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Dillon,

Montana.

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A TEXTBOOK

ON

ORNAMENTAL DESIGN

International Correspondence Schools
SCRANTON, PA.

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GEOMETRICAL DRAWING

FREEHAND DRAWING

HISTORIC ORNAMENT

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4900

PREFACE.

All the Instruction and Question Papers of our Orna-
mental Design Course are contained in two volumes and the
accompanying portfolio, in which will be found facsimiles
of all the drawing plates that the student is required to
execute. These volumes and portfolio together form a com-
prehensive treatise on the theory of ornamental design, and
can be used as a work of reference by the practical designer
in the solution of the numerous problems that confront him
in his every-day work.

The geometrical considerations that lie at the foundation
of all good designs, the proper understanding of historic
style and detail, the origin and influence of certain ele-
mentary forms, the practical considerations that govern the
final arrangement of all designs, and the influence of mate-
rial and the ultimate purpose are all dwelt upon in detail in
this volume, and practical examples of them are shown in
the accompanying portfolio of plates.

The method of numbering the pages, cuts, articles, etc.
is such that each paper and part is complete in itself; hence,
in order to make the indexes intelligible it is necessary to
give each paper and part a number. This number is placed
at the top of each page on the headline opposite the page
number; and to distinguish it from the page number it is
preceded by the printer's section mark (§). Consequently a
reference such as § 4, page 29, would be readily found as
follows: look along the inside edges of the headlines until
§ 4 is found, and then through § 4 until page 29 is found.

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PREFACE.

The Examination Questions are divided into sections, which have been given the same section numbers as the Instruction Papers to which they belong and are grouped together at the end of the volumes containing the Instruction Papers to which they refer. The papers on Geometrical Drawing, Freehand Drawing, and Historic Ornamental Drawing are not accompanied by Question Papers.

The portfolio contains copies of all the plates sent to students in this Course.

INTERNATIONAL CORRESPONDENCE SCHOOLS.

CONTENTS.

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GEOMETRICAL DRAWING.

INSTRUMENTS AND MATERIALS.

1. A **drawing** is a representation of objects on a plane surface by means of lines or lines and shades. When done by the use of free hand only, it is called **freehand drawing** or **sketching**; when instruments are used, so that greater exactness may be obtained, it is called **instrumental, or mechanical, drawing.**

2. All of the instruments and materials required for the courses in drawing are mentioned in the following descriptions:

The **drawing board** should be made of well-seasoned, straight-grained pine, the grain running lengthwise. For this course, the student will need a board of the following dimensions: length over all, $22\frac{1}{2}$ inches; width, $16\frac{1}{2}$ inches.

The drawing board illustrated in Fig. 1 is the one furnished in our students' drawing outfits and can be fully recommended as possessing the qualities a good and accurate board should have. It is made of several pieces of pine wood glued together to the required width of the board. A pair of hardwood cleats is screwed to the back of the board, the screws passing through the cleats in oblong slots with iron bushings, which allow the screws to move freely when drawn by the contraction and expansion of the board. Grooves are cut through half the thickness of the board over the entire back side. These grooves take the transverse resistance out of

§ 1

the wood and allow it to be controlled by the cleats, at the same time leaving the longitudinal strength nearly unimpaired. In order to provide a perfectly smooth working

FIG. 1.

edge, for the head of the **T** square to slide against, a strip of hard wood is let into the short edges of the board, and is sawed through in several places, in order to allow for the contraction and expansion of the board. The cleats also raise the board from the table, thus making it easier to
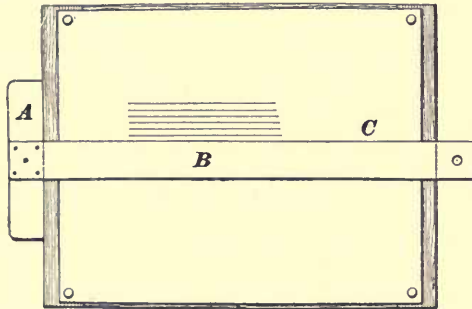
FIG. 2.

change the position of the board. When in use the board is placed so that one of the short edges is at the left of the draftsman, as shown in Fig. 2.

3. The **T square** is used for drawing horizontal straight lines. The head *A* is placed against the left-hand edge of the board, as shown in Fig. 2. The upper edge *C* of the blade *B* is brought very near to the point through which it is desired to pass a line, so that the straight edge *C* of the blade may be used as a guide for the pen or pencil. It is evident that all lines drawn in this manner will be parallel.

Vertical lines are drawn by means of triangles. The tri-
angles most generally used are shown in Figs. 3 and 4, each
of which has one right angle. The triangle shown in Fig. 3
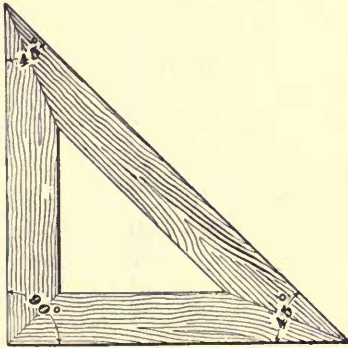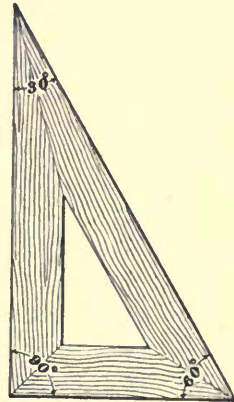
FIG. 3.   FIG. 4.

has two angles of 45° each, and that in Fig. 4 one of 60° and
one of 30°. They are called *45°* and *60° triangles*, respect-
ively. To draw a vertical line, place the **T** square in posi-
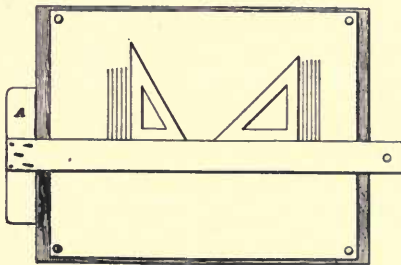
FIG. 5.

tion to draw a horizontal
line, and lay the triangle
against it, so as to form a
right angle. Hold both
T square and triangle
lightly with the left hand,
so as to keep them from
slipping, and draw the line
with the pen or pencil held
in the right hand, and

against the edge of the triangle. Fig. 5 shows the tri-
angles and **T** square in position.

4. For drawing parallel lines that are neither vertical nor
horizontal, the simplest and best way, when the lines are
near together, is to place one edge of a triangle, as *a b*,
Fig. 6, on the given line *c d*, and lay the other triangle, as *B*,

against one of the two edges, holding it fast with the left hand; then move the triangle A along the edge of B. The edge $a\,b$ will be parallel to the line $c\,d$; and when the edge $a\,b$ reaches the point g, through which it is desired to draw the parallel line, hold both triangles stationary with the left
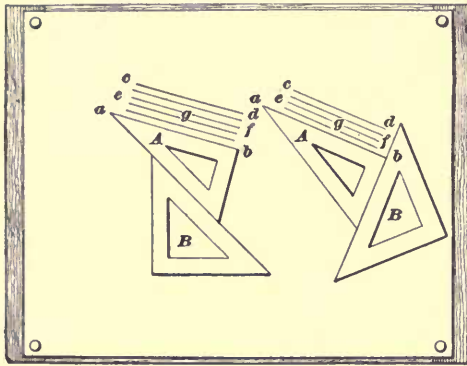
Fig. 6.

hand, and draw the line $e\,f$ by passing the pencil along the edge $a\,b$. Should the triangle A extend too far beyond the edge of the triangle B after a number of lines have been drawn, hold A stationary with the left hand and shift B along the edge of A with the right hand, and then proceed as before.

5. A line may be drawn at right angles to another line which is neither vertical nor horizontal, as illustrated in Fig. 7. Let $c\,d$ be the given line (shown at the left-hand side). Place one of the shorter edges, as $a\,b$, of the triangle B so that it will coincide with the line $c\,d$; then, keeping the triangle in this position, place the triangle A so that its long edge will come against the long edge of B. Now, holding A securely in place with the left hand, slide B along the edge of A with the right hand, when the lines $h\,i$, $m\,n$, etc. may be drawn perpendicular to $c\,d$ along the edge $b\,f$ of the triangle B. The dotted lines show the position of the triangle B when moved along the edge of A.

6. The right-hand portion of Fig. 7 shows another method of accomplishing the same result, and illustrates how the triangles may be used for drawing a rectangular figure, when the sides of the figure make an angle with the **T** square such that the latter cannot be used.

Let the side $c\,d$ of the figure be given. Place the *long* side of the triangle B so as to coincide with the line $c\,d$, and bring the triangle A into position against the lower side of B, as shown. Now, holding the triangle A in place with the left hand, revolve B so that its other
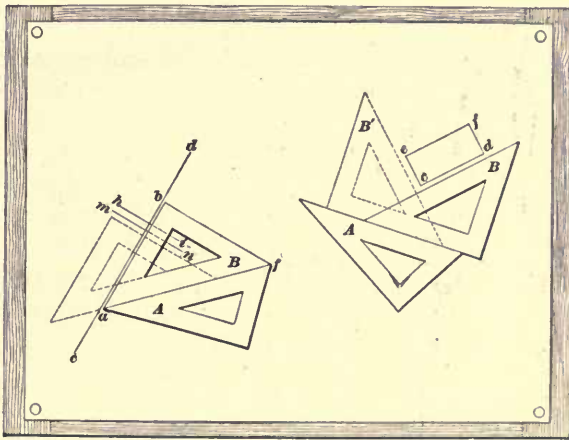
FIG. 7.

short edge will rest against the long edge of A, as shown in the dotted position at B'. The parallel lines $c\,e$ and $d\,f$ may now be drawn through the points c and d by sliding the triangle B on the triangle A, as described in connection with Fig. 6. Measure off the required width of the figure on the line $c\,e$, reverse the triangle B again to its original position, still holding the triangle A in a fixed position with the left hand, and slide B upon A until the long edge of B passes through e. Draw the line $e\,f$ through the point e, and $e\,f$ will be parallel to $c\,d$. The student should practice with his triangles before beginning drawing.

7. The **compasses,** next to the **T** square and triangles, are used more than any other instrument. A pencil and pen point are provided, as shown in Fig. 8, either of which may be inserted into a socket in one leg of the instrument, for the drawing of circles in pencil or ink. The other leg is fitted with a needle point, which acts as the center about which the circle is drawn. In all good instruments, the needle point itself is a separate piece of round steel wire, held in place in a socket provided at the end of the leg. The wire should have a square shoulder at its lower end, below which a fine, needle-like point projects. The *lengthening bar,* also shown in the figure, is used to extend the leg carrying the pen and the pencil points when circles of large radii are to be drawn.

The joint at the top of the compasses should hold the legs firmly in any position, and at the same time should permit their being opened or closed with one hand. The joint may be tightened or loosened by means of a screwdriver or wrench, which accompanies the compasses.
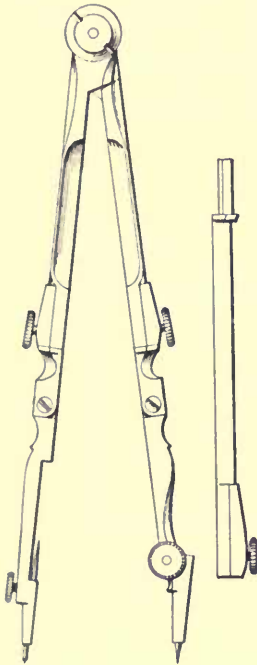
Fig. 8.

It will be noticed in Fig. 8 that each leg of the compasses is jointed; this is done so that the compass points may always be kept perpendicular to the paper when drawing circles, as in Fig. 11.

The style of compasses shown in Fig. 8 have what is called a *tongue joint,* in which the head of one leg has a tongue, generally of steel, which moves between two lugs on the other leg. Another common style of joint is the

pivot joint in which the head of each leg is shaped like a disk and the two disks are held together in a fork-shaped brace either by means of two pivot screws or by one screw penetrating both disks.   The brace that forms a part of this
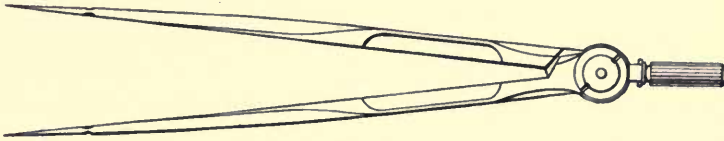
Fig. 9.

joint is generally provided with a handle, as the shape of the joint makes it rather awkward to hold the compasses by the head as is usual with instruments provided with tongue joints.   In Fig. 9 is shown a common style of pivot joint.

8.   The following suggestions for handling the compasses should be carefully observed by those who are beginning the subject of mechanical drawing.   Any draftsman who handles his instruments awkwardly will create a bad impression, no matter how good a workman he may be.   The tendency of
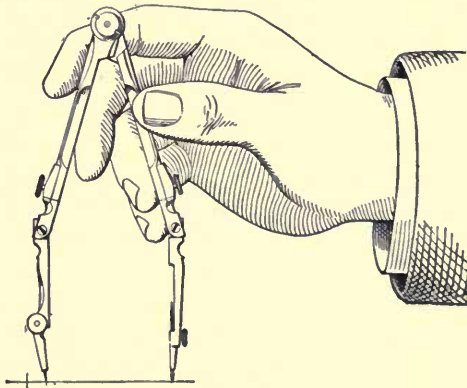
Fig. 10.

all beginners is to use both hands for operating the compasses.   This is to be avoided.   The student should learn at the start to open and close them with one hand, holding them as shown in Fig. 10, with the needle-point leg resting

between the thumb and fourth finger, and the other leg
between the middle and forefinger.   When drawing cir-
cles, hold the compasses lightly at the top between the
thumb and forefinger, or thumb, forefinger, and middle
finger, as in Fig. 11.   Another case where both hands
should not be used is in locating the needle point at a point
on the drawing about which the circle is to be drawn, unless
the left hand is used merely to steady the needle point.
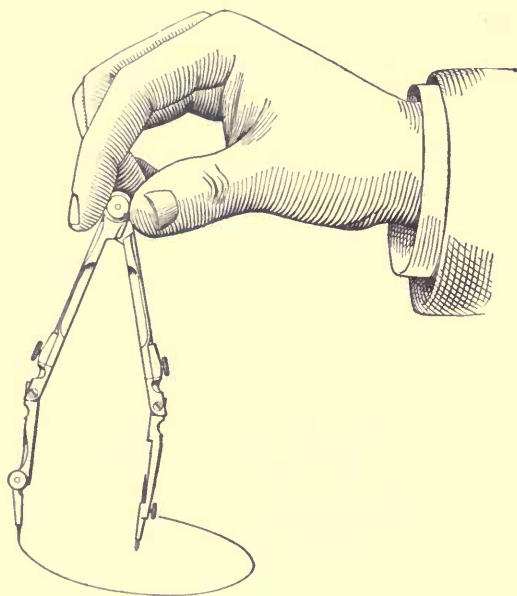
FIG. 11.

Hold the compasses as shown in Fig. 10, and incline them
until the under side of the hand rests upon the paper.   This
will steady the hand so that the needle point can be brought
to exactly the right place on the drawing.   Having placed
the needle at the desired point, and with it still resting
on the paper, the pen or pencil point may be moved out
or in to any desired radius, as indicated in Fig. 10.
When the lengthening bar is used, both hands must be
employed.

9.   The compasses must be handled in such a manner that the needle point will not dig large holes in the paper.   Keep the needle point adjusted so that it will be perpendicular to the paper, when drawing circles, and *do not bear upon it*.   A slight pressure will be necessary on the pen or pencil point, *but not on the needle point*.

10.   The **dividers**, shown in Figs. 9 and 12, are used for laying off distances upon a drawing, or for dividing straight lines or circles into parts.   The points of the dividers should be *very* sharp, so that they will not punch holes in the paper larger than is absolutely necessary to be seen.   Compasses are sometimes furnished with two steel divider points, besides the pen and pencil points, so that the instrument may be used either as compasses or dividers.   This is the kind illustrated in Fig. 12.   When using the dividers to
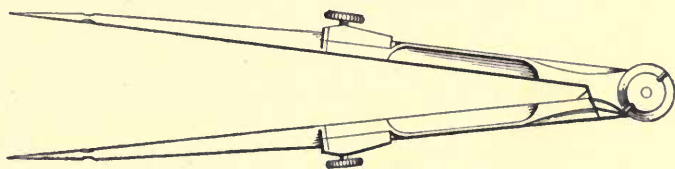
FIG. 12.

space a line or circle into a number of equal parts, hold them at the top between the thumb and forefinger, as when using the compasses, and step off the spaces, turning the instrument alternately to the right and left.   If the line or circle does not space exactly, vary the distance between the divider points and try again; so continue until it is spaced equally. When spacing in this manner, great care must be exercised not to press the divider points into the paper; for, if the points enter the paper, the spacing can never be accurately done.   The student should satisfy himself of the truth of this statement by actual trial.

11.   The **bow-pencil** and **bow-pen**, shown in Fig. 13, are convenient for describing small circles.   The two points of the instruments must be adjusted to the same length:

otherwise, very small circles cannot be drawn. To open or close either of these instruments, support it in a vertical position by resting the needle point on the paper and bearing slightly on the top of it with the forefinger of one hand, and turn the adjusting nut with the thumb and middle finger of the same hand.
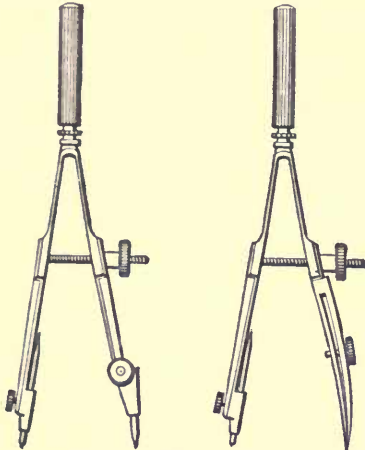
12. Drawing Paper and Pencils.—The drawing paper recommended for this series of lessons is the T. S. Co.'s cold-pressed demy, the size of which is $15'' \times 20''$. It takes ink well, and withstands considerable erasing. The paper is secured to the drawing board by means of **thumbtacks.**

Fig. 13.

Four are usually sufficient—one at each corner of the sheet (see Fig. 7). Place a piece of paper on the drawing board, and press a thumbtack through one of the corners about $\frac{1}{4}$ or $\frac{3}{8}$ of an inch from each edge. Place the **T** square in position for drawing a horizontal line, as before explained, and straighten the paper so that its upper edge will be parallel to the edge of the **T** square blade. Pull the corner diagonally opposite that in which the thumbtack was placed, so as to stretch the paper slightly, and push in another thumbtack. Do the same with the remaining two corners. For drawing in pencil, an HHHH pencil of any reputable make should be used.

_A_   Fig. 14.   _B_

The pencil should be sharpened as shown at _A_, Fig. 14.
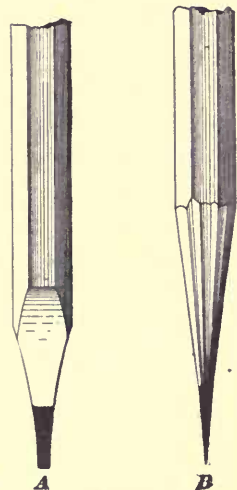
Cut the wood away so as to leave about ¼ or ⅜ of an inch of the lead projecting; then sharpen it flat by rubbing it against a fine file or a piece of fine emery cloth or sandpaper that has been fastened to a flat stick. Grind it to a sharp edge like a knife blade, and round the corners very slightly, as shown in the figure. If sharpened to a round point, as shown at *B*, the point will wear away very quickly and make broad lines; when so sharpened it is difficult to draw a line exactly through a point. The lead for the compasses should be sharpened in the same manner as the pencil, but should have its width narrower. *Be sure that the compass lead is so secured that, when circles are struck in either direction, but one line will be drawn with the same radius and center.*

13. Inking.—For drawing ink lines other than arcs of circles, the **ruling pen** (or *right-line pen*, as it is sometimes called) is used. It should be held as nearly perpen-
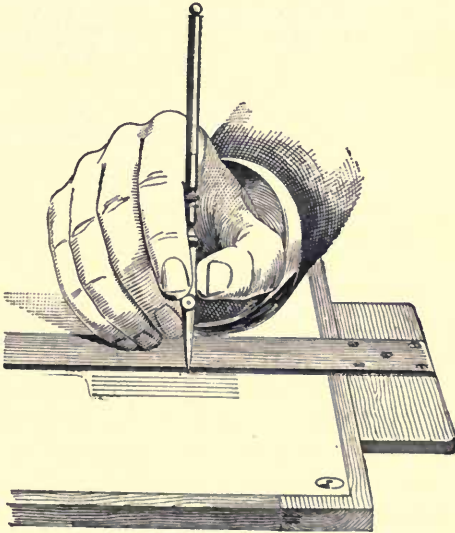
FIG. 15.

dicular to the board as possible, with the hand in the position shown in Figs. 15 and 16, bearing lightly against the **T** square

or triangle, along the edge of which the line is drawn. After a little practice, this position will become natural, and no difficulty will be experienced.

14. The beginner will find that it is not always easy to make smooth lines. If the pen is held so that only one blade bears on the paper when drawing, the line will almost invariably be ragged on the edge where the blade does not bear. When held at right angles to the paper, as in Fig. 16, how-
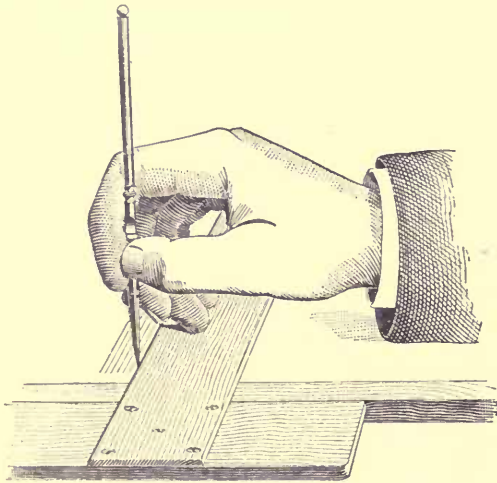
FIG. 16.

ever, both blades will rest on the paper, and if the pen is in good condition, smooth lines will result. The pen must not be pressed against the edge of the **T** square or triangle, as the blades will then close together, making the line uneven. The edge should serve as a guide, simply.

In drawing circles with the compass pen, the same care should be taken to keep the blades perpendicular to the paper by means of the adjustment at the joint. In both the ruling pen and compass pen, the width of the lines can be altered by means of the screw which holds the blades together. The handles of most ruling pens can be unscrewed and are provided with a needle point intended for use

when copying maps by pricking through the original and the underlying paper, thus locating a series of points through which the outline may be drawn.

15. Drawing Ink.—The ink we recommend for the work in this course is the T. S. Co.'s superior waterproof liquid India ink. A quill is attached to the cork of every bottle of this ink, by means of which the pen may be filled. Dip the quill into the ink, and then pass the end of it between the blades of the drawing pen. Do not put too much ink in the pen, not more than enough to fill it for a quarter of an inch along the blades, otherwise the ink is liable to drop. Many draftsmen prefer to use stick India ink; and, for some purposes, this is to be preferred to the prepared liquid ink recommended above. In case the stick ink is bought, put enough water in a shallow dish (a common individual butter plate will do) to make enough ink for the drawing, then place one end of the stick in the water, and grind by giving the stick a circular motion. Do not bear hard upon the stick. Test the ink occasionally to see if it is black. Draw a fine line with the pen, and hold the paper in a strong light. If it shows brown (or gray), grind a while longer, and test again. Keep grinding until a fine line shows *black*, which will usually take from fifteen minutes to half an hour, depending upon the quantity of water used. The ink should always be kept well covered with a flat plate of some kind, to keep out the dust and prevent evaporation. The drawing pen may be filled by dipping an ordinary writing pen into the ink and drawing it through the blades, as previously described when using the quill. If liquid ink is used, all the lines on all the drawings will be of the same color, and no time will be lost in grinding. If stick ink is used, it is poor economy to buy a cheap stick. A small stick of the best quality, costing, say, a dollar, will last as long, perhaps, as five dollars' worth of liquid ink. The only reason for using liquid ink is that all lines are then sure to be of equal blackness, and time is saved in grinding.

India ink will dry quickly on the drawing, which is

desirable, but it also causes trouble by drying between the blades and refusing to flow, especially when drawing fine lines. *The only remedy is to wipe out the pen frequently* with a cloth. Do not lay the pen down for any great length of time when it contains ink; wipe it out first. The ink may sometimes be started by moistening the end of the finger and touching it to the point, or by drawing a slip of paper between the ends of the blade. *Always keep the bottle corked.*

16. To Sharpen the Drawing Pen.—When the ruling, or compass, pen becomes badly worn, it must be sharpened. For this purpose a fine oilstone should be used. If an oil-stone is to be purchased, a small, flat, close-grained stone should be obtained, those having a triangular section being preferable, as the narrow edge can be used on the inside of the blades in case the latter are not made to swing apart so as to permit the use of a thicker edge.

The first step in sharpening is to screw the blades together, and, holding the pen perpendicular to the oilstone, to draw it back and forth over the stone, changing the slope of the pen from downward and to the right to downward and to the left for each movement of the pen to the right and left. The object of this is to bring the blades to exactly the same length and shape, and to round them nicely at the point.

This process, of course, makes the edges even duller than before. To sharpen, separate the points by means of the screw, and rub one of the blades to and from the operator in a straight line, giving the pen a slight twisting motion at the same time, and holding it at an angle of about 15° with the face of the stone. Repeat the process for the other blade. To be in good condition the edges should be fairly sharp and smooth, but not sharp enough to cut the paper. *All the sharpening must be done on the outside of the blades.* The inside of the blades should be rubbed on the stone only enough to remove any burr that may have been formed. Anything more than this will be likely to injure the pen. The whole operation must be done very carefully,

bearing on lightly, as it is easy to spoil a pen in the process. Examine the points frequently, and keep at work until the pen will draw both *fine* lines and *smooth* heavy lines.   Many draftsmen prefer to send the pens to be sharpened to the dealer who sold them and who is generally willing to do such sharpening at a trifling cost.

17.   Irregular Curves.—Curves other than arcs of circles are drawn with the pencil or ruling pen by means of curved or irregular-shaped rulers, called **irregular curves** (see Fig. 17).   A series of points is first determined through which the curved line is to pass.   The line is then drawn through these points by using such parts of the irregular curve as will pass through several of the points at once, the curve being shifted from time to time as required.

It is usually difficult to draw a smooth, continuous curve.   The tendency is to make it curve out too much between the points, thus giving it a wavy appearance, or else to cause it to change its direction abruptly where the different lines join, making angles at these points.   These defects may largely be avoided by always fitting the curve to at least three points, and, when moving it to a new position, by setting it so that it will coincide with part of the line already drawn.   It will be found to be a great help if the line be first sketched in freehand, in pencil.   It can then be penciled over neatly, or inked, without much difficulty, with the aid of

FIG. 17.

the irregular curve, since the original pencil line will show the general direction in which the curve should be drawn. Whenever the given points are far apart, or fall in such positions that the irregular curve cannot always be made to pass through three of them, the line must invariably be sketched in at first.

As an example, let it be required to draw a curved line through the points a, b, c, d, etc., Fig. 18. As just stated, a part of the irregular curve must be used which will pass through at least three points. With the curve set in the first position A, its edge is found to coincide with four points a, b, c, and d. The line may then be drawn from a around to d, or, better, to a point between c and d, since, by not con-

tinuing it quite to d, there is less liability of there being an angle where the next section joins on. For the next section of the line, the curve should be adjusted so as to coincide with a part of the section already drawn; that is, instead of adjusting it to points d, e, f, etc., it should be placed so as to pass through the point c, the part from c to d being coincident with the corresponding part of the first line drawn.
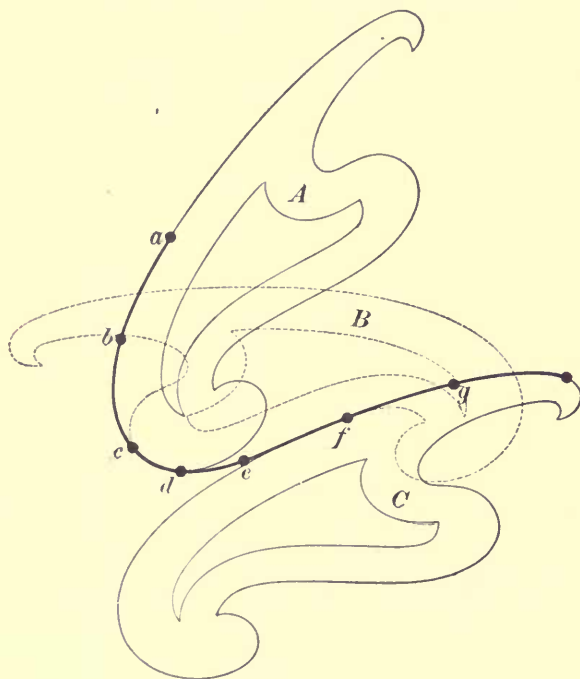
The irregular curve is shown dotted in this position at *B*. Its edge passes through four points *c*, *d*, *e*, and *f*, and the line should be made to stop midway between the last two, as before.

Now, it will be noticed that the points *f* and *g* are so situated that the remainder of the line must curve up, instead of down, as heretofore, the change in curvature occurring at a point between *e* and *f*. In this case, therefore, it is not necessary for the curve to extend back to *e*, through which point the line has already been drawn, but it may be placed in position *C* with its edge just tangent to the line at the point where the curvature changes.

It is to be noticed that in inking with the irregular curve, the blades of the pen must be kept tangent to its edge (i. e., the inside flat surface of the blades must have the same direction as the curve at the point where the pen touches the paper), which requires that the direction of the pen be continually changed.

18.   The scale is used for obtaining measurements for drawings.   The most convenient forms are the usual flat and triangular boxwood scales, having beveled edges, each of which is graduated for a distance of 12 inches.   The beveled edges serve to bring the lines of division close to the paper when the scale is lying flat, so that the drawing may be accurately measured, or distances laid off correctly.   The use of the graduations on scales will be explained when it is necessary to use the scale.   ·

19.   A protractor is shown in Fig. 19.   The outer edge is a semicircle, with center at *O*, and is divided into 360 parts.   Each division is one-half of one degree, and, for convenience, the degrees are numbered from 0° to 180° from both *A* and *B*.   The protractor is used for laying off or measuring angles.   Protractors are often made of metal, in which case the central part is cut away to make the drawing under it visible.   When using the protractor, it must be placed so that the line *O B*, Fig. 19, will coincide with the

line forming one side of the angle to be laid off or measured, and the center O must be at the vertex of the angle.
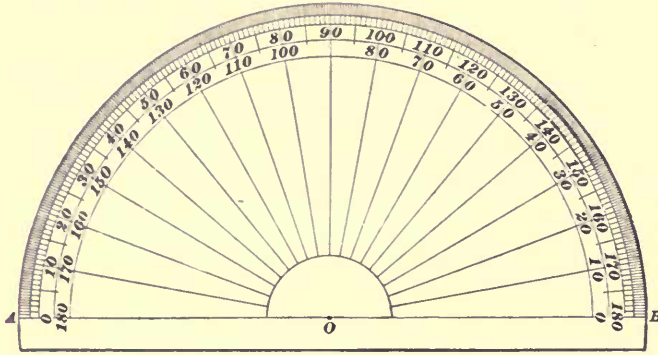
FIG. 19.

For example, let it be required to draw a line through the point C, making an angle of 54° with the line EF, Fig. 20. Place the protractor upon the line EF, as just described, with the center O upon the point C.   With a sharp-pointed pencil, make a mark on the paper at the 54° division, as indicated at D.   A line drawn through C and D will then make an angle of 54° with EF.   Greater exactness will be secured
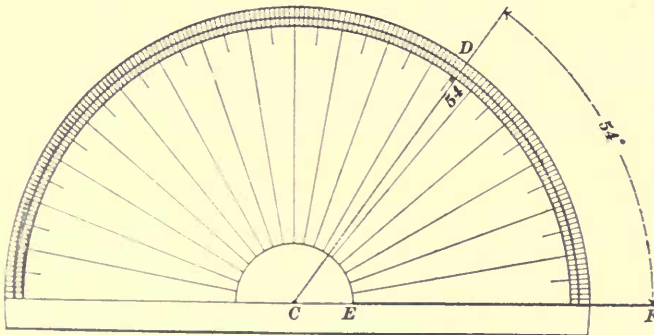
FIG. 20.

if the line EF be extended to the left, so that both zero marks (A and B, Fig. 19) can be placed on the line.   This should always be done when possible.

LETTERING.

20. In mechanical drawing, all headings, explanatory matter, and dimensions should be neatly printed on the drawing. Ordinary script writing is not permissible.

It is usually difficult for beginners to letter well, and unless the student is skilful at it, he should devote some time to practicing lettering before commencing the drawing. In correcting the plates, the lettering will be considered as well as the drawing. Many students think that it is only necessary to exercise special care when drawing the views on a plate, and that it is not necessary to take particular pains in lettering. This, however, is not the case, for, no matter how well the views may be drawn, if the lettering is poorly done, the finished drawing will not have a neat appearance. In fact, generally speaking, more time is required to make well-executed letters than to make well-executed drawings of objects. We earnestly request the student to practice lettering, and not to think that that part of the work is of no importance. The student should not be too hasty in doing the lettering. It takes an experienced draftsman considerable time to do good lettering, and no draftsman can perform this work as quickly as he can ordinary writing; therefore, no beginner should attempt to do what experienced draftsmen cannot do. In order to letter well, the work must be done slowly. Very frequently more time is spent in lettering a drawing than in inking in the objects represented. Instructions will be given in two styles of freehand lettering, both extensively used in American drafting rooms.

With the exception of the large headings or titles of the plates, the style and size of all lettering used on the original

ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz &
1234567890 1234567890 2″-6¼″dia.Cast Iron

<div align="center">Fig. 21.</div>

drawing plates of this course are shown in Fig. 21. This style, although a little more elaborate and difficult in execution, was selected on account of its greater neatness and

legibleness. The two styles are very similar in the forma-
tion of the letters, and although the student is advised to
select and use only one of the two on his drawings in this
course, he will find, after having mastered one of the styles,
little difficulty in practicing the other.

When lettering, a Gillott's No. 303 pen should be used.
The height of the capital letters should be $\frac{3}{32}''$, and of the
small letters two-thirds of this, or $\frac{1}{16}''$. This applies to
both styles of freehand lettering. *Do not make them
larger than this.*

21. Before beginning to letter, horizontal guide lines
should be drawn with the T square, to serve as a guide for
the tops and bottoms of the letters (see Fig. 22). The out-
side lines should be $\frac{3}{32}''$ apart for the capitals, and the two
lower lines $\frac{1}{16}''$ apart for the small letters. The letters
should be made to extend fully up to the top and down to

FIG. 22.

the bottom guide lines. They
must not fall short of the guide
lines, nor extend beyond them.

Failure to observe this point will cause the lettering to look
ragged, as in the second word in Fig. 22.

22. It is very important that all the letters have the
same inclination. For example,
by referring to Fig. 23 (a), it
will be seen that the backs of

FIG. 23 (a).

letters like *B*, *E*, *l*, *g*, *d*, *i*, *t*, etc. are parallel and slant

the same way. This
is also true of both
sides of letters like
H, *M*, *n*, *u*, *h*, *y*, etc.
To aid in keeping the
slant uniform, draw
parallel slanting lines
across the guide lines
with the 60° triangle,

as in Fig. 23 (b), and, in lettering, make the backs or sides
of the letters parallel with these lines.
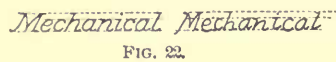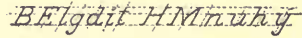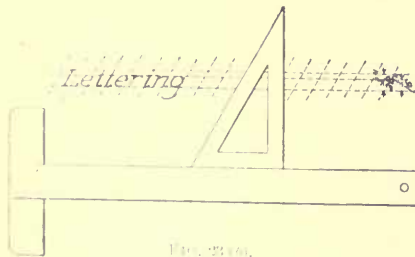
23. A few points regarding the construction of the letters are illustrated in Fig. 24, in which the letters are shown upon an enlarged scale. The capital letters A, V, Y, M, and W must be printed so that their general inclination will be the same as for the other letters. To print the A, draw the center line $a\,d$, having the common slant; from
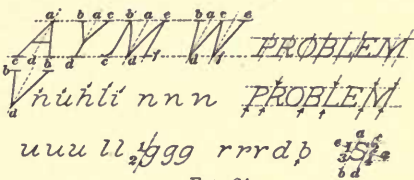
FIG. 24.

a draw the sides $a\,c$ and $a\,b$, so that points c and b will each be $\frac{3}{64}''$ distant from point d. The side $a\,b$ will be nearly perpendicular to the guide lines. The V is like an inverted A, and is drawn in the same way, the line $b\,d$ being nearly perpendicular.

To make the Y, draw the center line $a\,d$, having the common slant, which gives the slant for the base of the letter. The upper part of the Y begins a little below its center, and is similar to the V, though somewhat narrower, as the letter should be only $\frac{5}{64}''$ wide at the top. Points b and c should be at equal distances from point a.

The two sides $b\,c$ and $e\,f$ of the M are parallel, and have the common slant. The M is made as broad as it is high, or $\frac{3}{32}''$. Having drawn the two sides, mark the point d, midway between the points c and f, and connect it with points b and e. The lines $b\,d$ and $e\,d$ should be slightly curved, as shown.

In the W the two outside lines are not parallel, as in the M, but are farther apart at the top than at the bottom. Draw the line $a\,d$, having the common slant. Mark points b and c, which are exactly $\frac{1}{32}''$ from the point a. From b and c draw lines $b\,d$ and $c\,d$. The other half of the W is like the first part, $c\,f$ being parallel to $b\,d$ and $e\,f$ parallel to $c\,d$. It will be seen that the W is composed of two narrow V's, each $\frac{1}{16}''$ wide, the width of the whole letter being $\frac{1}{8}''$.

24. Capital letters like P, R, B, L, E, etc. should be printed so that their top and bottom lines will be *exactly*

horizontal. This is illustrated in the two examples of the word *problem* in Fig. 24. In the first example, it will be noticed that the tops of the *P* and *R*, the bottom of the *L*, and the tops and bottoms of the *B* and *E*, all run in the same direction as the guide lines, and coincide with them. In the second example, these lines are not horizontal, which makes the word look very uneven. It is also to be noticed that these lines extend beyond the upright lines in the first word, and that cross-lines are used on the bottom of the *P* and *R*, on the top of the *L*, and on the *M*. In the second word, these lines are omitted at the points indicated by the arrows. These features are found on most of the other capitals.

The small letters *n*, *u*, *h*, *l*, *i*, etc. should have sharp corners at the points indicated by the arrows in Fig. 24. They look much better that way, and are less difficult to make, than when they have round corners. Following these letters are five groups of letters containing *n*, *u*, *l*, *g*, and *r*. The first letter of each group is printed correctly, while the letters following show ways in which they should *not* be printed. In the case of the *g*, point *2* should fall in a slanting direction under point *1*, the slant being the same as *a d* of the preceding letters. The difference between *d* and *b* and the construction of the *s* are also shown in the same figure. The *b* should be made rounding at the point indicated. As a guide in making the *s*, draw the two lines *a b* and *c d*, having the common slant. The *s* should now be drawn so that it will touch these lines at points *1*, *3*, and *4*, but *not* at point *2*. It will be an additional help if the line *e x* is also drawn as a guide for the middle portion of the *s*; but care should be taken not to have it slant more than shown in the copy.

The letters *a*, *o*, *b*, *g*, etc. should be full and round; do not cramp them. It will be necessary to follow the copy closely until familiar with it. Notice that the figures are not made as in writing, particularly the *6*, *4*, *8*, and *9* (see Fig. 21). Try to space the letters evenly. Letter in pencil first, and, if not right, erase and try again.

25. Another style of freehand lettering is shown in Fig. 25. This style is extensively used for the lettering of working drawings. It is more easily and rapidly

ABCDEFGHIJKLMNOPQRSTUVWXYZ.

abcdefghijklmnopqrstuvwxyz &

1234567891O 1234567890 2-6¼" dia. Cast Iron.

FIG. 25.

made than the style previously described, and although not productive of as high degree of neatness in appearance will be found very useful and acceptable for general office work.

A comparison between the two systems will disclose a great similarity in the detail formation of the letters.

26. The horizontal and slanting guide lines are drawn exactly in the same manner as for the style previously described, and if

Horizontal   Horizontal

FIG. 26.

not followed the results will be similar. See the uneven appearance of the second word in Fig. 26.

27. By studying the formation of the letters carefully, it will be found that many of them are formed on the same principle, as shown in Fig. 27. The ovals of the letters a, b, d, g, p, and q are formed exactly alike and have a slant of 45° with the horizontal. These ovals should be made a little wider at the top than at the bottom. Care should be taken that the straight downward strokes are made parallel to the slanting guide lines. The letters c and e are commenced in the same way, but the upper loop in e should

abdpqo

c e

rnmh

wvy

til jf

FIG. 27.

be formed in such a manner that its axis will be at an angle

of 45° with the horizontal. The r is made by having the down stroke parallel to the slanting guide line and the up stroke slightly curved in the same way as in the letter n (see Fig. 27). The strokes in the letters j and f are the same, with the position of the hooked part reversed.

28. The capital letters shown in Fig. 28 are formed very nearly in the same manner as those shown in Art. **23,**

$$A \ Y \ M \ W$$

$$V \ PROBLEM$$

FIG. 28.

but differ slightly by omitting the short spurs that give to the letters a more finished appearance.

In the capital M, however, there is a decided variation. The M is made with four strokes, putting in the parallel sides first. The two other strokes should join midway between these sides and at a distance from the top of about $\frac{4}{5}$ of the height of the letter. These strokes, as will be seen, are straight and not curved.

29. The *numerals* should be $\frac{5}{32}$" high and of the style shown in Fig. 25; fractions should be $\frac{1}{8}$" high over all. In

$$1 \ 2 \ 3 \ 4 \ 5 \ 6 \ 7 \ 8 \ 9 \ 0$$

FIG. 29.

Fig. 29 the numerals are illustrated to a larger scale, and a comparison with the style shown in Fig. 21 will disclose several variations.

The loops of the *2*, *3*, *5*, *6*, and *9* should be formed so that their axes will be at an angle of 45° with the horizontal. It will be noted that the *7* differs widely from the style shown in Fig. 21, the down stroke not curving but having a straight slant of 45°. The axis of the *0* and the loops of the *8* should slant at an angle of 60°.

Diligent practice for a short time and careful observation of the forms of letters and numerals as shown in Figs. 21–29 will soon enable the student to acquire skill and speed in this branch of drawing.

30. The alphabet shown in Fig. 30, called the **block letter,** is to be used for the large headings or titles of plates, as shown on the copy plates. This alphabet is *not* to be used on the first five geometrical drawing plates. The letters and figures are to be made $\frac{5}{16}''$ high and $\frac{1}{4}''$ wide, except *M*, which is $\frac{5}{16}''$ wide, and *W*, which is $\frac{3}{8}''$ wide. The thickness of all

A B C D E F G H I J

K L M N O P Q R S

T U V W X Y Z & ,"

1 2 3 4 5 6 7 8 9 0

FIG. 30.

the lines forming the letters is $\frac{1}{16}''$, measured horizontally. The distance between any two letters of a word is $\frac{1}{16}''$, except where *A* follows *P* or *F*; where *V*, *W*, or *Y* follows *L*; where *J* follows *F*, *P*, *T*, *V*, *W*, or *Y*; where *T* and *A* are adjacent, or *A* and *V*, *W*, or *Y* are adjacent; in this case, the bottom extremity of *A* and the top extremity of *P*, *T*, *V*, *W* are in the same vertical line, etc.

31. Since these letters are composed of straight lines, they can be made with the **T** square and triangle. In lettering the title of the drawing plates, the student should draw six horizontal lines $\frac{1}{16}''$ apart in lead pencil, to represent the thickness of the letters at the top, center, and bottom; then, by use of the triangle, he should draw in the width of the letters and the spaces between them in lead pencil. Having the

letters all laid out, he can very easily ink them in.   Use the
ruling pen for inking in the straight outlines of the letters,
and the lettering pen for rounding the corners and filling in
between the outlines.   It is well to ink in all the perpen-
dicular lines first, next the horizontal lines, and then the
oblique lines.

PLATES.

32.   Preliminary Directions.—The size of each plate
over all will be $14'' \times 18''$, having a border line $\frac{1}{2}''$ from each
edge all around, thus making the size of the space on which
the drawing is to be made $13'' \times 17''$.   The sheet itself must
be larger than this when first placed upon the board, so that
the thumbtack holes may be cut out; the extra margin is
also very convenient for testing the pen, in order to see
whether the ink is flowing well and whether the lines are of
the proper thickness.

The first five plates will consist of practical geometrical
problems which constantly arise in practice when making
drawings.   The method of solving every one of these
problems should be carefully memorized, so that they
can be instantly applied when the occasion requires,
without being obliged to refer to the text for help.
Particular attention should be paid to the lettering.
Whenever any dimensions are specified, they should be
laid off as accurately as possible.   All drawings should
be made as neat as possible, and the penciling entirely
finished before inking in any part of it.   Great care
should be taken in distributing the different views, parts,
details, etc. on the drawing, so that when the drawing
is completed, one view will not be so near to another
as to mar the appearance of the drawing.   The hands
should be perfectly clean, and should not touch the paper
except when necessary.   No lines should be erased except
when *absolutely* necessary; for, whenever a line has once
been erased, the dirt flying around in the air and con-
stantly falling on the drawing will stick to any spot where an
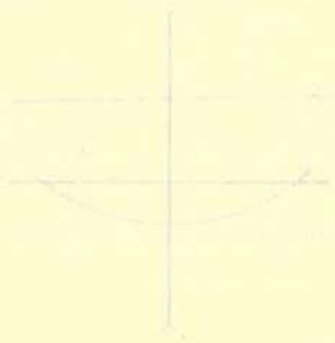
PROBLEM 1: To bisect a straight line.

PROBLEM 2: To draw a
CA.
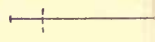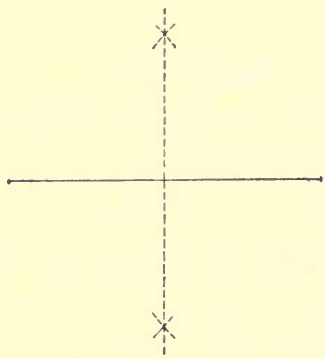
PROBLEM 3: To draw a perpendicular to a straight line from a point withou
CASE 1.   CASE
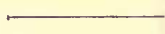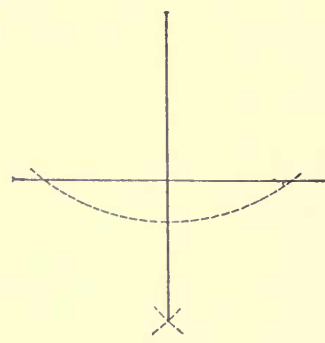
MARCH 29, 1901

cular to a straight line from a given point in that line.

CASE II.
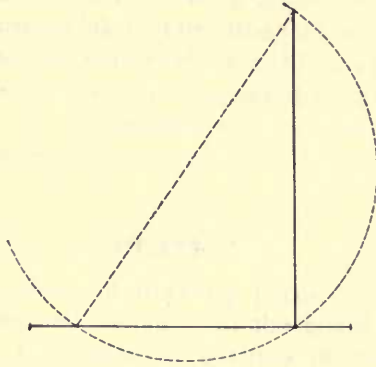
PROBLEM 4: Through a given point to draw
a straight line parallel to a given straight line.
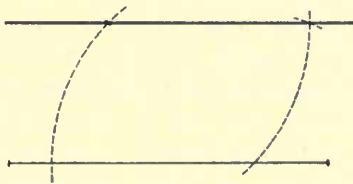
JOHN SMITH, CLASS Nº 4529.

erasure has been made, and it is then very difficult, if not impossible, to entirely remove it.   For this reason, all construction lines that are to be removed, or that are liable to be changed, should be drawn lightly, that the finish of the paper may not be destroyed when erasing them.   When it is found necessary to erase an ink blot or a line that has been inked in, only an *ink eraser* or *sand rubber* should be used.   After the erasure has been made, the roughened part of the surface of the paper can be smoothed by rubbing with some hard, smooth substance, as a piece of ivory or the handle of a knife.

PLATE I.

33.   Take a sheet of drawing paper 15″ wide and 20″ long (demy size), and fasten it to the board as previously described.   On this draw the outlines of the size of the plate, $14″ \times 18″$, and draw the border line all around $\frac{1}{2}″$ from the edge of the outline, leaving the space inside for the drawing $13″ \times 17″$.   When the word *drawing* is used hereafter, it refers only to the space inside the border lines and the objects drawn upon it.   To understand clearly what follows, refer to Plate I.   Divide the drawing into two equal parts by means of a faint horizontal line.   This line is shown dotted in Plate I, above referred to.   Divide each of these halves into three equal parts, as shown by the dotted lines; this divides the drawing into six rectangular spaces.   *These division lines are not to be inked in, but must be erased when the plate is completed.*   On the first five plates, space for the lettering must be taken into account.   For each of the six equal spaces, the lettering will take up one or two lines.   The height of all capital letters on these plates will be $\frac{3}{32}″$, and of the small letters $\frac{2}{3}$ of this, or $\frac{1}{16}″$.   The distance between any two lines of lettering will also be $\frac{3}{32}″$.   The distance between the tops of the letters on the first line of lettering and the top line of the equal divisions of the drawing is to be $\frac{1}{2}″$; and the space between the bottoms of the letters and the topmost point of the figure represented on the

drawing within one of these six divisions must also be not less than $\frac{1}{2}''$. This makes a very neat arrangement, if the figure is so placed that the outermost points of the bounding lines are equally distant from the sides of one of the equal rectangular spaces. Consequently, if there is one line of lettering, no point of the figure drawn should come nearer than $\frac{1}{2}'' + \frac{3}{32}'' + \frac{1}{2}'' = 1\frac{3}{32}''$ to the top line of the space within which it is represented; or, if there are two lines of lettering, nearer than $\frac{1}{2}'' + \frac{3}{32}'' + \frac{3}{32}'' + \frac{3}{32}'' + \frac{1}{2}'' = 1\frac{9}{32}''$. The letter heading for each figure on the first five plates will be printed in heavy-faced type at the beginning of the directions explaining each problem. The student must judge for himself by the length of the heading whether it will take up one line or two, and make due allowance for the space it takes up. This is a necessary precaution, because the lettering should never be done until the rest of the drawing is entirely finished and inked in.

PROBLEM 1.—**To bisect a straight line.**

See Fig. 31; also 1 of Plate I.

CONSTRUCTION.—Draw a straight line $A\,B$, $3\frac{1}{2}''$ long. With one extremity A as a center, and a radius greater than one-half of the length of the line, describe an arc of a circle on each side of the given line; with the other extremity B as a center, and the same radius, describe arcs intersecting the first two in the points C and D. Join C and D by the line $C\,D$, and the point P, where it intersects $A\,B$, will be the
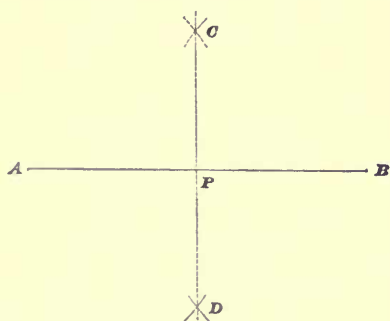
FIG. 31.

required point; that is, $A\,P = P\,B$, and P is the middle point of $A\,B$. Since $C\,D$ is perpendicular to $A\,B$, this construction also gives a *perpendicular to a straight line at its middle point.*

PROBLEM 2.—To draw a perpendicular to a straight line from a given point in that line.

NOTE.—As there are two cases of this problem, requiring two figures on the plate, the line of letters will be run clear across both figures, as shown in Plate I.

Case I.—*When the point is at or near the center of the line.* See Fig. 32; also 2, Case I, of Plate I.

CONSTRUCTION. — Draw
$A\,B$ $3\frac{1}{2}''$ long. Let P
be the given point. With
P as a center, and any
radius, as $P\,D$, describe
two short arcs cutting
$A\,B$ in the points C and D.
With C and D as cen-
ters, and any convenient

FIG. 32.

radius greater than $P\,D$, describe two arcs intersecting
in E. Draw $P\,E$, and it will be perpendicular to $A\,B$
at the point P.
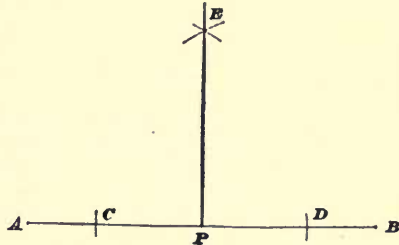
Case II.—*When the point is near the end of the line.* See
Fig. 33; also 2, Case II, of
Plate I.
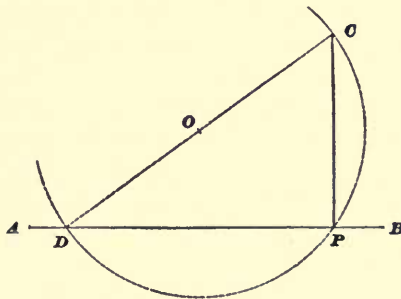
FIG. 33.

Draw $A\,B$ $3\frac{1}{2}''$ long.
Take the given point P
about $\frac{3}{8}''$ from the end of
the line. With any point
O as a center, and a radius
$O\,P$, describe an arc cut-
ting $A\,B$ in P and D.
Draw $D\,O$, and prolong it
until it intersects the arc
in the point C. A line drawn through C and P will be per-
pendicular to $A\,B$ at the point P.

PROBLEM 3.—To draw a perpendicular to a straight line from a point without it.

As in Problem 2, there are two cases.

Case I.—*When the point lies nearly over the center of the line.* See Fig. 34; also 3, Case I, of Plate I.
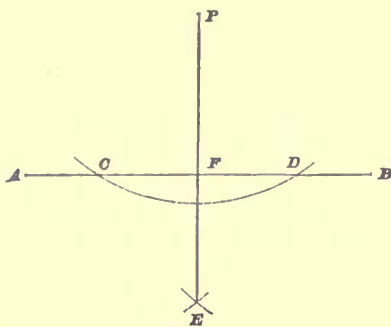
FIG. 34.

CONSTRUCTION.—Draw $A B$ $3\frac{1}{2}''$ long. Let P be the given point. With P as a center, and any radius $P D$ greater than the distance from P to $A B$, describe an arc cutting $A B$ in C and D. With C and D as centers, and any convenient radius, describe short arcs intersecting in E. A line drawn through P and E will be perpendicular to $A B$ at F.

Case II.—*When the point lies nearly over one end of the line.* See Fig. 35; also 3, Case II, of Plate I.

Draw $A B$ $3\frac{1}{2}''$ long, and let P be the given point. With any point C on the line $A B$ as a center, and the distance $C P$ as a radius, describe an arc $P E D$ cutting $A B$ in E. With E as a center, and the distance $E P$ as a radius, describe an arc cutting the arc $P E D$ in D.
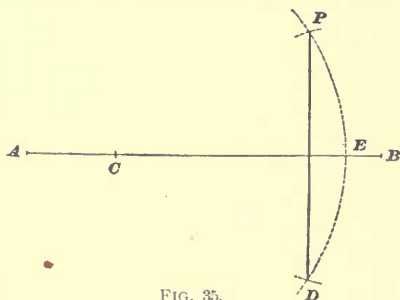
FIG. 35.

The line joining the points P and D will be perpendicular to $A B$.

PROBLEM 4.—**Through a given point, to draw a straight line parallel to a given straight line.**

See Fig. 36; also 4 of Plate I.

CONSTRUCTION.—Let P be the given point, and $A B$ the given straight line $3\frac{1}{2}''$ long. With P as a center, and any
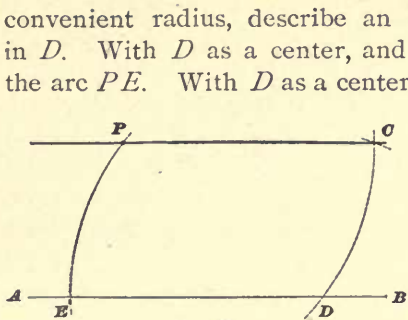
convenient radius, describe an arc CD intersecting AB in D. With D as a center, and the same radius, describe the arc PE. With D as a center, and a radius equal to the chord of the arc PE, describe an arc intersecting CD in C. A straight line drawn through P and C will be parallel to AB.

FIG. 36.

34. These four problems form Plate I. They should be carefully and accurately drawn in with lead-pencil lines and then inked in. It will be noticed that on Plate I, and Figs. 31 to 36, the given lines are *light*, the required lines *heavy*, and the construction lines, which, in a practical working drawing, would be left out, are *light dotted*. This system must also be followed in the four plates which are to follow. A single glance enables one to see at once the reason for drawing the figure, and the eye is directed immediately to the required line.

In the first five plates, accuracy and neatness are the main things to be looked out for. The student should be certain that the lines are of *precisely* the length that is specified in the description. When drawing a line through two points, be sure that the line goes through the points; if it does not pass exactly through the points, erase it and draw it over again. If a line is supposed to end at some particular point, make it end there—do not let it extend beyond or fall short. Thus, in Fig. 36, if the line PC does not pass through the points P and C, it is not parallel to AB. By paying careful attention to these points, the student saves himself a great deal of trouble in the future. *Do not hurry your work.*

First ink in all of the light lines and light dotted lines (which have the same thickness); then ink in the heavy required lines after the pen has been readjusted. Now do the lettering (first read carefully the paragraphs under the head " Lettering "), and finally draw the heavy border lines, which

should be thicker than any other line on the drawing. The word " Plate " and its number should be printed at the top of the sheet, outside the border lines, and midway of its length, as shown. The student's name, followed by the words " Class " and " No.," and after this his course letter and *class number* should be printed in the lower right-hand corner below the border line, as shown. Thus, John Smith, Class No. C 4529. The date on which the drawing was completed should be placed in the lower left-hand corner, below the border line. *All of this lettering is to be in capitals $\frac{3}{32}''$ high.* Erase the division lines, and clean the drawing by rubbing very gently with the eraser. Care must be exercised when doing this, or the inked lines will also be erased. It is best to use a so-called " Sponge Rubber " for this purpose, as it will not injure the inked lines. *If any part of a line has been erased or weakened, it must be redrawn.* Then write with the lead pencil your name and address in full on the back of your drawing, after which put your drawing in the empty tube which was sent you, and send it to the Schools.

HINTS FOR PLATE I.

35. *Do not forget to make a distinction between the width of the given and required lines, nor forget to make the construction lines dotted.*

When drawing dotted lines, take pains to have the dots and spaces uniform in length. Make the dots about $\frac{1}{16}''$ long and the spaces only about one-third the length of the dots.

Try to get the work accurate. The constructions must be accurate, and all lines or figures should be drawn of the length or size previously stated. To this end, work carefully and keep the pencil leads very sharp, so that the lines will be fine.

The lettering on the first few plates, as well as on the succeeding plates, is fully as important as the drawing, and should be done in the neatest possible manner. Drawings sent

in for correction with the lettering omitted will be returned for completion.

The reference letters like A, B, C, etc., as shown in Fig. 31, are not to be put on the plates.

Do not neglect to trim the plates to the required size. Do not punch large holes in the paper with the dividers or compasses. Remember that the division lines are to be erased— not inked in.

PLATE II.

36. Draw the division lines in the same manner as described for Plate I. The following five problems, Nos. 5 to 9, inclusive, are to be drawn in regular order, as was done in Plate I, with problems from 1 to 4. The letter headings are given in heavy-faced type after the problem number.

PROBLEM 5.—**To bisect a given angle.***

Case I.—*When the sides intersect within the limits of the drawing.* See Fig. 37.

CONSTRUCTION.—Let $A O B$ be the angle to be bisected. Draw the sides $O A$ and $O B$ $3\frac{1}{2}''$ long. With the vertex O as a center, and any convenient radius, describe an arc $D E$ intersecting $O A$ at D and $O B$ at E. With D and E as centers, and a radius
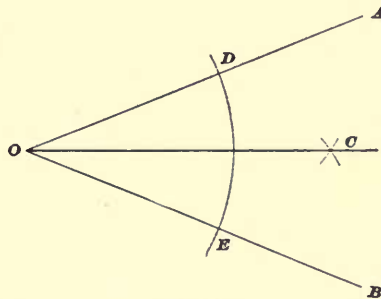
FIG. 37.

greater than the chord of half the arc $D E$, describe two arcs intersecting at C. The line drawn through C and O will bisect the angle; that is, $A O C = C O B$.

---

* Since the letter heading in this problem is very short, it will be better to place it over each of the two cases separately, instead of running it over the division line, as was done with the long headings of the two cases in Plate I. Put Case I and Case II under the heading, as in the previous plate.

Case II.—*When the sides do not intersect within the limits of the drawing.* See Fig. 38.

Draw two lines, *A B* and *C D*, each $3\frac{1}{2}''$ long, and inclined towards each other as shown. With any point *E* on *C D* as a center, and any convenient radius, describe arc *F I G H*; with *G* as a center and same radius, describe arc *H L E F*, intersecting *F I G H* in *H* and *F*. With *L* as a center, and same radius, describe arc *K G J*; with *I* as a center, and same radius, describe arc *J E K*, intersecting *K G J* in *K* and *J*. Draw *H F* and *J K*; they intersect at *O*, a point on the bisecting line. With *O* as a center, and the
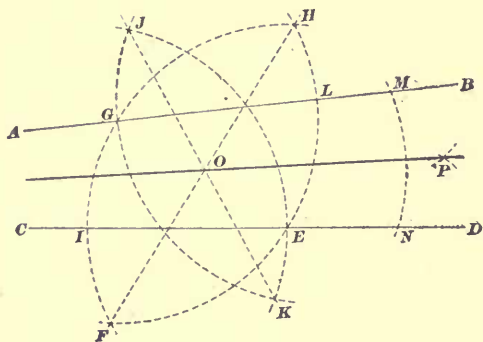
FIG. 38.

same or any convenient radius, describe an arc intersecting *A B* and *C D* in *M* and *N*. With *M* and *N* as centers, and any radius greater than one-half *M N*, describe arcs intersecting at *P*. A line drawn through *O* and *P* is the required bisecting line.

PROBLEM 6.—**To divide a given straight line into any required number of equal parts.**

See Fig. 39 (*a*).

CONSTRUCTION.—*A B* is the given line $3\frac{7}{16}''$ long. It is required to divide it into eight equal parts. Through one extremity *A* of the line, draw an indefinite straight line *A C*, making any angle with *A B*. Set the dividers to any

convenient distance, and space off eight equal divisions on
$A\,C$, as $A\,K$, $K\,I$, $I\,H$, etc.   Join C and B by the straight
line $C\,B$, and through the points D, E, F, G, etc. draw
lines $D\,L$, $E\,M$, etc. parallel
to $C\,B$, by using the two
triangles; these parallels in-
tersect $A\,B$ in the points
L, M, N, etc., which are
equally distant apart. The
spaces $L\,M$, $M\,N$, $N\,O$, etc.
are each equal to $\frac{1}{8}\,A\,B$.
Proceed in a similar way

FIG. 39 (*a*).

for any number of equal parts into which $A\,B$ is to be
divided.
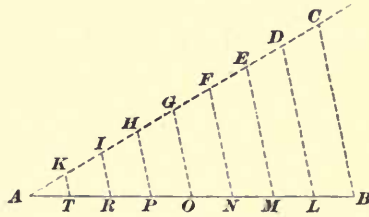
An important modification of the method just described
is shown in Fig. 39 (*b*).   Draw $A\,B$ as before, and erect
the perpendicular $B\,C$.   Now divide $3\frac{7}{16}''$, the length of

FIG. 39 (*b*).

$A\,B$, by 8, the number
denoting the number of
equal parts into which $A\,B$
is to be divided, obtaining
$3\frac{7}{16}'' \div 8 = \frac{3}{8}'' + \frac{7}{128}''$, divi-
ding the whole number and
the fraction separately. Now
considering $\frac{3}{8}'' + \frac{7}{128}''$ to be
approximately equal to $\frac{1}{2}''$,
multiply $\frac{1}{2}''$ by 8, the number of parts into which $A\,B$
is to be divided; the result is $\frac{1}{2}'' \times 8 = 4''$, which is the
length of $A\,C$.   With A as a center and a radius equal
to $4''$ describe an arc cutting $B\,C$ in C, and draw $A\,C$.
Then with a scale lay off $A\,K = K\,I =$ etc. $= \frac{1}{2}''$, and
project K, I, H, etc. upon $A\,B$, in T, R, P, etc., the
required points.   The advantage of this method over the
other is that the **T** square and triangle can be used through-
out, thus making it very much easier to draw the parallels
$D\,L$, $E\,M$, etc.

The student, when drawing this plate, is at liberty to use
either of the two methods given in this problem.

PROBLEM 7.—**To draw a straight line through any given point on a given straight line to make any required angle with that line.**

CONSTRUCTION.—In Fig. 40, $A B$ is the given line $3\frac{1}{2}''$ long, P is the given point, and $E O F$ is the given angle.
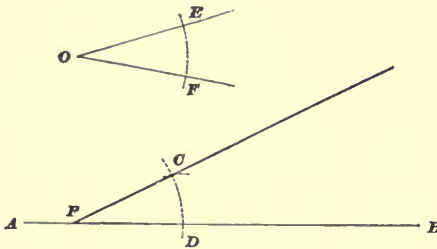
FIG. 40.

With the vertex O as a center, and any convenient radius, describe an arc $E F$ cutting $O E$ and $O F$ in E and F. With P as a center, and the same radius, describe an arc $C D$. With D as a center, and a radius equal to the chord of the arc $E F$, describe an arc cutting $C D$ in C. A line drawn through the points P and C will make an angle with $A B$ equal to the angle O, or $C P D = E O F$.

PROBLEM 8.—**To draw an equilateral triangle, one side being given.**

CONSTRUCTION.—In Fig. 41, $A B$ is the given side $2\frac{1}{2}''$ long. With $A B$ as a radius, and A and B as centers, describe two arcs intersecting in C.

FIG. 41.

Draw $C A$ and $C B$, and $C A B$ is an equilateral triangle.
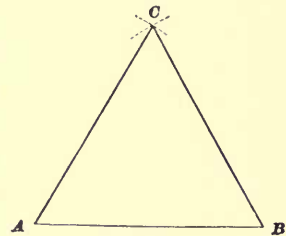
PROBLEM 9.—**The altitude of an equilateral triangle being given, to draw the triangle.**
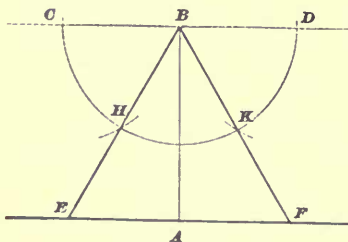
FIG. 42.

CONSTRUCTION.—In Fig. 42, $A B$ is the altitude $2\frac{1}{4}''$ long. Through the extremities of $A B$ draw the parallel lines $C D$ and $E F$ perpendicular to $A B$. With B as a center, and any convenient radius, describe the semicircle $C H K D$ intersecting $C D$ in

C and D.   With C and D as centers, and the same radius, describe arcs cutting the semicircle in H and K.   Draw BH and BK, and prolong them to meet EF in E and F. BEF is the required equilateral triangle.

This problem finishes Plate II.   The directions for inking in, lettering, etc. are the same as for Plate I.

PLATE III.

37.   This plate is to be divided up like Plates I and II, and the six following problems are to be drawn in a similar manner:

PROBLEM 10.—**Two sides and the included angle of a triangle being given, to construct the triangle.**

CONSTRUCTION.—In Fig. 43, make the given sides MN $2\frac{1}{2}''$ long and PQ $1\frac{7}{8}''$ long.   Let O be the given angle.   Draw AB, and make it equal in length to PQ.   Make the angle CBA equal to the given angle O, and make CB equal in length to the line MN.   Draw CA, and CAB is the required triangle.
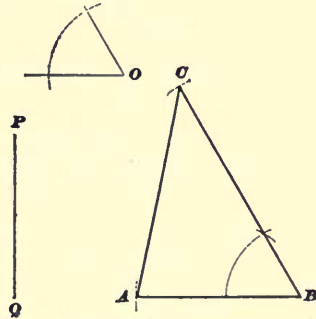
FIG. 43.

PROBLEM 11.—**To draw a parallelogram when the sides and one of the angles are given.**
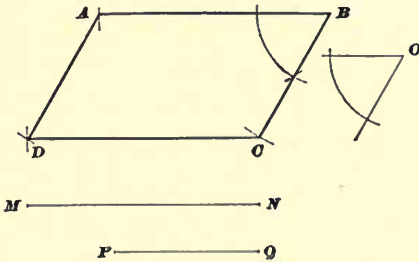
FIG. 44.

CONSTRUCTION. — In Fig. 44, make the given sides MN $2\frac{1}{2}''$ long and PQ $1\frac{7}{8}''$ long.   Let O be the given angle.   Draw AB equal to MN, and draw BC, making an angle with AB equal to the given angle O.

Make *B C* equal to *P Q*. With *C* as a center, and a radius equal to *M N*, describe an arc at *D*. With *A* as a center, and a radius equal to *P Q*, describe an arc intersecting the other arc in *D*. Draw *A D* and *C D*, and *A B C D* is the required parallelogram.

PROBLEM 12.—**An arc and its radius being given, to find the center.**

CONSTRUCTION.—In Fig. 45, *A C D B* is the arc, and *M N*, $1\frac{3}{4}''$ long, is the radius. With *M N* as a radius, and any point *C* in the given arc as a center, describe an arc at *O*. With any other point *D* in the given arc as a center, and the same radius, describe an arc intersecting the first in *O*. *O* is the required center.
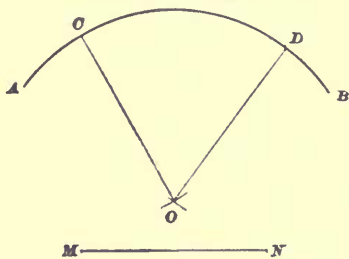
FIG. 45.

PROBLEM 13.—**To pass a circumference through any three points not in the same straight line.**

CONSTRUCTION.—In Fig. 46, *A*, *B*, and *C* are the given points. With *A* and *B* as centers, and any convenient radius, describe arcs intersecting each other in *K* and *I*. With *B* and *C* as centers, and any convenient radius, describe arcs intersecting each other in *D* and *E*. Through *I* and *K* and through *D* and *E*, draw lines intersecting at *O*. With *O* as a center, and *O A* as a radius, describe a circle; it will pass through *A*, *B*, and *C*.
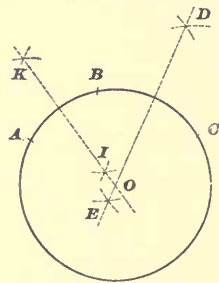
FIG. 46.

PROBLEM 14.—**To inscribe a square in a given circle.**

CONSTRUCTION.—In Fig. 47, the circle *A B C D* is $3\frac{1}{2}''$ in diameter. Draw two diameters, *A C* and *D B*, at right angles to each other. Draw the lines *A B*, *B C*, *C D*, and *D A* joining the points of intersection of these diameters

with the circumference of the circle, and they will be the sides of the square.
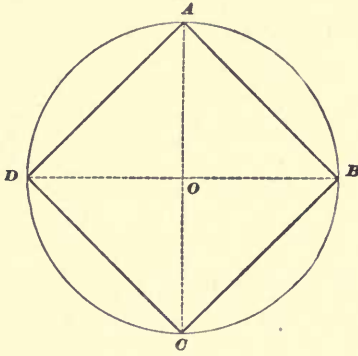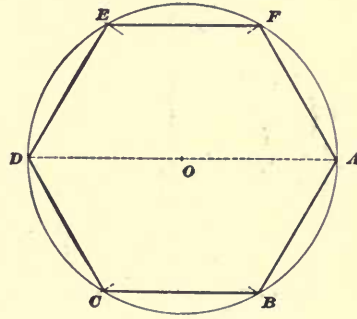
FIG. 47.   FIG. 48.

PROBLEM 15.—To inscribe a regular hexagon in a given circle.

CONSTRUCTION.—In Fig. 48, from O as a center, with the dividers set to $1\frac{3}{4}''$, describe the circle $A\,B\,C\,D\,E\,F$. Draw the diameter $D\,O\,A$, and from the points D and A, with the dividers set equal to the radius of the circle, describe arcs intersecting the circle at E, C, F, and B. Join these points by straight lines, and they will form the sides of the hexagon. This problem completes Plate III.

PLATE IV.

38. The first four problems on this plate are more difficult than any on the preceding plates and will require very careful construction. All the sides of each polygon must be of exactly the same length, so that they will space around evenly with the dividers. The figures should not be inked in until the pencil construction is done accurately. The preliminary directions for this plate are the same as for the preceding ones.

PROBLEM 16.—To inscribe a regular pentagon in a given circle.

CONSTRUCTION.—In Fig. 49, from O as a center, with the dividers set to $1\frac{3}{4}''$, describe the circle $A\,B\,C\,D$. Draw the two diameters $A\,C$ and $D\,B$ at right angles to each other. Bisect one of the radii, as $O\,B$, at I. With I as a center, and $I\,A$ as a radius, describe the arc $A\,J$ cutting $D\,O$ at J. With A as a center, and $A\,J$ as a radius, describe an arc $J\,H$ cutting the circumference at H. The chord $A\,H$ is one side of the pentagon.
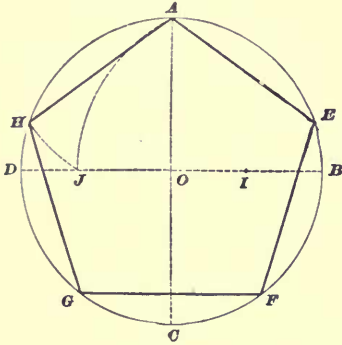
FIG. 49.

PROBLEM 17.—To inscribe a regular octagon in a given circle.

CONSTRUCTION.—In Fig. 50, from O as a center, with the dividers set to $1\frac{3}{4}''$, describe the circle $A\,B\,C\,D\,E\,F\,G\,H$. Draw the two diameters $A\,E$ and $G\,C$ at right angles to each other. Bisect one of the four equal arcs, as $A\,G$ at H, and draw the diameter $H\,O\,D$. Bisect another of the equal arcs, as $A\,C$ at B, and draw the diameter $B\,O\,F$. Straight lines drawn from A to B, from B to C, etc., will form the required octagon.
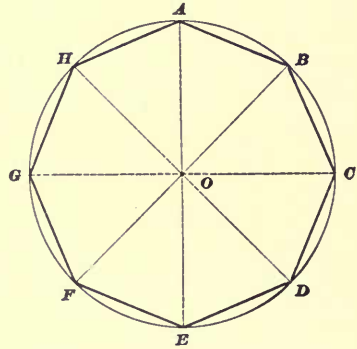
FIG. 50.

PROBLEM 18.—To inscribe a regular polygon of any number of sides in a given circle.

CONSTRUCTION.—In Fig. 51, from O as a center, with the

dividers set to $1\frac{3}{4}''$, describe the circle $A\,7\,C\,D$.   Draw the two diameters $D\,7$ and $A\,C$ at right angles to each other.

Divide the diameter $D\,7$ into as many equal parts as the polygon has sides (in this case seven). Prolong the diameter $A\,C$ and make $3'A$ equal to three-fourths of the radius $O\,A$.   Through $3'$ and 2, the second division from D on the diameter $D\,7$, draw the line $3'\,I$, cutting the circumference at I.   Draw the chord $D\,I$, and it is one side of the required polygon.   The others may be spaced off around the circumference.
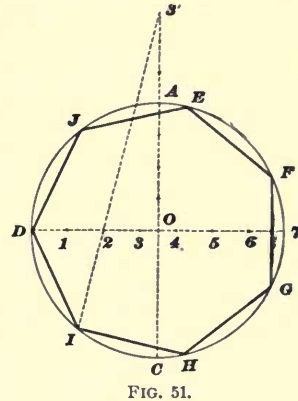
FIG. 51.

PROBLEM 19.—**The side of a regular polygon being given, to construct the polygon.**

CONSTRUCTION.—In Fig. 52, let $A\,C$ be the given side.   If the polygon is to have eight sides, the line $A\,C$ should be,
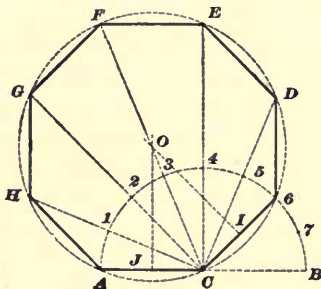
FIG. 52.

for this plate, $1\frac{1}{4}''$ long.   Produce $A\,C$ to B.   From C as center, with a radius equal to $C\,A$, describe the semicircle $A\,1\,2\,3\,4\,5\,6\,7\,B$, and divide it into as many equal parts as there are sides in the required polygon (in this case eight).   From the point C, and through the second division from B, as 6, draw the straight line $C\,6$.   Bisect the lines $A\,C$ and $C\,6$ by perpendiculars intersecting in O. From O as a center, and with $O\,C$ as a radius, describe the circle $C\,A\,H\,G\,F\,E\,D\,6$.   From C, and through the points $1, 2, 3, 4, 5$ in the semicircle, draw lines $C\,H$, $C\,G$, $C\,F$, etc. meeting the circumference.   Joining the points 6 and D, D and E, E and F, etc. by straight lines, will complete the required polygon.

PROBLEM 20. To find an arc of a circle having a known radius, which shall be equal in length to a given straight line.

NOTE.—There is no exact method, but the following approximate method is close enough for all practical purposes, when the required arc does not exceed ⅛ of the circumference.

CONSTRUCTION. — In Fig. 53, let $A\,C$ be the given line $3\frac{1}{2}''$ long. At A, erect the perpendicular $A\,O$, and make it

equal in length to the given radius, say $4''$ long. With $O\,A$ as a radius, and O as a center, describe the arc $A\,B\,E$. Divide $A\,C$ into four equal parts, $A\,D$ being the first of these parts, counting from A. With D as a center, and a radius $D\,C$, describe the arc $C\,B$ intersecting $A\,B\,E$ in B. The length of the arc $A\,B$ very nearly equals the length of the straight line $A\,C$.
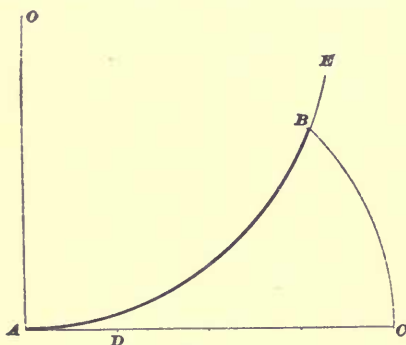
FIG. 53.

PROBLEM 21. —An arc of a circle being given, to find a straight line of the same length.

This is also an approximate method, but close enough for practical purposes, when the arc does not exceed ⅙ of the circumference.

CONSTRUCTION.—In Fig. 54, let $A\,B$ be the given arc; find the center O of the arc, and draw the radius $O\,A$. For this problem, choose the arc so that

FIG. 54.

the radius will not exceed $1\frac{3}{4}''$. At A, draw $A\,C$ perpendicular to the radius (and, of course, tangent to the arc).
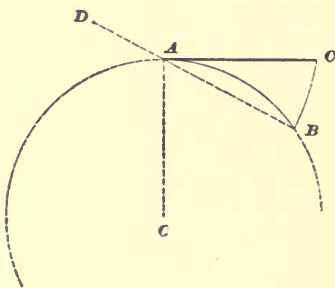
Draw the chord AB, and prolong it to D, so that $AD = \frac{1}{2}$ the chord AB. With D as a center, and a radius DB, describe the arc BC cutting AC in C. AC will be very nearly equal to the arc AB.

PLATE V.

39. On this plate there are five problems instead of six. It should be divided into six equal parts or divisions, as the previous ones. The two right-hand end divisions are used to draw in the last figure of Plate V, which is too large to put in one division.

PROBLEM 22.—**To draw an egg-shaped oval.**

CONSTRUCTION.—In Fig. 55, on the diameter AB, which is $2\frac{3}{4}''$ long, describe a circle $ACBG$. Through the center O, draw OC perpendicular to AB, cutting the circumference $ACBG$ in C. Draw the straight lines BCF and ACE. With B and A as centers, and the diameter AB as a radius, describe arcs terminating in D and H, the points of intersection with BF and AE. With C as a center, and CD as a radius, describe the arc DH. The curve $ADHBG$ is the required oval.
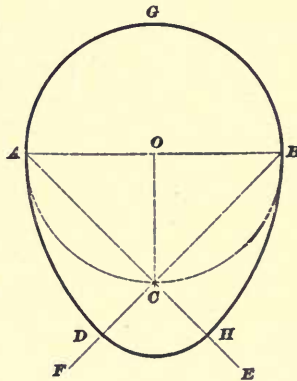
FIG. 55.

PROBLEM 23.—**To draw an ellipse, the diameters being given.** The exact method.

CONSTRUCTION.—In Fig. 56, let BD, the long diameter, or major axis, which is $3\frac{1}{2}''$ long, and AC, the short diameter, or minor axis, which is $2\frac{1}{4}''$ long, intersect at right angles to each other in the center O, so that $DO = OB$ and $AO = OC$. With O as a center, and OC as a radius, describe a circle; with the same center, and OD as a radius, describe another circle. Divide both circles into the same

number of equal parts, as *1–2*, *2–3*, etc. This is best done by first dividing the larger circle into the required number of parts, beginning at the center line *A C*, and then drawing radial lines through the points of division on this circle,
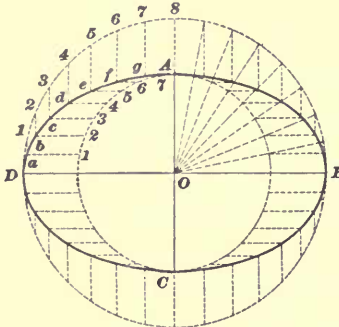
Fig. 56.

to the center *O* of the circles, as shown in the upper right-hand quarter of the figure. The radial lines will divide the smaller circle into the same number of parts that the larger one has been divided into. Through the points of division on the smaller circle, draw horizontal lines, and, through the points of division on the larger circle, draw vertical lines; the points of intersection of these lines are points on the ellipse. Thus, the horizontal line *3 c* and the vertical line *3 c* intersecting at *c* give the point *c* of the ellipse. Trace a curve through the points thus found by placing an irregular curve on the drawing in such a manner that one of its bounding lines will pass through three or more points, judging with the eye whether the curve so traced bulges out too much or is too flat. Then adjust the curve again, so that its bounding line will pass through several more points, and so on, until the curve is completed. Care should be taken to make all changes in curvature as gradual as possible, and all curves drawn in this manner should be drawn in pencil before being inked in. It requires considerable practice to be able to draw a good curved line in this manner by means of an irregular curve, and the general appearance of a curve thus drawn depends a great deal upon the student's taste and the accuracy of his eye.

PROBLEM 24.—**To draw an ellipse by circular arcs.**

This is not a true ellipse, but is very convenient for many purposes.

CONSTRUCTION.—In Fig. 57, use the same dimensions as before. On the major axis $A\,B$, set off $A\,a = C\,D$, the minor axis, and divide $a\,B$ into three equal parts. With O as a center, and a radius equal to the length of two of these parts, describe arcs cutting $A\,B$ in d and d'. Upon $d\,d'$ as a side, construct two equilateral triangles $d\,b\,d'$ and $d\,b'd'$. With b as a center, and a radius equal to $b\,D$, describe the arc $g\,D\,f$
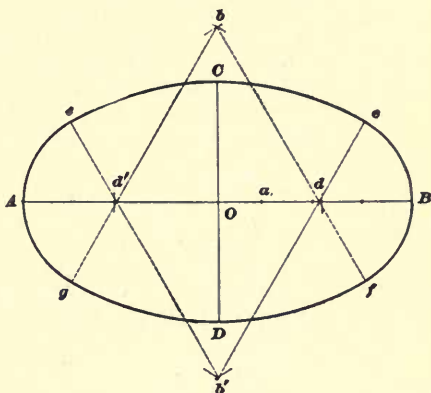
FIG. 57.

intersecting $b\,d\,f$ and $b\,d'g$ in f and g. With the same radius, and b' as a center, describe the arc $c\,C\,e$ intersecting $b'd'c$ and $b'd\,e$ in c and e. With A and B as centers, and a radius equal to the chord of the arcs $A\,c$ or $B\,e$, describe arcs cutting $A\,B$ very near to d' and d. From the points of intersection of these arcs with $A\,B$ as centers, and the same radius, describe the arcs $c\,A\,g$ and $e\,B\,f$.

