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I.

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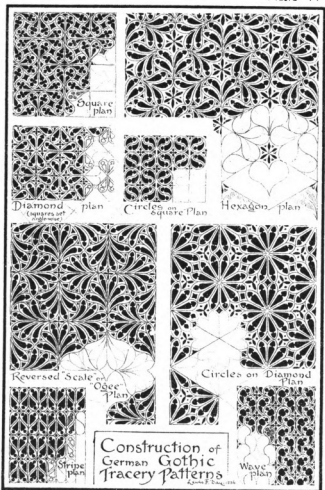
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THE

ANATOMY OF PATTERN.

BY

LEWIS F. DAY,

AUTHOR OF 'SOME PRINCIPLES OF EVERY-DAY ART,'
'THE PLANNING OF ORNAMENT,' 'THE APPLICA-
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PREFACE TO THE FOURTH
EDITION.

BY way of preface to a fourth edition I can only repeat that throughout this series of text books I have assumed no particular knowledge on the part of the student, but only that he is a student, that he wants to know, and that what he wants to know is what I would have liked some one to tell me when I was a beginner.

No pains of mine, of course, will save him the pains of study; but it would be hard if a man's experience during a quarter of a century could benefit none but himself; and here, in as few words as possible, is the sum of my experience—for what that may be worth at second hand.

The book has been once more revised, and amplified, and the number of plates increased to forty-one. Five of the old illustrations have been withdrawn and ten new ones added.

*13 Mecklenburg Square, London, W.C.
January 8th, 1895.*

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THE ANATOMY OF PATTERN.

I.

INTRODUCTORY.

THE dictionary scarcely helps us to a definition of the word pattern, in the somewhat technical sense in which it is used by the designer.

Inasmuch as a pattern signifies a "specimen," one might argue that repetition is implied in ornamental pattern. But inasmuch as any "shape or model for imitation" is quite as strictly speaking a pattern, one cannot precisely define pattern as repeating ornament.

Nevertheless, pattern mostly comes of repetition. Many a pattern bears on the very face of it the evidence that it grew directly out of the necessity of repetition.

It is more than probable that some mechanical necessity gave rise to all geometric

B

pattern ; certainly it is impossible to plait, net, knit, weave, or otherwise mechanically make, without producing pattern. It may be infinitesimally small, as in weaving, where the warp and weft are often invisible to the naked eye ; but it is there ; and all that remains for us to do is, to efface it as far as we can, or to make the best of it.

Out of the determination to make the best of it has grown much of the most beautiful pattern-work. To neglect this source of inspiration, therefore, to say nothing of the attempt to suppress it, would seem to be wasteful of opportunity to the very last degree.

So certainly will the repetition of parts result in some sort of pattern, that one may say, wherever there is ordered repetition there is pattern. Take any form you please, and repeat it at regular intervals, and you have, whether you want it or no, a pattern, as surely as the recurrence of sounds will produce rhythm or cadence.

The distribution of the parts need not even be regular. The wave marks on the sand, the veins of marble, the grain of wood, the crystallisation of the breath upon the window-

panes, the curls of the hair, the very features of the human face—resolve themselves into pattern. So distinctly is this last the case, that the ornamentist finds himself continually devising, *malgré lui*, patterns that remind one of faces. One almost wonders whether it may not have been with a view to escaping this danger, or anticipating it rather, that the designer first took to the deliberate use of those masks and grotesque heads, which form so prominent a feature in certain styles of ornament.

The popular idea of the process of ornamental design is, that the artist has only to let his hand crawl over a piece of paper, and, like a spider, spin out the fancies that may crowd his fertile imagination. Indeed, there is scope in design for all his fancy ; but he is no Zeus, that ornament should spring, Athena-like, full-grown from his brain.

Ornament is constructed, patiently (I will not say laboriously, for the artist loves the labour), patiently built up on lines inevitable to its consistency—lines so simple, that to the expert it is not difficult to lay bare its very skeleton ; and just as the physiologist divides the animal world, according to anatomy, into

4 *The Anatomy of Pattern.*

families and classes, so the ornamentist is able to classify all pattern-work according to its structure. Like the scientist, he is able even to show the affinity between groups to all first appearances dissimilar ; and, indeed, to point out how few are the varieties of skeleton upon which all this variety of form is framed.

Before enumerating those varieties, let us suppose for a moment a man to imagine (and this is by no means an imaginary case) that he will make to himself a repeating pattern without regard to its logical construction—as though in his domain there should be no skeletons. That would be, from my point of view, a profoundly foolish thing to do ; but, more than that, it is impossible. He may design a unit in which there is no repetition, and no formality ; but the moment he repeats that unit, the very order of its repetition proves to be, if I may call it so, the cupboard in which the skeleton will be found.

It might be imagined that by designing in some such hap-hazard fashion as I have just supposed, the artist would secure to his design a freedom of line, an absence of formality, not readily to be obtained by adopting the more systematic method. But this is not by any

means so. If, indeed, the design be of such absolute uniformity all over that there is no one feature in it more pronounced than another, it may pass muster, notwithstanding the want of backbone. But that is not to claim much for it as a design. And it is scarcely worth the pains to take a round-about way to this insignificant end.

If, on the other hand, a design be above the level of insignificance, there must be in it some dominant feature or features, which, when many times repeated, will appear more prominent than ever. It is to these features that the eye will irresistibly be drawn; and it is the lines they take in relation one to another, which will assert themselves. It is hardly to be expected that, if these lines have never been taken into consideration, they should come out very satisfactorily—and, as a matter of experience, they always come out awry.

Every one must have suffered more or less from wall-paper and other patterns, in which certain ill-defined but awkward stripes impressed themselves upon him; and he may have imagined possibly, if he thought about it, that this effect of stripes came of working

6 *The Anatomy of Pattern.*

upon the vertical, horizontal, or diagonal lines, which thus asserted themselves. It was much more likely the result of not working upon definite lines at all. A designer who knew the A B C of his business, would make sure of lines not in themselves offensive; he would counteract a tendency to stripes in one direction by features directing the attention otherwards; and he would so clothe any doubtful line that there would be no fear of its unduly asserting itself, as in its nakedness it might. He foresees the danger (it is a danger even to the most experienced) and he is fore-armed against it. The mighty man of valour who disdains to be trammelled by principles, or any such encumbrance, is without defence against contingencies practically certain to arrive. It is only by a miracle, or a fluke, that he can escape failure. The overwhelming odds are, that the petty considerations he has despised will be quite enough to wreck any venture he has dared in defiance of them.

Since, then, it is practically inevitable that there shall be definite lines in ornamental design—seeing that if you don't arrange for them they arrange themselves—it is the merest

common sense to lay down those lines to begin with, and, in fact, to make them the skeleton or framework upon which you build up your pattern.

You will see, when they are laid bare for you, that these skeletons are after all very few.

II.

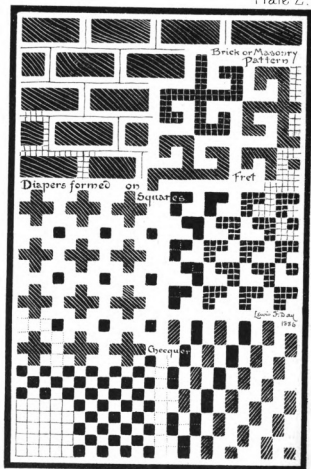
PATTERN DISSECTION.

