

## Arrangement of Figures

All designs for weaving, as already stated on numerous previous occasions, must be eventually capable of containment within a rectangular base to produce a weaver's repeat. Within the repeat, however, many different bases can be employed for the construction of figures, and the finalised shapes themselves can be placed in varying relationships one with another. Whether the design form itself is geometric, or floral, or abstract, the base lines on which it is constructed within the repeat usually take the aspect of a well-defined lattice or net. The lattice may be of varying form, and common starting points are: the rectangle, the diamond, the hexagon, the circle, etc.

When a figure is finally designed it may represent the full repeat in which case its relationship is pre-determined; or, it may represent one of many units of the repeat in which case its relationship with a number of like units within the repeat must be considered. The former situation gives rise to unit repeating, or side-by-side designs; the latter leaves the designer free to arrange the units in the most effective manner.

### UNIT REPEATING DESIGNS

The term unit-repeating is applied to designs in which the unit figure and the repeat are the same. They may be constructed upon definite bases, as shown in certain of the preceding and following examples, but frequently the designs consist of combinations of different forms that are grouped together upon no particular principle, except that they fit satisfactorily together within the repeat area, and join correctly when repeated. With care, variety of effect can be produced which is free from the stiffness that sometimes characterises designs constructed upon defined bases. *Figure 13.1* is illustrative of a well-balanced, all-over, unit-repeating design, in which it will be noted that the largest form is comparatively small in relation to the size of the repeat, while the various parts of the ornament are about equally conspicuous.

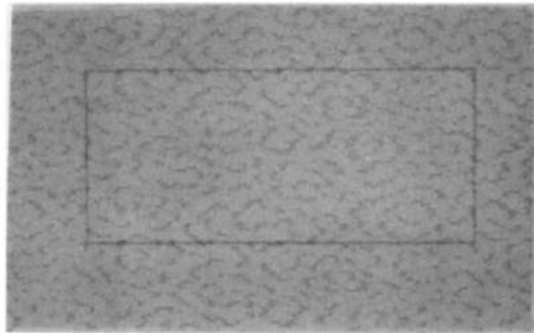
If one feature of a unit-repeating design shows more prominently than the rest, the repetition of the pattern, from side to side and from end to end of the cloth, is liable to cause the leading feature to form lines in one or both directions. As a rule, when a design contains a distinct object, one or more similar objects should be used in addition, arranged according to a definite base.

Such an arrangement may still be unit-repeating, as in the examples given in *Figures 13.43 and 13.50*.

The unit-repeating principle of arrangement is very suitable for an abstract type of ornament, such as is shown in *Figure 13.2* as the indefinite system, upon which a variety of equally prominent shapes is introduced, tends to reduce the stiffness of the design. In sketching this type of design a portion of



*Figure 13.1*



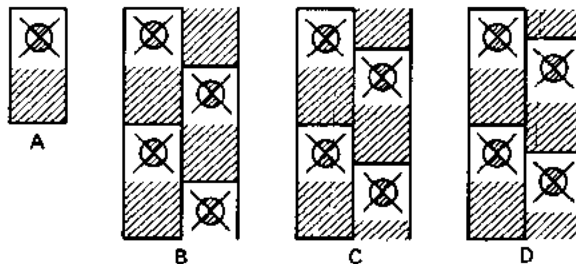
*Figure 13.2*

the figure should be drawn in and traced into corresponding positions in the repeat alongside and above the first repeat. Then, by repeating the process carefully and building up the design in stages the various parts can be made to fit correctly together at the edges of the repeat, at the same time that the formation of bars or stripes is avoided.

The unit-repeating principle is particularly applicable in the construction of designs for cloths in which a special order of introducing the warp and weft threads is employed as it enables the figure to be placed in conformity with the arrangement of the threads.

### THE DROP DEVICE

This is a common device which enables the designer to place two similar units in different relationship to one another as shown at B, C, and D in *Figure 13.3*.



*Figure 13.3*

A in *Figure 13.3* shows the unit itself and B the arrangement, using the commonest and the most effective drop distance—the half-drop. C and D indicate in a schematic manner the relationship of units in the one-third, and the one-quarter drop effects respectively.

*Half-drop designs*

In true half-drop designs the figure in one-half of the complete repeat is exactly the same as that in the other half, and if the repeat is divided into four equal parts by bisecting it in both directions the ornament in alternate



Figure 13.4

sections is exactly the same. This is illustrated in *Figure 13.4*, in which a half-drop design is shown with the four equal-sized sections detached from each other. It will be seen that the unit-figure comprises one half of the complete design, taken either vertically or horizontally, and that one half of the repeat

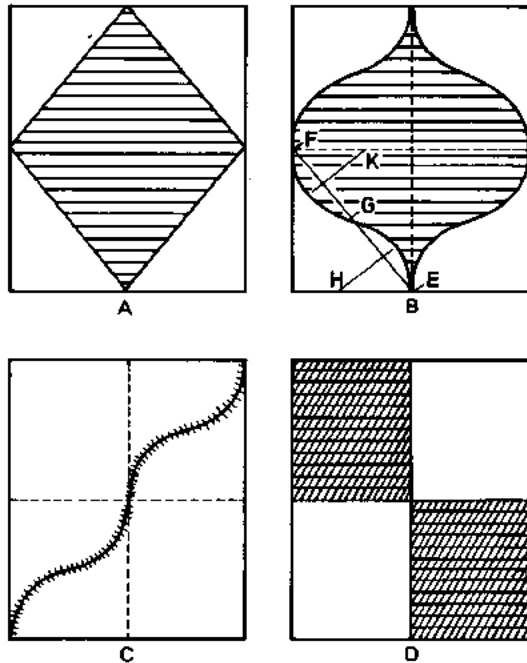


Figure 13.5

can be produced from the other half by 'half-dropping' the unit longitudinally, or, by moving the unit one half the width of the repeat.

### *Half-drop bases*

The chief bases upon which the half-drop principle is applied are the diamond, the ogee, the diagonal waved line, and the rectangle, which are respectively indicated at A, B, C, and D in *Figure 13.5*.

The ogee base, represented at B, may be obtained as follows: The repeat is bisected in both directions, as shown by the dotted lines, and a line E F, which is drawn diagonally from corner to corner of one of the rectangles, is bisected at G. Lines are then drawn at right-angles to E F, passing through the centres of the lines E G and F G respectively, and cutting the horizontal lines at points H and K. These points form the centres from which the curves are drawn. As a rule, by using tracing paper, the ogee base lines can be drawn with sufficient accuracy freehand.

The waved line, shown at C in *Figure 13.5*, is constructed in a similar manner to the ogee. In this case, however, instead of the line being turned back in order that it will join with itself in a vertical direction, it is continued in the opposite corner of the repeat, and is joined with itself diagonally.

The rectangular lattice is given at D, and in this base one half of the design is contained within a shaded and a blank section.

### *The diamond base*

The diamond base may be employed in the construction of any form of half-drop design, but it is chiefly serviceable in the arrangement of figures that are more or less diamond-shaped. As shown in the example given in *Figure 13.6*, the leading feature, or the mass of the design is drawn within the diamond



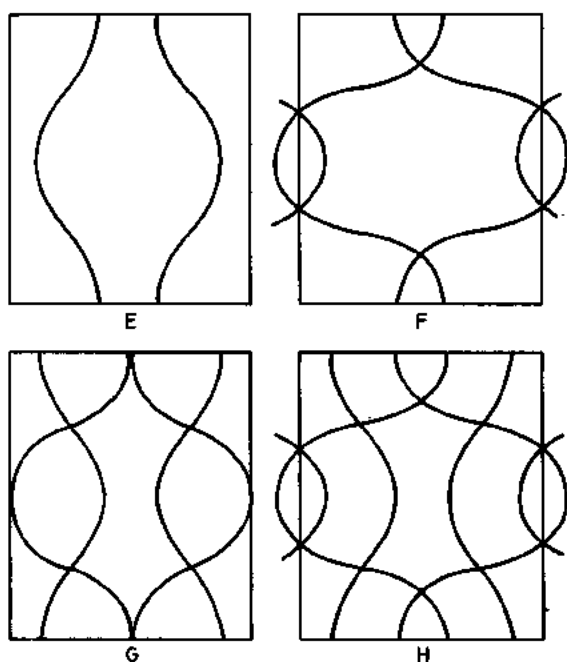
*Figure 13.6*

space, which is indicated by dotted lines. The four triangular spaces at the corners of the repeat, when united form a second diamond-shaped space equal in size to the first, and the figure is traced into this space in exactly the same relative position as in the first diamond. The correct position of the

second figure is obtained by marking the corners of the first diamond on the tracing paper, and then placing the paper so that the marks coincide with the corresponding corners of the second diamond. This ensures that if a line in the first diamond is crossed by a portion of the first figure the corresponding line in the second diamond will be crossed by a similar portion of the second figure in exactly the same relative position. Two or more repeats should be traced in each direction in order that it may be conveniently seen where bare places require to be filled in, or parts curtailed where the figures encroach on each other.

### *The ogee base*

In addition to the form of ogee, illustrated at B in *Figure 13.5*, in which the base lines touch, the lines may be open, as shown at E in *Figure 13.7*; or interlacing, as indicated at F; while closed and open lines may be used in combination, as represented at G; or interlacing and open lines in combination, as shown at H.



*Figure 13.7*

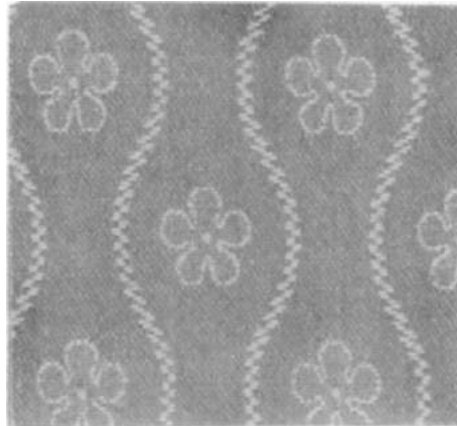
*Figure 13.8* shows the application of a design to the base given at B in *Figure 13.5*. This form of ogee is merely a variation of the diamond base, the ogee lines similarly dividing the repeat into two sections, which are of the same shape and size. A similar method of constructing the sketch may therefore be employed, the figure which is placed in one space being traced into the other space in exactly the same relative position. The curved lines of the ogee are, however, better adapted than the straight lines of the diamond base for the construction of designs of a graceful flowing character. Designs based on

the ogee are specially suitable for hanging fabrics on account of the effective manner in which the lines of the figure play in and out of the folds of the textures. In *Figure 13.8* the large leaves distinctly follow the base lines, and as the latter are in contact the design has a pronounced ogee appearance with the central figures closed in.