PROBLEM 25.—**To draw a parabola, the axis and longest double ordinate being given.**

EXPLANATION.—The curve shown in Fig. 58 is called a **parabola.** This curve and the ellipse are the bounding line of certain sections of a cone. The line $O\,A$, which bisects the area included between the curve and the line $B\,C$, is called the **axis.** Any line, $B\,A$ or $A\,C$, drawn perpendicular to $O\,A$, and whose length is included between $O\,A$ and the curve, is called an **ordinate.** Any line, as $B\,C$, both of whose extremities rest on the curve, and is perpendicular to the axis, is called a **double ordinate.** Point O is called the **vertex.**

CONSTRUCTION.—Make the axis $O\,A$ equal to $3\frac{1}{2}''$, and the longest double ordinate $B\,C$ equal to $3''$. $B\,A$, of course, equals $A\,C$. Draw $D\,E$ through the other extremity of the

axis and perpendicular to it; also draw BD and CE par-
allel to OA and intersecting DE in D and E. Divide DB
and AB into the same number of equal parts, as shown
(in this case six); through the vertex O, draw $O1$, $O2$, etc.
to the points of division on DB, and through the corre-
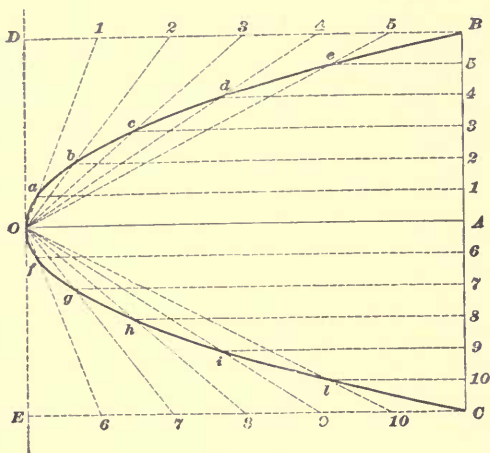
FIG. 58.

sponding points 1, 2, etc., on AB, draw lines parallel to the
axis. The points of intersection of these lines, a, b, c, etc.,
are points on the curve, through which it may be traced.
In a similar manner, draw the lower half $OfghilC$ of the
curve.

PROBLEM 26.—**To draw a helix, the pitch and the
diameter being given.**

EXPLANATION.—The helix is a curve formed by a point
moving around a cylinder and at the same time advancing
along its length a certain distance; this forms the winding
curved line shown in Fig. 59. The center line AO, drawn
through the cylinder, is called the **axis** of the helix, and any
line perpendicular to the axis and terminated by the helix is
of the same length, being equal to the radius of the cylinder.
The distance BE that the point advances lengthwise during
one revolution is called the **pitch**.

CONSTRUCTION.—As mentioned before, this figure occupies two spaces of the plate. The diameter of the cylinder is $3\frac{1}{2}''$, the pitch is $2''$, and a turn and a half of the helix is to be shown. The rectangle $FBED$ is a side view of the cylinder, and the circle $1'\ 2'\ 3'\ 4'$, etc. is a bottom view. It will be noticed that one-half of a turn of the helix is shown
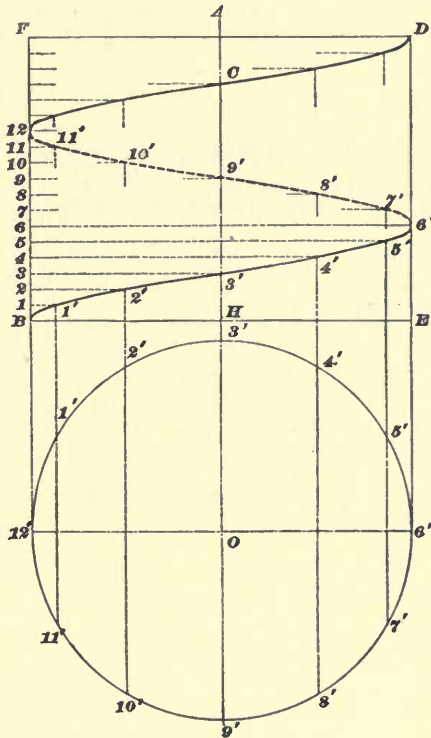
FIG. 59.

dotted; this is because that part of it is on the other side of the cylinder, and cannot be seen. Lines that are hidden are drawn dotted. Draw the axis OA in the center of the space. Draw FD, $3\frac{1}{2}''$ long and $4''$ from the top border line; on it construct a rectangle whose height $FB = 3''$. Take the center O of the circle $2\frac{3}{4}''$ below the point H on the axis AO, and describe a circle having a diameter of $3\frac{1}{2}''$ equal to the

diameter of the cylinder. Lay off the pitch from *B* to *12* equal to 2″, and divide it into a convenient number of equal parts (in this case 12), and divide the circle into the same number of equal parts, beginning at one extremity of the diameter *12′ O 6′*, drawn parallel to *B E*. At the point *1′* on the circle divisions, erect *1′–1′* perpendicular to *B E*; through the point *1* of the pitch divisions, draw *1–1′* parallel to *B E*, intersecting the perpendicular in *1′*, which is a point on the helix. Through the point *2′*, erect a perpendicular *2′–2′*, intersecting *2–2′* in *2′*, which is another point on the helix. So proceed until the point *6* is reached; from here on, until the point *12* of the helix is reached, the curve will be dotted. It will be noticed that the points of division *7′*, *8′*, *9′*, *10′*, and *11′* on the circle are directly opposite the points *5′*, *4′*, *3′*, *2′*, and *1′*; hence, it was not necessary to draw the lower half of the circle, since the point *5′* could have been the starting point, and the operation could have been conducted backwards to find the points on the dotted upper half of the helix. The other full-curved line of the helix can be drawn in exactly the same manner as the first half.

FREEHAND DRAWING.

INTRODUCTION.

1. History of Ornament.—The history of ornament in architecture and the technical arts antedates all written history. One of the strongest characteristics of even the most savage tribes is their attempt at ornamental design, expressed in rude carving, or in the painting of their bodies, weapons, or utensils. To this instinct may be ascribed the habit of tattooing practiced by many uncivilized nations, whereby they essayed to increase the expression of terror of countenance, and create what appeared to them an additional beauty. Uncivilized man has always been a *warrior*, and as such he ranked with his fellow man according to the bravery he exhibited before his friends, and the fear with which he inspired his enemies. For this reason nothing appeared beautiful to the savage, unless it possessed some element of the terrible or the supernatural. As man becomes civilized his tendency in ornamental design leans toward the reproduction of natural forms, and his self-glorification gives way to the desire to glorify the works of his Creator. Therefore, we always see some attempt to combine in the design some form from the animal or vegetable world, suggestive of the beneficence of Providence.

Ornamentation is thus seen to precede architecture historically, but it was the *art of building* that afforded the grandest field for its development and application. The noblest achievements in the technical arts have been produced

§ 2

in the service of architecture; and in all art industries, even wherein ornamentation seems to follow an independent existence of its own, its products are in harmony with the contemporary taste and tendency of architecture. The historical style and development, and the technical execution of ornament, whether carved, painted, or woven, are thus seen to be inextricably interwoven with the history of architecture and the sister arts.

2. A Drawing.—A drawing is the expression of an idea by means of a picture; therefore, to draw an object is to represent it with all its characteristic features. Some ideas can be expressed clearly in writing, but others require a drawing in order to convey them to the mind. Drawing is not designing but is the means by which we express our ideas in design to one another. It would thus appear that, to teach the *drawing of ornament* in a comprehensive way, we should at the same time teach all about its design and application; but experience has proved that such a course complicates the work of elementary instruction, and is only adapted to those that have already learned to draw well, and that know something about design in general. The subject must be divided, and for those that just enter upon its study it is best to first learn *how to draw*, and then devote their energies entirely to the study of *how to design*.

This is the scope and aim of this Paper. In a series of carefully graded exercises, the student is led from the simple straight line to the more difficult problems, and the lessons are confined at first to *outline drawing*, the object being to develop, in the shortest possible time, such ready facility of the hand and judgment of the eye as will enable him to correctly draw any outline whatever.

Notwithstanding this program of making this course essentially one of *drawing lessons*, the text is enriched with explanations of the problems presented, to stimulate the student's interest in his work. Information thus obtained, gradually grows together in the student's mind, and enables him to more readily comprehend the subject he has in hand.

3. Ornament is either the embellishment of a structural feature, accentuating its form and purpose, in which case it is usually carved or molded *in relief*, or the ornament consists of a flat-surface decoration, such as a carpet pattern, wall paper, or a painted design. Ornament consists of a combination of straight and curved lines, independent, or joined with vegetable or animal forms, or exclusively of the latter—with or without color decoration. Some ornament is purely geometrical in character, and can be drawn entirely with instruments; other is partly freehand and partly geometrical work; and the remainder is entirely freehand work. Ornamental drawing includes the rendering of *form* itself, being the representation of such graceful lines as exist in the animal and vegetable world, and also those of man's own invention, as seen in the architectural moldings, in the sweeps and curves of furniture, in the scrolls and twists of wrought-iron ·work; and in the outlines of pottery, glassware, cutlery, vehicles, ships, machinery, etc. For instance, in an ornamental vase or a wrought-iron grille, the general form and the graceful lines and proportion of its parts are as much subject for ornamental drawing as is any individual ornament with which a part of either of these objects may be decorated.

4. How to Draw.—The making of a drawing can be said to consist of two parts, namely, the making of the individual lines and the composition. Straight and curved lines must be drawn *in strokes*, and not in dots nor in a succession of short scratches. The strokes must not be jerky nor detached, but *continuous,* each one being a continuation of the preceding one, and as long as one unconstrained movement of the finger joints will make them, which is about ¾ inch. No other method maintains so well the *direction* of the lines to be drawn, nor develops so readily the pliability of the hand and the judgment of the eye by fastening the attention of both on the making of a continuous line, instead of on the making of the *pieces* of a line.

In ordinary drawing the elbow may be rested on any part

of the drawing board that the case may require; but the ball of the hand should be as free as possible, in which position the hand will rest and travel along lightly on the first joint of the little finger.

The pencil recommended for practice is one corresponding to grade " S M " of the *Dixon* brand, but the final work on the drawing plates should be executed with a harder pencil. For aiding in the work, a soft waffle, or multiplex, rubber may be used to advantage, to clean up the drawing after the sketch is completed and just previous to the process of inking in.   The final pencil lines must be firm and clean, but not heavy; and, if any corrections are necessary, an ordinary white Faber's rubber should be used.   The student should keep a uniform round pencil point, of medium length, and avoid frequent sharpening, but maintain a good point by turning the pencil as he works.   Avoid cheap pencils; they are a delusion as to economy, and their common lead smears up the drawing.   Three golden rules to be observed by the student are: *Never wet the pencil; never use a very hard pencil; never use a short pencil.* The pencil should not be less than 5 inches long, in order that it may rest against the knuckle of the forefinger.

The *eye* must guide the hand in drawing, but should not be riveted too closely upon the pencil or drawing pen; a glance forwards and backwards over the work, to compare the *form* of the design and the direction of the lines, will enable the student to keep his work close to the original, which is all that is at present desired.

The draftsman, sitting at work, should avoid bending over the drawing in a cramped position, as it is likely to injure his eyesight, and will in no way benefit his work.   An easy, natural attitude is the best.   All subjects should be outlined in their normal aspect, not upside down nor sideways, the paper being straight in front of the draftsman; but, in the final rendering, especially when a drawing is to be inked in, there is no objection to turning the sheet or the body around, to make the work more convenient and thus produce perfect lines.

5. Composition.—This element of a *drawing* consists of the general grouping of the lines and masses of the design, according to the size or scale to which the drawing is made.

Before beginning to draw a figure, its *general effect* and characteristic shape *as a whole* should be carefully observed. The individual forms, the curves, and scrolls, and the cut of the foliage should then be studied; and its symmetry and the proportion of its parts, and the direction of its movement, should be borne in mind during the entire process of sketching it in.   As to the *size* of the drawing in relation to the copy, model, or natural object, it is sufficient to say that some definite scale of enlargement or reduction should be followed, so that everything shall be maintained in *equal relative proportion*.   In beginning to draw an object, first lay out the extreme outline, as in Fig. 1; then locate all the principal points of extent and position by measuring from the base and center lines.   The
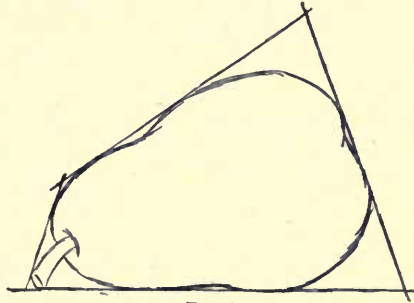
FIG. 1.

extreme outline should be composed of a few straight lines so arranged as to enclose the object in an irregular geometrical figure.   The curves and other details of the object may then be rounded in at the angles of the geometrical figure, as shown.   For this measuring and locating, *extreme exactitude is not required;* there should, in fact, be as little mechanical measuring as the student can get along with, all minor details being gauged by the eye.   Use the *eye* as much as possible, in order that it may become trained to judge correctly of absolute and relative sizes, of form and proportion.   The value of this accomplishment to the draftsman and designer cannot be overestimated.   Since the object of the student is to learn *to draw*, and, in a measure, to obtain a knowledge of ornament, the above points are of

far greater importance to him than the mere act of repeating or copying of lines, and the purpose of this course is not to make copyists of the students, but to make draftsmen and designers of them.

The same spirit applies to the drawing of the *two halves* of any symmetrical ornament. Except in the main points of the design, no absolute identity of the two halves is to be attempted; there is no artistic necessity for such, either in drawings or in executed work. If some little inequalities appear in the two halves of some scroll or foliage work, *leave them alone* and remember that good ornament is enhanced in value, rather than depreciated, by the absence of constraint or of stiff regularity. The individuality of the designer, carver, or painter shows itself in such matters, and gives character to his work.

There is another very important point to be observed in the drawing of symmetrical figures. Never draw one half complete by itself and then the other half; lay the whole ornament out *as one figure* and finish it up simultaneously. Above all, *never trace off* one half of an ornament to produce the other half. This method of working is permissible in offices and shops, on the part of experienced draftsmen, and will be explained in future work, but must be *absolutely avoided* by the student in freehand drawing. Let him remember that he is learning *to draw*, and nothing will train either hand or eye as well as constant practice and redrawing the same thing.

6. While the use of drawing instruments and mechanical appliances is necessary in blocking out the preliminary work of any design, the design itself must in nearly all cases be executed freehand, or at least partially so. For this reason, the work in this course will be entirely freehand. The student is urged to practice constantly on other work than these plates, so that his hand may become subtle and his style systematic and individualized.

In freehand drawing, the work may be executed with one of several materials, as explained below, but only three

methods will be considered herein, as these three are the ones most frequently used and the only ones necessary except in special cases. The most common method of drawing is with lead pencil, and the object is either drawn in outline, as indicated at (*a*) and (*b*), Fig. 2, or shaded as at (*c*). If an outline drawing, the object may be expressed in lines conforming to the actual contour of the object itself, as at (*a*), or it may be drawn as it appears to the eye, as at (*b*). In

(*a*)   (*b*)   (*c*)
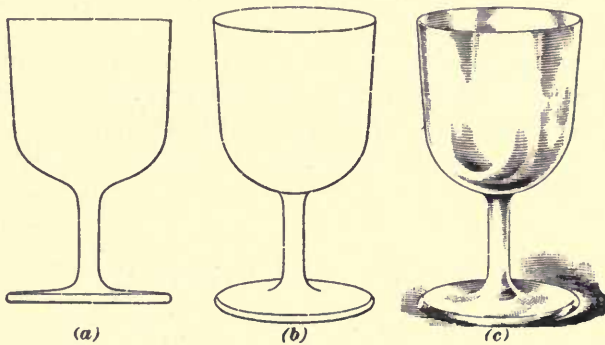
FIG. 2.

the former case the drawing is called an *elevation* of the object, and the latter is a *perspective* view.

Now, though the elevation of an object is of vast importance to the designer, he rarely expresses an object that way in design; unless the character of the work actually demands it—for instance, where the design is of a vase or pitcher that is to be *thrown* or *spun* in metal, it is sometimes necessary that the spinner should have an elevation of the object in order that he may spin it to the proper outline; but, where a design is to be reproduced by printing, weaving, carving, etc., the original drawing represents the design just as the reproduction is to appear. Elevations are usually drawn mechanically, while perspectives are in nearly all cases executed more or less freehand. Mechanical drawings are executed to scale, or in exact proportion according to measured dimensions. Freehand drawings are executed entirely with the unaided hand, and measured by the judgment of the

eye. The expert designer uses eye measurement almost exclusively, and the student is here advised to pay particular attention to this branch of his study, as it will be indispensable to him hereafter.

Drawings are also executed with pen and ink, in which case the general appearance is the same as in pencil; the method of execution is different, however, as will be explained later on. In fact, in the majority of cases a drawing is outlined in pencil, and then inked over and shaded with the pen.

The third method of drawing, described in this course, is with the brush. This is the method used most extensively by all designers. Its use is limited to freehand work, but its application is extended to designs in color and mezzotint.

THE PLATE EXERCISES.

7. The plates are to be drawn on the same size of paper (14 in. × 18 in.) as was used in *Geometrical Drawing.* The student should draw each of the exercises several times before he attempts the plate he will send in to the Schools for correction, as these plates are considered examinations to determine how carefully the student has studied the text and practiced his exercises. This preliminary work need be drawn in pencil only, on a good quality of brown paper that will withstand rubbing. Draw all the figures of one plate and complete it before beginning to ink it in, and do not attempt to ink it until you have practiced inking on separate pieces of paper. For fine lines in freehand work, use a Gillott's No. 404 pen, in a smooth, round, long holder without swell or taper. For heavy lines a coarser pen should be used. In regard to curves, it is generally best and easiest to ink them freehand, but in some cases, which will be pointed out as we progress in the work, they may be inked with instruments by combining arcs of circles with the lines of irregular curves.

When inking, keep the hands and tools clean, wipe the pen

clean before each dip into the ink, and keep the bottle corked
to exclude dust.   When using stick India ink, ground on a
slab, occasionally add a drop of water to keep it of equal shade
and fluidity.   The prepared ink provided with the designing
outfit will require no diluting if it is kept constantly corked.

8.   To the Student.—We realize that this work goes
out to young men and women of varying degrees of ability,
diligence, and opportunity; the exercises that will appear
simple to one will prove difficult to another.   To those of
decided natural ability, we say: "Be diligent; keep at it in
the regular order; do not think too soon that you know it all,
or that you can disregard our instructions, or become care-
less."   To those others whom nature has not so kindly
endowed, but who have an earnest wish to learn, we say:
"Be not discouraged by early difficulties; you are learning
every day; your hand is becoming more supple and your eye
more observant with each new exercise; try to realize that
you are studying not only a useful, but an artistic, and also
a difficult accomplishment, something worthy of your greatest
efforts and unswerving perseverance.   These staying qualities,
joined to but a medium grade of talent, often succeed where
greater abilities, joined to indolence and restlessness, result
in failure.   It sometimes takes years for the child to learn
to write, but he finally learns, while the adult, better appre-
ciating the value of the accomplishment, may acquire the
same knowledge in a few months.   Patience, perseverance,
and constant practice are necessary in all cases, and *he who
can learn to write can learn to draw*, as the principle is the
same in both accomplishments."

DRAWING PLATE, TITLE: LINEAR ELEMENTS.

9.   This drawing plate consists of 21 figures, each of
which the student should be able to execute perfectly with-
out other aid than the directions herewith given.   The suc-
ceeding plates will each contain some detail or element, the

instruction for which can be traced back through the preceding plates to this one. *It is absolutely necessary, therefore, that the student should be perfect in every detail of each plate before attempting the next one.* The figures on this plate are simple lines and combinations of lines to produce some of the elementary forms that enter largely into all classes of design.

The exercises on this plate are to be drawn by the student to train his eye and hand to work together, and thereby become sufficiently practiced to execute the problems that follow. The drawing of a single line is of as much importance as the execution of an entire design, and the student must practice constantly and patiently, until he masters each simple problem, before he attempts the next. · If each lesson is thoroughly learned, the next one will invariably prove easier.

In Fig. 1 of the plate is shown the method of drawing perpendicular straight lines. The pencil should be held lightly between the thumb and forefinger, with its upper end resting against the finger between the second and the third joint, while the end of the middle finger rests on top of the pencil alongside of the forefinger, and not underneath the pencil, as is sometimes erroneously done in writing.
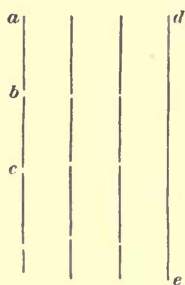
FIG. 3.

The drawing board should be squarely in front of the student, and his elbow should rest near the bottom of the board, somewhat to the right of the drawing on which he is at work. A short straight line is then drawn, as from *a* to *b* in Fig. 3, and the arm shifted a little lower down on the board, and another line, as *b c*, drawn, care being taken that there is a space of at least $\frac{1}{32}$ inch between the end of the line *a b* and the beginning of the line *b c*. A third section of the line is then drawn from *c* downwards, and so on, until the line is of the desired length. Having practiced this several times, the student should gradually decrease the spaces between the sections of the line until it appears as a straight

unbroken line, as shown at *d e*. It is necessary to be still more careful in doing this, lest the lines overlap one another or curl out at the ends. The former error causes the finished line to appear somewhat as at (*a*) in Fig. 4, while the line composed of strokes whose extremities are curled would appear ragged, as at (*b*). The strokes with which these lines are made are not short, quick dashes of the pencil or pen, but slow, even marks, each of which is started carefully, drawn slowly, and finished abruptly, so as to show a clean, even stroke, the same weight and color throughout, and clean cut from end to end. The second stroke must never lap over the first, and it is better to let a hairbreadth space remain between the ends of the lines than to have the least suggestion of a line like (*a*). Practice this simple line exercise repeatedly as in it lies the whole key to successful freehand drawing. When the student has acquired proficiency in this exercise, he may commence work on his drawing plate. Draw the border line enclosing a space 13 in. × 17 in., and then draw three light horizontal pencil lines *A B* 5 inches, *C D* 7 inches, and *E F* 9¾ inches above the lower border line. This will divide the drawing plate into four horizontal bands.

(*a*)   (*b*)
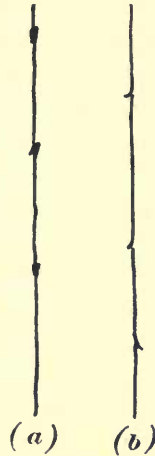
FIG. 4.

Divide the length of one of these bands into five equal parts, and through the points of division draw light vertical lines, thus converting the surface of the drawing plate into twenty rectangles. This may all be done with the **T** square and triangle; but, from this point on, the student must abandon the use of instruments for this plate, and execute the problems freehand. Each figure, except Figs. 17, 18, 19, and 20, must be drawn as nearly as possible in the center, between the vertical lines of its respective rectangle, and each figure, except Figs. 11 to 15, must rest on the lower horizontal line of its rectangle. Now draw the first figure of the drawing plate. This consists of seven perpendicular lines, each of which is 2 inches long and spaced as shown, either ¼ inch or

½ inch from its neighbor. Only one of them need be an absolutely solid line, the others being composed of dashes about ¾ inch in length.

The drawing of horizontal lines should now be practiced in a similar manner, except that the elbow should be drawn nearer the body. When the strokes forming the horizontal lines are drawn, the whole arm should be moved toward the right, in order to prevent the lines from becoming arched, as would be the case if the elbow remained fixed and the hand were moved only so far as the swing of the arm would permit. The strokes forming the horizontal lines may be somewhat longer than those composing the vertical lines, but the method of forming one straight line, by the careful union of several smaller ones, remains precisely the same for both cases.

In drawing the horizontal lines, see that perfect parallelism is maintained; the spacing between the lines, however, may be gradually increased or decreased in order to better train the eye as well as control the hand. In drawing Fig. 2 of the drawing plate make the upper and lower three lines ¼ inch apart, and ½ inch from the middle line, all the lines being 2 inches long.

Figs. 3 and 4 show two sets of parallel oblique lines, the former being drawn from right to left, and generally called *right-oblique* lines, and the latter drawn from left to right, and usually designated as *left-oblique* lines. Fig. 3 is much the easier to draw, as the slope of the lines corresponds in direction to the inclination of the letters in ordinary handwriting, and the hand is more accustomed to the angle. After practicing the right-oblique lines until the student feels assured he can do as well with them as with the two previous sets, he should draw a series in the direction shown in Fig. 4. To do this it will be necessary for him to change the position of his arm, so as to bring the elbow toward the right end of the board and the hand above, and to the right of the lines to be drawn. The lines in Figs. 3 and 4 should incline at an angle of 45°, and should be arranged in pairs, as shown, with ¼ inch between the individual lines of each

pair, and a distance of 2 inches between the extreme outside lines of each figure, the lines each being $1\frac{3}{4}$ inches long.

Figs. 5 and 6 involve no new principle in drawing, and are simply a combination of the previous problems. Observe, however, that though these two figures contain exactly the same number of lines and nearly the same lengths of lines, they are, in appearance, entirely different. This difference of appearance is due to the *composition* of the figures, and many changes of arrangement can be effected without altering the number or size of the lines. In line composition the designer has but two elements to consider—the lines and the spaces. Subsequently he may darken some of the spaces,
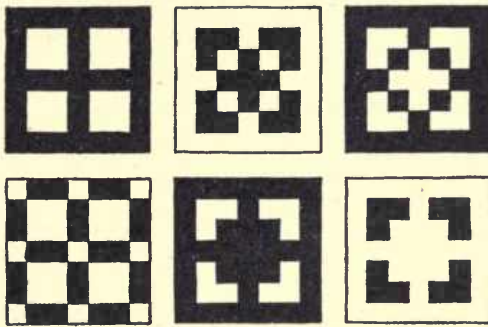
FIG. 5.

thereby entering into surface composition, wherein he has at least two more elements to consider—*light* and *shade*. Fig. 5 of the text shows six different problems in composition, all based on the line elements as arranged in Fig. 5 of the drawing plate, but treated differently as to light and shade, thus illustrating the fact that even with a few elements of composition a great variety of design may be produced. The blackening, or shading, of certain parts of a line composition, in this manner, is technically termed *spotting*, and when a plain line drawing is thus treated it is said to be *spotted*.

To draw Fig. 5, first erect a perpendicular line in the center of the last rectangle, and from its intersection with the line *E F*, draw right and left oblique lines each at an angle of

45°, and $1\frac{3}{4}$ inches in length. Let these two lines be the lower sides of a square standing on its corner. Having completed the square, draw $\frac{1}{4}$ inch within each of its sides, a line parallel to that side, and through the center of the square draw parallel lines $\frac{1}{4}$ inch apart, as shown. The small inscribed square may then be drawn, each side of which is $\frac{3}{4}$ inch.

The square enclosing Fig. 6 is 2 inches on each side, and rests on the line $C\,D$ directly below Fig. 1. The lines of its composition are spaced $\frac{1}{4}$ inch, $\frac{9}{16}$ inch, $\frac{11}{16}$ inch, 1 inch, $1\frac{1}{8}$ inches, and $1\frac{1}{4}$ inches from the left side and top, respectively. The same number of lines and nearly the same lengths of lines are used in both Fig. 5 and Fig. 6, but, as said before, the student can readily see the variation of effect that may be obtained by the simple arrangement of a few lines.

The exact sizes and dimensions of the several interior squares are not matters of importance to us now, and the student's drawing of this figure will be judged by the care of his execution rather than by the accuracy of his eye measurement. The angles of the square must be 90°, and not more nor less, and opposite sides must be perfectly

Fig. 6.

parallel, while adjacent sides must be perpendicular to each other. The straightness of the lines or their exact length as to this description will not be considered. For instance, a drawing like Fig. 6 of the text would be considered as satisfactory at this stage of the work, for, though the lines are somewhat irregular, their directions are correct and they intersect at right angles; and though the inner rectangles are larger than the corner ones, they are perfect squares and are all the same size one as another. They thus preserve harmony in the figure and avoid the appearance of irregularity and carelessness shown in Fig. 7, wherein the lines themselves are more nearly perfect but their direction and parallelism extremely faulty. Draw Fig. 5 several
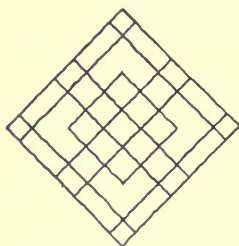
times on a separate piece of paper before executing it
on the drawing sheet.

These simple line exercises are of the utmost importance
to the student, as on them will depend much of his future
freehand work.   He should practice each set repeatedly, on
a sheet of ordinary brown Manila paper, until he feels confi-
dence in his ability to produce, at will, perpendicular, hori-
zontal, or oblique lines, and then, *but not till then*, should
he attempt to draw them on the sheet that he will send to
the Schools for correction.   Each of these exercises should
be drawn as carefully and as accurately
as though it were a part of a compli-
cated design.   Haste will only produce
slovenliness and impede the progress
of the student to the end he seeks to
attain, namely, that of becoming a
good draftsman. *Neatness*, *accuracy*,
and *rapidity* are the three qualifica-
tions of a good draftsman, in the
order of their importance, and the

Fig. 7.

last is of no value unless accompanied by the other two,
while the second is impossible without the first.

Fig. 7 is an equilateral triangle, the base of which is
$2\frac{1}{2}$ inches long.   The inclination of the sides is not so
easy to judge by the eye as were the 45° lines in Figs. 3, 4,
and 5, but if the student will bear in mind that the apex
must be exactly over the center of the base, he will expe-
rience little trouble.

After the triangle is drawn, bisect the sides and draw the
enclosed triangle as shown.

The triangle is a very important figure to the designer of
certain classes of goods, such as wall papers, carpets, etc., as
the facility with which it can be repeated, and still retain its
original form, makes it extremely valuable as the guiding
principle of several classes of patterns.

Figs. 8, 9, and 10 are examples of borders taken from
Greek pottery, and are composed entirely of straight lines,
that when *spotted*, as explained in connection with Figs. 5
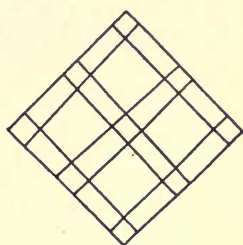
and 6, can be made very interesting and complicated. For instance, on looking at Fig. 8 of the text we observe that the pattern consists of two outline forms identical in every respect, and so shaped that one fits exactly into the other, that the lines a are all of the same length and at right angles to each other, and the lines b are all twice the length of lines a.
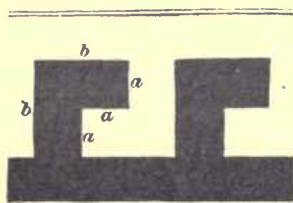
FIG. 8.

For Figs. 8, 9, and 10, the student may draw with his T square three horizontal lines at x, y, and z, about $\frac{1}{2}$ inch apart, and extending through the three right-hand divisions of the sheet. Fig. 8 is then executed by drawing a vertical line $x z$ across the three lines thus ruled; and at a distance to the right of this vertical, equal to the space between the horizontals, another vertical line $u t$ is drawn between the two lower horizontals. A third vertical line $w v$ is then drawn the same distance to the right of the second one, and extending between the upper two lines. The horizonal lines $x w$ and $u v$ are then drawn, connecting the ends of $x z$ and $w v$, and $w v$ and $u t$, as shown, and with $t s$ equal to $x w$ the outline of one of the sections of the fret is complete. The vertical line a', drawn to the right of $w v$, will then start a second section of the fret, and, at the same time, complete the inverted outline that is to follow the contour of the first section. A peculiarity of all the best Greek frets is that the outline of the fret and the outline of the background are identical, as shown in Fig. 8. Having drawn the meandering outline of the fret, draw the horizontal border lines above and below, so as to make the whole design about 2 inches wide, and erase the pencil lines x, y, and z where they have not been inked in.

Fig. 9 is somewhat similar to Fig. 8, but is capable of more variations in *spotting*, as shown in Fig. 9 of the text. At (a) we have the ground and the pattern of the fret spotted in contrasting colors, while the effect at (c) is produced simply by increasing the weight of the constructive lines. Both systems

produce frets wherein the ground and pattern are similar in outline.   At (*b*) the line of separation between the dark and light portions of the design is thickened into a white band and the other elements are left in black.   To design Fig. 9, a number of perpendicular lines are drawn across the center line *y* equal in length and spacing to the distance between the three horizontal guide lines *x*, *y*, and *z*.   The tops *r* and bottoms *q* of each alternate pair of the verticals are then connected with a horizontal line equal to the verticals.   This forms the meandering outline of the figure. Above and below this meandering outline, at a distance equal to half the space between the lines, two horizontal lines are drawn, from which perpendiculars extend into the open parts of the meander as far as the middle horizontal guide line *y*. The border lines above and below are then drawn to make the entire width about 2 inches.

Fig. 10 is more complicated. It is a combination of Figs. 8 and 9, and, when analyzed, shows two entirely separate and distinct but identical outlines so interwoven as to form one harmonious design. This design may be made very complicated by *spotting*, as shown in Fig. 10 of the text. · To design Fig. 10 of the drawing plate, the simplest method is to draw across the central guide line a short vertical line equal in length to the verticals in Fig. 9; then, through the center of this vertical, draw a horizontal line of the same length, thus forming a simple cross, *a b*, *c d*, Fig. 11 (*a*).   Now, from

(a)

(b)

(c)
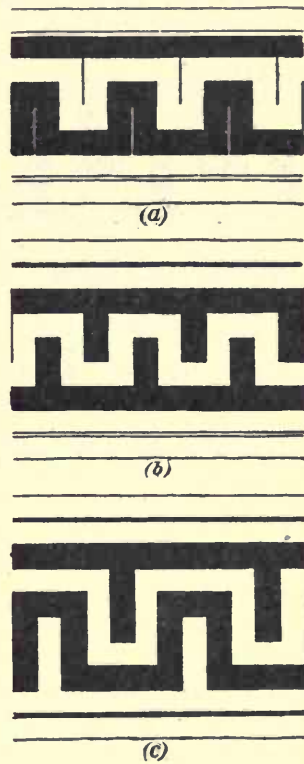
Fig. 9.

the upper and lower ends of the verticals, draw lines of equal length to the left and right, respectively, and from the left and right of the horizontal line draw at right angles a line extending below and one above the center guide line and equal in length to the other lines drawn; this will produce a figure similar to Fig. 11 (*a*). Now draw a third set of lines at right angles to this second set and parallel to the first set, as shown in Fig. 11 (*b*). These lines, it will be observed, are the same distance apart, and are exactly parallel. The horizontal lines at the top and bottom may now be extended to left and right, respectively, a distance equal to the space between parallel lines of the meander; this will complete one section, and the same operation may be repeated, making the intersections of the short cross-lines take place at a point five times the space between the horizontal lines to the right.
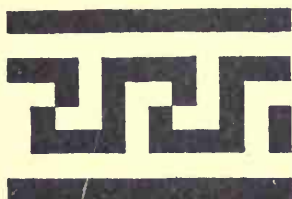
(a)

(b)

(c)

FIG. 10.

Fig. 11 is a simple octagon, but to draw it accurately requires more care and accuracy of eye measurement than any of the previous figures. Begin it by drawing a perpendicular line *a b*, 2 inches in length, and extending 1 inch each side of *A B*. Carefully lay off the length of *c c*, 1 inch each side of *a b*; *e f* and *g h* are now drawn at an angle of 45° with *a b*, and intersecting it at its center *o*. From *o*, carefully lay off 1 inch on each of the oblique lines, as its length each side of the center. If this work is accurately done, the lines connecting *a c*, *c c*, *c h*, etc.
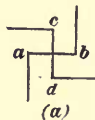
(a)
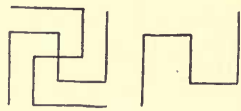
(b)

FIG. 11.

will describe a perfect octagon. Study it carefully, and if any signs of unevenness are observed, alter the outline and correct the point.

Fig. 12 is a circle, and it is drawn in precisely the same manner as the previous figure, except the points *a c*, *e d*, etc. are connected with curved lines instead of straight ones. In drawing the circumference of the circle, after the guide lines have been carefully laid out, a short straight line may be drawn across the ends of each of the guide lines, as shown in Fig. 12 of the text at *a*; then between each pair of these short lines, another short line may be drawn, producing a 16-sided polygon; the whole circumference may then be evened up as at *b* before it is inked in. Considerable prac- tice is necessary to enable the student to draw a perfect circle,

FIG. 12.

but he will be surprised and delighted to learn how simple a problem this is after careful and repeated practice.
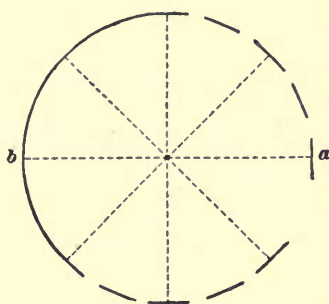
Figs. 13, 14, and 15 are ellipses whose major and minor axes intersect on the line *A B*. The three large ellipses in these figures are each $3\frac{1}{4}$ inches long and 2 inches wide, and the fourth one intersecting the large one in Fig. 15 is $3\frac{1}{4}$ inches long and $\frac{3}{4}$ inch wide.

The method of drawing an ellipse geometrically was explained in *Geometrical Drawing*, so the student should be, by this time, fairly familiar with the characteristics of the curve. First draw the two axes, then draw short straight lines at right angles to the ends of the axes, and roughly sketch in the curve, in pencil, as shown in Fig. 13 of the text. Care must be exercised, however, to keep the proper curvature and avoid such appearing sketches as shown in Fig. 14. The student himself can see that these are not ellipses, and must avoid return- ing his drawing plate with any such monstrosities. This

is a difficult figure to draw, but with proper care and practice it can soon be satisfactorily rendered. The con-
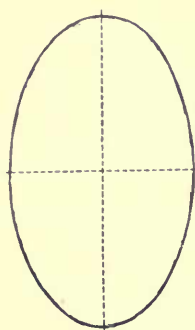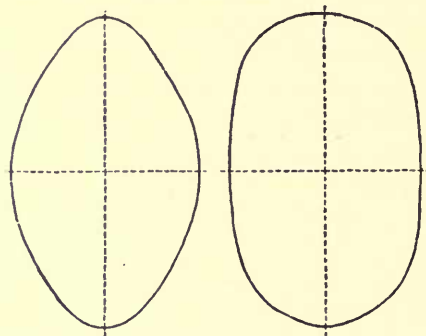
FIG. 13.   FIG. 14.

struction lines of Figs. 11 to 15 should be drawn and inked freehand.

Fig. 16 is a volute more commonly known as a spiral, and its outline in varied forms pervades all styles of ornament. It is, therefore, worthy of considerable attention. The example here given is purely Greek in its proportions, and the ratio of its height to its width is governed by definite geometrical rules for each convolution or turn.

In drawing the Grecian volute, the construction lines ab, bc, and cd should be laid out in the proportion of $6\frac{1}{2} : 5\frac{1}{2} : 4\frac{1}{2}$. That is, if ab is $6\frac{1}{2}$ inches long, then bc and cd must be $5\frac{1}{2}$ inches and $4\frac{1}{2}$ inches, respectively. And the construction lines of the inner convolution must have this same proportion; that is, $ef : fg : gh = 6\frac{1}{2} : 5\frac{1}{2} : 4\frac{1}{2}$.

To draw Fig. 1, lay off $ab = 3\frac{1}{4}$ inches, $bc = 2\frac{3}{4}$ inches, and $cd = 2\frac{1}{4}$ inches; ef is always $\frac{1}{2}ab$, and de is $\frac{1}{2}(cd + ef)$; therefore, ef is $1\frac{5}{8}$ inches, and de is $\dfrac{2\frac{1}{4} + 1\frac{5}{8}}{2} = 1\frac{15}{16}$ inches; de is, therefore, laid off $1\frac{15}{16}$ inches and ef $1\frac{5}{8}$ inches; fg will be in proportion to ef as $6\frac{1}{2} : 5\frac{1}{2}$, or $1\frac{3}{8}$ inches, and gh will be to fg as $5\frac{1}{2} : 4\frac{1}{2}$, or $1\frac{1}{8}$ inches. In the same manner hk is found to be $\frac{31}{32}$ inch, kl is $\frac{13}{16}$ inch, lm is $\frac{11}{16}$ inch, and mn is $\frac{9}{16}$ inch. Within these construction lines (*which must be accurately laid off with the scale, and drawn with the*

square and triangle) the volute is then drawn freehand, care being exercised that the curves are just tangent to the straight lines as they pass. After inking this volute curve, the student should dot in the construction lines with a ruling pen.

Fig. 17 is an *oval* and is composed of a semicircle and a semiellipse whose major axis is located 4¾ inches from the left border line. Draw freehand the line *a b* 2 inches in length and 2½ inches above the lower border. Above this line construct a semicircle in the same manner as was done in Fig. 12, using *a b* as its horizontal diameter, and below construct a semiellipse after the manner practiced in Figs. 13, 14, and 15, with *a b* as the minor axis which shall extend 2 inches below *a b*. The correct outlining of these elliptical curves is of vast importance in the exercises that follow, and the student is urged to practice them frequently.

Fig. 18, though simple in appearance, is by no means easy to draw. It represents the radiation of lines from a point, a characteristic of the growth of some plants, that is frequently taken advantage of in examples of ornamental design. To draw Fig. 18, first lay off the lines *a b* and *c d* as the major and minor axes of an ellipse (the former being 7½ inches from the left border line) identical with Fig. 14; then carefully outline this ellipse in pencil, and within it draw the radiating lines curved, as shown. Note that the radiating lines intersect the circumference of the ellipse nearer together at the top than at the sides, the distance *a e* being about ½ inch, while *e f* and *f d* are about ⅝ inch and ⅞ inch, respectively. After inking the figure, the construction line *c d* may be erased, and the ellipse dotted in with the ruling pen and irregular curve.

Fig. 19 is drawn within an ellipse also, but the major axis *a b* is inclined at an angle of 60° and intersects the minor axis at a point 2 inches above the lower border line and 6½ inches from the right border line. The curved lines radiate evenly from *b* and intersect the circumference in three points equally spaced between *a* and *c*. In inking this figure, the construction lines may be erased

and the elliptical curve dotted in with ruling pen from c to a only.

Fig. 20 is another example of radiation, but from a line in this case instead of a point. Draw *a b* 3 inches long and 4 inches to the left of the right-hand border line, and mark off thereon the points from which the curved lines radiate. Note that these points are not regularly spaced along *a b*, but that their distance apart increases toward the top. From *b* to *c* is but $\frac{1}{2}$ inch, while the distances *c d* and *d e* are $\frac{5}{8}$ inch and $\frac{3}{4}$ inch, respectively. The radials starting from *c* extend $\frac{7}{8}$ inch to the right and left of *a b*, and upward to the level of *d*. The radials from *d* extend $\frac{1}{2}$ inch to the right and left of *a b*, and those from *e* only $\frac{1}{4}$ inch. Their length and upward extent the student must judge by the eye, as also the two lower radials, which extend about $\frac{3}{4}$ inch each side of *a b*.

These radiating figures must be studied carefully; there is really very much more in them than would at first appear, and the principles of their composition and construction pervade all natural ornament.

The radiation of the lines in Figs. 18 and 19 is characteristic of the growth of some plants, such as the cattail, as shown in Fig. 15, and the veining of certain leaves as in Fig. 16 of the text. The radiation from a line, as shown in Fig. 20 of the drawing plate, is characteristic of the growth of

FIG. 15.
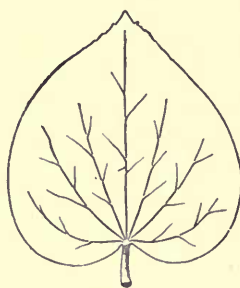
FIG. 16.

many trees and shrubs, and illustrates the great laws of all foliated ornament. These laws are based on the observation

of the arrangement and natural growth of plants, and are as follows:

1. *All lines should radiate from a parent stem.*

2. *All branching lines should be tangent to the line from which they branch*, as in Fig. 20, where the branching lines do not start out of *a b* abruptly, but are tangent to it at *c, d,* etc.

3. *There should be a proportionate distribution of areas.* This is not so easy to understand as the previous rules, but may be illustrated by a tree, wherein the areas are proportioned according to their distribution and distance from the parent stem. The trunk is the parent stem, and has the greatest area, but decreases toward the top. The branches nearest the ground are the largest and closest together, and diminish in size toward their ends. All branches and twigs are less in area than the branch from which they spring. In Fig. 20 observe that, though the parent stem and branches are single lines of equal thickness and apparent area, the arrangement is such as to give the impression of distribution. The area embraced by the lower branches is greater than that of the ones above, and the outline of the entire figure diminishes toward the top, giving an impression of lightness and solidity.

Always observe these rules in drawing any figure, and try to make the representation of an object appear lighter toward the top. Note that in all works of architecture, high structures, such as steeples and towers, are either made smaller toward the top, or are pierced above with large windows in order to give the appearance of lightness at the top and solidity at the bottom. Note that columns, pilasters, and piers are nearly always smaller at the top than at the bottom, thus expressing their immovability; while the legs of tables and other unfixed objects are smaller at the bottom than at the top, expressive of their movability.

In drawing Fig. 21, the student has simply to combine the details of a few of the previous problems. This figure is a vase 3 inches in height, and $\frac{1}{2}$ inch and $1\frac{7}{8}$ inches in diameter at *a* and *b*, respectively. The student will draw the center

line of the vase directly under the center of Fig. 15, and lay
out the outline entirely freehand and by eye measurement.
Knowing the dimensions a and b, the observing student will
discover that c is a little more than a, and that d is a little
less. Other dimensions can be judged by comparison in the
same manner and the figure completed without further
directions. After inking in Fig. 21 the construction line
through its center may be erased.

Having completed all the figures in pencil, the student
will proceed to ink them in freehand, except where the pre-
vious instructions directed him to do otherwise. He may
then draw the title $\frac{5}{16}$ inch high at the top of the plate, free-
hand, and ink the border line with his ruling pen. In inking
a drawing freehand, the pen is held in precisely the same
manner as the pencil, and the lines are drawn carefully in
short, even strokes, to preserve uniformity. Use a good,
coarse pen, and do not be afraid to let the lines be rather
heavy at first, as a thin line is more difficult to draw evenly
than a heavy one. The name, class letter and number,
together with the date, may then be inserted below the line,
as in previous cases.

NOTE.—Do not ink in your drawing of this plate, or return it to us
for correction until after your first plate is returned to you with its cor-
rections and criticisms. Then note carefully the errors pointed out
and see that similar ones have not been made on your Drawing Plate,
title, Surfaces and Solids.

After we have called the student's attention to the errors on his
first plate, we expect him to profit by the criticism and avoid a repeti-
tion of them on his second plate; as a repetition of the error will count
against him more than when it was first made.

This method of procedure will be necessary throughout the entire
course, as there are but two plates of each kind of work, and the stu-
dent needs the criticism of the first in order to properly execute the
second.

DRAWING PLATE, TITLE: SURFACES AND SOLIDS.

10. The figures on this plate consist of a series of objects,
the drawing of which will involve all the principles learned
in the execution of the previous plate. The first four figures
are designs of surface ornament or details wherein the con-
sideration of depth or thickness forms no part. The last

five figures are sketches in perspective of familiar objects drawn so as to accustom the student to the representation of objects where the dimension of thickness or depth must be expressed. In drawing this plate, lay out the border line as before and divide the plate lengthwise by a horizontal pencil line through the middle, and above this line divide the space as follows: Draw four vertical lines, $1\frac{1}{2}$ inches, 4 inches, $7\frac{3}{4}$ inches, and $11\frac{3}{8}$ inches to the right of the left border line. The first three of these will be the center lines of Figs. 1, 2, and 3, and the fourth will be the line of the wall $a\,b$.

Fig. 1 is a baluster and its moldings, according to the architectural proportions set forth for such details. The student will first draw a vertical line $x\,y$, $\frac{1}{2}$ inch to the right of the border, to serve as a measuring line. This line will be divided into 68 equal parts, as shown, each part being $\frac{1}{16}$ inch, thus making the height of the baluster $4\frac{1}{4}$ inches. All the measurements for the proportioning of the baluster will be given in parts, each part being, as above stated, $\frac{1}{16}$ inch. The width of the abacus a is 22 parts, the thickest part of the vase at b is 25 parts, and the diameter of the neck at c is 10 parts. The vertical measurements can be determined by counting the number of parts between each division, and when all the horizontal lines are located the contour may be carefully sketched in. The vertical measuring line may then be erased before the figure is inked in. Although these proportions are subject to slight relative alterations under different circumstances, they are practically uniform in nearly all cases where the outlines of a stone baluster are required.

Fig. 2 is a panel of an iron railing the design of which consists of a series of scrolls and radiating ornament, based on the outline of the baluster just drawn, but changed to suit the circumstances required by working in strap iron, in contrast to the requirements of stone. The student's attention is called particularly to the fact that there is propriety in the ironwork design in making its outline resemble the outline of the solid baluster, inasmuch as it is to serve a similar purpose in a balustrade of different material.

The center line and enclosing rectangle of Fig. 2 may be

drawn precisely the same as in Fig. 1, except that the rect-
angle itself and the center line will be inked in solid, as it is
intended to form a part of the ironwork. The center line is
located 4 inches to the right of the border line, and the con-
tour of the inside ironwork follows as closely as possible the
contour of the stone baluster.

In Fig. 3 we have a design for another device in ironwork,
but one of an entirely different character. Fig. 3 is a car-
touch made of sheet iron, the design of which is based on the
ellipse. *Cartouch* is the term applied to circular or shield-
shaped devices, whose surface is represented in relief, and the
border of which is
usually more or less
ornate with scrolls or
strap work. In order
that the student may
understand the char-
acter of Fig. 3, he
should give his atten-
tion to Fig. 17 of the
text, which is a devel-
oped outline of the
piece of sheet iron
or other metal from
which the cartouch
would be made. The
wings *a* are rolled
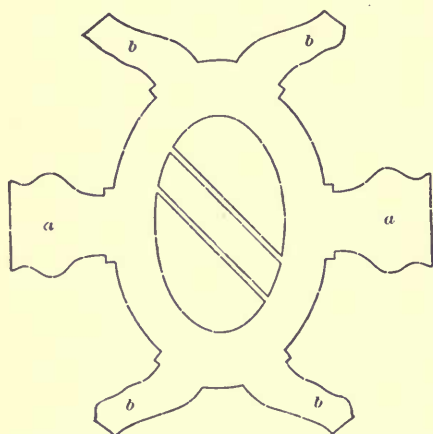
FIG. 17.

backwards and the wings *b* rolled forwards, and produce the
effect expressed in Fig. 3 of the drawing plate. The stu-
dent should lay out the figure first, as shown in the text,
and cut it out of heavy paper or thin metal, and then by
rolling the wings around his pencil in the direction indi-
cated, he can form a model of the device, which, set up
before him, will greatly assist him in the representation on
his plate. The length of the ellipse from *c* to *d* is $3\frac{1}{2}$ inches,
while its breadth from *e* to *f* is $2\frac{1}{2}$ inches. The interior ellipse
is $2\frac{1}{2}$ in. $\times$ $1\frac{1}{2}$ in., the circumference of which is practically
parallel with the outside. After the wings have been rolled

over, they project uniformly from the top and sides of the cartouch, so as to come within the outline of another ellipse shown dotted at $g\,h$. There is nothing difficult in the drawing of this figure, the ellipses being contoured in the same manner as on the previous plate, and the curled wings being represented by a simple combination of scrolls and straight lines. When the figure is completed, the student may erase all of the guide lines.

Cartouches are not only executed in metal work, but are often carved in stone or wood, or modeled in plaster or terra cotta. They are also sometimes drawn, as on this plate, as an ornament at the top, or in the center, of some certificate, or other paper of a documentary character. Its purpose, in nearly all cases, whether carved in stone or wood, or drawn or printed on paper, is to bear a device—either a number, a title, or a monogram. There are many forms of it, some being regular, as in this case, and others being irregular and eccentric, according to the purpose for which it is required.

In Fig. 4 we have an iron bracket, such as is used in many foreign cities as a sign hanger. It consists of plain straight iron rods bent into scrolls, combining beauty of curve with utility of purpose. The main rod of the bracket $c\,d$ is $5\frac{1}{4}$ inches long and $2\frac{3}{4}$ inches below the upper border line. At e, $3\frac{1}{4}$ inches from c, a hanger extends to the main wall at f, $1\frac{3}{4}$ inches above c, while from the same point e on the under side of the rod $c\,d$ the main scroll springs and becomes tangent to the wall at g, 1 inch below c. The branch scroll is tangent to the wall at h, $2\frac{1}{4}$ inches below c, and the other tangent points at i and j, $\frac{7}{8}$ inch and 2 inches to the right of c, respectively. The other curves of the scroll, and the small ornamental scrolls on the top and sides of the main bar and hanger, can be proportioned and drawn by the eye, altering and shifting them as the circumstances may dictate. The sign itself hangs below the bar within a rectangle $1\frac{1}{2}$ inches square, the center of which is at k, $4\frac{1}{4}$ inches to the right of the wall and $1\frac{1}{2}$ inches below the bar $c\,d$. The rectangle containing the sign should be drawn in place and the sign itself then sketched within it. After the figure is inked,

(a)

(b)

(c)

(d)

(e)

(f)
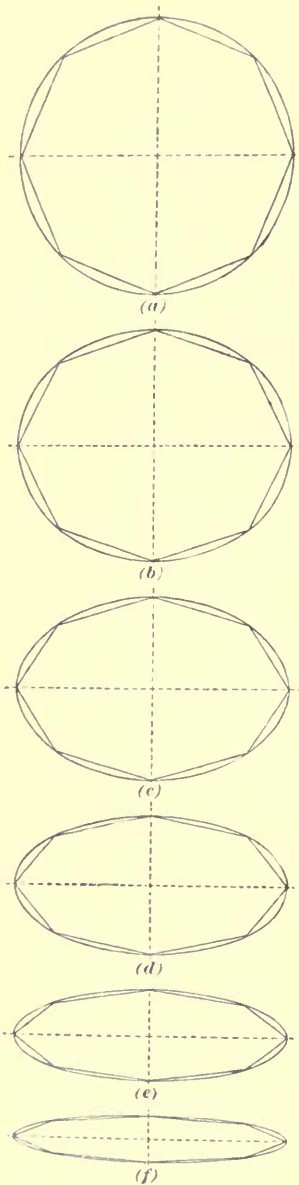
Fig. 18.

all of the guide lines should be erased. The student should take plenty of time and pains in drawing this figure, as its style is not only useful for many devices and designs, but the same design will be used again in this course to illustrate an advanced branch of ornamental ironwork. Not only are hanging signs of this character used over doors and on posts to indicate a public inn or other announcement, but they are frequently used on designs for menus and other occasional cards as a device on which to place the date, or a title, or even the initial letter of a sentence.

The next five figures on this plate will be sketches of objects in perspective, and, while it is not the intention in any part of this course to teach the theory of perspective drawing, there are a few simple details concerning perspective representation that are not only useful, but in some instances of design positively necessary. In the first place, the appearance of a circle in perspective is always elliptical, and when the student draws an ellipse, either mechanically or freehand, he represents thereby the perspective view of a circle. The student should practice frequently the drawing of ellipses of different sizes, and particularly of different widths on

the minor axis; for instance, he might start with a circle 3 inches in diameter and then draw an ellipse 3 in. × 2½ in. and another 3 in. × 2 in., thus decreasing the length of the minor axis and maintaining the same length of major axis until this diminishing circle reaches the limit in a straight line.   Having done this, he should draw inside of his circle some polygon, as shown in Fig. 18 (*a*), either an octagon or a hexagon, or even a triangle, and then project horizontally across from the circle, through all the ellipses, lines marking the corners of the polygon where they intersect the circumference of the circle.   Short straight lines, connecting successively these points in the circumferences of the ellipses, will give a perspective view of the polygon inscribed in the circle, as shown at (*b*), (*c*), etc.

Fig. 5 of the drawing plate is a perspective view of a cylinder and a cone, the former standing on its base and the latter lying on its side.   The top of the cylinder is an ellipse 2¼ in. × ¾ in., and the bottom is a semiellipse of the same size.   The height of the cylinder is 2½ inches, and straight lines connecting the extreme outside points of the ellipse and the semiellipse complete the drawing of the cylinder and represent it as it would appear in perspective.   · To draw the perspective view of the cone, a straight line is drawn from a point 1 inch below the right-hand end, the longitudinal axis of the ellipse forming the top of the cylinder, to a point ½ inch below and ⅞ inch to the left of the right-hand end of the axis of the ellipse forming the bottom of the cylinder.   On this line an ellipse 2¼ inches long by ¾ inch wide is then drawn, similar to the ellipse forming the top of the cylinder.   From the center of this ellipse draw a line 2 inches long perpendicular to its major axis, and consider this line as the axis of the cone.   From the right-hand end of this line draw two lines tangent to the curve of the last ellipse, as shown, these lines forming the sides of the cone. This will complete the view of the cylinder and cone in perspective, and the portion of the cylinder that extends behind the cone, which is shown dotted in the drawing, should then be erased.

Fig. 6 represents an octagonal pyramid. The base of the pyramid shows an octagon in perspective, which is drawn within an ellipse 2¼ inches high by ¾ inch wide. Perpendicular to the major axis of this ellipse a line is drawn 2 inches long, which is the axis of the pyramid, and from the right-hand end of this line, straight lines are drawn connecting the corners of the octagon with the apex of the pyramid, thus representing that figure in perspective.

Fig. 7 is a perspective view of an ordinary tumbler, which, though slightly more complicated, and thereby demanding greater care in execution, is no more difficult to draw than either of the previous figures. The top of the tumbler is an ellipse 2¾ inches long by ¾ inch wide, and the bottom is one-half of a regular 30-sided polygon drawn within an ellipse 2 inches long by ½ inch wide. The distance between the major axes of the two ellipses is 3 inches, and the sides of the tumbler are drawn tangent to the extreme ends of the curves. Above the bottom of the tumbler 1¼ inches, a third ellipse is drawn lightly, to indicate the point where the fluting starts. Within the two lower ellipses two semi-polygons are drawn in perspective, each with fifteen sides. These semipolygons should first be laid out in a semicircle above and below the major axes of the two lower ellipses, as shown in Fig. 19, and the points of intersection of their sides with the semicircle projected to the ellipses of the tumbler, in order to locate the points to draw the polygon in perspective. It will be observed that this figure is simply a combination of the essential points of the two previous problems.

Fig. 8 is a vase, the outline of which is precisely the same as Fig. 21 of the previous plate, except that this view represents the vase in perspective, while the one on the previous plate was simply its outline in elevation. Where straight horizontal lines mark the details of the previous sketch, ellipses now show those parts in perspective. The ellipse forming the top of the vase is a very thin one, and the student should exercise care to insure the evenness of its curve. Draw all the parts lightly in pencil; make the curves

as perfect as possible, in order that the inking process may be carried out neatly and without any irregular breaks.

The last figure on this plate (Fig. 9) is another vase with which is combined the border drawn in Fig. 8 of the previous plate. The height of the vase from the center of the ellipse a forming its top to the center of the ellipse b forming its base, is 4 inches, and the longitudinal axes of these two ellipses are $1\frac{3}{4}$ inches and $1\frac{3}{8}$ inches, respectively. The length of the neck from the center of the ellipse a to the center of the ellipse c is 1 inch, and from a to the bottom of the bulb d is $3\frac{3}{4}$ inches. The diameter of the smallest part of the neck is $\frac{1}{2}$ inch, and the lines gradually curve out toward c, where the diameter is $\frac{3}{4}$ inch. The border around the thickest part of the vase (which is $2\frac{1}{2}$ inches in diameter) is $\frac{5}{8}$ inch wide, and the line that forms the axis of the upper ellipse of this border, is $1\frac{3}{4}$ inches below a. It will be necessary to divide the band within which the border is drawn into 4 equal parts, horizontally, as the straight band was divided in Fig. 13 of the previous plate. Then
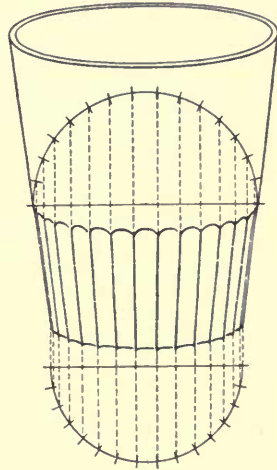
FIG. 19.

above the vase a semicircle must be drawn and divided into 24 equal parts, as shown for the tumbler in Fig. 19. Vertical lines drawn from the semicircle across the border band will locate points for the vertical lines in the fret border, and the horizontal lines may then be drawn, connecting them as was done with Fig. 8 of the previous plate; but the horizontal lines in this case will each be part of an ellipse parallel to the top and bottom elliptical lines forming the band around the vase. The vertical lines of the border will curve slightly as they approach the sides of the vase until the extreme outside lines on the right and left, will be practically parallel to the outline of the vase at those points.

11. All the figures on this plate should be practiced on other sheets of paper until the student is satisfied that he can draw each of them evenly and neatly on his drawing plate. The oftener he practices the figures in this preliminary work, the easier he will find the subsequent problems. A few extra hours of labor expended in this part of the course will save much time toward the end. When the plate is completed in pencil, the student will draw the border line with his ruling pen and **T** square, as shown, print in the title in letters $\frac{5}{16}$ inch high, and ink in all the figures freehand. The construction lines may then all be erased, leaving nothing but the full lines of the drawings. The name, date, and class letter and number can then be neatly printed in their customary places.

DRAWING PLATE, TITLE: NATURAL LEAVES.

12. It is assumed that by this time the student is thoroughly familiar with the use of his drawing instruments, both mechanical and freehand, and in the following plates he will not be called upon to ink in his drawings with the freehand pen except in special cases. He should keep practicing the making of freehand sketches with the pen, however, in order that he may not lose the dexterity he has already acquired.

This plate consists of 12 figures, each representing some form of a natural leaf, and is intended not only to familiarize the student with the characteristics of each kind of leaf represented, but also to accustom him to the study of the botanical and geometrical details of all vegetable forms used in design. Nearly all leaves and flowers are governed in outline by some geometrical figure, and by varying this outline slightly, various leaf forms are made different, while the leaves are at the same time governed by the same geometrical figure. Draw a horizontal line through the plate 5 inches below the upper border line, and divide the space between this line and the border line into six rectangles;

the ones containing Figs. 1, 2, and 3 will measure $2\frac{5}{8}$ inches in width each, and the ones containing Figs. 4 and 5 will measure $2\frac{1}{8}$ inches and $2\frac{3}{4}$ inches, respectively.

Fig. 1 is the leaf of the nasturtium, the governing outline of which is a circle, and the student should first draw lightly a circle about $2\frac{1}{2}$ inches in diameter, the exact dimensions being of no great importance. It will be observed that there are seven sides or lobes to the leaf, the lower one of which is the largest, and the others unequal. These lobes are expressed by making slight notches in the circumference
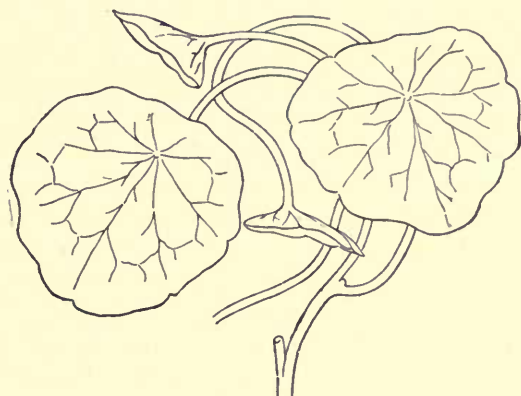
FIG. 20.

of the circle and then rounding them off into the main curve. The stem joins the leaf not on the edge but at a point about one-third the way up, and from it radiate seven veins, each toward one of the notches in the circumference of the leaf. It will now be observed that two of these veins form an almost straight line across the lower portion of the leaf, above which three of the veins radiate at almost equal angles. These are geometrical characteristics of the nasturtium leaf, and if followed out will enable the student at all times to present a fair portrayal of this class of vegetation. When used for embroidery work and other classes of design wherein a softness of outline is more consistent with the character of the material, the leaf may be expressed more freely, as shown in Fig. 20. In drawing this and the subsequent

figures on this plate, it is not desired that the student shall actually copy the drawing plate. His work will not be judged according to his accuracy compared with the copy, but according to the clearness with which he represents the object portrayed. It would be better for him, if possible, to procure a nasturtium leaf from the plant and make a drawing of that, using the characteristics in this description as a guide in the procedure. As said in the early part of this Paper, "A drawing is the expression of an idea by means of a picture," and the student's work on these plant-forms will be judged by the clearness with which he expresses his idea rather than by the accuracy with which he copies the figure.

The second figure on this plate is a leaf of the pond lily, also based on the principle of the circle, but with an even circumference that is deeply indented at the bottom. At the point of indentation a long stem joins the leaf, from which thin veins radiate toward the circumference. The length of the stem is a matter of little importance, as in nature it is governed by the depth of the water in which the lily is growing. The leaf in size may be the same or slightly larger than the nasturtium leaf, and the stem may be curled as shown on the drawing, or, if the student works from the actual lily leaf, instead of this copy, the stem may be drawn as he sees it in his original.

The leaves shown in Figs. 3 and 4 are characteristic of a number of plants, and vary in size with each plant. Their governing outline is practically an ellipse, as shown by the dotted lines. The student will draw for them two ellipses about 3 inches in length by 2 inches in width, as shown by the dotted lines, and then draw one side of Fig. 3, corresponding closely to the circumference of the ellipse. The other side diverges from the ellipse as shown, the leaf being pointed at its upper end and slightly indented at the bottom. A long vein extends from the stem of the leaf, which joins it at the bottom indentation, almost to the point at the top, and the side veins branch to the right and left. After the drawing is completed, the construction lines may be erased.

The drawing of Fig. 4 is precisely the same as Fig. 3, except the edges of the leaf are serrated or notched, as shown, and there is no indentation at the bottom, the leaf ending in a point at that end also, but more abruptly than at the top. This is the style of leaf characteristic of the rose and of the elm tree, though on the former plant it forms one of a group of leaflets, and is seldom more than half this size.

The spray of leaves in Fig. 5 is from the maple tree, and their governing outline is a pentagon, not a regular pentagon with equal sides, but one whose base is considerably longer than the other four sides. The indentations in the top lobe are more marked than those in the side lobe, and vary in different leaves. In fact, no two leaves are ever exactly alike, though the characteristics are always the same, and there should be no difficulty in portraying a maple leaf so that it is unmistakable for this class of vegetation. The lower lobes of the leaf are some-

FIG. 21.

times rounded, and in the younger leaves the indentations are much less marked than in the mature ones. In drawing the spray shown in Fig. 5, draw the large leaf first, and fit the smaller ones in under it, as shown, not necessarily following this exact arrangement, but placed in such a manner that they will show the characteristics of the leaf. Maple leaves are easily obtained in nearly all communities, and the student should certainly draw this figure from nature, if possible. The maple leaf can be characteristically and conventionally designed within the sides of a regular pentagon, however, as shown in Fig. 21.
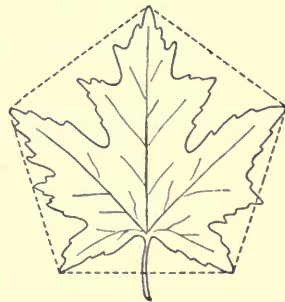
Fig. 6 is a cluster of one class of horse-chestnut leaves, the governing outline of which is practically a hexagon. Each leaf is complete in itself, but as they always grow in a cluster at the end of a stem, with almost invariably the same number in a bunch, it is proper that they should be so represented.

especially in design, as this is one of the geometrical
characteristics of their botany.   The true horse-chestnut
leaf has invariably seven leaves in a cluster, arranged in the
same manner as this example, but there is another variety
of the same tree that has either five or seven in a cluster.
To draw Fig. 6, first construct a general outline of the group
as explained in Fig. 1, and then draw in the individual
leaflets.   The general outline will be somewhat the shape of
a hexagon, with the outside points of the leaves and extrem-
ity of the stem in each of its angles.   In drawing the leaves,
observe that they are larger at their outer ends than toward
the stem; that the notches in their edges extend into the
leaf toward the stem, and are not sharp, straight lines, but
curved in the same direction as the veins of the leaf.   The
last point at the extreme end of the leaf is considerably
longer than the others, and tends to give a spear-like termi-
nation.   The peculiar form of the leaves permits them to
cluster nicely in a bunch, as shown, and enables them to be
conventionalized and easily used in certain forms of geo-
metrical designs.

These six figures, constituting the upper half of the plate,
will serve to familiarize the student as far as is necessary
with the geometrical and botanical characteristics of these
particular forms.   He should make it a point, however, to
study other forms, and broaden his knowledge as much as
possible in the observation of nature.   He should frequently
draw the leaves of different plants, and if his drawing does
not convey a satisfactory idea of the leaf itself, he should
analyze his drawing carefully, and also the natural leaf, and
learn wherein he has altered or omitted some detail that
stamps the character of the original.   These leaves have
been drawn singly because they are usually seen singly on
the trees, or on the ground under the trees, with the excep-
tion of the horse-chestnut leaf; they are seldom associated
in the mind as clusters.   In the next six figures, however, a
class of leaves is considered that are associated with the vine
or plant on which they grow, and their characteristics must
be considered, not singly, but together with the plant and

surrounding details. Figs. 1 to 6 represent, also, a development in botanical evolution, the theory being that the fundamental leaf form was circular, as in Fig. 2. The notches in the outline of Fig. 1 are indicative of a lack of nourishment being conveyed to the margin of the leaf at certain points, thereby retarding its growth; the serrations in the edges of Fig. 4 are caused by a similar lack of circulation of sap, until finally we come to Fig. 5, where the serrations are so developed as to make lobes on the edges of the leaf, and in Fig. 6 to cause the leaves to grow in clusters at the end of one stem, instead of a single leaf. The different forms of the edges of leaves so developed are due to the system of veining. A study in comparison of different forms of leaves will soon place the student in a position to judge and recognize the proper veining of a great many leaves, according to the indentation of their edges. The nasturtium leaf is indented regularly at the end of each vein, and the veins are regular and straight. In the maple leaf the indentations are very irregular, because the veining of the leaf is irregular and forms a network throughout the whole tissue. In the horse-chestnut leaf the general veining is regular in each individual cluster, thereby causing an even subdivision into a uniform set of individual leaflets, while the edges of each leaflet are serrated, owing to a slight irregularity in their individual veining.

Fig. 7 is a spray of the vine and leaves of the convolvulus, which is of the class of vine to which the morning glory belongs, and the student will not attempt to draw the same until he has, on a separate piece of paper, frequently practiced the drawing of the individual leaves of the plant. The number of leaves on the stem will depend on the object from which he draws. If he can secure a slip of the vine itself, he will draw it as he sees it, locating the leaves as he sees them, and not in any way attempting to copy his drawing plate, but referring to same for the expression of the stronger characteristics of the growth. If he cannot secure a slip of the plant, he will have to make his drawing from the plate. The leaves of this example are triangular, slightly

indented at the bottom, and manifest a strong inclination to curl up slightly at the edges. They are a soft leaf, and rarely lie stiff and flat, like the maple. In drawing
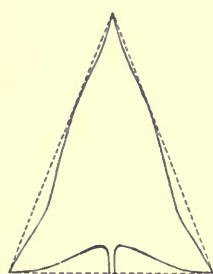
FIG. 22.

them, the student will observe the character of the veining, the arrangement on each side of the main stem, noting that they branch alternately, and that no two of them start from the same point. The leaf that is turned over, showing its under side, indicates the method and manner of the stem joining the surface, and in making the drawing the student has but to bear in mind that the governing principle is an isosceles triangle, as shown in Fig. 22, and the arrangement on the stem is an alternation on opposite sides.

Fig. 8 is a spray of ivy leaves, each of which may be drawn within a pentagon, as shown in Fig. 23, in the same manner as was described for the maple leaf. The edges of the ivy leaf are not serrated, and the sides of each lobe are distinctly curved. Each leaf has five lobes; the stems join them in a stiff, angular way at the lower indentation, and are heavy in proportion to the size of the leaf. The leaves do not show the wavy outline of the morning glory, for they are naturally stiff and somewhat clumsy. The stem from which the leaves branch is of a woody texture, and is much stiffer and harder than the stem of the morning glory; therefore, it does not grow in a wavy line, and care should be taken that, though the ivy is a vine and manifests as strong an inclination to climb as does the morning glory,

FIG. 23.

it does so in a stiffer and more regular manner—a characteristic that should always be expressed when it is used in
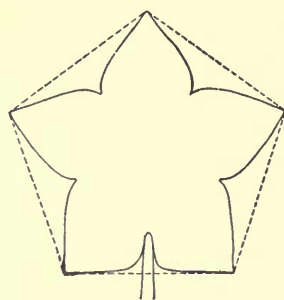
design.   The student will draw Fig. 8 as shown, or from
the natural leaves, if such are obtainable.

Fig. 9 shows the long stem of the lily.   There are several
classes of lilies that manifest different characteristics in
some of their details.   This view shows the principle on
which the leaves branch from the stiff stem, their tend-
ency being to grow upwards toward the flowers, which
bloom at the top.   Each individual leaf is a plain straight
blade, sometimes with a strongly marked central vein, and
at other times with a number of veins running through it.
Its lower end wraps itself partly around the stem, and in
some classes, such as the tiger lily, the flowers blossom at
the juncture of the leaf and the stem, and after the flowers
have blossomed, a round seed marks the place where they
stood on the stem.

Fig. 10 is a branch of the olive tree—a very difficult speci-
men to get from which to draw from nature, but an impor-
tant leaf in design, as it has always been held as the emblem
of peace.   The leaf of the olive is long and narrow, very
slightly widened at its upper end, somewhat after the gen-
eral shape of the chestnut, but softer and not so conspicu-
ously unequal.   The fruit grows on branches under the
leaves, with six or eight olives on each branch.   In drawing
this little spray, it is simply necessary to indicate the main
branch about as shown on the plate, and draw the two leaves
that terminate at its upper end.   The next two leaves below
these grow out of opposite sides of the main stem, from
the same point in height.   They are not directly over the
ones below or under the ones above, but take a position
half way around the stem from these, so that if the stem
were so held that any two of its leaves pointed toward
the north and south, the pair next above and below them
would point toward the east and west.   This is a char-
acteristic that should always be borne in mind in represent-
ing the plant.

Fig. 11 is a branch of laurel introduced here with the olive
on account of its symbolism, the laurel wreath being an
emblem of victory.   The shape of the laurel leaf is not

widely different from the olive, but it is much larger, being 3 inches or more in length, while the olive is seldom more than 1½ inches or 2 inches. The leaves of the laurel grow all around the stem, branching alternately from opposite sides, and the edges, though not serrated like the rose leaf, are indented by a series of rounded notches at the end of each vein. The flowers of the laurel blossom in the angle between the leaf and the stem.

The last figure on this plate (Fig. 12) shows two kinds of the palm—a plant emblematic of royalty. The palm leaf is used largely by the Egyptians in many of their designs, and from it were made several devices and utensils important in the ceremonies and customs of the complicated formalities of the ancient Egyptian society. In drawing the palm as shown on the plate, the student will observe that in one example of it the leaf radiates from the end of the stem, and he must bear in mind that though the edge is ragged and broken up into a number of string-like terminations, its natural unbroken form is practically circular, and that the delicacy of the tissue composing the leaves causes them to be shredded on the edges when blown together in high winds or handled roughly when taken from the tree. This variety is known as the *fan palm*. The other form of palm, called the *feather palm*, is similar in texture of leaf to the first, but its veins radiate from a line instead of from a point; this difference of radiation will recall to the student Figs. 18, 19, and 20 of his first freehand drawing plate.

The student will complete this plate and draw the border line, but ink in none of the figures. It is desired that he should become accustomed to drawing rapidly and readily with the pencil and expressing himself with as few lines as possible. He must bear in mind that he is not to be a copyist, that no two leaves in nature are alike, and, therefore, it is unnecessary that he should portray any of the leaves on this drawing plate exactly like the example we send him. However, he must remember that in each case he is solving a problem; he is endeavoring to express by means of a picture the idea of a certain form of leaf, and that failure to

express all the characteristics of that particular leaf makes the solution of this problem incorrect. The title may be put on the top of the plate, as shown, and the name, date, and class letter and number printed below the margin line as heretofore.

DRAWING PLATE, TITLE: FLOWERS AND CONVENTIONALIZED LEAVES.

13. On this drawing plate the student is given a few examples of familiar flowers, and the same remarks concerning the method of drawing them applies here as with the previous plate. Original flowers are to be preferred rather than printed copies, and whenever such are obtainable, the student should avail himself of the opportunity to draw them.

In Fig. 1 is shown the morning glory, its bud, and the method of its branching from the vine. The flower itself is trumpet-shaped, the upper end being practically circular, which makes it elliptical when shown in perspective, as it is here. The sides of the tube forming the lower part of the flower are curved slightly, and gradually approach a straight line toward the stem. Observe that where they join, the little leaves around the bottom of the tube have pointed ends and form a cup called the *calyx*, in which the trumpet-like flower sets. Observe that the bud of the flower is twisted, producing a screw-like effect, as shown to the right of the open blossom.

Before drawing this plate, divide the paper lengthwise through the center, $6\frac{5}{8}$ inches above the lower border line, and above this center line construct five rectangles $3\frac{1}{4}$ inches in width and 5 inches high, with the center line as their common base. Proceed to draw Fig. 1 in the first rectangle by constructing an ellipse about 3 inches above the center line of the plate and about $2\frac{1}{4}$ inches in length on its major axis, and $\frac{1}{2}$ inch or a little more on its minor axis. Within this ellipse, describe the slightly scalloped edge of the upper portion of the blossom. Draw the lines

forming the trumpet-like tube of the lower portion of the blossom, and then draw the stem. The main stem of the vine runs from the lower right-hand to the upper left-hand corner, and by noting where it crosses the upper edge of the blossom, its position on the plate can be determined with sufficient accuracy. The leaves and bud may then be drawn in their relative positions.

If the flower is drawn from nature, as heretofore suggested, the student need not follow closely these directions, except so far as they apply to inserting each problem in its proper rectangle.

Fig. 2 shows two flowers somewhat alike in their general formation but possessing characteristics that stamp them so forcibly that it is impossible to mistake one for the other; these are the phlox and the carnation. Both flowers possess five petals radiating from the center. The petals are larger at their outer ends and taper almost to a point where they come together. They enter the top of an almost straight tube that is held at the bottom by the little green calyx, where it joins them to the stem. This tube, however, is larger in the carnation than in the phlox, and the carnation itself is a larger flower than the phlox. The edges of the petals of the carnation are toothed very sharply and very plainly, while the edges of the phlox are round. The outline of the ends of the flowers are practically governed by a pentagon, and in drawing them the student should be careful to emphasize the characteristics of each, the strongest distinctive characteristics being the round petal of the phlox and the toothed petal of the carnation.

In making the final drawing of these flowers on the plate, the student will locate the first carnation of the bunch in the upper left-hand corner of the second square, as shown. He will then draw it so that its stem will pass out of the square near the lower right-hand corner, and then successively draw the other two blossoms in place, to the right and left of the first one. The outline governing the ends of these blossoms is practically elliptical, although the edges of the petals vary more in the carnation than they did in the morning glory.

In drawing the phlox, observe that the petals of the flower form a part of the tube that connects the flower with the stem, thus differing from the carnation, where the petals grow out of the tube.   The outlining of the petals is practically the same, though on a smaller scale, and the governing outline of the top of the flower is an ellipse, as in the previous cases.   Observe here that the blossoms of the phlox are all on one stem, while with the carnation each separate stem carries a flower.

The exact arrangement of these flowers on the plate is not of importance as long as they are within the second square.

In Fig. 3 is shown a couple of sprays of a little flower known as the harebell.   The flowers themselves are cup-shaped and hang from fine thread-like stems that grow alternately on opposite sides of the main stem.   It has no large leaf like most flowers, but a series of little spur-like projections along the stem, as shown.   The edges of the flower are indented by fine notches that curve in from the top, and the spaces between these indentations rise to little sharp points, giving the flower a very pretty and strongly characterized marking.   The bud, as shown at the top of one of the sprays, is formed by the ends of the flowers closing over and folding themselves within, and does not twist around like the buds of the morning glory.   In drawing the figure, try to keep the flowers in a graceful position; also prevent any appearance of stiffness or forced regularity, and especially be careful to draw them with a light delicate touch, avoiding a crude hard line, as one of the strongest characteristics of the flower is its delicacy, and this would be destroyed by too harsh a rendering of the pencil.

Fig. 4 shows the ordinary dogrose, the flower possessing five petals, which radiate from the center and are slightly curled up on their outer edges.   Where they join, a series of fine hair-like filaments (botanically known as pistils) mark the center.   The leaflets grow on opposite sides of a thin stem, usually three on each side and one on the end, and the edges of the leaves are sharply serrated, as explained on the previous plate.   The thorn is characteristic of all kinds of roses, and should always be expressed as a characteristic of the plant.

Fig. 5 is the common field daisy—a flower easily obtainable during the month of June, and a very interesting subject for various classes of design. It grows at the end of a long stem, at the lower part of which the ragged leaves branch and spread on the ground. The flower itself varies in size from 1 inch to 1½ inches in diameter, is practically circular in outline, and consists of a number of white petals that branch from a central disk or sun in the center, about one-fourth the diameter of the whole flower. The petals vary in number, and branch out thickly on all sides, forming a solid white disk. The side view of the daisy shown on this plate illustrates the tendency of the leaves to grow upwards slightly, and also shows the thickness of the sun or center piece below the petals of the flower. In drawing the daisy, it is well to sketch in the outline as a circle, and to draw the sun as a circle, and then, one at a time, indicate the petals or rays that branch around the edge. The petals are rather wider at their outer end than in the middle, and taper almost to a point where they sprout from the flower; two deep notches in the end cause three teeth to be characteristic of their outer extremities.

Now, besides drawing these five examples of wild flowers as shown on this plate, the student should take every oppor-
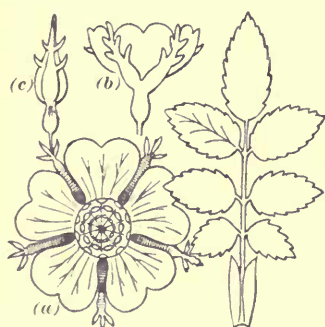
FIG. 24.

tunity to study the flowers themselves, and after he has drawn the details of each flower as he sees it in blossom, it should be taken apart and analyzed. For example, we take the wild rose and pull it apart, and make an individual drawing of one of the petals, or of all of them, as shown in Fig. 24. Every detail of every part of the plant should be simi-

larly drawn, in order that we may become familiar with the characteristics of the plant as separate from the plant itself. The leaves in their arrangement on the stem should be made

the subject of another drawing, and this drawing of the details of the flower preserved as a guide to be used when the flower itself is expressed in a conventionalized design. The practice of thus drawing the details of a flower, or other vegetable form, is called *plant analysis*, and is the only way by which the strongest characteristics of every individual plant can be properly studied.

In drawing the figures on the upper half of this plate always outline the grouping first, as explained heretofore. Then draw the individual outline governing the extremities of the flowers, etc., and finally fill in and develop the detail.

The lower part of this plate contains four figures, and requires that the plate, below the center line, should be subdivided as follows: The center line of Fig. 6 is $2\frac{3}{8}$ inches to the right of the border line, and its top is tangent to the horizontal center line of the plate. The center line of Fig. 8 is $8\frac{3}{4}$ inches to the right of the border line, and the rectangle containing Fig. 8 is 3 inches wide by 6 inches high. Fig. 7 is then fitted in between this rectangle and Fig. 6. The wall on which the bracket in Fig. 9 hangs is about $\frac{1}{4}$ inch to the right of Fig. 8. By locating these points on the plate the student will have no trouble in drawing his figures in the proper places.