REPEATED pattern may be classified, I said, according to its structure.

First in order of obviousness comes *the stripe*. It comes also very early in order of invention: the loom must from the beginning have suggested the stripe-pattern, which practically grows out of it.

The stripe, however, carries us only a very short distance in the direction of design. For as soon as you make any break in the repeated line, the recurrence of that break gives other lines in the cross direction.

Suppose a series of horizontal bands broken at equal intervals by a series of rosettes. It is clear, that if the rosettes fall one under the other, they give upright lines; or if they are shifted you get diagonal cross lines. If the line itself is broken, as in the case of a series of waved lines, or, still more plainly, in a



series of vandykes, the turn of the wave, or the point of the zigzag, when it is repeated, gives the cross line just the same.

And so we come at once to the vast order of patterns constructed upon *cross lines*.

This is probably quite the first in point of time, arising as it inevitably does out of the very primitive art of plaiting. You have only to interweave strips of two different colours, and you get at once a *check*, or what is familiar to us in black and white as the chess-board pattern. (Plate 2.)

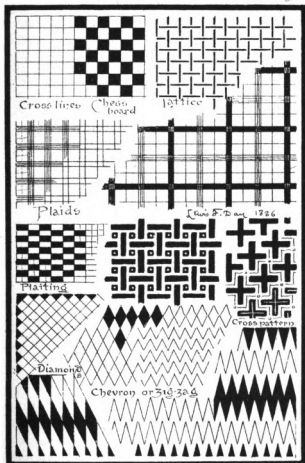
Suppose the interwoven strips to be all of one colour, then *the lines of intersection* would make a *lattice* or basket-work pattern.

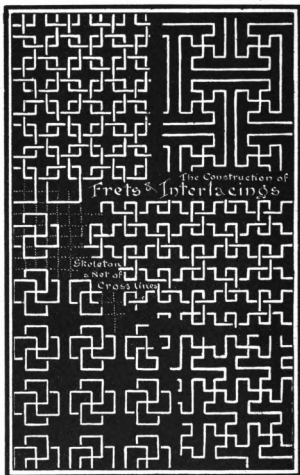
The simplest form of check or lattice is when the crossing is at equal intervals and at right angles. Vary the interval, and you have all manner of plaids and tartans. Alter your point of view (or turn the design 45 degrees round) and you get the diamond. The difference in point of view makes no real difference in plan: a stripe may take any direction, yet it is always a stripe. But if we alter the *angle* at which the lines cross, we get not only a fresh variety of shapes, but we may obtain also a diamond

shape which, for the sake of clearness, I will call *the* diamond. This plays a very important part in the next order of patterns, at which, however, we have not yet arrived. Various plaids, diamond patterns, and other developments of the lattice are exemplified in Plate 3.

In the case of a regular network of cross-lines there is no particular reason why they should always be filled in alternately *à la* chess-board. They may just as well be grouped in twos, threes, fives, and so on, resolving themselves into patterns of great variety and even of intricacy, as may be seen in Plate 2.

This theory, however, must not be pressed too hard, or you may squeeze something very like a false idea out of it. It might be contended that all patterns are formed on the square, or all patterns, at least, that can be woven, the threads forming the squares on which the design is laid. This is obviously absurd. The only patterns which can fairly be described as built on the square are those in which the artist (consciously or not) worked upon square lines. The actual squares apparent in a coarsely-woven scroll, or in the old-fashioned sampler, belong, not





to the pattern, but to its translation into a textile fabric.

If instead of the chess-board we take the *lines* of the lattice, and work upon them, we get, without departing from those lines (only intermitting them) a wonderful range of interlacements and the like; some of them of exceeding intricacy, as in the case of the "*fret*." A number of these are shown on Plate 4. There seems no limit to the ever-increasing range of pattern-work thus disclosed, all built upon the same constructional scaffolding.

From the intermission of the lines results a kind of spot pattern, more or less free, which might be mistaken for a distinct order of design (Plates 2 and 4). But it is only a variety.

In a certain sense it matters little whether a design is constructed on geometric lines, or only arranged so that it falls within them. The skeleton, when you come to dissect the two, is the same in either case. Our theory of construction, therefore, applies quite as much to sprigs, spots, and all so-called free patterns, as to those in which the constructional lines actually occur as lines. You have not done away with construction when you have succeeded in keeping the scaffolding out of

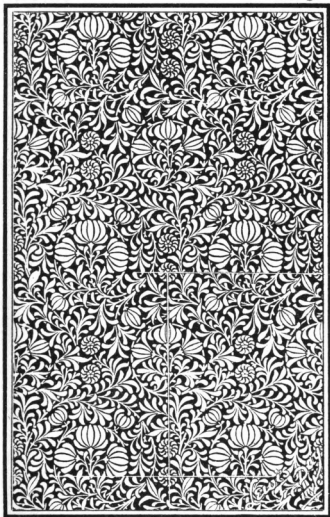
sight. Again, the use of the broken line instead of the straight, or of the curved (which we shall have to consider more particularly further on), makes no difference except in effect. The skeleton is the same, though you show no lines at all, as in the "all-over" pattern on Plate 5, which is planned on the parallelogram given by lattice lines.

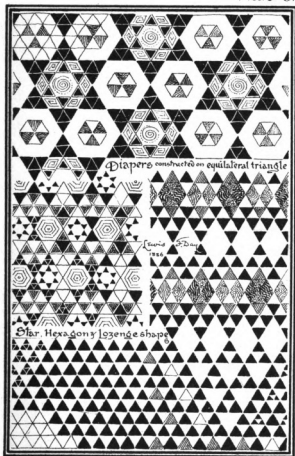
So far we have had to do only with the simplest of all possible schemes, in which at most two series of lines intersect one another. The introduction of a third series of cross lines constitutes a new departure, and a most important one.

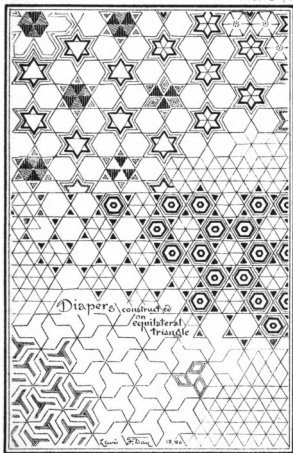
Cross the square lattice by a series of diagonal lines bisecting the right angles—cutting the squares in half, that is to say—and we have a new form to work upon, the *triangle*.

If instead of the square lattice, one starts with a lattice of diamond shape, a third series of cross lines bisecting the angles of the diamond produces equally a diaper of triangles.

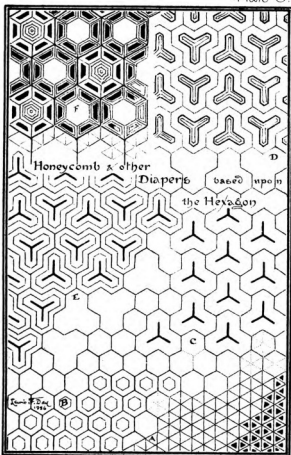
And if the diamonds of the lattice be of a certain proportion—if, that is to say, the two sharp angles be together equal to one of the blunter angles,—you have only to bisect







DESIGNED BY GEORGE F. DAY



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"Pavito-Tier", by J. Alkman, S. Owen Square W.C.

the blunt angle of the diamonds by this third series of cross lines, and you arrive at the *equilateral* triangle, which of all triangles is far away the most useful in design.