*Figure 13.8*

A design is given in *Figure 13.9*, which has been constructed upon an open ogee base, similar to that shown at E in *Figure 13.7*.

A design which corresponds with the basis given at G in *Figure 13.7*, is illustrated upon squared paper in *Figure 13.10*, in which a double pair of open lines are shown interfacing with a closed pair. The ogee base is naturally

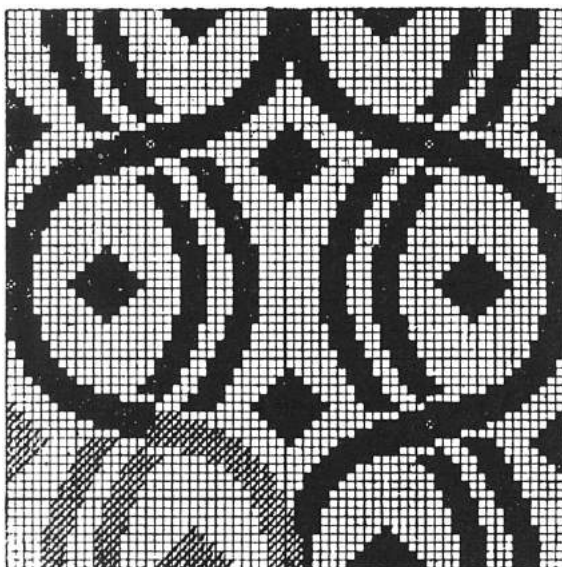
*Figure 13.9*

adapted to the construction of drop designs of a symmetrical character, and this example illustrates a convenient method of working out such a design directly upon squared paper. The centres from which the lines are turned or reversed are found by dividing the repeat into four equal parts, as indicated by the crosses on the 1st, 17th, 33rd, and 49th squares. The ogee net, although frequently employed as a base for the half-drop arrangement of figures, can also be used in other ways, and it is not uncommon to find completely different designs used in each of the two units of the ogee base which, due to this

treatment, becomes merely a part of the ornament of a unit-repeating design.

*The diagonal waved line base*

This base is particularly applicable to the arrangement of figures which are required to run in a diagonal direction, as shown in the design given in *Figure 13.11*. In constructing the style, the length of diagonal repeat is



*Figure 13.10*



*Figure 13.11*

indicated, and the waved line drawn in. The ornament may then be built upon the waved line before the boundary lines are indicated, because the angle of inclination of the line may be varied, within limits, to suit the form of the figure, and to fit the width of repeat that a given jacquard will give. Thus, assuming that the figure shown in *Figure 13.11* had to be inclined at a steeper angle, the repeat would be increased in length, and reduced in width, while by making the figure run at a flatter angle the length of the repeat would be reduced, and the width increased. After the boundary lines have been inserted on the sketch the parts of the figure require to be joined at the edges, and details may be added to the design, if necessary. In *Figure 13.11* one complete repeat, and its division into four equal parts, are indicated by the dotted lines, which enable the half-drop principle of arrangement to be observed.

The diagonal basis, although chiefly suitable for the diagonal arrangement of figures, can be employed in the construction of drop designs of an all-over character. There is always a tendency, however, for the diagonal line to assert itself, which allows its use as a base only for special styles.

#### *The rectangular base*

In the arrangement of given masses or detached figures upon the half-drop principle, the rectangular base, illustrated at D in *Figure 13.5*, frequently possesses distinct advantages, and except in special cases (as for example, when the ornament is required to definitely follow certain base lines) may be used with greater facility than the other bases. The chief reason for this is that in using a base such as the diamond or ogee it is necessary to indicate both the width and the length of the repeat when the sketch is commenced. With the rectangular basis, however, the length of the repeat can be varied, during the construction of the sketch, to suit the required size of mass and amount of ground space, at the same time that the width of the repeat is made to coincide with that of a given jacquard. *Figure 13.4* shows a typical example of a design which can be arranged most satisfactorily on the rectangular plan. The mass is large in proportion to the width of the repeat, therefore, in order to secure proper balance of figure and ground the length of the repeat has had to be made much greater than the width.

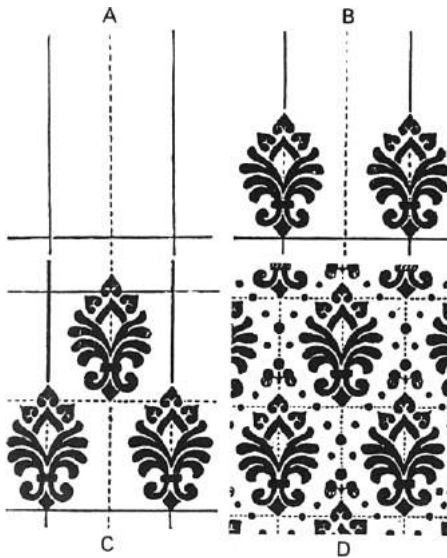
The method of constructing a drop design on the rectangular basis to fit a given width of repeat is shown in stages at A, B, C, and D in *Figure 13.12*. First, as shown at A, a horizontal line is drawn on the sheet of paper, and three vertical lines, the two outer lines having a space between them equal to the width of the repeat, while the third, which is shown dotted, divides the repeat into two equal parts. The lines should be drawn in lightly and of unlimited length.

Second, as shown at B, a tracing of the figure is made in a suitable position relative to the base line and the first vertical line. In this case, as the figure is bi-symmetrical, it is conveniently placed with the vertical line passing through its centre. The positions of this line and the horizontal line should be indicated on the tracing paper before the latter is removed, to enable the figure to be traced again in the same relative position to the other lines. A second tracing of the figure is made with the lines on the tracing paper coinciding with the horizontal line and the vertical line on the right. This ensures that the distance



from one figure to the other is equal to the width of the repeat, and that the parts of the figure join correctly at the sides.

In the third stage, shown at C in *Figure 13.12*, the position of the intermediate figure is found, and the length of the repeat determined. The tracing paper, placed with the vertical line coinciding with the dotted vertical line of



*Figure 13.12*

the sketch, is moved in a vertical direction until it is judged that the figure occupies a suitable position in relation to the figures which have already been traced. If placed correctly the horizontal line on the tracing paper will be parallel with the base line of the sketch, and the distance between the two lines will be equal to half the repeat in length. A third tracing of the figure is made and the second horizontal line is drawn in, as shown by the dotted line; then by doubling the distance between the two horizontal lines, the position of the third horizontal line is found. When this is drawn in, the space occupied by one repeat is obtained divided into four equal rectangles.

D in *Figure 13.12* shows the completion of the sketch. Portions of the figure are traced at the top and bottom, and at the sides, and details of the design are added and traced in stages. By placing the vertical and horizontal lines on the tracing paper to coincide with the corresponding lines of the sketch the additional figure in alternate sections is readily made the same, and a correct junction formed of the parts of the figure at the edges of the repeat.

#### *Drafting half-drop designs*

In drafting a true half-drop design upon squared paper considerable time and labour can be saved by adopting a system which corresponds with the principle of construction of the design. The method is illustrated in *Figure 13.13*, which shows the lower half of the design given in *Figure 13.12* worked out in two sections lettered A and B. Each section is equal to one-fourth of the complete repeat, and they are placed alongside each other, as shown in *Figure 13.13*, while the first half of the cards is cut. Then, to enable the cards

for the second half of the design to be cut, the two sections are reversed in position, A being placed on the right and B on the left. Only one half of the complete design thus needs to be painted out on the design paper, but care has necessarily to be taken that the ground weave and the figure at the top of A and B, join correctly with the bottom of B and A respectively.

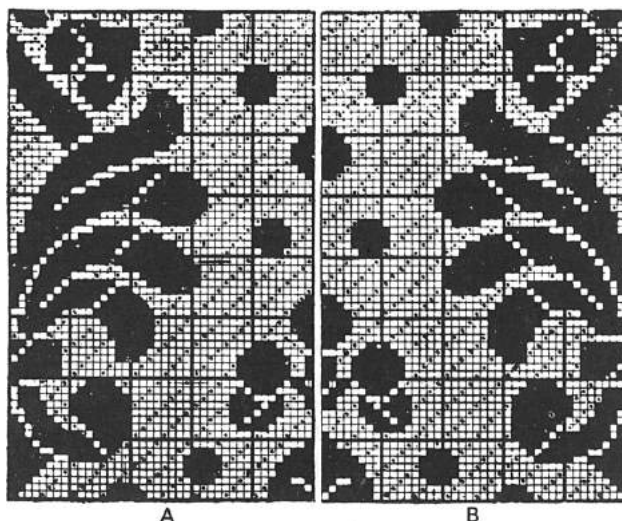


Figure 13.13

In the construction of all-over designs, in which the figure is rather indefinite in character, the half-drop system is very useful, and an illustration of a design thus arranged is given in *Figure 13.14*. The designer can readily judge the balance of the figure, and the parts can be made to fit correctly together with little difficulty; while in most cases the design paper work is reduced by about one-half, as compared with a unit-repeating design.