With Fig. 6 of this plate we take up the first part of the subject of conventionalized forms. It is seldom that a plant or other form from nature can be used in a design with reason without reducing it to a plain practical form that is conventional or symbolic more than pictorial. Fig. 6 is a conventionalized form of the acanthus leaf, and as we draw it we will endeavor to get a better idea of the meaning of the word *conventional*. In the first place, the outline of this figure is based on the ellipse, and the student's first move will be to construct in the corner rectangle of his drawing plate a semiellipse $4\frac{1}{2}$ inches high and 4 inches wide. Within this he will draw the main outline of the lobes of the leaf, as shown in Fig. 25, observing that these lobes are farther apart as he approaches the top of the leaf, or, in other words, are closer together at the wider portions of the

leaf. There is a central lobe and three smaller ones on each side. The top lines of the side lobes are curved, but are nearly horizontal in position, and the side lines of the lobe are inclined slightly toward the center of the leaf. The middle vein is a straight line on the major axis of the ellipse, and the side veins curve from the points of the lobe to the bottom line, as shown, and approach the central vein as they reach the bottom; in other words, if all the veins of the leaf were continued downwards, they would eventually meet in a point like the lines radiating from a point in Fig. 18 of Drawing Plate, title, Linear Elements. The acanthus leaf
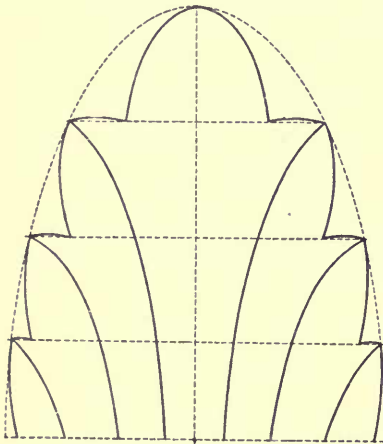

FIG. 25.

is now drawn by serrating the edges of these lobes, following the drawing plate as closely as possible. The inner angles of the lobe are then carried into the leaf in the form of loops, the vertical lines usually being the ones that govern the direction of the loop. The leaf lobes are then drawn as though lapping over one another slightly, and extra lines are drawn indicating the sides of the *pipes* or tubes that are naturally formed in the leaf where these loops exist. This can be more readily understood by referring to Fig. 39, where the surface of the conventionalized leaf is shown as it usually appears when carved in stone or wood or modeled in clay or plaster. It will be seen that the sides of the leaf on this plate are symmetrical, that the leaf is perfectly flat in the drawing, and no attempt is made to shade it. The existence of the last line drawn from the loops down is indicative of the raised surface of the pipes on the leaf. This is the expression of an idea by means of a picture. It is not a picture of the acanthus leaf as it appears in nature, but a

picture of the characteristics of the leaf—characteristics that are themselves emphasized beyond the mere drawing of the leaf itself, and it is the emphasis of these characteristics that distinguish in the drawing of a leaf or flower the naturalistic and the conventional rendering. Flowers and leaves may be rendered naturalistically if they are painted on canvas or printed on paper, but if woven in cloth or carpet, or used as a part of a wall-paper design, or burned in leather, the details of the process by which they are thus reproduced will not permit of an accurate portrayal of them naturalistically. They are therefore conventionalized, and lines indicating their strongest characteristics are woven, printed, or carved to stamp the leaf for what it is. In drawing this figure, complete both sides. The example on the drawing plate was left unfinished on the right side in order to show the relation of the semiellipse.

Fig. 7 is a side view of the conventionalized acanthus as it is sometimes used in connection with scrollwork on brackets. The **S**-like outline of the leaf is first drawn about $4\frac{1}{2}$ inches high; the lower curve is then drawn to measure $2\frac{1}{2}$ inches across, and the upper curve about $\frac{3}{4}$ inch across. The lobes are then outlined exactly in the same manner as the previous case, and the indentations drawn within these outlines, as before. The veins running from the center of the lobes are then drawn, following the contour of the lobe itself, and finally becoming tangent to the main curve at the outside of the leaf. After the leaf has been drawn, the guide lines, which are shown dotted on the original drawing plate, may be erased by the student, and the drawing of the leaf itself completed.

In Fig. 8 is shown a panel in which is drawn a conventionalized design based on the growth of the ivy, and which is, with slight alterations, a suitable design for carved wood or burnt-leather work, or even for embroidery. The details are not as conventionally rendered as would be necessary for certain woven work, such as damask linen, or silk, but the two sides of the design are precisely alike, and the details all geometrically arranged so as to reduce the whole to a

mathematical principle. In drawing the panel, make its dimensions 3 inches wide by 6 inches high, and divide it into eight equal rectangles each 1½ inches square, as shown in Fig. 26. Within these rectangles then draw a number of pentagons, more or less irregular, according to the outlines
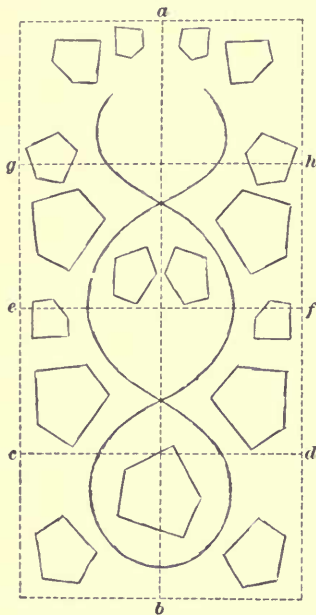

FIG. 26.

of the various leaves, and generally indicate the lines of the main stem of the vine where it crosses the dividing lines of the squares. Notice that the center of the main stem crosses the center line of the panel *a b* about one-fourth of a square above the bottom, and it curves so as to cross the horizontal line *c d* a little less than one-half a square each side of the center line. The two stems then cross each other on the center line one-third of a square above the horizontal line *c d*, and they cross the horizontal line *e f* about one-half a square to the right and left of the center line. These stems then cross the line *g h* about one-third of a square each side of the center line *a b*, and cross each other on the line *a b* one-fourth of a square below the horizontal line *g h*.

These measurements are not absolute and should be judged by the student entirely by the eye. A principle to be observed is that the arrangement of the panel is based on the same rules concerning foliated ornament that were given in connection with the Drawing Plate, title, Linear Elements, under Art. 9. The strongest growth should be at the bottom, the arrangement of the leaves and area covered by them should diminish toward the top, and though it is not the nature of the ivy that its leaves should grow tangentially

from the stem, the stems should be so arranged that they appear to grow gracefully and rationally, one out of the other, without abruptness or severity. The main stem, however, should be stiff, rigid, and geometrical, as explained in the instructions for drawing the ivy leaf on the previous plate, as this stem is stiff and woody in its natural growth. Within the pentagons that have been previously drawn to indicate the locations of the leaves, carefully outline the five lobes of the ivy leaf and connect them with a gracefully curved stem with the main lines of the growth. Enclose the whole design in a border line, as shown.

In using such a design as this for practical work, the relative sizes of the stems and tendrils may be materially altered. Certain materials and methods of handling will permit a much more delicate treatment than is here shown, while other conditions will demand that all the lines be bolder and that some of the details at the top of the panel be suppressed entirely. For instance, if the design were to be embroidered, the colors to be used would determine largely the strength of the line of the stem, dark colors always looking heavier than light ones. The curve and arrangement of the fine tendrils at the top would also be altered, as the tracing of these lines would be governed by the possibilities of the handling of the thread employed. If the design were to be carved in wood, the tendrils at the top would probably be omitted entirely, and heavier forms replace the smaller leaves. The nature of woodwork would not permit so delicate a treatment at the top, and as the omission of the tendrils would leave a blank space that would look unfinished, the leaves themselves should be enlarged to satisfy the feeling that the proper area at the top had been covered. In the smaller stems, throughout the body of the panel, the design would probably require strengthening, that it might be better expressed in wood, and their increase would require a general increase in the thickness of the main stem throughout, in order that the proportions of one to another might remain the same. After the student has carefully outlined these details he should

strengthen up the general lines of his drawing, clean off his guide lines, and then finish the figure in pencil.

Fig. 9 is a bracket and hanging sign, similar in every respect concerning its general outline to the bracket and sign drawn by the student on Drawing Plate, title, Surfaces and Solids. The student will draw the outline of this bracket and sign precisely as before, but where the lines of ironwork split and branch into separate scrolls, he will cover the joint with a drawing of a conventionalized leaf, the details of which he has just studied. The length, size, and proportions of the different parts of the leaf he must judge by his eye, observing that the outline of the leaf follows
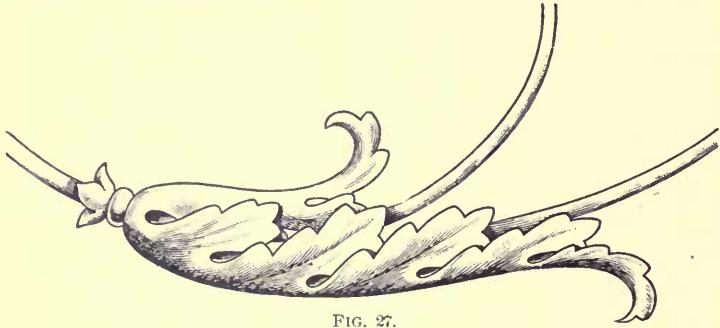

FIG. 27.

closely the outline of the ironwork that it covers, and observing, also, as he draws it, that he is converting a plain strap-iron bracket into an ornamental device, requiring in its execution the greatest skill in the ironworkers' art. It is also well for him to know that in the execution of a design of this character for an ironwork bracket that might be used either as a sign hanger, or as a design for a chandelier or gas bracket, he has to exercise the same judgment in the formation of the leaf as was necessary when he made his drawing of the cartouch on his second freehand drawing plate. The leaf itself must be cut out of plain sheet iron by the ironworker, and hammered into the shape expressed by the designer on his drawing. It is well, then, for the student to study what the developed shape of this leaf would be if it were flattened out. He will probably then find by

experiment that the leaf can be improved in design by
varying some of its dimensions.   Referring to Fig. 27, we
see a piece of iron scroll projecting
from a hammered ornamental iron
leaf, while in Fig. 28 a developed
form of this leaf is shown in out-
line before it is hammered into this
shape.   It is a simple matter, and a
very instructive practice, for the
student to experiment in drawing
and making these devices of paper
or thin metal, as was suggested
previously in the drawing of the
cartouch. Very thin brass or cop-
per is an excellent material to prac-
tice with.   It may be readily cut to
any desired shape with ordinary
scissors, and bent and creased with
the fingers to bring it up to the
finished shape, and the student that
can both draw and model his designs
will be in better shape to execute
satisfactory compositions than the
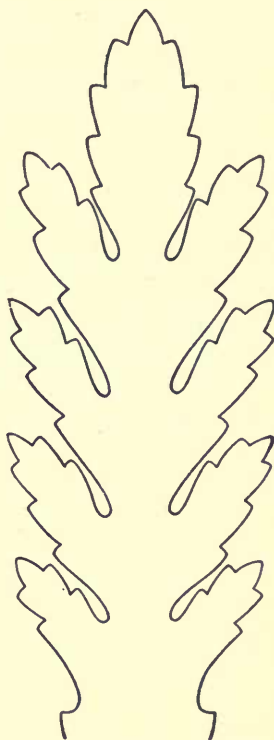one that is simply satisfied to express
his ideas on paper.

The student will finish drawing
the bracket as shown on the draw-

FIG. 28.

ing plate, and, after drawing the border and inserting in the
title at the top, will letter his name, date, and class letter
and number below the border line as heretofore.   The fig-
ures on this plate will remain in pencil.

DRAWING PLATE, TITLE: BRUSH WORK.

14.   As expressed in the first part of this course, design
in its most elementary state consists of an arrangement of
lines, these lines forming the boundaries of several shapes
or definite forms; they may be straight or broken, heavy or

fine, firm or delicate. This variation of the quality of each line, combined with the possibilities of variation in arrangement, renders it possible, as already explained, to give a great variety of expression to a design that consists of lines only. Certain classes of work depend entirely on this line arrangement for their value as artistic productions. In dress goods, a great variety of plaids, though influenced by the combination and comparison of their colors, are dependent more largely for their beauty on the arrangement, weight, firmness, and delicacy of the lines of color that constitute their design. In leaded and stained glasswork the necessity of uniting the multitude of pieces with strips of H-shaped lead, compels the design to assume in its composition a number of irregular black lines that the skill of the designer arranges to form a part of his composition and therefore renders inconspicuous. The design of a window may consist of delicate figures and foliage, or it may be simply a heraldic or symbolic device, but the lines of the lead work must each be considered as a part of the composition; otherwise they will interfere with the repose of the whole and render it inartistic and unsatisfactory. In order to produce lines expressive of beauty, the hands must be well trained to execute the ideas of the mind, and the mind well trained in matters of art and composition. It is for the former of these requirements that the student has been drilled on these simple exercises of freehand drawing, but the latter can be acquired by him only through a persistent study and analysis of the works of art through all ages.

In the drawing of lines with a pen or pencil there are limits to the weight, strength, and firmness that can be expressed, but with the brush there are no such limitations, and by varying the size of the instrument, and the shade of the ink, or other medium used, there is no extreme that may not be reached in the matter of boldness, power, and nobility of expression in any design, whether it is composed of individual lines or of shaded surfaces. In drawing lines with a brush there are many kinds of instruments that will produce the required results, but the Japanese painting brush, shown

in Fig. 29, is undoubtedly the simplest, after the student has become accustomed to its management and the peculiar method of holding it.* The brush is not held as is an ordinary water-color paint brush, but is managed after the

FIG. 29.

Japanese method, and held as shown in Fig. 30, in order that there may be perfect freedom of movement to the hand and power to produce even results in all directions. To draw simple lines with the brush, the student should practice according to the following directions until he has acquired such dexterity in its management that he feels confident of properly executing the problems on the plate. If the student finds he can do better with an ordinary brush, there is no objection to his using it.

In the general practice with brush work the student should not use his ink in full strength; in fact, it is a great deal better that his wash drawings should be executed with a very dilute ink producing a gray wash, instead of a heavy black silhouette-like effect. For this purpose, Stafford's "*Not Waterproof*" or Higgins' "*General Drawing*" ink may
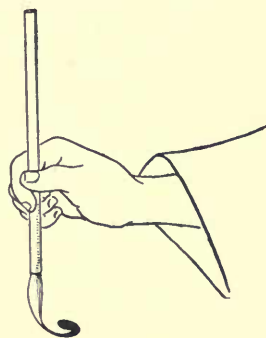
FIG. 30.

be diluted with four to eight times its bulk of water, and used to produce a tint about the same as that shown on the accompanying plates. A good way to do is to pour a

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* If the Japanese brush is not used, the student may practice with ordinary camel's-hair brushes, such as are used in general water-color work. These are held in much the same manner as a pencil, but the hand is not as free as with the Japanese brush. We, therefore, advise the student just beginning to study brush work, to use the style of brush illustrated in Fig. 29. All new brushes should be soaked in water one hour before they are used the first time, and washed clean and wiped after using. After wiping the brush, it should be moistened in the mouth and its hairs drawn to a point between the lips. It may then be put away and allowed to dry.

small quantity of ink (2 or 3 drops being usually sufficient) in a small saucer and add thereto enough water to reduce it to the desired color. This may be determined, after stirring the brush in it thoroughly, by drawing a light wash of it over a piece of paper and allowing it to dry. If the tint is lighter than that on the drawing plate, or is very much darker, then more ink or water must be added to change its tint to the one required. A very little practice will enable the student to judge the amount of dilution necessary. Drawing ink thus diluted is usually called "color"—a term used in brush work, generally, to indicate that there is a variation of tint rather than an even monotone.

It may also be pointed out that where a drawing is to be executed in ink and afterwards washed in, in color, as in the wash tint above described, that the outline of the figure should be drawn in *waterproof* drawing ink, and the wash work done with dilute general ink. The reasons for this should be apparent. If the outline is drawn in general drawing ink, which is not waterproof, the wet color will cause it to spread and become ragged on the edges and contaminate the tint and destroy the even effect of the outline. Whereas, if the outline is drawn in the waterproof ink, and then waterproof ink is diluted to use for the wash work, the ingredients added to the ink to make it waterproof are antagonistic to its dilution, and the wash of this ink is likely to settle in uneven spots and make an irregular and dirty-looking drawing.

15. Whenever a considerable surface is to be washed over with an even tint of color it is necessary that plenty of color be first taken in the brush, and the upper left-hand corner, or other convenient point of the subject, be lightly drawn in with the point of the brush, and the color then spread evenly and generously over the entire surface. The color can be carried to any extent by recharging the brush from time to time and adding it to the surface that is not yet dry, or to the bottom of the previously applied color, which should always be allowed to remain in a slight pool while the brush

is recharged. Should the color dry, or become nearly dry, it will be impossible to apply a new tint over it of greater extent, without showing a line where the first wash stopped. In applying color in this manner, the student should incline his board so that the color will flow downwards, and can be led in even advances by means of the brush; and each time the brush is recharged with color it should be stirred around in the saucer so as to evenly distribute the pigment, or coloring matter, through the fluid.

The student can readily learn the value of placing one tint over another by drawing in pencil a rectangle 8 inches square, and dividing it by means of vertical and horizontal lines into sixty-four equal squares of 1 inch each. If he will then tint evenly with a very pale shade of color the upper left-hand square of the main rectangle and allow it to dry thoroughly, and then with the same tint of color wash over the two upper left-hand squares within the rectangle, and allow these to dry, and so on repeatedly until he has covered the entire area of 8 in. × 8 in., he will have in the upper left-hand corner of the main rectangle sixty-four applications of one tint, and in the lower right-hand corner, one application. The gradual and almost imperceptible grading of one square into another, from the palest shade to the darkest, will give him a valuable insight into the use of color for expressing light and shade. In trying this experiment, however, he must be sure that each successive wash dries thoroughly before the next one is applied. As this will take some time, it is well that he should not attempt to execute the whole sixty-four squares at one sitting, but paint a few at a time from day to day until the entire work is completed.

16. Pin a sheet of paper to the board as usual, and hold the brush between the thumb and middle finger, as shown in Fig. 30, steadying it with the forefinger. Dip the brush in the ink and hold it perpendicularly over the paper; draw a vertical straight line with a single movement or sweep of the arm, keeping the hand free from the paper and an even

pressure on the point of the brush; never permit the brush to become inclined in any direction, and do not allow any movement of the fingers to change the form or direction of the line, all of which should be controlled entirely by the movement of the arm.   Do not draw the line as with a pencil, according to instructions given on your first drawing plate—draw it slowly and continuously, and never allow the movement to become jerky.   Confine the entire attention to the execution of a single line, and pay no heed to any wavering, or apparent irregularity, as these are of no importance whatever, and often add character to the work of a designer. The main object sought should be the maintenance of a uni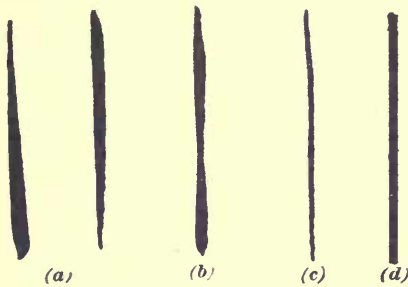form width of line, by the keeping of a uniform pressure on the brush throughout the entire length of the stroke, thereby avoiding such results as shown at (*a*) in Fig. 31, which are due to a gradual increase or decrease of pressure as the stroke progresses.   At (*b*) is shown a line that is of unequal thickness, due

(a)   *(b)*   *(c)*   *(d)*

FIG. 31.

to varying pressures throughout the stroke.   A line such as shown at (*c*) is not objectionable, although it is not perfectly straight; it is of uniform weight, and expresses a direct connection between two points, and is, therefore, satisfactory for brush-work design.   A ruled line like (*d*), however, has no artistic value whatever, and should never be used in any other than absolutely mechanical work.   Draw these lines repeatedly on separate pieces of paper until you are proficient in making them vertical and horizontal, and parallel to one another.

Now repeat the first six figures executed on Drawing Plate, title, Linear Elements, carrying them out according to the rules for brush drawing instead of the rules for pen drawing.   Make the lines about $\frac{1}{8}$ inch in breadth and

about 6 inches long, and execute them in one even stroke. After acquiring proficiency in this work of rendering a single even line, the student may attempt the expression of a conventional form by a single stroke of the brush. In doing this, the student charges his brush thoroughly with color, laying the point lightly on the paper, and drawing the brush toward him with an even straight stroke, gradually increasing in pressure, until at the center of the stroke he is utilizing the full width of the brush; and then decreasing the pressure until the end terminates in the point, thus producing a leaf-like form such as is shown in Fig. 32. Repeat this practice, making the forms vertical, horizontal,

FIG. 32.

and inclined; then attempt the drawing of the form shown in Fig. 33 (*a*). The only difference between this and the

(a) (b)

FIG. 33.

previous figure is that its end is round instead of pointed, and the point of greatest breadth is nearer the upper end than the middle of the stroke. The regulation of this is by brush pressure entirely, but in starting a stroke of this kind it is necessary to draw with the point of the brush a short curve, such as shown in Fig. 33 (*b*), and while this curve is still wet, the end of the brush is pressed down beneath it until the hairs spread sufficiently to include it in the general stroke that follows. This form may also be drawn in the same manner as

that shown in Fig. 32, the stroke being carried only half way and the lower edge being finished with a small curve. This will produce a form like Fig. 33, but upside down. Having drawn these two forms repeatedly until the student can produce them so uniformly that several of them side by side appear to be almost

(b)

(a)

FIG. 34.

exactly alike, he may attempt to draw the same figures curved instead of straight, following the single and compound curves shown in Fig. 34.
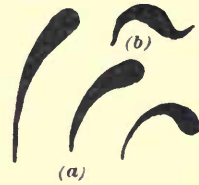
17. Having practiced this brush work sufficiently to become thoroughly familiar with it, the student may now attempt Fig. 1 of the drawing plate. This consists of the elements of a border, Greek in its origin, but formed entirely of single strokes of the brush; in fact, a large proportion of certain classes of Greek and Roman mural design is governed in its main characteristics by the limitations of form that can be derived from single brush strokes. Each section of Fig. 1 consists of a single stroke drawn as above explained. Preliminary to drawing Fig. 1, the student should draw the border line of his plate in pencil, and then divide the plate by a horizontal pencil line $a\,b$, $\frac{1}{4}$ inch above center of plate. The upper half of the plate should then be divided so as to include five figures, as follows: At distances $\frac{3}{8}$ inch and $1\frac{5}{8}$ inches from the left border line, and 1 inch and $2\frac{1}{4}$ inches below the top, lines are drawn parallel to the border lines, within which the details of Fig. 1 are drawn, as shown. To the right of the left border line, $3\frac{1}{2}$ inches, a perpendicular line is drawn to form the center line of Fig. 2. Between the center lines of Fig. 2 and Fig. 3 a space of $3\frac{3}{4}$ inches is left, and between the center line of Fig. 3 and that of Fig. 4 another space of $4\frac{1}{4}$ inches is left. In the space between the center line of Fig. 4 and the border of the plate, Fig. 5 is drawn, so that its right extremity extends to within $\frac{1}{4}$ inch of the border line and its lower left extremity extends to a point hereafter to be described. The part of the plate below $a\,b$ is again divided by a horizontal line $c\,d$, and vertical lines through this lower half of the plate are drawn, dividing it into ten equal rectangles, within which the figures are drawn, as hereafter described.

The lines already drawn for Fig. 1 parallel to the border line, may now be divided by light pencil lines into six squares, the corner one being left blank, while in each of the other five is one of the devices characteristic of the border. In the center of each square draw a vertical brush stroke similar to Fig. 32 of the practice strokes just explained, but with its widest part near the top; and alternately on the right and left of this stroke, commencing at a point half way up

the square and almost touching its sides, draw a curved
stroke similar to *a* of Fig. 34 of the practice strokes. Beneath
these, and half way between the second strokes and the bot-
tom of the square, draw a third brush stroke on each side
the center similar to *b* of the practice strokes, thus comple-
ting one section of the border.   Repeat this operation in each
of the squares, as shown on the plate, being careful to keep
all the strokes of uniform thickness and color with those of
the preceding section.

To draw Fig. 2, the student has simply to combine a num-
ber of brush forms similar to Figs. 33 and 34 of the practice
strokes, except that they are considerably larger, the entire
height of Fig. 2 being $3\frac{7}{8}$ inches. This figure is also of Greek
origin, and is used in various positions of mural decoration
and border work, as will be seen in the execution of the next
drawing plate.   The governing outline of the figure is ellip-
tical, and the student may lightly sketch an ellipse that is
$3\frac{1}{4}$ inches wide and 6 inches long as the governing outline of the
strokes of this figure.   The top and side of the ellipse should
be $\frac{1}{8}$ inch below and $\frac{1}{4}$ inch to the right of the border lines
just drawn.   The outline of the ellipse above the line *a b*
should then be divided on each side of its major axis into
four parts similar to the division of the ellipse for the draw-
ing of the conventionalized leaf on the previous plate.   The
points of division should locate the position of each brush
stroke intended to compose this figure.   The student, if he
so desires, may draw lightly in pencil the outline of each one
of these strokes, in order that he may be more accurately
guided in laying the stroke with his brush; but the lines thus
drawn should be so light that they will not show after the
color is applied, but if they do show, do not try to erase them,
as it cannot be done without reducing the tint of the color
used in the brush work.

Fig. 3 is a device commonly known as the *fleur-de-lis*,
which, though usually considered as typical of French design,
is also found in Italian and German work, of the 15th and
16th centuries.   The origin of the form is, as its name
implies, the lily.   The term *fleur-de-lis* literally translated

means "flower of the lily." It is extremely conventional-
ized, and resembles but slightly the type from which it is
derived, having been reduced to its present form by the lim-
itations imposed through brush-work rendering.   To draw
this figure, the student should lay off at an angle of 45° each
side of its center line a distance equal to the height of Fig. 2.
He should use this measurement as the side of a square,
drawn lightly in pencil with his 45° triangle, as shown by
the construction lines.   Within this square he may draw
lightly in outline the figure as shown, and then fill in the
outlined form with strokes of the brush.   It will be practi-
cally impossible to make each of these strokes with a single
stroke of the brush; but, by charging his brush with plenty
of color, and drawing first one side of the large stroke to
completion, and then the other side, before the color last
laid has a chance to dry, he can produce an even tint through-
out the figure, as explained in the preliminary instructions
on brush work.

18.   After the figure is drawn, strengthen the lines with
a *hard* pencil, and then clean the plate around the figure
thoroughly with a soft rubber so that no cleaning up will be
necessary after the brush work is done.   Mix up a consider-
able quantity of wash ink and water in a teacup or saucer
and do not be afraid of keeping it pale.   Try on a separate
piece of paper until the proper tint is attained, and do not
determine on the tint until it is thoroughly dry.   Keep it
lighter rather than darker than the original plate.   Be sure
that the brush is full of color and lay it on liberally, keeping
the board tilted so that it will be inclined to run downwards,
but not so much tilted that it will run by itself unless pushed
with the brush.   Keep a puddle of ink on the plate below the
brush at all times so that there will be no chance of its dry-
ing when you are dipping the brush in the vessel again, and
push this puddle ahead of the brush until the entire surface
is evenly covered.   Cover each part as you go along, and
never under any circumstances go back over it.   If it
appears wetter in one place than another, tilt the board so

that this extra moisture may be gradually drained down into the advancing brush fluid.

A few trials in this way on a separate piece of paper will surprise you with the simplicity of this operation. It requires knack more than skill, and this knack will come to you suddenly after repeated practice. Do not work too slowly, nor yet hurry. With this work there is plenty of time to do it carefully, yet one must not work so slowly as to let any portion dry until the entire figure is covered, as otherwise the tint will be uneven. When the puddle of color below the brush has reached the extreme end of the figure, the brush may be dried on a piece of blotting paper and then applied to the puddle to take up the superfluous ink, and dried again on the blotter as often as is necessary to tone down the last part.

19. With Fig. 4 we return once more to the conventionalized acanthus leaf; this time, however, though rendered on the same principle as Fig. 6 of the previous plate, it is varied somewhat to accommodate the brush-work limitations. Construct as before, in the drawing of Fig. 6 of the previous plate, an ellipse, and divide it through the center and sides in precisely the same manner as the ellipse was divided for drawing the first outlines of the acanthus leaf. On the center line of the ellipse, on the present drawing plate, draw the single brush stroke $a\,b$, and on each side of this stroke draw the additional brush strokes shown at $c\,d$, $e\,f$, $g\,h$, etc. These strokes have for their center lines the penciled lines drawn in the original subdivision of the ellipse, and the space between them is divided as shown by the single brush strokes—each complete in itself but not in any way lapping over its neighbor. In drawing this figure, let each stroke dry thoroughly before the one next to it is executed. This may readily be done by drawing every alternate stroke first, as shown on the left side of the figure, but on the student's plate the figure must be completed on both sides. A very slight lapping over of one stroke on the other will then produce a dark line, due to the double tint, which

is not objectionable if not too prominent. On the other hand, the effect of one stroke not quite meeting its neighbor will produce a white line between the strokes, which is also unobjectionable if not excessive. The main object to be sought in putting in the minor strokes is to divide them up in groups with the main stroke, so that, in each case where the main stroke reaches to the outside border line, a minor stroke will be on each side of it to fill up the space between it and its neighbor, but not extending so near the outline. The principle expressed in this figure is the same as that of the form illustrated in Fig. 28, in connection with which was explained the necessary development of leaf forms when they are to be executed in wrought-metal work. The principle of this conventionalized acanthus foliage is identical in each case, and, though many variations in its outline may be practiced, the governing lines will determine the direction and degree of radiation in the several lobes, whether the indentations on the edge of the leaf are based on a regular growth, as in this case, or on an irregular or serrated leaf, as in Fig. 6 of the previous plate. After the student has drawn and brushed in the work on this figure, he may erase the elliptical outline, but should bear in mind that both sides of the leaf are to be finished in the same manner as the right side on the drawing plate, the left side being here left skeleton in form on the specimen plate in order that the strokes may be correctly delineated.

Fig. 5 is a side view of the conventionalized acanthus leaf, rendered in brush work similar to the side view of the previous plate. The student will draw this view, starting with the stroke from a to b, showing the full breadth of the stroke at the commencement and tapering it off until the last two-thirds of it is but a mere line. The next stroke, starting at c, is similar to the first one, though not so sharply curved, and dies away into the first about half way down. The third stroke d, however, is carried all the way to the bottom. The other strokes are laid in succession, one after the other, as indicated, each one being allowed to dry before the following is laid. If the student should so desire, he may outline

the general grouping of the strokes with his pencil. In size and general proportion, this leaf is similar to the conventionalized form previously drawn, though it does not necessarily follow that it is a side view of the same leaf, the object of this work being simply to familiarize the student with his brush and his medium, or color, in order that he may give proper expression to his ideas by the simplest methods.

In the following nine figures on the plate, the student uses his brush to express natural forms, some of which he has become familiar with in his designs in pencil, though the essential difference between pencil drawing and brush drawing lies in the fact that one deals with lines and the other with surfaces.

In Fig. 6 are shown three simple flower forms, two of which are the phlox and the third the carnation. These were drawn by the student in pencil on his fourth drawing plate, and the characteristic differences in their various parts were there explained. In drawing them now, the student has but to observe that each part of the flower consists of one stroke of the brush. He may, if he chooses, draw a light pencil ellipse to limit the outline that will enclose the ends of the petals of each flower, and point off approximately five equal divisions of the circumference toward which these petals will extend. When he starts his flower form with the brush, he will lay one petal at a time, each petal consisting of but a single stroke in its general form, but it may be shaped or its edges serrated by extra touches before the original stroke dries. He will then draw the little cup at the bottom of the tubular portion of the flower, showing its characteristic points or prongs that extend upwards and grasp the tube, and then, when both the petals and the cup are dry, he will draw the connecting tube from the center of the flower to the heart of the cup, and afterwards the stem of the flower. He must be careful to give expression to the edges of the leaves or petals of the two styles of flower, as explained in connection with their original drawing in Drawing Plate, title, Flowers and Conventionalized Leaves. Though it is not necessary that the student should have

before him the natural flower from which to draw these forms, it is assumed that by this time he is familiar with the characteristics of at least a few of the principal plants, and can, without copying, give expression to their form on paper. Fig. 6, like all the following figures of this plate, with the exception of Fig. 10, is drawn approximately in the center of the square laid out in the original subdivision of the plate.

Fig. 7 is drawn in the square immediately below Fig. 6, and consists of a loose bunch of cattails or flag weed so familiar along the edges of swamps and marshes. This form is much used in many classes of design. Though the student has not drawn anything like it before, its delineation is so simple that it requires little or no botanical explanation. The stem containing the cattail stroke is nearly straight. The leaves themselves sprout stiffly from the root and curve gracefully away from each side. The stiffness of the leaves causes them to be easily broken, and it is rarely a bunch of cattails is seen that some of its long slender lance-like leaves are not broken off sharply at an angle. This sharp broken leaf therefore becomes as characteristic of the cattail weed as though it were actually a detail of its growth.

In Fig. 8 are shown two views of the common butterfly. There is no attempt made to show the gradation of the color or shading of the wings, the idea being simply to express the outline in brush form. At a the insect is shown with its wings spread as though flying, while at b it is shown as it would appear after alighting, with the wings folded up over the back. To draw this figure, the student should construct in the upper left-hand corner of his third square a trapezoid, the two parallel sides of which—top and bottom —shall be 2 and $1\frac{1}{4}$ inches long, respectively, and spaced $1\frac{3}{8}$ inches apart. The body of the insect may then be outlined lightly in pencil, with its head $\frac{3}{8}$ inch from the top line and its body $\frac{7}{8}$ inch in length. The body may then be drawn with a brush and allowed to dry, and when thoroughly dry the student may draw the wings as shown, rounding them in the corners of the trapezoid and washing from one pair of wings across the body to the other, thereby producing a

double tint for the body of the insect, while but one tint is expressed in the wings. This is the first application of brush work wherein the student has been called on to express more than one tone or shade in his wash drawings. By mixing the ink rather pale and making repeated washes over a given spot, allowing each to dry before the following one is laid, a gradation of color can be made from a very faint tint, scarcely distinguishable from white, to absolute black. In some classes of work, finer effects are obtained by repeated washes than by laying the body tint in full strength of color in the beginning.

At (*b*) in Fig. 8 the insect is shown at rest. The wings are folded straight over the back, the front wing and the back wing being brought more closely together than when flying; and, as the wings in this position show their under sides, it is the back wing that is seen lapping over the front wing, instead of vice versa as at (*a*). The outline of the individual wings is precisely the same in either case, though there is a slight difference in the body, the legs here seen grasping the twig on which the insect is resting and the full outline of the side of the body more clearly shown. It might be well to suggest that Fig. 8 (*b*) may be drawn within a tri-angle constructed by drawing a line diagonally through the trapezoid required for the first figure. The base of the tri-angle will then become one of the sides of the trapezoid, and the distance necessary to close the wings in lighting is shown by the amount it projects over the lower line of the above constructed triangle. The body itself of the insect should then be drawn independently, as its outline is quite different from (*a*).

In Fig. 9 at (*a*) is shown an insect composed entirely of single brush strokes, very familiar in Japanese design, that, though it does not bear any strong resemblance to any spe-cial living form, it combines so many characteristics of a number that for want of a better name it is termed "a con-ventionalized mosquito." The principle of its construction is based on the circle. The student may draw in the upper left-hand corner of the proper square of the drawing plate a

circle $1\frac{1}{2}$ inches in diameter, and divide its circumference into three equal parts. From the center of the circle to the bottom division point, a single brush stroke is made, being broad at the top and terminating at a point at the bottom.
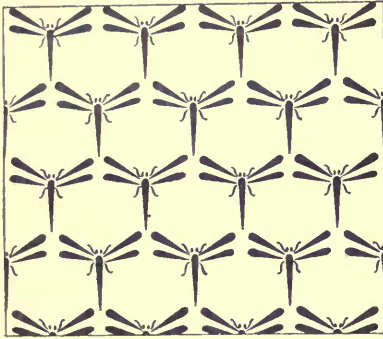

FIG. 35.

This characterizes the body of the insect. From each of the upper divisions of the circle, a similar stroke is drawn toward the center, forming the two upper wings; and below these, two similar and parallel strokes are drawn, forming the lower wings. The head and legs are then indicated in the most conventional manner, simply by two dots for the protruding eyes and four fine filaments for the visible legs. The combination of this design in geometric ornament used for wall decoration is illustrated in Fig. 35.

In Fig. 9 (*b*) is shown a familiar insect seen around swamps and marshes, usually termed the *devil's darning needle*, or sometimes called a *dragon fly*. The body of this insect is first drawn lightly in pencil so that it measures $1\frac{3}{8}$ inches in length, and about $\frac{1}{8}$ inch in thickness at its thickest part. The outlines of the wings may then be sketched so that they measure $2\frac{1}{4}$ inches across. The wings are arranged so that the foremost edges of the front wings and the tip of the head of the insect are on the same line. The whole surface of the fly is then washed in with a very dilute solution of India ink; and after this wash is dry, the solution of ink may be strengthened, and the darker portions of the wings and the body of the insect painted a second time. When this is dry, the lower right-hand portions of the articulations of the body may then be shaded, as shown.

This insect is introduced here to illustrate clearly the difference between conventional and realistic rendering. At (*a*) is shown a strictly conventional insect; at (*b*) is shown

an insect of the same class arranged naturalistically, or as it is usually seen in nature.

Fig. 10 is a rather elaborate combination of brush line and wash work familiar in various designs for crests, monograms, and heraldic devices. The governing outline of the figure is a simple shield, $2\frac{1}{4}$ inches wide at the top and $2\frac{1}{2}$ inches high at the center. Within this, by single brush strokes, a conventionalized silhouette of a bird is expressed, and around the outside a wavy band to receive the inscription, when such is applied. The student may, if he so desires, outline portions of this suggestively with the pencil, though a careful study of the form will show so conclusively the direction and termination of each stroke that outlining seems hardly necessary. The finer forms may be drawn with a pen, or, by careful handling, the entire figure can be executed with the brush.

Fig. 11 is a heraldic silhouette of a lion. The form is purely conventional, but by careful handling can be arranged to be expressive of life and action. The student should first draw a line 3 inches high and extending $\frac{1}{4}$ inch below the lower line of the enclosing rectangle. From the center of this, draw a horizontal line to the right $1\frac{3}{4}$ inches in length, and from the extremities of the vertical line draw lines to the point last located, thus forming an isosceles triangle standing on one corner, as indicated by the construction lines. One foot of the animal then rests in the lower corner of this triangle, while another foot rests about midway between this and the apex. Of the forefeet, the right one crosses the line midway between the apex and the base of the triangle, while the left one crosses one-quarter of the distance between the first and the apex above. The ear is in the uppermost corner of the triangle, and the entire face extends outside, so that the side of the triangle passes even with the edge of the lower jaw. The hollow of the back is $1\frac{1}{8}$ inches below the top of the ear and $\frac{1}{4}$ inch to the right of the vertical line. By way of checking the measurements, it might be noted that the back of the lion is $\frac{3}{16}$ inch from the vertical line, measured on the horizontal line marking the altitude of the triangle, and on this same horizontal line is $\frac{3}{8}$ inch in

thickness. Having outlined the figure carefully in pencil, the student will wash it in with one even tint, allowing the same to dry, and then going over the darkened parts as shown to give expression to the details. If a second wash is not sufficient to accomplish this, he may give a third or even a fourth one; but, as soon as the detail is defined and the drawing expresses what is required, do not apply any further wash work, but consider the figure complete.

Fig. 12 is another heraldic device based on a style of design usually termed *grotesque*. In this work the attributes or elements of several different classes of animals are often combined. This example illustrates a figure that might be properly called a *dragon*, and though there are many different kinds and conceptions of this mythical form, they all usually possess the body of some reptile, the feet and claws of a feline animal, the wings of a bird or occasionally of a bat, and the head of a carnivorous bird or beast.

To draw Fig. 12, construct, 4 inches from the right border line, a square 2 inches each way, whose base is $1\frac{1}{4}$ inches above the lower border line; $\frac{2}{3}$ inch from the right and left sides of this square, and within it, draw two vertical lines, thus converting the square into three rectangles each $\frac{2}{3}$ inch wide by 2 inches high. Now draw a horizontal line through all three rectangles and $1\frac{1}{8}$ inches below the top. These lines are shown on the drawing plate, and by comparison and eye measurement the student may outline in pencil the general proportions of the grotesque figure.

The head is located on the right vertical line of those drawn within the square, and the neck curves to the left and just crosses the next line to the left of this. In crossing into the lower right-hand rectangle, the line of the back of the neck practically passes through the intersection of the vertical and horizontal lines, just below which point the outside of the body comes within $\frac{1}{8}$ inch of the right side of the square. The foot then extends outside of the square $\frac{1}{4}$ inch, and $\frac{3}{8}$ inch above the horizontal line. The upper portion of the wing is an evenly curved line, extending into the upper left rectangle as shown, but is ragged on its lower edge.

The tail extends outside of the square, turns over, and ends with a scroll termination $2\frac{1}{2}$ inches to the left of the square. After the figure has been outlined, the student may wash it in and shade the individual parts as in the previous figure, indicating a roughness on the under side of the wing in the same manner as he indicated the feathers in Fig. 10, and drawing scales by means of triangular brush marks on the lower part of the body. When the figure is complete and dry, the drawing medium should be thinned down some-what, and the brush strokes that form the background should be drawn in without too much color in the brush, and care taken that their curves follow and radiate from the general curvature of the body. When all is dry, carefully erase the guide lines.

Figs. 13 and 14 are additional devices frequently seen in heraldry, and are drawn in precisely the same manner, so far as the brush work is concerned, as the two previous ones. Fig. 13 represents a dolphin, engraved upon a shield. This device is used in various forms as a part of a coat of arms of many foreign families, particularly the ancient royal families of France. The shield on which it is drawn is $2\frac{1}{4}$ inches wide at the top and $2\frac{1}{2}$ inches deep to the bottom. The distance from the outline of the dolphin to the nearest point in the outline of the shield at the top and sides is $\frac{1}{4}$ inch, while the extreme height of the fish from top to bottom is 2 inches. The student may outline this figure carefully in pencil, and with a harder pencil strengthen up the lines after it has been drawn to his satisfaction; and then, after cleaning up the drawing, he may wash in the background to form an even tint as shown, with the dolphin device silhouetted against it in white.

The size of the shield in Fig. 14 is the same as that in Fig. 13. The figure here is a combination of the lion's body with the eagle's head, claws, and wings, and is usually known as a *griffin*. Another device in heraldry known as the *panther* is almost precisely the same as the griffin, but without the wings. A vertical line through the center of the shield will pass through the left foot and the center

of the top of the head of this figure, while a line through
the upper right-hand corner of the shield drawn to the left
at an angle of 45° will give the direction of the upper slant
of the wing, and pass through the knee and above, and
parallel to, the lower extended fore leg and claw. A similar
line drawn through the upper left-hand corner toward the
right, at an angle of 45°, will mark the direction of the
upper fore leg and claw, and also the direction of the slant
of the upper portion of the left hind leg.   These points
located, the student should have no difficulty in outlining the
general figure in pencil, after which he may erase the guide
lines and carefully wash it in with his brush, making it in sil-
houette on a white shield—the reverse of the one above. The
shield may be outlined with a pen, using ink in full strength.

There are many variations of all these animals and imag-
inary figures that combine the distinguishing characteristics
of beasts, birds, and fishes; they all enter largely into the
devices used in heraldry, though their more frequent mission
in nineteenth-century design has been to suggest subjects for
ornament in stone, plaster, and iron, and even to suggest
devices for the ornamentation of burnt-leather work and
ornamental advertising.   Their original purpose in her-
aldry they have outlived so far as origin of design is con-
cerned, each particular heraldic device or coat of arms
requiring a particular form of beast or imaginary figure
that is unalterable without varying the characteristics of
its own coat of arms.

After finishing this plate as above described, the student
will carefully erase the construction lines, draw in the border
line in ink as before, carefully print the title at the top of
the plate, and then insert his name, date, and class letter
and number in their usual locations below.

DRAWING PLATE, TITLE: APPLIED DESIGN.

20. It is the purpose of this plate to give the student a
few examples from actual designs, both classic and modern,
wherein the principles taught on the previous plates are

distinctly applied; and in studying this work it will be to his advantage, not only to study the application of the different points of design, as they are set forth in the instructions for this drawing, but to study similar applications in other designs, whether he finds them in printed books, in woven cloths or carpets, or on painted vases or chinaware.

In Fig. 1, we have a border showing the application of a vine, and although on this plate it is executed as a silhouette design, its application for inlaid woodwork, for embroidery work, or the theme of its design for the border of any printed program or advertising work, is very apparent. This style of ornament is easily executed, and for certain classes of printed work is particularly desirable, because, owing to the absence of any fine lines, it is subject to extensive duplication in the printing process without injury to the original plate. The design may also be executed with the white figure on a dark ground, and it is always left to the designer's judgment which style of treatment would be the more satisfactory. All the figures on this plate are in black and white, and the student in blacking them in will use his brush well charged with the waterproof drawing ink, using it full strength, and without diluting or attempting to spread it thinly, as on the previous plate.

To draw Fig. 1, the student will draw parallel with the left border line, and $1\frac{1}{2}$ inches from it, a vertical line from the top to the bottom of his plate; parallel to the top and bottom border lines he will draw horizontal lines about 6 inches in length and $1\frac{1}{2}$ inches from them.

Omitting for the present the square formed in the corners by the intersection of these lines, the student will draw horizontal lines through the vertical panel formed on the left of his plate, so as to divide that panel into four equal parts, these lines being indicated by the dotted lines on the drawing plate. The winding of the stem of the morning-glory vine can then be readily traced, and if the subdivisions so marked are repeated horizontally on the top and bottom of the plate, the design may be repeated within their limits, and the curved line through the corner square will connect

the ends of the stems where, with the corner leaves drawn
in as shown, the border repeats itself continuously.

No directions are necessary here for the drawing of the
convolvulus or its leaf; the outline and characteristics of
each of these the student is supposed to have learned in
executing his third and fourth drawing plates.   His atten-
tion is only called to the fact that, in outlining these leaves
and flowers, the lines are arranged somewhat stiffly, and,
instead of curves, angular bends are expressed in the leaves,
in order to make the design appear somewhat more conven-
tional.   Where a flower laps over on the leaf or crosses the
stem, or where one stem crosses another, it is customary
under these circumstances of conventionalism to indicate it
by breaking the stem, leaf, or flower on each side of the
continuous detail, leaving a fine white line across the stem
or flower to indicate which laps over the other.   The veins
of the leaves and the suggestion of the heart of the flower
are also here expressed in white.   This white work, how-
ever, is not left clear when the design is drawn, nor scratched
out afterwards, but after the design has been blacked in
solidly from end to end, an ordinary writing pen charged
with white water-color paint (usually Chinese or zinc white)
is used to mark the veining and the crossings and lapping
over of the details.   Chinese white may be obtained either
in cake form, like ordinary water colors, or in a pasty form
in bottles.   In the former case, it is prepared for use by
grinding in a saucer or on an ink slab in the same manner as
stick ink, as described in *Geometrical Drawing.*   In the
latter case, it is simply diluted with enough water to bring
it to the proper consistency for use; occasionally a drop of
dilute ox gall is added to the solution to make the white
paint flow easily.

The term "repeat" in any form of design is used to
express the quality of the design for continuity by extending
itself with a given variety over a given surface, and then
fitting on to a repetition of itself again so as to form a cor-
rect geometrical continuation of the pattern.   In carpet and
wall paper the quality of repeating is generally termed

matching, and is illustrated when the edges of two pieces are brought together so that the design continues unbroken from one of them to another, and the designer of this character of goods is required to give this fact his constant consideration whenever he is laying out any pattern.

In Fig. 2 is shown a panel, the design of which is based on the growth of the lily. The size of the panel is $2\frac{3}{4}$ inches wide by $7\frac{1}{2}$ inches high, and it is located so as to be surrounded by the morning-glory border previously drawn, as shown on the plate. In drawing this figure a center line should be drawn vertically through the panel, and on this center line the height of the panel should be divided into fifteen equal parts, through each of which a horizontal line is drawn, as shown. The dividing of the space on each side of the center line into three equal parts through which other vertical lines are drawn will reduce the surface of the panel to a series of rectangles, by means of which each detail of the design may be accurately located. After the student has outlined all of his work on this panel carefully, he will find it an advantage to ink it in with waterproof drawing ink; then, when he is washing in his black background, he will find the brush less inclined to run over the ink lines and destroy the evenness of his contours than if he had nothing but pencil lines to guide him. After the entire background is washed in and dry, the veining and suggestive shading of the leaves and blossoms may be put in with a fine brush or pen. The stamens may be put in with Chinese white.

By comparing this conventionalized design with the drawing of the lily on the third freehand plate, the student will observe a variation. In the first place, the leaves are rather broader than on the previous plate, as this class of lily has broader leaves; but their characteristic form is maintained the same, and the blossom, though seen in two different positions, expresses the characteristics of the lily development so clearly that there is little or no danger of mistaking the design. This design is rather too conventional for embroidery work, but for wood inlay or damask weaving it is easily adaptable.

In Fig. 3 is shown a design that is applicable either to china decoration, embroidery, or linen damask work. The governing form of the design is a circle with its center $4\frac{1}{2}$ inches below the upper border line of the plate, and exactly midway between the two side border lines. The student may draw a circle 5 inches in diameter, and divide it into eight equal parts, to each of which he will draw from the center eight radial lines. Then, with a radius of $2\frac{3}{8}$ inches, he will strike from the same center a circle that will form the outside of his ornamental design, while a circle drawn from the same center, with a radius of $1\frac{1}{4}$ inches, will limit
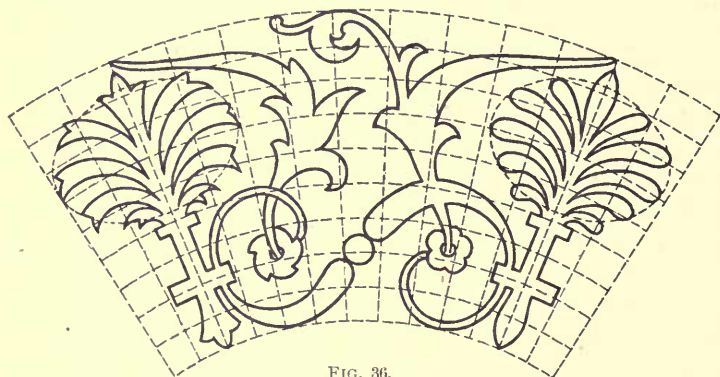
FIG. 36.

the inside of the design. On each of the radial lines thus drawn the student will first draw the foliated brush forms $a\,b$, $c\,d$, etc. according to the methods practiced on the previous drawing plate, except that the ellipse governing the outside limits of these forms has its longitudinal axis at right angles to the perpendicular axis of the figures $a\,b$ and $c\,d$, as the enlarged detail, Fig. 36, will show. Having carefully sketched the ellipses as shown in Fig. 36, the student may draw the brush marks that indicate the leaves on this figure, being careful to extend the central brush mark nearly to the outside line. He will then divide the distance from a to b into nine equal parts, and through each of these points of division draw a circle with its center at o. The arc from a to c will then be divided into nine equal parts, through

each of which radial lines should be drawn toward the center o. This will divide the surface $a\ b\ c\ d$ into eighty-one similar geometrical figures, by means of which the details of the ornament can be radially located. When all is carefully drawn in, in pencil, throughout the entire circumference of the plaque, the student may brush in the design in black ink, as shown, and complete the figure. The outer circle should be inked in with the compass, the other construction lines being erased.

Fig. 4 is an ornament taken from the ceiling of the Parthenon—a Grecian temple at Athens considered to be one of the finest examples of Grecian art the world has ever seen. The original of this ornament was executed in gold on a red ground—a condition of coloring impossible to express here, but as a practical example of brush work, nothing could be more serviceable. To draw it, locate the line $a\ b\ c$ $1\frac{5}{8}$ inches from the border line, and between this line and the border line draw a line $\frac{1}{8}$ inch above and to the right of $a\ b\ c$. This line and the border line will then together establish the limits of the border outline. Commencing at the corner b, lay off to the left and below, a distance of $\frac{7}{8}$ inch. Draw a vertical line in the upper part and a horizontal line in the side part of the border, and from the lines just drawn space off two additional lines $1\frac{1}{2}$ inches apart in each direction, to form the centers of the palmettes that are the distinguishing features of the border. With the center lines of these palmettes as the upper part of the longitudinal axis, draw ellipses whose transverse axes are $\frac{7}{8}$ inch below the top of the palmette, and $1\frac{1}{8}$ inches in length, and within these ellipses so drawn construct the brush forms of the border according to directions given in connection with the previous plate. Having done this, draw $\frac{3}{8}$ inch inside of, and parallel to, $a\ b\ c$, the inner line of the border, and $\frac{1}{8}$ inch within this and parallel to it, draw two lines that shall form the upper and right side of a square that will be $3\frac{3}{8}$ inches on each side. Divide this square vertically and horizontally, by means of perpendicular and horizontal lines, into three equal parts, thus converting it into nine smaller squares within each of which distinguishing

characteristics of the panel ornament are drawn. In each of the four squares in the center of each side of the main square, circles may be drawn with the compasses $1\frac{1}{8}$ inches in diameter, or as near thereto as will make them tan-

FIG. 37.

gent to the lines of the squares. The palmette figures in the corner squares may then be drawn similar to those in the border, the other details being too apparent to require description.

In drawing the ornament of Fig. 4, which is commonly known as the Greek honeysuckle ornament, it is more than evident that its conventionalized condition is due as much to the limitations of brush stroke rendering as to an accurate portrayal of the details of the flower or plant. The little scrolls and connecting lines are suggestive of the tendrils of the honeysuckle, while the single brush strokes with their rounded ends tapering off to the finishing are strongly suggestive of the unbroken bud as seen in the honeysuckle blossom. Fig. 37 shows a spray of the honeysuckle vine and its blossoms in its natural growth. In the upper part of this figure there is a cluster of the unbroken buds, and their resemblance in outline to the plain brush stroke of

Fig. 4 of the drawing plate is readily apparent. Fig. 38 shows a conventional rendering of the honeysuckle, the blown buds being arranged geometrically around the bottom, and the unbroken ones above, each over the blown flower beneath. There is no attempt in the Greek ornament to imitate directly any portion of the honeysuckle vine or flower; the details of the flower are readily made use
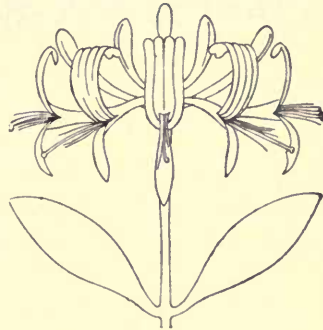
Fig. 38.

of to form a new and original ornament resembling directly nothing, but at the same time dependent entirely on a natural form of growth. Having completed this figure, the construction lines may be erased, leaving only the line *a b c* and the one next within it, to be inked in with the ruling pen.

In Fig. 39 is shown the acanthus leaf, according to the Roman conventional design, as it appears in carved stone or marble; each lobe of the leaf is carefully rounded on the end, and the under surface is hollow; then, where the leaf turns over at the top, and the back is shown, each lobe appears with its convex side forward. Where the main divisions of the leaf curl and lap over each other, deep hollow grooves are cut that show in the reproduction as heavy black

lines. Observe that deep undercut portions of the leaf cause a black shadow and impress the mind generally as with total absence of detail. Now, when it became necessary to repro-

duce this carved form of acanthus by simple brush strokes, the Roman artist made a stroke for each lobe of the leaf and left a blank space to represent each spot where there was absence of detail—owing to deep shadow—rendering his brush-work acanthus leaf as it appears in Fig. 5 of the drawing plate.

In drawing this figure, the student should observe Fig. 40, and compare each stroke carefully with the carved ornament illustrated in Fig. 39. Before commencing the figure itself, he should, on the plate, construct a semiellipse as its outline, whose minor axis shall be $3\frac{3}{4}$ inches, and half of whose major

axis shall be 5 inches, and on a line directly under the center of Fig. 3. This semiellipse is shown dotted around the figure on the drawing plate. The central rib of the leaf, which is $\frac{3}{8}$ inch wide at a, should then be sketched in pencil, tapering off so that it would reach to a point at the top of the ellipse b, if it were continued that far. The curved line at the top of the leaf $d\,e\,e$ is then drawn, and may be the arc of a circle
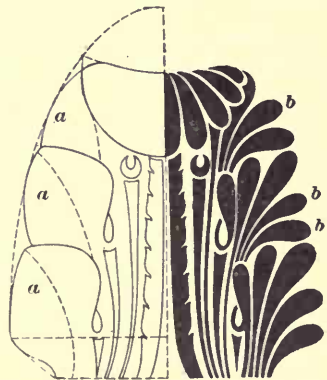
FIG. 40.

whose radius is $2\frac{1}{4}$ inches and whose center is $1\frac{1}{2}$ inches above b. Then draw the first brush stroke under c, $1\frac{1}{2}$ inches in length. This will also regulate the length of the middle rib a. The points f and g should then be located

$3\frac{1}{8}$ and $1\frac{3}{4}$ inches above the bottom of the leaf, respectively.
The lobes may then be sketched in with a pencil, as shown
in Fig. 40 at a, only roughly, however, and the conventional-
ized form finished with single brush strokes as shown at b,
each one representing a lobe existing in the carved leaf, as
shown in Fig. 39.

Fig. 6 of the drawing plate shows a square pattern for a
repeating design suitable for wall paper, silk, or other fabric,
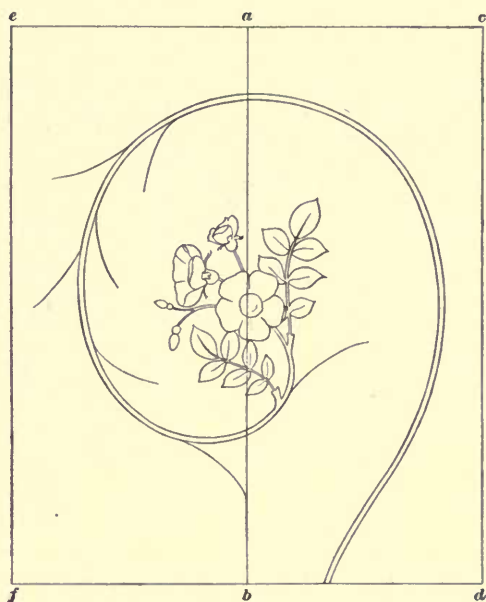
FIG. 41.

and involving the characteristics of the rose, studied in con-
nection with the Drawing Plate, title, Flowers and Conven-
tionalized Leaves.   In all designs for repeating patterns,
the designer usually uses a paper that has been ruled by
machinery into a number of squares, varying in size from
$\frac{1}{16}$ to $\frac{1}{8}$ inch.   By means of these squares he is able to locate
certain details at the top and bottom of his paper, so that
the design will repeat as previously explained.   It is not
necessary that the student should use such paper in drawing

this figure, but it is absolutely necessary that he should draw it separately and completely on another sheet before he executes it on his drawing plate. In doing this, it will be necessary for him to understand a practical method of getting the *repeat*, and though this does not form a part of this branch of drawing, it will be here explained for this problem only, in order that he may better grasp the subject.

On a separate piece of paper, the student will lay out a
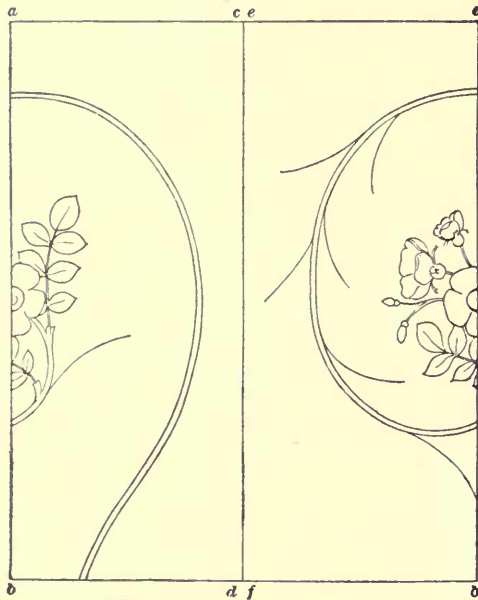
FIG. 42.

rectangle $5\frac{1}{2}$ in. $\times 6\frac{1}{2}$ in.; in this he will draw a spray of rose leaves and a blossom, with the outline of the running vine about as shown in Fig. 41. It makes no difference for this purpose how well these leaves are drawn, or how roughly they may be sketched, as long as their general location and proportion to the paper is about as shown. The student will then cut the paper in two with a pair of scissors on the line *a b*, and arrange the two parts so that the edges *c d* and *c f* are next to each other. He will then again pin the paper

to his drawing board, and it will appear as in Fig. 42. It
will be well for him now to draw two more sprays of roses,
or partial sprays, to fill up the blank space in the center of
the sheet, somewhat as shown in Fig. 43, and having done
so he will cut Fig. 43 through on the line gh and arrange
the pieces, with the lines aa' and bb' together in the middle,
as shown in Fig. 44. This will give him an idea of the
amount of surface he has covered with his design; it will

FIG. 43.

show him where more detail is required in order to evenly
fill the space, and that detail he can sketch in, but wherever
it crosses either one of the center lines in Fig. 44, it will be
necessary to rearrange the pieces in order to get its relative
position in the other arrangements. Having accomplished
all this and sketched the extra details in, as shown in Fig. 45,
he can rearrange the four pieces to their original positions
in Fig. 41, and make a tracing of the drawing, which will
now be a completed pattern as shown in Fig. 46. Several

tracings of this figure on the same sheet side by side, one above the other, will make a repeating pattern that can be spread out, above or below, to the right or left, unlimitedly, as one side of the drawing fits exactly on the other, and all details will be continuous. This is but one of several methods of accomplishing this same purpose, and the same spray of roses with which we started in Fig. 41 would produce different results by varying the methods.
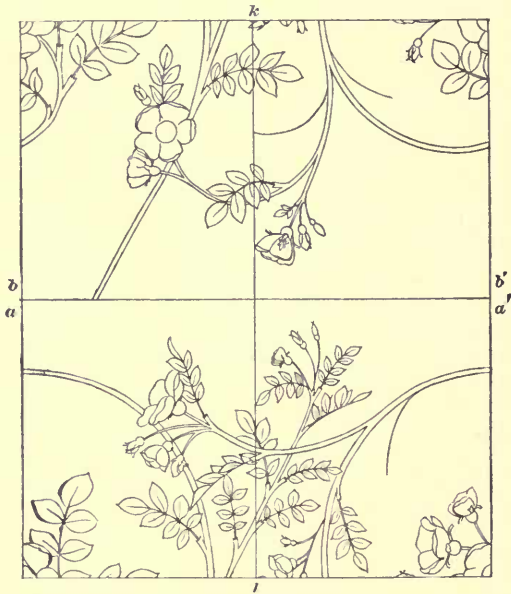
FIG. 44.

For instance, if instead of drawing our design in a rectangle, we should draw it in a parallelogram whose length was equal to $1\frac{1}{2}$ times the breadth, or if we draw it within a triangle of any dimensions, or within a rhomboid, or within any other figure that is capable of unlimited repetition, we would find the results obtained to be as different as were the figures themselves, the running pattern taking different directions. Now, after the student has, on his separate paper, designed Fig. 6 of the drawing plate as shown, traced

it and tested it to be satisfied that there is no error in the repeat of his pattern, he may redraw the result of his tracing on his drawing plate, being careful that the parts are accurately reproduced. He may outline the figures with waterproof ink and black in the background with his brush to produce the silhouette effect shown in the figure (the thorns may then be indicated with Chinese white); after which he will place the title at the top of the plate, and his name,

FIG. 45.

date, and class letter and number at the bottom, below Figs. 1 and 6, but he may omit any border line entirely.

This completes this course of instruction in freehand drawing. The principles of freehand drawing set forth in this work simply require practice to make an expert draftsman. No person can acquire any accomplishment without diligent and persistent work, and the difference between a medium and a good designer is seldom more than a question of practice. After having finished this work, even though the

student's drawing plates have been correct and marked
satisfactorily, it will be an advantage to him to deliberately
go over the entire course again for his own satisfaction, to
practice more on details that proved difficult for him in the
beginning, and to make sketches of objects of various kinds
whenever the opportunity presents itself, and particularly
of those objects that are illustrated in the last six drawing

FIG. 46.

plates. If he starts at the beginning, or near the beginning,
and goes through his instruction again, he will be surprised
and encouraged at the facility he has acquired during his
course of study, and it is wise for him to thus encourage
himself in order that he may have the patience to continue
practicing, and thus always be making progress. The student
is now supposed to know how to draw and he is ready to
take the first step in the study of design.

HISTORIC ORNAMENT.

(PART 1.)

INTRODUCTION.

1. Meaning of "Ornament."—The term ornament in its more limited sense is applied to such elements of decoration as are adapted or derived from natural forms. These differ from what we consider the geometrical elements, inasmuch as they are organic, and suggestive of life and growth. They depend for their expression on the general arrangement of their branches, leaves, and blossoms, while the geometrical elements owe their expression entirely to their geometrical form and arrangement relative to one another. When simply drawn on paper and in no way applied to any object, or used for any purpose other than the expression of itself, one of these elements of decoration may be considered simply as an ornament. It does not become an element of decoration until it is applied to something, and in the abstract, the term *ornament* should not be confused with the term *decoration*, which is distinctly *applied ornament*.

2. Meaning of " Decoration."—The term decoration signifies the application, or the result of the application, of ornament to objects or surfaces. It does not mean the simple "sticking on" of an ornament to a surface, but conveys the idea of the *adaptation* of an ornamental form to suit the requirements of its position and the purpose of the object to which it is applied.

§ 3

The elements of decoration consist of geometrical lines, natural foliage, artificial objects, animals, and the human figure. All these may be considered as ingredients or components that may be mixed and applied in various proportions according to certain standard and acknowledged rules termed *principles*. The rule by which any one mixture is accomplished determines the style or class of the design.

3. Principles of Decoration.—The **principles of decoration,** considered separately and distinctly from the elements that are used to make up the design, are dependent on, and in harmony with, the rules of architectural proportion. This may be illustrated by considering the subdivision of a wall surface into three horizontal bands—the *dado*, the *wall*, and the *frieze*—in the proportion of the pedestal, column, and entablature of an architectural order. True, there are styles of design where these proportions are at variance with any architectural order; but, with few exceptions, these will be found to exist in styles or periods of historic art wherein the orders of classic architecture were unknown or misunderstood, as will be considered hereafter. This general division of a wall surface, however, may exist by the simple placing of horizontal lines to mark the heights, this subdivision being purely geometrical. The decoration may be extended by applying to the subdivisions such natural foliage as leaves and running vines; artificial objects, such as the hieroglyphics of the Egyptians; or animals, and the human figure, as seen in the Gothic and Renaissance work; or a combination of these forms. In each case, however, the main subdivisions are in accordance with general rules; and the surface covering, though governed by less restrictive rules, is, at the same time, subservient to a definite proportion of ornamented to plain surface, different under different circumstances.

4. Elements of Decoration.—Whatever the theme of decoration—whether it be the expression of the invention of a new idea, or only the arbitrary adoption of some familiar

form—two elementary conditions will always be found to exist: *first*, a decoration produced by an arrangement and joining of dots and lines, or by a combination of geometrical figures in accordance with the laws of rhythm, regulation, and symmetry; and *second*, a decorative effect arising from the attempt to represent objects from the external world.

The elements nearest at hand for imitation are found in organic nature with its plants, animals, and the human form; but inorganic nature also furnishes models, as in the forms of crystallization, such as snowflakes, and various phenomena, as clouds, lightning, waves, etc.; besides which there are rich resources open in artificial objects fashioned by man himself, as vases and utensils of daily use.

5. Combination of Elements.—It may now be more readily understood how all kinds of elements may be combined. Geometrical may be united with natural forms, and details and ideas suggested by natural forms may be combined with creatures of the human imagination to form eccentricities that do not really exist in nature, but that man has always delighted in adopting as representative of some higher or supernatural power. Illustrative of these, we have the sphinx, so identified with Egyptian art; the centaur and the mermaid in classic art; and the animal bodies with human heads, and the combination of beasts or fishes with the wings of birds, or with plant life and foliated terminations, prevalent in many details of Gothic and Renaissance art.

6. Symbolic Devices.—In heraldry and armorial bearings, with which the decorations of the Middle Ages and following centuries are replete, there are a number of devices with definite names that depend entirely on the combination of different characteristics, borrowed from different classes of animals, in order to combine in one figure the attributes of several natural beasts. For instance, we have the dragon, with the body of a serpent and the head of a carnivorous bird, and the wings of a bat, combining in the one animal the stealth and treachery of the snake, the cruelty and

passion of the vulture, and the uncanny and silent secrecy associated with the nocturnal habits of the bat.

On the other hand, we have a variation of the form or characteristics of an individual animal, in order to emphasize those characteristics for the purpose represented. In many of the armorial devices of Great Britain is found a representation of a lion—never in the true form of the lion, as we are in the habit of thinking of him in the jungle, but a lion with a long attenuated body, generally with one or both fore paws raised from the ground, and always with his mouth open and protruding tongue and teeth. The lion is indicative of power and strength, and, consequently, of sovereignty. The attenuation of his body increases the feeling of litheness associated with animals of the cat tribe, while the expression given his face and forefeet is indicative of firmness, and power for aggressiveness, offensiveness, or defensiveness, as the case may require.

7. Influence of Architecture.—Decoration is applied art, and the forms used in decoration become varied according to the purpose for which they are used. Decoration, as applied to architecture, consists of the ornamentation of the structural features of a building—of the variation in color, or proportion of different surfaces that are adjacent, and of the introduction of familiar symbols, or objects, to convey a definite historical or religious idea.

To a certain extent, all decoration partakes of the same characteristics as architectural decoration. Wall decoration is architectural, and consists of the variation in color or proportion of adjacent surfaces, or of the same surfaces divided. The decoration of silks and tapestries, either in the weaving or printing, is a variation of surface that must be further considered in its architectural relation, when they are hung on the walls, over the doors, or around the windows, and seen, not as plain surfaces, but in folds. The treatment of furniture is an architectural decoration, both in the ornamentation of its structural features and in the application of symbols to portions of its surface. In fact, in all periods of

art, it will be found that any attempt at ornamentation is governed directly or indirectly by the prevailing tastes in architecture and the sister arts.

8. Conditions Influencing Architecture.—Though ornament and architecture have been steadily progressive from the days of earliest Egypt to the close of the nineteenth century, there is little resemblance between the characteristic ornament or architecture of any two periods, except where there has been a deliberate revival of a certain style of art. Where the artists of a nation or locality have been left to their own devices and originality, they have produced a style of ornament suitable to their purpose, their period, and their relations, that is in no way connected or suited to other surrounding conditions. Although the influences that have affected the style and character of the ornament of different periods are many, the religious and geographical influences are probably the strongest. Political influences determine, to a certain extent, the character, according to the government and relations of the people, and also the profusion and elaboration, and, to a certain extent, the quality of execution, of ornament; for the richer a nation becomes, the more she expends on her monuments of public utility and beauty, and the more elaborate her citizens become in the taste and decoration of their households. In fact, we find no art progress in any country until it begins to show signs of amassing wealth.

9. Influence of Religion.—The effect of religion in ornament can be traced through all periods, and those nations with whom religious belief was more closely intermingled with the civic and domestic duties of the day, expressed in every detail of their ornament some tribute to a superior being. During the laxity of morals and general religious fervor toward the close of the Renaissance period, we find few religious forms woven in the fabric of any class of ornament, except the pagan forms that were borrowed in ignorance from an antique religion and an ancient art.

This free use of symbolic forms, both ancient and modern, gives us an unlimited field for combinations in ornamental design, which, though practiced through fifty centuries, has not exhausted the possibilities for originality.

10. Decorative Art.—All decoration and decorative art, whether carved, painted, or modeled, is the expression of the wants, facilities, and sentiments of the age in which it is created. All products of decorative art should possess fitness, proportion, and harmony of both form and color, in order that the result may express what we term *repose;* and beauty results from that repose that the mind feels when the eye, the intellect, and the affections are satisfied, and free from any sense of want. As in architecture, construction may be decorated, but under no circumstances can decoration be constructed. Decoration must always form a part of the purpose or object with which it is associated.

It is useless to try to deceive the eye and intellect by carving a natural vine on a stone tablet. No right-minded person will ever take the imitation for the real vine, and the highest tribute that can be paid to it is that the carver was skilled with his chisel and hammer, and the designer had failed to understand and appreciate his material. If the vine is to be a stone vine, let it be reduced to a form that is suitable in stone; if it is to be a woven vine in a fabric, let its form be reduced to the limitations of results obtainable from the loom; if it is a vine to be painted on a wall surface, let it be a painted representation of the characteristics of a certain vegetable growth, and not a picture or portrait of an object that if real would be highly out of place where represented.

11. Conventionalism.—This proper representation of a familiar form according to the position it is to occupy, or the material in which it is to be executed, is called **conventionalism,** and is the first detail of applied art that the designer must learn to comprehend. An old axiom states, "That which is beautiful must be true," and we may add

to it conversely, "That which is true must be beautiful," and on this axiom depends all the beauty of ornament in architecture, decoration, and the allied arts.

Ornamental design is not portrait painting—it is not the faithful portrayal of the details of nature for purely pictorial purposes. The skill of the artist in this branch of art is applied to making something of simple utility an object of beauty; whereas, the portraitist is engaged in rendering on canvas, or other surface, an absolute portrait of the subject before him.

12. Consistency in Designing.—The decorative designer must have in mind the construction or fabrication of a useful article, with the value and utility of which he combines his art. The figure portraitist, landscape portraitist, or floral portraitist, if we may so distinguish them, has before him a subject that he intends to translate in paint to a surface that shall have nothing associated with it in the mind but the figure, the country, or the flowers it represents. If the decorative designer takes the same subject, he does not represent it with the same fidelity, because it is applied to a utensil, and the object of the utensil must not be lost sight of; and if he decorates the surface of a utensil or dress material with a design that claims to be an absolute portrayal of the flower or other device itself, he states in his decoration that this is nothing but the representation of a flower and he draws the mind away from the fact that it really is a utensil; this is not true, and, according to the foregoing axiom, the result cannot be beautiful.

13. If, in the weaving of a carpet, or other floor covering, the designer attempts to portray natural bunches of roses and rose leaves, he is suggesting to the observer that this is a picture or portrait of a bunch of roses, executed entirely to please the senses as a portrayal of the flowers themselves, which is not true; for, if it were, we should hang it near the level of the eye, separating it from any sense of utility, other than the conveying of a feeling of

satisfaction and delight to the affections and to the intellect; whereas, as a matter of fact, it is a floor covering decorated with an out-of-place design.

14. General Rules.—In the decoration of a surface, the general form is first cared for and subdivided or ornamented by general lines; the interstices may then be filled with ornament and may themselves again be divided and fully enriched for closer observation. But all ornament, no matter how minutely carried out, should be based on a geometrical system of construction, as a true proportion will be found to exist between all members so based.

In all surface decoration, a rule to be observed is that all lines should be traced back to their branchings from a general parent stem, so that each detail of the ornament, no matter how distant, can be traced back through its branch to the root. This makes the design rational, but the connection with the parent stem and root must not be so marked as to dominate the spirit of the design. Another rule requires that all junctions of curved lines with other curved lines, or of curved lines with straight lines, should be so made that they are tangent to each other at the point of junction, if they are intended to express parts of the same design. And a third rule says that flowers and other natural objects should not be used as ornaments in their natural forms, but should be conventionalized or reduced to geometrical principles that convey the idea of their representation without purporting to be a likeness of the original, for the reasons heretofore set forth.

15. Color may be used to assist in the development of a form or idea, or to distinguish objects or parts of objects, one from another; or color may be used to assist light and shade, helping undulations of light and form by the proper distribution of several different tints. Color should never be used, however, where the exigencies of the case do not positively require it. Every design should depend for its intrinsic beauty on its form and its proportion, and these

may be enhanced by combinations and relations of color; but the design is a poor one that depends entirely on color for its attractiveness and beauty.

With this understanding of the facts, let us now consider what has been done by our predecessors in the field of ornamental design.

ANCIENT ORNAMENT.

PRIMITIVE ORNAMENT.

16. Under primitive ornament, we will consider those efforts at ornamental design observable in the works of the savage tribes. These peoples had no written history of art from which to draw ideas, no theory or rules of proportion to govern their conceptions, and, consequently, the expression of art as exhibited in their decorated utensils can be considered pure and untrammeled.

17. Influence of Nature.—From the testimony of travelers in but partially explored countries, it would appear that there is no place on the face of the earth where some attempt is not made at ornamentation, no matter how crude a state of civilization the people may be in. The desire for ornament is present in every race, and it develops and increases in importance directly in proportion to their progress in civilization. Man appears everywhere impressed with the beauties of nature that surround him, with the mysteries governing the growths and phenomena that he cannot understand; and he seeks to imitate, within the limitations of his power, some of the works of his Creator. The earliest instinct of man is to create something; no matter how powerful he may be as a warrior, how distinguished he may be as a tribal leader, or how wealthy he may be in the possession of earthly goods, he recognizes his inability to explain the phenomena of nature, and naturally attributes it to a being higher than himself. It is at all times

apparent that this being, whom he in his primitive way may worship as a god, creates, by some undefined power, developments and appearances that inspire him with mystery and awe. Consequently, he endeavors, in his own simple way, to call into existence creations of his own that shall impress those fellow men whom he considers his inferiors as much as he is impressed by the works of his mysterious Supreme Being.

18. Origin of Tattooing.—In some savage tribes, this desire is expressed in the attempt to increase the facial expression by which he expects to strike terror to his enemies, rivals, or inferiors, or to create what appears to him a new and mysterious beauty. This he accomplishes by tattooing, or sometimes merely with paint. It is a remarkable fact that hideous as this practice renders his visage, it is, in most cases, exercised with the greatest care that the lines shall be so placed as to *increase* the facial expression and *develop*, to the greatest extent, the eccentricities of his natural features. Trivial as this detail may at first appear, it lies at the bottom of the fundamental principles of decorative design. The savage warrior does not obliterate his own expression and cover his face with paint and tattoo marks to create a new one, but simply arranges the lines to emphasize the details of severity that he already possesses and with which he expects to inspire an impression of terror.

19. Origin of Set Styles.—It can be clearly shown throughout all history that in certain periods, an individual mind, stronger than those with which it is surrounded, will impress itself on a generation and carry with it a host of other minds of inferior power. These inferior minds imitate what they know to be better than what they can create, but do not imitate so closely as to destroy their own individual ambition to originate. It is to this tendency that we owe the birth and the modifications of styles.

The efforts of the people in the earliest stages of civilization are like those of children, though lacking in power of

expression, they possess a grace and originality rarely found
in middle age, and never in manhood's decline.   The same
may be found in the infancy of any art, which we will
endeavor to point out as we go along.   When art struggles
for an existence, it succeeds by creating for itself new forms
and new ideas, but, when reveling in its own successes, it
fails.

20.   Effect of Traditional Styles.—The pleasure we
receive in contemplating the crude attempts at ornament of
the most primitive tribes arises from our appreciation of a
difficult accomplishment.   We are interested in the evidence
of the intention, and are surprised at the simple and child-like
rudeness by which the result is accomplished.   In fact, what
we seek in their work of art is the evidence of mind—the
evidence of that desire to create to which we have already
referred.   This evidence of mind, strange to say, is much
more readily found in the rude attempts at savage ornament
than in the innumerable productions of a highly advanced
civilization.

When art is manufactured by a combined effort, instead
of being originated by the efforts of an individual, the true
instincts, which constitute its greatest charm, are lost.   By
this we mean that the art of the present day is the result of
the combined efforts of artists and artisans through centuries
of development, whereas the art of the savage tribes is the
expression of the mind of an individual warrior, untram-
meled by tradition.

21.   Expression of Taste in Savage Ornament.—In
Fig. 1 is shown a reproduction of a cloth pattern, the original
of which came from the savage tribes of the Samoan Islands.
It is made from thin sheets of bark stripped from a peculiar
species of tree, and is beaten out and united so as to form
one long parallelogram of cloth.   Certainly nothing could
be more primitive as a method of manufacture, yet the pat-
tern shows the existence of taste and skill, and an ingenuity
of design rarely found in many of our woven fabrics of the

present day. The pattern is executed by means of small wooden stamps, and the work, though rude and irregular in its execution, conveys the intention at every point. There is a skilful balancing of the masses and a judicious avoidance of lines that would tend to cause the eye to run in one direction. This is done by opposing each set of lines with others of opposite tendency. There are many styles and patterns of this work, all of which show positive genius in their arrangement and development.
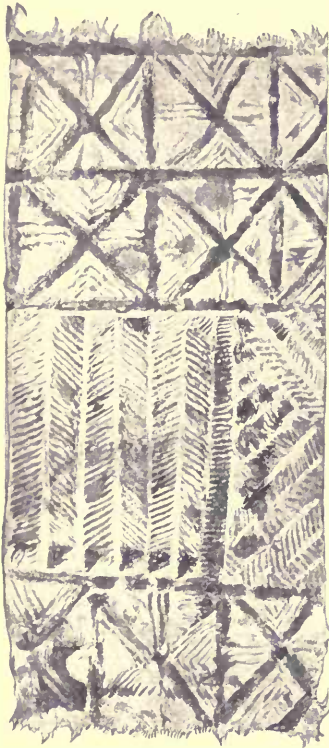
22. Decorative Theory Exhibited by the Savage.— The next development in this primitive art is found in the attempts at wood carving, and the most likely place to look for it would be on the weapons used for the defense of the tribe, or in the chase of animals for food. The bravest or the most skilful of the warriors or hunters would desire to distinguish himself somewhat above the others by the possession of a weapon, not only more useful, but, in his eyes, more complicated, and more beautiful. The best shape for the weapon he has already determined by experience, and the enriching of its surface by carving naturally follows.

Fig. 1.

The eye of the warrior being accustomed to the geometrical forms and details of the stamped cloths, his hand attempts to imitate them in the handles of his wooden utensils by means of knife cuts, and the paddle shown in Fig. 2 illustrates how faithfully this representation has been carried out.

This instrument is from New Zealand, and the taste exhibited in its carving would bear favorable comparison with the art works of the highest state of civilization. There is not a line on its surface misapplied; the general shape is most graceful and elegant, and the decoration is applied everywhere to best develop the form.
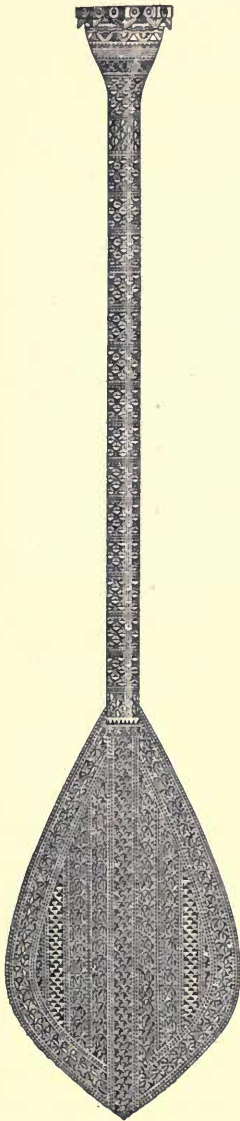
The New Zealander's instinct taught him that his paddle should be strong, not only in reality, but in appearance, and his ornament is so disposed as to give an appearance of strength greater than it would have had if the surface had remained undecorated. The band in the center of the length of the blade is continued around both sides, binding the border that extends around the edge, and this latter appears to hold in place all the other bands. Had these bands run out like the center one, they would appear to have a tendency to slip off, as the center one is the only one that can occupy its position around the end of the paddle with repose.

23. Value of the Study of Historic Ornament. — These few facts have been pointed out in the preceding pages, so that the student may fully appreciate that beauty of ornament does not depend on the fidelity with which ancient ornament can be copied. The natural tendency of the mind will produce good results in the application of ornament in nearly all cases, if it is allowed to work

FIG. 2.

logically and without influence from stereotyped or historical forms.

The study of historic ornament is practiced to familiarize the student with what has been done heretofore, to point out to him such parts of the ancient works as have been done well, and to show him why they are considered to be done well, and also to render him familiar with other works of celebrated art periods which, though they may be beautiful in themselves, are not, as a matter of fact, as high a grade of art as our New Zealander's paddle, because of the lack of expression of mind in the designs, and the tendency to imitate the works of what was believed to be a superior mind, rather than to develop a new style along new lines.

24. How to Study Ornament.—From what has already been said, it will be easily understood that the ornament of a people carries in itself the characteristics of that people. It must be interpreted, however, by the aid of the history of the people as expressed in their monuments. The subject of historic ornament should therefore be studied, not only with regard to its grace and beauty, but as a key to a portrayal of the qualities, characteristics, and disposition of the people to whom it belonged.

In the consideration of the ornament of a country, we must first investigate all the details that are likely in any way to affect the art, in order that we may better understand why certain characteristics exist in the ornament of one people and are entirely absent in that of another.

EGYPTIAN ORNAMENT.

25. Influence of the Nile on Egyptian Ornament. It seldom or never rains in Egypt, except in the delta at the mouth of the River Nile, and nature has provided for the fertilizing of the land by an annual overflow of the river that brings down mud and alluvial soil from the mountain regions, and deposits it on top of the old soil, thus enriching it. For three months the water slowly rises in the Nile

Valley, and, for three months following, the river slowly subsides and then remains a narrow stream for the rest of the year, bordered by green fields of cotton and grass. The phenomenon of this yearly inundation of the Nile, Fig. 3, slow, majestic, and munificent, naturally impressed the early Egyptian with a feeling of mystery and awe. In fact, in this inundation lies the key to the wealth of ancient Egypt.

FIG. 3.