By merely grouping the equilateral triangles, as in Plate 6, we get the hexagon (a group of six triangles), the star (a group of twelve), and other shapes, such as that in the lower part of Plate 7, which is made up of seven triangles (i.e. three diamonds and a triangle); or that on Plate 8, which is composed of eighteen triangles (i.e. three hexagons.)

A glance at the three Plates 6, 7, 8, will show how immensely the designer's scope is now widened.

The design on Plate 9 is on the lines of the hexagon, the actual unit of repeat is an equilateral triangle.

We have now the basis of all that infinity of geometric pattern which we find in Byzantine mosaic, and in the Moresque tile-work derived from it.

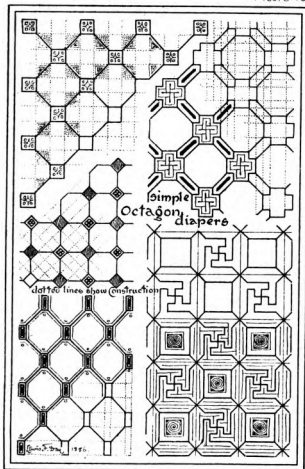
‡ It will be seen that the triangle, the hexagon, and some of the shapes compounded of them form, of themselves, exactly-fitting diapers.

By the use of a fourth series of cross lines

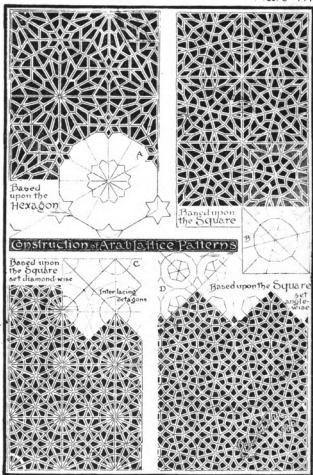
another new shape is evolved. Returning once again to the square lattice, if we cross it diagonally *both ways*, cross it by itself, that is, so that each square is cut up into four, we get out of those lines the *octagon* (Plate 10); but not an equal-sided octagon; that is, built on a cross lattice of different proportions.

The octagon, however, is not a unit which will of itself form a diaper, as the hexagon will. It is only in connection with a square, diamond, or other four-sided figure, that it will "repeat." Place side by side a series of octagons, and there will appear four-sided gaps between (Plate 10). Nevertheless, this new series of lines gives us new varieties of radiated pattern: witness once more the elaborate interlacings of the Arabs; all of which, even the most magnificent, are closely related to the pattern so familiar in the seat of a common cane-bottomed chair.

It is possible to carry the principle of *radiation* further still. You may, for example, cross this more elaborate lattice by a lattice like itself; but you get by that means rather intricacy than variety—especially when the intersecting lines are in part interrupted. In



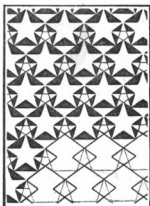
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certain Arab patterns, where this ultra-elaboration of lines is employed, it appears almost as if a new principle had been introduced (Plate II); but, upon analysis, the designs resolve themselves into the elements with which we have already had to deal—so few are the plans upon which pattern is constructed. Already we have come to the end of the straight-lined family.

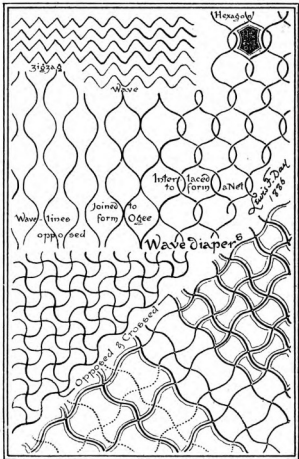
Why, it may be asked, can you not make a diaper on other lines, on the lines of the pentagon for example? Well, you may put together so many pentagons—and a very respectable diaper they form—especially if you further enrich the pentagons with five-pointed stars. Not long since I came upon just such a diaper, which, for a moment, promised to upset all my neatly arranged theories on the subject of pattern anatomy. However,



Pentagon diaper and its skeleton.

I had only to dissect it, to discover that it was our old friend the diamond in disguise ; but so artfully made up as at first sight to deceive. There it is on page 15. It consists of pentagons put side by side, the interstices between them ingeniously filled with stars and triangles, much as the pentagons themselves are filled—so that one does not readily distinguish the main divisions. It wants no telling that shapes of any kind may be put together to form a pattern ; but that does not alter the fact that the *lines* on which they are arranged, or into which they fall, must be those I have already laid down ; which are indeed the base of all possible pattern.

For further variety in design, we must resort to the use of the *circle*. The circle itself has, indeed, to be arranged on one or other of the foregoing plans. It must be struck, that is to say, from centres corresponding to the points of intersection of lines, such as have already been described. In so far it is only one of the innumerable arbitrary shapes that may be so arranged. The right lined shapes on Plate 11 are all but circular in effect. But the circle is so important a feature in itself, it so entirely alters the scope of geometric pattern,



that it deserves to be considered apart. One cannot lightly pass over the element of curvilinear design in ornament.

Whether or not the idea of flowing patterns originated in the circle, is of no great consequence. Instinctive practice must have preceded geometric principles in the mind of man.

One may very easily deduce many of the common curvilinear patterns directly from *angular* motives. (Plate 12.)

The wave, for example, is a zigzag just blunted at the points. Soften the lines of the hexagon, and you have the ogee. Interlace straight rods, and you get waved lines, as may be seen in the perspective view of the common hurdle. Round the corners of the hexagon or octagon, and you arrive at a rude circle. The relation of the hexagon or octagon diaper to the diaper of circles is obvious. Presumably, the busy bee, if one may suggest such a thing without irreverence, only works in a circle ; and the hexagonal form of the cells of the honeycomb is simply the result of gravitation ; just as you find that cylinders crowded crush themselves into hexagonal prisms.

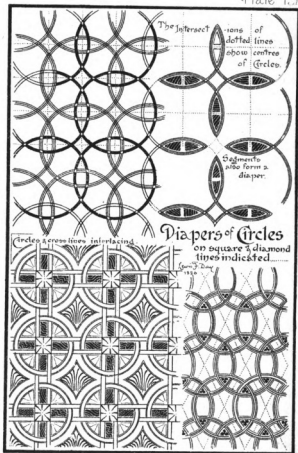
Geometric shapes offer themselves to us

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from the first—stars in the heaven above and in the grass below, circles in the sun's disc and in the eye of the daisy. For all we know, the very first pattern ever traced by human hand may have consisted of circles. The primeval artist had only to pick up the nearest dry twig and indent the damp earth with the end of it, to get a series of round impressions which would pass for a very respectable diaper. I do not say that was so. I only mean to say that the ways in which patterns can be formed are of the simplest; and that they practically force themselves upon the workman—making him, as it were, an artist in spite of himself.

The circle, with its segment the curve, and its compound the spiral, assumes extreme importance when we come to the consideration of the scroll (with which just now we are not concerned); but it will be seen that even in mere diapers it leads to an apparently new order of things.

The simplest form of circle diaper is when the circles are arranged on the *square* or the *diamond* plan, and so as to touch at the edges. By the intersection of the circles one by another, an effect of much greater elabora-



tion is at once obtained: and it makes all the difference whether you determine the proportions of the circle according to the intersections of the lines on which they are struck (as in Plate 13) or not (as on the upper part of Plate 14).