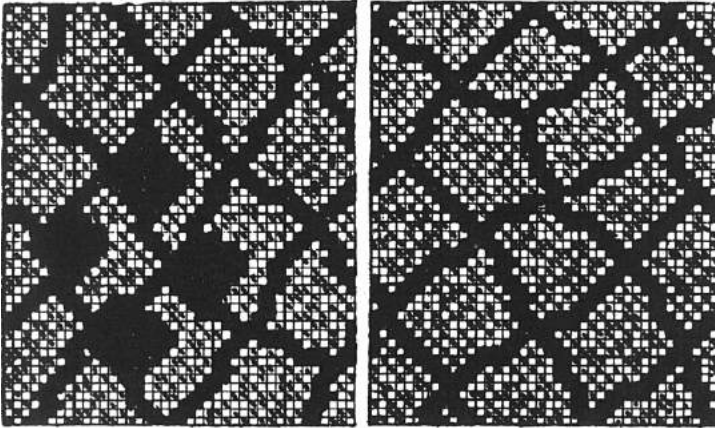
Figure 13.14



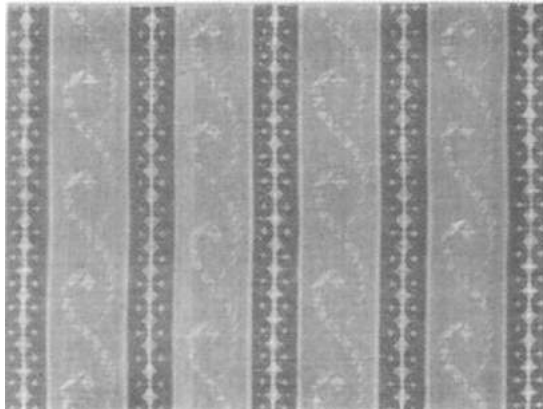
Designs of an abstract character, such as the example given in *Figure 13.15*, are sometimes drafted directly on the squared paper without the aid of a sketch, and for this class the half-drop system of construction is very convenient, because of the saving in time and labour that can be effected. In drawing and painting in the figure and ground, two sections of design paper are used, which together comprise one half of the complete repeat, and these are moved about, being placed alongside, and then one above the other, while the parts of the design are made to join up correctly.

*Half-drop stripe designs*

In stripe designs the figure is mostly placed at a different level in adjacent stripes, as shown in *Figure 13.16*, in order to prevent the masses from falling into line with each other horizontally. Therefore, although the same ornament is used in each figured stripe, a complete design extends over the width

*Figure 13.15*

of two stripes. In *Figure 13.16* the different position of the figure in succeeding stripes is due to dropping it one-half the length of the repeat. In sketching a stripe design, after the figure in the first stripe has been drawn in, its correct position in the second stripe is readily found on the rectangular principle by dividing the repeat horizontally into two equal parts.

*Figure 13.16*

In drafting a half-drop stripe design, it is generally only necessary to fully paint out one stripe, as shown in *Figure 13.17*, which corresponds with the example given in *Figure 13.16*. The cards for the first half of the design may be cut with the upper section of *Figure 13.17* on the right, and for the second half, on the left of the lower section.

*Defective half-drop designs*

Figure 13.18 illustrates the defective appearance of a design in which an inclined figure is arranged on the half-drop principle. The design not only has a monotonous appearance, but the arrangement causes twill lines of

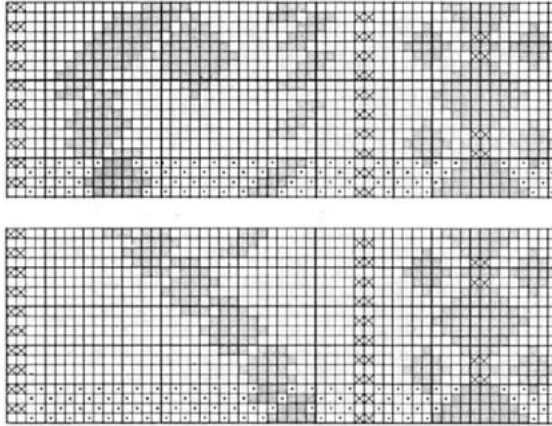


Figure 13.17

figure to show in the cloth. Unless a diagonal effect is desired, only symmetrical, or well balanced figures are suitable for the half-drop system of construction. An inclined figure requires to be turned or reversed in the intermediate position.

The half-drop principle may be employed in the arrangement of two figures which are not alike, and an illustration of the style is given in Figure 12.1.

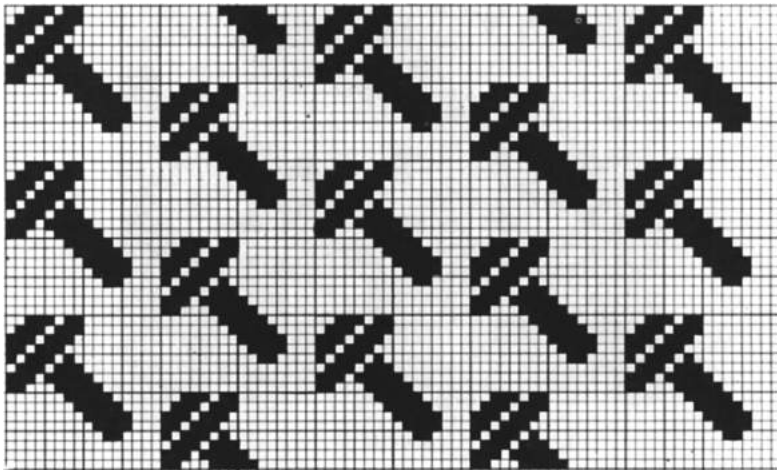


Figure 13.18

Such a design does not possess the distinctive features of a true half-drop arrangement, and it is necessary to draft it in the same manner as a unit-repeating figure.

*One-third and one quarter-drop designs*

As shown earlier a unit figure may be dropped each time a distance equal to one-third or one-fourth of the length of a repeat, and be used three or four times respectively in the complete design. The method, however, throws the masses into twill lines, and is therefore only applicable to styles in which a

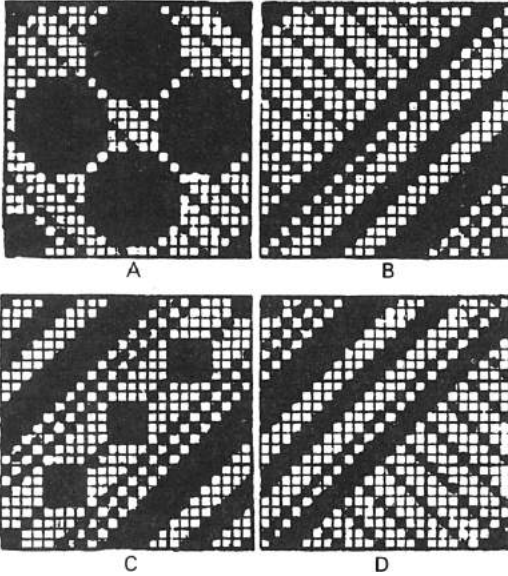


Figure 13.19

diagonal effect is not objectionable. A simple illustration is given in *Figure 13.19*, which shows how a diagonal figure may be readily designed upon squared paper. The figure is intended to be dropped one-fourth, that is, to repeat diagonally four times, upon 96 ends and 96 picks. One-fourth of the design is painted out and divided into four sections, as shown by the portions lettered A, B, C, and D. Then in cutting the cards the sections are arranged as follows: First, A, B, C, D; second, D, A, B, C; third, C, D, A, B; fourth, B, C, D, A.

## DROP-REVERSE DESIGNS

*Comparison of half-drop and drop-reverse designs*

The pure drop-reverse arrangement is similar to the pure half-drop in the respect that the unit of the design is contained twice in the repeat, the ornament in one half, in each case, being the same as that in the other half. The essential difference between the two systems is that in the half-drop the figure in both halves is turned the same way, whereas in the drop-reverse the figure in one half is reversed or turned in the opposite direction to that in the other half. The latter feature is illustrated in *Figure 13.20*, which shows the repeat of a drop-reverse design bisected in both directions. In marking the boundary lines of the repeat in *Figure 13.20* the vertical lines have purposely been drawn in such positions that they pass through corresponding parts of the figure in

the upper and lower halves. Each vertical line thus indicates a position where the figure reverses, and an examination will show that the ornament in alternate sections of the design is the same, but turned the opposite way. It will also be seen that if the lower half of *Figure 13.20* be turned over from side to side and placed above the upper half with the vertical and horizontal lines coinciding, the ornament in the two halves will also coincide.

### *Drop-reverse bases*

The chief bases upon which drop-reverse designs are constructed are the diamond, ogee, vertical waved line, and rectangle, which are indicated, in conjunction with a design, at A, B, C, and D, respectively in *Figure 13.21*.

### *Diamond and ogee bases*

In using the diamond or ogee base the figure which is drawn in the one section is placed in the other section in exactly the same relative position to the base lines, but with the tracing turned over. Thus, in *Figure 13.21*, it will be seen



*Figure 13.20*

that the unit figure occupies corresponding positions in the diamond spaces of A, and in the ogee spaces of B, a portion of figure that overlaps one space similarly overlapping the other space, but turned over from side to side.

The diamond and ogee shapes are naturally best adapted to the construction of designs in which the lines of the figure follow the base lines. An



*Figure 13.21*



*Figure 13.22*

illustration is given in *Figure 13.22*, in which the central masses are reversed, but the other parts of the figure are symmetrical, and the example shows—in comparison with a style which is entirely bi-symmetrical—how the reversing method tends to reduce the stiffness of a design.

#### *The vertical waved line base*

This is a particularly suitable basis to use in the construction of designs of a graceful flowing character. From an examination of *C* in *Figure 13.21* it will be seen that the figure is the same on opposite sides of the line, but reversed. The principle of the arrangement is also illustrated by the example given in *Figure 12.36*.



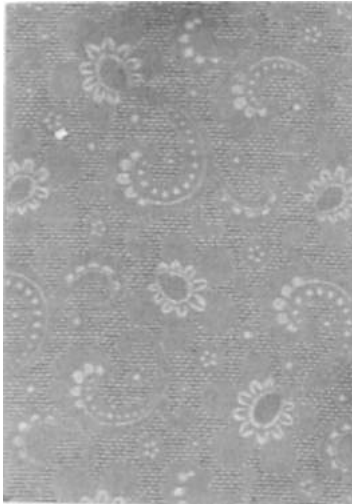
*Figure 13.23*

The base can also be used with advantage in the construction of designs in which the figure runs continuously in stripe form, as shown in the example given in *Figure 13.23*. The base lines not only afford a suitable foundation upon which to arrange the parts of the ornament, but the addition of the figure, in the same relationship to each half of the line, enables a well-balanced design to be readily produced.