Dwelling during the dry season on what would appear to be a barren plain, the Egyptian saw the provision of a Supreme Being working for his good when the waters of the Nile gradually overflowed, fertilized the soil, and then slowly subsided, leaving him to plant his seed. It is not strange, therefore, that the Nile and everything associated with it should be sacred. In all Egyptian ornament, we find some symbol or detail that reminds us of this great beneficence of Providence and favor to the Egyptian. The Egyptian was an appreciative mortal, and in his art and architecture everywhere placed some reminder of the fact that he could do nothing and would be nothing without the care and watchfulness of this supreme power.

26. Antiquity of Egyptian Ornament.—In studying Egyptian ornament, however, we cannot begin at the

beginning, as we can with other styles, inasmuch as we have no historical records of any beginning. A peculiarity of the Egyptian over all other styles is that the more ancient the ornament, the nearer perfection is the art. Architectural monuments, erected 2,000 years before the Christian era, are built of stones taken from the ruins of much more ancient buildings that were really more perfect. We are therefore compelled to study Egyptian art during a period of its decline, but can accept the style as absolutely original, inasmuch as we have no record of the existence of an earlier nation from whom they could have borrowed it.

In Egyptian art, there are no traces of infancy, nor of foreign influence, and it is safe to infer that the Egyptian artist drew his inspiration directly from nature. The types of his ornament are few but perfectly natural, and in the earliest period of Egyptian art, the representation is but slightly removed from the type; but the later we descend in history, the more we find the original types receded from, until it is difficult, in many cases, to discover from what original idea the ornament, by successive mental efforts, has been developed.

27. Influence of Religion.—Although the Egyptians decorated every article of utility that was in any way associated with their civil, domestic, or religious duties, we depend for examples of their ornament almost entirely on the designs and writings executed in connection with their complicated form of religion.

The temples, tombs, and other sacred monuments of the most ancient inhabitants afford us the most rational and progressive examples of ornament, and it is from these that we derive nearly all the information that we have of the manners and customs of the early Egyptians. In the temples are preserved certain stone tablets and other devices, on which are records of certain ceremonies in connection with their religion, and these records are always executed in their peculiar form of hieroglyphs. The word *hieroglyph*, being literally translated, means sacred writing, but in its specific

sense is used to indicate the peculiar pictured descriptions of the Egyptian religious ceremonies that are found carved and painted on the walls of their tombs and temples.

28. The **Egyptian temple** consisted of a small sanctuary, or *sekos*, as it was called, that was reached through a large columnar hall known as the *hall of assembly*, or sometimes the *hypostyle hall*, the latter term meaning covered over on columns. In front of the hypostyle hall was a large open court, surrounded by high and massive walls and

Fig. 4.

entered between two tower-like front walls, called **pylons.** Each of these parts was varied slightly in dffèrent structures, some having two courts in front of the hypostyle hall, known as the outer and inner court, and in many of the temples the sekos was surrounded by a number of smaller apartments. On the outside of the temple, the entrance was approached through a long avenue—often a mile or more in extent— lined on each side with colossal sphinxes, and occasionally

ending in a large monumental gateway advanced before the
main entrance to the temple, as shown in Fig. 4.   This
gateway was called a **propylon,** and it stood alone before
the main entrance like a silent sentinel.   The example shown
in Fig. 4 is from the temple of Rameses III, at Karnak, and
from this a fair idea of the magnitude of these great archi-
tectural details may be obtained.   The faces of the propylon
were always decorated with elaborate hieroglyphic devices
as shown, and over the top was carved the *winged globe*, of
which we shall have occasion to speak hereafter.   Beyond the
propylon stand the two great pylons that form the outer front
wall of the building, and the entrance between these two
masses is similar in detail to the gateway advanced in front.

A better idea of this arrangement can be obtained from
Fig. 5, which shows a portion of the avenue, the entrance,
and pylons of the temple of Edfou, in Upper Egypt.   In
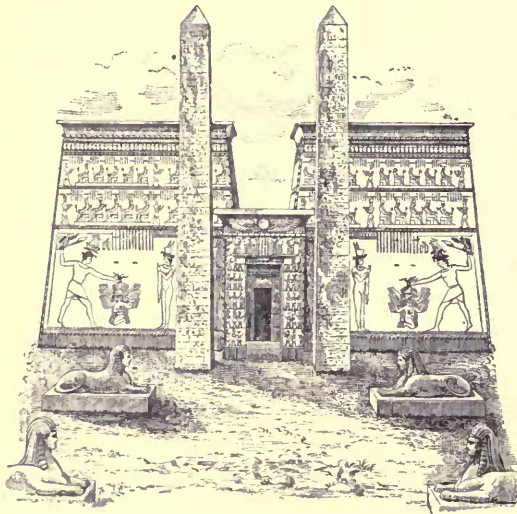
Fig. 5.

this case, the propylon is omitted, and at the end of the
long avenue of sphinxes stand two great obelisks—one on
each side of the entrance.   The walls of the pylons them-
selves are decorated in hieroglyphs, the design at the bottom

representing a group of prisoners, taken from Palestine, about to be executed by the king.

29. Interior of the Temple.—On the inside of the temple, these pylons are sculptured in much the same manner, though the lower part of them is largely covered by the roofed passageway around the edges of the court. Fig. 6 is

FIG. 6.

a reproduction of a photograph taken in the inner court of a temple on the island of Philæ, and shows the appearance of these pylons on the inside, and a portion of the columns supporting the roof on the right side of the court. The pylons were massive structures, and contained, in their interior, a number of secret rooms accessible only to the priest and members of the royal family.

An entrance to the interior of one of the pylons is seen on the left of Fig. 6, and it will be observed that the general treatment around the door and over it is precisely the same, but on a smaller scale, as the main entrance to the temple

and the general character of the propylon illustrated in
Fig. 4.

A better idea of the massiveness of these pylons may be
obtained from Fig. 7, a photograph of the temple of Edfou,
showing the taper of the walls from the ground upwards, a
characteristic of all Egyptian architecture.　This illustra-
tion is taken from above the side walls of the temple, so

FIG. 7.

that the entrance columns of the hypostyle hall at the
rear of the court may be seen, and by comparing Fig. 7
with Fig. 5, both being illustrations of the same tem-
ple, a fair idea of the state of preservation of this great
edifice may be obtained, Fig. 5 representing it in its
original form and Fig. 7 being a photograph of it at the
present day.

At the top, the walls of the pylons flared out, forming a
simple concave cornice, above which gleaming cressets at
night and flaunting banners by day were carried on long
iron stocks or staffs, which, combined with the highly
colored decorations on the walls, gave the building an effect

of mysterious grandeur, perfectly consistent with the complex system of the ancient Egyptian belief.

The iron stocks carrying the banners, etc. were inserted in the recesses shown on each side of the entrance.

FIG. 8.

30. Obelisks.—The obelisks in front of the temple are in themselves characteristic of Egyptian art. Each of these consisted of a tall stone shaft, quarried in a single piece,

and sculptured on four sides with elaborate hieroglyphic ornament. A photographic reproduction of one of these interesting details is shown in Fig. 8. This was one of a pair of obelisks known as "Cleopatra's needles," and is shown as it stood in the city of Alexandria, Egypt, for nearly 2,000 years. It is 67 feet in height, and 7 feet 7 inches square at the base. It originally stood with its companion before the entrance of the temple at Heliopolis in Lower Egypt, but was removed to the city of Alexandria after the defeat of Anthony and Cleopatra by the Roman emperor Augustus, just before the beginning of the Christian era. In the year 1878 it was removed from Alexandria and transported to New York City, where it now stands on a mound on the east side of Central Park.

31. The temples differ widely in size and elaboration of plan, but the general scheme of arrangement is the same in all cases, whether the example is taken from Northern Egypt or Southern Nubia. Between the years 1600 and 1100 B. C., the greatest temples were built. The Pharaohs
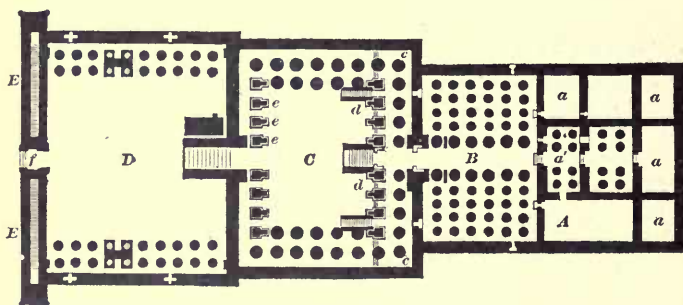
FIG. 9.

wanted eternal dwelling places for their deities, and built their temples entirely of stone, laid up in blocks so massive and so well fitted that they have withstood the ravages of time down to the present day.

In Fig. 9 is shown the plan of the Ramesseum, a temple built by, and named after, Rameses, one of the kings of Egypt, who reigned about 1500 B. C. Here the sanctuary

is shown at A, surrounded by a number of smaller apartments a, which were used by the priests and members of the royal family, both as places for their mysterious devotions and as royal residences; the king and his immediate relatives being considered earthly representatives of the gods.   The sanctuary contained the shrine, and was entered through either of two portals, one from the hypostyle hall B and the other communicating with one of the sacred apartments a'.

At B is shown the hypostyle hall, the roof of which was supported by two sets of columns, the central ones being
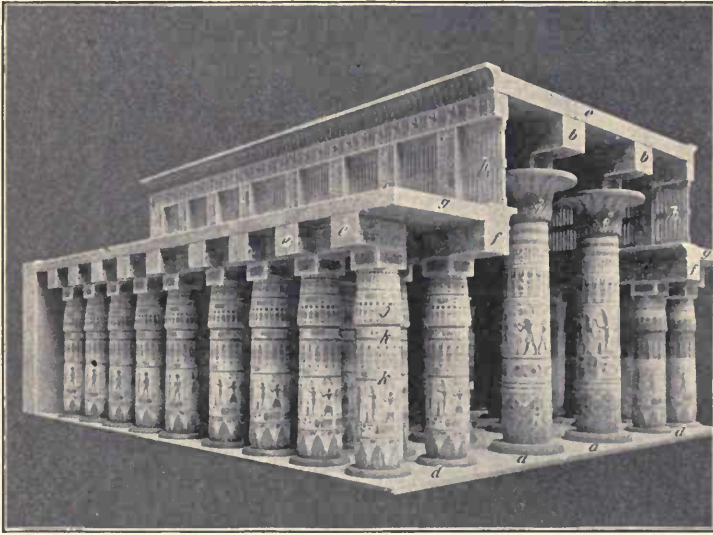
<center>Fig. 10.</center>

longer than those on each side, in order to provide a clearstory for the admission of light and air.

This is more clearly shown in Fig. 10, which is an illustration photographed from a restored model of the great hypostyle hall in the temple at Karnak.   At a is seen the double row of long columns, which are connected longitudinally by the stone lintels b, in order to receive the edges of

the stone slabs *c*, which form the roof over the *nave*, or central portion of the temple. On each side of these are the shorter columns *d*, which are connected transversely by the lintels *c*, and the inside row longitudinally by the lintel *f*, to support the roof slabs *g* in the same manner as over the nave. An open space *h* is thus left to admit light to the interior of the hall, and form a clearstory similar to the same detail in our more modern cathedrals, of which we shall learn later on.

The spacing of the supports being governed entirely by the length of lintel the builders were able to quarry, the columns are exceedingly close together. For this reason, large apartments were never entirely roofed over in the Egyptian temples, but were open to the sky, either wholly or in part, as shown in Fig. 9 at *C*, which is the inner court of the temple, from which the hypostyle hall must be entered.

On each side of this inner court is a double row of columns supporting a roof extending from the side walls, while at the back is a single row of columns *c*, and a row of square piers *d*, which carry a portion of the roof that extends over from the hypostyle hall. Another row of square piers *e* carries the roof over the front end of this inner court, which, with the other partial coverings, surrounds the court with a narrow projecting roof on all four sides.

32. The effect of this treatment must have been very imposing in itself, but, to add to the impression, colossal statues were carved on the inside faces of the square piers, and flights of stone steps led up to a gallery at the level of the hypostyle hall, the floor of which was considerably above the level of the inner court. The outer, or entrance, court *D* was a comparatively plain enclosure, with columns on each side and a single flight of steps up to the floor of the inner court above. It was entered through a narrow portal *f*, flanked on each side by the massive pylons *E*, and served merely as an entrance court preparatory to the grandeur and solemnity of the more sacred apartments beyond.

33.   The early Egyptian statues were usually colossal in size, and there was no attempt at economy or saving of time in any structure that was erected for the purpose of religious ceremony or the burial of their dead.   The pyramids (see Figs. 3 and 11) were erected as tombs for the kings, and give a very fair idea of the patience and persistence of this ancient people, that would work 100,000 men for 20 years on a tomb for the body of their king, at a cost of over $40,000,-000.   It is a mystery to this day how the stones were quarried and transported with the primitive tools and machinery in use 3,000 years before the Christian era, for this great pyramid of Cheops, 800 feet square at the base, and 450 feet in height, is the largest structure in the world today.

34.   The Great Sphinx.—Next to the pyramids in massive grandeur comes the Great Sphinx at Gizeh.   This is a statue of the Egyptian god Harmachis, carved out of solid rock, making a figure 146 feet long, 65 feet high, and

FIG. 11.

34 feet across the shoulders.   The body, which has the form of a crouching lion, is now entirely buried in drifted sand, but the human head, measuring 28 feet from chin to top, and the broad, massive shoulders, are still visible above the

sand drifts, as shown in Fig. 11.   Between the forefeet of
the body is excavated a temple where the god was wor-
shiped, and, if built at the same time as the sphinx, this
temple is the oldest architectural monument on record, as it
antedates the pyramids over 1,000 years.

35.   Types of People.—There were two types of people
among the Egyptians, varying decidedly in physique and
intellectual appearance.   One type of aristocratic origin
possessed a refined face, with a moderately high forehead,
aquiline nose, rather full lips, and rounded chin; the other
type was from plebeian stock, with low forehead, short nose,
heavy jaws, and very thick lips.   The former was serious
and thoughtful, grave, dignified, and religious; the latter
gay, pleasure loving, light hearted, and good natured.   These
two types are represented in many of their hieroglyphs and
wall paintings, and are often used as symbols of the very
attributes we ascribe to them.   The lower type have been
used to express some degraded or inferior people, and the
more refined type have been used to represent royal person-
ages and the gods.

The kings and royal families in Egypt being considered
earthly representatives of the gods, had privileges in the
complicated system of Egyptian religious rites that the
priests themselves did not enjoy.   An offering to a king was
equivalent, under certain circumstances, to an offering to
one of the gods.   The Egyptians worshiped many gods, but
the chief ones were Osiris, Isis, Horus, and Thoth.   They
also paid religious regards to animals.   Cats, dogs, cows,
hawks, beetles, and monkeys were sacred throughout all
Egypt, as will be seen hereafter.

36.   The Lotus and Papyrus.—The most conspicuous
type in Egyptian art is the **lotus** (Fig. 12), a plant growing
on the banks of the Nile, somewhat resembling our pond
lily, but differing from it in coloring.   The lotus leaves float
on the surface of the water at the end of a long stem, in the
same manner as do the pond-lily leaves, but the blossom

stands on a stiff stalk high out of the water, and is of a bril-
liant purple color on the border petals, with a heart of deep
orange. The lotus was a sacred flower, and as an offering to
the gods was conspicuous in the highest forms of worship.

It is easy to understand the importance of the lotus in
Egyptian religious theories. The deified lotus stands repre-
sentative of the homage rendered to the beneficent action of
water and sun on the sleeping earth. It is the symbol of the
annual evolution of the seasons, causing generation to suc-
ceed generation, and the return of life, where everything had
seemed barren in the immobility of death.

The **papyrus plant** was also used largely in Egyptian art
and associated with the Nile on whose banks it grew, but not
to such an extent as the lotus. From the papyrus plant a
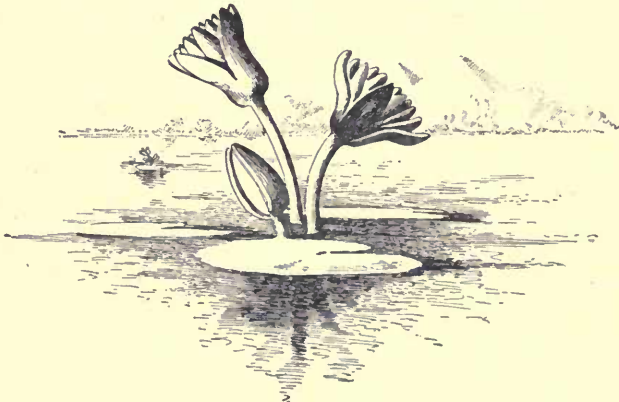
Fig. 12.

kind of paper was manufactured on which the Egyptians
wrote many of their sacred legends, and it is from the name
of this plant that the modern word "paper" is derived.

37. The Winged Disk.—The sun itself was also the
object of direct worship, the ceremony of which was varied
by the priests in order to make it penetrate more deeply
among the masses. The disk, as representative of the sun,
is used in many Egyptian hieroglyphs, and received a certain

share of homage owing to its relation to agricultural development after the Nile had completed its inundation. A combination of the disk and feathered forms produced an ornament generally known as the winged disk, or the winged globe (Fig. 13). This consists of the solar disk, supported
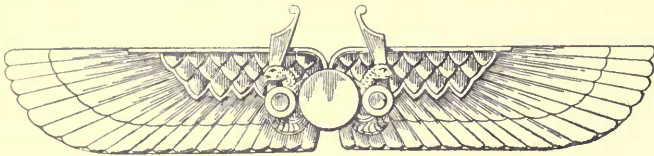
Fig. 13.

on each side by an asp (the royal symbol of Upper and Lower Egypt), and the wide outstretching wings symbolize the untiring activity of the sun in its beneficence; hence, a divine protecting power. It is emblematic as a whole of the triumph of right over wrong, and an inscription at Edfou says that Thoth, the god of speech and wisdom, ordered that this emblem should be carved over every door in Egypt. It is everywhere apparent in Egyptian sacred painting, but varies slightly in detail according to the place where it is used. Wherever it appeared carved over the doorway of a temple, painted on the walls of a tomb, or woven into a fabric of the vestments of a priest or king, this emblem was a monument of the Egyptian's religious sincerity and appreciation of benefits derived from his god.

Fig. 14.

38. The Scarabæus.—The scarabæus, or beetle, Fig. 14, was identified with the rising sun, and typified creation and resurrection, or new birth. Its exact significance is somewhat complicated, as are in fact all Egyptian emblems; but, owing to the habits of the beetle, slowly developing from a grub through various stages to a full-grown insect, it is emblematic of progress and evolution. In the tombs and ruins of the Egyptian temples are found

thousands of models of these beetles that seem to have been worn as amulets.

39. Consistency of Egyptian Ornament.—Another type of Egyptian ornament is the palm, from which canopies were made, and also the fans and shades that were held over the heads of royal personages during ceremonies, to protect them from the sun.   These few types form the foundation of an immense variety of ornament with which the Egyptian decorated the temple of his gods, the palace of his kings, the covering of his person, and his articles of luxury, as well as those articles of more modest daily use, from the wooden spoon that fed him in infancy to the mournful boat that carried his embalmed body across the Nile to its final resting place in the Valley of the Dead.   Following these types in a manner so nearly allied to the natural form, they observed the same laws that the works of nature ever displayed, and, no matter how conventionalized their ornament ever became, it was always true.   The Egyptian artist never violated a natural principle, and, on the other hand, he never destroyed the consistency of his conventional representation by too close an imitation of the type.   A lotus flower carved in stone, or forming the graceful termination of a column, or painted flat on the walls as an offering to the gods, was never a lotus portrait, and never impressed the beholder as one that might be plucked, but was always the architectural representation of it suited to the material in which it was cut, or the colors in which it was rendered.

40. Conventionalism.—A good idea of the simple conventionality of their forms can be obtained from Fig. 15, where at (*a*) is shown the conventional representation of the lotus blossom, the outside leaves of which, in colored work, were usually painted a deep green.   The first row of petals was also green, but of a lighter shade, while the innermost petals were red.   The space between the petals was painted a deep yellow.   At a distance from the eye, the red and yellow seemed to blend together and form a deep orange

hue with a suggestion of surrounding green, characteristic of the general appearance of the lotus flower.

The transition from (*a*) in Fig. 15 to the form shown at (*b*) is by no means a difficult matter, the omission of the innermost row of petals being the only radical change. From (*b*) to (*c*) is a simple development wherein the calyx

(*a*)   (*b*)   (*c*)   (*d*)
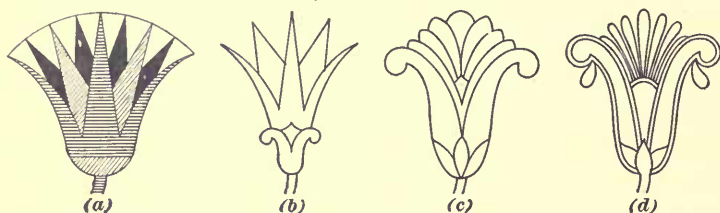
FIG. 15.

of the conventionalized flower has become larger in proportion to the petals, and from (*c*) to (*d*) is but a step in ornamentation, showing the gradual growth of design from the conventionalized rendering of the blossom itself to a device that is purely ornamental and derived from, though in no way representative of, the Egyptian lotus. The further development of this form in Assyrian and Greek art will show the importance of this line of study.

41. **Classes of Egyptian Ornament.**—Egyptian ornament may be divided into three classes: that which is *constructive*, or forms a part of the monument itself; that which is *representative*, but is at the same time conventionally rendered; and that which is simply *decorative*. In each class, the ornament is always symbolic, and the few types mentioned, upon which it is founded, we find are but slightly changed during the entire period of Egyptian civilization.

42. The student of historic ornament should familiarize himself with the difference between the terms *style*, *class*, and *type*. The term **style** is used to indicate the period or nationality of the ornament, as the Early Egyptian style; the term **class** is applied when we wish to indicate a subdivision of some style, as the constructive class of the Egyptian

style.   The term **type** is used to refer to the natural form
from which the ornament is derived, as the lotus type of
Egyptian ornament.

43.   Constructive Ornament.— Of the constructive
ornament are the columns and their terminations, and the
crowning members of the walls.   The column base was fre-
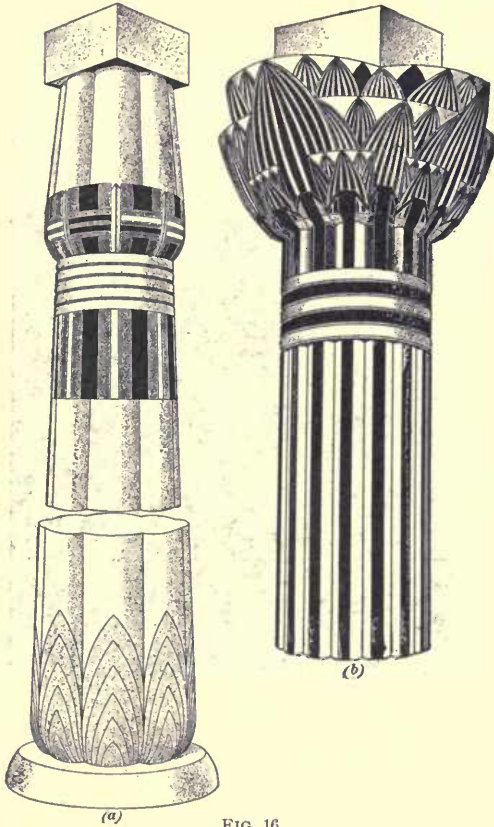
FIG. 16.

quently molded to represent the root, and the shaft was
reeded in representation of the stalk, while the capital was
carved similar to the form of a bud or full-blown lotus
flower, as shown in Fig. 16, where at (*a*) is seen the bud

capital, and at (*b*) the capital derived from the full-blown flower. All this was symbolic, as the lotus meant much to the Egyptian.

In Fig. 17 are shown two square columns standing in the ruins of the temple of Karnak, the one to the left being decorated with a lotus flower carved in high relief, while the one to the right is similarly decorated with the papyrus

FIG. 17.

plant. The plain, severe treatment, so characteristic of Egyptian art, is forcibly illustrated here.

Another form of column flares out at the top, and has for its original type the papyrus or palm tree, as shown in Fig. 18. This style was usually placed in the center of the halls of assembly, with the lotus-bud columns on each side, as shown in Fig. 10. All columns were richly colored and sometimes decorated with hieroglyphs.

Feathers were held by the Egyptians as emblematic of sovereignty, and the cornices of their temples were usually decorated with ornaments derived from a combination of feathered forms.

44. Representative Ornament. The second class of Egyptian ornament results from the conventional representation of commonplace things upon the walls of their temples and tombs. In this kind of ornament each representation is not only a detail of the wall decoration but is a hieroglyphic record of a fact. Sometimes it was carved in the surface of the walls, and sometimes merely painted; and occasionally, it was both carved and painted. It was always most conventional, and certain details, such as the lotus and papyrus, were represented in the strictest geometrical arrangement, usually show-

ing the bud, blossom, and fruit in regular order, typifying the development of the entire plant.
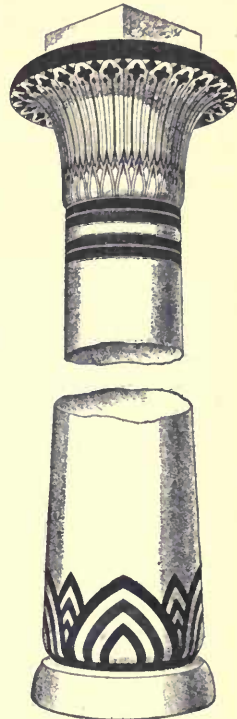
FIG. 18.

In Fig. 19 observe the straight, stiff stem and trumpet-shaped blossom, the sharp-pointed petals of the calyx, and the geometrical arrangement of the entire plant, with all its distinguishing characteristics emphasized to produce conventionalism.

Egyptian carved ornament of this character is nearly always in low relief,

FIG. 19.

and is sometimes merely incised or outlined in the surface of the wall, as shown in Fig. 20. On work executed in a later period, the background is sometimes cut away,

leaving the carved ornament and figures in full relief, as
in Fig. 21.

This figure represents a statue of the queen, Cleopatra,
upon whose head is supported, between the two horns of the
sacred cow, the disk, emblematic of the sun.   The head-dress
consists of a representation of the buzzard, a sacred bird,
whose head protrudes from the fore part of the head-dress,
and whose wings reach down on each side, as though pro-

<table>
<tr><td>FIG. 20.</td><td>FIG. 21.</td></tr>
</table>

tecting the .wearer.   The panel or cartouch in the upper
left-hand corner contains the hieroglyphic characters spelling
the name Cleopatra.   From this figure, a characteristic
example of Egyptian ornament of this period, we can obtain
a good idea of the contemporary head-dress, of the habit and
method of wearing beads and necklaces, and, to a general
extent, the cast of features and countenance of this race of
people.   It must be remembered, however, that these carv-
ings are not always portraits, but symbolisms drawn to
represent the characteristics of the person portrayed.

45.   **Decorative Ornament.**—The third kind of Egyptian ornament, that which is purely **decorative,** is found mostly in paintings on the walls of tombs, on mummy cases and sarcophagi, on dresses and utensils.

46.   The Egyptians believed in the immortality of the soul, and also that the soul would return after death and reoccupy the body; hence, they took every means to preserve the body in order that it should be in a fit condition for the reception of the soul at the time of its resurrection.   Death was not regarded by the Egyptian as a great calamity, as he looked on his earthly life as a mere temporary existence during which he made elaborate preparations for the preservation of his body after death. This accounts for the massiveness and permanency of the tombs, some of which were the life work of those that expected to occupy them.

Fig. 22.

The body was embalmed with great care; a scarabæus was fastened to the breast, and the mummy wrapped in cloths or bandages bearing hieroglyphic inscriptions. In some cases, particularly with the wealthier classes, the mummy thus wrapped was placed in a wooden box, carved inside to fit the form, and generally shaped to conform to the lines of the body on the outside, as shown in Fig. 22. The box was then carefully sealed and the outside painted, or often gilded, and covered with elaborate and complicated hieroglyphs describing the life and deeds of importance connected with the earthly existence of the body within.

The mummy case was then deposited in the tomb, frequently in a standing posture, and the walls and columns, and other architectural details of the particular chamber

where the mummy was placed, were painted with rich ornament and inscriptions. The sarcophagus, or stone box, in which the mummy was sometimes placed, was richly ornamented both with painting and carving of the same general character as on the walls, and it is from examples of this kind that the following illustrations are taken.

In Fig. 23 is a painted wall ornament from the temple of Seti I, and it represents the *sacred bark*, the ceremonies connected with which were an exceedingly complicated but important branch of the religious devotions of the priests. This device frequently appears in the sculpture and paintings

FIG. 23.

of the tombs, and usually represents the funeral of one of the gods. Everything is arranged in a most orderly manner, as will be observed, and every detail is placed to convey a certain significance. It would be impossible here to go into all the explanations connected with Egyptian hieroglyphic ornament, and the illustration in Fig. 23 is given to show how completely the walls were covered with an illustrated idea.

47.   The Fret.—Fig. 24 is a *fret* design, sometimes called a *labyrinth*, and is stated by some to have been suggested by the plan of a building known as the labyrinth that was erected in ancient Egypt about 4000 B. C.   This was
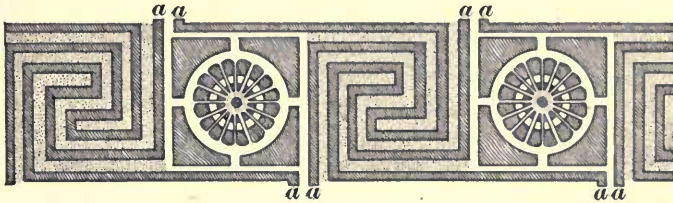
FIG. 24.

supposed to have been a very complicated structure of many hundred rooms, out of which it was practically impossible for one to find his way without the assistance of a guide. The rosette alternating with the labyrinth pattern was probably derived from the full-blown lotus flower.   This ornament is found on many mummy cases, and is even used for surface decoration, for it can be repeated in any direction simply by continuing the lines, as shown at *a*, to form a new pattern above and below similar to this one.
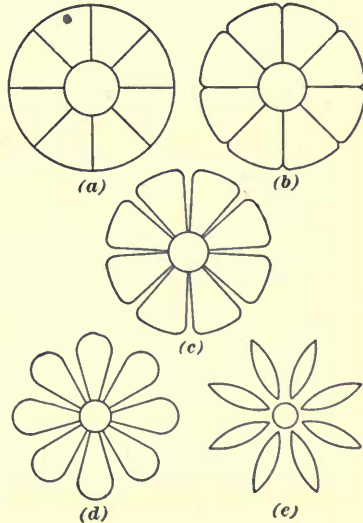
48.   It may be said here that the rosette form shown in Fig. 24 is but one of many observed in Egyptian ornament.   In Fig. 25 (*a*) is shown a simple circle with an inner circle, and the space between them is divided by straight lines into eight

FIG. 25.

equal parts.   The transition from this form to the form shown at (*b*) consists merely of a notching of the edge of the

outer circle where the lines intersect the circumference; (*c*) is the same as (*b*), except that the dividing lines are made in pairs, thus making each segment independent and by itself. From (*c*) to (*d*) the segments are made narrower, until they are very nearly the size of the spaces between them, and at (*e*) we reach the extreme limit where what might be considered the petals of the floral device are separated from the center and from one another entirely, and become independent elements of the design.   Observe that the central circle has been becoming smaller in the evolution of the device from (*a*) to (*e*), and the design has worked itself from a purely geometrical form at (*a*) to a purely floral form at (*c*) and back again to a purely geometrical form at (*e*), entirely different from (*a*).   This principle should be borne in mind, as it is of much importance in the tracing of the Egyptian style in European art.

49.   In Fig. 26 is shown a border wherein the scroll is made use of simply as an ornament, in distinction from its character, as emblematic of the *waves of the Nile*.   The lotus also appears at the springing of each scroll line, but, in this case, purely in a decorative sense, and in no way

FIG. 26.

suggestive of a hieroglyphic record.   Below is a stiff conventional row of lotus buds and blossoms, so arranged as to form a conventional border and a part of the design above, purely for decorative purposes.   In the hieroglyphs, the symbol for the word *water* consisted of a simple jagged line

suggestive of waves, as shown in Fig. 27 (*a*).　This symbol, when used under certain conditions, was indicative of the Nile also, and in some

(*a*)

(*b*)

FIG. 27.

of the hieroglyphic ornament it is elaborated into what is called the *wave border* as shown at (*b*).

50. In Fig. 28 are shown two borders where the lotus is conventionalized, very much on the lines of Fig. 15.　It is
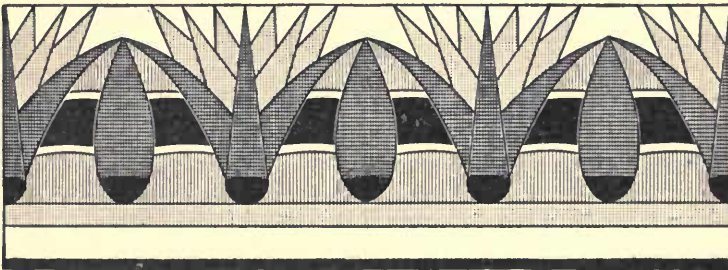
(*a*)
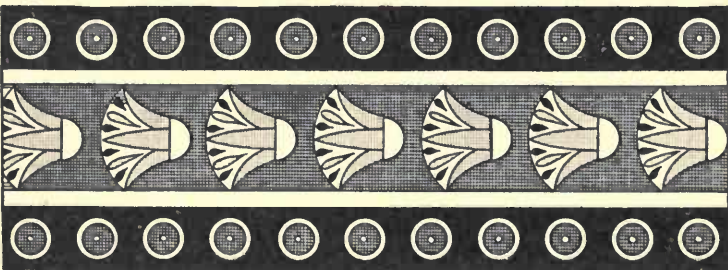
(*b*)

FIG. 28.

used here purely for decorative purposes, and in Fig. 28 (*a*), where the side leaves of the flower intersect, a bud **is**

drawn in order to fill up the intervening space, while at (*b*) the flower is placed in a horizontal position and shows another application of the lotus to a border that requires little or no explanation, simply being the conventional rendering of the lotus blossom applied in repetition on the border of a wall surface, and completing the simple geometrical forms above and below.

51. Fig. 29 shows an application of the scroll without the lotus, while below is a simple serrated band, the type of
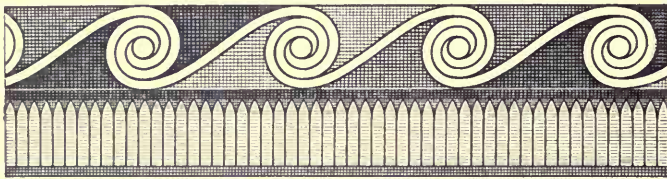
Fig. 29.

which is suggestive of the hieroglyphic representation of the Nile, though its derivation from this origin is by no means certain. These few borders show the immense variety of detail that the inventive Egyptian secured from a few simple types. When he carried his design further, to make complete surface decorations, he did not complicate his designs by adding to them any new forms.
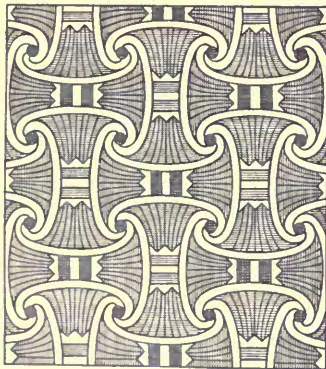
Fig. 30.

52. Fig. 30 shows a wall decoration from a tomb at Thebes. Here the scroll, similar to that used in Figs. 26 and 29, is applied as a repeating ornament in four directions, and, in the space enclosed between the lines of the scroll, conventional representations of the lotus petal are drawn, thereby simply suggesting the

existence of an idea of lotus origin. It is not a representation of the flower, nor is it intended to be; it is simply a wall decoration, the lines of which, though abstract, owe their origin to the Egyptian ever-present association of the Nile and the lotus with every-day details of importance.

53. In Fig. 31 we have a border, also taken from a tomb at Thebes, wherein the lotus is used in a most conventional manner, but, at the same time, not greatly removed from its original type. The border above and below is a simple rendering of bands varied sufficiently from one another to destroy the appearance of stripes in either

FIG. 31.

direction, and at the same time so arranged as to blend with the whole general effect and not attract the eye to any certain point.
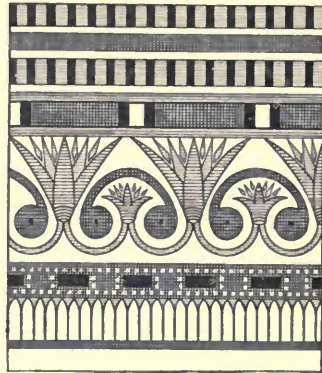
54. The Scroll.—The use of the scroll as a wall decoration, repeating only in two directions, is shown in Fig. 32.

FIG. 32.

Compare this figure with Fig. 30 and observe that the materials used to create the patterns are identical in both designs. We have the scroll and the lotus, and the lines of the scroll run from one end of the pattern to the other, and between the lines the space is filled with a design from the lotus. Notwithstanding this fact, could any two designs be more unlike ? The fact that the

scroll lines in Fig. 32 extend and repeat only upwards and downwards, would tend to give the pattern the appearance of running in stripes vertically; this is, to a certain extent, offset by reversing the directions of the scrolls, giving each a letter **S** pattern, thereby preventing any vertical lines from appearing one over the other.

As an additional element to destroy this feeling of stripe, the coloring of the lotus flower has been so arranged that the darkest portions will all blend and give the appearance of stripes in a horizontal direction, although really no stripes exist there.   Observe that in each reversed lotus flower, the horizontal line that cuts it off at the bottom of the petals is about on a level with the lines of intersection between the individual petals of the next flower, and this, continued, gives a dark stripe alternating with a lighter stripe, running in a horizontal direction throughout the pattern.   This in effect destroys the vertical element.   The same result is obtained in Fig. 30 by the changing of the direction of the figures.   Each individual element of the design is placed at right angles to the one above and below, or to the one to the left and right of it; a feeling of continuity is thereby avoided.
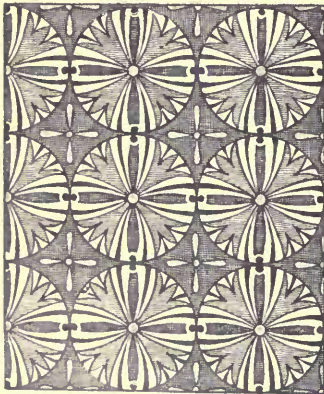
Fig. 33.

55.   Another combination of lines based on the lotus is shown in Fig. 33, wherein the wall surface is divided by a number of circles, from the center of each of which spring four ornamental forms whose outline is based on the three outer leaves of the lotus. Another pattern based on a combination of the circle and the square is shown in Fig. 34.   The wall surface is covered with tangent circles, exactly as in the previous case, but from the centers of these circles spring four leaves in

vertical and horizontal directions, thereby suggesting rectangular forms connecting the centers of the circles. Other foliated forms, in the quadrants of the circles embraced by each pair of these leaves, outline the three petals of a lotus
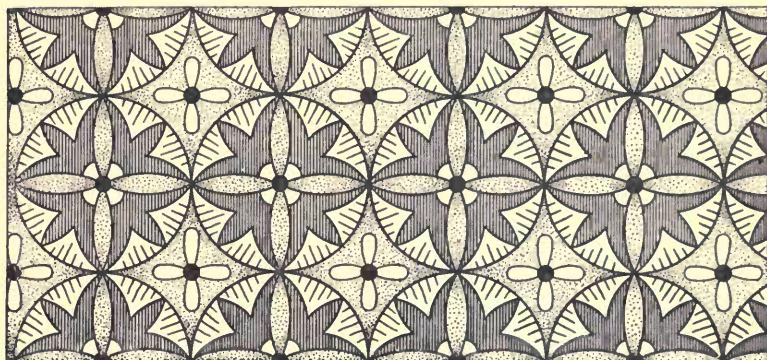
FIG. 34.

as before, in each quarter of the circle, while the spaces outside of the circumference of the circles are ornamented with a figure smaller than, but almost identical with, the one springing from the centers.

A careful analysis of Figs. 33 and 34 will again show that the elements, types, materials, and forms of both figures are as near identical as it is possible for any two patterns to be, and yet no two designs could be more unlike in appearance.

56. Referring now to Fig. 35, we have a wall decoration composed of the wave lines associated with the Nile, running in different directions. Trace any one of these lines out and you will

FIG. 35.

see that it simply runs across the pattern in a diagonal direction from top to bottom, or from bottom to top. The line that intersects with it runs practically at right angles

to it and intersects at every wave. The small irregular figures thus enclosed in the wave line are colored distinctly in alternate stripes, and a contrasting figure identical with the figure drawn outside the circumferences in **Fig. 34** is then stamped in them.

57. Fig. 36 might be at first considered a double rendering of Fig. 35, but, strictly speaking, such is not the case. The heavy black lines of Fig. 36 in general direction run vertically and horizontally, and the spaces enclosed by each pair of verticals are painted alternate colors, the effect of which is not to give that of stripes, but of a general blending of wall surface. Observe that the · colored or shaded portions of the pattern are broad, alternating with a connecting link of narrow color, while opposite this connecting link, on each side, are the broad portions of the contrasting
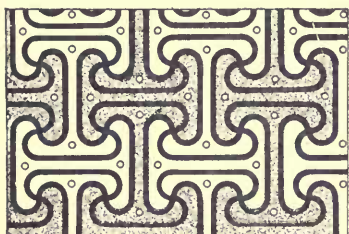
FIG. 36.

color. A study of Fig. 36 in comparison with Fig. 30 will show that the effort to prevent continuity or the effect of a stripe is the same in each case, and the principle by which this appearance is prevented is identical in each case, though the patterns themselves are utterly unlike in principle, type, and manner of execution.

58. In Fig. 37, taken from a tomb at Thebes, we have a combination of the scroll and the lotus as the running elements of the design, and the scarabæus and lotus rosette as surface elements or inlays. In this design, five sets of scroll lines spring from each center, the two upper ones branching out to form the top of an enclosing panel and to form the continuity from one scroll to another, while of the three lower ones, one connects in a horizontal direction the two lower scrolls, and the other two serve to form a bottom of a panel and preserve the line of continuity to the scroll below.

Simple as this arrangement is, it illustrates the ingenuity of the designer. From every springing point, the three characteristic petals of the lotus flower are exhibited, while from the bottom of each pair of scrolls the spreading petals of the full-blown blossom are used to fill the space. In each alternate panel, both vertically and horizontally, the scarabæus appears in its characteristic hieroglyphic form, and in each alternate panel between is a rosette based on the lotus blossom.

FIG. 37.

59. It will be unnecessary to describe all the characteristics of the design in Fig. 38; the student will simply observe that the scroll here consists of but four springing lines, and these are apparently made to serve the same purpose as five in the previous case. The panels enclosed between the lines of the scroll are of a different character, and, though filled with devices similar to the ones in Fig. 37, the general appearance of the design is totally different. We have one element in this design, however, that differs from any of the previous ones discussed, and makes a portion of it belong to the second class of Egyptian ornament, heretofore described; that is, the hieroglyphic representation of a fact, the little devices in alternate spaces being hieroglyphic writings descriptive of some of the acts and doings connected with the life of the person to whom the

FIG. 38.

tomb was erected. All this ornament was richly colored, and the effect of it on the walls was due as much to its system of coloring as to the design itself.

60. It is impossible here to express in each case, without means of color, the characteristic appearance of each design, but the main point is to exhibit the ingenuity and invention of the Egyptian artist in his portrayal of a multitude of different designs, all based on exactly the same idea, and using less than half a dozen different forms. In spite of their simplicity, a careful study of each one of the designs here illustrated will always bring forth a new point so subtle that, though when once discovered it appears most prominent, it has for a long time previous remained undiscovered.

61. Egyptian Coloring.—In general effect, Egyptian ornament was brilliant and many-colored. The reason for this must be borne in mind: the interiors of the Egyptian's temples and tombs were pervaded by a deep sepulchral gloom fittingly symbolizing the mysterious character of his religious belief, and, in order that the decorations on the walls should stand out amidst this gloom, it was necessary that the brightest of colors should be used, or the decoration would fade into insignificance.

While the Egyptian ornament may be said to be thoroughly polychromatic, there are many cases where it depended as much for its expression on carving as on painting. However, Egyptian ornament may be considered, in a multitude of cases, as being painted ornament. In their rendering, the Egyptians used no shades or shadows, and laid their colors in flat tints only; yet they found no difficulty in conveying to the mind the identity of each object they desired to represent, without a suggestion of shade or shadow.

62. The palette of the Egyptian artist contained seven depressions for seven colors, arranged in the following order: white, yellow, green, blue, red, dark brown, and black. There were two kinds of yellow—a bright yellow and yellow ocher. There were three kinds of blue—an azure blue, a

greenish blue, and a dark blue. The reds were made of burnt ocher, and the general tone of Egyptian ornament seems to have inclined more to yellow than to any other color. Green was used less than red, yellow, and blue. The Egyptian oriental blues are more greenish in hue than a strictly normal blue, and their reds partook of an orange tinge. They appreciated the fact that colors were affected much in their appearance when in juxtaposition to one another, and they made use of this detail to emphasize or detract from the strength of some particular hue.

ASSYRIAN ORNAMENT.

63. Development.—Although the early architecture of Western Asia is of little importance so far as its direct influence on the styles of later periods is concerned, it must be given a certain amount of consideration in order that the development and growth of certain subsequent forms may be properly understood under the different conditions.

64. The ornament of Assyria was probably borrowed from Egypt, as there are many points of resemblance in the two styles. The sculpture of the Assyrians seems to have been a development of that of the Egyptians, but descended from it rather than advanced in scale of perfection. Egyptian sculpture degenerated toward the end of the fourth century B. C., as it expressed an unnatural swelling of the limbs that was at first but lightly indicated and gradually became almost exaggerated—the conventional having been abandoned for an imperfect attempt at the natural. In Assyrian sculpture, the attempt was carried still further, and, while the general arrangement of a subject and the pose of a single figure was still conventional, an attempt was made to express the muscles of the limbs and the rotundity of the flesh to an extent that destroyed all conventionalism. In all art, this is a symptom of decline. Nature should be idealized, not copied.

65. Assyrian ornament is not based altogether on the same types as the Egyptian, but is represented in the same way. In both styles, the ornaments appear in relief, as well as painted, in the nature of hieroglyphic diagrams. With the exception of the pineapple, and the adaptation of the Egyptian lotus, Assyrian ornament does not seem to be based on any natural type, and the natural laws of radiation and
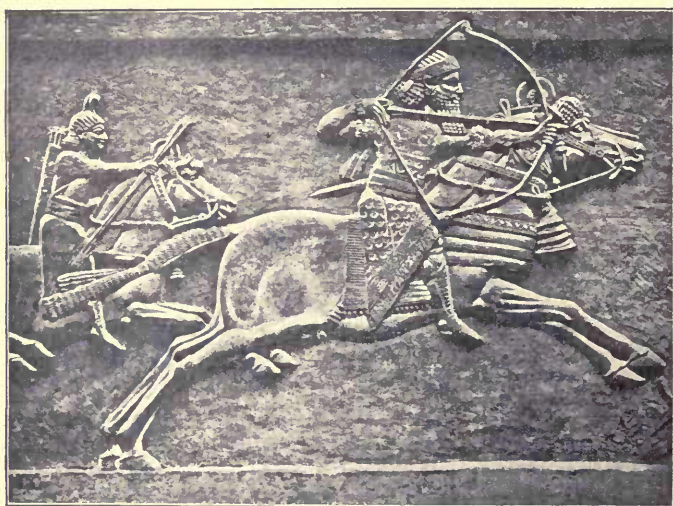
FIG. 39.

tangential curvature that we find in Egyptian ornament are, in the Assyrian, observed more as a traditional or borrowed idea rather than an instinct of the people themselves. Fig. 39 shows an example of Assyrian sculpture supposed to illustrate a scene where the king on horseback is hunting, attended by his servants and arrow bearer. The pose of the figure and the character of the work is strongly suggestive of Egyptian origin, but the attempt to express in stone the muscular roundness of the limbs and other parts is indicative of a decline in art.

66. The Assyrian religion differed widely from that of the Egyptians, and, though their combinations of forms

resembled, somewhat, certain of the Egyptian deities, the
style in which they sculptured them was below the standard
of art and practice in Egypt.

Fig. 40 is an example of this work representing the winged
deity Asshur, in which may be seen the excessive effort to

FIG. 40.

represent the rotundity of muscular developments.   The
attempt to represent the muscular characteristics of this
figure is exceedingly inartistic, and, though the attempt to
present an appearance of power and strength is well carried
out, it is done with much less delicacy and refinement than
we would expect if the work were an example of Egyptian
art.   Asshur was the supreme deity in the Assyrian group
of gods, and in the conception of his form there is much that
is suggestive of Egyptian origin.   The hawk head and wings

are surely borrowed from Egypt, and the pose of the body and limbs is strongly suggestive of Egyptian ideas. The position of the hands seems to be repeated in nearly every example of Assyrian ornament where the figure represents a deity, and is similar to certain Egyptian productions of the kind, except that the limbs are clumsy and the molding possesses much less refinement.

67. In Fig. 41 is shown the Assyrian rendering of the Egyptian lotus, and, in fact, this border, which comes from
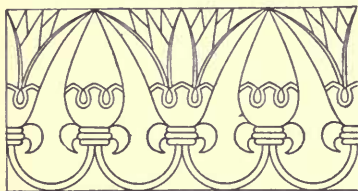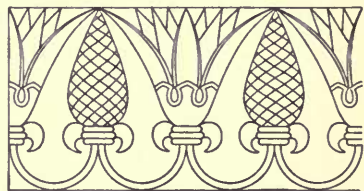
FIG. 41.   FIG. 42.

Persepolis in Assyria, might easily be considered an attempt to copy the example of Egyptian ornament shown in Fig. 28 (*a*). Fig. 42 shows another example of lotus ornament from the same city in Assyria, wherein the detail is almost identical with Fig. 41, but the lotus bud between the two blossoms is replaced by a device representing the pineapple — a fruit that was sacred in Assyrian art. The close resemblance of these forms to those seen in Egypt is almost indisputable evidence that they were derived from the latter country, and the rosette form shown in Fig. 43, while it appears frequently in borders of Assyrian orna-
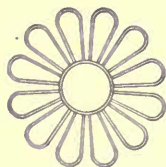
FIG. 43.

FIG. 44.

ment, must undoubtedly have been developed or adapted from the Egyptian device shown in Fig. 25 (*d*). A still

cruder adaptation of the Egyptian lotus to carved ornament
in Assyrian work is seen in Fig. 44, wherein the surface of
the petals is simply indented in a harsh, crude manner,
and the outline is carved into seven pointed terminations
of the leaves.   The use of this ornament in borders, in
combination with another crude ornament, is shown in
Fig. 45, wherein the outline of the lotus-derived figure
shows a little more refinement, as its lines are more grace-
fully curved, but where the connecting lines between it
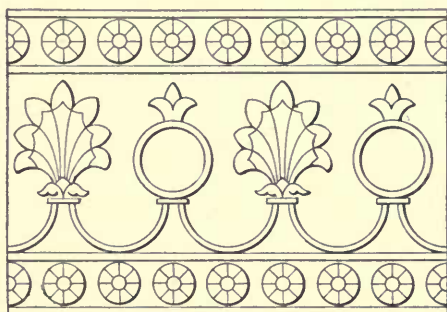
FIG. 45.

and the interposed device are arcs of a circle, making
the entire composition crude and inartistic.   The circu-
lar forms with the three-leaved blossom on top may be
representative of pomegranates, the designs of which were
used largely in Assyrian decoration.   However, it is of little
importance in itself what types were used in this art.   The
lotus and rosette were undoubtedly borrowed from Egypt;
the latter, both as shown in Fig. 43 and modified in
Fig. 45, are easily traceable to designs seen on the banks
of the Nile.

68.   These few ornaments will suffice to trace the
art of Egypt into Asia Minor and show in subsequent
styles how their altered introduction into European coun-
tries was able to harmonize with the style already
existing.

CLASSIC ORNAMENT.

GREEK ORNAMENT.

69.   Greece and Egypt Compared.—Before entering
on the study of the characteristics of Greek ornament, let us
for a moment compare the conditions and surroundings of
Greece with those of Egypt.   Although modern Egypt
covers a considerable extent of country, ancient Egypt
included only the section that bordered on the Nile.   In fact,
as we have already suggested, it may be considered simply
as the country that was watered by the annual inundations of
the Nile.   The climate here was mild, there being but two
seasons—spring and summer—and there was very little
variety in the daily life of the inhabitants, except what may
have been experienced in the celebration of some national or
religious festival.

70.   Greece, on the contrary, presents entirely different
conditions.   It is on the sea, and throughout its long broken
shores, the tide ebbs and flows and penetrates far inland
through the long clefts in its coast.   Greece has many moun-
tains, too, and this affected her climate inasmuch as they
served as watersheds, carrying the rains down and fertilizing
the valleys.   The country, however, is far enough south to
receive a tropical sun, and, although its climate ranges from
severe·cold in winter to a fierce heat in summer, the majority
of the time its temperature is warm and comfortable.

71.   Character of the Greeks.—The people of Greece
were brave, active, and athletic; their Olympian games were
world renowned.   Their bodily culture was extremely fine,
but did not compare with their intellect, which was more
developed than that of any other nation.   The Greek lan-
guage is rare and complete in structure, and Greek literature
is unsurpassed.   The Greek religion was polytheistic, but
the Greeks did not devote as much attention to the worship

of their gods as did the Egyptians. True, they erected vast temples and costly monuments to Athena, Apollo, Zeus, Erectheus, and other deities, and these temples, exquisite in form, proportion, simplicity, and perfect harmony, are examples of the finest architecture that the world has ever seen. Notwithstanding this mark of reverence to their gods, the Greeks did not embody into every branch of their art some detail or reminder of their religious duties and inclinations as did the artists of Egypt. The form of the Greek's worship was, in some respects, almost as complicated as that of the Egyptian, but his intellect seemed to be more advanced and he was bound less by a superstitious interest in the future condition of his soul, and his fancies naturally sought ideas that in themselves were beautiful to think of and to look at, rather than suggestive of gloom and forebodings concerning an uncertain future existence.

The development of Greek art then takes place along an entirely different line from that of Egypt, and though it goes as directly and intelligently to a point of climax, the resulting forms are totally different in their character, meaning, and influence on subsequent styles.

72. We have seen how the Egyptian artists derived their ideas for ornamental design directly from nature, that their types were few, and that they remained unchanged throughout the entire course of Egyptian civilization, except in the degree of perfection of execution; and, in this detail, the greatest perfection existed in the most antique examples.

We have studied that the Assyrian was a borrowed style and possessed no characteristics of an inspired art, but appeared to have been suggested by the art of Egypt, and that the suggestions borrowed from the Egyptian style were during its decline, and the Assyrian artist, instead of advancing on the style, carried that decline still further. With Greek art, however, we find a vast difference. It was undoubtedly borrowed from both Egypt and Assyria, but was developed in an entirely new direction, and, unrestricted by any complicated religious laws, as both Egyptian

and Assyrian art seem to have been, the Greek adoption rose rapidly to a high degree of perfection. Though the influence of Egyptian and Assyrian art can be traced in many details of Greek designs, those influences are entirely subordinated to the Greek feeling applied in their introduction. Neither the art of Egypt or Assyria can be considered to play an important part in the styles of subsequent generations, but the art of Greece pervades all subsequent history.

73. It must be considered, in the study of the Greek styles, that the remarkable development was due to their introduction into Greece at a critical period of the art development of that country. Greek art carried the perfection of pure form to a point that has never since been reached, and the abundant remains of Greek ornament compel us to believe that refined taste was universal, and that the country was overflowing with skilled hands and minds so trained as to enable them to execute these beautiful ornaments with unerring precision and truth.

The beauty of Greek ornament, however, lies almost exclusively in its *symmetry* and *form.* It is lacking in one of the greatest charms that should always accompany ornament, viz., *symbolism ;* and, despite the pleasure we experience in its beautiful gradations of form and color, Greek ornament is meaningless, purely decorative, never representative, and in few cases it is, in the stricter sense, hardly even constructive.

74. Architecture.—In the architecture, the various members of a Greek monument presented exquisitely designed surfaces to receive ornament, which at first was simply painted and in later times carved and painted, but the ornament formed no such essential part of the construction as did that of the Egyptians. It could often be removed and the structure remain unchanged.

On the Corinthian capital (Fig. 50), the ornament is applied to the surface and is hardly constructed as a part of the capital itself. Remove the scrolls and foliated
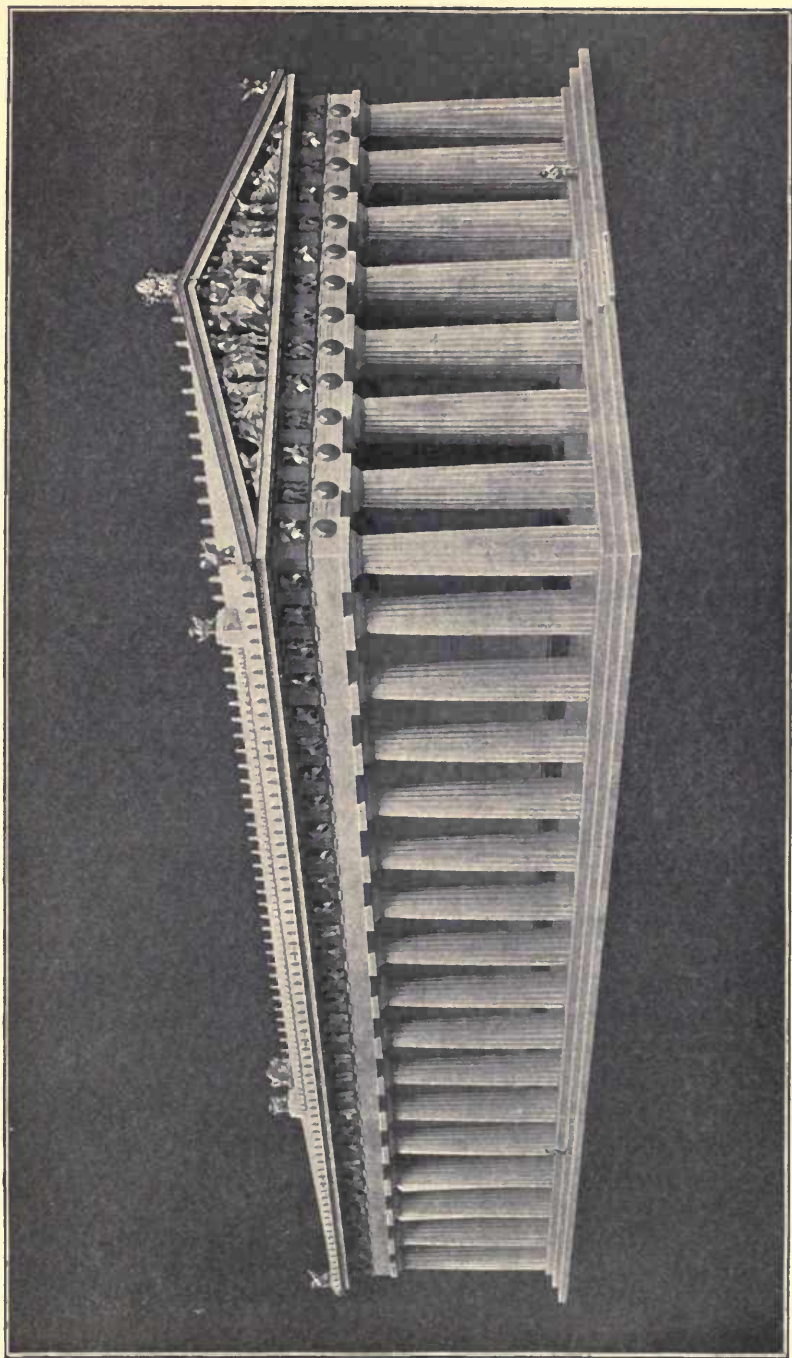
FIG. 46.

ornament and there still remains sufficient substance and material for the pier to carry out its purpose. On the Egyptian capital, however, Fig. 16, the whole capital is an ornament, and to remove any portion of it would be to destroy both the ornament and structural purpose of the column itself.

75. Sculpture.—In addition to the skill of the Greek artist as a designer, his unerring truth in the use of his chisel renders the work of the earlier periods remarkably interesting to us, but the monumental sculpture of the Greeks frequently went beyond the bounds of ornament. For instance, in the frieze of the Parthenon, Fig. 46, though composed of a series of groups of draped figures, the ornament was so far above the eye that it became a mere diagram —an ornamental band around the top of the building, the beauties of which are simply astonishing when observed more closely. Every detail of each of the panels was as minutely wrought as though it were to receive the closest inspection. The folds of the garments and the molding of the limbs, even on the side away from the eye, that could never be seen unless the panel was removed from the monument itself, are as carefully modeled as those most prominently in sight.

Conscientious as this treatment may appear to be, systematic and honest as is the execution of a design that was dedicated to one of their gods, we are bound to consider this an abuse of means as a work of art design, and that the Greeks were, in this respect, inferior to the Egyptians, whose system of broad conventionalized ornament for monumental sculpture served its purpose to better effect.

76. Representative Types.—The examples of Greek representative ornament are few. In the earlier wall painting, there is a wavy ornament—a fret, somewhat similar to the Egyptian, used to distinguish water from land—and a few conventional renderings of trees, but nothing of importance was done in this line in the later history of Greek art. In the decorative ornament of the Greek vases, however, there is abundant material to assure us that we have examples

of every type of Greek ornament in all its phases.   The
types are few, but, in their conventional rendering, are so
far removed that it is difficult to recognize any attempt at
imitation.   An examination of the wall paintings and vases
leads to the belief that the forms
of the leaves of the Greek flowers
are due more to the limitations of
brush work than to any direct imita-
tion of the natural flower.
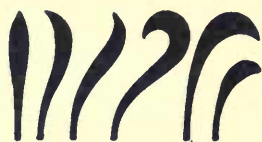
FIG. 47.

The six forms shown in Fig. 47
constitute about all the leaf strokes
that are found throughout Greek ornament, but these six
forms were applied to a variety of purposes, the extent of
which is almost past belief.

77.   The Three Great Laws of Nature. — That the
Greek artists carefully observed the principle on which cer-
tain plants grew, and carried that principle out conscien-
tiously in the execution of their designs, cannot be doubted.
They were close observers of nature, and although they did
not copy or attempt to imitate or make true portraits of any
natural forms, they never violated a natural principle.   The
three great laws of nature—*radiation from the parent stem,
the proportionate distribution of areas, and the tangential
curvature of the lines*—are always obeyed; and it is the
unerring perfection with which they are carried out in the
most humble works, as well as those of the greatest impor-
tance, that fills us with astonishment at the conscientious
scruples of the Greek artist.

Before we analyze examples of Greek ornament, we must
first consider the architecture.   The Greek, like the Egyp-
tian, spanned his architectural opening with a lintel, and
though the width of the opening was, like that of the Egyp-
tian, governed by the length of the lintel that could be con-
veniently quarried, the Greek's knowledge of statics and
his highly intellectual mind rendered him more inclined to
develop artistic proportions, between the support and the
material supported, than is found in any Egyptian work.

78. Orders of Design.—As before stated, the capitals of the Egyptian columns were of but three styles—the lotus bud, the lotus blossom, and the palm. These were varied
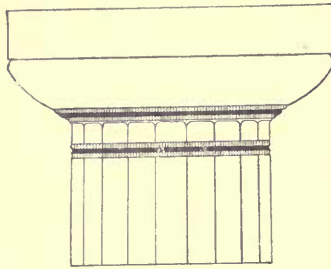
more or less in different localities, but all being the development of a single principle, can hardly be called different orders of design from one another. In the Greek, however, we have three distinct **orders,** or systems, of design, the distinguishing characteristic of each being the capital of the column ; these orders are the **Doric,** whose column is topped with a capital consisting of a simple slab over a thumb-shaped molding, as shown in Figs. 46 and 48; the **Ionic,** whose capital consists of a pair of scrolls, or volutes, supported upon a thumb molding similar to a diminished form of the Doric, as shown in Fig. 49 ; and the **Corinthian** order, Fig. 50, whose capital has been before referred to. In the last named, the top of the column is swelled out into a bell shape, not unlike the palm column of Egypt, but is decorated with leaves and vines and scrolls, and other forms based on types from the

Fig. 49.

vegetable world. The volute, or scroll, of the Ionic capital some authorities endeavor to trace back to the lotus blossom;
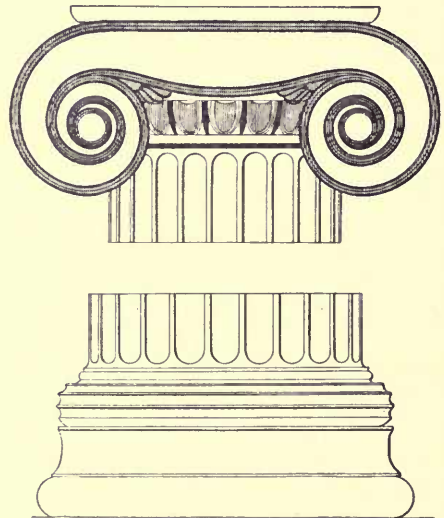
other authorities claim that its origin is in Assyria or Persia, certain forms of column there being treated with the scroll. However, it matters little whence came the idea, inasmuch
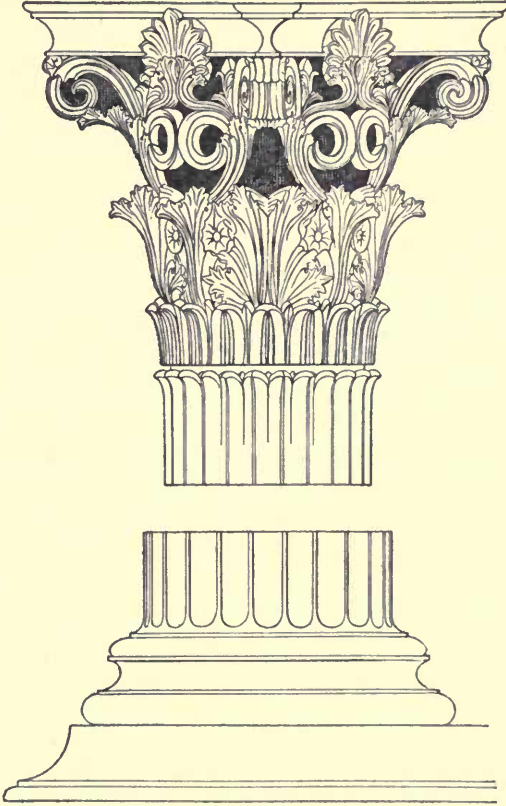
Fig. 50.

as it is so elaborated as to bear scarcely any resemblance to its original type. The bottom, or foot, of each of these columns differs somewhat from the Egyptian type also.

79. Bases.—It will be remembered that the Egyptian column was usually rounded off so that it was smaller at the bottom, and painted or carved, representative of the root of a growing plant. The Doric column sits flat on the ground

or plinth without any molded base whatsoever, and its sides
are cut in channels, or grooves, each pair of which meet in
an edge, or arris, that extends all the way to the capital.
These may have been derived from the reedings of the
Egyptian columns, imitative of the reeds of the growing
plant.   In fact, it has been practically conceded by nearly
all authorities that the Doric column is a development of
a certain form of Egyptian column; but, as said before,
though the Greeks borrowed ideas from the Egyptians, they
carried them to a higher state of perfection, and in nothing
is this more evident than in the columnar elements of their
architecture.

The bases of the Ionic and Corinthian columns are regu-
larly molded, and though it is difficult to trace any direct
origin to the system of moldings that appear so uniformly
on these bases, it is simply necessary to bear in mind the
fact that, in the three orders of Greece, two of the columns
possess bases, and one of them—the Doric—is without that
detail.   The mathematical proportions of these orders we
will consider later, when we can compare them with their
Roman modifications.

80. Classic Moldings.—In Greek architecture all of
the moldings are profiled on the curve of some conic section.

Before analyzing the outlines of these Greek moldings and
the methods of contouring them, let us first give our atten-
tion to the conic sections from which they seem to have been
derived.

81.   In Fig. 51 are shown two similar cones $a\,b\,c$ and
$a\,d\,e$, which are in contact with each other at their vertexes
a, and whose bases $b\,c$ and $d\,e$ are circular and at right angles
to the axes $a\,f$ and $a\,f'$.   If either of the cones be intersected
or cut by a plane, which is parallel to one of its elements or
sides, as $b\,c$, the line of intersection will be a *parabola*, as at
$g\,h\,i$; but, if instead of being parallel to the side $b\,e$, the
cutting plane makes an angle with it, the curve formed by
the intersection will be either an ellipse or a hyperbola,

according to the angle. It will be an ellipse when the cutting plane is more nearly parallel with the base of the cone than it was in the case of the parabola, and passes through both sides as at *j k*; and the line of intersection will be a hyperbola when the cutting plane is more nearly perpendicular to the base than it was in the case of the parabola, as shown at *l m n* and *o p q*.
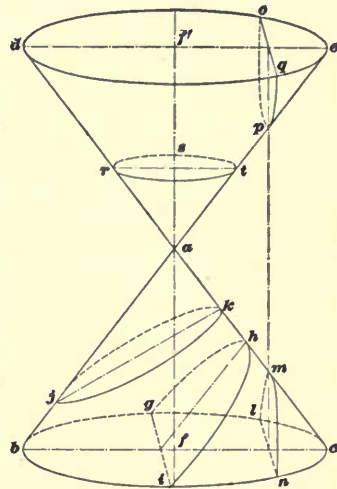
82. In the case of the hyperbola, the plane will always cut both cones, thereby giving two branches to the curve, and these branches will be farther apart as the cutting plane recedes from the axes of the cones. The nearer the plane approaches the axes of the cones, the straighter will become the sides of the intersecting curve, and as the plane

Fig. 51.

recedes from the axes, the rounder and nearer circular will be the intersection, though no matter how closely the curve of intersection may approach the arc of a circle, it can never become absolutely circular in form.

The hyperbola becomes two intersecting straight lines when the plane passes through the vertex; these two lines are most divergent when the plane is parallel with the axes of the cones, and gradually become closer together as the plane approaches a position parallel with the side of the cone, where the hyperbola reaches its limit in a straight line. This straight line is the common limit of both hyperbola and parabola, as any deviation from it will produce one or the other of these curves, according to the direction of that deviation.

83. As the plane of the ellipse becomes more nearly parallel to the base of the cone, the ellipse approaches the

form of a circle, which it finally becomes, when the axis of the cone and the cutting plane are perpendicular to each other, as at *r s t*, and as the plane of the ellipse approaches the vertex of the cone the ellipse diminishes in size until it reaches its limit in a point. From a point to a circle, then, is the limit of curvature of the ellipse.

84. In *Geometrical Drawing*, methods are given in examples 23 and 25 for drawing an ellipse and a parabola of any desired proportions, and it is only necessary to add here the method of contouring the hyperbola.

To draw a hyperbola of a given width and height, the axis *a b*, Fig. 52, is laid down perpendicular to the width *c d*, in the same manner as for the parabola, and the rectangle *c d f e* is constructed with *c d* equal to the base of the hyperbola,
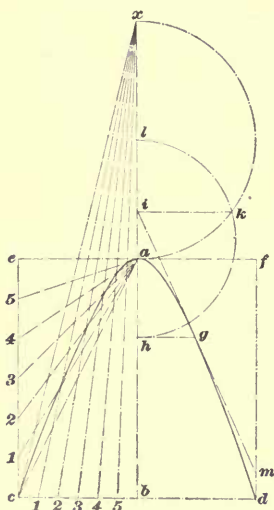
FIG. 52.

and the height *c e* equal to the axis *a b*. Divide one half the base and also each side into any number of equal parts, and connect the points of division on the sides with the vertex *a* by means of the lines *a 1*, *a 2*, *a 3*, etc. The points of division on the base are connected by lines to some point *x* on the line of the axis *a b* extended; the points of intersection of these two series of lines will determine points on the hyperbolic curve, taking the lines in the order as they recede from point *c*; *x* can be at any distance above *a*, and the curved lines *a c* and *a d* will approach more nearly the curves of the parabola as the point *x* becomes more remote. On the other hand, the nearer the point *x* is to the vertex *a*, the more *a c* and *a d* will approximate to a straight line, and when points *x* and *a* coincide, the line *a c* will be a straight line.

85. To draw a tangent to any point of the hyperbola, first draw a line from the desired point *g* perpendicular to the axis *a b*, and on the extended axis *a x*, describe the semicircle *a k x*, with a radius *l a* equal to $\frac{1}{2}$ *a x*; then, with a radius equal to $\frac{1}{2}$ *l h*, describe the semicircle *l k h* intersecting *a k x* at *k*; draw *k i* perpendicular to *a x*, and connect *i g*; then *i g m* will be the tangent required.

86. There are, generally speaking, eight moldings used to separate different members and surfaces from one another, and these eight are shown in Fig. 53. The *fillet A* is simply a square-edged band used to separate individual members of a group of moldings. The *cyma recta B* is more commonly known as a crown molding, as it is used in the uppermost portions of a composition; at *C* is the *cyma reversa*, the contour of which is the direct opposite of *B*; at *D* is the *cavetto*, or hollow molding; at *E* is the *echinus*, or egg-shaped molding, at *F* is the bead,

Fig. 53.

a small molding similar in use to the fillet, but with a round, instead of rectangular, section. At *G* is the *scotia*, the contour of which is practically the reverse of the echinus; and at *H* is the *torus* molding, used almost exclusively around the bases of the columns, as shown in Figs. 49 and 50.
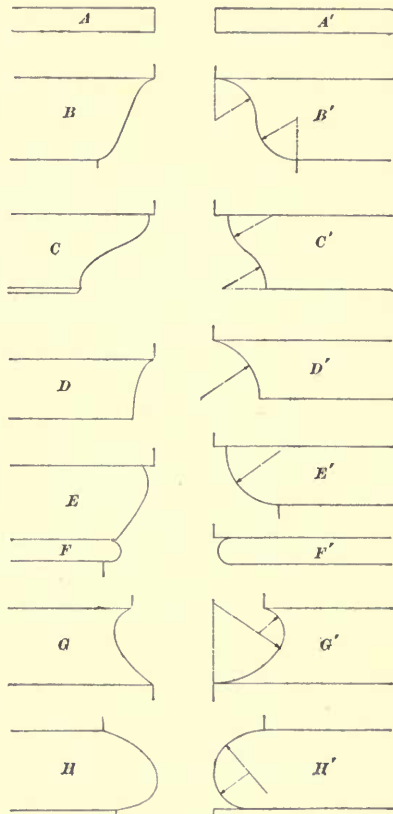
wherein the bases of the Ionic and Corinthian columns each consist of two torus moldings, separated by a *scotia* and *fillets*. In Fig. 48, the principal molding at the top of the Doric column, it will be observed, is the echinus. The application of the other moldings will be discussed as examples of them occur.

87. Doric Order.—As seen in the illustration of the Parthenon, Fig. 46, there is little carved ornament in the Doric order, except such as appears in the sculpture of figures and animals, and, though in the Ionic order there are a few examples of relief ornament, it is in the Corinthian order we find the greatest relief and broadest demonstration of surface work.

88. Ionic Order.—In Fig. 54 is shown a frieze from the principal Ionic temple in Athens, the Erechtheum, the
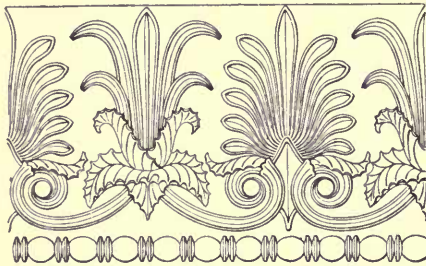
FIG. 54.

style of which is typical of this class of relief ornament throughout Greek design. It is plainly a development, in relief, of the brush forms shown in Fig. 47; and the addition of scrolls at the bottom, and leaves, from which the forms appear to spring, is due to a conventionalization of the acanthus leaf, which first makes its appearance in art through its introduction into Greek architecture.

89. Corinthian Order.—In Fig. 55, however, is shown a section of ornament from the choragic monument of Lysicrates at Athens. This is the principal structure of Greek origin designed in the Corinthian order. Fig. 55 is an ornament from the top of the above monument, and shows not only the elaboration of ornament characteristic of this order, but also a principle of ornamental design that is of the

utmost importance in its relation to the lack of invention of
new forms and the restraining influences of certain art
periods.   It will be observed here that the various parts of
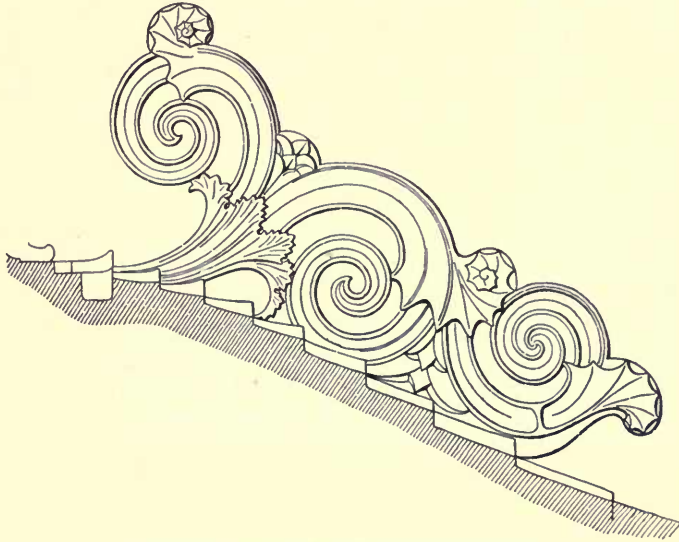
the acanthus scroll grow out of one another in a continuous
line.   This is a principle of design that originated with the
Greeks, and was continued by the Romans, after which, as
we shall see, it was abandoned, and the abandonment of this
simple principle was sufficient to gen-
erate an entirely new order of forms
and ideas.

In Fig. 56 is shown a form of
the acanthus leaf taken from the
Tower of the Winds at Athens.   It
is purely conventional in form, pos-
sessing a broad, bold treatment, nec-
essary for its execution in stone, and
following closely the principles of the

FIG. 56.

growing plant, as do all other developments in Greek
ornament.
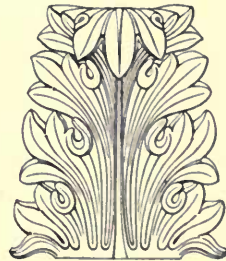
These few examples of Greek constructive ornament are most important just now, as they contain the principles from which certain later forms were developed, though they are of no great importance in subsequent history, except so far as they were developed and extended by the more voluptuous though degraded art of Rome.

90. Surface Ornament.—Of the surface ornament, purely decorative in character, we have a great variety in Greece, though all of it is based on a few simple types, and restricted almost entirely to variations of the brush forms shown in Fig. 47. The first exceptions to this, however, are the fret forms used extensively both in the architecture and

(a)
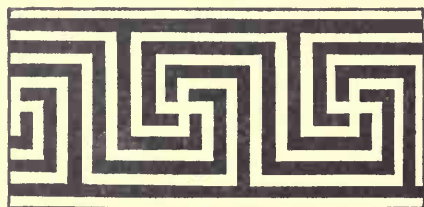
(b)

Fig. 57.

ceramics, of which Fig. 57 (*a*) and (*b*) are typical examples. The meandering line of Fig. 57 (*a*) is continuous and forms the entire pattern, while in (*b*) the pattern is composed of two lines that are carried through the fret parallel, to its center, where they cross each other and retrace their steps out of the labyrinth.

91. In Fig. 58 is a portion of a repeating border consisting of a number of brush strokes in the form of a *palmette* or

anthemion, and then enclosed in a single stroke, by which it
is joined to a repetition of the same form.   This is typical in
certain classes of Greek pottery, and is
usually executed in a reddish color on a
black ground.

92.   Anthemion.—The anthemion is
one of the most characteristic of Greek
forms.   It exemplifies most perfectly the
beauty of radiation, of tangential union,
and of the proportionate distribution of
areas.   In Fig. 59 is shown at (*a*) an
ornamental form occasionally met with
in the earliest examples of Greek work,
whose identity can be readily traced
back to the lotus by comparison with
Fig. 15 (*d*).   The Greek development of
this form into Fig. 59 (*b*) is not hard to
comprehend.   The radiating leaves are
made larger and fewer.   The calyx, from

Fig. 58.

which they spring, is diminished to a couple of conventional

(*a*)   (*b*)
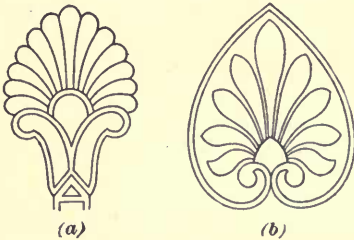
Fig. 59.

scrolls, and a sweeping out-
line encloses the whole device.
The figure is sufficiently like
that in the design shown in
Fig. 58 to establish the origin
of the latter; and, in fact,
numerous cases of the appli-
cation of the anthemion or
palmette ornament, both in
sculptured and painted work, will be met throughout the
study of Greek art.

93.   Greek Lily.—In Fig. 60 is shown another pattern
where the palmette is formed of brush strokes in black upon
a reddish ground, with a form somewhat resembling the
Greek lily between each pair.   The palmette form in this
figure is rather more densely drawn than the anthemion in

Fig. 58, and is representative of the class of ornament usually termed the *Greek honeysuckle*. The conventional form between these anthemions just referred to—the Greek

FIG. 60.

lily—is traceable back to the old Egyptian lotus form, as are many other Greek details.

Fig. 61 shows at (*a*) an outline form of the lotus seen in many of the hieroglyphs. Variations of the form shown at (*b*) are seen in both Egyptian and Greek work, while at (*c*)

(*a*)   (*b*)   (*c*)
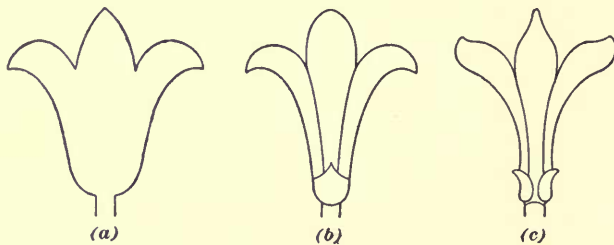
FIG. 61.

is the brush-stroke device, usually distinguished under the name of the *Greek lily*.

The foliated form between the palmettes in Fig. 60 is undoubtedly an adaptation of the lily to fit around the brush strokes of the intermediate figures, and the reaching of the outward leaves back toward each other is suggestive of the treatment of the lotus flower, both as used in Assyria, Fig. 41, and in Egypt, Fig. 28 (*a*).

94. In Fig. 62 we have a rosette pattern, repeated at intervals in reddish color on a black ground, that is almost undoubtedly of Egyptian origin, as shown in Fig. 25, although its development on a similar line of thought may
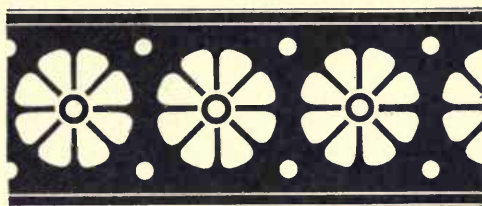
FIG. 62.

have been reached in Greek art. It is painted around the necks and bases of many vases, however, and is used so much in Greek ceramics that we associate it very largely with that style of art.

95. Fig. 63, another pattern undoubtedly of Egyptian origin, brings us to the consideration of the scroll in the surface decoration of Greek work. This pattern must certainly have been borrowed from the symbol of the Nile seen

FIG. 63.

in the Egyptian hieroglyphs, and though there has been little change in the idea, we find a refinement of its proportion and lines, and an improvement in its details from an art standpoint, even though it has lost all its symbolic character.

96. Fig. 64 is another adaptation of an Egyptian idea, as may be seen by referring to Fig. 26, wherein the scroll is

repeated as growing out from a device of the same kind, and a foliated form, slightly suggestive of the lotus, fills the space between each pair.   The rosette, similar to that shown in Fig. 62, is also used as a termination of this scroll, and

FIG. 64.

this combination of the scroll growing out of the scroll and terminating in a rosette or flower, is of vast importance in Roman art, although on this simple vase border is the first place we find it among the Greeks.

97. Guilloche.—In Fig. 65 is shown an interlaced ornament used almost entirely in carved work on the *torus moldings* at the base of a column.   It represents, supposedly, the woven bands around the bottom of a shaft composed of
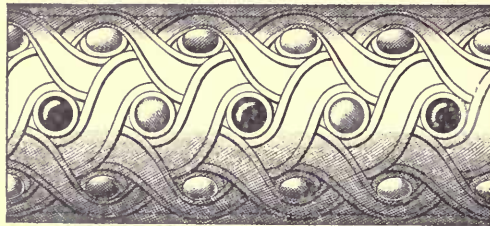
FIG. 65.

a bunch of reeds, and serves to bind them together.   The name of the ornament is a **guilloche,** and different forms of it, varying in complexity, are found throughout Greek art.