Out of the circle, or its segments, we get the trefoil, the quatrefoil, and all manner of cusped shapes (Plates 14 and 15)—which also must needs be put together on one or other of the plans already set forth.

Further, out of the segments of the circle you can construct the scale pattern; which (as you may see on Plate 15) might equally have been derived from the scales of a fish or the plumage of a bird's neck. The scale may also be considered as a translation of the diamond into curved lines. Re-arrange the scales and you have a more graceful, as well as a more complicated, diaper (same plate)—in which appears the ogee shape, once before referred to as being a curvilinear modification of the hexagon.

The hexagon itself may be deduced from it. Suppose a network of interlacing wave lines or ogee shapes—it amounts to the same thing—and the result is a series of six-sided

figures (Plate 12), very nearly approaching the straight-lined hexagon.

In this way the straight-lined series might be derived from the curved (compare Plates 1 and 11); and so once more, by a very different road, we reach always, in this maze of pattern-work, the same point, which is, the limited variety of skeleton on which pattern is built.

From the combination of straight lines with curved (Plates 13 and 14) result all manner of new diaper forms; which, however, present nothing very new in the way of skeleton.



You might start a scroll pattern, such as that given in Plate 17 (a type common in the sixteenth and seventeenth centuries), on the lines either of the hexagon or of the ogee, or of a mixture of curved and straight lines which I may call the broken ogee; and in the end it would not be very clear which of them you had taken for a groundwork; or even whether you had not founded your design upon the diamond—such close

kindred do those various skeletons betray.

I have dwelt at some length upon rudimentary diaper forms, for reasons quite apart

from anything intrinsically interesting or beautiful in them, although they may be both the one and the other. More especially is this likely if tender colours be employed to soften the forms, or if the colour variations do not quite follow the pattern, as in the case of marble inlay, where the accidental colour of the material is a relief from the geometric monotony of the shapes. The Japanese sometimes go so far as to interrupt the pattern, wiping out a bit of it here and there, anticipating, indeed, the softening effect that age might impart to it.

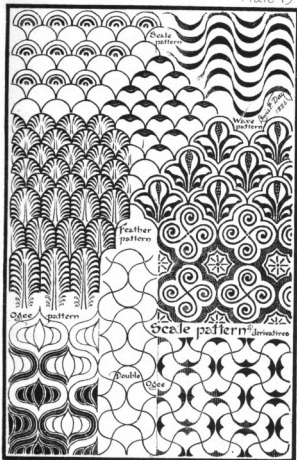
But it is more as a *basis of design* that we have at present to consider geometric forms. The basis of all repeated patterns is, as I said, geometric. And, this being so, it is as essential that the designer should be acquainted with simple geometric principles, as it is that a figure draughtsman should have some knowledge of superficial anatomy.

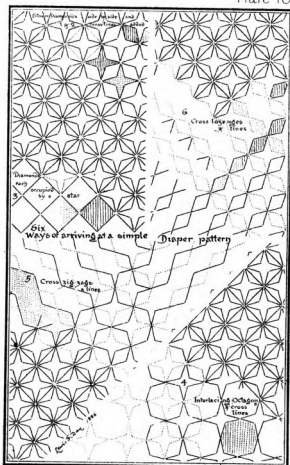
For all the simplicity of the skeleton lines he has to deal with, the pattern designer's art is not such a simple thing as you might suppose. He has not merely to invent pretty patterns, but patterns that can be conveniently worked—and the lines mapped out for him

by the conditions of his work, are, in most instances, not just those which beauty would have decreed.

They prove, however, to be identical with the lines already shown to be the basis of all recurring pattern-work ; and so we begin to see that, had there been no such thing as pattern design before, and no traditional forms of design for us to follow, those very forms must have been evolved as certainly out of the more complex conditions of modern manufacture as they were out of the simple contrivances of primitive handicraft. That is to say, that the lines first given to us by the primary processes of netting, plaiting, and so on, would equally have been prescribed by the printing roller or the power loom.

It is one of the most interesting points in the analysis of pattern design to see how regularly we work round, again and again, to identically the same shapes. You cannot safely dogmatise as to the origin of this or that pattern ; there are always so many ways in which it might have been suggested. Put side by side a series of waved lines so that their curves are opposed (Plate 12) and the effect is exactly the same as though you had opened





out an ogee diaper ; you can deduce either pattern from the other. Or, again (same plate), if the ogees interlace, it is impossible to say whether this was the outcome of the ogee, or of waved lines, or simply of the process of netting.

On Plate 16 are shown six different ways in which one and the same simple star pattern may be arrived at.

1. By the juxtaposition of stars and the addition of cross-lines.

2. By the juxtaposition of diamonds and the addition of cross-lines.

3. By the juxtaposition of right-angled diamonds, each occupied by a star.

4. By the interlacing of two series of octagons, and the addition of cross-lines.

5. By the crossing of two series of zigzag lines, and the addition of cross-lines.

6. By the crossing of two series of diamonds or lozenges, and the addition of cross-lines.

And this does not by any means exhaust the number of ways in which the same result might have been reached.

To take another instance, of a very different kind, you know how common it is to see a waved line with leaves alternating on

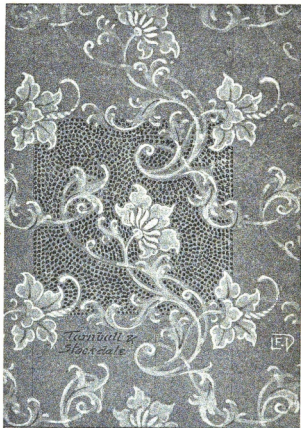
each side of it. This appears on the face of it, a quite mechanical and arbitrary arrangement ; but you have only to note how, in nature, the alternate leaves on a slender stem pull it out of the straight, to see the natural and inevitable origin of the idea. By merely exaggerating the slight wave of the natural stem, you get one of the most conventional of ornamental border patterns.*

So it would seem that, whether you begin with mechanical construction or with nature, it works round to the same thing in the end—in the hands of an ornamentist.

* See 'Nature in Ornament,' pp. 55, 56.



PLATE 17. — The Flower of the Penman.



"Pique-Tart", by J. Alcockman, 6, Queen Square, W.C.

III.

PRACTICAL PATTERN PLANNING.

PATTERN design is very seriously affected by this circumstance—that the possible lines of construction are not in all cases practicable.

In practical work for manufacture the limitations are strict ; and it is only by submission to them that success in ornamental design is possible. Nor is it only the style or character of the design that is affected, but its plan also.

The Oriental mind, delighting in geometric intricacy, has availed itself largely of the triangular unit, and has built up with it all manner of delightfully elaborate patterns. The modern European finds it more convenient to him to adopt the simpler parallelogram. He may now and then use hexagonal or other many-sided tiles, but he prefers the square. So also the weaver's cards are inevitably in the shape of parallelograms, and the wall-paper printer's blocks ;

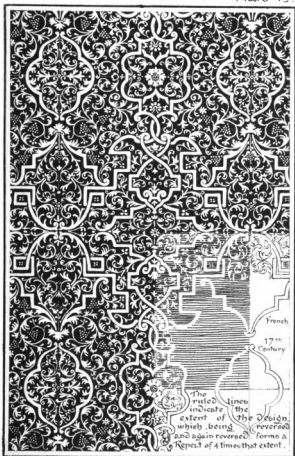
and though the printer make use of the roller instead of the block, the conditions of design remain unaltered; for the roller is, for all practical purposes of design, only a block bent round in the shape of a cylinder. The square plan of the printed curtain design on Plate 18 was prescribed by the roller, which was 30 inches wide and the same in circumference.