*The rectangular base*

The relation of the rectangular basis to the diamond, ogee, and vertical waved line will be understood by comparing A, B, C, and D in *Figure 13.21*, in each of which the base lines pass through corresponding parts of the figure. By examination it will be seen that the bases A, B, and C could be similarly indicated upon the design given in *Figure 13.20* in addition to the rectangular base which is shown. Further, it will be observed that *Figure 13.20* is arranged similar to D in *Figure 13.21*, except that in the former the sections which contain corresponding parts of the figure are placed alternately, while in the latter they are situated one above another. In both cases, however, the figure in the upper half exactly corresponds with that in the lower half. No matter where the boundary lines of the repeat are drawn this is a distinct feature of all true drop-reverse designs in which the unit is turned over from side to side. Because of this, and for the reason stated in reference to half-drop designs,

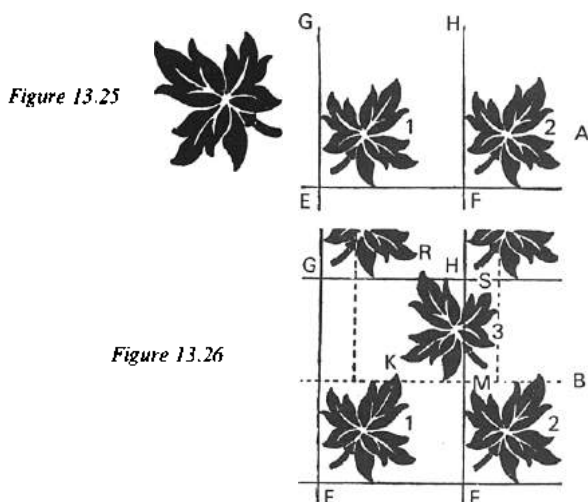
*Figure 13.24*

the rectangular system of arranging a unit figure in the drop-reverse order is frequently preferable to the other bases. Particularly is this the case when the principal figure is not well balanced, or when it is very large in comparison with the width of the repeat. In illustration of the latter point, a design is represented in *Figure 13.24*, in which the figure extends over two thirds of the width of the repeat, while the length is nearly one and a half times the width. When a large figure is arranged in a narrow repeat, an appearance is given to the design of having been woven in a larger capacity of jacquard than has actually been the case. By properly adjusting the length of the repeat, practically any size of figure, so long as it does not encroach on itself when repeated, can be arranged on the rectangular drop-reverse principle.

The method of arranging a figure (the figure given in *Figure 13.25* is used) to fit a given width of repeat, is illustrated at A and B in *Figure 13.26*. As shown at A, a horizontal base line E F, and two vertical lines E G and F H, are drawn of unlimited length; the distance between the latter being equal to the width of the repeat. The figure is inclined at a suitable angle, and a tracing is made as shown at I, and the relative positions of the base lines to the figure are

indicated on the tracing paper. The figure is then copied as shown at 2, one repeat distant from the first tracing, in a similar position relative to the vertical and horizontal lines.

B in *Figure 13.26* shows how the position of the intermediate figure is found. The tracing of the figure is turned over from side to side, and is moved about (the base lines of the sketch and tracing being kept parallel) until it is judged



that the reversed figure is in the most suitable position in relation to the figures 1 and 2. Then a third tracing is made, as shown at 3, and the positions of the base lines are transferred lightly to the sketch, as indicated by the dotted lines. The reversed figure is usually in the best position when there is an approximately equal space between the figures at K and M; a smaller overlap, if necessary, being allowed on one side than on the other in order to counteract one side of the figure being heavier than the other side. The position of the



*Figure 13.27*

third horizontal line G H is found by doubling the distance between E F and the dotted horizontal line, and when this is drawn one complete repeat is enclosed within the rectangle E G H F. The main feature is again copied above the repeat, as shown, then, if correctly placed, the figures are in exactly the same relation to each other at R as at K, and at S as at M.

As shown in *Figure 13.27*, the sketch is completed by adding the details of the design in one half, and reversing them in the same relative position in the other half. A distinct advantage of this method of arrangement is that, if a

proper balance of the ornament is obtained in one half of the design, a similar balance is ensured in the other half.

### *Systems of drafting drop-reverse designs*

Different methods of constructing the squared paper design of a true drop-reverse figure may be employed either in working from a sketch or a woven pattern. One method consists of drawing the complete outline of the figure on the design paper in the same manner as in drafting a unit-repeating design. In another method one half of the design (the unit) is drawn and painted on the design paper; then a starting point of the second half is found, and the figure is copied in the reverse direction, square by square, from the first half. Thus, in *Figure 13.28*, which shows the design given in *Figure 13.27* worked out upon 96 ends and 118 picks, the position lettered A corresponds with that lettered B. The latter, therefore, shows a suitable place to commence the copy of the figure in the reversed position and it will be seen that the number of picks from A to B is half of the total number of picks in the repeat. In a third method the first half of the design is drawn on the squared paper, and a copy is made upon tracing paper. Then the tracing is turned over from side to side, placed in the proper position on the design paper, and a reversed copy of the figure made by rubbing. In each of the foregoing methods the boundary lines of the repeat may be drawn in any position in relation to the figure.

A fourth method is illustrated by *Figures 13.27* and *13.28*, in which the special features of the drop-reverse arrangement—described in reference to *Figure 13.20*—are taken advantage of to reduce the amount of work in drafting a design. The first vertical boundary line of the repeat is drawn in such a position that the figure is cut in the same relative position in each half, as shown by the line T W in *Figure 13.27*. (The position of the line T W is exactly between the line E G and the first dotted line in B, *Figure 13.26*.) The lower half of the repeat, taken from left to right, is thus made to exactly coincide with the upper half, taken from right to left. In *Figure 13.28* the two halves of the design, which are shown detached from each other, correspond with the arrangement of the repeat shown in *Figure 13.27*, and it will be seen, by comparing the picks in succession, that the marks and blanks in the lower half, read from left to right, are the same as in the upper half, read from right to left. It will therefore be clear that it is quite possible to cut all the cards from one half of a plan such as that given in *Figure 13.28*. Sometimes the half-repeat is worked out on transparent design paper, which enables the cards for the second half of the design to be cut by turning the paper over, but ordinary design paper can be used quite conveniently.

The foregoing system is only applicable to designs in which the ground weave can be arranged to read the same from each side, and it is necessary to make the design upon a number of picks which is suitable for the reversing of the ground weave. Thus, in *Figure 13.28* each half of the repeat is made with an odd number of picks in order to fit with plain ground. A number of examples are given in *Figure 13.29*, which will reverse properly at the half-repeat if the design contains an odd number of repeats of the ground weave in each case.

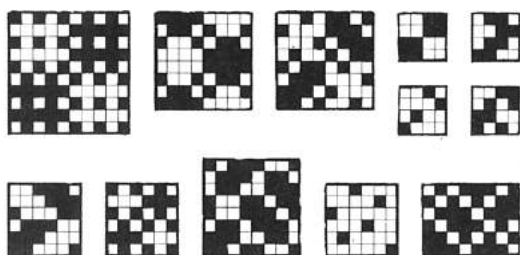
The preceding method is quite as applicable in constructing the design from a woven sample as from a sketch. If a thread arrangement is used in

dividing up the design (see *Figure 12.6*), the sample is adjusted, as shown in *Figure 13.30*, so that a vertical thread cuts the figure in the same relative position in both halves of the repeat, this thread being taken as the commencement of the design paper plan.



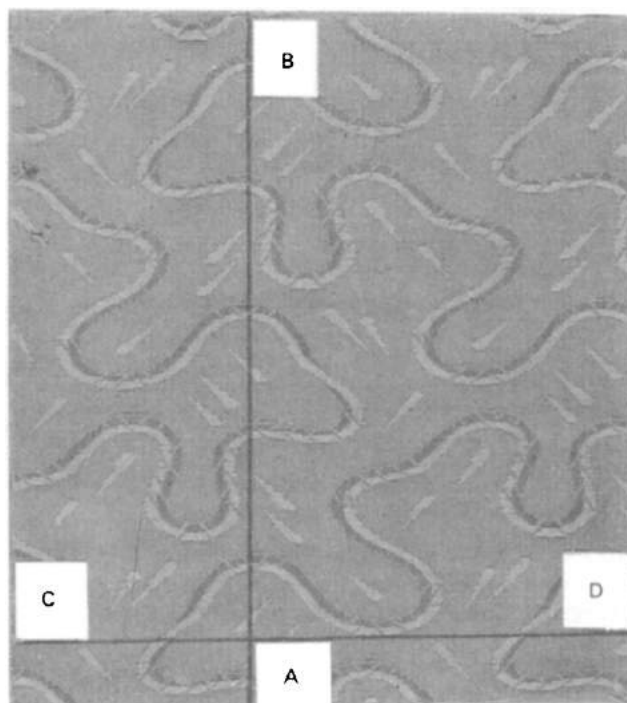
*Figure 13.28*

When the ground weave does not reverse it is necessary for the complete design to be made, and a method is illustrated in *Figures 13.30 and 13.31*, which enables the outline of the figure to be drawn in very readily. The example is a pure drop-reverse, and in *Figure 13.30* the figure reverses from