98. Fig. 66 shows examples of *raised* or relieved ornament, as seen in the details of the temple of Athena Polias,
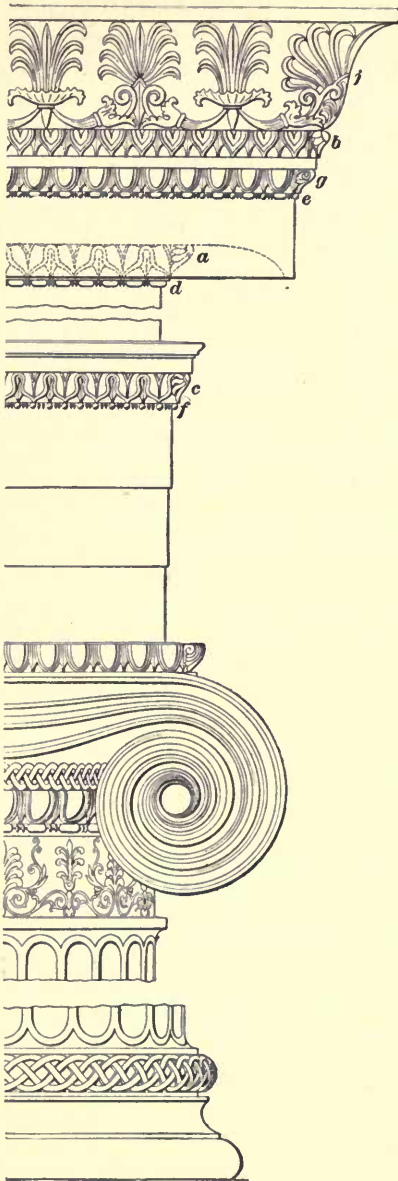
FIG. 66.

in the Erechtheum at Athens. The enrichment on the cyma recta *j* is the lotus-flower ornament, and is carved in very low relief; that is, cut so as to be raised slightly above the surface of the molding, and not sunk into it, as was customary with the Egyptians (see Fig. 20). As we examine later monuments of Greek architecture, we find the relief of the carvings increasing, until, when we reach the Greco-Roman period, the stems and stalks are in many instances so under-cut as to be almost clear of the molding.

The waterleaf carving on the cyma reversa occurs three times in this entablature, and is of varied form, according to its location. Up under the corona at *a*, where the shadow is deep and dark, the waterleaf is cut broad and bold, but immediately below the cyma at *b*, and above the upper facia at *c*, the lines of the leaf are drawn longer and narrower, so that the moldings appear in more

delicacy of outline, where the full strength of the light strikes it. The same thing may be said of the bead moldings under the corona at *d* and under each of the two lower cymæ reversæ at *e* and *f*. The one in the shadow of the corona, as at *d*, is cut into long beads, while the one above the corona, as at *c*, is divided into much more minute divisions; and the one on the top of the upper facia, as at *f*, being in the strongest light of all, is turned into forms where the *bead* is simply a tiny sphere between two pairs of disks of the same diameter. The egg-and-dart ornament of the ovolo occurs here above the corona of the entablature at *g* and under the guilloche and volutes of the capital, the only difference in these two examples being that the one above the corona is carved upon a straight ovolo extending along the top of the corona, while the other is carved in the circular echinus surrounding the top of the column. The honeysuckle ornament cut on the neck of the column is in low relief, the same as that upon the crown molding *j*. The guilloche immediately under the lines of the volute is carved as a thin strap, loosely braided, around the top of the column, and the same ornament is cut on the upper torus of the base.

99. Polychromy is the term applied to the ornamentation of sculptured and architectural works by means of colors. In ancient buildings these colors were made to cover both flat surfaces and architectural details, while in statues or individual portions of the human figure and drapery, and in other products of plastic art, separate features of a sculptured ornament were colored in a manner characteristic of the subject.

Egyptian polychromy, on columns, bases, capitals, entablatures, wall spaces, and, in fact, almost everything of an architectural character, expressed itself in a series of highly colored designs in low relief, consisting mostly of figures and hieroglyphs, and often of purely decorative ornament.

In Greek architecture a complete system of color had been developed at an early period, particularly as applied to Doric

temples, upon numerous remains of which traces of this coloring are distinguishable.

The principal use of color in architecture is to bring out decoration. Surfaces may be relieved by a rich play of color without actual relief, and ideas may with facility be expressed by colors, when the object they embellish calls for the widest possible range of imagination and fancy. Still, color has its own province, and to a certain extent its own series of forms, and must therefore be treated in its own manner. A harmonious interplay of colors, with correct proportion in the distribution of each, is characteristic of a fine work of art. In truly artistic periods, color has never been made use of to produce artificial shadows or to bring out artificial depths and reliefs; nor has it in any way been employed as a makeshift for them.
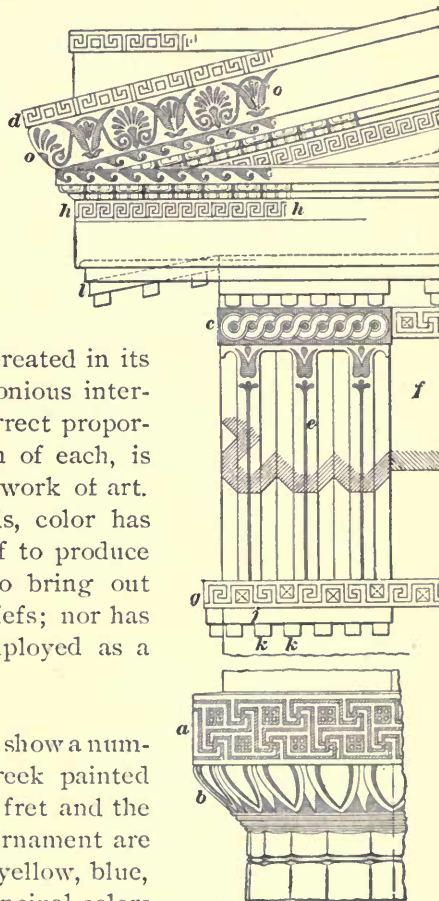
100. Figs. 67 and 68 show a number of examples of Greek painted ornament in which the fret and the lotus and honeysuckle ornament are both prominent. Red, yellow, blue, and green were the principal colors used by the Greeks in these decora-

FIG. 67.

tions, but they were so toned down and softened that the glare and harshness of such brilliant colors were blended into one delightful monotint as one viewed their structures from a distance. Fig. 67 is a portion of the capital,

entablature, and pediment of the Greek Doric order, with the characteristic polychromatic ornamentation. The fretwork on the abacus at *a* was usually executed in a dark red or black, while the groundwork was pale yellow or orange. The egg-and-dart ornament on the echinus of the capital *b* was generally printed in red on a dark-blue ground. The triglyphs *c* were nearly always blue, and any ornament *e* on them was executed in red. The metopes *f* were generally red, and the sculptured figures with which the metopes were ornamented were painted in tints that represented the color and texture of their garments.

The fret drawn on the tænia, or fillet, *g* and those on the corona and epitithidas, as at *h* and *d*, were usually executed in gold, though occasionally in red. The regulæ *j* were blue with red drops, or guttæ *k*, as were also the mutules *l*,
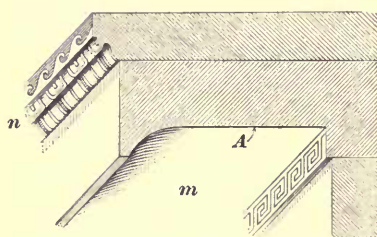
but the soffit of the corona *m*, shown in Fig. 68, was red. The small moldings *n* forming the finish to the corona were generally painted in light colors, such as red and blue, with spaces of white alternating between. The honeysuckle

FIG. 68.

or lotus ornament, usually found on the cyma recta or ovolo *o*, shown in Fig. 67, when either was the top molding of the pediment, was carefully outlined in gold, and was always drawn very lightly and delicately when used to embellish this top member of the entablature.

101. In Fig. 69 we arrive at a more complicated pattern of the honeysuckle ornament, taken from the temple of Theseus at Athens. In this example, the palmette forms, composed of nine brush strokes, were executed in green, and the scrolls and connecting fine lines between members of the pattern were worked in gold. The intermediate blossom between the palmettes, or conventionalized floral form, was in red, and the whole executed on a creamy

ground. The effect was naturally very brilliant, the red
and green colors standing out very sharply on the creamy
ground, and contrasting beautifully with each other.

FIG. 69.

In their colored ornament, the Greeks appreciated the
strengthening effect of placing one color beside another, and
in much of their work made use of this combination of red
and green on account of its superiority of effect.

In Figs. 70 and 71 are two panels taken from the ceiling
of the Parthenon.   While these at first seem somewhat sim-

FIG. 70.

FIG. 71.

ilar in appearance, and though both are plainly executed
with purely brush forms, a second examination will show

that they are entirely different as a whole, and unlike in their detail, except the form of their individual strokes. The lines of the pattern itself were executed in gold, that of Fig. 70 being on a red ground with a blue border around it, while the pattern in Fig. 71 was on a blue ground with a red border. This difference of coloring emphasized not only the difference in pattern of the two panels, but, at the same time, clearly marked the dividing line between them.

102. In Fig. 72 is shown a frieze ornament wherein the entire design is executed in the contrasting colors of red and green on a ground of cream. The central stroke of the honeysuckle ornament and of the figures on each side are

FIG. 72.

green, and each alternate brush stroke from them is green also, with intermediate strokes of red. The generating line, which encloses the honeysuckle ornament and curves into the base of the intermediate figure, is green, but the triangular stroke at the base of the honeysuckle is red. This design, like the two previous ones discussed, is dependent entirely on the limitations of brush work for the character of its form, while the contrast of color in the different strokes of its composition gives to the design the brilliancy of effect in no way obtainable in a pattern executed in a monotint.

103. Antefixæ.—Referring back to Fig. 46, it will be observed that all along the edge of the roof are a number of small vertical ornaments. These are **antefixæ,** and are so placed to close the end of each row of tiles with which the roof was covered. Though they were carved in marble, and designed to fit the end of the tile, they were modeled after the palmette, whose characteristics were governed, as is so much other Greek ornament, by the capabilities of the brush stroke.

In Fig. 73 is shown one of these antefixæ, the scrolls and vertical strokes of which were green, and the space between the two scrolls and each alternate stroke above them were painted red.

104. Endless examples could be recalled exhibiting one or more of the numerous characteristics of Greek ornament, but, like the Egyptians, their types were few, and it is the repetition of a single idea, or its combination with not more than one other idea, that lends what variety there is to Greek ornament.

Fig. 73.

There are one or two forms used in later art that undoubtedly had their origin on Greek soil, but they were developed to so much greater extent in a later period that their details will be considered in the later style.
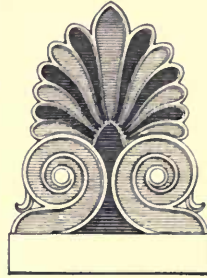
ETRUSCAN ORNAMENT.

105. The Etruscans were a people inhabiting the middle part of Italy from a period of most remote antiquity. It is probable that they came originally from the same Asiatic race as did the Greeks, and their occupation of Italy seems to date from about the same period as the settlement of Greece. Their language has never been translated, however, and we therefore have no written history to verify this belief.

106. In the settlement of Rome, the Etruscans played an important part. They were a highly artistic people, while the early Roman was a warrior and had no art taste whatever. The Etruscans introduced the arch into the constructions of public utility, and in that way it found a place in the architecture of Rome. Besides their skill as builders, the Etruscans were particularly deft in ceramics and goldsmithery, and, though the character of their designs bears a strong

resemblance to those of Egypt and Greece, their style was unique, and was developed on independent lines. In designs and workings for jewelry, they were original and skilled, and Etruscan jewelry was much sought even in artistic Greece. Under their skilful hands, every conceivable object was worked into the design. Flowers, fruits, figures, vases, cornucopia, rose work, crescents, ellipsoidal balls, and chains of all sorts and sizes found a place in their jewelry designs.

They used the emerald a great deal more than any other of the precious stones, on account of a superstition that it possessed medical qualities, but pearls, glass paste, cameos, and intaglios were used also, and the variety and taste in this line of ornament exceeded that of any other nation.

107. There are many objects of Etruscan design that are still considered masterpieces of art; and diadems, crowns, necklaces, ear drops, bracelets, hairpins, and rings are still designed on the lines originated by the Etruscan goldsmiths. Scarabæi are very frequently introduced in these designs, and are sometimes used as a link to unite two parts. In fact, this device appears so frequently in their jewels, utensils, sword hilts, etc. that it would appear probable that the

FIG. 74.

Etruscans worshiped this insect, or associated it with some superstitious idea. The scarabæus of the Etruscans differed materially from that of the Egyptians, inasmuch as it was usually carved of precious stone, or metal, whereas the Egyptian device was most frequently painted, though many of them were worked in metal and worn as rings and jewelry.

108. In Fig. 74 is shown a necklace, the centerpiece of which consists of an elaborate piece of goldsmith's work, set with precious stones, the central stone being a large emerald carved in the form of a face. The connecting links of the chain are designed in gold with intermittent precious stones. This is characteristic of all Etruscan ornament, and only one illustration is introduced here, as it is simply necessary to consider Etruscan art briefly, in order to preserve the thread of history, that we may better understand the influence of these people on the art of Rome.

GRECO-ROMAN ORNAMENT.

109. Historical Relations.—In the year 146 B. C., Greece was conquered by Rome, and the progress of pure Greek art suddenly ceased. The invasion of Greece and her colonies, by Roman workmen, caused the art, after this period, to become more and more tainted with the unrefined taste of the conquering nation. On the other hand, Greek artists executed vast works on Roman soil, and the subjected nation became the leaders of fashion in matters of art.

The subtle refinement of the Greek, however, became lost in the extravagant demands of Roman taste, and the resulting Roman art possessed none of the finer characteristics of the Greek style. Greek art was delicate, refined, and poetic —Roman art was voluptuous, vulgar, and extravagant. Greek art was an expression of pure beauty—Roman art was an ostentatious display.

110. During the period of transition when Greek forms were undergoing degradation at home, and conquering Roman art abroad, the style assumed a peculiar form that was neither Greek nor Roman. This style we will now consider under the name of **Greco-Roman,** though in modern times it is more often termed *Pompeian* from the fact that we derive the bulk of our information concerning it from the recently excavated city of Pompeii, which was destroyed through an eruption of Mt. Vesuvius in the year 79 A. D.

111. After Greece came under Roman dominion, the ever increasing introduction of Greek art into the Roman school caused the productions from Etruria to assume peculiar characteristics, as the local works of art yielded entirely to the influence of the conquered country. The ancient Romans possessed nothing of their own worthy of the name of art. In their earliest period, they borrowed ideas from the Etruscan builders, and it is from them that the use of the vault and arch are introduced for the first time in architecture. This introduction of a new architectural principle naturally wrought a change in the character of the ornament, and the workmen from Etruria, under the influence of, and association with, the workmen from the Greek colonies, naturally combined the art of Greece with the structural and engineering devices of their native country. When the generals of the Roman army returned from conquered Greece and brought back as plunder the objects of art that decorated Greece and her temples, they converted Rome into a museum of Greek antiquities, the presence of which changed and directed the Roman taste.

112. Mural Painting.—In decorative painting, particularly that applied to the walls of dwelling houses, the Romans borrowed everything they could from Greece, and Greek art became the ruling fashion of Rome. We know little of the plan of the Greek residences, and nothing of their decoration, but it is safe to assume that the decorations of the houses of Pompeii and Herculaneum were patterned after the decorations of the Greek dwellings seen by the Roman generals in their campaign in that country. These two cities were suburbs of Rome, and possessed much the same character as a modern summer resort. The decorations of the walls, ceilings, and pavements are totally different from anything we find in Rome, and, at the same time, show elements that must undoubtedly have originated in Greece.

These wall paintings are not all of the same value, and a number of them seem to have been executed by inferior

artists, but the beauty of others has led to the belief that they were copies and repetitions of Greek work of great celebrity.

113.   Besides decorative painting at Pompeii, we find a more or less imperfect polychromatic coloring in mosaic. This branch of Roman art, therefore, became subjected to serious modifications. The Romans already possessed a rudimentary knowledge of mosaic work and they now received examples of it from the hands of the Greeks, in a more advanced state; but the inherent love of luxury in wealthy Rome, and the general contempt for matters of expense, caused the taste for mosaic work to increase and acquire real progress.

The Romans, however, were not long perverting the nature of the art that the Greeks had transmitted to them. The exquisite taste possessed by the Greeks, and displayed in their distribution of ornament, together with their advanced imitative science, would have enabled them to have realized charming conceptions in mosaic, and the Greeks would never have attempted to place mosaic in competition with the highest prerogatives of painting.

114.   The Greeks are supposed to have designed the compartment of their own paved floors to represent such ornaments as branches, scrolls, festoons, and interlacings, and possibly passed onwards from these capricious forms— somewhat of the nature of arabesques—to more significant symbols and attributes, such as griffins, chimeras, tragic and comic masks, signs of the zodiac, birds, fruits, etc. It may even be inferred that the idea must have occurred to them to inlay a scene in the center panel of some of their richer pavements. At any rate, whatever the Greeks saw fit to work in their mosaic, must certainly have been designed in temperance, good taste, and with the highest artistic feeling.

115.   It was characteristic of the Romans to carry everything to excess; and, as the Romans admired mosaics, they wished to have them everywhere.

They were no longer satisfied to floor their courts and lower rooms with them, but inserted them in the sides of their walls, in the soffits of their arches, and in their ceilings. In fact, it is probable that they made more use of them in the latter positions than in the floors, as they soon became to be deemed of too great beauty and value to be trampled under foot.

Now, with the introduction of mosaic pictures in the side walls, ordinary pebbles, stones, natural or colored marbles, paste, and terra cotta were unable to contend with the brilliancy of paintings, especially as the taste of painters seemed to be impelled by a mad love of gaudy color and richness, so they introduced red, purple, and azure pigments, and metallic gold and silver to produce a deceptive glitter and striking contrast. Mosaic consequently demanded fresh resources, and various precious stones, such as agate, jasper, carnelian, sardonyx, emerald, turquoise, and lapis lazuli, were pressed into service, in order to produce the required effects.

Thus, Roman mosaic work became an ornamental untruth. Its productions claimed to be portraits of various objects, executed solely to please the eye, and of materials best suited to the purpose; while, as a matter of fact, they were incapable of portraying natural forms, and the materials were more suitable for pavements than for side walls. The idea was false, and even if the mosaic worker had had more shades at his command, and the painter had had fewer colors, the strife would certainly have been much in favor of the latter. Mosaic could never rationally supersede painting.

116. Pompeian Ornament.—The system of **Pompeian ornament** was carried to the very limit of caprice, and almost any theory of coloring and decoration could be supported by authority from Pompeii. The general arrangement of the decoration of the walls in the interior of a Pompeian house consisted of a *dado* about one-sixth the height of the room, on which stood broad pilasters half the width of the dado, thus dividing the walls into three or more large panels. The pilasters were united by a frieze at the top, varying in width,

but usually about one-fourth the height of the wall. The space above the frieze was frequently left white, and always subjected to most delicate treatment, representative of clear sky or open air; and on the background were painted fantastic architectural buildings that form a component part of the character of the style. In the best examples there was a gradation of color from the ceiling downwards, ending usually with black in the dado; but this is far from being a fixed law.

117. The colors used were mostly yellow, green, red, and black, and these were used almost indiscriminately for the various parts. Black or blue was occasionally used for the panels, but, as a rule, these colors were confined to the dado. Pilasters of yellow or green seemed to be the more popular tints, and red, green, and blue, with an occasional example of black, predominated in the panels. The most effective arrangement seems to have been a black dado with red pilasters and frieze, and with yellow, blue, or white panels, the upper part above the frieze being white with colored decorations on it. The best arrangement of color for ornament on the ground appears to have been masses of green and blue, with sparing use of red and yellow on the black grounds; white in thin lines and yellow in masses on the blue grounds; and white and blue in thin lines on the red grounds, with a limited use of yellow, as this color is not very effective on red. The Pompeian yellow approaches orange in hue, and the red is strongly tinged with blue. The neutral character of the colors thus enabled them to be used violently without discord.

118. The whole style of this system of decoration is so capricious that it is beyond the range of true art, and strict criticism cannot be applied to it. It generally pleased the eye by its novelty, but, though it was not absolutely vulgar, it oftentimes approached vulgarity, and owed its greatest charm to the light, sketchy, freehand manner of its execution, which is quite impossible to render in any modern drawing.

HISTORIC ORNAMENT.

(PART 2.)

CLASSIC ORNAMENT.

ROMAN ORNAMENT.

1. Comparison of Roman and Greek Art.—The real greatness of the Romans seems to be expressed more in their theaters, public baths, aqueducts, and other works of a public character, rather than in the decoration of their temples. The latter were but the outward expression of a religion they had acquired largely from the Greeks, and in which they had little faith, and therefore showed a corresponding want of earnestness in the art worship. In the Greek temple, it is more than apparent that the great struggle was to attain a perfection worthy of the gods. In the Roman temple, the aim was self-glorification. From the base of the column to the apex of the pediment, every part of the structure was overloaded with ornament, tending more to dazzle the eye by the quantity than to excite admiration by the quality of the work. True, the Greek temples when painted were as elaborately ornamented as those of the Romans, but with a different effect. The ornament was arranged so that it threw a colored bloom over the

§ 4

whole structure, and in no way disturbed the exquisitely designed surfaces that received it.

The Romans ceased to value general proportions and contours, and destroyed them by elaborate surface modeling, and extensive molded ornament. The chief fault of this system of decoration lies in the fact that it does not seem to grow naturally from the structure, but is applied directly to the surface in the same way that was suggested in connection with the foliage on the Greek-Corinthian capital, only in the present case it is exaggerated to a greater extent.

THE FIVE ORDERS OF ARCHITECTURE.

THE GREEK ORDERS.

2.   Classic Architecture.—The orders heretofore referred to furnish us with a standard of proportion with which we can measure all the classic monuments, and by which the work of the Renaissance was, and much of the modern architecture is still, proportioned.

As we have already seen, the structures of the classic ages were nearly all columnar—either with lintels connecting the tops of the columns, as the Greeks built, or with arches, according to the Roman custom. Now, the architects of the classic ages had reduced to an exact *system* the proportions of lengths to thickness in columnar work, and down to the present day we have been unable to improve on their proportions. This system is universally known as the " Five Orders of Architecture," and it embraces every combination of lines and masses seen in the classic monuments.

In it we find the fundamental principles of proportion, and only by the most careful study of these principles can we appreciate the importance of architecture as a fine art.

3.   Architectural Meaning of Order.—In its architectural meaning, the term **order** refers to the system of

columniation practiced by the Greeks and Romans, and is used to denote the column and entablature together—that is to say, the upright supporting piers, and the horizontal roof beams or *trabeation* supported by them. These two divisions constitute an order, and so far all orders are alike; but the form and proportions of the subdivisions of both the column and the entablature make it necessary to divide the original Greek orders into three classes, and when these three were adopted by the Romans, they again divided two of them, making five in all. Hence, it has become customary, in referring to the Five Orders of Architecture, to mean the Roman forms. The three original orders of the Greeks are the Doric, Ionic, and Corinthian, as explained before. Each order is an assemblage of parts subject to uniform, established proportions, and is regulated by the office each part has to perform. This so called "assemblage of parts" refers to the base, shaft, capital, architrave, frieze, etc., while the "uniform, established proportions" are the comparative sizes of these parts to one another in the same order. "The office each part has to perform" governs its size, shape, and position, and thus completes the expression of character in the order.

4. Greek-Doric Order.—The general character of the Greek-Doric order is expressive of grandeur, dignity, and simplicity. Hence, we find it used almost exclusively in temples dedicated to the most revered of the Greek deities, such as the Parthenon, at Athens. This is the most ancient of all the classic orders, and the proportions of its parts vary considerably in the different periods of its history. However, it reached the zenith of its perfection in the Parthenon, as shown in Fig. 46 of *Historic Ornament*, § 3, and it is from the portico of that temple we take the example illustrated in Fig. 1. It has already been observed that the Greek-Doric column consisted only of the shaft *B* filling the space between the stylobate *A* and the capital *C*. The latter is composed merely of an *echinus* molding under an *abacus*, which is the plain square slab upon which the architrave *D* rests. The

Greek-Doric order never possessed a base, but stood upon a
stylobate A, which is the substructure or foundation usually
disposed in three steps or divisions that extend entirely around
the building, and by spreading the ground line of the structure,
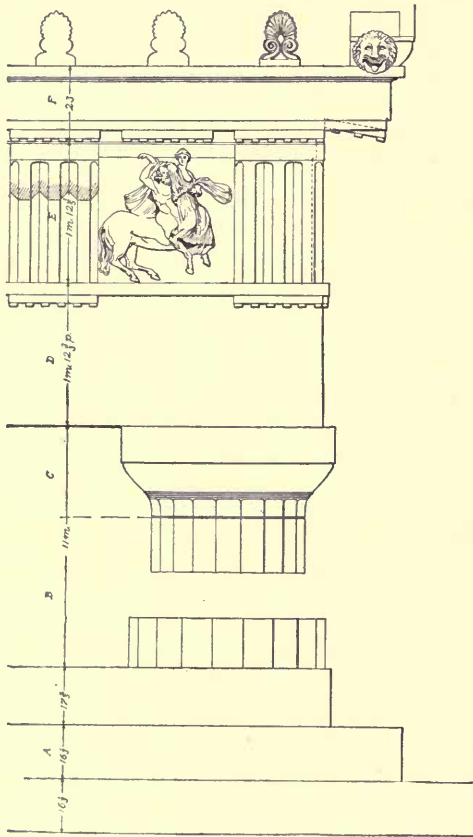
Fig. 1.

give a proper feeling of solidity and support.   In the outline
of the column, we first observe contraction and then expan-
sion; the former where the echinus converges to the neck of
the column, and the latter where the column swells out to
form a firm and substantial support at the bottom, which is

larger than the top. With few exceptions, the column of the Greek-Doric order is *fluted;* that is, its surface is grooved perpendicularly by a series of concave channels that touch each other and form a series of ridges, or *arrises*, upon its surface—a mode of decoration that is the direct opposite of that practiced by the Egyptians, some of whose columns exhibit, not channels, but a series of convex ridges, like a bunch of reeds or stems bound together. In the Doric order, the number of channels is either sixteen or twenty, though in the other orders there are usually twenty-four. The number varies, but it is invariably divisible by 4.

Doric flutings are much broader and shallower than those of the Ionic or Corinthian orders—broader for two reasons, *first*, because they are fewer in number, and therefore divide the circumference into larger parts; and, *second*, because there are no separating fillets between them. The shallowness of the Doric flutes is due to the fact that the arrises, or edges where the flutes come together, would be thin and liable to breakage if the flutes were deeply cut. This manner of fluting Doric columns, leaving arrises between the grooves instead of fillets, has been retained in modern practice as one of the characteristics of the order. In the Greek-Doric, every detail is marked by its breadth or flatness, or by its sharpness. There are no curved moldings or surfaces except the *epitithidas* (a term given to the upper-most member of the corona) and the echinus, the latter being almost flat on its under side and finished with a sharp turn against the abacus. The breadth and shallowness of the channels, and the flat curves in which they are formed, are therefore in perfect keeping with the style, as are also the sharp arrises between the flutings, which are expres-sive of a severe simplicity. The horizontal rings, or *annu-lets*—mere grooves cut around the neck of the column to form lines of separation between the capital and the shaft—are again expressive of the most extreme simplicity, and are in direct contrast to the projecting astragal, or convex molding, of the Doric capital as modified by the Romans.

The echinus is a simple convex molding, and, from its shape, is often called a *thumb molding*. Its form is suggestive of strength, as it expands to connect the diminished upper end of the column with the overhanging abacus.

5. Doric Entablature.—The entablature of the Doric order is, like the column, the embodiment of dignity and simplicity. Its lowest division, the *architrave D*, is a plain beam, whose height, including the tænia, or fillet, is a trifle less than the upper diameter of the column. The middle division, or *frieze E*, constitutes a very characteristic feature of the Doric order, being invariably ornamented with its **triglyphs** and **metopes**. The former of these consists of upright blocks about one-half the width of the mean diameter of the column, having their faces grooved with two **V**-shaped channels, and their edges chamfered off with two half channels, thus making three channels altogether, from which the ornament derives its name of triglyph, or *three-channeled*. A portion of the triglyph, called the *fillet*, extends below the tænia of the architrave, and depending from it are six drops, or guttæ, which represent the heads of treenails or pins used in the early wood construction.

In regard to the arrangement of the triglyphs, one was placed over every column, and one or more over the space between each pair of columns, but always so spaced that the metopes, or spaces between the triglyphs, should be exactly square; in other words, the height of the triglyph was always equal to the distance between them. In the best Greek work, there was only one triglyph between each pair of columns, and this arrangement is usually called *monotriglyphic*, or single-triglyphed intercolumniation. A peculiarity of the Greek-Doric frieze was that the end triglyphs, instead of being, like the others, in the same axis, or central line, as the columns beneath, were placed quite up to the edge or outer angle of the frieze. This is accomplished by making the extreme intercolumniation less by

one-half a triglyph than the intermediate ones, thereby imparting an expression of strength to the angles of the building.

The triglyphs are thus seen to govern the spacing of the columns, and as the spacing or intercolumniation governs the diameter, and the diameter governs the height, etc., we see that nearly all the proportions of a Doric temple can be traced from the size of its triglyph. There is one exception to this, however, and that is the little choragic monument of Thrasyllus, on the south slope of the Acropolis, at Athens. This monument has no triglyphs, but a series of wreaths ornament the frieze in their stead. The guttæ are nevertheless retained, but, instead of being grouped at intervals, they are continued across the lower side of the tænia uninterruptedly, as shown in Fig. 2.
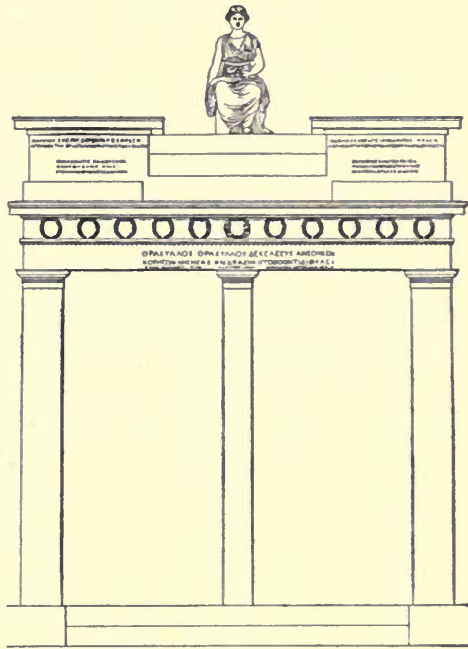
Fig. 2.

6. The Cornice.—The third and last division of the Doric entablature, the *cornice F*, though extremely simple, is strongly characteristic and boldly marked. It is in height about two-thirds the height of the frieze, and it is divided into three principal parts, the *corona*, with the *mutules* beneath it, and the *echinus* above it. The mutules are thin plates or tablets worked on the *soffit*, or under side, of the

corona, directly over each triglyph and each metope.   With
the former, they correspond in width, and their soffits, or
under surfaces, are set with a *rake*, or slant, which makes
them parallel with the line of the pediment.   They repre-
sent the under side of the wood roof beams that extended
over the eaves in the earlier construction.   Three rows of
guttæ, or drops, somewhat conical in shape, ornament the
soffits of the mutules, each row corresponding in number
of drops with the guttæ on the triglyphs beneath.   The
corona is merely a boldly projecting flat member, not much
deeper than the abacus of the capital, and examples exist
where it is even less.

The uppermost member of the entablature, the *epitith-
idas*, was sometimes a *cymatium*, or *wavy* molding, con-
vex below and concave above, or it was—as in this exam-
ple—an echinus similar in profile to the echinus of the
capital.   The cornice is to the entablature what the capital
is to the column, the crowning member of the composition,
completing and ending it in a very artistic and pleasing
manner.

7.   The proportions of these architectural orders are
measured in terms of the diameter of the column.   Thus,
the diameter of the column in its thickest part is divided
into two portions, called **modules,** and the proportions of
the order are then measured as being so many modules high
or wide.   A module is then divided into 30 subdivisions,
called *parts*, for the convenience of smaller measurements.
These terms are usually abbreviated to m for modules and p
for parts, and are so designated on the drawing.   For
instance, in Fig. 1, the height of the column from the stylo-
bate to the architrave is shown to be 11 modules (that is,
$5\frac{1}{2}$ diameters) and the top step of the stylobate is shown to
be $17\frac{2}{3}$ parts in height, while in the cornice F is shown
23 parts; that is, $\frac{23}{30}$ of one-half the diameter of the column.

8.   The Ionic Order.—The Ionic order is lighter and
more delicate than the Doric, being expressive of grace and

refinement rather than of grandeur and dignity. It was used by the Greeks in temples dedicated to deities representing the more worldly settlements, such as the temple
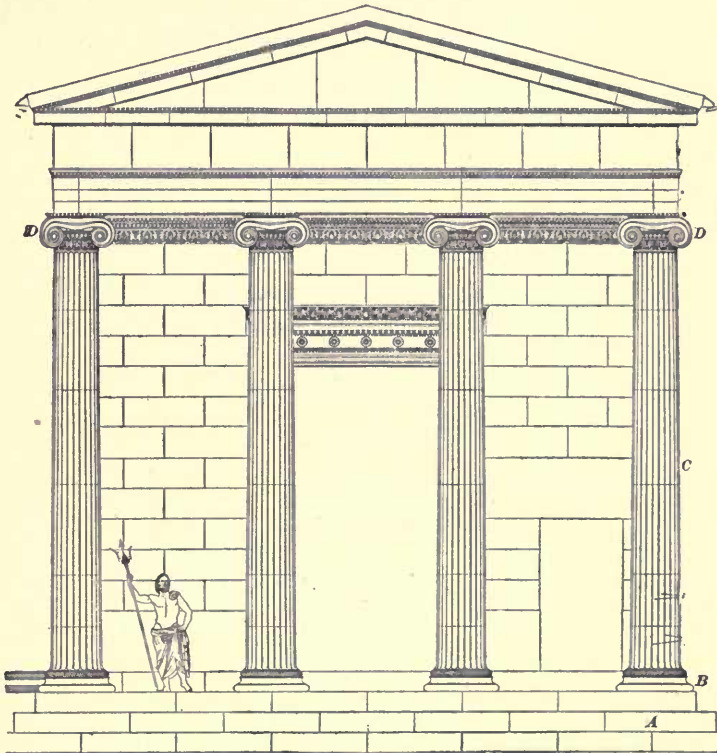
FIG. 3.

of Victory and the porch of the temple of Athena Polias, shown in Fig. 3.

Although the capital is the distinguishing characteristic, every detail of the order differs entirely from the Doric. Besides having the addition of a base, the shaft is taller and of more slender proportions, and much less tapering. The example of the Ionic order shown in Fig. 4 is taken from the porch of the temple of Athena Polias, and shows the order in the zenith of its perfection. The capital D is not only

more complex, but also more irregular than the Doric capital,
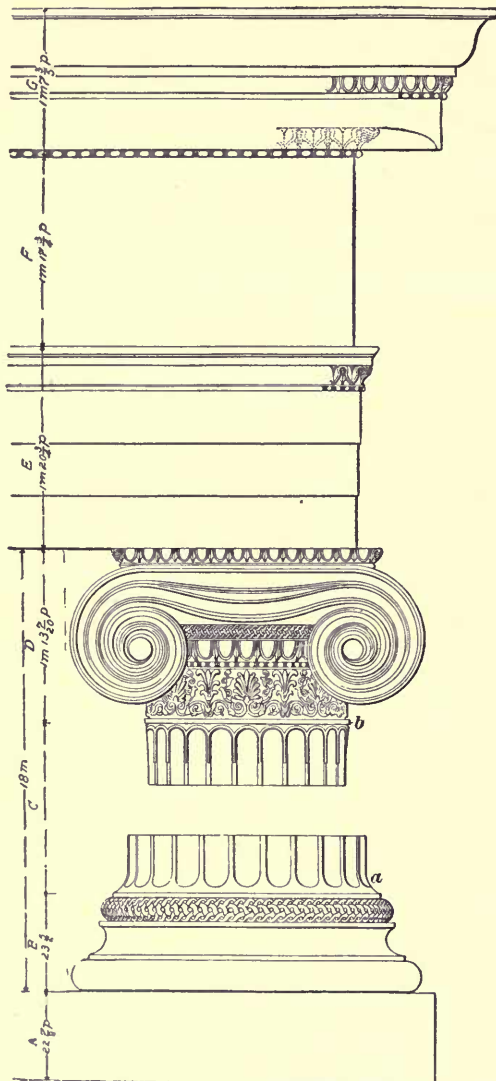
FIG. 4.

as it has two faces, or fronts, parallel to the architrave above
it, one of which is shown at *D*, and two narrower bolster

sides beneath the architrave, of which one is shown in Fig. 5.
This irregularity is considered by
many a defect, which can be obviated
only by turning the volutes diago-
nally, as in some Roman and modern
examples, or by curving concavely
the faces of the capital, instead of
making them planes, thereby obtain-
ing four equal faces.   However, the
Ionic capital, as used in the Erech-
theum and in the temple of Nike

Fig. 5.

Apteros, or Wingless Victory, on the Acropolis at Athens,
suits its position as well, and is as perfect an architectural
feature as is the Doric order in the Parthenon.
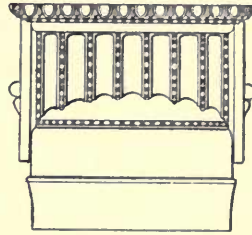
The only objection to the Ionic capital is that in the end
columns of a portico it exhibits an offensive irregularity,
because, on the return side of the
building, the bolster or side of the
capital shows itself beneath the
face of the architrave ; yet even
this is of no great consequence,
unless the colonnade is continued
down the sides of the building,
and the capitals at the extremities
present their bolster sides to the
observer, while the intermediate
ones show the voluted face.   The
Greeks, with their usual inventive
ingenuity, gave the capital at the
angle two adjoining voluted faces,
so that it should agree with the
other columns both on the front
and on the flank of the building.
This was accomplished by placing
the volute at the angle diagonally,
so as to obtain there two voluted
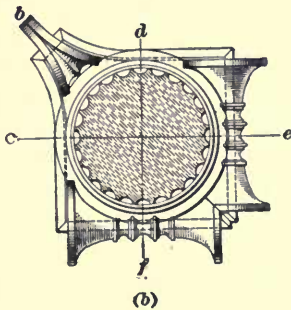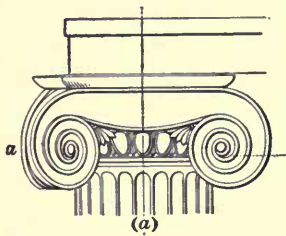
Fig. 6.

surfaces placed immediately back to back, as shown in
Fig. 6, which is an angle capital from an Ionic temple

on the Ilissus River, near Athens. At *a* in the elevation (*a*) is the angle where the volutes are turned back to back, shown at *b* in the plan (*b*), and in Fig. 7 is shown a view of these two volutes as they would appear looking directly at the corner. We therefore have two volutes and two bolsters, as in any Ionic capital; but the volutes are on two adjacent sides *c*, *d*, Fig. 6 (*b*), while the bolsters are on the two opposite adjacent sides *e*, *f*. A voluted face was thus kept to the outside on both sides of a corner, and the columns could be continued entirely around the cella.
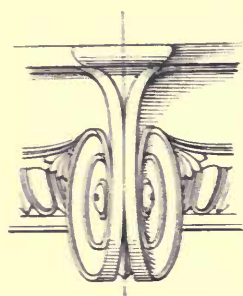
Fig. 7.

The Ionic order possesses a base that differs in outline and moldings according to the locality where the example is found. The best examples existed in Attica—the state of which Athens was the capital—and the most artistic base, and the one best adapted to the order is found here, and is known as the *Attic base*, shown at *B* in Fig. 4. It consists of two heavy torus moldings, separated by a scotia molding and resting on a square plinth, or stylobate. The upper torus is sometimes carved with a guilloche ornament, as shown, or is left perfectly plain.

9. The shaft *C* of the column is grooved by *twenty-four* flutes, each pair of flutes being separated by a *fillet*. These flutes extend from the **apophyge,** or swelling of the column shown at *a* on the base of the shaft, to the astragal, or fillet, around the neck. The neck is enriched with a carved honeysuckle ornament, which is carried entirely around the column. Above the neck is a fillet and bead, and above this is a small echinus, which is carved with an egg-and-dart ornament. Resting upon this echinus is a small torus that separates the echinus from the cushion-like capital, the ends of which are terminated by the *volutes*. A number of bands are run across the face of the cushion and rolled up on each side.

The abacus is a flat slab whose molded edge is carved with an egg-and-dart ornament.

The Ionic entablature, as expressed in modules, is greater than that of the Doric order; but in proportion to the length of the column, the Ionic entablature is less than the Doric. For example, the entablature of the Parthenon is about 3¼ modules high, while the Ionic entablature is about 4½ modules high; but 4½ modules of a column 18 modules high equal one-quarter the height of the column, while 3¼ modules of a column only 11 modules high equal about one-third the height of the column, thereby making the Ionic order lighter and more delicate than its dignified brother, the Doric.

10.   The Ionic Architrave.—The Ionic architrave does not differ materially from that of the Doric. Its average height is equal to the upper diameter of the column, and it is usually divided into three surfaces, or courses, called *facias*, which very slightly project one over the other. There are a few examples where the architrave is left plain, as in the Doric order, and, in such cases, the moldings are not so heavy as in this example from the Erechtheum. The Ionic frieze, being devoid of triglyphs, and having no other characteristic member substituted for them, becomes a mere plain surface, interposed between the architrave and the cornice. This plainness may be relieved by carving thereon figures in bas-relief; but as sculpture of that kind does not belong to the character of the entablature, it is never taken into account in describing the details of the order. The Ionic cornice is a simple affair, especially in the Athenian examples, being merely a corona, with a cyma recta above it and some narrow bed moldings beneath it. The soffit of the corona is hollowed out as shown by the dotted line, and the bed moldings above referred to are left when this soffit is so cut, and are here shown dotted under the corona. Between the corona and the cyma are two small enriched moldings, a bead, and another echinus.
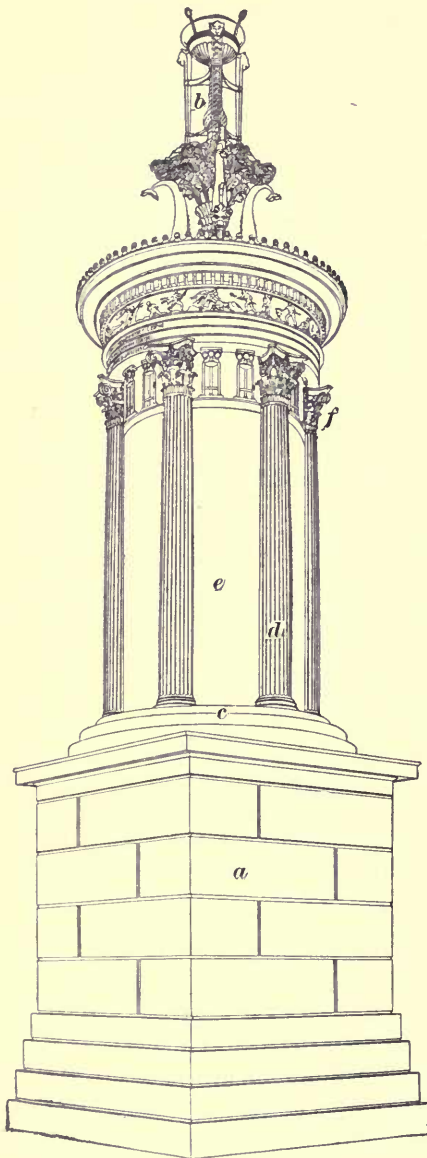
Fig. 8.

11.   The Greek-Corinthian Order.— The Corinthian order is the lightest and most delicate of the three, but it is almost impossible to determine for what class of builders the Greeks considered it best adapted, as there is but one perfect example left for us to judge at the present day, and that is the choragic monument of Lysicrates, at Athens, shown in Fig. 8.   Like the Ionic, the principal characteristic of the Corinthian order is its capital — tall, bell-shaped, and richly foliated, as shown at *C*, Fig. 9.   As was said with regard to the entablature of the Ionic order, the capital of the Corinthian column is higher in proportion to the diameter of the column than is either the Ionic or the Doric; but, as the shaft is longer and more slender than either of the others, it is able to carry a higher capital.

12.   The **Corinthian capital** has two rows of leaves, eight in the upper row, and sixteen in the lower row, so dis-
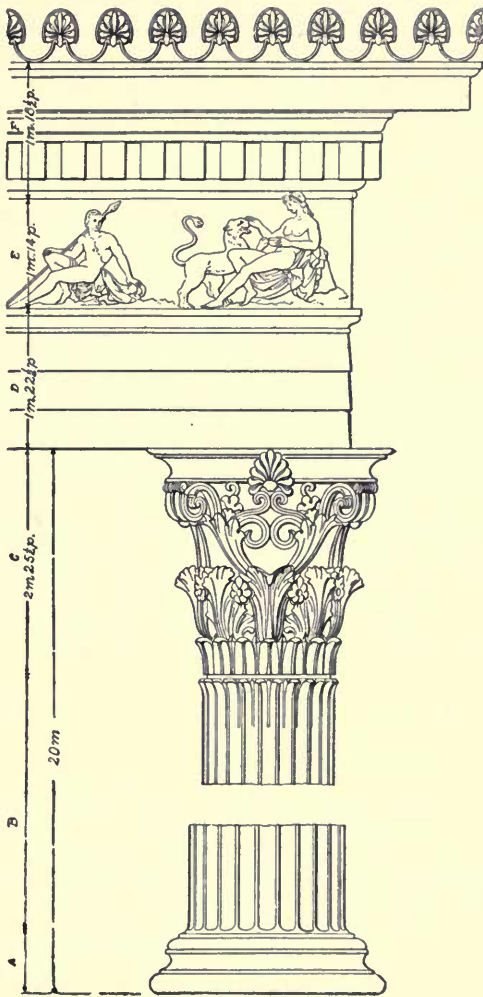
Fig. 9.

posed that, of the taller ones, composing the upper row, one comes in the center, beneath each face of the abacus, and the lower leaves alternate with the upper ones, coming both

between and under the stems of the latter, so that in the first, or lower, tier of leaves there is, in the middle of each face, a leaf between each two leaves of the upper row, and also a leaf under the stem of the central leaf above them. Above these two rows is a third series of eight leaves, turned so as to support the small volutes, which in turn support the angles of the abacus.   Besides these outer volutes, which are invariably turned diagonally, as in the four-faced Ionic capital, there are on each face of the capital two other smaller ones, termed *cauliculi*, which meet each other beneath a flower on the face of the abacus.

The abacus itself is different in shape from that of either of the other two orders.   In the Doric, it is, as we have seen, merely a thick slab resting on the echinus beneath it, and left absolutely plain; in the Ionic, also, it is square, but the sides are molded and sometimes carved, while the Corinthian abacus is, strictly speaking, not even square, except in general form.   True, it has four equal sides, but instead of being straight, they are deeply concave in plan, and the acute point that would be formed by the meeting of these concave sides is usually cut off straight, thus making the abacus an eight-sided figure, four of whose sides are short and straight, while the other four are long and curved.

13.   The base *A* of the Greek-Corinthian column is of the Attic type, almost the same as that of the Ionic order; and the shaft *B*, like the Ionic also, has twenty-four flutes separated by fillets, but these flutes and fillets terminate at the top very differently from the way they do in the Ionic. Here we have a row of leaf-like ends curling out from the column, with the fillets forming their central ribs.   The edges of these leaves intersect in an angle, and this angle gradually flattens out until it disappears entirely in the surface of the flute.   Above these leaf-like ends, and below the lower row of leaves in the capital, is a groove, cut entirely around the column, to emphasize the starting point of the capital, and which is said to have originally served as a receptacle for a braided band of bronze laurel

leaves, contrasting beautifully with the white marble of the monument.

The entablature is very similar to that of the Ionic order, with the exception of the cornice, which is larger and somewhat richer than the uppermost member of the order from the Erechtheum.   The architrave is divided into three facias, as in the previous order, but their surfaces are not perpendicular.   On the contrary, the faces are battered back so that the three arrises, or edges, are perpendicular over one another, and the offsets are formed by the batter.   The molding at the top of the architrave is a simple cyma reversa, resting on a bead and surmounted by a rather heavy fillet. The frieze is shown here with the carved figures in relief, as it appears in the original monument, although, as said before, this carving does not form a component part of the order itself. Above this frieze is a small torus and an ovolo supporting the dentil course.   These dentils are small rectangular blocks, spaced about two-thirds their width apart, and, in all probability, are the stone representations of projecting ceiling joists, which existed in an early system of wooden construction.

Above this dentil course is a cyma recta, supporting a cyma-reversa bed molding under the corona.   The corona projects more in the Corinthian than it does in the Ionic order; and the crowning member, instead of being a cyma, as in the previous order, consists of a series of *antefixæ* supported upon a serrated band, which is separated from the corona by a small echinus.

This completes the general description of the Greek orders, a description that has been here given somewhat in detail, in order that the student may fully comprehend the liberties that were taken with these orders when the Romans converted them to their own uses.

THE ROMAN ORDERS.

14.   The Five Orders of Architecture, according to the Italian architect and writer, **Vignola,** will now be analyzed and described, and the attention of the student is called
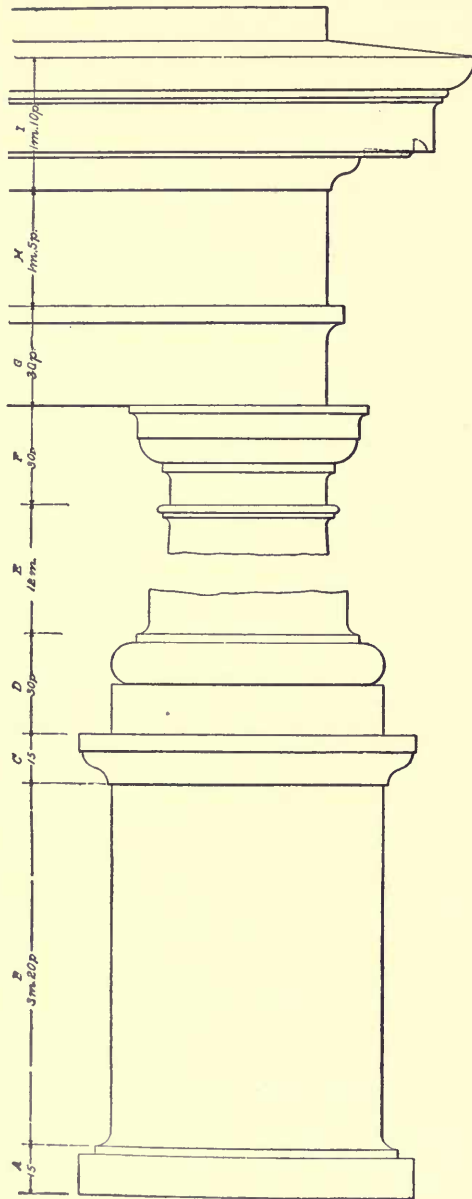
Fig. 10.

particularly to the unrefining influence of the Romans expressed in their interpretation of the Greek art forms.

The Romans were not an imaginative race, and had few original ideas in architecture. Their early works were copied from the Etruscans, and their later efforts were borrowed from the Greeks. In nothing is this fact more evident than in the first of the five Roman orders, namely, the *Tuscan*, Fig. 10.

15. The **Tuscan order** is but a modified form of the Greek-Doric, or, perhaps, more strictly speaking, it is an undeveloped form of the Roman-Doric. It takes its name from the Etruscan people, who are supposed to be its originators, though it is not improbable that the Etruscans received their ideas from the same source as did the Greek-Dorians, both nations having emigrated from Asia about the same time. One thing is certainly true, the Tuscan column and entablature bear a closer resemblance to the proportions of the Greek-Doric than they do to the Roman-Doric, which was admitted to be more or less copied from it; and the Roman-Doric resembles more the Tuscan column and entablature than it does the Greek order, whose name it bears. Hence, we see that the Tuscan is a sort of connecting link between the Greek and the Roman orders. It contains many Greek details that the Roman-Doric does not, while, on the other hand, the Roman-Doric possesses many Tuscan features unheard of in the Greek. The characteristics of the order are its *crudeness* and *plainness*, combined with its heavy moldings and lack of refinement in outline. It has, like all other Roman orders, a regularly proportioned and molded *pedestal B*, which, though not a specific part of the order itself, is generally drawn with it when the order is shown alone.

16. The **pedestal** is simply a square block *B*, with an apophyge, or escape to the fillet, resting on the plinth *A* at the bottom, and with a cyma reversa and a fillet at the top. Upon this stands the base of the column *D*, which consists of

a torus and a fillet resting upon a square plinth.　The capital F is in some respects similar to the Doric, but lacks both the refinement of the Greek-Doric and the delicacy of the Roman.　It consists of an abacus, ovolo, and necking.　The abacus is square in plan similar to the Greek-Doric, and is composed of a fillet resting upon a plain facia that has an apophyge, or curved escape to the fillet.　The ovolo is a plain molding, often referred to as a quarter round, as its section is exactly a quarter of a circle.

The entablature is subdivided into an architrave G, a frieze H, and a cornice I, in proportions nearer to the Greek-Doric than is the Roman order of that name.　But the triglyphs and mutules so characteristic of the Doric order are omitted entirely, while the moldings are large and heavy and out of proportion to the surfaces they are intended to ornament. The shaft of the Tuscan column is *never fluted, and no carving or enrichment of its moldings or surfaces is ever practiced.*

17.　Comparison of Greek and Roman Orders.— Before making a comparison of the Greek and Roman orders, let us first consider some of the conditions that made alteration necessary, before the art creations of the Greeks could be adopted by the Roman builders.

The distinguishing characteristic of all Roman architecture is the persistent use of the arch.　The Greeks spanned their openings with lintels—simple stone beams laid across from one column to another—and the width of the openings they could thus span was limited by the length of the stones they could conveniently quarry.　But, by means of the arch, the Romans could span any width desirable; but the pressure of the arch at the abutments was in the character of a horizontal thrust, which would overthrow any ordinary column, and especially such columns as were used by the Greeks, laid up in several courses and devoid of mortar or cement.

Heavy masonry piers laid up in strong mortar with securely bonded courses, became necessary, therefore, to withstand this thrust, and the Romans, having no structural use for the Greek orders, applied them as ornament to their masonry

abutments. *This is a very important point and should be remembered.*

The orders, thus backed up by heavy piers, did not require that appearance of sturdy independence that the Greeks instilled into their supports, and they were consequently drawn out longer and thinner, and embellished with much carving and enrichment, as though endeavoring to attract the attention to their false beauty, while the piers and arches did the real mechanical work of holding up the building.

This will, perhaps, be more clearly understood by referring to Fig. 11, which is a portion of the facade of the Theater Marcellus, at Rome. The arches resting on the piers support all the mason work above them, while the columns and the entablatures are applied to the structure simply as ornament. Strip these columns off, and the building will stand as well as with them, but in appearance it will be simply a structural edifice, entirely utilitarian, and in no way esthetic.

Greek designers made their architecture beautiful by ornamenting the construction itself —remove the column, or entablature, and you remove the essentials of the structure—

FIG. 11.

but the Romans designed the structure entirely apart from the ornament, and the latter might easily be removed without injury to the strength of the fabric.
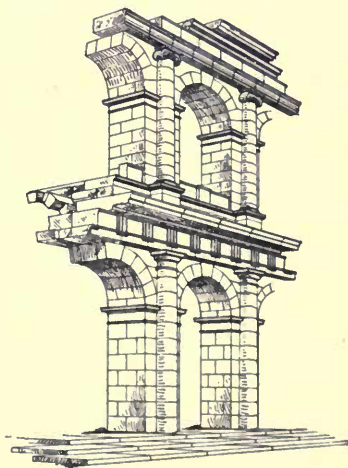
18. Description of the Roman-Doric Order.—The Doric column, as used by the Greeks, was from five to seven diameters in length, and the bottom of the shaft, being of the greatest diameter, it required no base to stand on, and
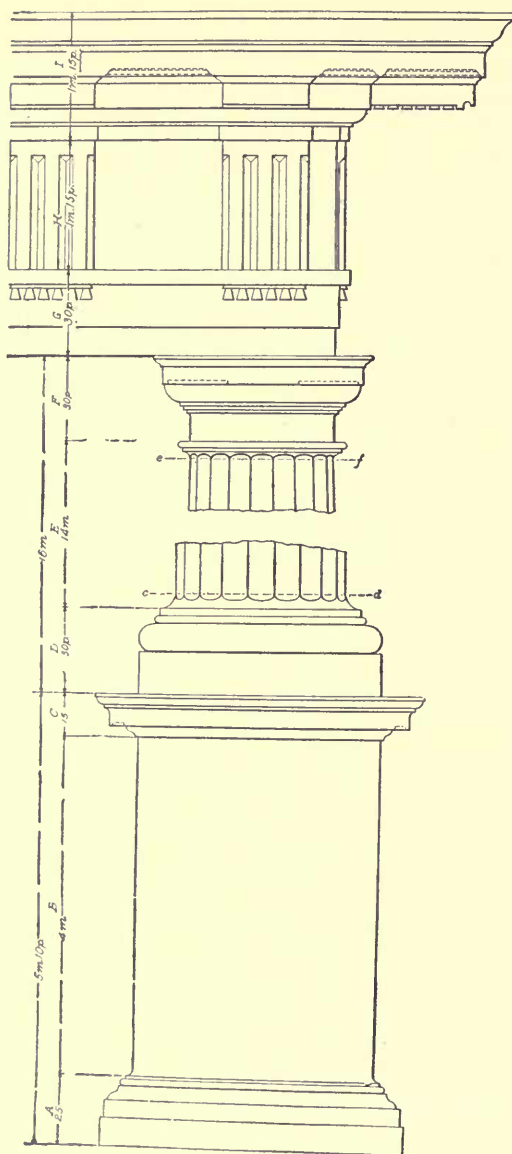
FIG. 12.

was beautiful in its simplicity.   The Doric of the Romans,
as shown in Fig. 12, was, on the contrary, eight or more
diameters in height, and the bottom of its shaft was so
small in proportion, that a regular molded base became
necessary to give it an appearance of stability.   There are
instances where the column was used without a base, and
the first story of the Theater Marcellus, at Rome, Fig. 11,
is a most excellent example of the struggle to apply the
Tuscan details to the Greek form.   The lower order of the
Theater Marcellus presents the Tuscan entablature with
triglyphs in the frieze and guttæ under the tænia, while
the mutules are omitted entirely, and a row of dentils
and bed moldings is inserted under the soffit of the corona.
It will also be observed that in this case the column is
not fluted, and stands upon the stylobate or plinth with-
out a base, while the capital is molded after the Tuscan
model.

19.   In the typical Roman-Doric, Fig. 12, the pedestal
is higher in proportion to its width than the Tuscan, and its
base exhibits more moldings than does the latter.   The
addition of a subplinth serves to raise the die B above the
ground line without producing too broad a band under the
base.   The cornice moldings of the pedestal are much like
the members of the Tuscan entablature, and show another
point of resemblance between these two orders.   The base
of the column D is almost identical with that of the Tuscan
order, with the slight addition of a bead molding between
the torus and the fillet.   The column is fluted with shallow
grooves that meet in an arris, as in the Greek order, but,
unlike the latter, they die out or terminate below the line
$c\,d$, which marks the apophyge of the shaft at the base.
The capital F of the column is decidedly more Tuscan than
Greek.   It is separated from the shaft by a projecting fillet
and bead, which in this position is called an **astragal**.
Instead of the annulets beneath the echinus, as in the Greek
capital, we have simply three projecting fillets, and the
echinus is rounded out until it becomes in section a mere

quarter circle. The abacus is square, but has a crowning member, and it has panels sunk in the corners of its soffit, as shown by the dotted lines.

20. Doric Entablature.—There are, in fact, two distinct systems of grouping the members of the Roman-Doric entablature: one, as in the Greek, with mutules in the frieze, and the other—an entirely Roman invention—with a course of dentils under the corona.

The mutular Doric is the order shown in the drawing plate; and, as will be at once observed, its entablature bears but a slight resemblance to the Greek model. The architrave G is divided into two facias, the upper one projecting slightly over the lower one, somewhat in the manner of the Greek-Ionic. The triglyphs of the frieze H are always centered over the axes of the columns, and, consequently, the metopes, which were always square in the Greek order, are often oblong in the Roman, with the longer axis set either vertically or horizontally.

The mutules, which in the cornice of the Parthenon were set over each triglyph and metope, existed over the triglyphs only in the Roman-Doric structures, and the soffit of the corona between them was paneled as shown by the dotted lines.

The cornice I is lighter and more delicate than in the Tuscan order, and its epitithidas is a cyma recta instead of an echinus.

21. Roman-Ionic Order.—The result of the Romanizing of the Ionic order is shown in Fig. 13, and is scarcely more successful than the Doric. The Romans never seemed to understand the possibilities of the order from the Erechtheum, and, as a consequence, only three accredited examples of the **Roman-Ionic** column are known in Rome today. These are the temple of Fortuna Virilis, the temple of Concord, and the second story of the Theater Marcellus. The first of these is by far the best, its volutes retaining much of the Greek character, while the last is the simplest and

FIG. 13.
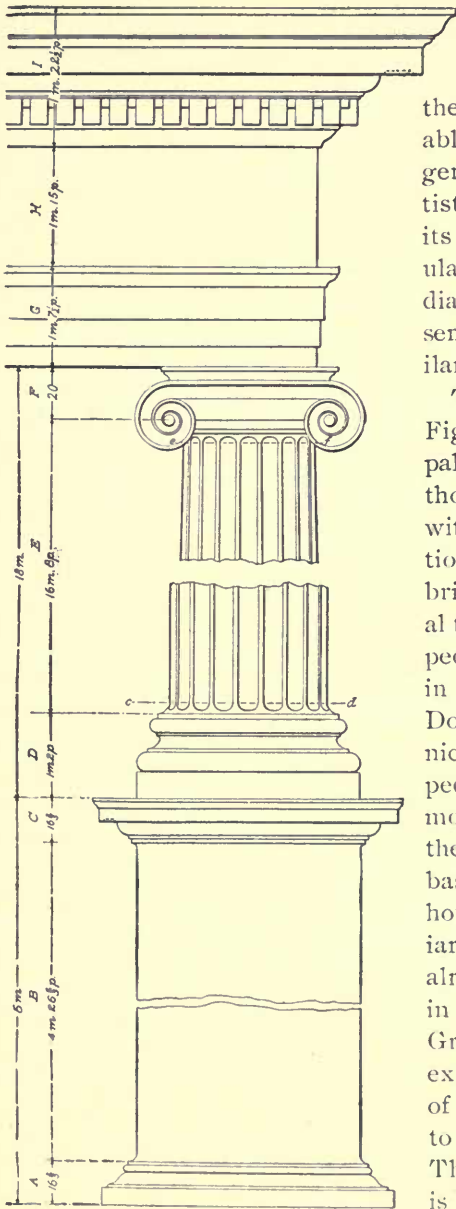
plainest, and also the smallest in its proportions; but the second is remarkable for its ugliness in general, and the inartistic arrangement of its volutes in particular, which spring out diagonally so as to present four equal and similar faces.

The example shown in Fig. 13 is taken prinpally from the first of those just mentioned, with only such alterations as are necessary to bring it down to a general type. In it we find the pedestal slightly longer in the die than was the Doric, while the cornice *C* and base *A* of the pedestal are more richly molded than in either of the previous orders. The base *D* of the column, however, is of the familiar Attic type that has already been described in connection with the Greek-Ionic order, and exhibits the first point of strong resemblance to the Greek ancestor. The shaft of the column is nearly of the same

height as the Greek; and, in many examples, is grooved by twenty-four flutes separated by fillets, though in this example there are but twenty.

By a strange perversity, however, when we arrive at the capital, we meet a striking difference from the Athenian order.   In the columns of the portico of the Erechtheum, we have a *necking*, between the echinus of the capital and the astragal of the column; but in the Roman-Ionic, the flutes of the shaft extend almost to the eyes of the volutes. In their Doric order the Romans inserted a necking above, which did not exist in the Greek order and must have been borrowed from the Attic-Ionic, or, possibly, from the Tuscan; but when they adopted the Ionic order, they seem to have taken especial pains to omit the detail that, according to previous appearances, they particularly admired.   For some reason, they omitted this necking, and the Roman-Ionic capital has a flat, crushed appearance in consequence, as   shown.   The   Roman-Ionic   volute   contains   but   one band, while that of the Greeks possessed three, though there are instances where a single band was coiled in the
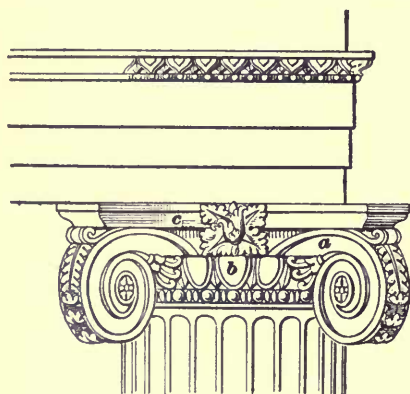
FIG. 14.

capital of the Greek order, as in the temple on the Ilissus River, Fig. 6.   But the Ionic order reached the zenith of its perfection in the Erechtheum, and it is with the details of that building we must compare any subsequent Ionic constructions.

The architrave *G* and frieze *H* of the Roman order are very similar to those of the Greek, but between the frieze *H* and corona of *I* is inserted a row of dentils with upper and lower bed moldings, which cast a serrated shadow and emphasize the projection of the corona.

22.   The Ionic capital above referred to in the temple of
Concord is illustrated in Fig. 14.   It is shown here, not on
account of its architectural beauty, for it has none, but
because in certain classes of early Renaissance work, this
style of cap was redesigned by Palladio and used in com-
binations where its defects were not so glaring.   The prin-
ciple on which this cap is designed is that the volutes *a* are
growing out and curling over the edge of the contracted
echinus *b*, while the whole is covered with an eight-sided
abacus *c*, strongly resembling the Corinthian.   The space
under the abacus and between the volutes is filled with a
carved rosette, or, in a few instances, with an animal's
head.

23.   Roman-Corinthian Order.—We now come to the
Corinthian, which we may consider a typical Roman order.
There is but one example of richly foliated capitals in all
Greek art, and the modern Corinthian order, though prob-
ably taken from it, bears but a general resemblance to its
prototype.   We have gone into the details of the Greek-
Corinthian capital, and the Roman style will only be dwelt
upon where it contrasts with the details of the Greek.   The
Roman-Corinthian capital, shown at *F*, Fig. 15, has two
rows of leaves, eight in each row, so disposed that of the
taller ones composing the upper row, one comes in the mid-
dle, beneath each face of the abacus, and the lower leaves
alternate with the upper ones, coming between the stems
of the latter; so that, in the first, or lower tier of leaves,
there is in the middle of each face, a space between two
leaves occupied by the stem of the central leaf above
them.

24.   Fig. 15 is not taken from any particular edifice, but
is compiled from a number of different structures, in order
to get a general type of the order. . The shaft here is fluted
with twenty-four flutes, though in many of the best examples
it is not fluted at all.   The portico of the Pantheon possesses
one of the handsomest examples of the Corinthian order in

Rome, but the granite columns are left unfluted, and their surfaces are highly polished, to compensate for the omission. The base of the Corinthian column varies somewhat in different examples, but is most frequently an enriched variation of the Greek-Attic. It is scarcely necessary to comment on the pedestal of either the Corinthian or Composite orders, as there is no change from the pedestal of the previously described orders, except an elongation of the die and an increase of the number of the moldings that ornament its top C and base A. The same may be said of the base D of the column, the only change from the previous orders being an increase of the members between the two torus moldings. The shaft E of the column is but slightly longer than in the Ionic order, but the increase in the height of the capital makes the entire column ten diameters high. The
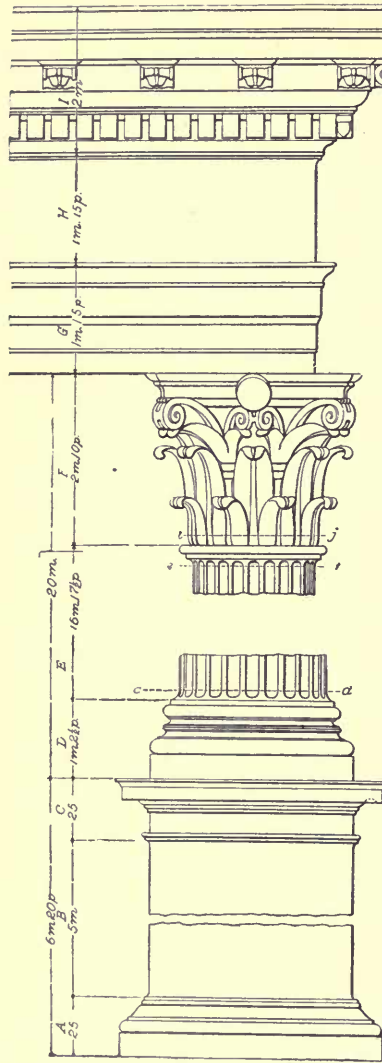
FIG. 15.

entablature, however, is very different from any we have yet described. The architrave G is divided into three

horizontal bands, or facias, as was the Ionic, but instead of a plain projection of one facia beyond the other, they are separated by a number of different small moldings, which, in nearly every instance, were carved and enriched almost to excess. The frieze *H* is here shown as plain, but the majority of examples show it carved in high relief. The cornice *I* exhibits the greatest alteration from the previous orders that we have yet seen. A row of dentils are supported by a cyma reversa immediately above the frieze, similar to the Ionic arrangement; but immediately above this we have a heavy ovolo supporting a row, of course, of *modillions*.
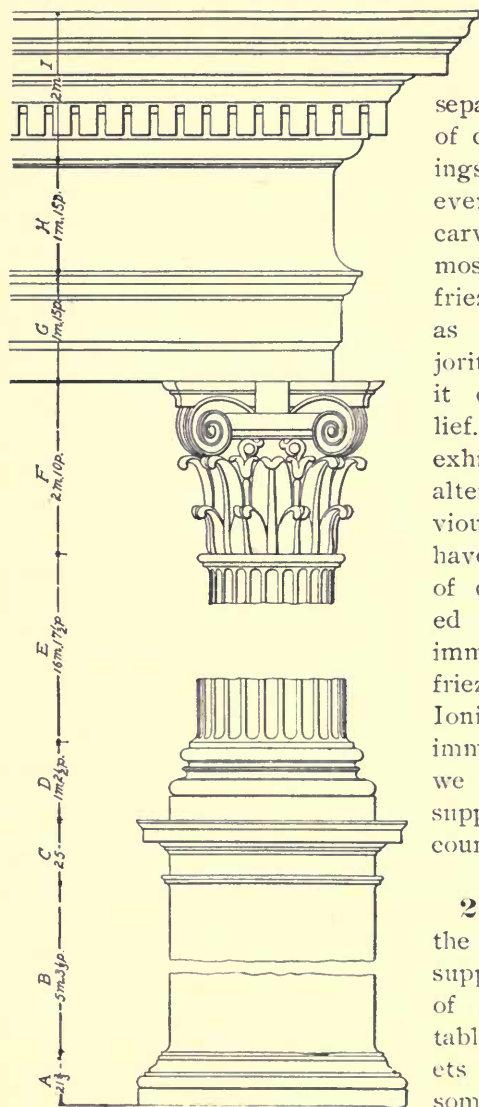
25. A **modillion** is the projecting bracket supporting the corona of the Corinthian entablature. These brackets possess a volute somewhat similar to that of the Ionic capital, but curved in the opposite direction.

Fig. 16.

26. Composite Order.—Between the Corinthian and Composite orders there is very little difference except in the size of the volutes, and, with the exception of the capital of the column, there is scarcely any difference in the proportions of their parts. Fig. 16 shows the general form of this essentially Roman composition, but omitting entirely the ornamentation of the frieze and moldings, which is as much a part of this order as the triglyphs are of the Doric. Ornamentation, as a rule, forms no part of the order that it enriches, and, consequently, should not be considered a part of the structure of the order, but the Composite order was invented by the Romans for no other purpose than to carry heavy ornamentation; in fact, it was the excessive and extravagant ornamentation of the Corinthian order that caused the Composite to spring into existence, and our example is, therefore, not complete until it receives such ornamentation as may be appropriate to its purpose. The general form is here given, and the application of ornament will be discussed later, in its proper place.

The pedestal of the Composite order is almost identical with that of the Corinthian, there being but a few slight changes in the moldings of its base and its cap, while the die is a trifle longer. The base, shaft, and capital of the column are the same height as the Corinthian, and with the exception of the capital are almost the same in design. The architrave, frieze, and cornice have the same relative proportions as in the previous order, but are treated somewhat more elaborately in the subdivisions of their parts.

The Composite capital is a combination of the Corinthian and the Ionic capital from the Roman temple of Concord, heretofore referred to. It is not an artistic combination, but its broad, strong volutes give an unusual surface on which to carve florid ornament, and, as such, it suited exactly the later-day admirers of everything strictly Roman. It suits its place in modern art very well, when in proper handling, but the Renaissance

architects were conspicuous in Italy by the interior application of the Composite order in every spot where it did not belong.

27. The Roman Acanthus. — The acanthus leaves under the Roman modillions and those around the bells of the Corinthian capitals are placed, one before the other, stiffly and inartistically; they are not even bound together by the necking at the top of the shaft, but appear to have been cut off to rest directly upon it. It will be remembered that in the capital of the Egyptian column, where the stems of the flowers are arranged around the bell, they appear to be continued through the necking of the column, and at the same time express a beauty and a truth.

The great facility that the Roman system of decoration affords for the application of this acanthus ornament to any form and in any direction, is the lamentable cause of the invasion of this ornament into most modern work. Its design requires little thought and is so easily manufactured that it has encouraged designers in an indolent neglect of one of their especial provinces—that of invention. In the use of the acanthus leaf, the Romans showed but little art. They received it from the Greeks most beautifully conventionalized, and though they went nearer to the general outline of the leaf, they exaggerated the surface decoration. The Greeks confined themselves to expressing the principles of the foliation of the leaf, and bestowed great care in the delicate undulations of its surface.

28. Character of Roman Ornament.—As said heretofore, Roman ornament consists essentially of one scroll growing out of another and encircling a flower or a group of leaves, as shown in Fig. 17, which is a characteristic piece of Roman ornament. This is the principle of Greek ornament, and though the Romans borrowed the principle, they omitted the Greek refinement.

The most characteristic method of using the acanthus leaf in Roman art can be seen in the Roman concep-tion of the Corinthian capital, Fig. 15. The amount of design that can be obtained by working on this prin-ciple of Roman orna-ment — of leaf within leaf and leaf over leaf —is very limited, and it was not until the principle of one leaf growing out of an-other in a continuous line was abandoned, for the adoption of a continuous stem throwing off ornaments on either side, that the pure conventional ornament received any development.

FIG. 17.

29. Painted Decorations.—The painted decorations of Roman art are comparatively few; the style was some-what similar to what we see at Pompeii—an adoption from the Greek, executed in the hands of the Roman artists. The coloring is hardly worth great consideration, as it possessed nothing of an original character, and the stu-dent should bear in mind that all art forms of Rome are borrowed forms. Her construction she inherited from Etruria, and combined it with the art obtained in Greece. In fact, it might be said that there is no true Roman style, that is to say, executed by Romans themselves, for the Roman was essentially a warrior and a politician, and his art works were designed by the subjugated Greek and his structural works put into effect by descendants from the Etruscans.

The transition of Greek ornament into the styles of Europe was simply delayed by the conquest of Greece

by Rome, and, during the delay so caused, the style was degraded, and spread throughout the country in that condition.

ROMANESQUE ORNAMENT.

30. Development of the Romanesque Style.—In considering the Romanesque style, it must be borne in mind that the Roman Empire covered almost the entire continent of Europe, and that Roman art had penetrated as far west as Spain and as far north as England and the Baltic Sea. After the downfall of the Western Roman Empire, the conquering races from the North attempted to carry out the Roman style of building as they found it in different parts of the country, and the endeavor to apply these art forms under a new system of religion, and influenced by different conditions of government and living, together with the necessity of practicing a rigid economy in material, caused an alteration of the original Roman style and brought about the style that we now consider Romanesque.

31. The fall of the Western Roman Empire, in 476 A. D., therefore marked the beginning of a new architectural era throughout all Europe (except possibly in the Eastern Empire, with its capital at Byzantium), and the so called dark ages that followed this event may be considered as a formative period of western civilization during which the barbaric conquerors of Rome became gradually Christianized and were subjected to the authority and educational influences of the Church.

Under these conditions a new architectural style was developed, founded on the traditions of the earlier Christian builders, but modified in different regions by local influences. The prevailing characteristics of the style were at first essentially Roman, for Rome soon recovered her antique prestige as the leading city of Europe, and the Roman monuments covering the soil of Southern

Europe were a constant object lesson to the builders at that time.

32. Influence of the Church.—Romanesque architecture was distinctly ecclesiastical. Civilization and culture emanated directly from the Church, and the requirements and discipline of the religious orders gave form to the builders' art.

Corinthian columns, marble incrustations, splendid mosaics, etc. were not to be obtained in the forest lands of France and Germany, and the priests caused to be erected with unskilled labor churches of stone, and the struggle with this structural problem underlies the entire system of Romanesque design.

33. System of Building Under Roman Domination. The Romans, when they wished to erect grand monuments of public utility, could send to the spot, no matter how remote, an army of soldiers, and, by their tyrannical system of government, compel the very inhabitants of the locality to desist from all their employments and work for the emperor of Rome. They thus achieved by a multitude of hands those prodigious results that today stand monuments not only of their enterprise but also of their despotism.

Had the builders of the Middle Ages desired to pursue this course, where would they have found the army of workmen? In countries not only without stone but without money to buy it, without beasts of burden to transport material if they could buy it, without even roads over which to travel, how could these people make any attempt to follow the course of their Roman predecessors?

Bearing these facts in mind as we study Romanesque ornament, we will readily see in the earlier examples an attempt to copy Roman art—an attempt that failed as a duplication of an antique style, but was eminently successful in the development of a new style that was much more rational than the one back to which the Middle-Age builder had been looking.

34. In Fig. 18 is shown the capital of a column, the moldings of which and the crude formations of whose leaves are easily traceable to the Roman-Corinthian order;
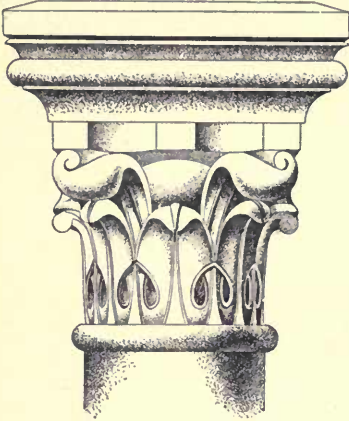
FIG. 18.   FIG. 19.

and the capital shown in Fig. 19, though entirely different from that shown in Fig. 18, also illustrates the influence of classic art and the Corinthian order in the formation of the style at this period.

More clearly, perhaps, than either of these is the base shown
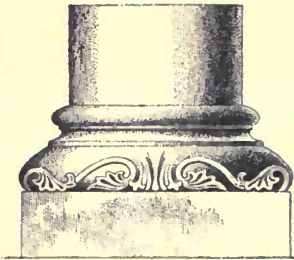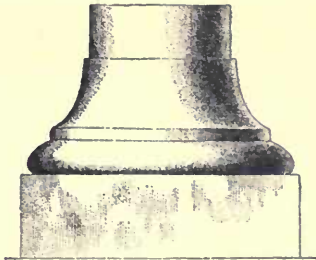
FIG. 20.   FIG. 21.

in Fig. 20, which dates back to the eleventh century. Here the moldings are almost identical with those seen on the classic columns. In Fig. 21 is shown a base of later date, which exhibits a radical departure from the classic lines.

35.   The frieze shown in Fig. 22 is taken from an exam-
ple in Southern Germany, dating back to the twelfth century

FIG. 22.
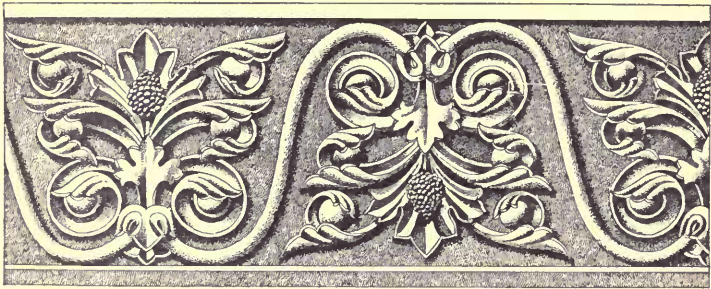
FIG. 23.

FIG. 24.

The treatment of the leaf forms there clearly shows a classic
origin, but the boldness of the treatment shows an inclination

to become independent of the traditions of the classic
style, and in Fig. 23 the ornament, taken from a French
church of the twelfth century, shows a decided freedom from
the governing rules of classic design, although the character
of the curves and proportions of the surface covered is
strongly suggestive of the Greek anthemion. In Fig. 24 is
shown a most independent example, where we have the main
running stem and the branches from alternating sides, while
the small pyramid forms cut in the main stem appear here
and are characteristic of the Romanesque period.

FIG. 25.

In Fig. 25 is shown an example of German twelfth-century
art that shows the possible influence of Celtic work. Observe
that, complicated as this design at first appears, it is really
very simple in construction and contains only one leaf form
arranged in two positions. The entire free flowing lines are
then woven around these forms
to produce a most satisfactory
effect.

36. In repeating ornament
and diaper patterns, Fig. 26
shows a simple arrangement of
circles from the church of
St. Denis, at Paris, dating back
to the twelfth century, while

FIG. 26.

Fig. 27 shows a diaper pattern from the Lincoln Cathedral,

FIG. 27.

in England, of the same period, showing a radical difference in style on account of the remoteness from Rome.

In Figs. 28 and 29 are shown two patterns taken from stained-glass windows, the former of German design and the latter French. The simplicity of the design in each case is its distinguishing characteristic, and, though in appearance somewhat complicated, a little study eliminates all

FIG. 28.

FIG. 29.

complications, and shows the geometrical principle on which it is constructed to be of utmost simplicity.

37.   Origin of Gothic and Byzantine Ornament.— From these few examples, with which the artists of the Romanesque period decorated their structural details, we see that the application of Romanesque forms was simple— simple from a necessity of economy, and simple on account of a freedom of mind devoid of any art traditions.

The builder and designer of the twelfth and thirteenth centuries had no memories of Rome or Greece to follow, and no historical forms that had been handed down from generation to generation, to copy which was almost required by law, and to depart from which would have been a sacrilege in the eyes of his country. The medieval builder attacked his problem with no other tools than his eye and his brain, and gradually developed the form of art that we call Romanesque, and that culminated in two entirely new styles, both in construction and ornamentation—the *Gothic* in the West and the *Byzantine* in the East.

BYZANTINE ORNAMENT.

38.   Oriental Influence.—In the East, around the city of Byzantium, Romanesque ornament was influenced by the art of Assyria and Persia.   In fact, its entire character became tinged with an oriental spirit, and, in the course of the next three or four centuries, it developed into a new and entirely different style of architecture and art, known as **Byzantine.** The old Roman forms became obsolete and gave place to new forms, original, beautiful, and artistic.

It will readily be understood that there would be a period of transition between the slowly developing Romanesque and the finished Byzantine style, and it is with such examples of ornament as date from this period of transition that uncertainty as to their proper classification arises. It is more difficult to distinguish between these styles, whose

transition took place peacefully, than between the Greek and Roman styles, where the transition was sudden.

39.   The Romans had wealth, ambition, and, to a certain extent, taste, but their taste was tainted with vulgarity, through their ostentatious display and desire to express their power as a nation.   Consequently, they seized boldly upon the Greek art forms and elaborated them indiscriminately in their Roman designs.   The refinement and delicacy of the Greek style was thus immediately wiped out, and there is little difficulty in distinguishing between the ornament of Greece and that of Rome; whereas, between the ornament of the Romanesque and that of the Byzantine period there is such a gradual change that distinction is in many cases impossible.

40.   Hagia Sophia.—Byzantine art, though spread to a greater or less extent throughout the continent of Europe, originated in and around the city of Constantinople, formerly called Byzantium.   The great church of Hagia Sophia was built by the Emperor Justinian, in the year 532 A. D., and is the earliest monument purely Byzantine in style.   A peculiarity of this monument and its style is the fact that we find so perfect an example of an original style with so little transition toward it.