Even the bookbinder of earlier days, who was comparatively free to do what he liked in the way of "tooling," was led, whether by instinct or by his tools, to adopt a rectangular repeat, as in Plate 19; in which also is exemplified what may be done in the way of reversing, and again reversing, the unit of design—so as with comparatively little drawing to produce the effect of an extensive pattern.

We have, ordinarily, to reconsider the possible lines of pattern construction in their relation to the rectangular figure,—that being the repeat determined for us by the conditions of nearly all modern manufacture.

The base of our operations is, then, usually a parallelogram.

Furthermore, this parallelogram is in all



1762. No. 10. 10. 10. 10. 10. 10.

cases restricted in size, and in most cases of more or less arbitrary proportions.

For example—in the case of wall-paper printing, it is practically determined for us that the printer's block shall be rectangular. Custom has further fixed its width at 21 inches. And, since a block of greater length than that would be unwieldy, we are restricted to a square of 21 inches by 21 inches.

The block may represent a fraction only of the design, which can theoretically be made up of as many blocks as you please. But in practice the expense of such a proceeding would make the paper-hangings cost more than paper-hangings are ordinarily worth; and, apart from commercial considerations, which would be enough to prevent that kind of extravagance, it is contrary to craftsmanship so to misapply labour. The most capable artist is he who can apply his art to most purpose, and get full value out of his materials.

As a matter of fact, the wall-paper designer has to content himself, then, except in very few instances, with a repeat of at most 21 inches square.

Within those limits he is comparatively

free ; but, as I have already shown, do what he may, his repeated pattern *will* fall into geometric lines, if only those of the parallelogram on which it is built. A pattern, such as A, on Plate 20, may seem at first sight to conform to no conditions of restraint ; but the actual lines of the repeat reveal themselves, on closer inspection, in any single feature whose recurrence is to be traced. It is based, you will find, upon the parallelogram—faintly indicated by dotted lines upon the black ground.

Apart from the conditions of actual manufacture, it is found commercially expedient to adopt certain fixed dimensions for the tile, block, roller, or whatever it may be—and we are thus constrained to design tiles (if they are to be of any use) on the usual three-, six-, eight-inch or other accepted scale ; textiles to a width fixed by the loom, and a length controlled by the consideration of economy ; block-printed fabrics under very similar conditions ; and roller-printed to a length as well as a width prescribed. The proportion of the parallelogram within which our design must be confined varies, that is to say, with the manufacture for which we are designing. An



A. F. KELL PHOTO-LITHO B. FURNIVAL ST. HUBERTS E. C.



"Photo-Tint", by J. Alkerman, 5, Ouseley Square, W.C.

Lucas F. Dudge 1893

experienced designer could often tell, from its proportion and scale alone, for what particular manufacture a design was made. And it is in the impracticability of his ideas that the novice most infallibly betrays his lack of experience.

The production of such a pattern as that on Plate 21 in the form of a wall-paper 21 inches wide, would involve the (prohibitive) cost of four sets of blocks. Whereas to the weaver it would not prove comparatively very costly: as a matter of fact patterns of that relative length occur quite frequently in textiles.

In the width of the Sicilian silk, on Plate 22, dogs, lions, and eagles follow one another closely in a row; but in the length of the material each is separated from its like by the other two. The pattern repeats on the lines of a long upright parallelogram; but obviously it was designed on the cross lines shown.

There is no occasion to enter more fully into all the various technical reasons for the limitations to which the designer is subject. The practical convenience of them, however, is patent. It is as desirable that the architect, for example, should know what sized tiles may be available, as that he should be able

to reckon upon the "bond" of his brickwork ; and it is equally clear that without some uniformity in the width of materials (such as silks, velvets, carpets, chintzes, and so on), it would be difficult to estimate, off-hand, the relative cost of each.

The upshot of it is, that the designer has habitually to shape his design according to a rectangular plan, and that of limited, if not fixed, dimensions.

It becomes, then, a very serious question with him how far he can avail himself of any other basis.

The student might with advantage set himself to tabulate the possibilities in the way of adapting the various units of repeat to repetition, within the square. It would then be seen that, though all things are possible, there are schemes the artist would like to adopt, which, in order to be brought into the repeat permitted, would need to be worked out upon so small a scale as to become quite too insignificant for use.

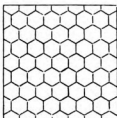
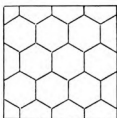
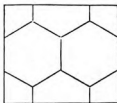
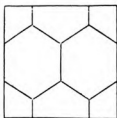
One instance of this it may be worth while to give.

Suppose a square block of 21 inches, and you wish to adapt a hexagonal design to



17. The Birds and Flowers of the 15th Century.

it. Only those who have tried the experiment have any notion how small the hexagons would come. If you made your hexagons $10\frac{1}{2}$ inches wide, so as to get two in width, they would not come true in the length; they would be too long. If you made them true, they would not fill the square, but only a space of 21 inches by about 18. Three and a half hexagons in the width would work, but only as a "drop" pattern: that would give hexagons of six inches across. In order to occupy the square with true hexagons repeating without a "drop," they would need to be re-



← scale 21 inches →

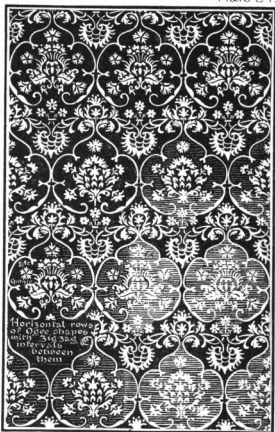
duced to half that size ; that is to say, there would have to be seven hexagons to the width, measuring each only three inches across.

Try to arrange a pattern such as that on Plate 9 to accommodate itself to a rectangular block of *given* dimensions, and you will realise how inevitably it is born of the hexagon or the triangle, and cannot be made to fit into arbitrary square lines.

It will be seen how very strictly the artist is bound by considerations which scarcely occur to the uninitiated, considerations which have always had a great deal to do with the design of pattern-work. Fashion has had her say in the matter, too, no doubt—it is a wicked way she has ; but, though certain lines have been generally adopted at certain periods and in certain countries, I think it will invariably be found that there was some technical or practical reason for their adoption in the first instance.

Out of the conditions of weaving came, for example, the adoption of upright patterns, such as that on Plate 23 (from a coarse woollen fabric of the fifteenth century) and cross colouring such as occurs in Byzantine,





Sicilian, and Early Italian silks (Plate 22).* Out of weaving comes also the turning over of the design on the two sides of an upright stem, or purely imaginary central line; as in Plates 23, 24, and many others.

In Plate 24 may further be seen what great influence material may exercise upon pattern. There was a whole class of patterns of this kind schemed in the 15th and 16th centuries, with the obvious purpose of disturbing as little as possible of the rich pile of the velvet for which they were designed.

When it is realised that the turning over of the pattern is essentially a weaver's device, it will be obvious that in a pattern similarly planned for *printing* there is no occasion for such rigid symmetry of the two sides; and that, on the contrary, it is desirable rather to introduce a certain amount of variation in the pattern. That is shown in Plate 25, where, though the main lines take the formal ogee shape, the termination of the branches is not alike on both sides.