*Figure 13.29*

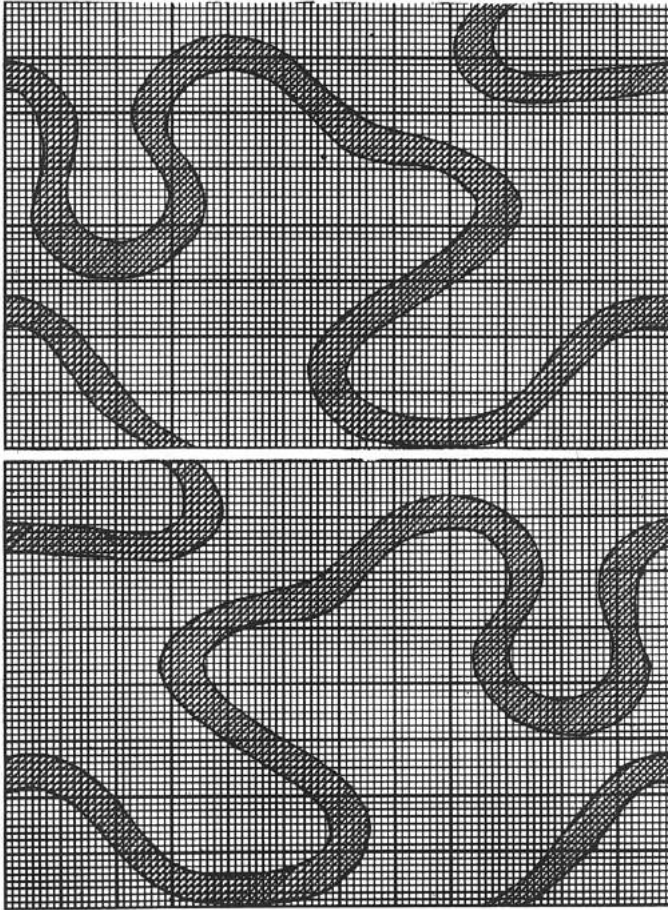
the vertical line A B; that is, the figure in the lower half of the repeat is in the same relative position to the line as the figure in the upper half, but on opposite sides. The line A B corresponds with the first end of *Figure 13.31*, and the line C D with the first pick, the position of the latter line, however, being immaterial. The design is divided into spaces (as previously explained in reference to *Figures 12.1 and 12.6*) commencing with the lines A B and C D.



*Figure 13.30*

Two sheets of design paper are used, each containing one-half, or rather more than one-half, of the number of picks in the full repeat, and one sheet is turned over horizontally and placed below the other sheet so that the ruled surfaces are on the outside. (By pricking two holes in corresponding positions in each sheet, which are made to coincide when the sheets are put together

the squares of the lower sheet can be placed directly below the squares of the upper sheet.) The sheets are secured by pins, and carbon paper is placed below them with the carbon side upward. As the outline of the figure in the first half of the design is drawn on the upper sheet of point-paper, an exact copy is produced at the same time on the under side of the lower sheet. Then, as shown at *Figure 13.31*, when the lower sheet is turned over, the figure upon



*Figure 13.31*

it is reversed, as in the second half of the design, and is approximately in the correct position in relation to the figure in the first half when the sheets are placed together. Some little adjustment of the outline may be necessary where the sheets join.

#### *Drop-reverse stripe designs*

In each stripe of the design given in *Figure 13.32* the figure is dropped one-half of the repeat, and turned over from side to side. Also, the ornament in the second stripe is dropped one-fourth of the repeat from its position in the first stripe, the complete repeat in width thus extending over two stripes. The

mass in one stripe is brought opposite the space between the masses in the other stripe, and the barriness, which would have resulted if the figure in both stripes had been placed on the same level, is avoided. The dotted horizontal lines, which divide the repeat of *Figure 13.32* into four equal parts, show how correct distribution of the figure is secured.



*Figure 13.32*

A ready method of drafting the style of design illustrated in *Figure 13.32* is indicated in *Figure 13.33*. The complete design of one stripe only is made, but the sheet of squared paper is divided into four equal parts, as shown at A, B, C, and D. The full design is produced by cutting the cards with the parts placed alongside each other as follows: First, A and B; second, B and C; third, C and D; and fourth, D and A.

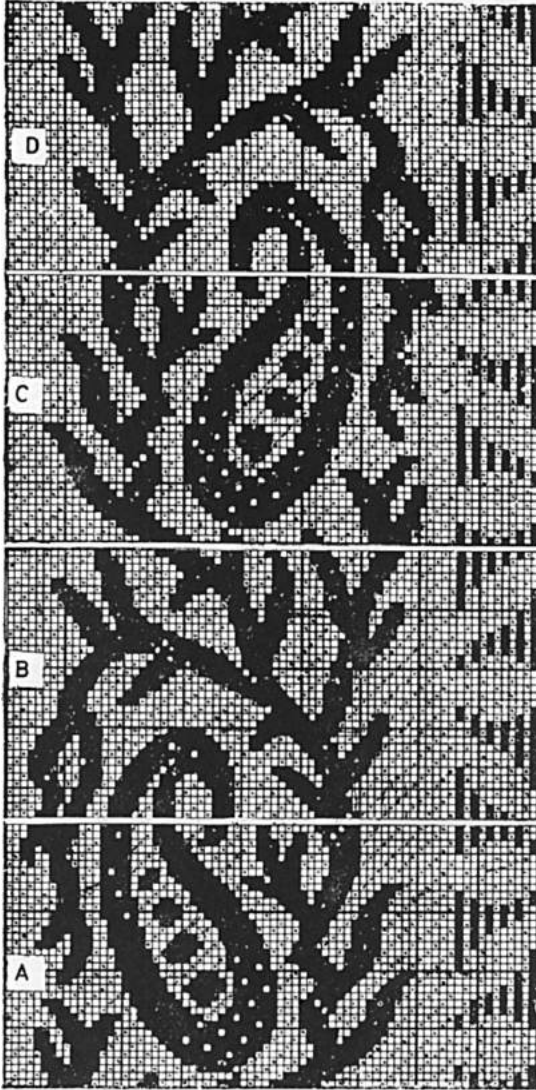
The method illustrated above can be readily adapted to designs repeating over three or four stripes with one-third or one-quarter drop arrangements by the division of the repeat into suitable segments.

#### *Vertical reversing of figures*

The style of figure, which is much heavier on one side than the other, is frequently very difficult to arrange on the drop-reverse principle by turning it over from side to side. It is impossible to get a proper balance of the ornament, on account of the heavy sides coming together in one line, and the light sides in another line.

The difficulty of arranging such a style can frequently be got over by turning the figure over from top to bottom in the second position, as shown in

*Figure 13.34.* The correct position of the second figure, and the length of repeat which is suitable, may be obtained as follows: A horizontal base line A B, two vertical lines A C and B D (the distance between the latter being equal to the width of the repeat), and a third vertical line E F, equidistant between A C and B D, are drawn of unlimited length. The figure is traced in a suitable position in relation to the lines A C and A B, and copied, as shown



*Figure 13.33*

at 2, in the manner described in reference to *Figure 13.26*, care being taken that the positions of the lines A B and A C are correctly indicated on the tracing paper. The tracing is then turned over from top to bottom, and placed with the vertical line upon it coinciding with the line E F. It is moved in a vertical direction until it is judged that the reversed figure is in the best position in relation to the first two figures; and a third tracing is made, as



shown at 3. The size of the repeat in length is found by turning the tracing back again, and placing it with the vertical line coinciding with the line A C extended, in such a position that there is approximately the same space between the figures at H as at G. Portions of the figure are then traced at the top, bottom, and sides, in order to show the repeat, and additional detail is added, if necessary. If the sketch is correctly constructed there will be exactly the same space between the figures at K as at G, and at M as at H.

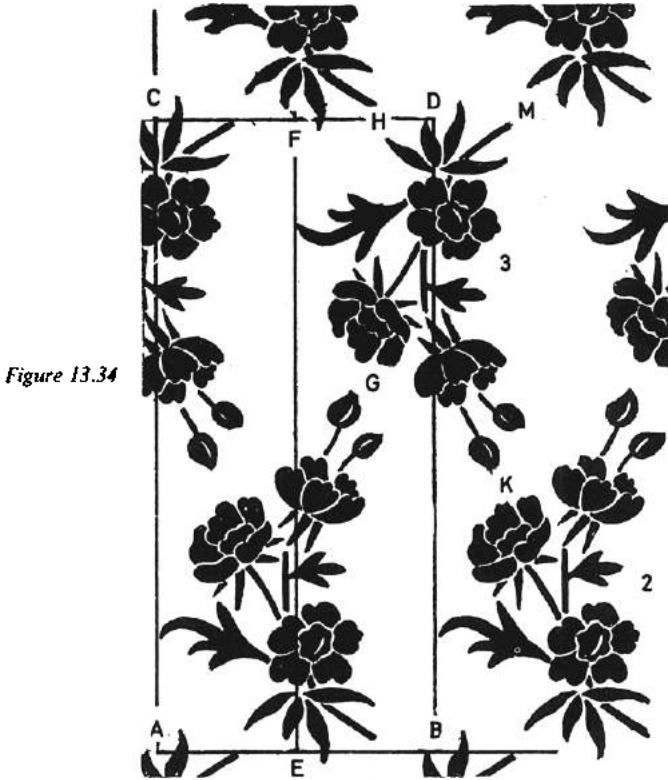


Figure 13.34

The foregoing system is useful in cases where the figure is required to appear the same way up, when viewed from either end of the cloth. It may also be advantageously used when some prominent shape occurs at one side of the figure, as will be seen from a comparison of the sketches given in *Figures 13.35 and 13.36*. In *Figure 13.35* the figure is alternately turned over from side to side in the ordinary manner, with the result that the flowers form a pronounced line lengthwise of the design, and the leaves another line. By turning the intermediate figure over from top to bottom, as shown in *Figure 13.36*, the second figure is moved one-half the width of the repeat from the first figure, and the striped appearance is avoided. It will be noted, however, that the stems of the figure come together and form a line across the sketch, while a similar effect is produced by the tops of the leaves falling into a line. The defect, however, is less noticeable than the distinct stripe produced by the arrangement shown at *Figure 13.35*.

From this and the foregoing examples it will be understood that in using a given figure it is necessary to select a system of arrangement which is most

suitable for it; while, with a given system of arrangement, the parts of the figure require to be so distributed that an evenly balanced design will result. Thus, *Figure 13.37* shows how the flowers and leaves might be re-distributed

*Figure 13.35*



in order to render the figure suitable for arranging on the principle illustrated in *Figure 13.35*.