The emperor declared that he would erect a church, "That should be the grandest monument ever built by man," and the governors of even the most distant provinces of the empire were ordered to ransack all the ancient Roman buildings for sculptures, precious marbles, and works of art, to be used in this edifice.   Eight columns of pure white marble were brought from Palmyra, and eight more of deep-green marble were stripped from the temple of Diana, at Ephesus, and shiploads of costly relics were brought from all sections of the empire to become a part of this great structure.

Ten thousand men toiled night and day for six years, and the royal treasury and private purse of the emperor were
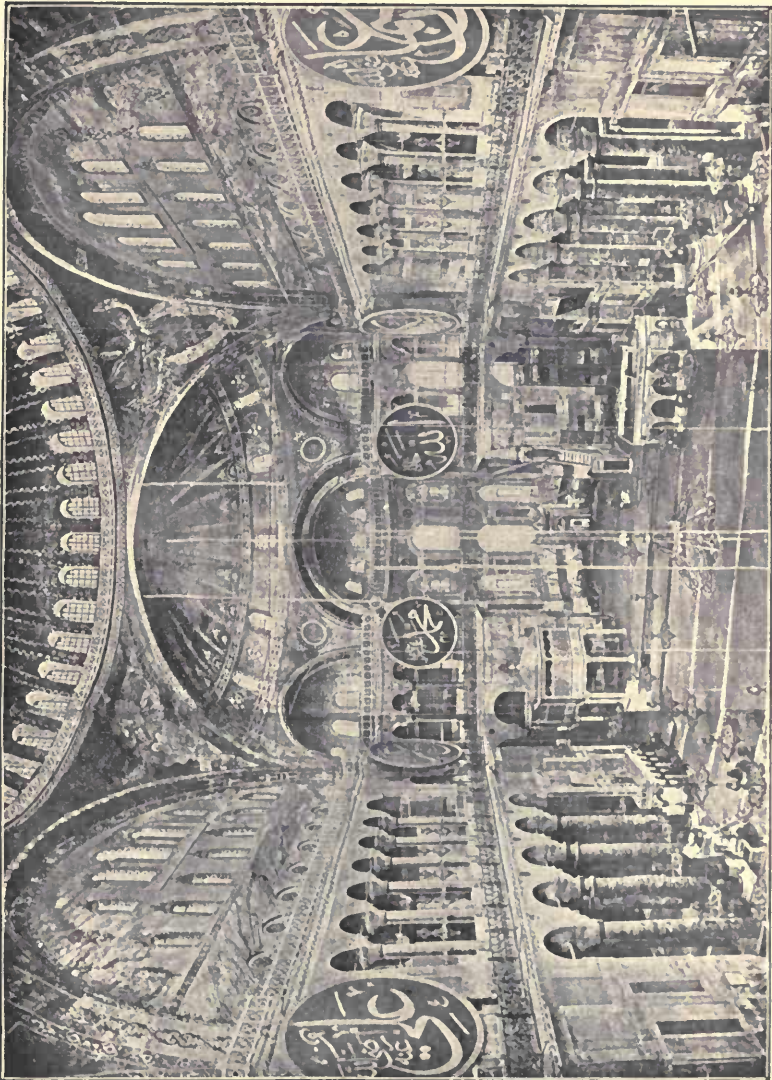
Fig. 30.

exhausted by the prodigious expense.   But the church was built, and is certainly one of the grandest architectural monuments the world has ever seen.   The plan and construction of this edifice is no more remarkable than the scale and treatment of its interior decoration (see Fig. 30), and it stands to Byzantine architecture as the Parthenon stood to the Greek.   Unfortunately it is now converted into a Mohammedan mosque, and the severity of the Mohammedan religion required that its beautiful interior decorations should be covered from sight by repeated applications of whitewash. However, we have been able to secure reproductions of some of these great ornaments so characteristic of the Byzantine style.

41. Examples of Byzantine Style.—At Ravenna, which was the seat of government of the Eastern Empire under Justinian, the church of San Vitale is also a fine example of the Byzantine style, and at Ravenna, Byzantine art reached its height in this edifice.

Venice also felt largely the Byzantine influence, and the church of St. Mark, built in the eleventh century, is a monument patterned largely after the plan and decoration of Hagia Sophia; and, extending as far south as Sicily, we have the cathedral of Monreale, near Palermo, showing strong Byzantine influences, but at the same time possessing many details

FIG. 31.

that are so strongly characteristic of the Romanesque style that it is difficult in many cases to classify them.

42. The capital shown in Fig. 31 is from one of the columns in the first tier of arches in the church of Hagia Sophia, at Constantinople. The scrolls in the upper part of this column undoubtedly have their origin in the Ionic order, and, though the entire capital is

decorated with the conventionalized acanthus leaf, observe how widely different it is from any Roman model. Here the block of the capital is sound and heavy, and at its bottom is a foliated ring that seems to bind it together, while the carved leafwork grows out of the top of the column and enters materially into the construction of the capital itself.

Another Byzantine capital, shown in Fig. 32, is taken from another church in Constantinople, built about the same time as Hagia Sophia, but less original in detail. Here the heavy scrolls project

FIG. 32.

from the angles of the capital very much in the same manner as the volutes in the temple of Concord at Rome, and the place usually occupied by the abacus is filled by a heavy semipyramidal form on which the ornament seems to be applied as a surface decoration more than a component part of the construction.

The effect of this illustrates, however, a radical departure from the traditions that limitated the architectural designs in Roman art; and even when we arrive at Byzantine capitals of the eleventh century, as seen in St. Mark's, at Venice, Fig. 33, we can still observe the influence of Roman art, but thoroughly subservient to the Byzantine school of design.
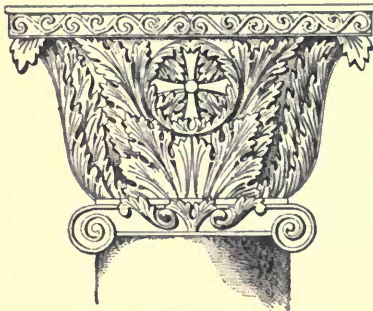
FIG. 33.

In Fig. 33, the volutes at the top of the column, the shape of the capital as it swells out to the abacus, and the general character of the

entire detail are strongly suggestive of its Roman-Corinthian origin; but the strictly conventional treatment of the leaves, the character of the scroll around the abacus, and the bind-

ing together of the ornament in the construction show plainly the influence of the work in the East.
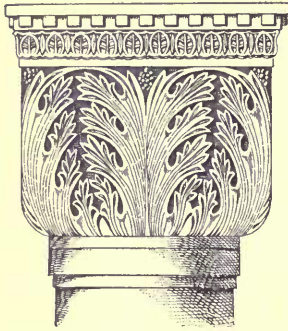
Fig. 34 is another example of Byzantine capital, from Italy, and is even more freed from Roman influence than that of the previous example. The long elliptical curves formed by the leaves, the sharp-pointed lobes, and the deep indentations are all suggestive of its Byzantine origin, while the little row of dentils so uselessly arranged around the top show the difficulty of producing any work in Italy without some taint of classic spirit.

43. The **running ornament** is illustrated in Fig. 35, which example is taken from the same church as Fig. 32, where the leaf form is thoroughly conventional, and, though

tending slightly toward a scroll, is governed by a continuous wavy line, from opposite sides of which the leaf forms branch.

Fig. 36 is an example of geometrically arranged running ornament from Hagia Sophia. The main geometrical forms, as will be observed, are circles, but these circles are not formed complete in themselves, but result from the crossing

and intersection of two wavy lines precisely the same in
general character as the wavy line that forms the governing
element of Fig. 35. Instead of branching foliage from oppo-
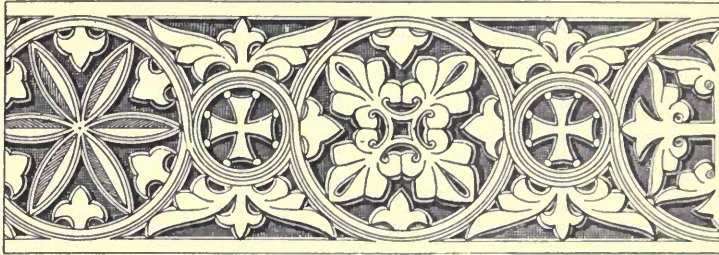
FIG. 36.

site sides of the lines, in the latter case, however, geometrical
figures are arranged within, and foliated forms that have the
cross of St. George for their guiding element are used to
form prominent details of the design.

FIG. 37.

44. Going back again now to the church of St. Mark,
built in the eleventh century, we have a wall decoration

between two arches, shown in Fig. 37. Tracing out the outline of this running surface ornament, it will be observed that the same wavy line governs its principle and direction, as in the case of Fig. 35; but a close study will show that the branching of leaves from one side is accompanied by a branch from the opposite side, so near that the general feeling is of a scroll growing out of a scroll, somewhat after the order of classic art. Above this ornament, however, the semi-circular ring is ornamented by geometrical devices within a governing outline, precisely similar to that seen at Hagia Sophia, Fig. 36.

In all these examples, the student will observe that the character of the leaf is particularly uniform, that it is in the principle of the decoration that we find the greatest variation, and that the variation in this character only amounts to a greater or lesser display of oriental or classic influence.

FIG. 38.

45. Examples of Byzantine art found in Greece are usually purer than any found in Italy, as Roman art and influence never secured a thoroughly characteristic foothold in the conquered country. Byzantine art was built on Greek

art in the first place, and examples of it on Greek soil are usually of excellent character. Besides this, Greek examples have not been mutilated by Mohammedan invasion to the extent that we find them in other eastern countries, and the color treatment and contrast can be best studied there.

46. Ceiling Decoration.—Fig. 38 shows an example of ceiling decoration from the church of St. George at Thessalonica. The circular ornament within the border was executed in red on a blue ground, though the hollow-sided square in the center of it was gold, as were also the triangles at the four corners. The peculiar outline of the device adjacent to the four sides of the interior rectangle is suggestive of Arabian origin, and is exceedingly ingenious in its method of preserving symmetry and preventing awkward repetition. The border around this was executed entirely in gold on a blue ground, with the exception of the extreme outside line, which was red.

47. Wall Decoration.—Fig. 39 is an example of wall
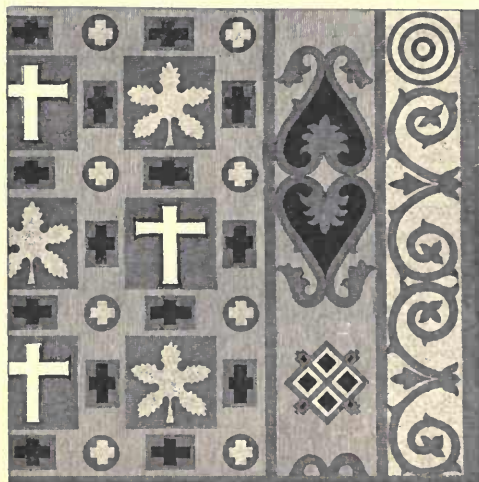
FIG. 39.

decoration from the same edifice, the rectangles and circles containing the leaves and crosses, all being worked with a

plain gold round, while the figures and half of the smaller
crosses were green and the outlines of the larger crosses and
the remaining smaller crosses were red.   The effect is very
rich, and the arrangement of the rectangles and smaller
circles shows a knowledge of surface division that is well
carried into effect.   The student's attention is particularly
called to the fact that the shape of the groundwork between
the rectangles is also crucial, and that every effort is made
to bring that symbolic detail into prominent display.

48.   In giving examples of Byzantine ornament, nothing
could be more characteristic than the stone panels herewith
illustrated.   The style of the ornament itself, the character
of the carving. and the development of the geometrical pat-
tern are all details that are shown here in a most character-
istic Byzantine form.
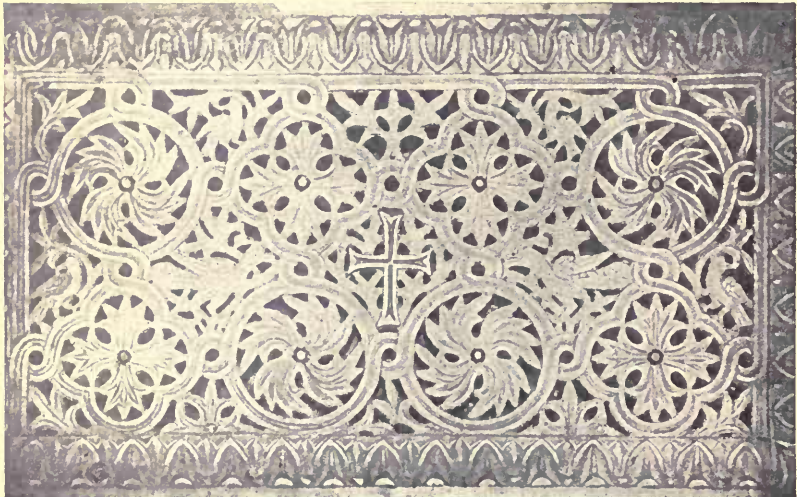
FIG. 40.

49.   The pierced screen shown in Fig. 40 is from
Ravenna, and illustrates the geometrical pattern based on
an arrangement of circles (somewhat after the style of the
Celtic ornament), in which is carved the typical Byzantine

leaf. The cross outlined in the center was emphasized in the original by a plating of gold, and the spaces around the foliage were filled with birds whose peculiar modeling and conventional outline is characteristic of the Byzantine style. Another characteristic of the style, shown clearly in this illustration, is the sharp angular cutting of the leaves, the deep circular and elliptical openings between the lobes of two adjacent leaves, and the tendency of the whole panel to appear in high relief on a dark ground rather than to be pierced through entirely.

In Fig. 41 is shown another screen of the same character, where the interlaced bands that form the geometrical outline
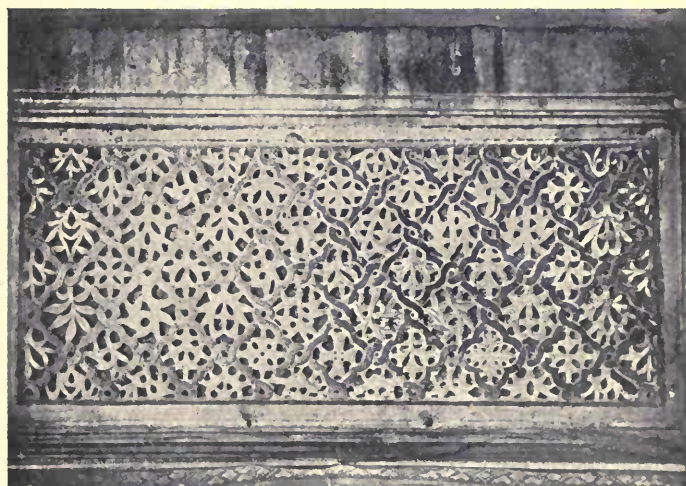
FIG. 41.

of the foliated ornament were originally gilded, and the leaf forms carved between them are similar to those in Fig. 40.

50. Fig. 42, however, shows a trend in a different direction. Here the openings in the screen are larger, the exterior portion of it being outlined with a design undoubtedly derived from the Grecian fret, while in the center a large Latin cross divides the panel into four smaller rectangles,

each filled with a particular device symbolic of Christianity
and characteristic of the Byzantine style.   Observe also the
running foliage around this panel, and its branching leaves
and fruit, alternately from opposite sides, and note the differ-

FIG. 42.

ence between this style of treating foliage and that of the
Roman and Greek artists, where continuous foliage was
accomplished by growing one spray or stem out of a calyx
or cup from which a scroll emanated.

51.   The capital of the column shown in Fig. 43 is also
from Ravenna, and the peculiar looking birds on the upper
part, as well as the sharply indented foliage, are character-
istic of this style.   Here, also, is seen that same geometrical
pattern as the governing outline to which we called atten-
tion in Fig. 40, and also the wandering-vine border line,

throwing off its leaves on alternate sides in a similar manner
to the outline in Fig. 42.

That the capital of the column is cut in full relief is clearly
shown by the fact that the light shines through the screen
work on to the stone interior, as may be seen.   This style
of capital will be found throughout Northern Italy where

FIG. 43.

any example of Byzantine style exists.   The dark portions
of it were originally gilded, and must certainly have pre-
sented a most remarkable effect.

52.   Turning to St. Mark's, at Venice, Fig. 44, we find
a frieze such as shown in Fig. 45, the lines of which are
based on identically the same motives as the screens we

Fig. 44.
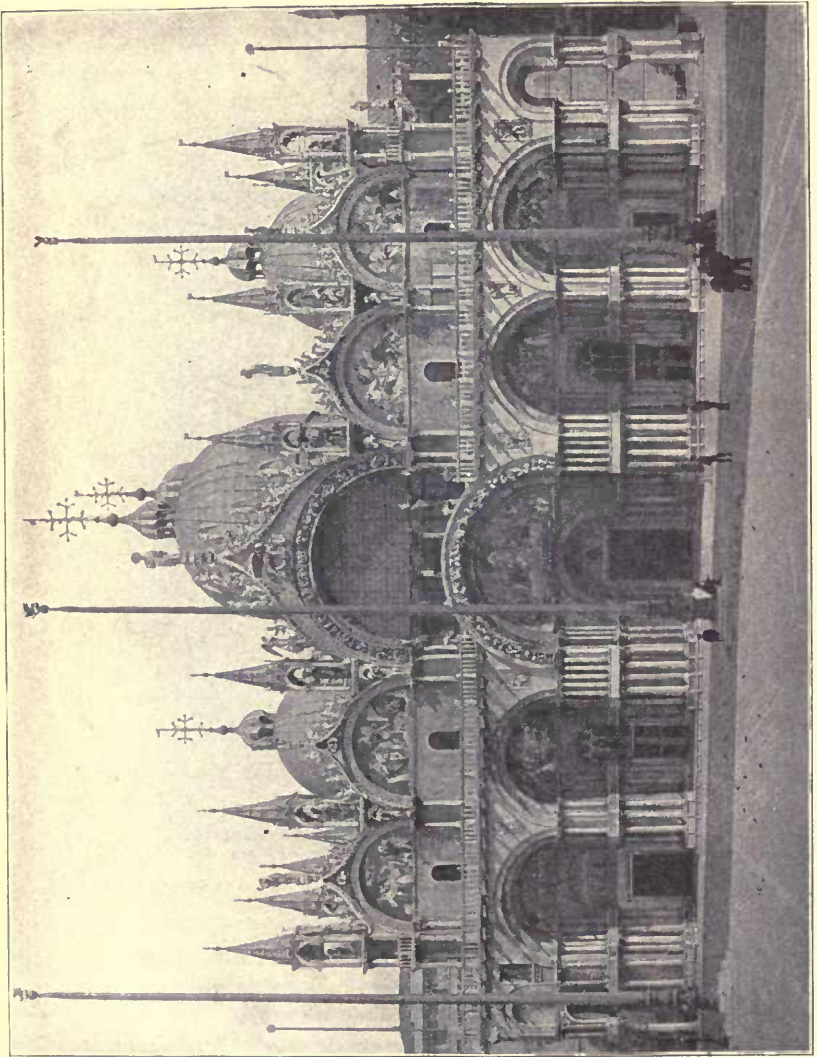
have already studied; but the carving, though in high relief,
does not pierce the screen, and the border of the panel, as
well as the treatment of the foliage within the panel, shows
a highly developed Byzantine feeling.   Observe, however,

FIG. 45.

the influence of its proximity to Rome on the treatment of
the scroll forms.   In the central part of the panel we do
not have the running vine, with its leaves branching from
each side, but a partly controlled tendency to grow one

scroll out of another—a tendency that is so well kept in submission that it does not materially affect the delicacy of the design.

In the same church, we find the panel shown in Fig. 46, the rounded forms of which are not often found in this style.   Note, however, the severe conventionalism of the foliage treatment, and also the independence of the artist

FIG. 46.

concerning the preservation of absolute symmetry.   On one side, the vine runs off the panel both at the top and edge, and, on the other side, runs off the panel on the top only.   One of the two central leaves extends over the molding of the panel frame ; the other is carved entirely within it.

53. In Fig. 47 is shown a well at Venice, the details of which illustrate clearly the strong, bold, outline effect characteristic of Byzantine carving.   The guilloche border around the top and the leaves patterned after inverted anthemions are suggestive of classic origin, but are treated with such

strong Byzantine effect that the classic taint is fairly
obliterated.

54. Ingenuity of Byzantine Ornament.—The geo-
metrical arrangements in Byzantine ornament are exceed-
ingly ingenious, and especially remarkable in mosaic work,

FIG. 47.

the monotony of which they destroy by well planned and
complicated constructions based usually upon a variation of
the straight line and the right angle.

In Fig. 48 is shown one of the doorways in the cathedral
of Monreale, near Palermo, around which mosaic patterns
are inlaid in the jambs and also in the flanking walls.   The
pattern of this mosaic is typical of examples of that art in
the Byzantine style, as the Byzantine mosaics can nearly
always be distinguished from the Roman mosaics by the

fact that the geometrical construction forms an integral part
of the design.   There is one style of this mosaic ornament
that is also typical of the Romanesque period, particularly
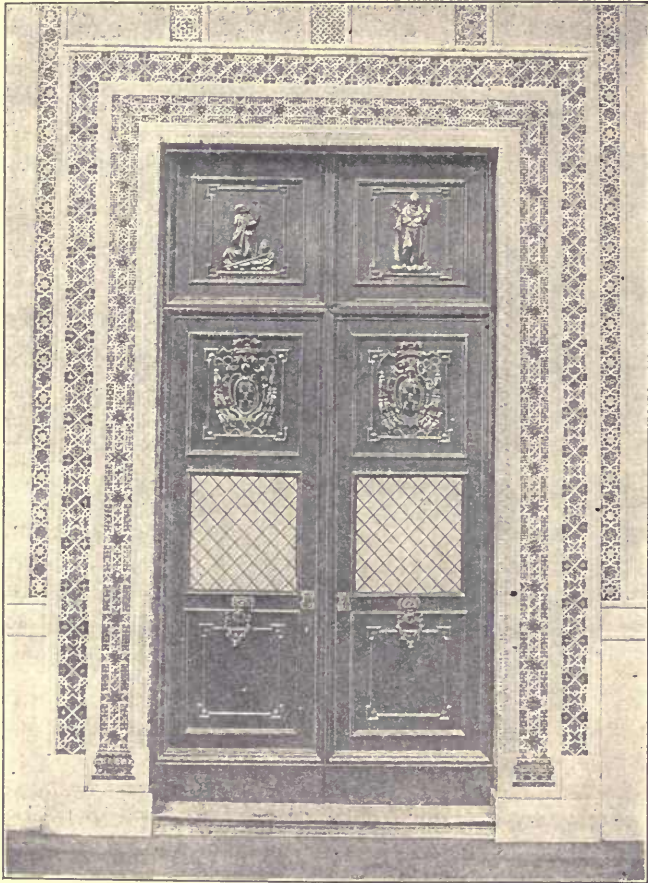
FIG. 48.

in Italy.   This consists of a geometrical arrangement of
lozenge-shaped pieces of glass in a complicated series of
diagonal lines, the directions of which are defined and
terminated by means of pieces in different colors.

The examples of this work in Central Italy are much simpler than those of the southern provinces of Sicily, where the influences of Saracenic art are very much felt; and this
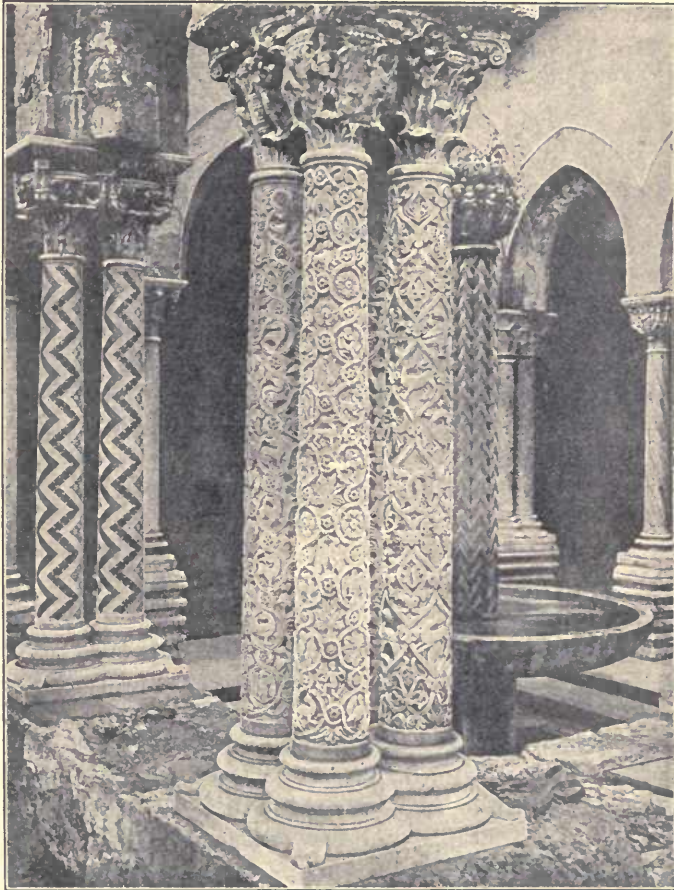
FIG. 49.

mosaic work, as observed in the southern provinces, is very difficult to classify positively, either in the Romanesque or the Byzantine style.

55. In Fig. 49 are shown some clustered columns from the cathedral of Monreale. One group of four columns is richly carved with the interlaced ornament so familiar in the examples of Byzantine art, while the adjacent columns, inlaid with zigzag lines of mosaic, are more suggestive of Romanesque art, and the capitals and bases of both sets of columns are more in accordance with the Romanesque idea than with the Byzantine. This, however, may be largely accounted for when we consider that both styles were merged together in Sicily at about the close of the twelfth century, and the examples in Figs. 48 and 49 are here given in order that the similarity of styles may be carefully studied.

56. Sculpture in Byzantine Art.—Pure Byzantine ornament is distinguished by broad-toothed and acute-pointed leaves, which in sculpture are beveled at the edge and are deeply chiseled throughout and drilled with deep holes at the springings of the teeth. The running foliage is generally thin and continuous. The ground, whether in mosaic or painted work, is almost universally gold. Thin interlaced patterns are usually preferred to geometrical designs, and the introduction of animal or other figures is very limited, especially in sculpture, and in painted work is confined principally to holy subjects in a stiff conventional style, exhibiting little variety of feeling. In fact, in Byzantine art, sculpture is a very secondary importance.

57. Sculpture in Romanesque Art.— Romanesque ornament, on the other hand, depended mostly on sculpture for its effect. It is rich in light and shade, deep cuttings and massive projections, and a great intermixture of figure subjects of every kind with foliage and conventional ornament. The place filled by mosaic work in the Byzantine art, in the Romanesque is supplied generally by paint. In colored ornament, animals are as freely introduced as in sculpture, and the ground no longer confined to gold, but composed of blue, red, or green. In other respects, however, the two styles are very much alike.

ASIATIC ORNAMENT.

58. Characteristics of the People.—Before studying the style of the ornament of this section of the eastern hemisphere, let us consider how different are the characteristics of this people from the European nations whose ornament we have so far analyzed. Oriental people are traditionally immobile in character and unprogressive in their methods of business and manufacture. The processes of weaving, carving, and other practices of art design are transmitted carefully and faithfully in the oriental nations from generation to generation, and it is therefore practically impossible to assign a precise date to any one production, so similar are the designs. The study of oriental art is therefore freed from any minute chronological examination, and the student is able to consider the subject in a broad sense, considering only primary and original styles that predominate over lesser divisions and personal modifications. These styles can be divided into three general groups: (1) *Chinese* and *Japanese*, (2) *Indian*, and (3) *Arabian*.

CHINESE AND JAPANESE ORNAMENT.

59. The Chinese are a nation of great antiquity, and we can discover no detail of art training that they have ever given to or received from any other civilization. This nation has been ever satisfied with itself, and this lack of progression and consequent isolation have given it an originality of character devoid of any detail that we find of the art works of other nations, unless we except those general geometrical formations that instinct seems to have implanted uniformly in the minds of every known race.

60. Primitiveness of Chinese Ornament.—Chinese ornament does not seem to have gone beyond the very earliest stages of design that we find among the most primitive people. They are even behind the New Zealander in

their theory of applied art, and are plodding along in the creation of fresh designs at a fixed point that is neither progression nor retrogression.   Like all oriental nations, they possess a wonderful faculty of color harmony, but they have never expressed an appreciation of pure form—a condition that must necessarily be arrived at by a subtle process and result from highly endowed natural instincts, or from the development of primitive ideas through successive generations of artists, each improving on the work of its predecessor.

In their decorative and woven patterns, the Chinese possess only just such talent as might be expected of a most primitive people.   Their most successful efforts are those in which a geometrical pattern forms the basis of a design, and even in these they depart from patterns formed by the intersection of equal lines, and seem to have a very imperfect idea of the distribution of space.

Their taste for color, which amounts almost to an instinct, enables them in some measure to balance form, but in designs deprived of color they seem to be almost helpless.   The Chinese are certainly colorists, and are able to balance with equal success both the fullest tones of color and the most delicate shades.   They are not only successful' in the use of the primary colors, but also in the secondaries and tertiaries, and they are particularly deft in their management of the lighter shades of pure color, such as pink, light blue, pale green, etc.

61.   Lack of Idealism in Chinese Ornament.—In their printed paper hangings, the treatment of both figures and landscape and of ornament is so conventional that, no matter how inartistic we may consider it, we feel that it is within the bounds of decoration.   In all cases, their instinct thus restrains them within the true limit, and although the arrangement is generally unnatural and inartistic, they never by shades or shadows violate consistency, as is repeatedly done in work at the present day.

In their floral patterns, they always observed natural laws

of radiation from the parent stem, and tangential curvature.
It could not very well be otherwise with a people like the
Chinese, whose strongest peculiarity is their fidelity in copy-
ing, and hence we must infer that they are close observers
of nature. It is the taste to idealize on this close observa-
tion that is wanting. On the whole, Chinese ornament is a
very faithful expression of the nature of this peculiar people.
Its characteristic feature is oddness. We cannot call it
capricious, for caprice is a playful wandering of a lively
imagination; but the Chinese imagination is disorderly, and
all their works are wanting in the highest grace of art,
namely, idealism.

62. Dearth of Chinese Architecture.—The extreme
fancifulness of Chinese ornamental compositions, and the
lack of order or method in them, is not surprising when we
take into consideration the fact that the Chinese have never
developed anything worthy of the name of architecture in
the true sense of the word. They have no original form of
construction that would be likely to give rise to a system of
ornament in which even the most insignificant designs have
been known to assume character and even grandeur, as is so
well exemplified in Egyptian style.

63. The absence of a national architecture renders the
character and genius of the Chinese easily understood. To
this people, that seems to occupy itself with naught but
details in everything, the conception of a monumental
building is entirely beyond comprehension. Certainly, this
circumstance is largely responsible for the condition of
the Chinese today and the rudimentary character of their
designs.

The first element of beauty in the Chinese school of art is
variety, and in their foliated designs we find leaves following
one after another bearing not the slightest resemblance to
one another. One panel of a screen painted with a land-
scape will be set beside another ornamented with metallic
arabesques. The use of straight lines and right angles is

either studiously avoided or so disguised that they will be vague or misunderstood.

64. Chinese Coloring.—That the Chinese imagination is of a disorderly character is shown in some of their curiously shaped forms; these are so entirely different from those with which we are more familiar, and so completely destitute of the elements that cause an impression of grandeur, that the interest in their designs is with difficulty maintained. The Chinese are apparently ignorant of the simplest laws of perspective, and seem in no way to comprehend the effect of light and shade. Notwithstanding this inferiority, however, the coloring of their ornament is so rich, and their imagination is so wild and irregular, that they make a varied and charming use of their ornament in particular applications, such as ceramics, incrustations, and woven fabrics. Their productions are models of color harmony, and are in some respects superior to the works of other nations. The very defects in their designs form sources of some of the good qualities that accompany them, and the capricious activity of their minds inclines them to make an ornament of everything, whether it be a cloud, wave, shell, rock, or form from the animal world. The bright-colored butterfly flitting among flowers and the flaming thunderbolt bursting from the heavens are of equal importance to the Chinese artist when applied to a surface as ornament.

To these rich and varied resources may be added a limited number of time-honored figures that, to a certain extent, have symbolical significance. We are all familiar with the Chinese dragons—those monsters with frightful heads, formidable looking teeth, and fearful claws—certain funny looking dogs with claws, sharp teeth, and curling mains somewhat resembling the lion, grotesque birds, and the mandarin duck, all of which are conspicuous in Chinese decoration.

65. Adherence to Standard Forms.—A peculiar characteristic of this art is that, though it appears in itself so

capricious, its execution expresses such faithfulness of trans-
mission in the representation of things from generation to
generation that the lapse of hundreds of years has not caused
the slightest modification of one of these standard ornaments.
This may be due to the effect of the imitative instinct of
this isolated nation that, so advanced in some points and so
primitive in others, is always consistent in itself. It is
possible, however, that this fidelity in the observance of the
form and coloring of some preceding work is due to some
mysterious rules—some sort of ritual perpetuated through
various ages. Ancient laws and customs established certain
rules governing the color of the robes and vestments of the
imperial court, according to different dynasties; once it was
white, afterwards green, and the Tai Tasig dynasty, now
reigning in China, dresses in yellow.

Chinese art is a mixture of ideal and imitative elements,
the latter being used in the most conventional manner, the
coloring of which is also conventional and not in the least
subject to any imitation of nature.

66. Japanese Art, though borrowed from the Chi-
nese, possesses much greater individuality and is better
preserved to the present day. The Japanese have devel-
oped the study of nature, especially in birds, with more
truthfulness and power of observation than did their ances-
tors or rivals, and their imitative style is therefore less
conventional. However, even though their delicate pro-
ductions have added fresh charms to the old Chinese cer-
amics, they are not equal to the figures of the work of the
finest periods.

One of the principal causes of the general progress of
Japanese art may be found in the fact that a great profusion
of examples of design of all sorts, conceived by good artists
and carved in wood, are so distributed as to be constantly
before the general public. Therein lies an element of prog-
ress, as it cultivates a taste for objects of art among the
common people and creates a demand. When all objects
and utensils of service and utility are richly carved and

decorated with ornamental designs, the eye is bound to become educated and the general taste of the people more refined. This is strongly exemplified in the Egyptian civilization.

INDIAN ORNAMENT.

67. Unprogressiveness of Indian Art.—Although less isolated than China, and in more frequent communication with the rest of the world, Indian civilization has not experienced such changes as mark the history of many other nations. The social and religious organizations, the priests, and castes of people, the sacred books and poetry, and the manners, customs, and superstitions remain today much as they were among the Hindus hundreds of years ago.

Art naturally has shared in this standstill, and the substance of Indian decoration is still limited to a few general features that for many centuries have undergone no fundamental alteration. The most striking of these characteristics are the continuity and abundance of decoration. The surface decoration is usually filled up entirely with a profusion of ornamental forms that, if not exactly alike, are very similar. The ground color is always warm and harmonious—occasionally light, though more frequently dark—which serves to unite the designs and add greatly to the general effect.

68. The method of distribution and the admirable feeling for color procures in Indian decoration a richness and calm that gives it an undefinable sense of repose. The tendency of the style toward monotony is overcome by this powerful unity that leaves no room for desire or need of greater variety. The designs are usually based on some floral type and are treated in a most conventional manner, and though the imitation bears a closer resemblance to nature than in most of the styles we have studied, it is by no means servile. The type from which an ornament is derived can usually be recognized without trouble, and, although floral ornament is occasionally seen under the pure art form

characteristic of the Egyptian style, it is usually treated with a pliancy of execution and picturesqueness of idea that brings it to a closer resemblance to the modern style.

69. In the execution, however, Indian art never attempts the rounding of a form (a process that is naturally opposed to the idea of surface decoration), and usually confines itself to silhouette drawings, in which the outline is shown off by a dark tint on light grounds or by a lighter tint on dark grounds.

70. Characteristics of Indian Ornament.—Indian ornament possesses the valuable characteristic of being distinctively original. It has been allowed to grow up and develop itself without any foreign influence or conflicting ideas of religion. In the application of ornament to the various portions of an object, the greatest judgment is, in this style, always shown. In the first place, the ornament is always in perfect scale with the position that it occupies. On the long narrow necks of the hookas are the small pendant flowers, as shown in Fig. 50, while the swelling form toward the base is occupied with larger patterns.

FIG. 50.

71. In the equal distribution of surface ornament over the grounds, this nation exhibits a remarkable perfection of drawing. An exact balance is obtained between the various colors used, and this balance is carried to such a nicety that it is practically impossible to reproduce any of their woven or embroidered goods with any degree of accuracy. In all their woven fabrics, the colors are so fused together that the entire piece of goods at a little distance presents no individual coloring, but a neutralized bloom.

72. The following general rules observed in the designs of their woven fabrics are of importance:

1.　When gold ornaments are used on a colored ground, or where gold is used in large masses, there the ground is darkest. Where gold is used more thinly, the ground is lighter and more delicate.

2.　When gold ornament is used alone on a colored ground, the color of the ground is carried into it by ornaments or hatchings worked on the ground colors in the gold itself.

3.　When ornaments in one color are on a ground of contrasting color, the ornament is separated from the ground by an edging of a lighter color to prevent all harshness of contrast.

4.　When, on the contrary, ornaments in a color are on a gold ground, the ornaments are separated from the gold ground by an edging of darker color to prevent the gold from overpowering the ornament.

5.　In other cases where varieties of color are used on a colored ground, a general outline of gold, of silver, or of white or yellow silk separates the ornament from the ground, giving a general tone throughout.

73.　In Fig. 51 is shown a diaper pattern taken from an Indian textile, and exhibits the regularity of repeated form

Fig. 51.

that thoroughly fills up the surface, as heretofore described. There is a slight tendency toward a geometrical formation

observable in this pattern, where the wavy line becomes tangent to its neighbor. This geometrical pattern is not as rigidly carried out, however, as in Fig. 52, where the construction lines governing the main details consist merely of semi-circles connected by short straight lines, thereby forming knees, as indicated at *a*. The style of ornament enclosed in the geometrical figures thus formed is typical of Indian design, and shows a number of forms tangent to a general stem, all of which may have had their origin in brush strokes of painted work, or possibly in the shape of the palm leaf, which they slightly resemble.

FIG. 52.

74. In Fig. 53 is shown a typical example of Indian ornament taken from a woolen fabric, many of the details of ˙

FIG. 53.

which will be found similar to the strokes referred to in

Fig. 52. These forms, though more or less foliated, do not bear a very strong resemblance to the natural type, but in Fig. 54 we have an example of silverware where the chased design is a conventionalized form of flower, but in more direct imitation of nature than exhibited in the other examples.

75. These few examples illustrate by comparison the different handling of ornament by the Indian designers to suit it to various purposes. The patterns shown in Figs. 51 and 52 are seen more usually in light fabrics, while that in Fig. 53 is woven in heavier woolen goods, and that in Fig. 54 is executed in metal.

In objects of low-tone combinations of color, a black general outline is used to separate the ornament from the ground. The object always appears to be, in the woven fabric, that
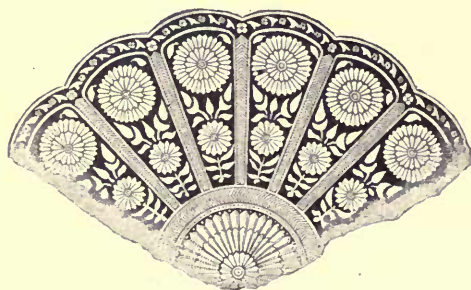
FIG. 54.

each ornament should be softly and not harshly defined, that colored objects viewed at a distance should present a neutralized bloom, that nearer approach should exhibit the beautiful details, and that a close inspection should divulge the means whereby these effects are produced. In this, the Indian carries out the same principle of surface decoration that we find in the architecture of the Arabs and Moors. The ornament in the spandrel of a Moorish arch and in an Indian shawl are constructed on precisely the same principles.

76. Indian decoration, like the Chinese, is unprogressive and introduces no new forms in its designs, but repeats traditionally generation after generation the same forms for the same purposes.

ARABIAN ORNAMENT.

77. Important as was the influence of Byzantine art in Europe from the sixth to the eleventh century, there was no people that it affected more than the great and spreading Arab race that propagated the creed of Mohammed, and, after conquering the finest countries in Asia and Africa, finally obtained a footing even in Europe. In the earlier buildings executed by them in Egypt, Palestine, and Spain, the influence of the Byzantine style is very strongly marked, and the tradition of the Byzantine school affected all the adjacent countries to a greater or less degree.

Although the Arabs must have possessed an original art, only a few traces of it remain, and these are in legends wherein grand buildings are spoken of that date back to remote antiquity.

It is known that the wandering and stationary tribes distinguished each other by the name of "Felt people" and "Clay people," and this would lead one to the impression that the latter title implied a knowledge of ceramics; but the character of the decoration of the pottery of these early tribes is at present unknown, as is also that of their arms, fabrics, and fixed dwellings.

78. Development of Arabian Ornament.—On their contact with the Greeks, East Indians, and Persians, the Arabian people produced a style of ornament that formed an important part in the compromise now called by the name Byzantine. Subsequently, when Byzantine art had reached its zenith, Arabian art, under the influence of Islam, took the form under which we now know it, and may have shown in some applications a certain Byzantine influence exercised on the Arab practice. It is unreasonable, however, to consider

Byzantine art, as is sometimes done, as being originally a formation of the Arab style, as the latter has too much character and unity not to be in itself an original conception. There appears to have been a mutual influence exercised between the Byzantine and Arabian during the earliest periods, as inevitably happens in a contest for supremacy between two neighboring styles; but if the Arab received anything from the perfected Byzantine, it may be said that they were only partly taking back their own from an art that had drawn so largely from oriental sources, not only during its formation but also up to the period of its greatest development.

79. Influence of Mohammedanism.—When the Mohammedan religion spread with such astounding rapidity over the East, the increasing demands of civilization naturally led to the creation of a new style of art, and while it is certain that the early Mohammedan structures were either an adaptation of old Roman or Byzantine buildings, or else buildings constructed from the ruins and materials of the ancient monuments, it is equally certain that the new ideas and expression of feelings must at a very early period have given rise to a characteristic form of art.   In buildings constructed largely of old materials, they endeavored to imitate the details borrowed from old buildings, and the same result followed that had already taken place in the transition of the Roman style to the Byzantine.   The imitations were crude and imperfect, but this imperfection created a new order of ideas; and instead of returning to the original model, they gradually threw off the restrictions, and early in their history formed and perfected a style of art peculiarly their own.

80. With the study of Arabian ornament, we meet the first restrictions in the application of certain forms in decoration.   The Mohammedan religion forbids the use of any animal or vegetable forms as an element of design.   The Koran, which occupies the same position in the Mohammedan belief that the Bible does in the Christian, distinctly states that the follower of Mohammed "Shall make no

images." We therefore find in the Arabian style, as a substitute for the foliated design we are now so familiar with, a system of constructive ornament, the complicated framing of which was fascinating to the geometrical mind of the Arab.
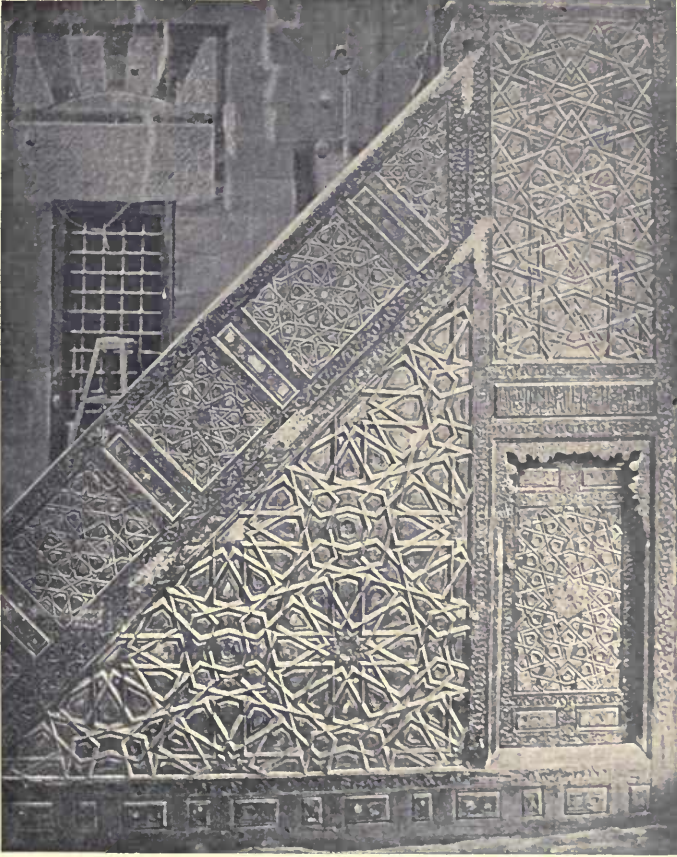
FIG. 55.

81. This is shown clearly in Fig. 55, which is the outside of a staircase in Egypt, the panels of which are enriched by very beautiful geometrical devices—complicated in their construction but really simple in their formation when their

governing lines are traced out.   Take, for instance, the large triangular panel, and it will be found that all the figures therein are formed by the intersection and crossing of a number of zigzag lines, several of which are exactly the same in pattern but arranged at different angles.

This is characteristic of all Arabian and Moorish designs, as we shall see hereafter.   The continuity of the ornament entirely covers the surface in Arabian as in Indian art, and nothing can be removed from the design without occasioning a feeling of loss.

The means employed, however, are different, and, while the mere repetition of objects frequently suffices in Indian decoration, the Arabian ornament, on the contrary, is built up and bound together in all its parts.   Everything is connected, and, from the circumference to the center of the interlacings in a piece of rose work, there is a continuous line that cannot be broken without destroying the design. This imaginative construction is sometimes double, that is, formed by two complete systems that follow each other to an end without confusion, but meet and overlap to produce incidental figures, intersections, and alterations.

82.   Arabian   Decoration. — Notwithstanding   this learned complication, Arabian decoration is clear and distinct, thanks to the general purity and fineness of the lines and the exclusion of all superfluity.   This is also due to the principle observed in the construction of the "roses," wherein the wider spans are reserved for the extremities of the circumference, leaving to the radiating center, from which they diverge, the fine work that throws out boldly, thus fixing the eye on the key of the whole composition as the central point of a circle.
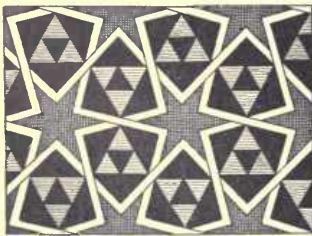
FIG. 56.

83.   In Fig. 56 is shown another example of this style of ornament, taken from a mosaic

pavement in a mosque at Cairo, in Egypt. Here the geo-
metrical simplicity of the pattern can be easily traced, as
the design consists simply of two horizontally arranged
zigzag lines, crossed at regular intervals by sets of diago-
nally arranged zigzag lines, the patterns of which are all
identical.

84. In Fig. 57 we have an ornament generated on a dif-
ferent system but on a similar geometrical idea. This orna-
ment, too, is suggestive of the fret pattern, though entirely
different from any frets we have hitherto observed. How-
ever, the shape of the enclosed figure *a b c d e f*, it will be
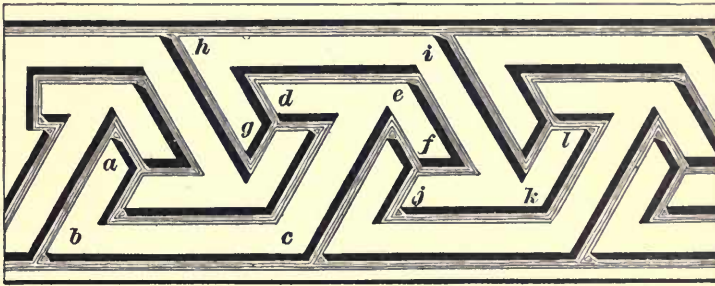
Fig. 57.

observed, is identically the same as the figure *g h i j k l*, and
the repetition and alternate arrangement of these two pecu-
liar outlines give us the key to the whole system of orna-
ment shown in the figure.

This result is obtained by an arrangement of the simplest
forms imaginable, but the geometrical and intellectual study
required to perfect these forms to bring about the result is
something tremendous, and the student will readily see that
it really requires more brain work to produce a simple look-
ing design like Fig. 57, than the complicated arrangement
of straight lines shown in Fig. 56.

85. Another pattern is shown in Fig. 58, and consists of
a number of scrolls of a more or less geometrical character,

and, though simple in itself, it is fascinatingly complicated in its conception.   The design is executed in two colors, and a little study will show that the outlines of the two colors are identical.   The light portions of the design in the upper half

FIG. 58.

of the figure are a duplication of the dark portions of the design in the lower half of the figure, and vice versa, every detail on one half being exactly reproducible in the opposite color on the other half, and, if the figure were sawed out on the line dividing the two colors, it would produce two outlines exactly the same in every respect.   We called attention to this fact in connection with the Greek frets, but no Greek ornament ever carried this wonderful mathematical detail to such a nicety.

86.   Arabian Coloring.—In Fig. 59 we have a ceiling taken from a mosque at Cairo.   The repetition of similar forms is clearly marked here, though the geometrical element is largely lost owing to the surface covered by the flat decoration.   The colors here used were a light blue for the groundwork, over which was laid the general design in bright gold, and that overlaid with a pale yellow, almost approaching a cream tint.   Light blue and

FIG. 59.

pale yellow are very prominent tints in Arabian ornament; red is used but sparingly, and then of a most intense shade; while green is introduced in small arabesque figures, scattered through with others of gold and occasionally of blue. The ground colors in nearly all instances are blue, creamy yellow, and occasionally red.
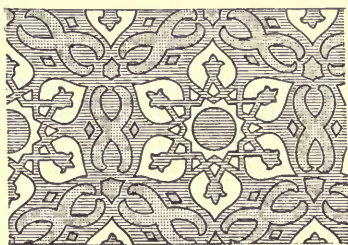
87. Fig. 60 is from an illuminated copy of the Koran, and illustrates the influence of Byzantine art on that of Arabia. The general construction lines of the ornament are Byzantine in character, while the filling in is typically Arabian. The small irregular spaces in the border of the design

FIG. 60.

at *a* are green, the square enclosed spaces at *b* are a brilliant red, and the groundwork that shows through at *c* is a delicate shade of blue. The ornaments worked on these grounds and in these spaces are either a bright gold or white, and the filling in of the general outline is a creamy shade of yellow.

88. In the primitive Arabian style, unmixed with the Persian, the flower, properly so called, is never to be found, but in its place appear other forms resembling it and are apparently inspired directly by nature. This sort of subject, half way between imaginary conception and the representation of natural flowers, does not appear simply as a termination of scrolls, as among the Greeks, but forms an integral part of the decoration and does not break the lineal network.

TURKISH ORNAMENT.

89. Characteristics of Turkish Ornament. — The architecture of the Turks, as seen at Constantinople, is patterned after the early Byzantine style, though their system of ornamentation is a modification of the Arabian style. In fact, it may be considered as an application of Arabian ornament, without any understanding of the meaning, derivation, or type of that ornament.

When the art of one people is borrowed by another of the same religion but of different character, temperament, and customs, the resulting designs are certain to show the deficiency of intellect or refinement that the borrowing people possessed in contrast to the others; and this is the case with the Turks when compared with the Arabs. There is the same difference in the refinement, elegance, and judgment of the Turkish ornament and Arabian ornament as there is between these two peoples. The Turks themselves can hardly be considered an artistic nation. They have built buildings and executed designs in their cities, but have employed foreign artists to do the work. All their public buildings, therefore, present a mixed style. It is not at all unusual to find in a Turkish building floral ornaments of Arabian and Persian origin side by side with details from Rome, the Turks having exhibited a tendency to abandon the traditional style of their forefathers.

The Turks are the first of the Mohammedan nations to adopt European fashions in architecture, and their modern buildings and palaces are the work of European architects and artists, and are designed in the most approved European style.

90. The Turkish embroideries give about the only style of ornament that we can consider strictly national, as work of this character must necessarily exhibit the characteristics of the race, and, judging from this, it will be readily seen that their art instinct is far inferior to that of India. Indian embroidery is perfect in the distribution of its forms and all

its principles of ornamentation.   With Turkish ornamenta-
tion, the only examples we have that approach any degree
of perfection are in the carpets, but these are executed
mostly in Asia Minor, and are probably not designed by
Turks.   The designs of most of them appear more Arabian,
and differ from the Persian carpets in being more conven-
tional in their foliage treatment.

91.   The general principles of the distribution of form
are the same in Turkish and Arabian ornament, but there is
a difference in the treatment.   In both the Arabian and
Moresque styles, the surface of an ornament is only slightly
rounded and the enrichment is secured by sinking in the
lines, or, where the surface was left smooth, additional pat-
tern upon pattern was obtained by painting.   Turkish orna-
ment, on the contrary, presents a curved surface, and the
effect is not as broad as that produced by the sunken-feather
treatment of the Arabian and Moresque.   Another peculiar-
ity that readily distinguishes Turkish ornament from Ara-
bian is its abuse of the reentering curve, thus causing all
its detail to have a feeling of instability and unrest.   This
is also, to a certain extent, characteristic of the Persian
style.   In the Moorish style, however, it appears only
exceptionally.

92.   It is a very difficult matter, in fact, almost impos-
sible, to clearly explain the differences in styles of ornament
that have so strong a family resemblance as the Persian,
Arabian, and Turkish, but, after practice, the eye detects
them as readily as it does the difference between Roman
and Greek.   The general principles remaining the same,
there will be found a peculiarity in the proportions of the
masses—more or less grace in the flowing of the curves, a
fondness for particular directions in the leading lines, and a
peculiar interweaving of forms, the general form of the
conventional foliage usually remaining the same.   The rela-
tive degree of fancy, delicacy, or coarseness with which these
are drawn will at once distinguish them as works of the

refined and spirited Persian, the not alone refined, but reflective, Arabian, or the unimaginative Turk.

93. The most prominent colors in Turkish ornament are green and black; in fact, these form a feature of the ornament. In modern Turkish ornament, green is much more prominent than in ancient examples, where blue was the important color.

PERSIAN ORNAMENT.

94. Characteristics of Persian Ornament. — The time at which we are most familiar with Persian art is at the period of its greatest splendor. The outlines of the ornament are generally taken from the conceptions of Arabian architecture, but modified by Indian tradition and the peculiar genius of the Persian race. The style of Persian ornament is less compressed and austere than the Arabian, and possesses more freedom and elegance, while its sources of double derivation give it a greater element of variety.

The floral motive is employed in both its aspects. In some examples it is scattered through the decoration with apparent freedom, and, in others, inserted in the linked network and usually placed at the intersection of lines; but even in the latter case, it is treated in a manner that is medium between the Arab conventionality and the Indian naturalism. A consideration of the characteristics of the Persians will help us to understand this more fully.

95. Persian Compared With Arabian Art. — The Arabs belonged to the Mohammedan sect of Omar, while the Persians had split from this faith, and belonged to the sect of Ali, and were great drinkers of wine. They therefore attributed to flowers a symbolical language, and did not exclude the representation of flowers in their decoration, which is also animated by real and fantastic animals, and sometimes, though rarely, with the human figure. The

resources resulting from this mixed style are enhanced by the manual skill and remarkable fertility possessed by the Persians. Bookbinders, potters, embroiderers, and miniature painters emulate one another in taste and skill. Persian carpets are still considered the finest in the world, and the dishes, vases, and enamel bricks from that country are models of taste, and European art seeks them out and manufacturers endeavor to equal them by imitation.

96. Persian Compared With Indian Art.—The Indian and Persian styles resemble each other in their polychromatic decoration. The rule is usually a silhouette, with geometrical outlines relieved by conventional coloring on a dominating generating ground.

97. The Mohammedan architecture of Persia never seems to have attained the perfection of the Arabian buildings in Cairo. Although presenting considerable grandeur in the main features, the general outlines are less pure, and there is a want of elegance in all their structural details compared with the edifices of Cairo. It is not strange, therefore, that we find their system of construction much inferior to that of the Arabians and Moors. The Persians, unlike the Arabs and Moors, were free to introduce animal life, and thus mixing up subjects drawn from real life with the inanimate forms of decoration, they were led away from the tendency to a pure style of ornament.

98. The great attention given to the illumination of manuscripts in Persia, which were widely spread through all Mohammedan countries, would naturally tend to spread the influence of this mixed style, and the decorations of houses at Cairo and Damascus, and the mosques and fountains of even Constantinople, are tainted with it to a greater or less extent. Groups of natural flowers are constantly found growing from vases and enclosed in panels of conventional Arabian ornament.

MOORISH ORNAMENT.

99. Derivation of Moorish Art.—The Moorish style, with but a few distinguishing characteristics, is the direct offspring of the Arabian. The methods of construction, the
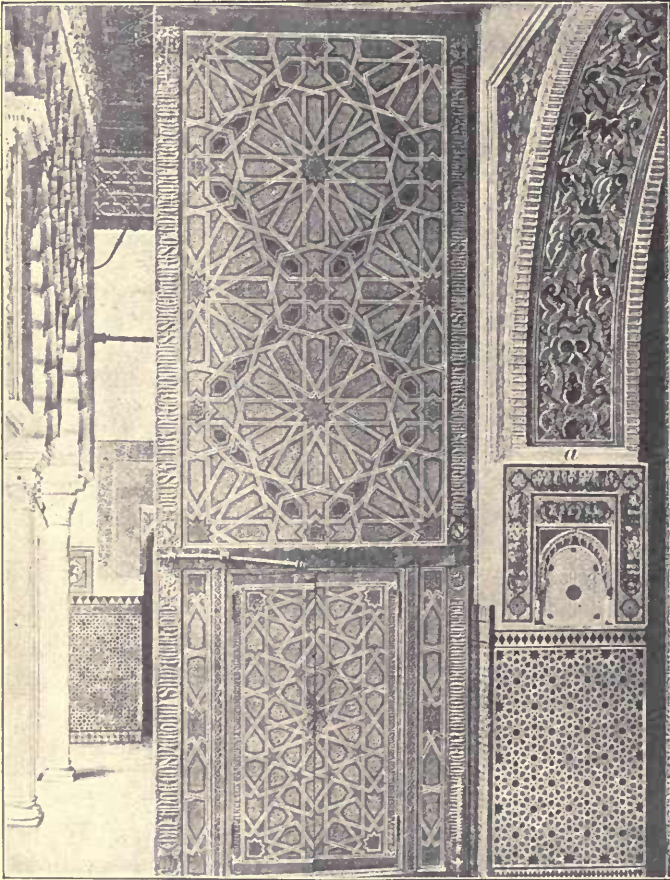
forms of ornament, and the frequent use of inscriptions are common to both styles. However, in Moorish decoration, a characteristic feature is the use of a third color, or ground

surface, worked over or between two others that serve as a framework. This may be seen in Fig. 61, which is a detail from the Alcazar, at Seville. Here the geometrical construction of the Arabian style is everywhere evident, while in the soffit of the arch at *a* is seen the typical relief Moorish ornament painted in three colors, as hereafter explained.

100. The Alhambra.—In discussing the ornament of the Moors, we will confine our illustrations largely to details taken from the Alhambra, in Spain, because this is one of their chief works of art, and the one in which their system of decoration reached its culminating point. In fact, the Alhambra occupies the same position in Moorish art as does the Parthenon in the Greek, or Hagia Sophia in the Byzantine style. Every principle of art that we find in the ornament of any other people, we find obeyed by the Moors in this erection of the Alhambra. Here are the eloquence of Egyptian art, the grace and refinement of the Greek, and the geometrical complexity and variety of the Byzantines and Arabs.

101. Characteristics of Moorish Ornament.—The ornament lacked the charm of symbolism, however, that is so characteristic of Egyptian ornament, for this was forbidden by the religion of the Moors; but its place is more than supplied by the Arabic inscriptions, which address themselves directly to the eye by their personal beauty, and not only excite the intellect by the difficulties of deciphering their complex and curious involutions, but also delight the imagination when read by the beauty of the sentiments they express and the music of their composition. Long fantastic letters, interwoven with graceful but intricate geometrical patterns, as shown at *a* in Fig. 62, lead the eye to decipher the words, and we find, as a part of the construction of their very buildings, sentiments that are ever present and associated with all their daily doings, and ever simple but truthful phrases elaborately twisted or intricately woven, such as, " There is no conqueror but God."

102.   The builders of this wonderful structure were
fully aware of the greatness of their work.   It was inserted
in the inscriptions on the walls that this building surpassed
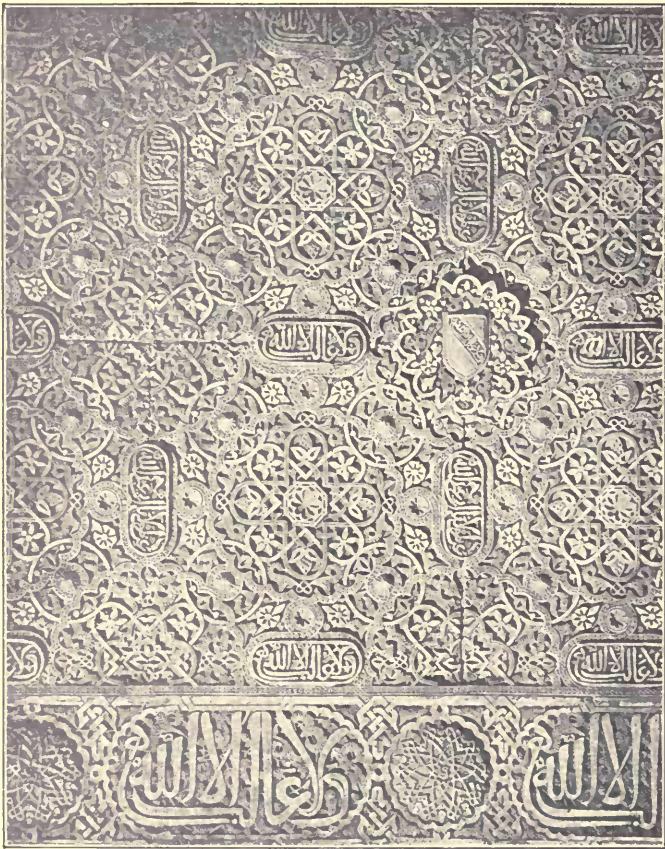
all other buildings.   They also state in the glittering eccen-
tricities of the design that, " He who stops to study
with attention will reap the benefit of a commentary on
decoration."

103. Decorated Construction and Constructed Decoration.—Let us now follow the injunction of this inscription and learn some of the general principles that
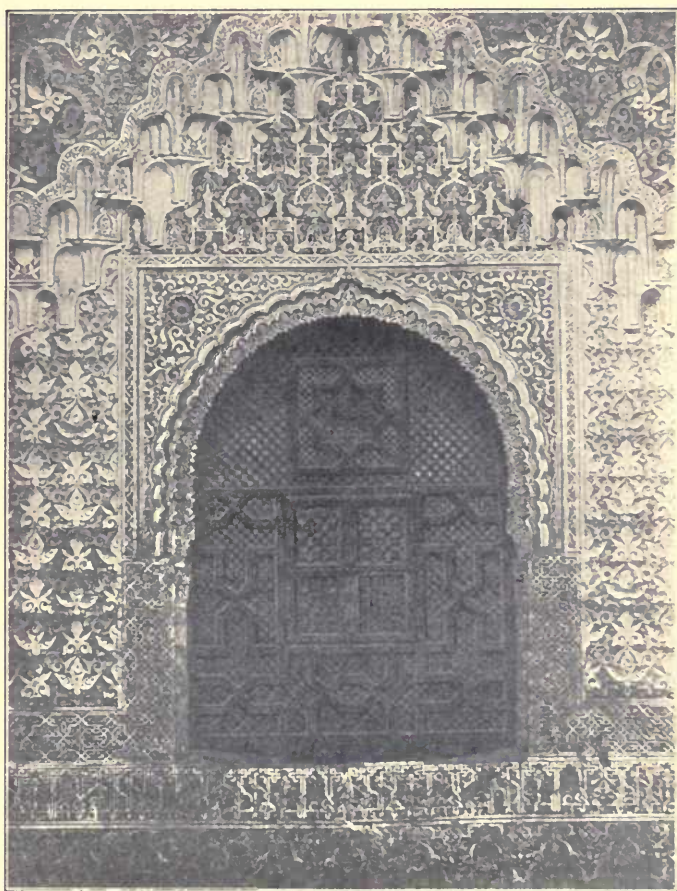
FIG. 63.

appear to have guided the Moors in their decoration. In the first place, they always regarded the first principle of architecture—to decorate construction and never to construct decoration.

In Moorish art, the decoration arises most naturally from the construction, and the constructive idea is carried out in every detail of the ornamentation of the surface, as shown in Fig. 63, which is a window opening, around which, it will be observed, the ornament is arranged to set forth and emphasize the opening as a structural detail. We have already said that true beauty results from a repose of mind, felt when the eye, the intellect, and the affections are satisfied and free from all sense of want. When a building is constructed falsely, and appears to derive or give support without doing either one or the other, it fails to afford this repose, and therefore can never pretend to true beauty, however harmonious it may be in itself.

The Moors and the Mohammedan races generally have ever regarded this rule, and we never find a useless or superfluous ornament, or one that does not arise quietly and naturally from the decorated surface. The lines grow out of each other in gradual undulations; there are no excrescences; nothing could be removed and leave the design as good, or make it any better.

104. The surface in Fig. 64 is entirely filled with ornamentation, but no detail of it can in any way be altered and so improve the design. In a general sense, if its construction is properly attended to, there can be no excrescences. The general forms were first cared for; these were subdivided by general lines, the interstices of which were then filled with ornament that was again subdivided and enriched for closer inspection. (This will also be observed by careful study of Fig. 60.) They carried out this principle with the greatest refinement, and the harmony and beauty of all their ornamentation derived their chief success from this observance; their main divisions contrasted and balanced perfectly. The detail never interferes with the general form, and, when seen at a distance, the main lines strike the eye and the fine detail disappears; nearer approached, more detail comes into the composition, and, on close inspection, all detail of the surface appears as a grand powdering of ornament. The

effect of this treatment is well illustrated in Fig. 65, where
the general arched construction is the main consideration.
The subdivision of the surface into general panels by means
of ornamental bands is of next importance, and the surface
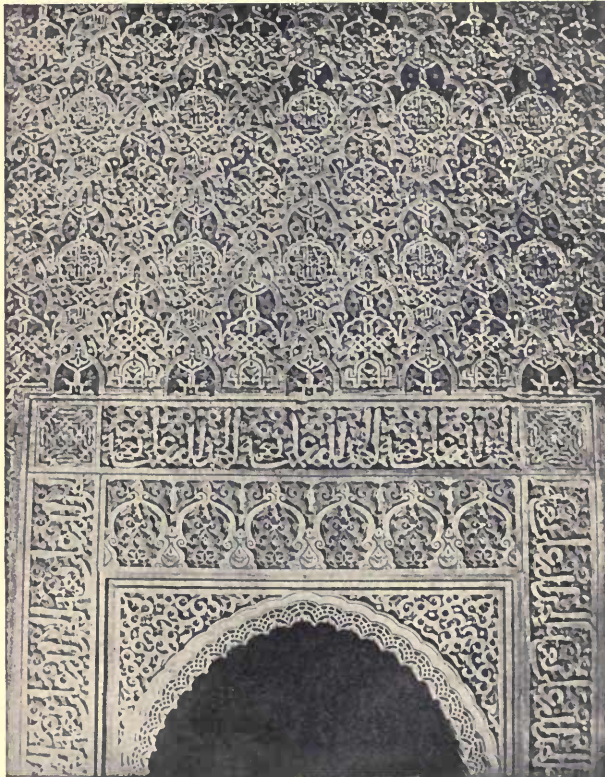
FIG. 64.

decoration of these panels then receives the final considera-
tion.   However, though these may be left to the last, they
receive the closest attention and a care in their treatment not
even second to that in the construction of the arch itself.

105. The Primary Elements.—Harmony of form
appears to exist in the proper balancing and contrast of the

straight, inclined, and curved elements; as in color there can
be no perfect composition in which either of the three
primary colors is wanting, so in form, whether structural or
decorative, there can be no perfect composition in which
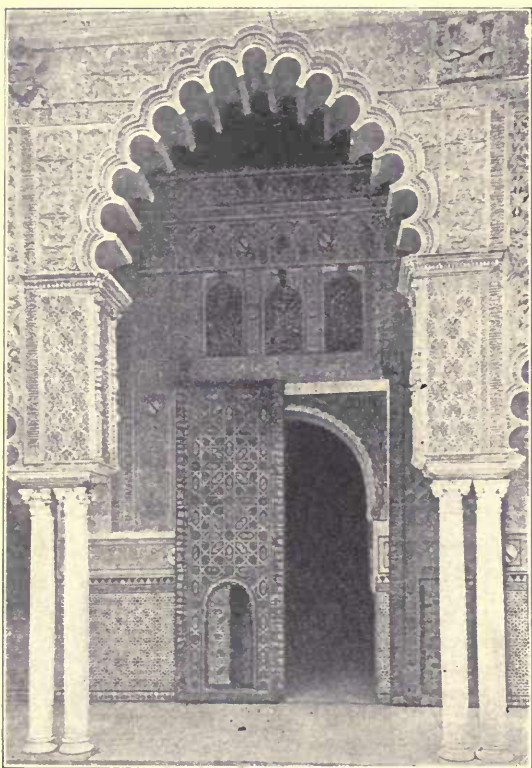
FIG. 65.

either of the three primary elements is wanting, and the
variety of harmony in a design depends on the predominance
or subordination of these three forms.

106.   In surface decoration, an arrangement consisting
of straight lines crossed by other straight lines, as in Fig. 66,

is monotonous and affords no feeling of satisfaction.   This is
because only one of the primary elements is present—the
straight line; but, if we introduce lines that tend to carry the
eye toward the angles, as in Fig. 67, the pleasure is increased
and the figure has more repose.   This is due to the presence
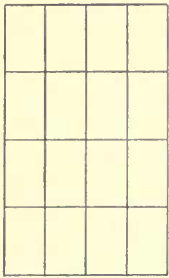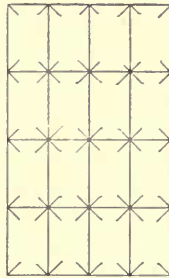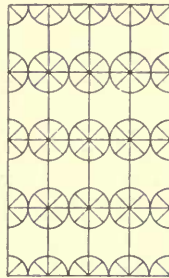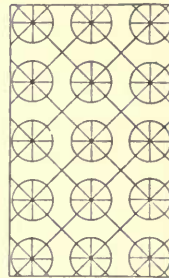
FIG. 66.   FIG. 67.   FIG. 68.   FIG. 69.

of another primary element—the inclined line.   Now, add
the third element—the curved line—as shown in Fig. 68, and
the figure expresses complete harmony.   In this case, the
straight line or square is the leading form and the others are
subordinate, but the same result can be obtained by making
the inclined line the leading form, as shown in Fig. 69.

107. It is the neglect of this simple rule that causes so
many failures in paper hangings and carpets, and more espe-
cially in articles of dress.   The lines of papers generally
appear to run up through the ceiling most disagreeably in
one direction only, carrying the eye right through the walls
of the apartment.

The study of any design or pattern that has been regarded
with any degree of satisfaction in ancient times, will show,
as component parts of its structure, the straight line, the
curved line, and the inclined line characteristic of the surface
decoration of the Moors.

108. Consistency of Moorish Ornament.—In the
decorative art of the Moors, all lines flow out from a parent

stem.   Every ornament, no matter how remote, can be traced
to its branch and root.   An ornament is so adapted to the
surface decorated that it often appears to suggest the general
form rather than to have been suggested by it.   In all cases
where foliage flows out naturally from a parent stem, the eye
is never offended as is done by modern practice in the random
introduction of ornament without reason for its existence.

However irregular the space they have to fill, the Moors
commence by dividing it into equal areas, and around these
they fill in their detail, but invariably return to their parent
stem.   They appear in this to work by a process analogous
to that of nature.

109.   Take, for instance, the leaf of a vine, the object
here being to distribute the sap from the parent stem to
the extremities; it is evident that the main stem should
divide the leaf as nearly as possible into equal areas.   So
again with the minor divisions, each area is then again
subdivided by intermediate lines that all follow the same
law of equal distribution, even to the most minute filling
in of the stem feeders.

110.   The Moors follow another principle—that of radi-
ation from the parent stem—as may be seen in a chestnut
leaf, wherein the leaflets all radiate from the parent stem,
each leaflet diminishes in size toward the extremities, and
each area is proportionate to the leaf.

The Orientals carried out this principle with marvelous
perfection, as did the Greeks in their honeysuckle ornament.
A great difference between the Greek ornament and that of
the Arabian and Moresque, however, is that the former
grows its ornament scroll out of scroll as before explained,
and the latter grow their ornaments off from each side of a
continuous stem.   With the Moors, all junctions of curved
lines with curved lines, or curved with straight, are tangen-
tial to one another.

111.   Conventionalism in Moorish Ornament.—A
charm found in the works of the Arabs and Moors lies in

their conventional treatment of ornament. Their creed forbade them to represent living forms, and, therefore, they could not let their art decline to realism even though they so desired. They worked on the same lines that nature worked, but always avoided a direct transcript; they took her principles but they did not copy her works.

112. Coloring in Moorish Ornament.—The coloring of the Moorish ornaments was treated as skilfully as was the form. They followed certain fixed principles founded on observations of natural laws. The colors employed on their stucco work were in all cases a combination of the three primaries—blue, red, and yellow, the last being represented by gold—and the secondary colors—purple, green, and orange—occurred only in the mosaic dados. These, being nearer the eye, formed a point of repose from the more brilliant coloring above.

113. It may be remarked here that among the Egyptians, Greeks, Arabs, and Moors, the primary colors were used exclusively in the earliest period of the arts, and, during the decadence, the secondary colors were used. Thus, in Egypt, the temples of the Pharaonic period were painted entirely in primary colors, while those in the Ptolemaic period used the secondaries. The early Greek temples were decorated in the primary colors, while at Pompeii every variety of shade possible appears. In modern Cairo, and in the East generally, we have green appearing frequently side by side with red, where blue would have been used in the earlier times. This is equally true of the works of the Middle Ages. In the early manuscripts and in stained glass, the primary colors were chiefly used, although other colors were not entirely excluded, while, in later times, every variety of shade and tint is used indiscriminately, with preference for none.

114. In Moorish art, the primary colors were used in the upper portions of the design, and the secondary and tertiary colors on the lower portions. This is entirely in accordance with natural law. We have the primary blue in the sky, the

secondary green in the trees and fields, and the tertiaries in the earth itself. It is also observable in flowers, where the primary colors are the buds and flowers, and the secondaries are the leaves and stalks.

115. The ancients always observed this rule in the best periods of art; though in Egypt we do occasionally see a secondary green used in the upper portions of a temple, but this arises from the fact that all ornament in Egypt was symbolic, and if a lotus leaf were used in the upper part of a building, it would necessarily be colored green. The law is true in general, and the aspect of an Egyptian temple of the Pharaonic period usually gives the primaries above the secondaries, while, in the Ptolemaic period, the order was inverted. In Pompeii, we occasionally find in the interior of the houses a gradual coloring, from the roof down, of a light to a darker color, ending with black, but this was by no means universal.

116. System of Moorish Coloring.—The system of Moorish coloring might be considered absolutely perfect. All the surfaces were modeled and proportioned according to the color they were to receive, and, in using the colors blue, red, and gold, they took care to place them in such positions that they should be best seen themselves and add most to the general effect. On molded surfaces they placed red (the strongest color of the three) in the depths, where it might be softened by shadow, and never on a raised surface; blue was placed in the shade, but not deep shade; and gold on all the surfaces exposed to strong light, for it was evident that by this arrangement alone could their true value be obtained. The several colors are either separated by white bands or by the shadow caused by the relief of the ornament itself, and this seems to be an absolute principle required in coloring—colors should never be allowed to impinge on one another.

117. In Fig. 70, the background *a*, on which the ornament is placed, was of a deep-red color, while the leaf forms *b*

were colored with the primary blue.   All the rest of the
surface, including the necks of the columns, was gold, and a
grand harmonious bloom was spread over the whole design.
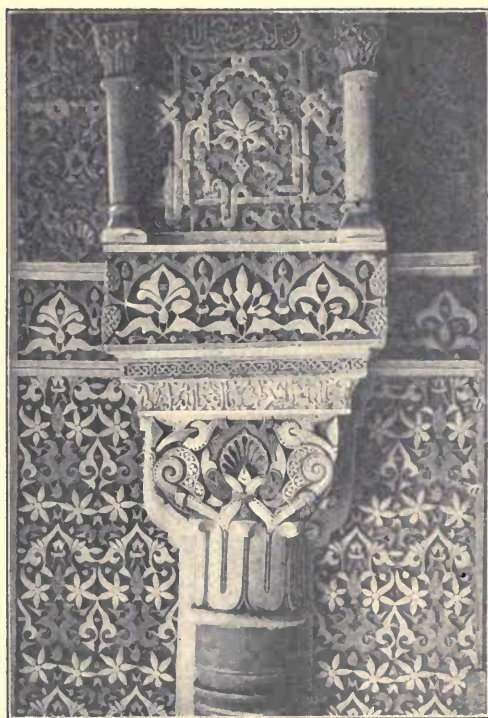
FIG. 70.

118.   Blending of Colors.—In coloring the grounds of
the various diapers, the blue always occupies the largest
area, and this is in accordance with the theory in optics and
the experiments that have been made with the prismatic
spectrum.   Rays of light are said to neutralize one another in
the proportion of 3 yellow, 5 red, and 8 blue.   Thus, it will
be seen that a quantity of blue equal to the sum total of the
required quantity of red and yellow will produce an effect
of harmony and prevent the predominance of any one color

over the others. In the Alhambra, yellow was replaced by gold, which tended toward a reddish yellow, and the blue on this account was further increased in proportion, to counteract the tendency of the red to overpower the other colors.

FIG. 71.
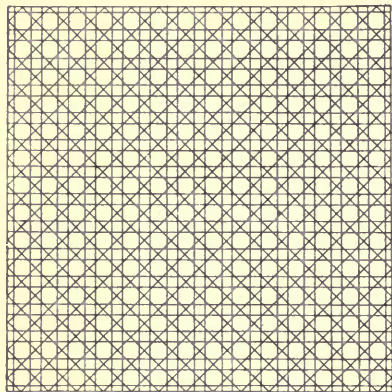
119. Moorish ornament is governed by certain geometrical patterns in its formation, although the number of these patterns is small. In Fig. 71 is shown an interlaced pattern consisting, *first*, of vertical and horizontal lines arranged in pairs, the distance between each pair being twice the distance between the lines composing each pair; *second*, of diagonal lines drawn through the pattern at an angle of 45°, and spaced a distance apart equal to the vertical and horizontal pairs. The diagonal lines are arranged so that the set of squares formed by their intersection will contain in their centers the intersection of the vertical and horizontal pairs.
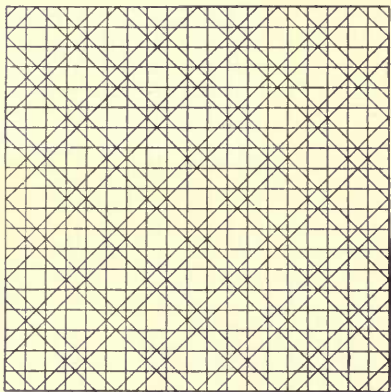
120. In Fig. 72 is shown a slight variation of this same interlaced pattern, wherein the vertical and horizontal lines are drawn singly and the diagonal lines are drawn in pairs, but of

FIG. 72.

slightly different proportion from Fig. 71. The amount of Moorish ornament that can be developed from these two figures is unlimited, and the Moors themselves extended even this limit by the variety of coloring in the different parts.

Figs. 73 and 74 are based on the system shown in Fig. 71, and Figs. 75 and 76 are developed from the system shown
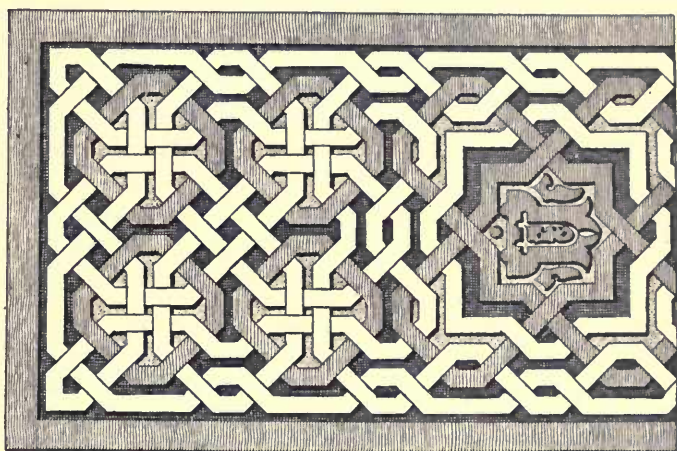
FIG. 73.

in Fig. 72. A slight variation of the systems themselves will produce most remarkable results in the figures.
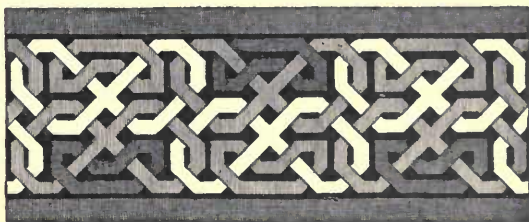
FIG. 74.

121. However much disguised, the whole ornamentation of the Moors is constructed geometrically. Their

fondness for geometrical forms is evinced by the great
use of mosaics, in which their imagination had full play.
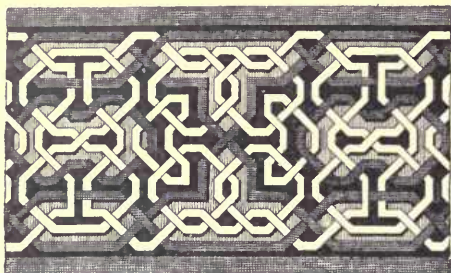
FIG. 75.

However complicated may be their patterns, they are all
extremely simple when the principle of setting them is
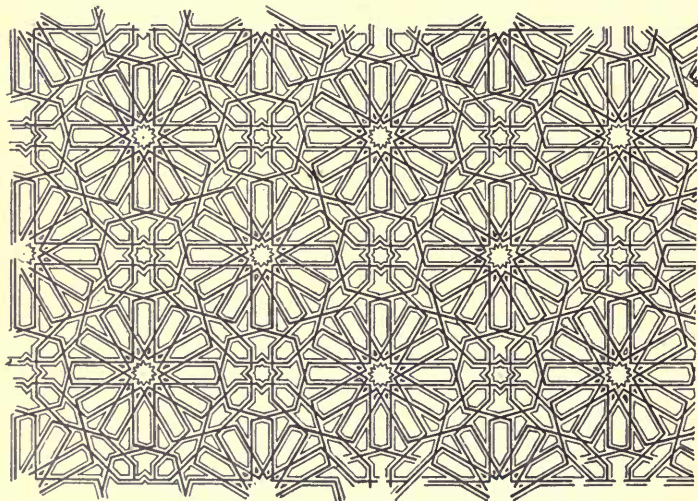
FIG. 76.

once understood. They all arise from the intersection of
equally distant lines around fixed centers.

WESTERN ART.

CELTIC ORNAMENT.

122. Origin and Character.—In studying the ornament of Western Europe, we follow a chronological order instead of an ethnological one, as we have been doing heretofore, the history of ornament in this section being progressive and free from outside influences except to a very limited extent.

When Byzantine art spread over Western Europe, as it did about the twelfth century, it must have found among the nations of Celtic origin an indigenous art, arising from the peculiar aptitudes of that race. The Celts undoubtedly had a spontaneous national art, though its birthplace, whether in Scandinavia or Ireland, has never been satisfactorily decided.

123. Interlacing forms almost the only element of the Celtic designs of the earlier period, and this establishes its antiquity, for the intertwining ornament is essentially a primitive style. Its distinctive mark is the division of the surface, decorated by such a combination of lines that the development is usually happy, possible, and logical, and there is no doubt that the origin of these designs was procured originally from interlaced cords. The pliability of this original type would account for the curved instead of acute angles, this being a characteristic difference between the Celtic and Arabian geometrical designs.

124. The variety of productions obtainable from such simple elements is remarkable. In many of them the complications prove, by their skilful divisions, and the ingenuity of the windings, a practical comprehension of ornamental construction. There is lacking, however, in this style, a vital element—the element of more extensive representation—and its resources were threatened with exhaustion from

having used every possible combination of the intertwinings of a cord.

125.   Introduction of Animal Forms. — In combination with Byzantine art, Celtic ornament advanced in style.   A portion of the original interlacings was still retained, and for the discarded part was substituted the stem from which sprang the leafwork and terminated in floral spans.