* See also 'The Application of Ornament,' Plate 23.

IV.

THE "DROP" PATTERN.

THE most useful skeleton to work upon, all things considered, is the diamond. For it is on the basis of the diamond that "drop" patterns are most readily designed.

The "drop" is a device by means of which the designer is enabled, without reducing the scale of his work, to minimise the danger of unforeseen horizontal stripes in his design, a danger which is imminent when the repeats occur always side by side on the same level.

The printer's block, we will say, is a square ; or the roller is its equivalent ; or the cards take that form. In the printed or woven strip, whether paper, cretonne, silk, or what not, the end of one repeat must tally with the beginning of the next, in order that the pattern may be continuous throughout the piece. Equally of course the design must be so schemed that the right side of one



piece of the stuff will fit on to the left of another, and so on.

But it is clear that the design may be so contrived that each succeeding breadth has to be *dropped* in the hanging.

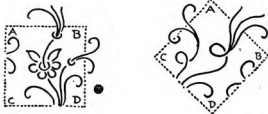
If this drop were only very slight—say three inches—it would take seven breadths, in a pattern of 21 inches deep, before a given feature in the design occurred again exactly on the same level. There would be no danger then of any *horizontal* tendency in the marked lines which recurring features of the design might take, but, on the other hand, great likelihood of a *diagonal* line developing itself, with even more unfortunate effect. The design would seem, rather, to step downwards; and the shorter the steps, the more noticeable would be the line such features might take. This difficulty is avoided if you make the "drop" just one-half the depth of the pattern, so that every alternate strip is hung on the same level. Then the diagonal lines correct themselves. If any line at all asserts itself, it is more likely a zigzag (instead of a step), which, in connection with corresponding zigzags above and below, may very possibly form a trellis or lozenge pattern.

There is good reason, therefore, for saying the diamond is a useful plan to work on; for upon it is formed the safest variety of drop pattern—that, namely, which drops one-half its depth.

Instances of drop patterns are given in Plates 17, 20 (B), 37, 41, and others.

One has heard persons, more familiar with the forms of ornament than expert in practical design, complain of the difficulty they experience in scheming a “drop.” If they would only think of the problem as the filling of a diamond shape, it would come very easily to them.

The diamond is, in fact, only a square turned part way round. That part of your



design which extends beyond the margin A B must occur again within the margin C D; that which extends beyond the margin C A



C. F. KELL, PHOTO-LITHO & PUBLISHER; ST. LOUIS, MO. U. S. A.

must recur within the margin DB, and *vice versa*, no matter whether the lines be vertical and horizontal or on the slant.

What you have to do is to see that one side of the pattern fits on to the other.

There is this further advantage in adopting the lines of the diamond—that it affords an opportunity of working out a design which is apparently twice the width of the material.

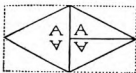
If you subdivide a block of 21 inches



thus, so that the two smaller divisions A and V together equal the larger division $\frac{A}{V}$, it amounts to precisely the same thing as though you designed

upon the basis of a squat diamond 21 inches high by 42 inches wide (see diagram below).

You have only to transpose the component triangles to produce the squat diamond. If, there-

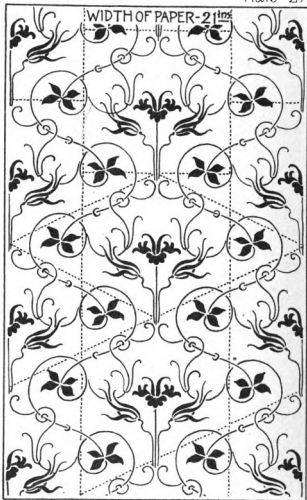


fore, you design your pattern within the lines of the squat diamond, 21 inches by 42 inches, you will find that it can be printed on a material 21 inches wide from a square block measuring 21 inches each way. (Plate 26.)

The advantage gained in this way is, of course, only apparent—what is put into one strip is taken out of the other—but in the case of pattern appearance goes a long way. From the practical point of view, it is difficult to over-estimate the value of this expedient in design, the common property of designers for all manner of fabrics, but undreamt-of in the philosophy of the amateur.

In theory, it may seem all the same whether you design a drop pattern on the lines of the square, on the slant, or on the diamond: you may arrive in any case at identically the same result.

Dissect the design on Plate 28 and you will find that it may be resolved into any one of the three repeats shown on Plate 27. That is to say, it will repeat (1) as a square pattern (occupying the full width of the material) to hang as a drop; (2) as a slanting pattern of the same width, also to hang as a drop; or (3) as a diamond pattern just twice the width of the material. *Theoretically*, the design might have been started on the lines of the square; but the diamond shape would have been much more likely to suggest the lines it takes. As a matter of fact it did.



J. Asnerman. Photo-lith London.



"Pavots-Tour" by J. Alarman, 5, Queen Square, W.C.

Snip from a square the two opposite corners (black in diagram) and transpose them, top and bottom, and you get the oblique shape. Snip from it the four corners, and rearrange them at the sides of the hexagon thus given, and you get the flat diamond.



Nevertheless, practically it makes all the difference in the world which plan you adopt. Your design must be influenced to a very considerable degree by the shape you set yourself to fill. It would never occur to you, for instance, to stretch a festoon, or wreath, across a width of space you did not see before you. So it may be fairly said, that such extension of the design beyond the width of the material, is the direct result of working on the lines of the diamond: whilst you are designing within the lines of the square, you have naturally less impulse to go beyond its limits.

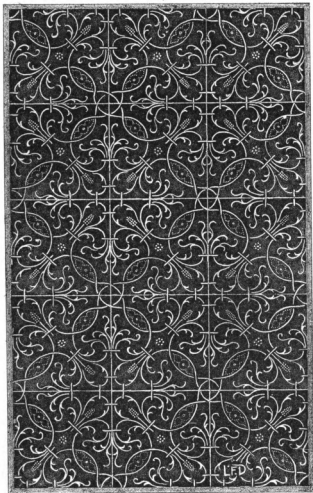
In designing for tiles and such like, where the material is not continuous, the conditions are somewhat different, and the possibilities

accordingly. Where the unit of design can conveniently be turned round, or half-way round, or three-quarters of the way, the scope of the designer is increased; in four repeats of a six-inch tile he can get, for



One 6-in. tile from 4 points of view.

example, a design which includes a circle 12 inches in diameter. On Plate 29 is shown how, out of a single 6-in. tile design you may get a pattern four times that size. The actual repeat is contained in a triangle which is only one-quarter of the 6-in. square; but such a pattern would obviously be most conveniently designed on a diamond measuring 12 inches from point to point. So again, the book-binder, with a comparatively limited set of tools, has very considerable scope as to the distribution of design; but he has still to work upon the lines set forth in Chapter II.



"Pavement Tiles", by James Alcock, London, W.C.



"Pavane-Tort", by James Alcock, London, W.C.

V.

SKELETON PLANS.

THE designer finds it ordinarily more convenient to design at once upon the lines of the diamond, because their simplicity enables him better to keep in view the effect of his pattern in its repeated form than any other lines on which the "drop" can be worked.

Even though one may have no intention of taking advantage of the full width of a block, it may still be found convenient to design within the diamond, if only in order to economise design: and, mind you, economy is an absolute necessity of the case. But for economic reasons there would be no weaving, printing, stamping, and so on; we should confine ourselves to embroidery, tapestry, painting, and other work of our own hands.