In order to show the distinctive features of the design given in *Figure 13.36*, and to illustrate a convenient method of drafting the effect on squared paper,



*Figure 13.36*



*Figure 13.37*

one complete repeat of the design is enclosed within the rectangle  $A B D C$ , which is bisected by the vertical line  $E F$ . The horizontal boundary lines  $A B$  and  $C D$  cut the figure in the same relative position in each vertical half; therefore, the figure in one half of the design is exactly like that in the other half, except that it is turned over vertically. Hence, if the line  $A B$  be used as the commencement of the design, the complete outline of the figure may be



Figure 13.38

obtained on the design paper in a similar manner to that illustrated in *Figure 13.31*. In this case the sheet of point-paper is cut vertically into two equal portions, which are placed one above the other, the lower portion being turned over from top to bottom. Thus, in *Figure 13.38*, which shows the complete plan of the design, given in *Figure 13.36*, the two portions are shown

detached from each other, and it will be seen that the figure in one half, followed from the bottom, exactly corresponds with that in the other half taken from the top.

*Combination of half-drop and drop-reverse systems*

*Figure 13.39* illustrates a system of arrangement which is particularly useful in securing even distribution of the ornament when the figure is badly balanced. In the example the figure is not only heavier on one side than the other but a distinct floral shape occurs on one side at the top. The figure is used eight times in the repeat, and is turned in four directions, and the complete design is a combination of the half-drop and the drop-reverse arrangements. The multiple reversing of the figure prevents the flowers from falling



*Figure 13.39*

into lines, either horizontally or vertically, while the inclusion of eight figures in the repeat makes the design less stiff and formal than is the case when only two figures are used. Compared with a two-figure arrangement the chief disadvantages are that twice as many cards are required, and very large figures cannot be woven because the figuring capacity of the jacquard is practically reduced by one half. It will frequently be found, however, that the system can be employed for figures which are too large to arrange in sateen order, while it possesses many of the advantages of the sateen distribution.

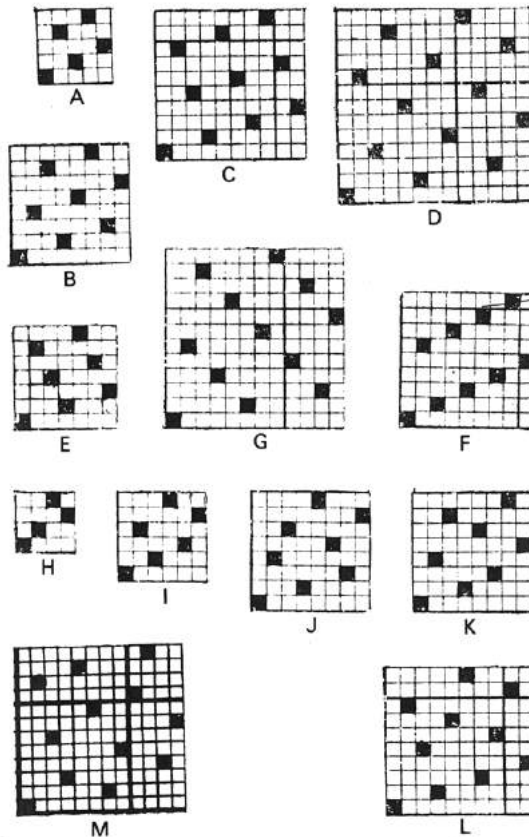
The repeat of *Figure 13.39* is shown bisected by dotted lines, and it will be seen that the ornament in alternate sections is the same. In drafting the design upon squared paper, it may therefore be treated as a half-drop arrangement,

so that only one-half of the effect needs to be worked out, the complete set of cards being cut from the half-repeat in the manner described in reference to *Figure 13.13*.

### SATEEN SYSTEMS OF DISTRIBUTION

#### *Comparison of regular and irregular sateen arrangements*

One of the most important functions of sateen weaves is their use as bases in the distribution of figures. The most commonly used sateens are illustrated in *Figure 13.40*, in which the examples A to G are regular, and H to M, irregular sateens.



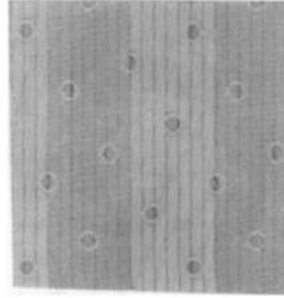
*Figure 13.40*

In *Figure 13.41* examples of designs are given which illustrate the comparative effects produced by using the two kinds of sateens as the bases of distribution. In the upper design the spots are arranged in the order of the 8-thread regular sateen, shown at B in *Figure 13.40*, and it will be noted that continuous diagonal lines of figure are formed. This tendency of the primary masses to fall into twill lines is occasionally an objectionable feature of the regular sateen orders of distribution. In the lower design the figures are arranged in the order of the 12-thread irregular sateen given at M in *Figure*

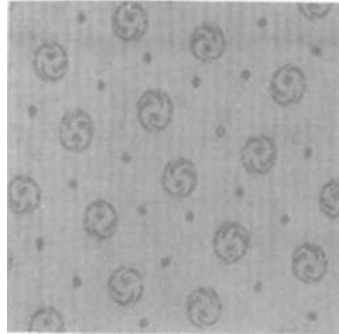
13.40. In this case the spots tend to run in groups of two or three, the direction of one line opposing that of another, so that there is no possibility of the figures falling into twill lines. A feature of the broken arrangements is the tendency of the figures to group in twos, threes, or fours.

#### *Advantages of sateen bases*

Compared with the half-drop and drop-reverse systems, the best sateen arrangements possess the following advantages: (1) There is less liability of stripes or bars occurring in the cloth, as uniform distribution of the primary masses is more readily secured; (2) a design is more effective be-



*Figure 13.41*

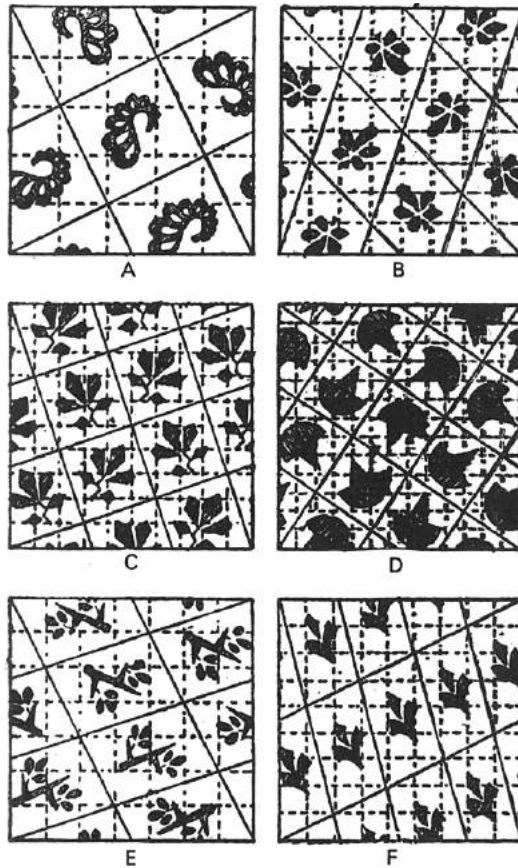


cause the main feature can be turned and reversed in diverse ways, which enables stiffness and sameness of appearance to be more readily avoided; (3) the repetition of the pattern is better concealed. The chief disadvantages are that with the same size of repeat smaller masses are necessary, or, on the other hand, with the same size of mass the capacity of the jacquard must be larger, while there is usually greater expense in cards.

#### *Regular sateen arrangements*

In using the regular sateens as bases it is important that the figures are placed at approximately uniform distances apart. Under ordinary circumstances this condition is secured by selecting a base weave in which there is a similar distance between the marks when viewed from different directions, as in the plans A, B, C, and D, in *Figure 13.40*. These are four of the best regular sateen

bases, the suitability of each being due to the feature that a twill line of dots in one direction is crossed by another line about equally prominent in the other direction. Such bases as E, F, and G in *Figure 13.40*, in which the marks



*Figure 13.42*

form a more prominent diagonal line in one direction than the other, are usually unsuitable. The applicability of the different sateens will be seen by comparing the examples given in *Figure 13.42*. In each design A, B, C, and D in *Figure 13.42*, the bases of which respectively correspond with the plans similarly lettered in *Figure 13.40*, there is an approximately equal space between the figures, while the twill lines, into which the figures fall, are about as prominent in one direction as another. On the other hand, designs E and F in *Figure 13.42*, the bases of which respectively correspond with E and F in *Figure 13.40*, are defective, because the spaces between the figures are unequal, and the figures form a more pronounced line in one direction than in the other. Circumstances sometimes arise, however, which render such a base as E or F necessary in order to obtain uniform distribution; as for instance, when the figure is longer in one direction than another, or when there is a considerable difference between the width and length of the repeat.

*Methods of distributing the figures*

In sketching designs in which the figures are arranged in sateen order, either of the two methods of dividing up the repeat illustrated in *Figure 13.42*, may be employed. In the first method the repeat is divided each way into as many parts as there are figures, as shown by the dotted lines. The number of rectangular spaces in the repeat area is equal to the square of the number of figures, and corresponds with the number of small spaces in the repeat of the sateen base weave. The correct positions of the figure are found by marking the spaces in the order of the sateen base, or by similarly marking the places where the lines intersect. *B* in *Figure 13.42* shows the figure placed each time as centrally as possible upon the allotted space; whereas in *C* in the figure is placed each time with its centre as near as possible to the selected place where a vertical and a horizontal line intersect.

In the second method, as shown by the solid lines in *Figure 13.42*, the repeat area is divided into the same number of spaces of uniform size and shape as there are figures. The spaces, in this case, indicate the relative positions of the figure which is traced as centrally as possible within each space. The method in which the positions of the intersecting diagonal lines are obtained will be readily understood by comparing the sketches with the corresponding sateen bases given in *Figure 13.40*. In each base the sateen marks form lines with each other in opposite directions, flat lines being crossed by steeper lines. By drawing lines to connect the weave marks each boundary line of the repeat is divided into a number of equal parts. Thus, to correspond with the sateen bases, in the design *A* in *Figure 13.42*, the points of connection are found by dividing the boundary lines of the repeat into two equal parts; in *B* by dividing the horizontal lines into three parts, and the vertical lines into two parts; while in *D* the boundary lines are divided into two and also three equal parts. On account of the designs in *Figure 13.42* having been arranged to fit the two methods of dividing up the repeat, the figures do not coincide in position with the marks in the corresponding weave bases given in *Figure 13.40*. Thus, the first horizontal series of spaces in the design *A* corresponds with the fifth pick of weave *A*, and in the design *B*, with the fourth pick of weave *B*.