Having thus attained some decorative richness, the Celtic style rose to the level of art; at the same time, the difference already mentioned between it and purely geometric conceptions, such as are usually found in Arabian decorations, became more striking, from the frequent introduction of the heads of quadrupeds and birds, serving as terminals to some of the principal lines that were made to represent bodies elongated out of all just proportion or probability, and from which emerge feet and claws corresponding with the head.   Such as they are, these fantastic and grotesque images constitute a separate art that the interlacings alone could never have reached.

126.   Distinguishing Characteristics. — The chief characteristics of the early Celtic style consist : *first*, of the entire absence of foliage or other vegetable ornament; *second*, the extreme intricacy and excessive minuteness and elaboration of the various patterns, most of which are geometrical, consisting of interlaced ribbon work, diagonal or spiral lines—each of which invariably wove itself alternately above and below each successive transverse strand—strange, monstrous animals, and birds with long topknots and tongues and tails intertwining in almost endless knots.   Some of the manuscripts have entire pages covered with elaborate patterns in compartments, the whole forming a beautiful cruciform design, and one of these facing a commencement of each of the four gospels.

The labor employed in such a mass of work must have been immense, the care most infinite, as a critical

examination with a magnifying, glass does not detect
an error in the truth of the lines or the regularity of
the interlacings; yet with all this minuteness, the most
harmonious effect of coloring has been produced.

127. Intricacy of Design.—Of the curious intricacy of some of these designs an idea may be obtained by following a ribbon in one of these patterns, as, for instance, in the upper compartment of Fig. 77. The method adopted to secure this intricate

FIG. 77.

interlacing, so that each strap shall alternately cross above
and below each following one, can be better understood

(a)   (b)   (c)
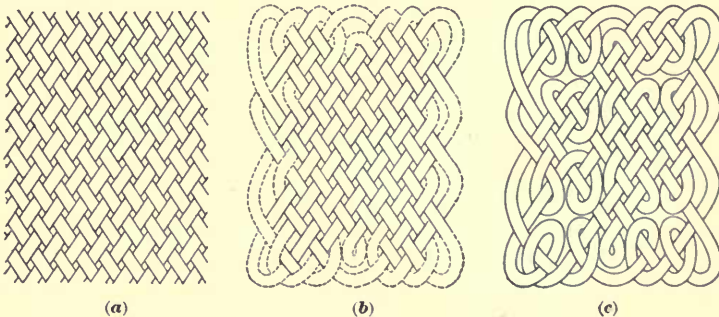
FIG. 78.

by reference to Fig. 78, where the preliminary arrange-
ment of a woven pattern is laid out at (a) and the turning
and joining of its exterior ends are shown at (b), while

at (*c*) is seen the completed interlacement and complication
of interior curves and returnings.

FIG. 79.

Sometimes two ribbons run parallel to each other, but are
interlaced alternately, as in Fig. 79.   When allowable, the

FIG. 80.

ribbon is dilated and angulated to fill up particular places in
the design, as in Fig. 80.   The simplest modification of this
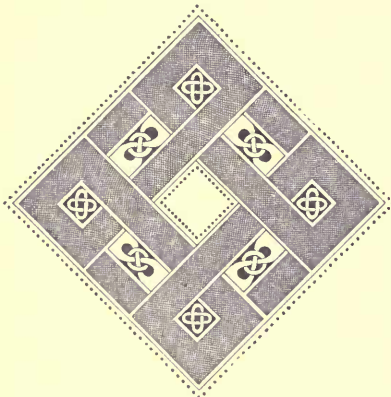
FIG. 81.

pattern, of course, is the
double oval seen in the
angles of Fig. 81.   This
occurs in Greek and Syr-
ian manuscript, in Roman
tessellated pavements, but
rarely in Celtic manu-
script.

128.   Symbolism.—
No   symbolic   meaning
seems to have been at-
tached to the Celtic orna-
ments, except perhaps in
the designs so frequently
found without beginning or end, in which appears what
might be a symbol of eternity.

The union of the Celtic and Byzantine styles did not entirely give way to the Gothic style with which it long existed.   It furnished types for the finest ornamentation of glass and manuscripts, that in this period, from the eleventh to the fourteenth century, resembles stained glass on a reduced scale.

GOTHIC ORNAMENT.

129.   Evolution.—Gothic art grew out of and succeeded the Romanesque in Western Europe in the same manner that the Byzantine did in the East.   Each was the result of an attempt to adapt a modified Roman style to the new conditions caused by political, religious, and geographical changes.   In Western Europe, however, the Romanesque style failed to develop into a new architectural system until about the middle of the tenth century, while the Byzantine became a perfect style of art before the close of the sixth century.

130.   Influence of Religion.—Gothic art in every particular was directly opposed to classic art, not only because it was developed by the nations that had conquered Rome, but because it was a Christian art, in opposition to a pagan art, and its architecture was based on an economical system of construction, while that of classic Rome was an extravagant construction.   Its greatest monuments were built to the glorification of the Supreme Being, while those of Roman art were for the glorification of the empire.   It is not surprising, therefore, to find the best and purest examples of Gothic art in localities most distant from Rome, and, as we gradually approach the south of Europe, we find Gothic ornament tainted more and more with classic influence until, in Italy, the examples are so different in feeling and expression from those we find in England that they constitute almost an entirely different style.   In France, the style is not as pure as in England, but it contains none of the extreme variations seen in Italy, and being patterned

more or less after the English examples, derives what good it has from that country.
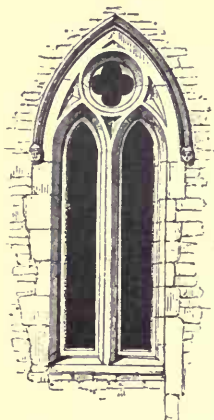
FIG. 82.

131.   German and English Gothic. In Germany, Gothic art was copied from the French, and carried the imperfections of the French style to a still lower degree, and its entrance into Italy from Germany renders its condition in the seat of the old Roman Empire so debased that it possesses none of the underlying principles of the pure Gothic style.

English-Gothic ornament may be divided into three general periods, each associated approximately with the century of its greatest development.   These periods are called the *Early English*, or thirteenth century, the *Decorated*, or fourteenth century, and the *Perpendicular*, or fifteenth century.
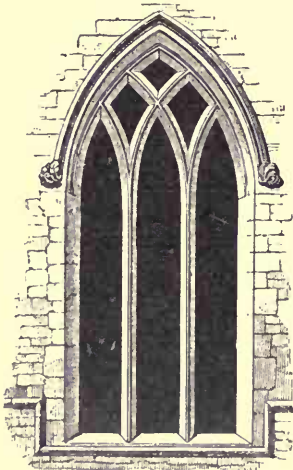
FIG. 83.
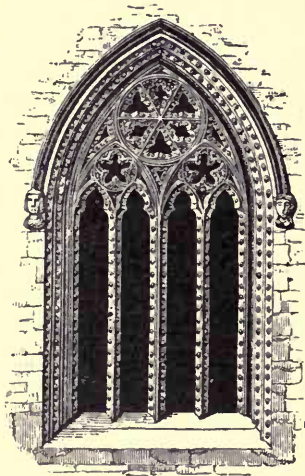
FIG. 84.

Generally speaking, the **Early English** period is characterized architecturally by long, narrow, lancet-shaped

windows arranged in groups of two or three, as shown in
Fig. 82, the space between the openings usually containing
a third perforation in the form of a trefoil or quaterfoil
included under the same dripstone as the window opening.
The mullions, or bars, separating the window openings
were, toward the latter part of this period, split to form a
network in the upper part of the window, called **tracery**,
as shown in Fig. 83. This tracery was greatly elaborated
as the style advanced, and filled the upper portion of the
window with a complicated series of geometrical forms that
were frequently richly elaborated with a *ball-flower orna-
ment*, as shown in Fig. 84.

132.   The Ball-Flower Ornament.—The **ball-flower
ornament** is characteristic of the **Decorated** period, and

FIG. 85.

consists of conventionalized floral forms nearly spherical in
shape, a detail of which is shown
in Fig. 85. They were not always
used to such an excess as is shown
in Fig. 84, and were inserted un-
der the dripstone at regular inter-
vals, as shown in Fig. 86, which
is a sedile, or seat, sometimes
built in the interior walls of a
church.   The dripstones of this
period usually terminated at each
end in the carved head of some
person of prominence, such as the
king or bishop, as shown in Fig. 84.

FIG. 86.

As we approach the **Perpendicular** period, the lines of

tracery are still more complicated but arranged more in perpendicular panels, the horizontal elements being suppressed as much as possible.

FIG. 87.
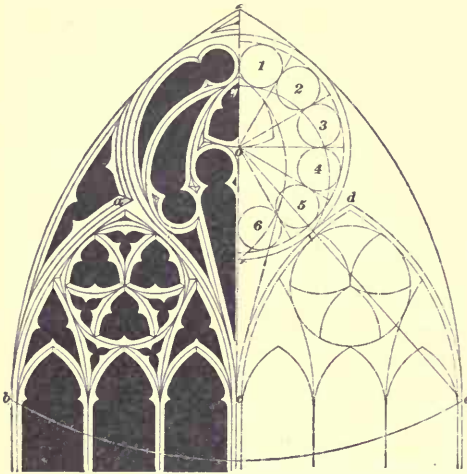
133. Designs for Window Heads.—All these designs for window heads were worked out on simple geometrical combinations, as shown in Fig. 87, which is a window with six days, or openings, divided in two groups of three each by means of pointed
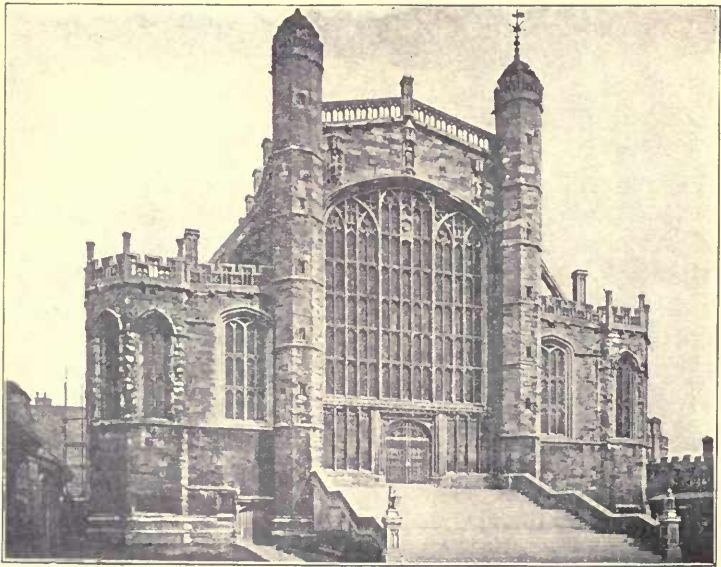
FIG. 88.

arches shown at *b a c* and *c d c*, over which a circle is struck, with its center at *o*, whose diameter is equal to half the width of the window, and its circumference is divided into twelve parts, as shown at *1*, *2*, *3*, *4*, etc. Within each of these parts, small circles, tangent to one another and to the circumference of the great circle, are described, and form the generating elements of the interior design.

FIG. 89.

This example is given with its construction lines simply to show how these details are geometrically worked out. All the elements of the design can be located and executed by means of a pair of compasses and a straightedge, without any other device to lay off measurements.

The lower part of these windows on the exterior, during the Perpendicular period, as said before, were divided into
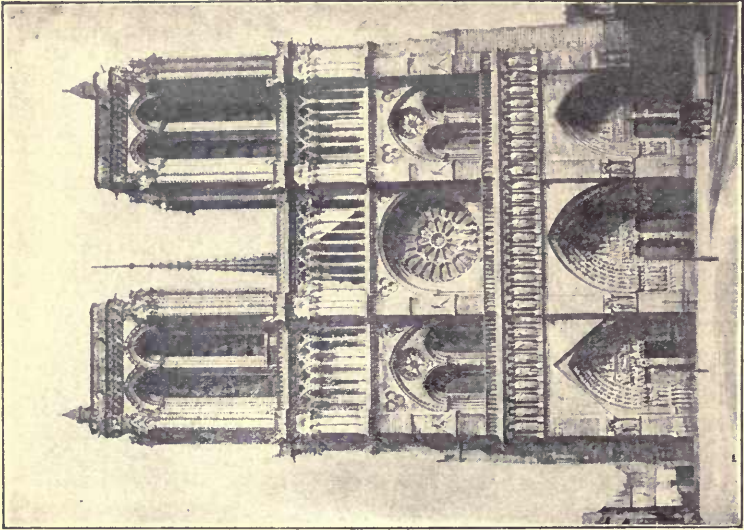
FIG. 91.
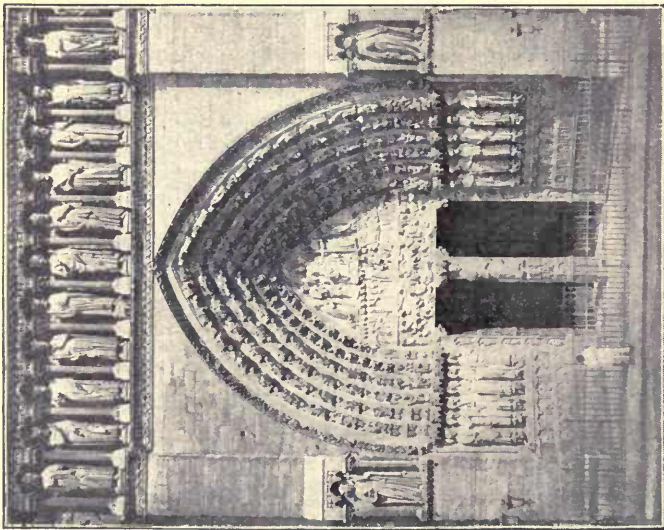
FIG. 90.

long panels, the total window opening usually being of
immense area, as shown in Fig. 88, which is the west front
of St. George's Chapel, at Windsor.   This also shows the
general exterior appearance of the Gothic architecture of
Great Britain, and, with the west front of Westminster
Abbey, shown in Fig. 89, will be interesting to compare

FIG. 92.

with the Gothic art of other countries, which we will con-
sider hereafter.

134.   French Window Tracery.—In France, the
progress of window tracery was similar to that of Eng-
land, but on less systematic lines, and the doors and win-
dows tend more to rich elaboration on the exterior, usu-
ally being carved with full-length human figures, as
shown in Fig. 90, which is one of the entrance doors to
the church of Notre Dame, Paris, the full front elevation
of which is shown in Fig. 91.   A comparison of Fig. 91

with the two examples of English Gothic will be interest-
ing, showing the tendency of the latter to vertical lines
more characteristic of the Gothic style, and of the French
to horizontal lines influenced by its closer proximity to
classic art.

135. Gothic Architecture in Italy.—In Italy, Gothic
architecture is unique, and though the Palazzo Vecchio,

FIG. 93.

at Florence, shown in Fig. 92, possesses the crude, bold,
unassuming construction of the early Gothic castles, it
scarcely represents the fundamental principle on which the
Italian design is developed. It is in Venice that we find
more elaborate examples, where window tracery is carried
to a most fanciful extreme.

The Foscari Palace, shown in Fig. 93, shows the gradual

development of this window treatment, which seems to con-
stitute the entire idea of the Italian-Gothic style.   In the
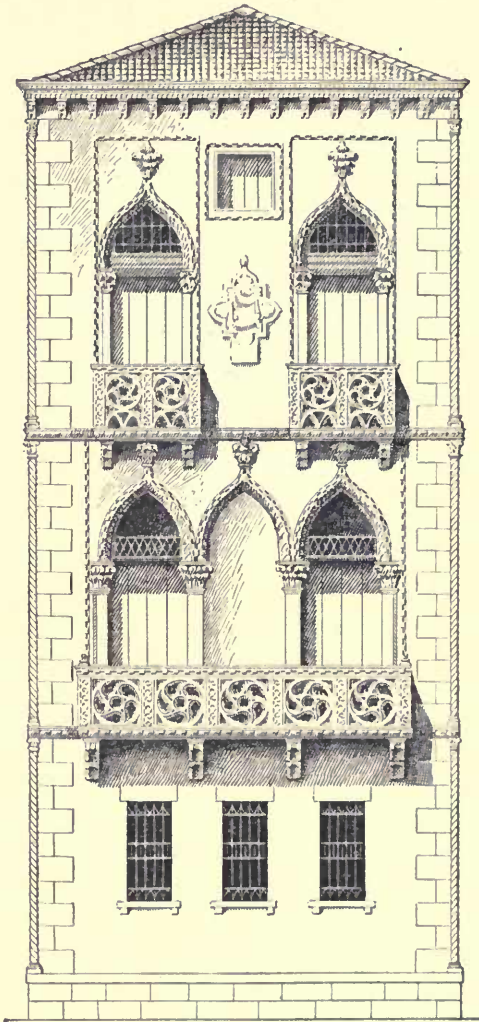
FIG. 94.

lower story we have the plain ogival arch, and in the central
portions of the second and third stories, small colonnades,

connected by pointed arches, and in the upper of the two with pointed arches, separated by plate tracery. In the top story, this tracery is carried to an elaborate extreme. This system of treatment, though based on entirely different structural ideas from the Gothic of the North, brought about many happy results, however, and the palace of Contarini Fasan, also known as the House of Desdemona, shown in Fig. 94, exhibits how adaptable the style of this Venetian work is to modern requirements by the careful proportioning and grouping of its parts and treatment of its details.

It is not in the exterior of these buildings that we find the most of value to us in ornamental design, except possibly in Venetian work; therefore, the treatment of the interior details we will now consider in regular order, having understood the transition in style that took place from the British Isles to the Italian peninsula.

136. Evolution of Gothic Ornament.—The transition of the round arch, characteristic of the Romanesque style, to the pointed arch, characteristic of the Gothic style, is easily traced in buildings where the two styles are intermingled, many of these being extant about the beginning of the thirteenth century, as shown in Fig. 95, which is taken from an arcade of Canterbury Cathedral, in England. But the passage from Romanesque ornament to that of the Gothic period is by no means so easily traced.

All traces of the acanthus leaf have by this time disappeared, and we find a purely conventional style of ornament prevalent in all buildings of the time. The nearest approach to the acanthus formation we find in the illuminated manuscripts of the twelfth century, where ornamental forms, such as shown in Fig. 96, are used, and appear to have been derived from some old Greek manuscripts, as Gothic ornaments are formed by a continuous stem throwing off leaves on the outer side and terminating in a flower.

Early English ornament is the most perfect, both in principle and in execution, of all the Gothic period. There is as

much elegance in distinct modulations of form as there is in the ornament of the Greeks. It is always in harmony with the structural features of the building, and always grows
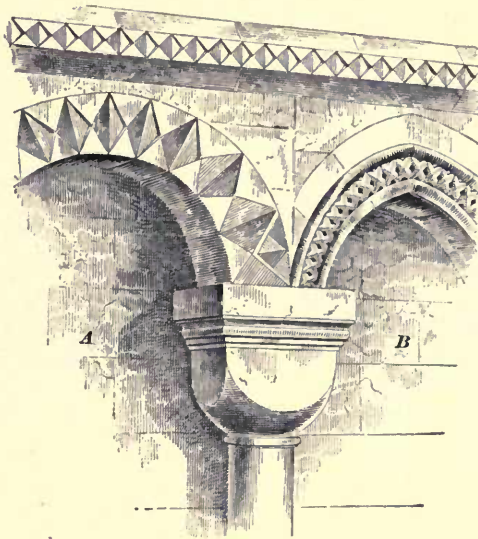
FIG. 95.

naturally from them. It fulfils every one of the conditions that we desire to find in a perfect style of art, but it remained perfect only so long as the style remained conventional. As the style became less idealized and more direct in imitation, it ceased to be an ornament of structural features, but became ornament applied.

137. Characteristics. — In the capitals of the columns of Early English architecture, the ornament rises directly from the shaft, above the necking of which the column splits

FIG. 96.

into a series of stems, each stem terminating in a flower, as shown in Fig. 97. This is analogous to the mode of decorating the Egyptian capital. In the decorated style, on the contrary, where a much nearer approach to nature was attempted, it was no longer possible to treat a natural leaf as
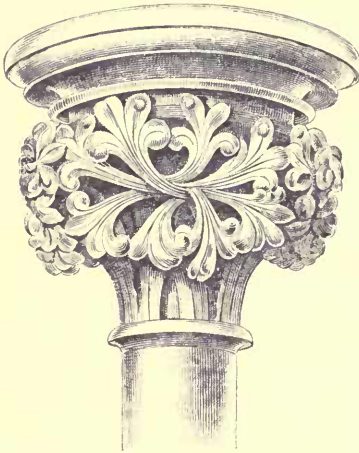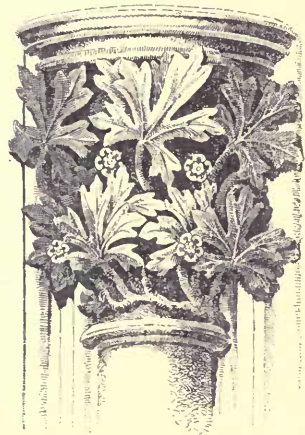
FIG. 97.   FIG. 98.

part of the shaft, and therefore the shaft is terminated by a bell shape, around which the leaves are twined, and the more natural these were made, the less artistic became the arrangement, as shown in Fig. 98. This method of applying ornament reminds us of the Roman-Corinthian capital.

FIG. 99.   FIG. 100.

In the Perpendicular period, the capitals of the columns were usually plain, and the shaft consisted of a cluster of

small columns.   In some large buildings, however, the capitals were carved with shallow foliage of a pronounced geometrical shape, as shown in Fig. 99.

In foliage and running ornaments on bands and moldings, the Early English period shows examples where the lines of the ornament follow the general directions of the lines of the molding, and the foliated work is conventionally rendered, but, at the same time, is graceful and natural, as shown in Fig. 100. In painted bands, the lines usually are easy and flow-

FIG. 101.

ing, following the principle of carved work, as shown in Fig. 101.

During the Decorated period, however, there is less effort made to continue the foliage in the direction of the molding,

FIG. 102.

and the guiding stem frequently wanders directly across the molding, from one side to the other, preserving the governing principle of throwing leaves off alternately, but at the same time chopping the molding up into a number of sections rather than giving it a feeling of continuity.

In Fig. 102 is shown an example of molding from this period, where the guiding stem of the foliation crosses and recrosses the molding almost at right angles to the line of its direction, and though the leaves are arranged to cover up this guiding

stem to a certain extent, the fact still remains that its most
prominent sections are seen across the molding, instead of
flowing with it.

138. In the Perpendicular period, the system of decora-
tion is still further removed from that of the Early English,

FIG. 103.

and the molding is fre-
quently divided up into a
number of rectangular
panels, each of which is
decorated to represent
some specific natural
form, but so convention-
alized as to be reduced
to a pronounced geometrical outline.   This is shown in
Fig. 103, where the leaves of the grape vine are reduced to
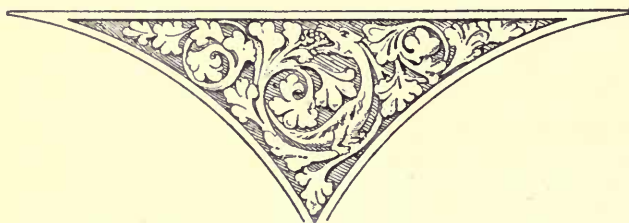
FIG. 104.

perfect rectangles, spaced evenly along the molding, between
which bunches of grapes are geometrically arranged.

139. Spandrels. — In the
spandrels of the arches, so
long as the conventionalism of
the Early English style was
maintained, one main stem
was distributed over the panel,
from which sprang leaves and
flowers, as shown in Fig. 104;
but as the style advanced the
stem ceased to be the guiding
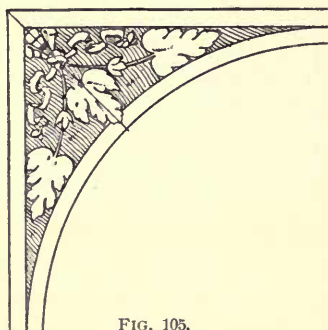
FIG. 105.

form of the ornament, and, in the endeavor to represent in stone the softness of nature, lost all its grace and decorative characteristics. Finally, the stem as a leading feature disappears, and we find the spandrels filled with three immense leaves, springing from a twisted stem in the center, and bearing no structural relation to the panel on which they are planted, as shown in Fig. 105.

140. Diapers. — In the painted wall decorations and diapers, the Early English artists usually divided the surface into a

Fig. 106.

number of geometrical forms within which a simple conventional ornament was introduced resembling tile work. The devices covering these ornaments were sometimes heraldic and other times based on forms borrowed from the vegetable world, as may be seen in Fig. 106.

During the Decorated period, the wall divisions are less naturally divided, and circular disks, within which are stenciled geometrical patterns, are spread over a wall surface, and between them are arranged shields with coats of arms and other devices, as shown in

Fig. 107.

Fig. 107. Another system prevalent in the Decorated period was to divide the wall into a number of bands, each of which

was decorated with a running ornament, as shown in Fig. 108, where the character of this running ornament is not widely different from that seen in the Early English period, as

FIG. 108.

shown in Fig. 101. However, introduced with this foliation are forms from the animal world that seem to possess no relation to the design, or the ornament, or the position that they occupy.

The diapers of the Perpendicular period are attempts at realism, and in Fig. 109 is shown a painted wall in which the pointed arch of ogival form and the foliations and crockets characteristic of the carved work of this period are attempted in the reproduction on the flat surface. This form of arch, with its compound curve — convex below and concave above—is a distinguishing characteristic of the Perpendicular period, as is also the subdivision of its under surface into the small arches or foliations, as shown. Within each of these panels (which in all work were long and narrow, giving the style its name of Perpendicular), the wall was decorated in the conventional pattern as shown, and executed in two colors. Similar patterns were also used for silks, tapestries, and other fabrics of this period.

FIG. 109.

In Fig. 110 is shown another style of wall treatment of the Perpendicular period, where the surface remains flat and no attempt is made to depict arches or moldings borrowed from carved ornament, but details from the vegetable world are drawn realistically against a background interspersed with conventionalized outlines of leaf forms.

141. Zenith of Architectural Development.—In the thirteenth century, beyond all others, architecture was at its zenith. The mosques of Cairo, the Alhambra in Spain, Westminster Abbey, and the Salisbury and Lincoln cathedrals, in

Fig. 110.

England, all possess the same secret of producing the broadest general effect combined with the most elaborate decoration. In all these buildings there is a family likeness; although the forms differ and the forces that have called them into existence are totally unlike, yet the principles that they embrace are the same. They all exhibit the same care for the leading masses of composition, the same appreciation of the undulations of form, the same correct observation of natural principles in the ornamentation, and the same elegance and refinement in all the decoration.

The attempt to produce at the present day a building of the character of those in the thirteenth century would be vain indeed. Whitewashed walls with stained glass and encaustic tiles cannot alone sustain the effect that was arrived at when every molding had its color best adapted to develop its form, when from the floor to the roof not an inch of space but that had its elaborate and appropriate ornament—an

effect that must have been glorious beyond conception.   In
fact, so glorious a point, indeed, had the style reached that
it exhausted itself by the effort; the light burned out.   Not
only in architecture, but in all decorative arts that accom-
panied it, immediately there began a decline—a decline that
never stopped until the Gothic style was dead.

142. Gothic Art in France.—In France, the three
periods of Gothic art are known by the terms : (1) *Early
French*, corresponding in period with the Early English,
but beginning a trifle later; (2) *Rayonnant*, meaning radi-
ating, and corresponding with the Decorated period of
English art; and (3) *Flamboyant*, meaning flame-like, and
corresponding with the
Perpendicular period of
English art.
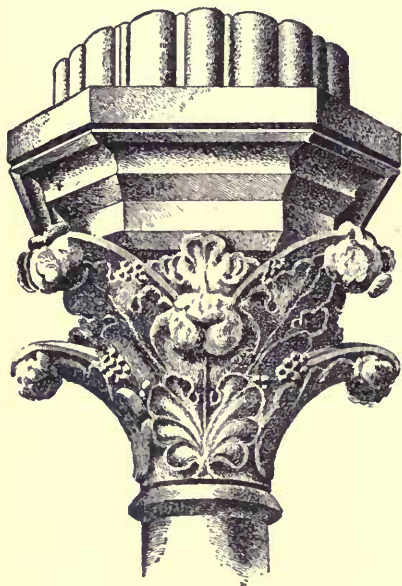
FIG. 111.

**143. Early French
Period.** — The   Early
French capital, though
patterned after the Early
English style, does not
possess its most impor-
tant characteristic—that
of the apparent spring-
ing of the foliation from
stems bound together at
the neck of a column by
a carved band.   The
capital in Fig. 111 pos-
sesses the characteristic
of having its foliage
spring from the top of
the column and spread
out gracefully under the abacus that receives the weight
from above, but this foliation seems to be planted on a
surface, rather than to be forming a part and detail of the
supporting member itself.

144. Rayonnant Period.—In the **Rayonnant period,** the capitals of the columns, like those of the Decorated period in England, are formed of bell shapes over which foliage is arranged; but, as shown in Fig. 112, the French arrangement is far inferior to the English, inasmuch as no attempt is here made to have the foliage a part of the supporting construction. It is evident that the bell shape does the support-
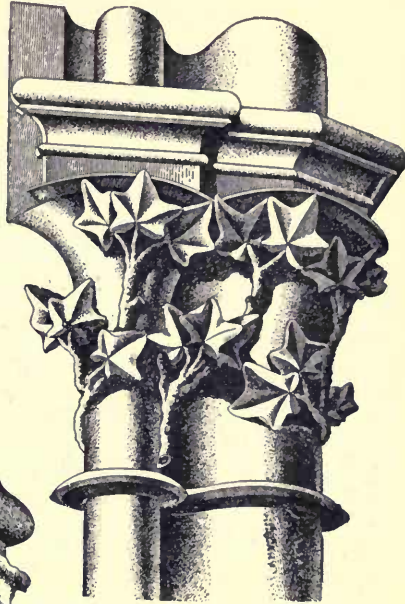
FIG. 112.

ing of the superimposed load, and the carved vine is simply an ornament laid on the surface to break up its monotony.
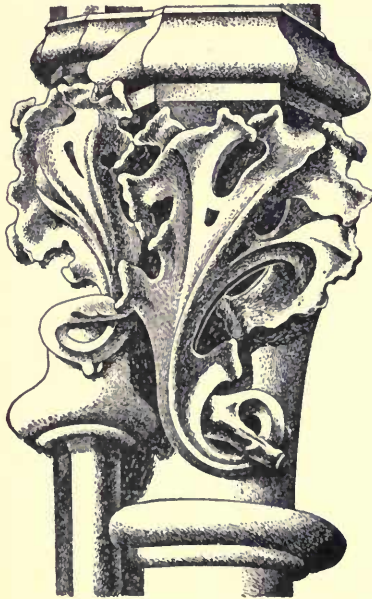
FIG. 113.

145. Flamboyant Period. — The **Flamboyant style,** shown in Fig. 113, carries this fault to still greater extent, and the twisted foliation is plainly planted on the bell shape, growing from nothing, supporting nothing, and apparently ready to drop off, as there is no reason why it should be left

there.   In Fig. 112 the vine is of a clinging character and
would naturally appear to attach itself to the capital,
although it does not appear to grow naturally out of the
shaft of the column in the manner characteristic of the
foliage of the Early English capitals.   In Fig. 113 the folia-
tion is not only of no particular character, but it is simply
"stuck on" with no
origin and no struc-
tural relation and con-
veys no idea of fitness
or propriety.
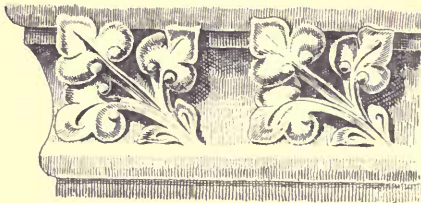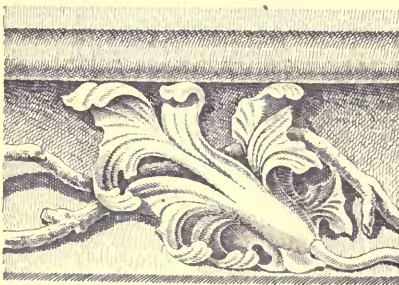
FIG. 114.

In the running bands
and moldings we find
the same characteristics
as those of England, but
not so pure in form.
In Fig. 114 the foli-
ated forms, it will be
observed, appear to be
attached to and grow
from the top and bot-
tom members of the
molding.   The line of
their growth is curved
toward the center of
the molding, but, at
the same time, follows
the line of the mold-
ing itself and appears
continuous with it ;
while in the Rayonnant
period, as shown in
Fig. 115, the molding
is divided up in sec-
tions more like the
Perpendicular period of

FIG. 115.

FIG. 116.

England, and the leaves, though growing apparently from
the stonework beneath them, are nevertheless stiff and

geometrical and do not appear to belong to the surface on which they are placed.

A characteristic of the Flamboyant style is seen in Fig. 116, where the guiding stem of the ornament that is carved on the molding is in some places clear from the molding itself, and though it shows great skill in the carving, exhibits little art in the design. The leaves and floral forms are twisted so that their ends represent forked flames, from which the period gets its name, and there is no structural relation between the foliation and its moldings.

Fig. 117.

146. Early French diapers divide the wall surface into geometrical forms in a manner similar to that in England, and stenciled within these figures are characteristic devices typical of the nation and the style.

Fig. 118.

In Fig. 117 we have a wall divided into lozenge shapes by diagonal lines, within some of which *fleurs-de-lis* are stenciled in gilt on a blue ground, while a simple foliated outline is stenciled within the others on a gold ground.

In Fig. 118 is shown a more complicated design based on the intersection of a number of circles whose centers

are found at the intersections of evenly spaced vertical and horizontal lines.   In this case, the ground of the decoration is pink, and the outlines of the subdivision and the stenciled forms within them are in gold.

147.   The character of surface treatment in the Rayonnant period is best shown in Fig. 119, which is from an illuminated manuscript.   The lines of the foliage and the

FIG. 119.

FIG. 120.

geometrical rendering of the flowers are characteristic of this style of work, and the twisted forms are suggestive of the change that is taking place toward the Flamboyant period. In Fig. 120 is shown another example from illuminated manuscript, where the naturalistic treatment of the flower, with the foliage reduced to a flame-like outline, shows the systematic rendering of all work of this period.

FIG. 121.

**148.　German-Gothic Details.—German-Gothic de-
tails** were influenced more largely by France, but, at the
same time, borrowed ideas direct from England.　Fig. 121
shows a wall diaper divided into circles somewhat after the
manner of the English example shown in Fig. 107, within
which geometrical forms are stenciled in some cases, while
in others the conventional brush form of the eagle, emblem-
atic of Germany, is rendered in light green on a darker
ground of the same color.

149.　Misinterpretation of Gothic.—As the term
'' Gothic '' as applied to architecture is, in the minds of most
persons, associated almost entirely with ecclesiastical edifices,
we are all likely to labor under the impression that the
medieval cathedrals were the only structures built during
these dark ages.　As a matter of fact, however, every build-
ing erected during the thirteenth and fourteenth centuries,
throughout Western Europe, was built in what we now call
the Gothic style.　In order that we may better understand
this domestic architecture and its details, from which much
of our ornament at the present day has descended, it will be
necessary for us to look into the habits, customs, methods
of living, and government of the people at this period.

Kings, princes, earls, and even the lesser nobility, all lived
in castles during this period, and these structures form a
most important part of the architecture, as they are undoubt-
edly the prototype of the modern dwelling house from which
have descended all those details of house plan that modern
requirements have brought into service.

150.　Feudal System.—At this time all lands were held
under what is known as the **feudal system.**　When the
tribes from the North had conquered Rome and overrun the
entire Roman Empire, the generals or chiefs of the different
military organizations were given lands for themselves and
their subjects over which they ruled as kings and princes.
This system existed throughout all Europe, but with slightly
varying conditions in Italy, France, Germany, and England,

according to the influences of each locality. The general
principle was the same, however, and we will confine our dis-
cussion simply to the effect of this system in France, inas-
much as it reached a most thorough organization there, and
had a more marked influence on the subsequent art of the
period of the Renaissance.

The political organization of a country under the feudal
system consisted in the bulk of the land being divided into
states called *fiefs*, which were held by their owners on the
condition that they should, when called on, perform certain
military duties to their superiors or pay them fees in grain,
wines, cattle, etc., and in default of such service or payment,
the land could be reclaimed. The superior lord might be
the king of the realm, or some nobleman that held a feudal
tenure from the king, and who in turn created fiefs by and
under his own personal rule.

An important detail of the old feudal law was the fact that
the king or superior lord, from whence comes the modern
term landlord, was entitled to the fealty of his own tenants,
but not to that of his subordinate tenants, every man looking
for rule and discipline only to his own immediate lord and
master. It therefore frequently happened that one of these
noblemen would build up a community so powerful as to
feel practically independent of his king, and therefore
refuse to render to his superior such military service as
was demanded. The result of this was inevitably the
same—war between the king and his subject. On the other
hand, if the subject remained loyal to his king, he was likely
to depend on the royal influence and encroach somewhat
upon the fief of some one of his feudal neighbors. This
would bring about the same result—war between two feudal
barons. And even if he remained within his own territory
and was true to his sovereign, the prosperity of his fief or
his influence with the royal court was sure to excite the
jealousy of some one of the surrounding nobles and bring
about war.

It would thus appear that the feudal barons were at war
with one another a large part of the time, and these frequent

wars required that the medieval castle should be a military
post from necessity and a domestic household for convenience.
During the war the castle was the stronghold of the lord and
his retainers, and during peace it was a house of entertain-
ment for his guests and vassals.

151.   Castle of Coucy.—In Fig. 122 is shown a plan of
the castle of Coucy, near Laon, France, the irregular outline
of which is due to the fact that military engineering required
that these structures should conform as nearly as possible to

the top of the hill, on
which they were usually
built, thereby rendering
it impracticable to storm
the fortress from more
than one side — that on
which the entrance was
located.

A large tower, or keep
— in the French castles
called the **donjon** —
guarded this main en-
trance and at the same
time served as a strong-
hold and point of last
resort in case other por-
tions of the castle should
fall into the hands of
invaders.   The donjon
of Coucy was 180 feet in
height and 108 feet in
diameter, and the walls
were 34 feet thick at the

FIG. 122.

base.   The uppermost of its three stories was the largest, as
the walls were thinner at the top, and 1,500 men could be
here assembled in a circular room and receive their instruc-
tions for the military routine of the day.   In the middle
story was the family apartment for use during siege, and in

the basement were storerooms for sufficient provisions to last 1,000 men over a year.

The keep was surrounded on the outside by a moat, or water-filled ditch, shown at *a*, beyond which was a large enclosure shown at *A*, called the outer bailey. This was a large piece of cultivated land and contained the chapel *r* and the stables *s*. The interior courtyard *d* was called the inner bailey and was the only outdoor area open to the garrison in time of siege.

These points are of interest, as from them are developed many details that are characteristic of the modern house in plan, while other details of more decorative value had their origin in devices originally invented for purely military purposes.

152. In Fig. 123 is shown a bird's-eye view of the castle of Coucy and the surrounding country. Around the top of each of its five towers will be observed small projections that carry an enclosed gallery. The spaces between these projections, or *corbels*, as they were called, were open through the floor of this overhanging gallery, and, in time of siege, when the walls of the castle were surrounded by sappers and miners endeavoring to disintegrate the stonework and gain access to the interior, deadly missiles were shot straight down from the floor of the gallery, or quantities of boiling oil or molten lead were used to make the base of the walls as unapproachable as possible.

The windows in the castle all opened on the inner bailey, no openings being permitted toward the outside except small loopholes of sufficient size only to shoot an arrow through. The tops of the individual walls enclosing the inner bailey were notched, and the rectangular sections of wall between the notches—called battlements—each contained a large loophole, as may be seen in the perspective view at *j*. Behind these battlements was a platform on which archers could stand and shoot at an invading force, while a similar treatment of the top of the walls around the outer bailey enabled the besieged to defend the outer bailey

against the besiegers before finally retiring within the castle
walls for safety.

All these details were altered from time to time, as civil-
ization advanced, and when the invention of gunpowder
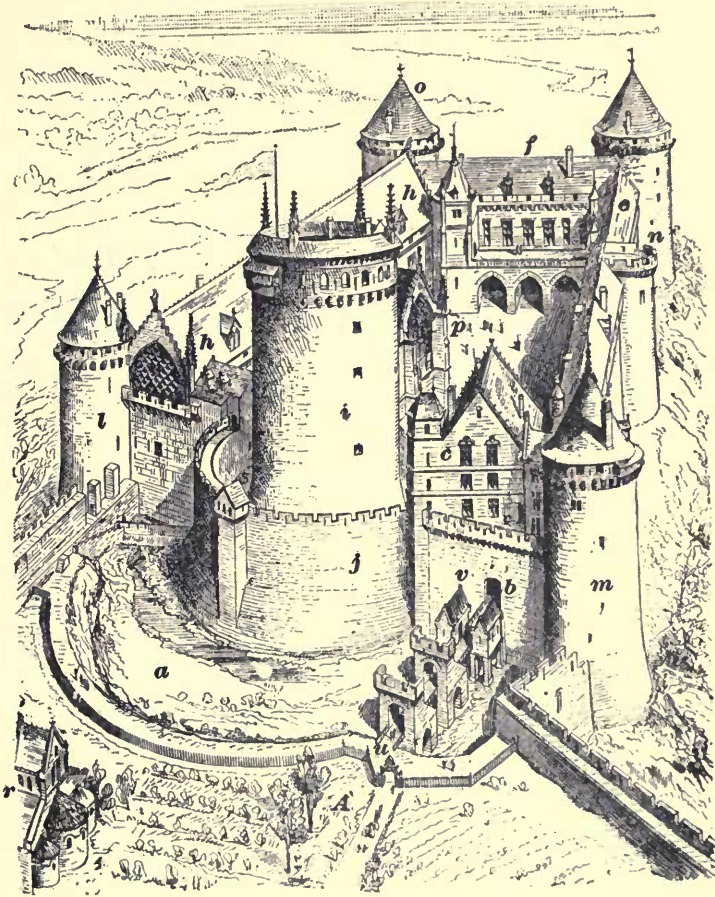
Fig. 123.

rendered the castellar system of defense obsolete, the
corbels, battlements, and other details of feudal military
origin were still retained as ornamental features in many of
the buildings developed from the castellar plan.

153. Mode of Living in Ancient Castles.—Regarding domestic life within these castle walls, it is well to remember that, previous to the fourteenth century, there was not much subdivision in the household apartments even of royalty, the king and queen and the servants and retainers all usually occupying one room, known as the great hall. This great hall is shown in the plan at *h*, and was to the domestic part of the household what the donjon was to the military—the main apartment wherein all household duties were performed.   Here the lord sat at his meals with his family, his guests, and his retainers; here he transacted all business of the day, both financial and domestic; and here in the earliest times he slept at night on a rough couch at one end.

By degrees, society began to improve and become more refined, and the constant daily association with servants and soldiers becoming undesirable, the great hall was divided into two apartments, one of which was known as the *withdrawing room*, where the lord and his family could retire after meals, but the hall was still retained for business and dining purposes.   However, a further subdivision provided another room for the transaction of business, which was still called the *hall*, but in distinction the remaining portion was called the *dining hall*.   These three rooms—the hall, the dining hall, and the withdrawing room—were the principal apartments in the house or castle, and, consequently, the separate sleeping apartments, which advanced ideas demanded, were crowded into any out-of-the-way corner that circumstances afforded.   For this reason, these sleeping rooms were often dark, cheerless apartments, and were designated by the term *chamber*—a word derived from the Latin, meaning a dark vault—and finally, when the bedstead was introduced as an article of household furniture, the sleeping rooms were called *bed chambers*, to designate them from other rooms in the castle of similar character but not for sleeping purposes.

154. Heating of Ancient Castles. — In the earliest days, the castle was heated by an immense fire-grate located

in the center of the room, the smoke from which passed through openings in the roof called *louvers*. Subsequently, this grate was removed from the center to the side wall, and the louver was replaced by a chimney stack.   This necessitated a separate chimney for each room, and is responsible for the fact that nearly every French château built in the fifteenth and sixteenth centuries bristles with beautifully designed chimney stacks above the roof, and nearly every room in the French château of the Renaissance period possesses a fireplace and a distinctively designed mantel.

155. Heraldry.—Another point of this feudal system is the subject of **heraldry,** which is of vast importance in its relation to historic ornament, inasmuch as it is based entirely on that important characteristic of all ornament, namely, *symbolism.*   It is doubtless true that armorial bearings were not in much general use until the twelfth century, when they were brought into prominence by the crusades—a term given to those wars waged by the Christians of Western Europe against the Mohammedans around Jerusalem for the purpose of rescuing the Holy Sepulcher from the hands of infidels.

The purpose of heraldic devices was to designate one person from another, as surnames did not exist in those days; and though the painted device by which the savage sets forth his personality may be considered as heraldic as the device borne on the shield of a soldier, it is with the latter class that we have to do in ornamental design.

We have seen in Egyptian art evidences of heraldry, inasmuch as the two serpents flanking the sun disk of the winged globe are symbols of Upper and Lower Egypt, and, therefore, heraldic.   But with the twelfth century, we arrive at a system of heraldry whereby the heraldic device was passed down from generation to generation, in the same manner that the family name is transmitted at the present day.   A heraldic device would be transmitted from father to son, on the death of the former, with few alterations, so that in our study of the history of subsequent styles, we can

locate and date many details by our familiarity with the insignia associated with certain royal families.

156. The Fleur-de-lis.—The *fleur-de-lis* has ever been emblematic of France, because Hugh Capet, the first French king, carried it on his shield as the insignia of his family, and subsequent rulers used this same emblem as an indication of royalty, while they coupled with it some other device to more clearly establish their own personality. In subsequent periods, as we shall see, the initial letter was frequently used by royalty on works of art erected by them during the period of their reign; but this is not of so much importance to us as the heraldic devices, as several sovereigns of the same name ruled many years apart. The importance of these heraldic devices cannot be overestimated, as will be pointed out when we study the ornament of the subsequent periods in the *Renaissance*.

HISTORIC ORNAMENT.

(PART 3.)

RENAISSANCE ART.

INTRODUCTION.

1. Origin.—Although the medieval style of art and architecture prevailed throughout all Europe for at least six centuries, it is still a difficult matter to draw a line at certain dates when the influence of the ancient classic art utterly ceased and the revival of that classic art after the Medieval period took place. In fact, if the two subjects were studied separately and independently, it is not unlikely that traces of revival of classic art could be discovered even before the classic style itself had become extinct.

It must be borne in mind that Italy, in the extreme southern part of Europe, was the seat of the original Roman government, and the country wherein the classic style developed to its greatest voluptuousness. The Roman people spread all over civilized Europe and established their monuments everywhere, but no place so profusely as in Italy itself.

After the conquest of Rome by the barbarous hordes from the North, the Latin-speaking people were largely confined to the Italian peninsula, and though a new style of architecture was developed by the conquering race—a style since derisively termed Gothic by the artists of the Renaissance

§ 5

period—the original Romans at home still endeavored to adhere to their ancient traditions and styles of art. If this point is thoroughly understood, there will be no difficulty in tracing the progress of Renaissance art from Italy throughout Europe. We have seen that the farther north we go from the site of the Roman Empire, the purer was the style of the Gothic art that prevailed, inasmuch as it was less hampered by the tradition of classic art.

2. Revival of Classic Style.—Now, when it comes to a revival of the classic style, it is not strange that that revival should take place first in Italy, where the Gothic style never secured a prominent foothold, that the revival should spread from Italy to France—a people made up largely of Latin extraction—and that, lastly, it should extend from France to England, but in a very imperfect form, as the English people were not Latins and had no sympathy with, nor tie to, the original Latin style. Bear in mind also that the Celtic ornament, of which we have studied, originated among the earlier inhabitants of the British Isles and naturally influenced any importation from a strictly foreign country, as was Italy.

3. Scope of Renaissance Period. — In describing Renaissance art, we will commence at the period of its infancy and continue under this heading down to the present day, inasmuch as there has been no new style evolved and no revival of any other style that need break this term of continuity. Moreover, it will not be inadvisable for us to set a period or character of the Renaissance style that theoretically may be considered the best, and, in doing this, we must consider all the influences that are brought to bear.

4. Intention of Renaissance Artists.—The effort of the Renaissance artists was not to invent a new style, nor to bring about through a transition a development based on classic lines, but to deliberately copy the monuments of pagan Rome and Greece and use these heathen forms, no matter how inappropriate or illy suited for the purpose of

modern Christian art. They were different from anything they had ever seen or conceived; they were the products of an age of wonderful art and literary advancement, and, in the eyes of the Renaissance artists, were accepted as superior to anything they could themselves devise.

5. Renaissance Art in Italy.—The style of Renaissance we find in Italy, where Gothic art had its slightest influence, naturally adheres as closely as possible to the old Roman forms, for there they had the old Roman buildings, many of them still intact, that could be copied line for line.

The invasion of Italy by Charles VIII of France, toward the close of the fifteenth century, brought into the latter country examples of this revived Italian art that were much admired by the French public, and the revival of classic art was immediately felt throughout France. Devoid of actual buildings from which they could study their designs, the French artists were compelled to go to Italy and study, and French kings imported Italian artists to do work in and around Paris. Either experiment was bound to produce an altered style.

6. Introduction Into France.—The French artist had been working in the Gothic style, and he studied the Italian monuments with an idea of medieval construction in his mind. The Italian artist came to France possibly with a clearer idea of classic art, but was hampered in his execution by the necessity of employing workmen that had cut stone in no other style than that which had prevailed during the six centuries of the Middle Ages. An even compromise can therefore be considered to have taken place between the perfect construction of the Gothic style and the perfect proportion of the classic art.

7. Introduction Into England.—The introduction of Renaissance into England, however, was far different. True, her artists studied the styles under great Italian masters at Rome, but they, too, had to compete with designers in the local school, where Gothic art had secured its strongest

foothold. Germany and Holland before this had adopted the Renaissance style from France, and the systematic patience of the Germans and the phlegmatic immobility of the Hollander are well woven into the style of classic art they reproduced. When these perverted ideas were transmitted to England, it is easily understood that they contained few details that could be considered purely classic. By a successive alteration through several countries, they could be with difficulty identified with their original type.

8. Purity of French Style.—We may therefore consider that in France we find the best examples of a practical adaptation of the ancient classic ornament to modern conditions and purposes, while in Italy we find a Renaissance of classic art that adheres more closely to the classic style, but can hardly be considered even a new departure. In England, however, the style that was developed in the Renaissance period is not classic at all, except in its derivation, and there, after repeated endeavors to apply the inappropriate forms to the modern purposes, the style was abandoned and an endeavor made to revive that of the Medieval period.

ITALIAN RENAISSANCE.

9. Origin.—Fragments of exquisite beauty in stone, bronze, and marble were hardly covered over by the top of the soil in the ruins of the ancient buildings of Rome, and these buildings therefore became quarries from which stone was easily obtained and recut to be used for tombs and other buildings wherein the style of art for which they were originally used played no part. This accounts largely for the fact that Gothic art secured so little foothold in Italy and remained for so short a time.

The pointed arch was introduced in the northern part of Italy early in the thirteenth century, and this might be considered the planting of the seed of Gothic art in this territory; but almost at the same time there was a protest

made in favor of the ancients and the arts as being supe-
rior to anything the barbarous hordes from the North could
produce.

10. Art and Literature.—The great poet Dante,
though an ardent Christian, was a profound student of
classic learning as well as a strong advocate of pagan art.
The celebrated authors Petrarch and Boccaccio were intimate
friends and spent their lives, not, as many people supposed,
in writing Italian poetry and prose, but in laboring almost
incessantly in the preservation and restoration to the rest of
the world of the long-lost text of the Roman and Greek
authors. It was Boccaccio that first gave to Italy a lucid
account of Greek mythology and that first instituted a school
for the study of the Greek language at Florence, and these
efforts at a revival of learning were seconded and backed by
a large number of notables who could not have failed to
make it a success.

11. Invention of Printing and Its Effects.—Now,
understand that at the time when the labors of all these
men had accumulated in their libraries—public and private
—all that could be recovered of classic learning, all that
could be gathered from the earliest scrolls of the Greeks, all
the information concerning art that remained from the
wreckage of old Rome, about the middle of the fifteenth
century, the art of printing was introduced into Italy and
the learning of the ancients became spread among the people
of all Europe.

The invention of printing and the printing press is there-
fore responsible for the development of the Renaissance
style. Louis XI of France sent Nicholas Jenson into Italy
to learn "the new art by which books were made." This
learned man was no less a competent editor than he was a
zealous printer, and from about the year 1490 he gave to the
world in rapid succession many editions of Greek and Latin
classics and a history of ancient art profusely illustrated with
engravings on wood.

12. Publication of Vitruvius.—Through these illustrations, which display a study on the part of the artist of ancient art, types of ornament geometrically opposed to those of the Middle Ages were disseminated over the continent of Europe; and, in 1511, the publication of the architecture of Vitruvius at Venice, with illustrations of the classic orders of architecture, set a final seal upon the fate of matters in art and afforded the means of spreading throughout other countries those details of ancient design that had so engaged the art public of Italy.

13. Italian Aversion to Gothic Forms.—However, before those laborers that were endeavoring to bring classic art and literature to the front had succeeded in getting the least sign of encouragement, it was apparent that the Italians did not take kindly to Gothic forms. The acanthus leaf was typical of Italian art, and the foliated capitals of the Gothic school had to accept this form of vegetation.

In its earliest stage, Renaissance art in Italy was really a revival of classic principles, and it was not until the middle of the fifteenth century that it could be considered an actual revival of style.

14. Roman Influences.—At Rome the great wealth of the Italian princes and the great ecclesiastical works undertaken by successive pontiffs of the Church attracted to that city the highest procurable ability in the art world, and it is for that reason that we can still find in Rome, in the various palaces and churches, the most exquisite fragments of decorative sculpture in detail.

15. Donatello.—One of the most interesting qualities of this style of ornament is the skill with which those by whom it has been wrought have availed themselves of a variation of light and shade by the treatment of the surfaces on which the ornament is raised. The refined appreciation of the delicate shades of relief in sculptured ornament was carried out with the greatest perfection by Donatello, an artist whose authority on matters of art was held in the

highest esteem by the people of Florence, and whose example was followed by all classes of artists.

He was the first to practice the true *basso rilievo*, by which the effect of projection and of rounded molding is obtained within what would appear to be impracticable limits of relief; that is to say, in modeling his ornament on surface, it was raised but slightly above the surface but was treated in its carving so as to appear in high relief.

Donatello then combined this style of work with *mezzo rilievo* and *alto rilievo*, the former being a half relief, and the latter being a sunken ornament below the surface on which it was executed. This combination maintained a division of the subject of his design into several planes. Donatello enriched many of his ornaments with elements derived from the art of painting.

16. Plane System.—At the zenith of its perfection, this system of regular arrangement of ornament in planes was so ingeniously managed in position of light and shade that, when viewed from a distance, the relief presented only certain points symmetrically disposed with some dominating geometrical figure. An approach of a few yards served to bring to the eye lines and details connecting the points of greatest importance, and a still nearer approach revealed the leafage of the delicate tendrils that were required to convey a tangible idea of the type of nature selected for the conventionalized design. And beyond this, no inspection could be too close a test of the artist's perfect appreciation of the refinements of surface texture.

17. Characteristics.—In the hands of less profoundly impressed artists than Donatello—those possessing an inferior sense of the proper limit of convention in sculpture—the introduction of pictorial elements in the bas-relief design soon degenerated into realism and confusion. Great as was the skill of Ghiberti, the effect of many of his most graceful compositions was marred by the introduction of perspective

effect and accessories too servilely copied from nature.   In
many of the ornaments of sculpture, this fault is exagger-
ated until the dignity of the design is lost in the frivolity of
the detail.   These monuments, decked with huge garlands
of flowers, hung with heavy cartouches and tablets, and fan-
cifully overgrown with foliage, appeared more as examples
of the artisan's skill than works of art commemorative of the
date or dedicated to sacred purposes.

This is somewhat illustrated in Fig. 1, which is a part of a
cornice taken from the Palazzo Vecchio, or Town Hall, of
Florence, Italy.   This also illustrates the minutia of detail
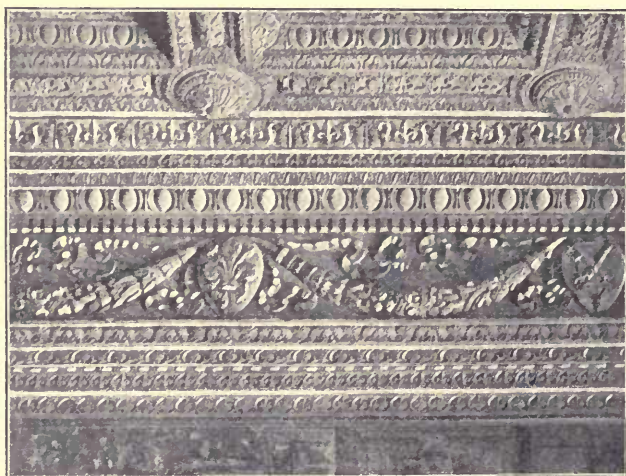
FIG. 1.

with which this style of ornament abounded.   Along the
frieze are heavy garlands of flowers, the design of which
includes also fruit and grain, while at the points between
which they are stretched are hung shield-shaped cartouches
bearing devices of a more symbolic character.   The fleur-
de-lis, emblematic of certain royal families, and the crossed
keys of St. Peter are here seen, and it would appear that one
of them must be strangely out of place in the frieze of a
town hall.   The other ornaments on the moldings, though

elaborately carved, are less out of place and are characteristic of the style and period.

18.　Frivolity and Incongruity of Designs.—The panels in the elaborately carved seat in Fig. 2 show to what extreme and frivolity ornament of this character can be car-
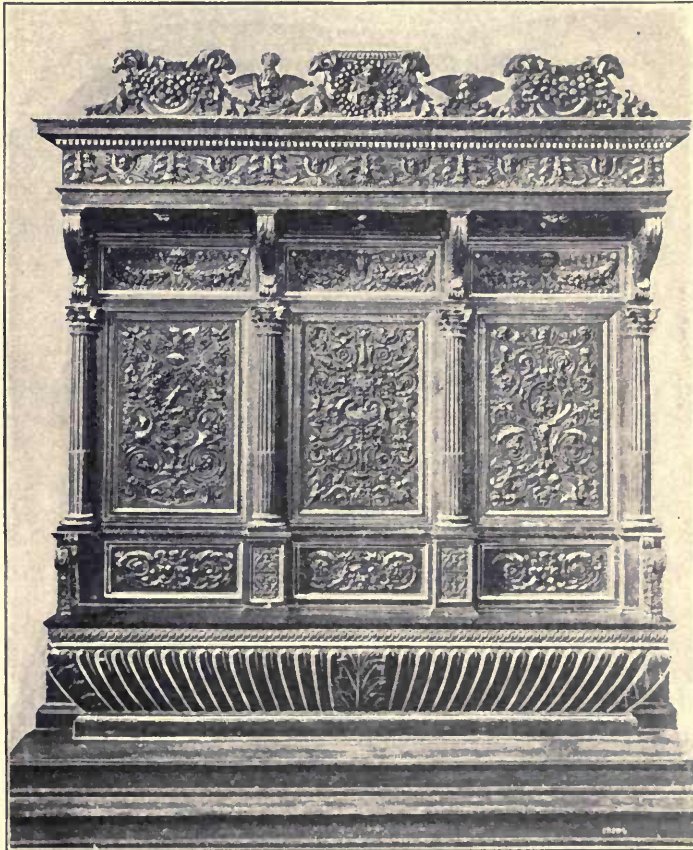
FIG. 2.

ried.　Here, as the settee in St. Peter's Church, Perugia, we have a design not only proportioned according to the pagan rules and ideas, but elaborately interspersed with grotesque

figures, comic masks, griffins, bucrania, flowers, and fruit, not one of which would appear to be particularly identified with any detail of the Christian faith.

Many of the designs of this period are strangely incongruous with the purpose for which they are called into existence. Tragic and comic masks, musical instruments, antique altars, tripods, hybrid marine monsters, and chimeras do not harmonize well with monuments reared in consecrated edifices or dedicated to religious rites.   However, this fault of the confusion of details cannot be laid entirely upon the shoulders of the artists of the Renaissance period, as their works may be considered simply as a reflection of the taste and dominant spirit of the age; and this revival of mythological symbolism was a protest against the hampering trammels of esthetic tradition erected into dogmatism by the rulers of the East, and endorsed by the Church during those centuries when its ascendency over an ignorant and turbulent population was at its greatest height.   The minds of even the most religious men were thoroughly imbued with such inappropriate and incongruous associations in the fourteenth century.

19.   Value to the Designer.—To the designer, the study of this period in ornament is of the greatest value, as in no style has ornament ever been better spaced or arranged to contrast more agreeably with the direction of the adjacent architectural lines by which it was bound and always kept in subordination.   Rarely do we find an ornament placed in a horizontal position that is more suitable to a vertical one, or vice versa; and rarely are the proportions of the ornaments and moldings, or the stiles and rails by which regularity and symmetry are given to the whole, at variance with one another.

20.   Propriety of Subject. — In Fig. 3 is shown a column from the inner court of the Palazzo Vecchio, with its stucco decorations in the style of the Renaissance of this period.   Observe that the arabesques fit perfectly the rectangular panels on the sides of the octagon column, and

that the ornament is well spaced, appearing not crowded or excessive, but flowing naturally and preserving a proper relation between the plain surfaces and the richly ornamented ones.   None of this ornament could be said to have

FIG. 3.

been better suited to a horizontal position, nor can it be stated that the relative proportions of the details of the ornament are such as to make one portion of it any more prominent or excessive than another.

In Fig. 4 is shown another column from the same building, ornamented on an entirely different system, although included in the group with the one of the previous example. Here the flowing grape vine winds spirally around the column, and the leaves and fruit are so disposed as to set off clearly the details and at the same time preserve that space relation that is always characteristic of good ornament.

The capitals of these columns, it will be observed, are almost identical in design, although one of them crowns an octagonal column and the other a round shaft.

21. In Fig. 5 is shown one end of a sarcophagus in the tomb of Marsuppini, at Florence, designed by a pupil and follower of Donatello. This is considered one of the finest examples of Italian-Renaissance sculpture. The treatment of the leaves and foliage, and the proportioning of the ornament to the surface, with the dignified simplicity of the inscription and frame, make it deserving of close attention and consideration of the method by which its decoration is handled. The relation here of plain surface and running ornament is very happily proportioned, avoiding so successfully the appearance of excess, so characteristic of most Renaissance design and at the same time satisfying the mind as to its sufficiency.

FIG. 4.

22. Scrollwork.—In Fig. 6 is shown the capital of a pilaster from the church of San Spirito, in Florence. The treatment of the acanthus leaf here, it will be observed, is very similar to its treatment on the Roman-Corinthian capital, very few alterations having been made in the type. The introduction of the oak leaf in an acanthusized form shows a step in progression, as does the introduction of the acorn accompanying the leaf. The peculiar form of S scroll in the center of the capital, each side and below the acorns, is characteristic of the Renaissance, and has its origin

FIG. 5.

FIG. 6.

undoubtedly in that irrepressible tendency of Roman orna-
ment to end its scrolls each time in a flower.   The propor-
tioning of the ornament to the surface in this case, however,
is much more moderate and refined than in the Roman-
Corinthian capital, and though copied after the classic
model, this is certainly an improvement on it.

23. Foliated Terminations. — In Fig. 7 is shown a
portion of a cornice supported on pilasters around the door-
way in the same church.   The treatment of the frieze shows
its origin in Roman ornament, but the introduction of the
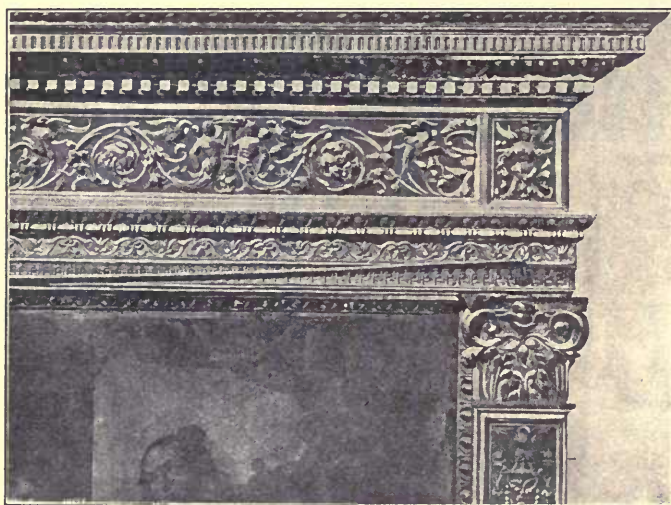
Fig. 7.

human figure and birds with foliated terminations reminds
us again of the innovations made by the Renaissance artists.
Observe that all surface is here ornamented, that every
molding is cut to break up an appearance of continuous line
and cast an irregular shadow, and that the surfaces, such as
the top of the pilaster and its capital and the panels in the
frieze just referred to, all have their decorations properly
proportioned and in keeping with the position they occupy.

In Fig. 8 is shown another cornice from the same church, the design of which follows more closely the ancient classic model. The ornament on the frieze is carved in high relief and does not possess that easy flowing feeling that is seen in the previous example. The same may be said of the
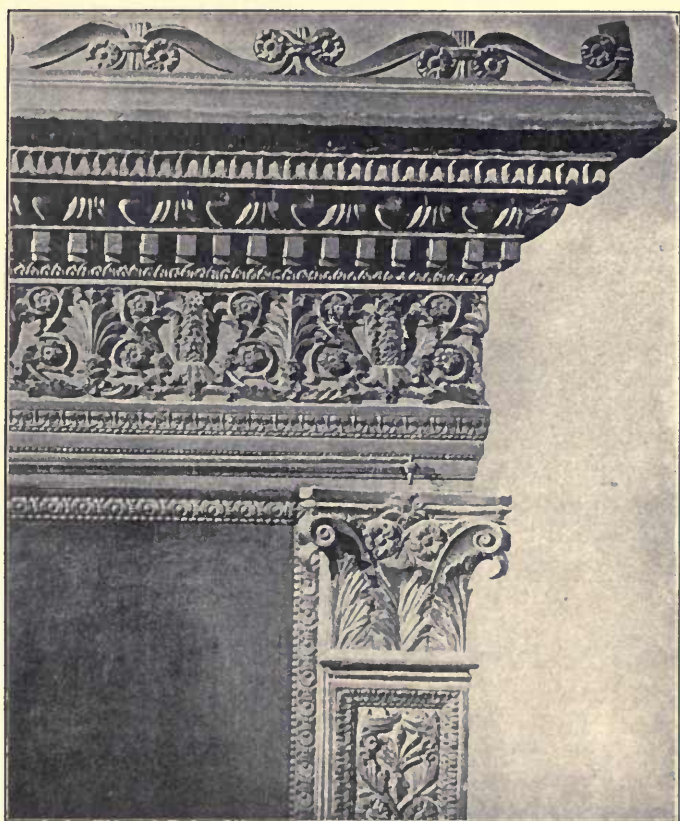
FIG. 8.

moldings on the pilaster that supports the cornice, and of the capital of this pilaster. The ornament is too thick and there is not sufficient blank surface to rest the eye from this abundance of detail, thereby giving the whole design a feeling of unrest that was more characteristic of the extravagant

Corinthian order of the Romans than the more refined hand-
lings of Italian art.

In Fig. 9 is shown a bracket that forms a detail of the
pulpit in the church of St. Croce, in Florence, the treatment
of the decoration of which is well worthy of study.   The
ornamen' is not excessive and well fills the surface where it is
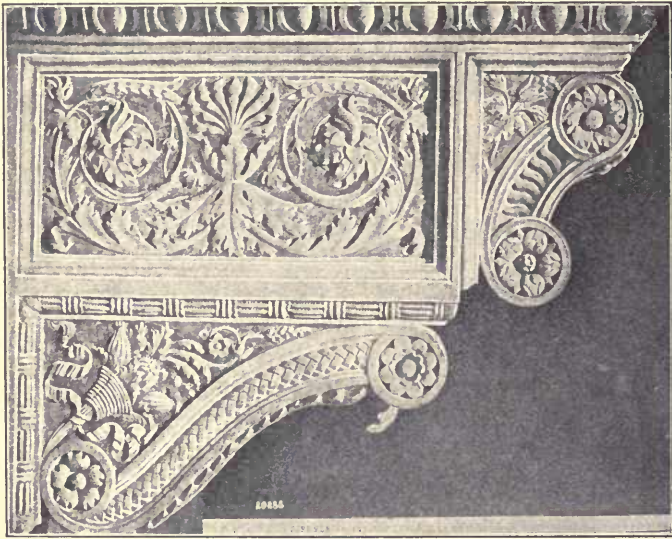
placed, and the leafwork is carved in low relief and does not
possess that excessive surface molding that so materially
detracts from some of the work of the later Renaissance.

24.   Examples of Venetian Renaissance.—In Fig. 10
is a bracket from the Ducal Palace at Venice, and is charac-
teristic of the style of the Venetian Renaissance.   The
scrollwork and treatment of the foliage in this bracket is
particularly happy, and illustrates, more clearly than any
example we have had, the obedience to those laws of nature
that must be observed in all good ornament: radiation from
the parent stem, tangential curvature of lines, and distribu-
tion of areas.   The latter rule is particularly well shown in

this by the gradual diminution in surface occupied by the running ornament as it extends into the extremities of the triangular panel. The scrollwork under the bracket is not so artistically formed or well proportioned, but errors here are amply balanced by the good points of the scroll.

In Fig. 11 is shown a panel from a large candelabrum that gives a very clear idea of the treatment of Venetian arabesques. The panel is symmetrical on each side of a center line, carved in high relief in stone, and is treated in
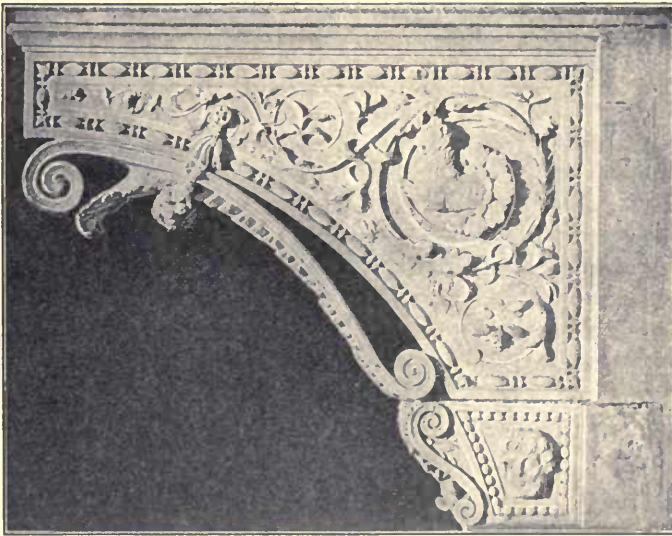
FIG. 10.

a manner that makes the ornament somewhat monotonous in itself but well proportioned to the surface it is intended to cover, with enough blank space to prevent tiresomeness in its study.

25. Ingenuity of Renaissance Designer.—Fig. 12 is a panel under the balustrade of the stairs in the cathedral at Sienna. This illustrates to a remarkable degree the ingenuity and fertility of mind possessed by the early Renaissance designer and sculptor. Here we have, forming the

running border around a trapezoidal panel, the guilloche ornament so characteristic of classic art, and the running arabesque identified with the classic-revival period; within this a modified form of the old Greek fret and then an irregular panel, the surface of which is carved in low relief with

FIG. 11.

a foliated scroll and arabesque that close study discovers is terminated at one end in a grotesque animal and at the other in a bunch of fruit.

26.   Renaissance Ironwork.—Not only was art at this period exemplified in details carved in stone and marble, modeled in stucco and painted on canvas, but the iron worker executed many details that brought his trade almost to a fine art.

Fig. 13 shows a bracket from the Florence Museum, representative of a cornucopia filled with grapes and leaves.

The treatment of the scrollwork and the elaboration of all
the detail of this device is peculiarly well adapted to the

Fig. 12.
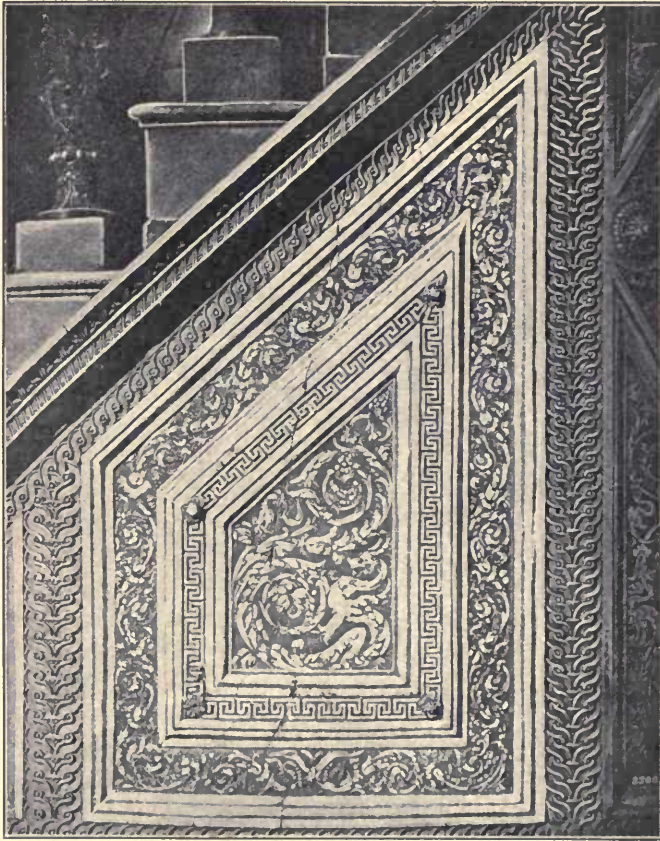
purpose, and altogether this exhibits a remarkable design
for a piece of work of this kind.

In Fig. 14 is shown a portion of an iron grille from the
cathedral at Prato, one portion of which, based on the com-
binations of the circle, shows a slight leaning toward Gothic
ideals, while the panel to the right is strictly Renaissance in
the treatment of its leafwork and small figures; but the

general direction of its outline, with its alternate branches to the left and right, undoubtedly have their origin in the Gothic school of foliation.

It must be borne in mind that at this period there was no
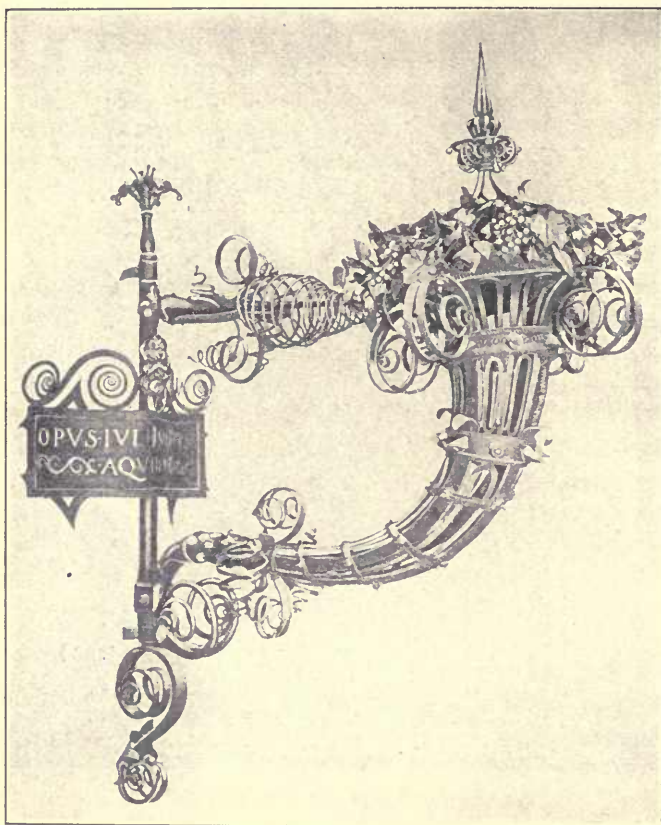
FIG. 13.

separation in the branches of the art world. A man was architect, painter, and sculptor at once, and often combined these with the trade of goldsmith. The great artist Raffael designed ornaments for carvers in stone and metal, and exhibited in them the purest taste and most exquisite fancy.

27. Michael Angelo, Sculptor and Artist.—Michael Angelo was born in 1475 and was a pupil of Domenico Ghirlandajo. Having shown at an early age a strong talent for sculpture, he was given an opportunity to study in a school for the culture of sculpture founded by Lorenzo de Medici. The Medici family was banished from Florence when Angelo was 20 years of age, and the young sculptor

FIG. 14.

was forced to retire to Bologna, where he worked for a while on the tomb of St. Domini. He returned to Florence, however, and about the time of his twenty-third birthday finished his celebrated statue of Cupid, and also his Bacchus, which were the cause of his being invited to Rome.

At Rome, among many other works by him, is the Pieta now standing in St. Peter's Church. His gigantic statue of

David, at Florence, was his next great achievement, and
before he was 30 years of age he was summoned to Rome
by Pope Julius II for the purpose of designing his Mauso-
leum, for which building the famous statues of "Moses"
and "The Slaves" were originally designed.

Thus far the work of Michael Angelo has apparently been
that of a sculptor, with possibly the exception of the design
of the Mausoleum.   His next great work, however, was the
painting of the Sistine Chapel—one of the greatest of his
achievements, whether we regard it purely as a work of
intrinsic art or as a monument that exercised a powerful
influence both on the art of a contemporary character as well
as that of later times.

For Pope Paul III, in 1541, he completed his vast fresco
"The Last Judgment" in the same chapel, and the
remainder of his long life was chiefly devoted to the con-
struction of St. Peter's Church, on which he was employed
at the time of his death, in 1564, and for which he refused
any remuneration.

During the long life of Michael Angelo, everything he
executed expressed a desire for novelty, and this is the only
detraction he ever seemed to have from the study of pure
excellence.   His daring innovations in ornament are most
striking.   His large broken pediments and moldings, his
sweeping consoles and scrolls, his direct imitation of nature
in some of his enrichments, and the amount of absolutely
plain surface that he uniformly preserved in all his archi-
tectural compositions, seem to bring new elements into the
field of design that were greedily snapped up by men of
lesser genius than he himself possessed.

Thus the style of the Roman school became materially
altered through the work of Michael Angelo.   Subsequent
artists, down even to Vignola himself, so far as ornament
was concerned, adopted all his beauties, and defects of design,
the greatest of which were an exaggeration of manner.

28.   Giacopo Tatti Sansovino. — Venice seems to be
the only city of Italy that did not follow the style that was

set by Michael Angelo, and this was probably due to the fact that she had a hero of her own in Giacopo Tatti Sansovino. This artist was born at Florence in the year 1479.   Having, at an early age, displayed a remarkable talent for art, he was properly educated and distinguished himself by his buildings at Florence.   He was then taken to Rome by San Gallo, architect of Pope Julius II, where he attracted the notice of Bramante, and made, under Bramante's direction, a large wax model of the Laocoon, in competition with other artists. Sansovino's was judged to be the best, and a bronze cast was taken of it that finally came into the possession of Cardinal Lorraine and by him was taken to France in the year 1534.

Sansovino was obliged to leave Rome on account of his health, and was placed by Bramante with the artist Perugino, who was then painting the ceiling in the Toore Borgia. Perugino was so pleased with Sansovino's ability that he caused him to prepare many models for his own use.

In the year 1514, most elaborate preparations were being made at Florence for the entry of Pope Leo X, and Sansovino was employed in the preparation for designs of many triumphal arches and statues.   The works were so successful that he was given the commission by the Pope to make a design for the facade of San Lorenzo, in Florence.   After this he continued in Rome and was employed both in sculpture and architecture, and was the successful competitor for the church of St. John, of the Florentines, against Raffael and Antonio San Gallo.   From this on he was engaged on work of importance in Rome until the year 1527, when Rome was taken by the French, and Sansovino sought refuge in Venice, intending from there to visit France, where the king had offered him employment.   The Duke Andrea Gritti, however, persuaded him to remain and undertake the restoration of the cupolas of St. Mark's Church—a work that he performed so successfully that he was appointed to a public office, given a house, and provided with a stipend.   It was to this appointment that Venice owes so many architectural monuments that are among the finest examples of Italian art.

FRENCH RENAISSANCE.

29. Rapidity of Transition.—The transition from the style of the Middle Ages to the style of the Renaissance, that took place so gradually in Italy, was in France sudden and complete. The campaigns of Charles VIII, Louis XII, and Francis I in Italy brought them in contact with the wonderful art productions of that country, and filled them on their return to France with an ambition to rival the splendid palaces and gardens of Italy, for which purpose they took with them Italian artists to act as instructors to the French. However, although these imported Italians introduced many classic elements and details into French art, they failed to dominate the natural spirit of the French master masons and architects in matters of general composition. Therefore, the early French Renaissance is wholly unlike that of Italy, from which it derived only a few minor details and the impetus that carried it forwards. On account of its possession of greater originality than the Italian style, and its freedom from the baser incongruities that prevailed in the Renaissance in Germany and England, we can take the French style as a good standard, and study it as a revival of classic art modified almost perfectly to fit more modern ideas. It is important in studying the French Renaissance to bear in mind the periods into which it is divided and subdivided, and also to bear in mind the dates of these periods. In modern practice, when any designs are executed in any particular style, the French styles more than any others are rated according to their period rather than nationality.

30. Periods of French Renaissance.—French Renaissance may be divided into three general periods: (1) *Valois period*, or *Renaissance proper;* (2) *Bourbon*, or *Classic, period;* and (3) *Rococo period.*

1. *Valois Period.*—The Valois period extends from 1483 (about the time of the invasion of Charles VIII into Italy) to 1589 (about the end of the reign of Henry III). This may be subdivided into: (*a*) The Transition period, comprising

the reigns of Charles VIII and Louis XII and the early years of Francis I, extending from 1483 to 1515. This period is characterized by a picturesque mixture of classic details and Gothic ideas. (*b*) The style of Francis I, or Early Renaissance, extending from about 1520 to 1547. The ornament of this period is distinguished by its great variety and grace of composition and the exquisite beauty of detail. (*c*) The Advanced Renaissance, combining the reigns of Henry II, Francis II, Charles IX, and Henry III, extending from 1547 to 1589, and distinguished by the general adoption of the classic proportions in the orders and a decline in the delicacy and originality in the treatment of the ornament. In other words, this period represents, as did the later Renaissance of Italy, an attempt to actually reproduce all classic forms.

2. *Bourbon Period.* — This period of the Renaissance extends from 1589 to 1715, covering the reign of Henry IV and of Louis XIV. This may be subdivided into the style of Henry IV, covering entirely his reign and part of the reign of Louis XIII, extending altogether from 1589 to 1645. The distinguishing characteristic of this period is the excessive use of the classic orders and other forms with a heavy, bold, florid ornament. The style of Louis XIV begins during the reign of his predecessor and extends to the time of his death—from 1645 to 1715. This is the great age of classic architecture in France, wherein the luxury and wealth of the nation and its desire for splendor exceeded its taste in art and represented in its architecture an attempt at the grandeur of Rome.

3. *Rococo Period.*—This period may be considered the decline, and is distinguished by the marked extravagance of detail derived from the leaf and other ornamental forms of previous periods, combined with rock and shell forms, so capricious as to be absolutely meaningless.

This period of French Renaissance terminates in what is known as the *Empire style.* This consisted of a strong protest against the frivolity of the ornament of the Rococo, and a return to the actual detail of more classic forms. As it

progressed into the nineteenth century, it expressed itself under the reign of Napoleon, as emperor, and attempted to produce the grandeur of Imperial Rome.

France had conquered the greater part of Europe, and believed that she was to set up a universal empire covering the entire country, as Rome had done, and with this idea in mind, built triumphal arches, columns of victory, gorgeous palaces, and country châteaux, and in every way lavished money on public and private monuments, in an endeavor to visibly express her imperialism.

31. Castles and Châteaux.—The transition from the Gothic to the Renaissance is more clearly expressed in the châteaux, or country residences, of the nobles than in almost any other class of buildings, and for that reason we will confine our discussion largely to a few of these interesting edifices.
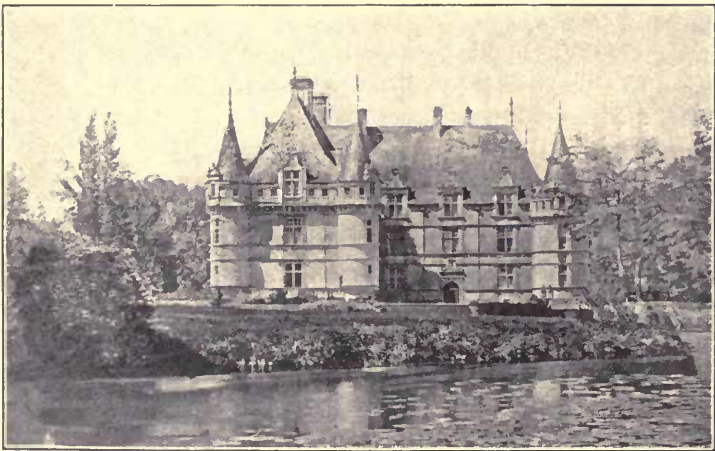
FIG. 15.