Assume, for the purpose of explanation, that it is a wall-paper you want to design. If you begin by dividing the width of 21 inches into two, and make your pattern a "drop," 21 inches long by $10\frac{1}{2}$ wide, as at A

on Plate 30 (where, by the way, two widths of the material are shown), it is the same as though you had worked upon a diamond 21 inches from point to point (as at B); although, as I said before, the same pattern would probably not have suggested itself to you in either case. This particular design would have been more likely to occur to one designing on the lines of the diamond. Working on the lines of the dropped parallelogram, one is more likely to arrive at something like B on Plate 20.

Again, if you divide the width of 21 inches into three, as on Plate 31, and on those lines set out a diamond pattern 21 inches long by 14 inches wide (that is two-thirds the width of the material) so that the block (21" x 21") contains one unit and a half in the width, the paper will hang as a drop, to fall one-half its depth.

This is a plan which lends itself as well to the design of a free, loosely distributed, all-over pattern, as of a severely bi-symmetric one.

It is clear that the half diamond on the one side of the block (A on page 43) and the two quarter diamonds on the other side (a a) must together form a complete unit, and the two

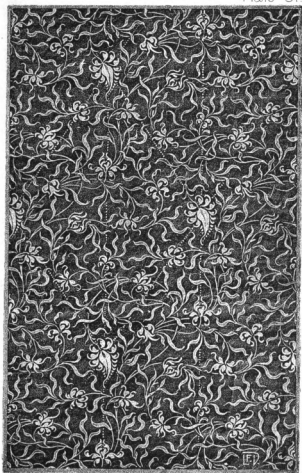


PHOTO-TINT, by J. Alarman, 5, Queen Square, W.C.



"Peony-Tier", by James Alcock, London, W.C.

half diamonds (B B) another, or the block would not work. With that proviso, the diamonds need not all be filled alike—that is to say, the three diamonds (A B C) comprised in the repeat may be variously filled.



If you still divide your 21 inches into three and institute, as on Plate 32, a series of stripes seven inches wide, each of which drops at the same interval (whatever it may be), it is likely to result in a diagonal stripe more or less pronounced; which might, of course, equally have been designed upon diagonal lines.

If of the three stripes only one were dropped, the design would also hang as a drop, revealing very likely a zigzag line on the principle already laid down. The zigzag cross line asserts itself plainly on Plate 33, notwithstanding the very obvious vertical lines within which it is designed.

Further explanation of the ways in which a given space may be subdivided (what is said of the supposed 21 inches applies equally to any given parallelogram) would be superfluous. Enough has been said to show

how by such subdivision the utmost variety of scale may be obtained.

Although, however you start, you come back always to the same few schemes; and although in any case your pattern might, as I said, equally have been designed upon other lines, had you worked upon them it never would have occurred to you.

The diagonal stripe pattern on Plate 34 resolves itself into a diamond repeat, but it is tolerably certain that the designer did not work upon the lines of that diamond, but most likely upon a network of diagonal and horizontal cross-lines—as did also the inventor of Plate 22.

The inevitable influence on your design of the lines upon which you start, is the excuse, and the only excuse, for puzzling over all the various skeletons upon which pattern can be laid out.

It is a good test of your design, when you have roughed it out on one plan, to make the finished drawing on another. By that means you see it, as it were, from two points of view, and can form a very fair idea as to how it repeats, without drawing much of the repeat.

The practical designer (who has learnt



"Pierro-Traf," by James Alcorn, London, W.C.



Plate 35.



W. H. R. KELL, PHOTO-LITHO & PUNTING BY HOBSON & CO.

not to attach great value to the appearance of his design as a drawing) often cuts it up deliberately, and re-arranges the parts, in order the better to prove his repeat. The use of this expedient is shown in Plate 35. The larger diagram shows a pattern as the designer might sketch it—and not much more of it than is enough to show the lines it will take in repetition. But, as I said, the simpler way of proving it would be to cut up the repeat (the square with black background to the left of the plate), and re-arrange its parts.

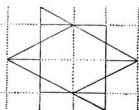
This has been partially done in Fig. 2, in which the design has been cut horizontally into two equal parts A B and C D ; and, by the transposing of these two halves, what were the upper and lower edges are brought together, showing plainly how this portion of the design will appear in completion.

The joining of the side edges is tested in Fig. 3. Here the drawing has once more been cut in two, vertically this time. And, since this is a drop pattern, it is not merely the two halves that have to be transposed ; but, whilst parts B and D remain relatively to each other in the same position as in Fig. 2, parts A and C are reversed in order (A C becomes C A).

The remaining Figure, 4, supposes us to have left parts A and C in the same position relatively to one another, as in Fig. 2, and to have re-arranged (on the same principle as before) parts B and D (B D becoming D B). The four quarters of the design have thus been shuffled and dealt out in every practicable manner, and each portion of it in turn promoted to the position most in view.

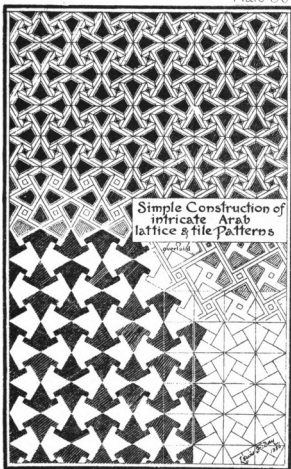
In the case of a pattern which did not drop, the proving would have been, of course, a yet simpler matter. Obviously, too, the operation of cutting up might be (and in practice would be) performed at a comparatively early stage in the designing, so that the various joints might in turn be tested and adjusted before the details of the intermediate spaces were finally determined.

The way in which the parts of the dia-



mond may be re-arranged, in like manner, is sufficiently indicated by the accompanying diagram.

But the best of all possible tests is to cut ever so rude a



G. J. BELL, PHOTO-LITHO. & FURNISH. ST. LOUIS, MO. U.S.A.



"Pesto-Tint", by James Akerman London, W.C.

stencil of the broad masses of the design, so as easily to multiply it to any extent. A child can be taught to apply that test for you ; and it is infallible.

Whatever the lines of the skeleton, in any important work they are usually disguised.

Sometimes (as often in Arab art) they are so crossed and interlaced that it is difficult to follow their intricacy. The really quite simple patterns on Plates I, II, and 36 are at first sight very puzzling.

Again, the lines may be interrupted so that you lose the thread of the design. Or, further, two or more schemes of ornament may be, so to speak, interwoven, the one asserting itself here, the other there, so that neither thread of idea is too conspicuous. The effect of this is to be seen in Plate 37, a drop pattern, in which the attention is diverted from the formal lines of the scroll by a conventional growth of much freer character over-running it.

Furthermore, features may be introduced of such importance in the design that the eye is drawn to them, and fails to perceive the connecting lines between.

In Plate 38 the strongly marked bird-forms counteract to some extent the simple ogee or diamond lines on which the pattern is set out. In fact, the birds emphasise the actual repeat of the *block*, just as the scroll reveals the real *construction* of the design; and out of the two contrasting schemes arises a certain confusion, which is of some artistic account in design.

Obviously, however, the most effective way of disguising the skeleton is to clothe it, as nature does; and the most natural way of doing this is, with something in the nature of foliation; beneath which the bare constructional lines are not necessarily more conspicuous than the stiff branches of a tree under their burden of leaf and blossom. (Plates 25, 26, 31, 40, &c.)