*Methods of reversing the figures*

The manner in which a figure is turned over or reversed in a sateen distribution has a considerable influence upon the appearance of the design. *A* in *Figure 13.42* shows the figure inclined at a different angle in each position—a system which is chiefly suitable for such textures as carpets and table-cloths, in which the design is required to appear similar from any point of view. *B* in *Figure 13.42* illustrates a good system of reversing a figure in the 8-sateen order of arrangement, four positions being shown, each of which is repeated. The object is always inclined at the same angle, and is therefore retained in the same relation to the threads in the cloth. Two consecutive figures are inclined to the left and two to the right, in either the steep or the flat twill line. If the figure is inclined alternately to right and left in the 8-sateen regular distribution, cross twill lines of figure are formed, in each of which all the figures are inclined in the same direction, and the design is defective. In the 10-sateen arrangement, shown at *C* in *Figure 13.42*, the figure is turned in two ways, and



in both the steep and the flat twill line the angle of inclination is to the left and right alternately. In the 13-sateen arrangement, given at D in *Figure 13.42*, no two figures are turned the same, which is a particularly suitable method for such a stiff figure in preventing sameness of appearance. In the design E, the figure is turned in four positions, but in F all the figures are placed the same, which not only causes the design to appear uninteresting, but the twill-line due to the unsuitable base, is accentuated.

*Figure 13.43*



In addition to turning the same figure in different directions in order to make a design more effective, every figure in the repeat may be different in form, as shown in the example given in *Figure 13.43*. In this design, massive figures turned in diverse ways, are arranged in 8-sateen order. All the figures possess the same characteristics but the difference in shape makes the design appear freer and more attractive.

#### *Size of repeat*

A convenient method of finding the size of repeat which is suitable for a given figure in a proposed system of arrangement is illustrated in *Figure 13.44*. The size occupied by two figures (roughly sketched in alternate order), with the necessary amount of ground space, is first found, as shown at A. Then the corresponding width and length of repeat for the sateen distribution are obtained by multiplying the ascertained dimensions by—

$$\sqrt{\frac{\text{number of figures required}}{\text{number of figures given}}}$$

This formula is applicable to all calculations on changing the number of figures while retaining the same proportion of ground space. For example, taking the repeat of A in *Figure 13.44* to be 4 cm wide by 6 cm long, the repeat

for the 8-sateen distribution shown at B =

$$4 \text{ cm} \times \sqrt{\frac{8 \text{ figures}}{2 \text{ figures}}} = 8 \text{ cm wide.}$$

$$6 \text{ cm} \times \sqrt{\frac{8 \text{ figures}}{2 \text{ figures}}} = 12 \text{ cm long.}$$

It may be necessary for the repeat in width to be changed to fit the capacity of a given jacquard. Thus, assuming that it is necessary for the design B to repeat on 6 cm, the length of repeat, which will give the same proportion of ground space, will be found as follows—

$$\frac{8 \text{ cm wide} \times 12 \text{ cm long}}{6 \text{ cm wide}} = 16 \text{ cm}$$

Changing the relative width and length of the repeat in the foregoing manner is not always practicable, however, because the twill line of figures is liable to be accentuated in one direction, while it is possible that the change will cause the figures to encroach on each other.

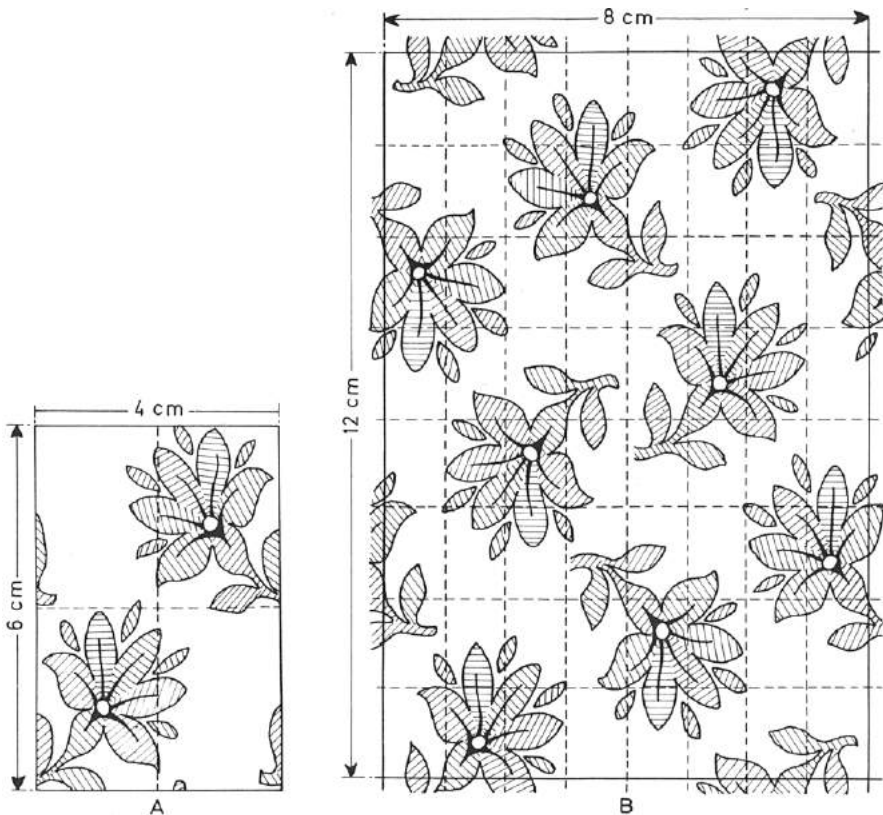


Figure 13.44

*Methods of drafting sateen arrangements*

The following methods of drafting a sateen arrangement of figures from a sketch design or a woven sample can be employed: (1) The full repeat is squared out and all the figures are drawn and painted independently upon the design paper. (2) One figure is drawn and painted on the design paper, and the remainder are copied square by square from it. (3) One figure is drawn on the design paper and the outline copied upon transparent tracing paper by means of which the remaining figures are traced. Certain of the sateen arrangements enable abbreviated methods of drafting to be employed, as shown in subsequent examples.

The 8-thread regular sateen base is one of the most convenient to use, not only because even distribution of the figures is readily secured, but on account of the expeditious manner in which the arrangement can be drafted. This will be understood by comparing the design shown at B in *Figure 13.44* with the corresponding squared paper plan given in *Figure 13.45*. By analysis, it will be seen that the design B in *Figure 13.44* possesses two distinct features: (1) If the repeat be bisected in both directions, the figure in alternate sections is exactly the same; (2) the boundary lines of the repeat are drawn in such positions that they pass through the figure in the same way at the top and bottom, and at the sides; hence, the design appears exactly the same, whether viewed from the top or the bottom. Either feature may be taken advantage of to reduce the design paper work by one half. For example, although only half of the complete repeat is given in *Figure 13.45*, the second half of the cards can be cut from it: (a) by dividing the plan vertically into two parts, and reversing the sections; or (b) by turning the plan round. The former method can be employed for an 8-sateen arrangement whether the figure is turned in two or four directions, but the latter only when it is in four positions. Another point worthy of notice, in the latter method, is that if the rows are arranged the same from either end of the cards, both halves of the set of cards can be obtained at the same time, by cutting two cards alike from each horizontal space of the design. Thus, the half-repeat shown in *Figure 13.45*, contains 96 cards, and numbers 1 to 96, when turned round, are successively the same as numbers 192 to 97 in the full repeat. In further illustration of this, it will be seen by comparison that the upper half of the repeat of *Figure 13.44* exactly corresponds with *Figure 13.45* when the latter is turned round  $180^\circ$ . It is necessary, of course, for the ground weave to be commenced in such a manner that it will be continuous throughout, but as the direction of a twill line is not reversed, by thus turning the cards, it will be found that the majority of twill and sateen weaves offer no obstacle to the method.

**Irregular sateen bases***Satinette arrangements*

Symmetrical shapes may be arranged in satinette order without changing their angle of inclination. Usually, however, a more interesting effect is obtained if the figures are inclined in different directions as illustrated in



Figure 13.45

Figures 13.46 to 13.49. A in Figure 13.47 shows a figure turned in two ways and all the other illustrations show a figure turned in four ways—with a different system of reversing used in each case. The method of reversing which is most suitable is decided by the shape of the figure and its size, as compared

Figure 13.46



with the size of the repeat. A method which is convenient for one figure might produce a defective design if employed for another different shape. It will be noted in each design B, C, and D, that corresponding parts of the figures are in line with each other, and there is thus a possibility of lines showing in the cloth; but frequently this feature can be made use of to give additional interest to the grouping of the masses.

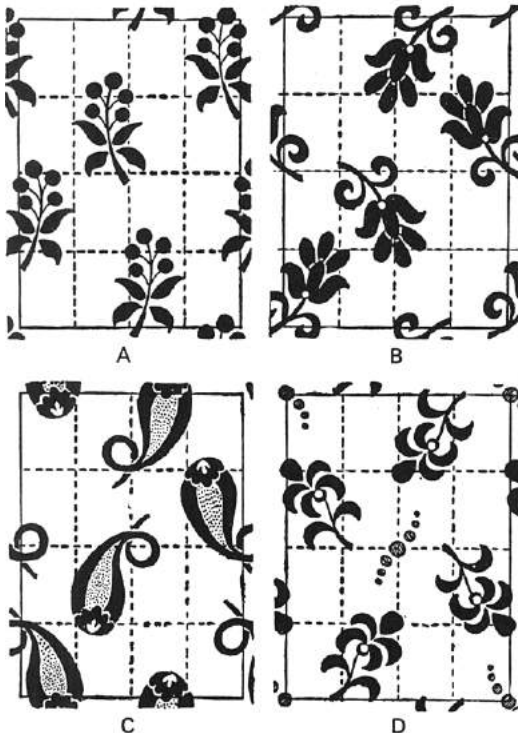


Figure 13.47

The positions of the figures are obtained by dividing the repeat each way into four equal parts, and marking the spaces in the order of the satinette. If each object is placed centrally on its allotted space the grouping of the figures in pairs is very noticeable, as shown in *Figure 13.46*. It is, therefore, usually better for each object to be slightly moved horizontally and vertically away from the centre of its space, in the manner illustrated by the examples given in *Figure 13.47*. The distance between the figures of each pair is thereby increased, while that between the pairs is reduced, which not only gives the design a better all-over appearance, on account of the masses being more evenly distributed, but figures can be employed which would otherwise encroach on each other.