We have seen how the castle of the Middle Ages was built mainly for defense, its ornamental features being merely an embellishment of the necessities that were prominent in its construction. Such was exhibited in the general appearance of the castle of Coucy, Fig. 123, *Historic Ornament*, § 4.

The remodeling of these Gothic castles to suit the taste of the Renaissance brought in many incongruous but very picturesque ideas. In Fig. 15, a view of the castle of Azay-le-Rideau, it will be observed how the towers and turrets characteristic of the old style are retained, how the upper portions are still carried out on bold corbels, and their tops

The Great Hall of the XIII Century

Wing of Louis XII

Francis I

Wing of

Wing of Henry IV.

Court of Honor

Chapel

Outline Plan of
CHATEAU DE BLOIS.
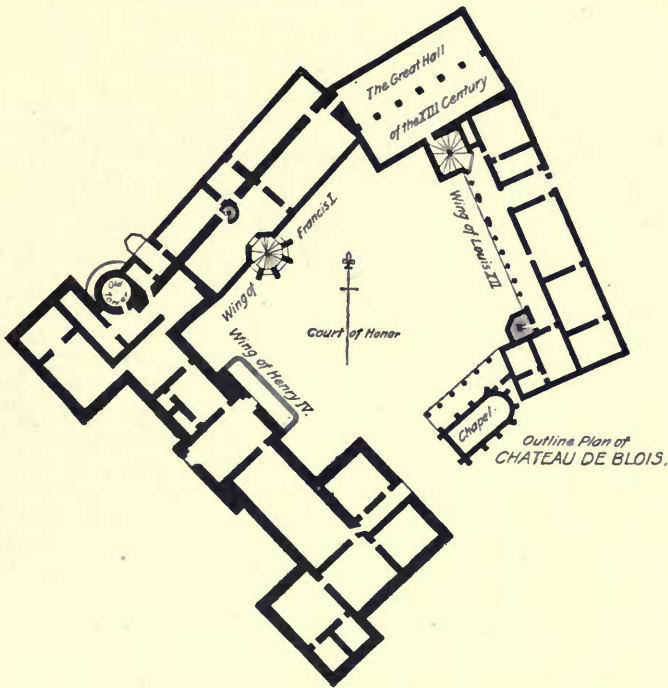
FIG. 16.

roofed over in a cone; but the drawbridge, the moat, and the portcullis have disappeared. Broad airy windows diminish the extent of blank wall surface characteristic of feudal times, and pilasters each side of the windows, topped with classic capitals and carved in rich arabesque, show the adoption of Italian art. The plan, composition, and grouping of the parts are still French and more or less feudal, and the Italian art has only affected the detail.

32. Château de Blois.—The largest, and, in many respects, the most important, of these country residences of royalty is the Château de Blois, and this we will consider in detail, as within it may be traced the gradual transition of each phase of the French Renaissance, from the time of Louis XII to the time of Henry IV, thereby including the entire Valois and a part of the Bourbon period of this style.

In Fig. 16 is shown a plan of this structure, the irregularity of which gives evidence of its medieval origin.   About the
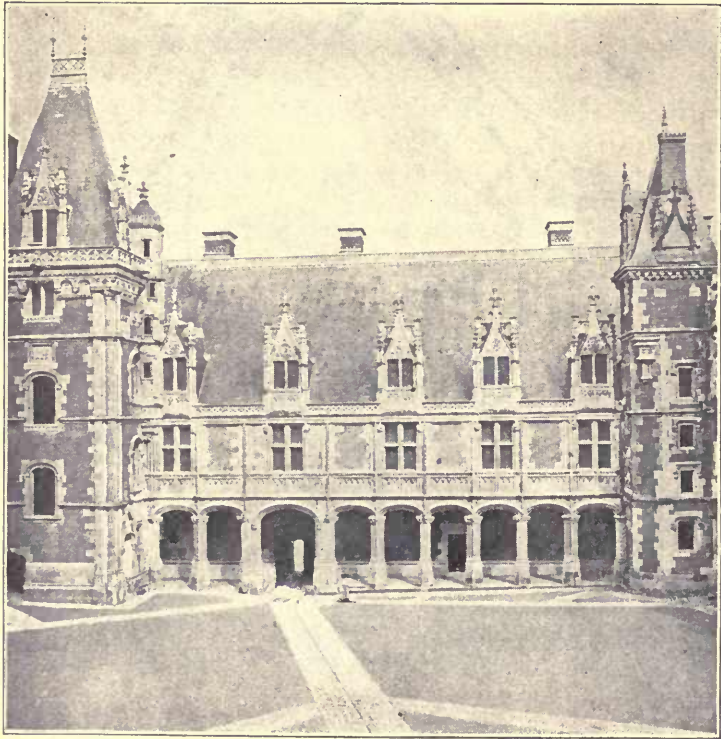
FIG. 17.

year 1500 Louis XII remodeled the east wing, which bears his name, a front view of which is shown in Fig. 17.   In this may be seen the elliptical arch, the clustered column, the

high-pointed gable, and the slender pinnacles whose origin can be traced to medieval days, but the introduction of flanking pilasters and arabesque ornament, though here but sparingly seen, is suggestive of the change to come.

On the outside of this wing, the archway that leads through to the "Court of Honor," shown in Fig. 18, is flanked on each side by heavy piers, over which is a conventional Gothic niche wherein, against an elaborate background of fleur-de-lis, rides King Louis XII on his charger. To the right of this is a little doorway that gives the pedestrian access to the passage, and over this entrance, in bas-relief, is carved a porcupine, the emblem of Louis XII, and a knotted cord for Anne of Brittany, his queen. Of these emblems we will have more to say later.

FIG. 18.

We will now turn to the wing of Francis I, on the northwest side of the court. This was erected but fifty years after the one we have just considered, but the difference in style is manifest even to the most casual observer, as shown in Fig. 19.

33. French Conception of Roman Ideas.—The artists of the sixteenth century, hurried along by the swift current of fifty years of wonderful intellectual regeneration, seemed to arrive at a comprehension of the use that the Romans had made of the Greek orders. They seemed to understand that the orders were not used in Rome as elements of construction, as they had been in Greece, but as decorative details having no essential relation to the construction itself. They seemed to comprehend by instinct that there was no reason why they should not take those same Roman orders and details and use them in any way they chose—structural or

non-structural—so long as their use suited the purpose to
which they were applied.

FIG. 19.

Thus a study of this period of French architecture shows
that the French builders accepted not the conventional

restrictions of the classic formulas, but the spirit of these
formulas, as an organized system of ornamentation.   A study
of the court facade of this Château de Blois shows that the
lessons in classic styles given by the imported Italian mas-
ters were accepted by the French architects with respect and
intelligence, but not learned by rote.   The Italian rules had
an influence, but were not accepted as a law.

34.   Octagonal Staircase.—The greatest artistic effort
of this period was probably the octagonal staircase that
appears in this facade.   It is considered one of the master-
pieces of the sixteenth century, though it is at the same time
an example illustrative of the audacious independence of the

FIG. 20.

French architect.   It has no architectural relation to the
wall surface from which it protrudes, except that its four
great free-standing buttresses support a cornice and balus-
trade that are a continuation of those on the wall.   These
buttresses are niched and contain exquisitely carved figures,
while between them extends the balustrade of the stairs,

divided into panels carved with the crowned salamander emblematic of Francis I, and in other places with the monogram F and C under a crown, standing for Francis, and Claude, his queen.

In Fig. 20 is shown a large detail of this salamander device, and the form of its crown, decorated with fleur-de-lis.   This
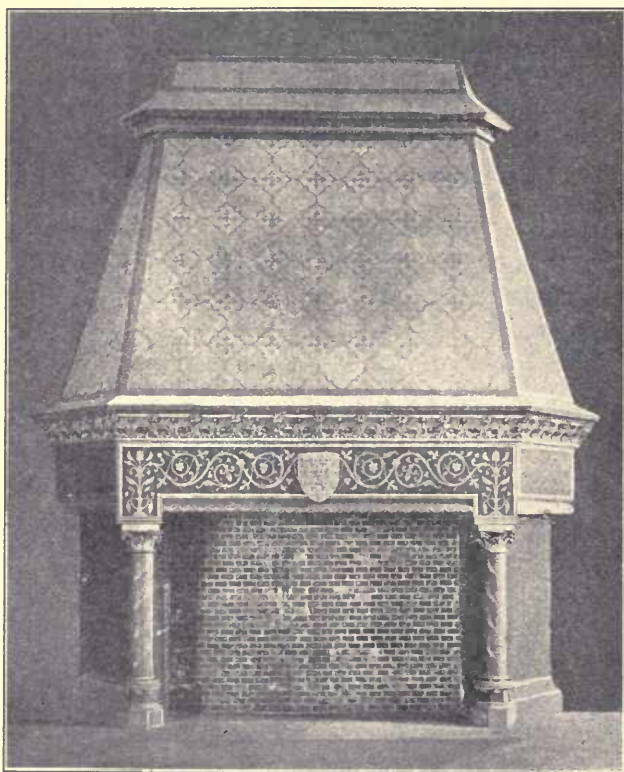
FIG. 21.

is the key of the period and style, as was the crowned porcupine a key to the style of Louis XII.   The fleur-de-lis will be found on nearly every detail connected with French royalty, as it was adopted originally by Hugh Capet, the first king of France.

If we now go into this castle and wander through its
rooms, we will find many details typical of the spirit of the
French people and suggestive of their love of display and
art.　We will be able to judge largely the period of each
particular room by the emblems characteristic of the reign.
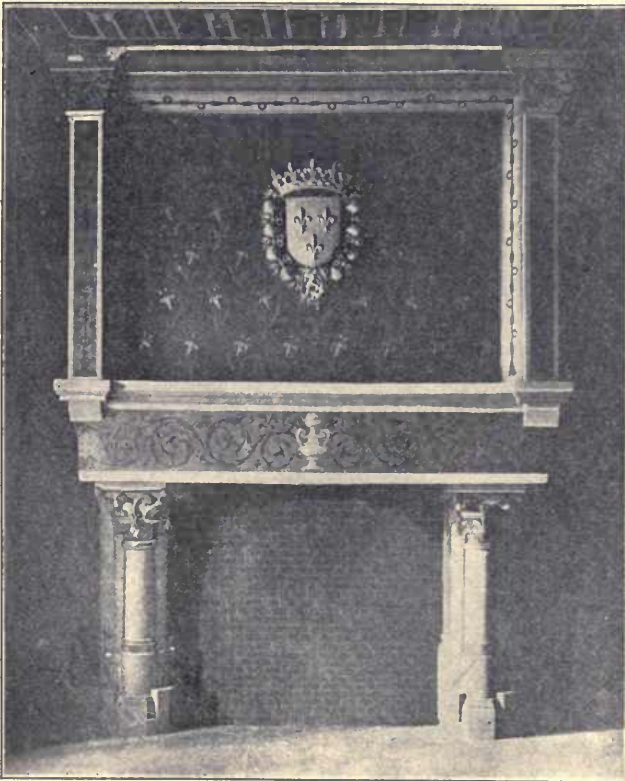
Fig. 22.

35. Development of the Fireplace.—It was about
the beginning of the Renaissance period that the chimney as
a means of carrying off the smoke was introduced into
France, and in the Château de Blois we see the full develop-
ment of the fireplace.　Therefore it will be well to make a

study of these details by themselves, inasmuch as the student can then make a better comparison.

36. In Fig. 21 is shown an old mantel that stood at the end of the great hall of the States General. Its design is Gothic in feeling, as is plainly shown by the crockets around its cornice. The columns either side of the opening are carved with Gothic capitals, and the ornament extending across the top of the opening is Gothic in its detail, though indicative of the influence of the Renaissance arabesque.

In Fig. 22 is shown a mantel of the hall of the Guards, the details each side of the opening of which, as well as the panel across the top of the opening and the frame panel over the mantel, are certainly Gothic in feeling. The pilasters at each side of the mantel, however, and the capitals at their tops, are certainly of Italian origin and design.

These two examples, particularly Fig. 21, give a good idea of the earliest ornamental mantel used in French art, and are typical of the designs in use at the close of the fifteenth century.

37. Heraldry.—In Fig. 23 is shown the mantel known as the Mantle of Crowns, on which in high relief we find the crowned porcupine emblematic of Louis XII, together with the crowned initials L and A, standing for Louis and Anne of Brittany, his queen. Around the frieze is a knotted cord that also is emblematic of Anne of Brittany, and in later years was used by some queens as a sign of widowhood. The dolphin forming the background of this mantel, and bearing the crown of France, appears as a detail in many French designs emblematic of heirship to the throne, the nearest heir to the throne in France being called the Dauphin—a word derived from the dolphin, that fish being the emblem.

Another interesting detail in this design is found above and below the knotted cord, around the frieze; above is the conventional fleur-de-lis emblematic of the kings of France, and below it is the conventional form of ermine emblematic of the queen, Anne of Brittany.

In Fig. 24 is shown another mantel from the Château de Blois, of the period of Louis XII, in which the crowned porcupine and the crowned ermine are each displayed in separate panels, the ermine in this case being shown as a complete animal instead of the conventional form representing its fur,

Fig. 23.

as displayed in the previous figure. The moldings of this mantel and its general outline and proportions are strongly suggestive of the Gothic style, but the treatment of the arabesque at each side of the panels, the carving of the three-quarter columns that mark the separate panels, and the frieze over the fireplace, show conclusively their Italian

origin. It will be observed that the initials L and A are
repeated across the top of the chimney, and the background
of the panels containing the reliefs of the porcupine and
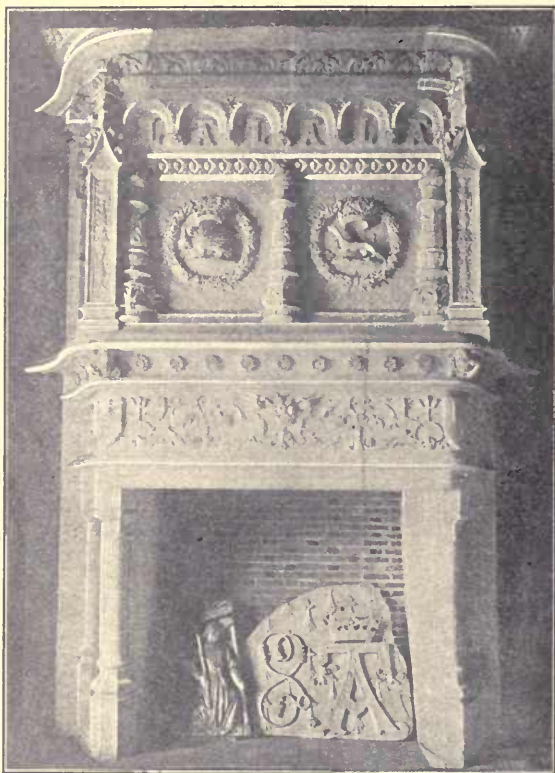
FIG. 24.

ermine are each diapered with the fleur-de-lis and conven-
tional form of ermine fur.

38. In Fig. 25 we have another mantel of this same
period, where the frieze over the top of the fireplace opening
is evenly divided between the crowned initials of the king
and queen, on a fleur-de-lis and ermine background, typical
of their houses or families. The crowned porcupine between

the two—the symbol of Louis XII—appears in nearly all
designs executed during the reign of that king. Above
the fireplace are the figures of two angels, supporting the
crown of France, and the shield bearing the escutcheons
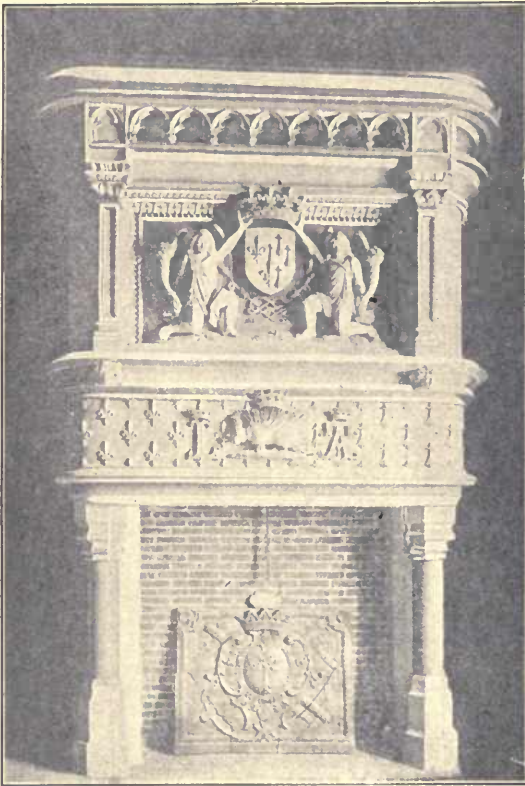
FIG. 25.

of both the king and queen. A little observation of the
detail at the top, and the moldings of the columns, will
show that the Gothic influence still pervaded the art of
the period.

In Fig. 26 is a chimney with the emblems of Anne of
Brittany. The elaborate A and knotted cords against a

background of ermine, together with the entire treatment of the design, is suggestive only of the house of the queen, undivided with that of King Louis.

Fig. 27 shows a mantel wherein no initials occur to indicate to whom or what period it belonged; but we can easily

judge from the presence of the knotted cord in each of the side panels, and the existence of this device as a border to the center panel, and its stenciled background of ermine and fleur-de-lis, over which the shield surrounded with shells has been placed.

39. In Fig. 28 is shown a mantel of the later period—
that of Francis I—a fact that is clearly declared by the pres-
ence of the *salamander* in its design, a word concerning
which might be necessary. The salamander is a mythical
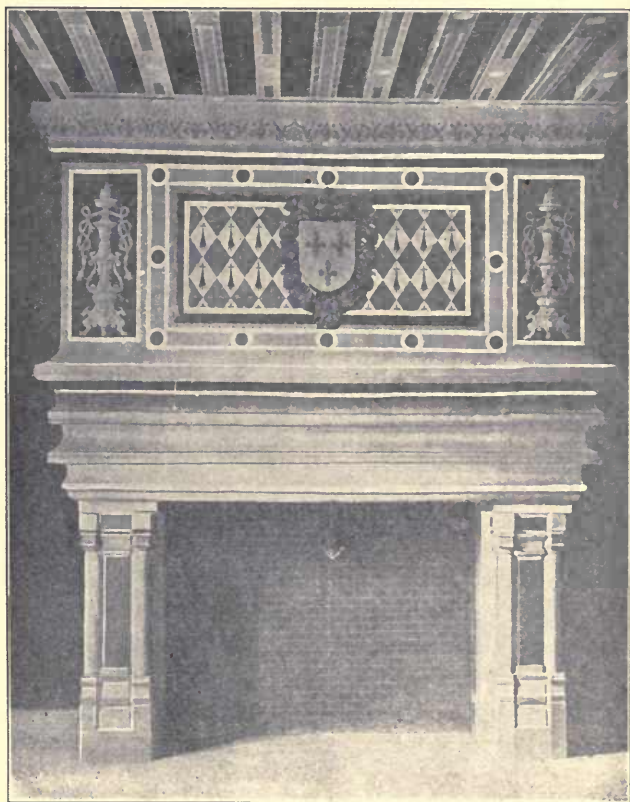
FIG. 27.

animal supposedly so cold blooded that it will actually quench
fire when placed within it, and the design here shown
expresses this idea of the salamander, standing on a bed of
coals and surrounded by flame that he is supposed to quench
by the coldness of his breath.

The details of this mantel are very classic. The capitals of the columns are derived undoubtedly from the Italian Renaissance. The acanthus leaf forming the bracket at the
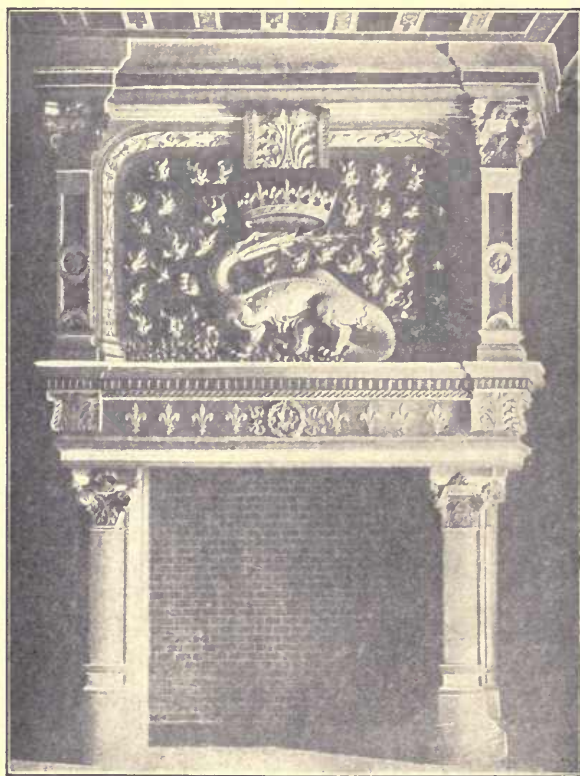
Fig. 28.

corners of the mantel, and the bracket over the crown, as a sort of clumsy keystone in the center, are decidedly Italian in their molding. The mantel is chiefly interesting by its strong personality and association with the reign, period, and person of Francis I.

40. In Fig. 29 is shown what is called the Chimney of the Fleur-de-lis, the upper background of which is stenciled

exclusively with fleur-de-lis, and bears in its center the
crowned shield surrounded by shells.

We now arrive at Fig. 30, a mantel in a room known as
the Cabinet of the Queen, and here we get the severe clas-
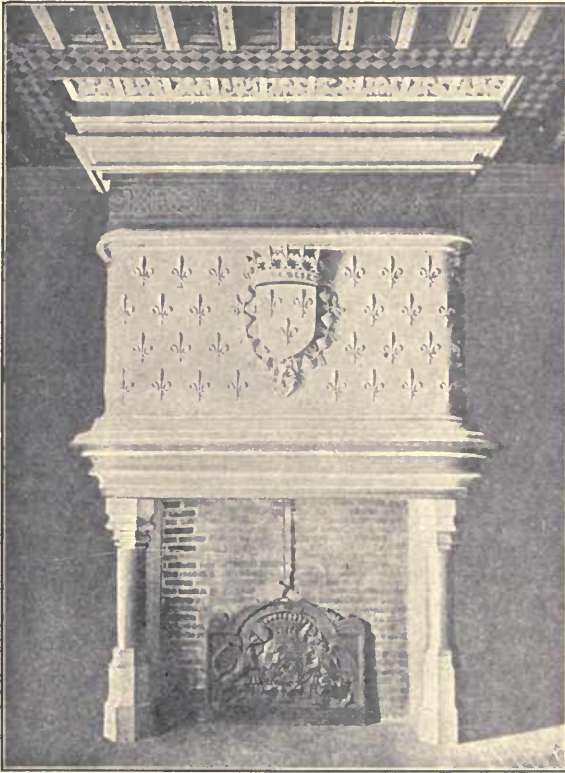
FIG. 29.

sicism characteristic of the period of Henry II.   The pilas-
ters each side of the mantel, and the panels of the wall,
all richly carved in arabesque, and the frieze over the top of
the mantel, with similar ornament, show the predominating
influence of Italian art.   The background of the upper
portion of the mantel, with its stenciled H and fleur-de-lis,

and the oval cartouch or modillion in the center, with its crowned H surrounded by laurel leaves, stamp this design characteristically with the period of Henry II, while a small cartouch in the center of the mantel over the fireplace open-ing bears the initials H and C, standing for Henry, and Catherine de Medici, his queen.

FIG. 30.

The study of these designs and escutch-eons is of particular interest to the student, as nearly all detail of the French Renaissance period can be classified easily by bearing in mind the heraldic sym-bols characteristic of each reign and period.

41. Wall and Ceil-ing Decoration.—No less interesting than the mantels of this cele-brated château are the decorations of the walls and ceilings with the characteristic surface ornament of the period. The same monograms and initials are here found in embossed leather, surrounded by richly foliated ornamentation in strong colors and gold.

In Fig. 31 is shown a room known as the King's Chamber, the walls of which are decorated with a repeating pattern at regular intervals, within which we find the initials H and C, for Henry and Catherine, the king and queen. An enlarged detail of this wall decoration is shown in Fig. 32, and is

valuable as a characteristic wall treatment of the period of
this French Renaissance.
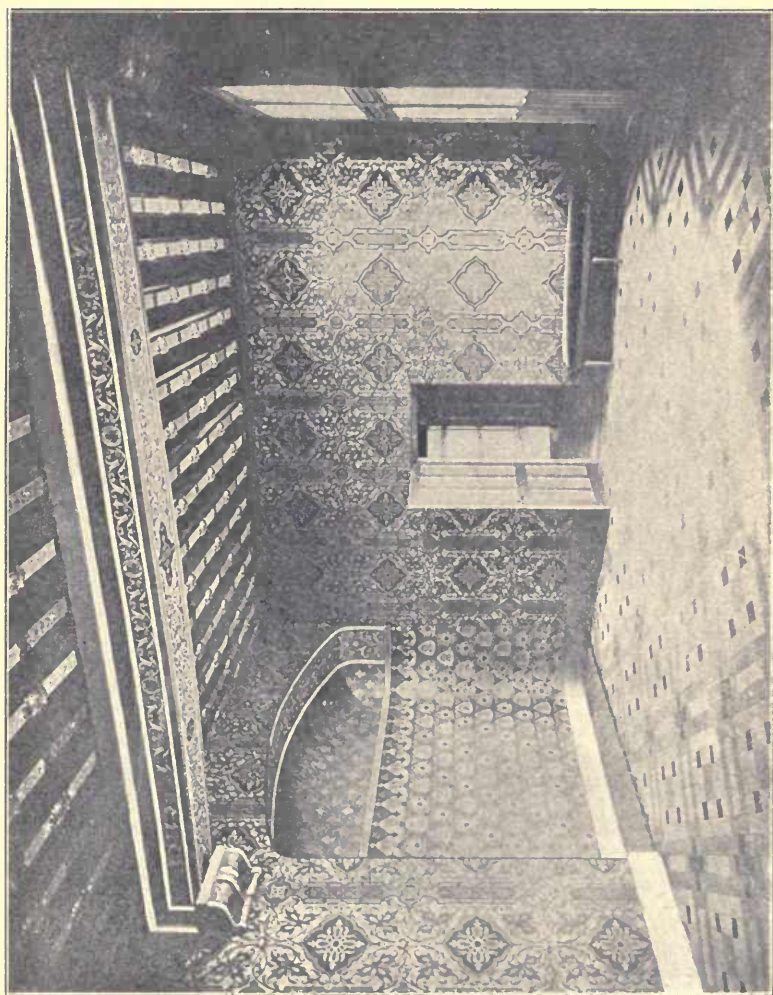
FIG. 31.

In Fig. 33, the decorations of Queen Catherine's chamber
may be seen, and it is interesting to note that in each of

these rooms there is an abrupt termination between the wall decorations of the main room and the dado or wainscot of the niche or alcove, no attempt being made to blend the two

FIG. 32.

patterns so that they die or fit into each other. The independence expressed is in perfect accordance with that already spoken of in the arrangement of the buttresses of the great staircase.

Beyond this room, through the open doorway seen in Fig. 33, is another apartment, the walls of which are treated
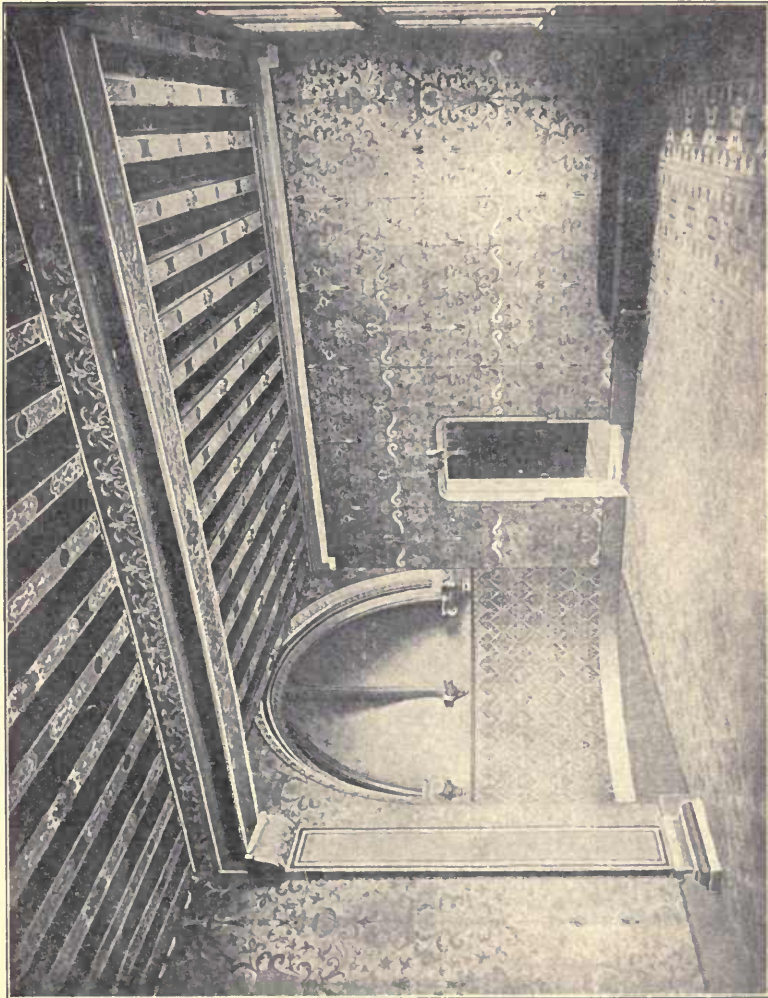
FIG. 33.

with a surface decoration shown in Fig. 34. The single letter H under the conventional crown indicates this apartment to

have been decorated in the period and style of Henry II,
and a little study of the design in comparison with Fig. 32
will show the simplicity and neatness of the earlier style as
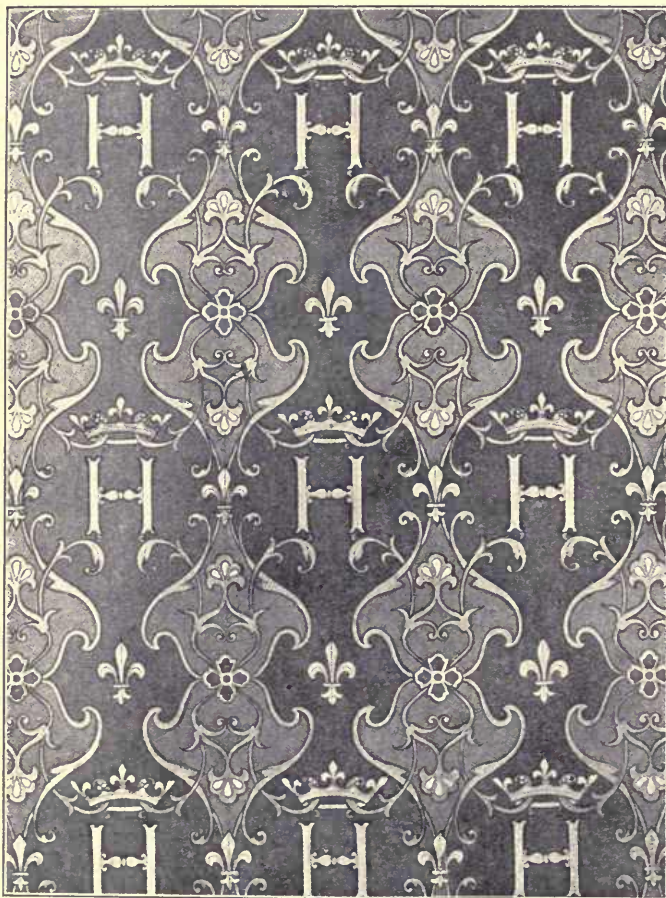
FIG. 34.

compared with the later one.　Fig. 35 shows a third example
of the wall decorations of this château.

These wall decorations are very valuable to the interior
decorator of today, inasmuch as they furnish him with a

clear suggestion of the style of interior work during the Renaissance period, of which so few examples are in existence at the present time.

FIG. 35.

42. Fontainebleau and Versailles.—During the decline of the Renaissance to the period of the Empire, the seat of government and the royal family were centered in Paris, and the palaces of Fontainebleau and Versailles are the

most important, with the exception of the Louvre, of the many palaces of France. They are both built up of sections that vary in style and age from the fourteenth century to the present day, but in each of these parts the greatest architectural interest centers in the details of the period of Francis I and his immediate successors.

The details of this style of architecture, as seen in Fontainebleau and Versailles, are more urban than those from the châteaux we have just been considering, and, though all these buildings in their proper sense were palaces, yet the two structures in present consideration were always spoken of as such, inasmuch as they were the city residences of the king in distinction from his country seat.

43. Variation of Styles.—In the rooms of these palaces can be seen the furniture and decorations whose style is typical of French art during each period of the Renaissance and at the height of its glory. Here, during the reigns of Louis XV and Louis XVI, we have the style of furniture characteristic of and known by the names of these monarchs, as well as that dainty specific style of design called *Marie Antoinette*. After the year 1662, French furniture can be roughly divided into four styles, corresponding to the four monarchs under whose influences its manufacture was carried on. These are: *Louis XIV, Louis XV, Louis XVI,* and *Napoleon*, usually called *Empire*.

As in all cases of subdivision into periods, there is a transition from one period to another that makes the styles overlap one another, and the distinctive characteristics of each cannot be applied with certainty. The dividing lines in the case of French furniture, however, are more clearly drawn than in other art details, inasmuch as each style seems to have been the result of a court fashion that depended largely on the taste of the reigning monarch.

44. Louis XIV loved pomp and grandeur, and the forms of Louis XIV furniture are bold and severe in line and proportion—a fact that kept them from appearing gaudy in

their excessive gilding. A great desire in furniture at this period was magnificence, and native woods were set aside in preference for foreign woods from India and America. Rarity of material was of more importance than any other detail, and artistic composition was now relegated to an inferior place. The effect of this was to make the details small, as the use of costly materials required that they should be treated with care and that even the smallest fragments should be used.

45. Introduction of Costly Materials.—A great difference was thus established between the old-fashioned joiner, faithful to the carving of native woods, and the cabinetmaker to the king, whose care was to produce objects of magnificence. In other words, vulgarity was introduced into the scheme of ornament, and brilliant and costly materials were used solely for their expression of brilliancy and costliness; and it is from this standpoint that French furniture of this period must be regarded. The skill lavished upon it and the fancy and variety that characterizes its design and the minuteness of its workmanship in inlaid surfaces, graven and chiseled brasses, and the ingenuity of its construction and expense, can then be appreciated.

46. Discouragement of Symmetry.—During the period of Louis XV, furniture loses the dignity of outline and proportion that characterized that of the previous style, although it possesses all the brilliancy and gaudiness of the former. Another detail of importance between these two styles is that in the Louis XIV work symmetry was not distinctly observed, as the great effect of varied light and shade was enhanced by the abruptness of unsymmetrical parts. In the period of Louis XV, this eccentricity became a law, and symmetry became not only a detail of no consequence, but a thing not to be encouraged. This caused the design to reach the height of irregularity, and the style took the name of Rococo—a term in the French language meaning frivolous.

In this eccentric ornamentation other details figured, and

roses, cornucopia, vases, scrolls, etc. are interwoven with a
great predominance of shell-like forms.   There is nothing in
the entire range of art acting as an example or prototype of
this Rococo idea.   Every shape and line throughout it is
twisted and turned until it is almost a deformity; the
ordinary acanthus scroll was carried into an endless reedy
foliation.   Nature appeared to be looked upon as a rude and
barbarous affair that needed some dressing of French taste,
and yet some specimens of Louis XV furniture impress us
both with the actual skill of the man that did the work,
whether in metal or wood, and that the pieces of furniture
are themselves marvels of decoration.   These twists and
turns, though absolutely meaningless, seem to have an object.
They reflect the light from gilded metal in a thousand
different ways, and from a thousand different points, while
the high relief affords an abundant play of light and shade
amidst this brightness.   Toward the end of the reign of
Louis XV, a reaction set in against these absurdities, sim-
ply because the exaggerated style was being carried beyond
reasonable limits.

   47.   Under the reign of Louis XVI, the furniture is
similar to that of his predecessor, inasmuch as the festoons,
garlands, gildings, and shell decorations still exist, but the
shape of the chair, and the care and study expended on it,
is very different.   Refinement is evident in every one of its
lines and proportions.   The earlier chair, with sprawling
legs—called the *cancan*—was not to be accepted during the
reign of Louis XVI, but to be departed from as widely as
circumstances would permit.   During this period, we find
none of the bandy-legged forms of the chair and table
characteristic of the previous style, but straight-turned and
sometimes fluted shafts imitative of attenuated vases or
cups, or suggestive of little columns or colonnettes.   The
gilding was used, not entirely over the surface, to increase
the gaudy appearance, but in lines, to accentuate the fluting
of the column-like legs more than to emphasize the curves
of the moldings that were turned according to Greek ideas.

48. The entire interior decoration of this period partook of a similar reformation. The panels of the rooms were divided into straight lines, and omitted all details of the rococo flourishes. These panels were painted white, and the pilasters between them were carved in rich and delicately executed arabesque.

The whole scheme of decoration of this period was equally elaborate and rich with that of its predecessors, and various articles of furniture were made of tulip wood, laburnum, or of rosewood, and on other occasions they would be executed in lighter wood, colored in various gold and brown shades by means of a hot iron. The chief ornament was marquetry of elaborate pattern, usually in floral garlands with borders of fine diaper work. The chairs, beds, and couches were usually upholstered in fine Gobelin tapestry or costly French and Italian silks, all of which were further enriched by beautiful metal mounts, while inlaid bits of Sèvres porcelain added a delicacy to the whole.

GERMAN AND ENGLISH RENAISSANCE.

49. Influence of Italian Art.—Renaissance ornament penetrated into Germany at an early period, but was not particularly popular at first, and took no hold on the hearts of the people until the spread of books and engravings prepared the way to the adaptation. From an early period there had been a steady current of artists leaving Germany to study art in Italy, and the return of these affected many of their countrymen.

50. Albert Durer, a German artist and illustrator, in many of his engravings, showed a perfect understanding of the conditions of Italian design, leaning occasionally to the Gothic style of his early master and on other occasions to the Italian style of his more recent studies. The spread of these engravings undoubtedly influenced the German taste, but, even at its best, the Renaissance of Germany was impure. The inclination of her people for

difficulties that could be solved by the hand rather than by the head soon led her into strapwork, jeweled forms, and monstrous devices more animated than graceful, but exhibiting fully the delight of the clever mechanic to execute details that were difficult to handle but easy to conceive.

51. Introduction Into England.—The introduction of Renaissance art into England dates from about the year 1518, when Henry VIII employed an Italian architect to design a monument in memory of Henry VII, which still exists in Westminster Abbey and is almost a pure example of the Italian style of that period.

The same architect designed a monument of the Countess of Richmond at Westminster, and shortly afterwards left England for Spain, leaving behind, however, a number of Italians attached to the service of Henry VIII, by whom a taste for the Italian style was thoroughly inoculated into the country. Among these was the architect John of Padua, who appears to have done more work than any of the others, among the most important of which is the old Sommerset House, built in 1549.

At the time these Italian artists were spreading a taste for Italian architecture and sculpture throughout the length and breadth of England, another influence was at work to temper this style and prevent its being accepted in its purest form.

52. Holbein.—In 1524, the celebrated German artist Holbein came to England from Holland, and to him and John of Padua is due mainly the resulting style of architecture that appeared in England during the reign of Elizabeth. Holbein was a man of great individual genius as a painter, and naturally inclined to establish the taste of the German school in England, and, though he died in 1554—thirty years after entering the country—his influence on John of Padua is plainly seen in the results of that architect during the subsequent years.

53. Dutch Influence. — At the time of Elizabeth, a number of artists came over from Holland, built several buildings, and painted many portraits, and, though these artists and architects were thoroughly imbued with a taste for Italian art, that taste was certainly affected by their Dutch surroundings and education.

Theodore Haveus, of Cleves, was architect of four gates of Caius College, in England, built toward the close of the sixteenth century, and at this time it appears that most of the Italian architects had left the country. There were many English goldsmiths and jewelers, as well as a number of artists and architects, whose names appear prominently at this time, and all this jointly had the effect of conglomerating the Dutch, Italian, and English-Gothic style of art.

54. Political Ties of England and Holland. — During the reign of Elizabeth we meet a great preponderance of Dutch names, considering that it was an English country, which is accounted for by the fact that England was bound by political and religious ties with Holland; and although the greater number of these names are applied to artists and painters, it must be borne in mind that all the arts were connected closely in those days, and artists and sculptors were frequently employed to design models for ornament and even for architecture, and, in the accessories of their own pictures, found frequent opportunity for the exhibition of ornamental design.

Michael Angelo was an artist and painted the ceiling and side walls of the Sistine Chapel, at Rome; Michael Angelo was a sculptor and carved much of the statuary that now stands in the corridors of some of the most prominent museums of Europe; Michael Angelo was an architect and completed the building of St. Peter's Church, in Rome, the most stupendous undertaking of the age and the largest structure now in existence.

55. Influences on English Art. — During the early part of Queen Elizabeth's reign, we are then justified in

concluding that a most important influence must have been exercised on English art, through the medium of the Protestant states and low countries and also of Germany.

Heidelberg Castle, in Germany, was completed about this time, and it is not unlikely that this, too, had an effect on English art, especially when we consider that Princess Elizabeth, daughter of James I of England, was queen of Bohemia, and held court at Heidelberg about the beginning of the seventeenth century. Records show that toward the close of ‘Elizabeth's reign, and about the beginning of that of James I, English artists seem to have predominated, and it would appear that at this time would be found the most likely development of a strictly native style. It is to be deplored, however, that this period of English art, known as *Jacobean*, is undoubtedly the most inartistic, inappropriate, and ill-composed in all history.

56.   Elizabethan Ornament.—Thus we may expect to meet with the purest Italian ornament during the reign of Henry VIII. During the reign of Elizabeth, his daughter, we perceive but a slight imitation of the Italian models and an almost complete adoption of the style of ornament practiced by the decorative artists of Germany and the Netherlands. In the reign of James I, Elizabeth's successor, we find this same style continued, or attempted to be continued, by the English artists, but in a large and gross manner.

57.   Characteristics.—There is little, then, that can be justly termed original in Elizabethan ornament. It consists more of an adaptation of foreign elements—an adaptation of elements with which the adapters had no intimacy, and about which they had little understanding. The characteristics of Elizabethan ornament may be described as consisting chiefly of a grotesque and complicated variety of pierced scrollwork with curled edges, as though a number of short straps were interwoven and their ends allowed to curl up; of interlaced bands, sometimes on a geometrical pattern, but more often

flowing irregularly and capriciously; bands composed of strap and nail-head ornaments; festoons of fruit and drapery interspersed with roughly executed figures of human beings; grotesque monsters and animals, with here and there large and flowing designs of natural branch and leaf ornament. High-paneled apartments often filled with designs of foliage, shields, and coats of arms, grotesque keystones in arches, and immense flowing brackets, are freely used; and the carving, whether in wood or stone, is always very roughly and crudely executed, and the design coarse and ill-adapted to the material in which it is executed.

Unlike the adoption of the Classic style in Italy and France, these ornaments are not applied to a Gothic system of construction, but the entire building is masked under a coat of plaster or other material, and the groundwork of classic simplicity is first laid, to receive the meaningless ornament that stamps the period.

58. Revival of Antique Art.—About the beginning of the sixteenth century, the revival of the **antique art,** which we have already discussed, in Italy became invigorated and reduced to a system, as we have said before, through its popular introduction afforded by the means of printing and engraving. Translations of the work of Vitruvius, copiously illustrated and ably commented upon, were printed and spread so as to become the foundation of work for every designer of eminence throughout the country, and at the same time offered a suggestion on which at least half a dozen other writers prepared treatises on architecture, among them Palladio and Vignola, whose works have been preserved and form the standard down to the present day.

59. Architecture and ornament during the period of the English Renaissance may be considered as failures from an artistic standpoint. The purest ornament developed during this great historical period we find in France, where it was uninfluenced by any foreign elements of importance except those received from Italy with the style itself.

CONCLUSION.

60. Object of Complete Reviewal of Historic Ornament.—Thus we have considered the entire range of historic ornament, from the earliest days of Egypt to the beginning of the nineteenth century. The object of this study has not been to acquire a number of forms that were characteristic of each period, that the student might copy or imitate outlines and designs of the past, in order to execute ideas characteristic of a certain historic period. The purpose has been to train the mind in order that the natural developments arising from conditions in the past can be applied to the probable conditions that would arise under similar circumstances of the present day and the future.

61. Influences Affecting Styles of Art.—It has been pointed out that religion, politics, and geography have affected the character of ornament in different countries, as well as historic influences, and at the present day we find that the majority of the ornament is affected by the inventions and advancement in science and art characteristic of the nineteenth century, as was the Renaissance period characterized by the advancement of learning in its period. In fact, the latter half of the nineteenth century has been characterized by some writers as a **New Renaissance,** if such a term can be reasonably used. It certainly bears a similar relation, to the three hundred years that preceded it, that the beginning of the Renaissance period bore to the centuries before its dawn.

62. Effect of Environments on Art and Architecture.—In the fifteenth century, we have the introduction of books to the masses of people, through the invention of the printing press and printing. A spread of desire for art and learning followed as soon as the antiquities of Rome and Greece were learned, and with this development of the human mind, a rapid advancement of civilization took place that characterizes the period as one of the most brilliant in history.

In the same manner, we have a number of inventions characteristic of the latter half of the nineteenth century that have so changed the conditions of man that his entire habits and character are different from those of his ancestors in the Renaissance period. Steam and electricity have been controlled so as to convert night into day, and make it no longer necessary to discontinue any line of work or manufacture at sunset. These same agents have rendered the distances between business centers—even on two continents—matters of only a few hours' or days' travel. Conversation between individuals a thousand miles apart is so easily maintained that it may be considered that space, from a business standpoint, is practically annihilated, and, with a hundred other inventions, we are confronted with a proposition in design today that makes the traditions and devices of past ages simply symbols of antiquity.

The modern mind is so imbued with mechanics and inventions that the present age can give little time to the study and development of a national or characteristic art. Designs of the past have been copied, and we are satisfied to imitate what has been done in this line, instead of trying to do something for ourselves. The human mind has not attempted to invent practical art forms, and years hence the study of the art of this period will be considered in much the same terms that we now consider the art of the Jacobean period in England.

63. Adherence to Old Designs. — A simple illustration of this may perhaps be seen in the ordinary chandelier, or hanging light. In the days when candles furnished all the light for rich and poor that was obtainable, it was customary that a rod or bar should hang from some portion of the room and support on its end one or more candles. The introduction of lamps to general use made it necessary that there should be a bulb or metal globe somewhere near the bottom of this rod, to be filled with oil to supply the lamp that still was suspended from the ceiling by a rod, or, occasionally, a chain. With the introduction of gas as illuminating

power, the rod was replaced by a pipe, still in imitation of the old rod, but serving the double purpose of supporting the chandelier and conveying the gas to the burner. The horizontal bars that formerly carried lamps now carry lava tips from which the gas burns, and the large round balls or globes that originally contained the oil to supply the lamp are now false, hollow devices, used to cover the joints where the vertical and horizontal bars are united.

In addition to this, elaborate designs for gas fixtures often introduced long chains from various portions of their crossbars to staples in the ceiling, suggesting that these fixtures were hung from the ceiling by chains, as the lamps of old— a clumsy deceit, inasmuch as the chains nearly always hung loose and the fixture was plainly supported by its central pipe.

From a point of design, nothing could be more inconsistent than to borrow the chain that hung the lamp of our ancestors and use it as a decorative element where it was allowed to hang in a limp curve, on account of this outline being more pleasing to the eye. The reason for this is to be found in the fact that the designer did not invent new conditions to suit the new material. Had he never known of chandeliers for candles and lamps and been called upon to design a device for gas, there is no doubt he would have done much better. His knowledge of historic ornament in lamp fixtures, therefore, did not benefit him, but injured his ability to design something original for gas, and now, with the introduction of electricity, many are continuing in the same error today.

64. All that is required for an electric-light illumination is a pair of small wires to convey the current, and a bulb in which the incandescent fiber is enclosed. The designer is free to use these two agents in any form he pleases, to elaborate them in any way he chooses, and to produce an equal illumination of a room in the simplest and most artistic way that circumstances can possibly admit. Yet, the majority of our electrolier designs are based on developments of the

old gas fixtures. or, in some instances, going back to the old candelabra of our forefathers, where tiny lights are poised on the ends of glass imitation tapers, designed with the ornament and after the style of the old dim candles of the sixteenth century, but burning with the brilliant electric illumination of the nineteenth century.

65.   Use of Historic Ornament in Designing. — In making use of historic ornament for a matter of design, there are two methods the student may legitimately pursue. He may make a design for any purpose whatsoever, which he may call after the style of Louis XII, for instance, and to carry out his idea, may honestly and confessedly borrow details from prominent châteaux or castles and carry them out with all the crude simplicity of this Medieval period. Or he may accept only the spirit of the period and produce designs that are copies of nothing that has ever existed before, but are applications of the simplicity and sternness of the necessities of that time to the change of conditions existing in his new surroundings.   In other words, he may duplicate a historic building, in some cases, to produce an emphatic suggestion of a historic period, or he may erect an entirely new structure that is designed of modern materials and with modern methods, but the spirit dominating that is similar to the spirit of the time he would have it represent.

Another illustration of this point may make it more clear. A sitting room or library that is to be decorated in the so called Gothic style need not be trimmed with antique oak, carved with deep moldings, and furnished with uncomfortable high-back chairs that run to a point, with finial and crockets, after the shape of church windows, but it can be decorated and furnished in the spirit of that period, with furniture more suitable to modern times.   It need not be oak if mahogany suits better, nor need the chairs be high back or pointed.   The treatment of this interior will consist more of an avoidance of what is wrong than of an introduction of what is absolutely correct.

Carpets on floors were practically unknown at this period, and some of the richest palaces had floor coverings of no better material than straw; but in the nineteenth century we require carpet, and our Gothic interior need not be made as crude as a barn in order to be correct; we can use hardwood floors and rugs, or if carpet is more desirable, we must avoid colors and designs that are inconsistent with the spirit of our purpose.

66. Window and Wall Ornamentation.—We must remember that glass was scarce and expensive at this time, and that in most cases the windows were large and filled with small panes—first, for the admission of sunshine and air, and, second, for economy. But glass is cheap now, and it is not necessary that we should divide our windows up into a multitude of trivial openings, in order that our panes may be small, because they were in the Gothic period. Leaded glass and stained glass existed in those days and can be used now to obtain any effect we desire that is consistent with our purpose. Walls were hung with tapestries at that time, whereas to-day the paper manufacturer has, for economical reasons, crowded the tapestry industry into a comparatively second place, except for the very wealthy. However, we can cover our walls with paper if we choose, but its design should not be suggestive of any period but the one we have in mind.

And so throughout, all our efforts may be carried out with the material we have in hand or available at the present time, if we but stop to consider the reason for certain things in the past and a reason why they should or should not be reproduced in the present.

67. This same suggestion applies to the designer of fabrics of all kinds as well as to the decorator, and, whether executing a design for a carpet, wall paper, dress fabric, or linen damask, it is a simpler matter, if its practice is once started, to imitate the spirit of any age or style than it is to attempt to copy the elements of existing designs.

HISTORIC LETTERING.

68. Lettering does not in reality form a part of Historic Ornament as the various other ornamental details do, but it is here introduced with the explanation of the characteristics of each style, in order that it may be associated with the ornamental style of each characteristic period. We all know that there was no such style of alphabet as we term Antique Egyptian extant in ancient Egypt, but we do find letters of this character in certain Roman works executed at a late period on Egyptian soil, and it is from these that it derives its name. The styles of letter here given must all be accepted with a certain amount of liberality, as each, though in harmony with the period it represents, has certain modern characteristics introduced for purely commercial advantages.

69. The practical designer is frequently called upon to execute ornamental lettering appropriate to some historic style and in harmony with some practical purpose. For this reason the student is herewith given a number of useful alphabets, with a brief description of each, that will enable him to execute the outlines of each letter properly and proportion them according to rules. The titles given to these alphabets are names by which they are known in modern use and explain themselves.

There is no rule by which one can determine what style of letter is best suited to each particular purpose, but it is well to bear in mind that legibility is always the first consideration, and where the lettering of a design is intended to convey direct information, as in a sign or piece of advertising matter, the lettering should be simple and clear in order that the purpose of the design may not fail. On the other hand, where the lettering is for a certificate, diploma, memorial, or other piece of matter that is more ornamental than instructive, the lettering may be elaborated to any degree within reasonable limits. The relative amount of space covered by letters and background is a matter of design that is considered in the same manner as spotting,

ANTIQUE EGYPTIAN

ABCDEFGHIJKL
MNOPQRSTUVWX
YZ 123456789

abcdefghijklmn
opqrstuvwxyz
&

FIG. 36.

and the proportions of letters to each other must also be considered in the composition of the design, as matters of the principal and subordinate parts of the same design, all of which will be more fully explained hereafter.

Elaboration of letters or the use of elaborate letters does not enhance either the beauty or the value of the design unless these letters are used intelligently, and a plain letter correctly and intelligently proportioned will produce a much more pleasing effect than the most elaborate style badly and ignorantly arranged.

ANTIQUE EGYPTIAN ALPHABET.

70. This letter, Fig. 36, is almost identical with the plain Egyptian, the distinction being in the addition of the spur at the angles of the letters, but no variation occurs in the proportion of the letter or its stroke. The **stroke** of a letter is the proportional width of its heavy lines in comparison with its height. In this letter the stroke is one-fifth the height, as shown by the small squares in which the letter surface is divided. Some designers make the spur much more exaggerated than is shown on this plate, while others make it scarcely perceptible. The examples given herewith, however, may be taken as an average, wherein the spur projects about one-third the width of the stroke. All letters having a horizontal stroke, as the *E*, *L*, etc., have these strokes finished with a beveled end, on which the spur is added at the same angle. The ends of the strokes of the *C* and the upper stroke of the *G* and *S*, and figures *2*, *3*, *5*, *6*, and *9* are beveled at an angle opposite to that of the other letters referred to above. This bevel, shown on the upper terminal of *C*, is made by drawing a line from a point one-fourth the width of the stroke to the right of *5 a* to a point one-third the width of the stroke to the left of *5 c*. The points *5 a* and *5 c* refer to the intersection of the fifth vertical line from the left side of the letter, with the third horizontal line marked *c*.

The middle bar of the *A* is the width of the stroke below

the center; the middle bar of the *H* is one-half the width of
the stroke above the center; while the middle bars of the *E*
and *F* are exactly in the center.   The *J* is finished with a
spur at *5 c*, as well as just above *1 c*.   The points that deter-
mine the inclination of the strokes of the *K* are from *5 a* to
two-thirds the width of the stroke below *2 d*, and from *4 f* to
the intersection of the upper slanting stroke with line *3* one-
third the width of the stroke above *d*.   The two slanting
strokes of the *M* meet in the center of the letter at a point
on line *f*, and no spurs exist on the insides of the slanting
strokes at the top.   The tail of the *Q* is cut on an angle of
45 degrees, the shorter side being the width of the stroke in
length and the longer side being equal to the distance from
2 c to *3 f*.   The tail of the *R* is a slanting stroke; the points
of contact are *4 d* to *5 f*.   The strokes of the *W* come to a
point on line *a* to correspond with the *M*.   The corner of
the *Z* is beveled off at about the same angle as the interior
of the *5* and the top of the character &.   The long slanting
stroke of the character & is drawn from a point one-half the
width of the stroke to the left and below *1 a* to a point one-
half the width of the stroke to the right of *4 f*.   The corre-
sponding, or upper, slanting stroke, from its top to the
beginning of the curve, is made from a point one-half the
width of the stroke to the right and below *4 a* to a point *2 d*.
The other slanting stroke intersects the long stroke the
width of the stroke below this point and is parallel with the
upper stroke, finishing on line *c*.   The curve by which these
strokes are united is three-fourths the width of the stroke to
the left of line *1* at *c*.   The middle bar of the numeral *3* is
beveled at a slight angle, as shown.   The character of the
numeral *5* is changed at the point where the vertical stroke
joins the curved bottom portion of the numeral *5*.   The
point added below the line *d* is necessary to fill out the space
to the line of the curve.   The numerals *6*, *8*, and *9* are about
one-third the width of the stroke wider than the other char-
aracters, but are similar in other respects to the same
numerals in the plain Egyptian alphabet.

   The lower-case letters are, in many respects, the same as

those in the plain Egyptian alphabet, although many exceptions occur. All strokes extending above the line *a* are cut at an angle of 60 degrees, to which the spur is added at the same angle. This characteristic is also observable on letters of shorter height, such as the *i*, *j*, *m*, *n*, etc., but the ends of the strokes of all letters extending below the line are finished without this detail.

LIGHT ANTIQUE EGYPTIAN ALPHABET.

71. The difference between the alphabet shown in Fig. 37 and that shown in Fig. 36 is almost entirely in the weight of the stroke. The capital letters and figures of this alphabet are one-fourth higher than wide, with the exception of the letters *A*, *M*, *O*, *Q*, *S*, *W*, etc., which are wider than the others, and the letters *I*, *L*, and *N*, which are narrower.

On the top line we have, in *A*, a letter whose width is equal to its height, and in *I* a letter whose width is but three thirty-seconds its height. The cross-bar of the *A* is two and two-thirds strokes above the bottom line, and the curved line at the top and to the left of *A* is a short pen or brush stroke termed the cyma, on account of its resemblance to the curve of the Greek moldings of that name. The purpose of the cyma in lettering is to fill the space between the slanting parts of the letters, or extremities of letters where wide openings are likely to appear where the letters are placed together. It is also used as an integral part of some letters, as in the *Q* and lower part of the *Z*. In other styles of lettering the cyma is frequently used as a structural part of many letters, particularly in the Old English alphabet. On the letter *A* the cyma is eight strokes in length and is located one stroke to the left of the upper point of the *A*.

The letter *B* is fashioned so that its lower portion to the middle of bar is eight strokes above the bottom line, and projects one stroke to the right of the upper portion. As far as it goes, the letter *C* is a perfect arc of a circle, and the spur on the inside is about two strokes from the top line. The

ANTIQUE EGYPTIAN, (Light)

ABCDEFGHIJKLl
MNOPQRSTUVW
1234 5 · X Y Z · 6789
&
abcdefghijklmnopqrstuvwxyz

FIG. 37.

lower extremity of the letter projects a stroke beyond the
top and finishes at a point about three strokes above the
lower line. The right side of the letter D is semicircular
and becomes tangent at the top and bottom three strokes to
the right of the vertical. E, F, G, and H each possess a
middle bar that is located four strokes below the top of the
letter, and in the letters E and F this middle bar extends to
within three strokes of the right extremity of the letter. In
K the slanting stroke begins three strokes above the lower
line and extends to the top line where the end is beveled at
an angle of about sixty degrees. The letter L is about one
stroke narrower than the other letters, and the cyma is
placed over it so that its lower extremity is even with the
right-hand portion of the letter.' M is two strokes wider
than the other letters, and in some cases is made precisely
like an inverted W, except at the union of the two slanting
strokes where the letter is finished flat with a spur instead of
being pointed as in the W. Here the middle strokes of the
M are brought to a point one-half the width of the letter
below the top line. The slanting stroke of the N commences
on the vertical stroke one-fourth the width of the letter
below the bottom line. The loops of the P and R are very
different in style, the middle bar of the P being four and
two-thirds strokes from the bottom line, while the middle
stroke of the R is six and two-thirds strokes above the bottom
line. The tail of the R intersects the middle bar at a point
where the curve becomes tangent. The letter S curves in
each direction from a point in the center of the letter on a
line with the middle bar of the R, and this letter is narrower
at the top than at the bottom and can be enclosed in an
isosceles triangle whose height is about three times the
height of the letter. The W is precisely the same as two
V's joined at a point two and two-thirds strokes below the
top line. The vertical stroke of the Y extends six and two-
thirds strokes above the bottom line, the letter being twelve
strokes wide on the top. The X is nine strokes wide on
top and thirteen strokes wide on the bottom. The letter Z
is the same width as the average letters on top, but it may

ANTIQUE EGYPTIAN (HEAVY)

ABCDEFGHI
JKLMNOPQR
STUVWXYZ&
123456789

Fig. 38.

be finished either with the cyma as shown here, or with a bottom corresponding in detail to the top, as the fancy dictates.

The figures are of the average width of the letters, the $\mathcal{3}$ being similar to the S, and the Z to the 7. The lower-case letters are easily constructed, as shown.

HEAVY ANTIQUE EGYPTIAN ALPHABET.

72. The style of letter shown in Fig. 38 is the heavy extreme of the Antique Egyptian style, in the same manner that Fig. 37 was the light extreme of this style. Between these two extremes the style may be varied to almost any extent, slight variations in the form of letter being necessary to suit the different conditions. The Heavy Antique Egyptian, however, is rarely used as a solid black letter as shown in this figure, and is only so printed here in order to preserve uniformity in the alphabets.

In much design work this letter is found in simple outline, and though extremely bulky on account of the weight of its stroke, it may be gracefully handled and elaborately ornamented to produce a most pleasing effect. The stroke in the Antique Egyptian alphabet should not exceed one-third the full width of the average letter, which is the extreme illustrated in this case, and it will be observed that with this heavy stroke it is necessary that certain letters, such as the K, S, V, W, etc., be carried beyond the limiting top and bottom lines, in order that the full outline of the letter may be shown without confusion of parts. In some places, too, it will be found necessary to diminish the width of the stroke in order to leave necessary space between strokes, and other variations may be indulged to suit specific circumstances.

MEDIEVAL ROMAN ALPHABET.

73. This style of letter, by many authorities, is termed the Antique Roman, but it belongs to the historic period indicated by its name. The Medieval Roman alphabet as

MEDIEVAL ROMAN

ABCDEFGHI
JKLMNOPQR
STUVWXYZ&
1234567890

shown in Fig. 39 possesses three distinct and characteristic features. First, there is a small spur that projects above and below the lettering lines, and there is another projection of the inside line of the stroke beyond the fine line for a distance of about one-third the stroke, as in the top of the letter A and the bottom of the letter N; and besides these, every angle between a stroke and a fine line is rounded. The width of the stroke here is from one-fourth to one-fifth the height of the letter, and the spur is one stroke long and is joined to the letter one stroke above the bottom, or below the top line, thus making the curve on the inside an exact quarter circle.

All letters average five strokes in width, with the exception of such letters as have heretofore been described as varying from the regular limits. In the letter A the fine line intersects the stroke at the point of the letter, and though on its inside the stroke is carried past the fine line, the intersection takes place precisely as though this peculiarity did not exist. The horizontal fine line of the A is one and one-fourth strokes above the bottom of the letter.

LIGHT AND HEAVY FRENCH ROMAN ALPHABET.

74. In modern usage the Roman alphabet is varied somewhat to suit certain purposes. One of these variations, called the "New York Roman," adheres in outline very closely to the original Medieval form with the exception of the projecting spur of the stroke beyond the fine line. Another variation, known as the "French Roman," differs from its prototype by increasing the weight of the fine line in order that it may be better expressed in carved stonework, etc. The variations of these three styles, from an extremely light letter to an extremely heavy letter, is practiced by all designers, but the similarity is such that we only give the normal conditions of the Medieval Roman and extreme conditions of the French.

In Fig. 40 is shown the Light French Roman alphabet,

FRENCH ROMAN. (Light)

ABCDEFGHI
JKLMNOPQR
STUVWXYZ&
123456789

FIG. 40.

:FRENCH:ROMAN:(HEAVY.)

ABCDEFG
HIJKLMN
OPQRSTU
VWXYZ&

FIG. 41.

FRENCH ROMAN

abcdefghijklmnopqrstuvwxyz

ROMAN NUMERALS

I II III IIII IV V VI VII VIII IX X XX XL C D M·

MEDIEVAL ROMAN

abcdefghijklmnopqrstuvwxyz
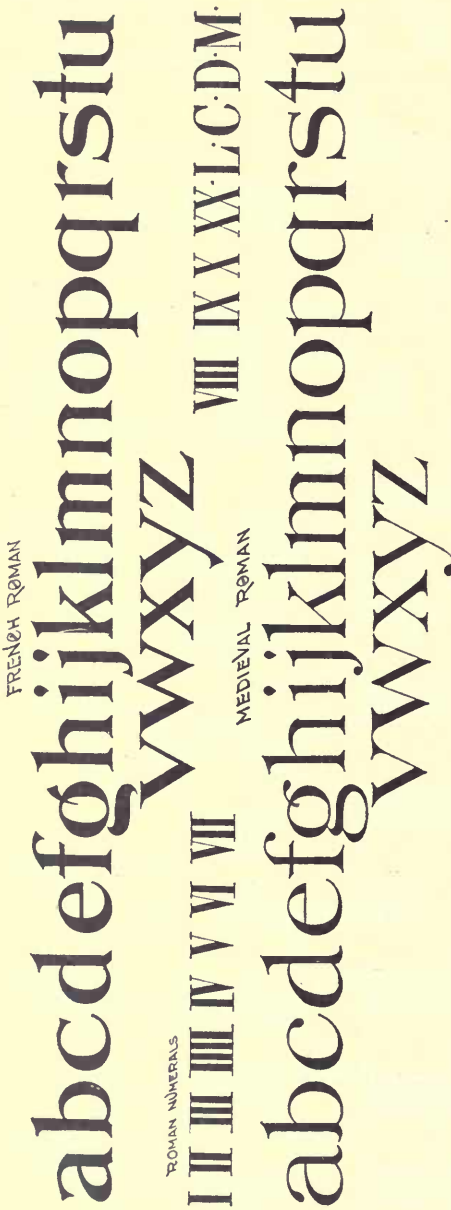
Fig. 42.

and this fills the same position in the variation of the alphabet as the Light Antique Egyptian. In giving the letter weight, as shown in Fig. 41, certain liberties are taken with the fine lines, as shown in the lower strokes of the E, L, and Z.

In using these Roman alphabets, care must be taken to have the lower-case letters well proportioned in the weights of their strokes with the capitals that are used. In Fig. 42 are shown the lower-case letters of the French Roman and the Medieval Roman alphabets, the former, it will be observed, possessing a much heavier stroke. These lower-case letters in Fig. 42 are proportioned for the normal condition

of alphabet, and where used with the heavy or light alphabet, they must be increased or diminished in stroke accordingly. The use of the Roman numerals with these alphabets is by no means essential, but the numerals are given here in order that the proportionate stroke may be observed. There are many cases where the use of the Medieval Roman alphabet is appropriate beyond all other alphabets, and it is usual that in such cases the Roman numerals be used.

GOTHIC ALPHABET.

75. The style of letter we term "Gothic" was designed during the latter part of the Medieval period and is associated both historically and architecturally with the style of Gothic architecture that existed during the Flamboyant period in France and the Perpendicular period in England. In modern use this letter is largely applied to church decoration for the purpose of making religious quotations, and is also used in printing for certain kinds of literature on account of its origin in ancient monasteries. It is similar but much more easily read than what we term "Church Text," and is, therefore, given here to the exclusion of the latter, as it is much more serviceable.

In Fig. 43 the capital and lower-case letters, as well as the figures, are shown, and the distinguishing characteristics of this style lie in the peculiar formation of the letters A, C, E, F, H, J, and U. The letters A, M, N, etc. do not possess any slanting strokes as they do in the Roman alphabets, but are formed with a vertical stroke as one of their sides and curved strokes for the rest of the outline. The letters C and E are closed on their right sides by a vertical line ending in small dots or volutes, the line on E being longer than that on the C. The F is similar in general outline to the capital F of the Roman styles, but carries its spur on the upper fine line below the bottom of the letter itself. The capital H is but slightly varied from the lower-case h, and the J is peculiar in its general details to

Gothic

ABCDEFGHIJ
KLMNOPQRS
TUVWXYZ
1234567890

abcdefghijklmnopqrsturwxyz

Fig. 43

16TH CENTURY

A B C D E F G

H I J K L M

N O P Q R S T

U V W X Y Z

FIG. 44.

HENRY VII
(WESTMINSTER ABBEY.)

A B C D E F G H
I J K L M
N O P Q R S T U
V W X Y Z

FIG. 45.

this style of alphabet. Other details of peculiarity exhibit themselves to the student as he studies this style. This letter is frequently elaborated in certificate and engrossing work, by means of shading and elaborate backgrounds, and some proportions of the letters may be slightly changed in order to suit them to particular circumstances.

A later development of this alphabet is shown in Fig. 44, where the letters *A*, *M*, *N*, etc. partake of the same characteristics as the Roman letter, while the peculiar ogival form of outline characteristic of the Gothic style is maintained in all of the curves in the stroke. A strong characteristic difference, however, between the alphabet in Fig. 43 and that in Fig. 44 is that in the former all the fine lines are straight and in the latter all of the fine lines are curved, except in the *A*, *K*, *M*, etc. This style of letter, usually termed "16th Century," is suitable where more elaboration is required than the Gothic style permits, and is seldom used for church work as it is associated with that period of archi-tecture when the building of churches was in its decline.

Another style of letter that had its origin, also, in the Gothic is illustrated in Fig. 45 and is termed "Henry VII" inasmuch as the only existing example of this work is to be seen in the Henry VII Chapel at Westminster Abbey. As a matter of fact, this is technically a Renaissance style, although like all early Renaissance art it developed from the Gothic. The tendency to elaboration and the intro-duction of meaningless curves and forms is characteristic of this period, but the style of alphabet when properly treated affords a very valuable means of enriching a design that is composed almost entirely of lettering work.

OLD ENGLISH ALPHABET.

76. A standard alphabet that has ever been popular and is ever serviceable under certain conditions is the Old English, shown in Fig. 46. There can be little doubt that this bears a close relation to the Gothic alphabet, and,

Old English

ABCDEFGHIJK
LMNOPQRSTUVW
XYZ &
abcdefghijklmnopqr
stuvwxyz

Fig. 46.

indeed, its lower-case letters are very similar to the Gothic; and, though it is much used in church work and in the designing of certificates and other engrossed documents, it is not as legible as the Gothic alphabet and is more suitable for conditions where ornamentation is required rather than clear information.

It will be observed in this alphabet that the cyma forms a marked characteristic in each of the letters. For instance, in the letter E nearly all the strokes are composed of at least a portion of the cyma. Certain letters are very hard to distinguish from one another in this alphabet, and care should be taken to remember the distinguishing characteristics of each in order that they may be rendered without referring constantly to the copy. In some forms of alphabet, the C and the E are almost identical, the exception between the two letters being that the E contains a solid stroke where the two horizontal fine lines exist in the C. We think it preferable, however, to use the form of E shown in Fig. 46, although this is somewhat confusing when compared with the F. It will be observed that the vertical stroke of the F is a straight stroke and not a cyma as in the E, and that a fine line connecting the upper spur of the F with the main stroke is straight instead of a curved continuation of a cyma as in the letter E. T and U are also difficult to distinguish in some styles of alphabet, and study should be given to the formation of the I and J in order that they may not become confusing.

A little consideration of these letters will show the student that there are only three or four different styles of stroke and that many different letters are formed simply by the addition of some detail of other letters. For instance, the letter E differs but slightly from the letter L, except in the addition of its center spur, and the left-hand portion of the letter M is almost identical with the letter I. Similar resemblances will be found in many other letters, such as the Q, R, etc., and the Z, though shown on this plate with a compound final stroke, is often drawn with a top and bottom of the same character.

The lower-case letters are similar to the lower-case letters of the Gothic alphabet, except that they are somewhat heavier in their stroke, but for all practical purposes the two styles are so near alike in their lower case that one is frequently used with the other without invoking any severe criticism.

77. In making use of these alphabets in design, it has been customary to associate all the Roman styles with Classic and Renaissance art and to use the Gothic and "16th Century" with Medieval art; while the Henry VII and Old English are used both in Medieval and Renaissance art. There are cases where one style of letter may be used perfectly proper in another style of art, but care must be given to this consideration when the mixture of styles is attempted, as it will readily be seen that there is nothing particularly incongruous about using the Roman letter in Renaissance art, or even in Gothic art, but a Gothic letter would be highly out of place in Classic art no matter what were the circumstances.   The reason for this should be clear, as the Gothic architect might have inherited some knowledge of the Roman letter and used it in his designs, but it would be utterly impossible for the Roman designer to borrow a letter of the Gothic style inasmuch as that letter had not been invented during the period of the Roman architectural styles.

78. The initial letters that are woven in many of the designs of French Renaissance art usually tend toward the character of the French Roman, and the interwoven initials of H and C in the wall decoration shown in Fig. 32 are borrowed from the style we have herein described as French Roman, and comparison of other initials that will be found carved in the stonework of the mantels illustrated in the foregoing pages will indicate that they have all been adapted to their modern purpose from the more ancient style of classic letter.

A SERIES

QUESTIONS

RELATING TO THE SUBJECTS
TREATED OF IN THIS VOLUME.

———

It will be noticed that the various Question Papers that
follow have been given the same section numbers as the
Instruction Papers to which they refer. No attempt should
be made to answer any of the questions until the Instruc-
tion Paper having the same section number as the Question
Paper in which the questions occur has been carefully
studied.

HISTORIC ORNAMENT.

(PART 1.)

(1) (*a*) How many types of people were there among the Egyptians ? (*b*) Describe each.

(2) What natural types are found in Assyrian ornament ?

(3) (*a*) How many moldings are there in Greek architecture ? (*b*) Make a sketch of the outline of each molding, with its name under it. (These outlines should be about 1 inch high.)

(4) (*a*) Who were the Etruscans? (*b*) What nation was largely affected by their art ? (*c*) What class of work did they excel in ?

(5) (*a*) What two plant forms play a conspicuous part in Egyptian ornament ? (*b*) Make a sketch of either one of them and describe the other one.

(6) How is Assyrian sculptured ornament inferior to the Egyptian ?

(7) State the difference between *ornament* and *decoration*.

(8) (*a*) What is the winged disk ? (*b*) What does it signify ? (*c*) To what style of ornament does it belong ? (*d*) Of what class of ornament is it ?

(9) Make a sketch, about 2 inches high, showing the Assyrian rendering of the Egyptian lotus.

§ 3

(10) (*a*) Where is the torus molding most frequently used? (*b*) Where is the echinus molding most frequently used? (*c*) Where is the cyma recta most frequently used?

(11) What is meant by the term *conventionalism?*

(12) (*a*) What is a scarabæus? (*b*) To what style of ornament does it belong?

(13) What great geographical differences were there between Greece and Egypt?

(14) What is the principal Greek building in the Doric order?

(15) (*a*) Should a floral design on a textile fabric be as close an imitation of the natural plant as is possible? (*b*) Why?

(16) Into what three classes is Egyptian ornament divided?

(17) Describe the character of the Greeks as a nation.

(18) Make a drawing 2 inches high of the Greek anthemion.

(19) How should color be used in decorative design?

(20) Describe Egyptian carved ornament.

(21) How does Greek art differ from Egyptian and Assyrian art?

(22) Make a drawing 2 inches high of the Greek lily.

(23) What was the origin of the fixed styles of ornament?

(24) Describe the preparation of a body for burial, as practiced among the ancient Egyptians.

(25) (*a*) In what does the beauty of Greek ornament lie most largely ? (*b*) What characteristic that is prominent in Egyptian art does it lack ?

(26) What is a guilloche ?

(27) Of what advantage is the study of historic ornament ?

(28) What is the scroll ornament, as seen in Egyptian art, considered to be symbolic of ?

(29) To what do the leaves of the Greek flowers owe their form and shape ?

(30) What is polychromy ?

(31) What natural phenomenon had a marked effect on Egyptian ornament ?

(32) Make a sketch, about 2 inches by 3 inches, of characteristic Egyptian ornament based on a combination of circles and ornamented with lotus-flower devices.

(33) What are the three great laws of nature observed by the Greek artist in his ornament ?

(34) Describe the colors used, and the location of each, in the Grecian-Doric order.

(35) What peculiarity does Egyptian ornament possess over all other styles ?

(36) (*a*) What colors were used in Egyptian ornament ? (*b*) Why was it necessary to use bright colors ?

(37) (*a*) What are antefixæ; and (*b*) from what derived ?

(38) (*a*) What are the three Greek orders ? (*b*) What is the distinguishing characteristic of each ?

(39) From what country was the ornament of Assyria borrowed ?

(40) What is a propylon ?

(41) How are the contours of Greek moldings profiled ?

(42) What objects standing in front of the Egyptian temples are characteristic of this style of art ?

(43) Draw a hyperbola.

HISTORIC ORNAMENT.

(PART 2.)

(1) What great religious difference existed between the Arabs and the Persians?

(2) What other nations carry out the same principles of surface decoration that we find in Indian art?

(3) In painted Byzantine ornament, of what does the ground almost universally consist?

(4) (*a*) Romanesque ornament in Eastern Europe was affected by the art of what other countries? (*b*) Into what style of art did the Romanesque develop under this influence?

(5) What is a modillion?

(6) What products of Persian design are still considered the finest in the world?

(7) What is the relationship that exists between Byzantine and Arabian ornament?

(8) What is the relative importance of sculpture in Byzantine and Romanesque art?

(9) Why is the distinction between Roman and Greek art so much more clearly marked than that between Byzantine and Romanesque?

§ 4

(10) (*a*) What is the essential difference between the Roman-Corinthian order and the Roman-Composite order? (*b*) For what reason was the Composite order originally designed?

(11) What are the characteristics of Celtic ornament?

(12) From what did the Moorish style spring?

(13) What are the restrictions of the Mohammedan religion in relation to decorative design?

(14) What is the relation of mosaic work and painted work in Byzantine and Romanesque art?

(15) (*a*) What is the earliest monument in the Byzantine style? (*b*) When was it built?

(16) What is the difference between the treatment of the acanthus leaves at the top of a Roman-Corinthian column and the lotus leaves at the top of an Egyptian column?

(17) What is the principal building in Moorish architecture?

(18) What peculiar personal characteristics of the oriental people affect the progress of their arts?

(19) (*a*) What building stands as prominently characteristic of Byzantine art as the Parthenon does of Greek art? (*b*) For what is the building now used?

(20) What is the essential characteristic of all Roman ornament?

(21) What characteristic does Moorish ornament lack?

(22) To what can we trace the predominance of geometrical ornament in all Mohammedan designs?

(23) Aside from coloring, what is the first element of beauty in Chinese art?

(24)   * Make a sketch of a Byzantine capital.

(25)   At the time of its fall, how much of the continent of Europe did the Roman Empire cover ?

(26)   (*a*) What colors were used by the Moors, and (*b*) how were they arranged in wall treatment, to accord with natural laws ?

(27)   Describe the capitals of the columns in (*a*) the Early English period; (*b*) the Decorated period; (*c*) the Perpendicular period.

(28)   * Make a sketch of Arabian geometrical ornament suitable for mosaic work.

(29)   In Indian woven fabrics, what rules are observed under the following conditions: (*a*) How are colored grounds treated when gold ornaments are used, or where gold is used in large masses ?   (*b*) How is the ground treated when gold ornament is used alone ?   (*c*) When ornaments of one color are used on a ground of a contrasting color, what is the general rule ?   (*d*) When colored ornaments are used on a gold ground, how are they separated sharply from the ground ?

(30)   * Make a sketch of Byzantine running ornament or surface decoration.

(31)   What conditions gave rise to the Romanesque style ?

(32)   * Make a sketch of Moorish geometrical interlaced ornament.

(33)   What was the first Mohammedan nation to adopt European fashions in architecture ?

(34)   Why are examples of Byzantine art, as found on Greek soil, usually purer in style than others ?

---

* All sketches are to be about 2 inches square.

(35) (*a*) In what year occurred the fall of Rome? (*b*) How did this affect the art of Eastern and Western Europe?

(36) In what monuments was Roman art mostly expressed?

(37) In what class of work do we find the only ornament that is strictly Turkish in character?

(38) What object appears to have been maintained in the woven fabric of Indian manufacture concerning the definition of each object, and the effect of colored objects viewed at a distance?

(39) What are the characteristics of Byzantine carved ornament?

(40) What was the period of highest development in all architecture?

(41) What structural problem underlies the system of Romanesque design?

(42) Why was modification necessary when the Romans adopted the Greek orders?

(43) (*a*) Can the designs observable in Turkish carpets be considered characteristic Turkish designs? (*b*) Why?

(44) * Make a sketch of the capital of an early Roman-esque column.

(45) (*a*) Name the five orders of architecture. (*b*) Which of these are essentially Roman?

(46) What are the most prominent colors in Turkish ornament?

---

* All sketches are to be about 2 inches square.

(47)   How do Byzantine mosaics differ from Roman mosaics?

(48)   Why are Romanesque forms so simple?

(49)   In what colors do modern Turkish ornament and ancient Turkish ornament differ?

(50)   Give the characteristics (*a*) of the Greek-Ionic order; (*b*) of the Roman-Doric order.

HISTORIC ORNAMENT.

---

(1)   Into what four styles can French furniture be divided after the middle of the seventeenth century ?

(2)   What are the characteristic differences between the feudal castle and the Renaissance château ?

(3)   What effect did the invention of printing and the printing press have on the development of Renaissance art ?

(4)   Execute your name in letters of the Old English alphabet.

(5)   (*a*) Make a sketch of some heraldic device characteristic of Francis I period; (*b*) Henry II period.

(6)   Describe the furniture of the Louis XIV period.

(7)   What is the largest and most important of the French châteaux ?

(8)   What is meant by (*a*) basso rilievo ? (*b*) mezzo rilievo ? (*c*) alto rilievo ? (*d*) By whom were they first practiced ?

(9)   Describe the decorations of the molded work and panels in the three periods of English architecture.

(10)   Make a sketch, 2 inches square, showing an example of Celtic interlaced work.

§ 5

(11)   Describe the furniture of the Louis XV period.

(12)   What idea did the French artists conceive of the Romans' use of the Greek orders ?

(13)   What great painting did Michael Angelo execute in 1541 ?

(14)   Describe the diapers and wall decorations of the three periods of English art.

(15)   Where do we find the purest forms of Gothic ornament ?

(16)   Describe the furniture of the Louis XVI period.

(17)   What was the heraldic device of Francis I ?

(18)   What two famous statues did Michael Angelo design for Pope Julius II ?

(19)   Print the title '' Historic Ornament '' in letters of the Medieval Roman alphabet.

(20)   What are the characteristics of Early English architecture ?

(21)   Describe the interior decorations of the Louis XVI period.

(22)   What was the heraldic device of Louis XII ?

(23)   What are the characteristics expressed in all of Michael Angelo's works ?

(24)   What are the three periods of Gothic architecture in France ?

(25)   What are the three periods of English-Gothic ornament ?

(26)   In what way did Albert Durer influence the tastes in German Renaissance ?

(27) What heraldic device was sometimes used by Anne of Brittany?

(28) What building was Michael Angelo employed upon as architect when he died?

(29) What other buildings than churches formed a large portion of the Gothic architecture of the thirteenth century?

(30) What are the characteristics of the Decorated period of English architecture?

(31) (*a*) What monument, in England, marks the introduction of Renaissance into that country? (*b*) What year was it erected?

(32) In French heraldry, of what was the dolphin indicative?

(33) Why was the transition from Gothic to Renaissance much more rapid in France than anywhere else?

(34) Describe the feudal system.

(35) What are the characteristics of the Perpendicular period of English-Gothic architecture?

(36) What Dutch architect designed a number of college gates in England?

(37) What animal was used in heraldic devices, indicative of Anne of Brittany?

(38) Into what three periods is French Renaissance divided?

(39) How were the rooms heated in the early feudal castles?

(40) What are the distinguishing characteristics of Italian-Gothic architecture?

(41)　What　are　the　characteristics　of　Elizabethan ornament ?

(42)　What two palaces near Paris became popular with the royal family toward the decline of the Renaissance ?

(43)　What class of buildings best expresses the transition from Gothic to Renaissance in French architecture ?

(44)　Describe the influences that affected Renaissance architecture in Italy, France, and England.

(45)　What is the purpose in studying historic ornament ?

INDEX.

NOTE.—All items in this index refer first to the section (see Preface, Vol. I) and then to the page of the section. Thus, "Lotus 3 26" means that lotus will be found on page 26 of section 3.

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