By this means, you get at once life, interest, and variety so great, that one might continue this already lengthy explanation until it became tedious,—and yet, perhaps, fail to make the sceptic quite believe in the absolute simplicity of the skeleton forms underlying all pattern.

The foliated scroll, as you see it, for example, in Roman or Renaissance Arabesque (or

even in Plate 40), looks almost as though it were impossible of geometric construction. And, of course, it never is mathematically built up. But, for all that, it falls into the familiar lines. The spiral itself is only a series of segments of circles ; and if you dissect any repeated scroll-pattern, you will find most likely that its back-bone is a wave line or spiral. Certainly you will find it has a back-bone. Pattern is a vertebrate thing ; and in a scroll the spinal cord is very decidedly pronounced. You can soon see when a scroll is broken-backed.

VI.

APPROPRIATE PATTERN.

IT is only by experience that a designer learns to know what may, and what may not, be done within given lines. Many a notion which one had a thought of adopting, turns out to be practically quite unamenable to existing conditions.

You cannot have a bold, flowing scroll without considerable allowance in the way of length in the blocks, cards, or whatever may be the mechanical contrivance used ; nor can you well avoid a certain upright tendency in patterns where the width is very much restricted ; though you may counteract it to some extent by lines in the contrary direction. In Plate 39 the horizontality of the large leaves is more than corrective of the upward growth of the design. The fact of the matter is, the characteristic lines of time-honoured patterns are mainly the direct result



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of the restrictions under which the craftsman was working.

It is owing to the facility with which triangular cubes or tiles can be arranged in patterns, that the peculiarly geometric character of much Oriental ornament is due. So also with us, the proportions of the square tile have resulted in a distinctly characteristic form of ornament.

I do not pretend to say whether the turning over of the design which prevails in early silks, was suggested by the fact that such turning over could be so readily done in weaving ; but it looks, at all events, as though the Sicilians, and, in fact, weavers generally, until comparatively recent times, adopted that plan of design, because by means of it they could without more ado double the scale of their pattern.

In the Gothic scroll pattern on Plate 40, and in all such turned-over designs planned upon, or falling into the lines of, the diamond or the ogee, one-half the labour of designing and card-cutting is saved. Naturally, the nineteenth century manufacturer has not been slow to adopt a plan so obviously economical. It has been said, that the idea of reversing a pattern owes its origin to the circumstance that you

may double a sheet of paper, and so, with one action, cut out the two sides of it. If that is not so, it well might be—except that, probably, reversed patterns were common long before paper was. Very possibly it is derived from the practice of folding or doubling. One may put together, for example, several sheets of veneer, or even several planks, and, with one action of the saw, fret all of them alike. That facility gave rise at all events to Boullé's characteristic inlay patterns ;* and in the balconies of Swiss châteaux one still sees a very effective kind of pierced pattern-work, which is accounted for in a similar way.†

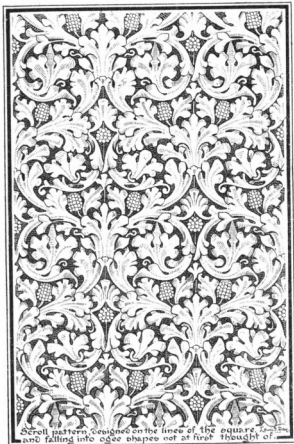
Bands or stripes of different colours are so common in Eastern curtains, blankets, &c., because they can be so easily woven. ‡ Even in more elaborate silk and other designs, certain of the colours are very often distributed band-wise. The variety of colour so obtained, is obviously due to the ease with which the weaver can change his shuttle.

At the same time, economy is thus often effected. If in such a design as that on

* 'The Planning of Ornament,' Plate 13.

† 'The Application of Ornament,' Plate 34.

‡ 'The Application of Ornament,' Plate 23.



Scroll pattern, designed on the lines of the square, and falling into odd shapes not at first thought of.

Plate 38 the birds were meant to appear in gold, the gold thread need only be used in the bands where the birds actually occur. You have but to look at the back of any old piece of many-coloured silk damask to see the changes of the shuttle very plainly marked. The aim of the designer is usually to disguise them more or less in his pattern. But in the early days of silk weaving the unsophisticated artist had no fear of a horizontal line. In such a pattern as the Sicilian silk in Plate 22, he would boldly make the various bands of animals in various colours. He would sometimes even carry bands of colour straight *across* the animals, regardless of their shape. And the effect of this rough-and-ready proceeding, in the silk itself, certainly justifies him.*

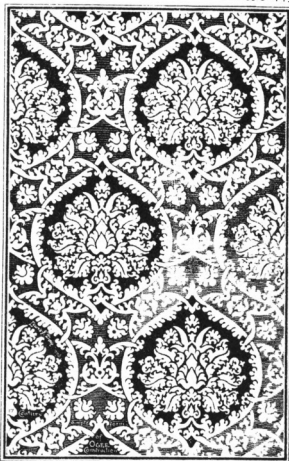
In early examples of weaving both the turning over of the pattern, and the banded arrangement of the colour are very frequent; indeed, so much so, as to form quite marked features in the design of the eleventh and following centuries, whether Sicilian or Italian. (It was from Sicily, you know, that the art of weaving was introduced into Italy.)

* 'The Application of Ornament,' Plate 23.

Designers would be the more ready to adopt, and to adhere to, the plan suggested by the loom, in that the horizontal line, due to it, was in no way injurious to the effect of a fabric meant to fall in folds. In fact the horizontal band emphasised by the change of the shuttle had an absolute value in marking the fulness of the hangings. The dim vertical line, which was likely to occur from the turning over, was calculated to lose itself in the more strongly marked verticality of the folds.

In flat decoration the horizontal band is less unobjectionable; and it is for that reason that so many of the wall-paper patterns, borrowed or stolen from good old stuffs—by their stripes you shall know them—are altogether unsatisfactory on the wall. To me, horizontal stripes usually suggest the ample hanging, and seem to want the folds.

The bold and beautiful effect of many a fine brocade or damask pattern, such as that on Plate 41, would be lost if it were rendered in flat decoration, with no charm of texture to decoy the eye. Many an admirable textile pattern, suitable in all respects but that of its marked horizontal lines, is inapplicable to



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flat wall decoration, whether in the shape of silk, or chintz, or paper.

Some persons appear to be of opinion that, a pattern (according to Dr. Johnson) being "something to be copied," design consists therefore in copying what has been done before. That is all very well so far as concerns the definition of the word pattern; but how about the meaning of the word design? I would go against the lexicographer, and say: *not every* pattern is an "exemplar."

In adapting a design, from one material to use in another, it is not enough to copy the original: it needs to be translated; which translation is not so easy, but that an artist gifted with any invention of his own, will find it, on the whole, better worth while to say what it is in him to say for himself, and not go on harping on the old, old tunes, melodious though they be.

The most perplexing thing to us just now is that we are asked to design, to-day under these conditions, to-morrow under those. We have no traditions and no style. Our consolation is that in the very variety of the efforts demanded of us there is relief of a kind: and in the presence of difficulties our

ingenuity, if we have any, is excited. The more difficult the conditions, the more they provoke solution. A designer must have in him something of pugnacity ; he must enjoy attacking a tough problem. Indeed he proves himself a designer, not when he has somehow or other arrived at a design, but inasmuch as out of unpromising material and untoward circumstances he can contrive a thing of beauty.

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