The working out of the designs on squared paper can frequently be materially simplified if the basis of construction is taken into consideration. For example, if A and B in *Figure 13.47* are examined it will be seen that in each design the boundary lines are in such positions that the ornament in the lower half, taken from left to right, is exactly like that in the upper half taken from right to left. The designs thus possess the distinctive features of a pure drop-reverse arrangement, and a corresponding method of drafting can be employed.

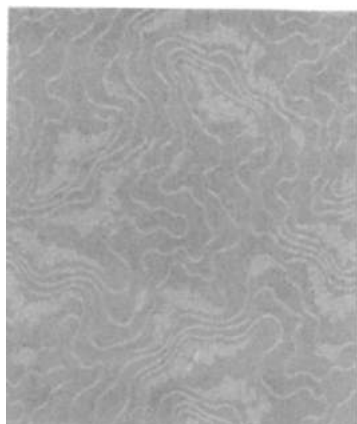
In the same manner the design C in *Figure 13.47* coincides in arrangement with the examples given in *Figures 13.34* and *13.36*, in which the second half is like the first half turned over vertically.

From an examination of D in *Figure 13.47* it will be seen that the method of construction causes the design to appear the same, whether viewed from the top or the bottom. It is therefore possible, with certain ground weaves, for the complete set of cards to be cut by drafting the half repeat of the design, as shown in *Figure 13.48*, which corresponds with the lower half of D in *Figure 13.47*. The picks, from the first to the last in the given half of the design, are respectively like the last to the first in the other half, taken from opposite sides. The plan shows a fancy crêpe, that fits with plain weave, arranged so that the ground weave will be unbroken where the two halves of the repeat join.

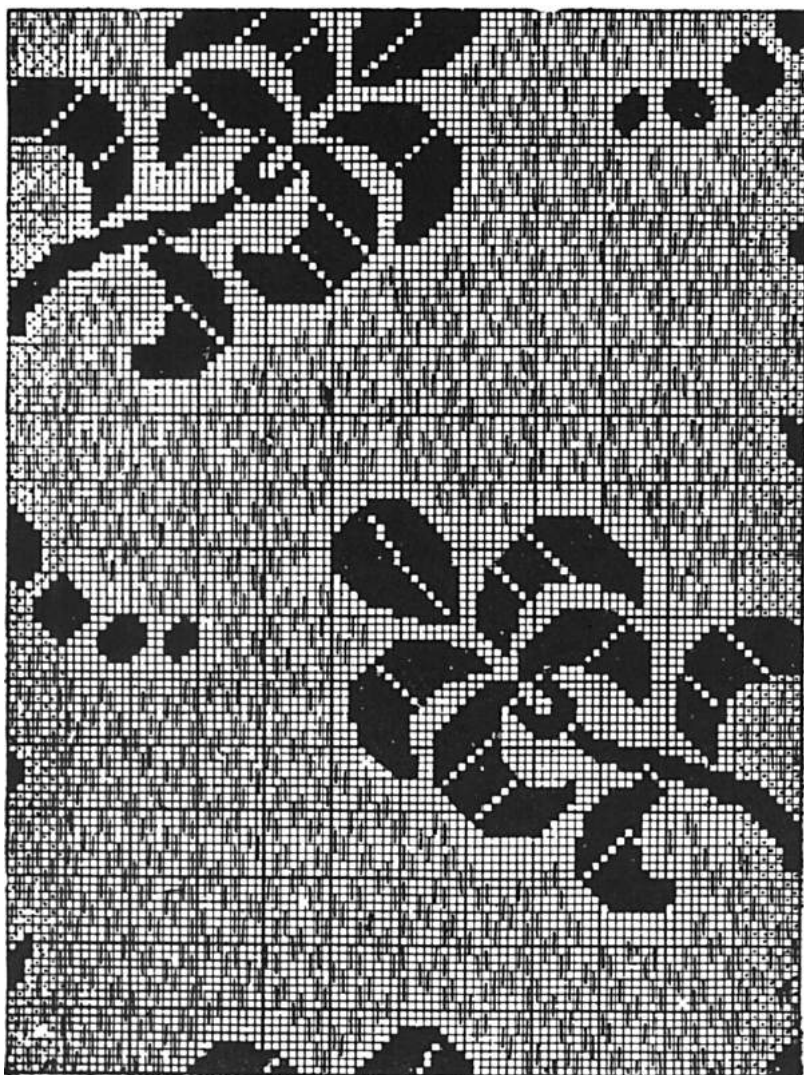
The example given in *Figure 13.49* illustrates a method of arranging the main masses in an abstract type of design. The greater freedom of form in such designs permits unusual arrangements, and creation of uneven spaces between the figures does not present the same problems as in more formal designs. Thus, in *Figure 13.49* the four figures, each of which is slightly different, are arranged in two reversed pairs and the large spaces between the pairs are adequately filled up with meandering lines which provide additional interest without overpowering the main features of the ornament.

#### *Irregular six-sateen arrangements*

Different methods of arranging figures in 6-sateen order are illustrated in *Figures 13.50* to *13.54*. In this case the positions of the figures are found by dividing the repeat both ways into six equal parts and marking the spaces in the order of the 6-sateen weave. The masses group in threes both upward and outward, and to secure even distribution it is necessary to place each mass as centrally as possible upon its space.

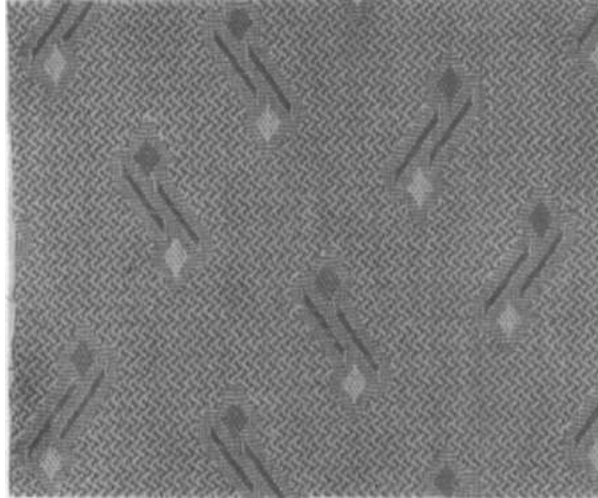


*Figure 13.49*



*Figure 13.48*

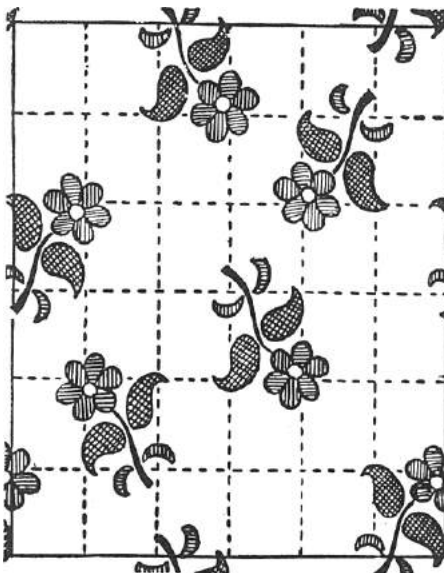
Inclined figures afford considerable scope for producing diversity of effect, as a variation in the method of reversing causes a change in the relation of the masses to each other. This is illustrated by the designs shown in *Figures 13.50 to 13.52*, while many other arrangements can be made.



*Figure 13.50*

The design given in *Figure 13.53* shows how the 6-sateen order naturally permits two different forms to be introduced, one of which occupies the central position of each group of three figures. It will be noted in the example that the central figures are distributed in the drop-reverse order, and form the main features of the design; while the remaining figures are subsidiary, but in such positions that they overlap and give perfect distribution.

The design given in *Figure 13.54* shows how variety of effect may be produced by combining a satinette order with the 6-sateen. The figure in the



*Figure 13.51*



latter order is turned in two directions, and forms the main feature of the design; while that in the satinette order is made subsidiary and quite distinct in character, in order that the contrast will be effective. The centres of the secondary figures can be conveniently found by drawing two lines diagonally from corner to corner through three spaces, as shown, and marking off from the extremities a fourth of the length of each line.

It will be noted in each design given in *Figures 13.51 to 13.54* that instead of the first figure being placed on the first space it is placed on the sixth, the order of arrangement thus being changed from 1, 3, 5, 2, 6, 4, to 6, 2, 4, 1, 5,

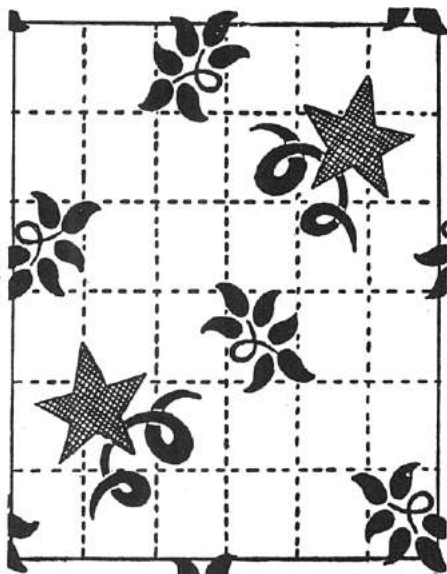


Figure 13.53

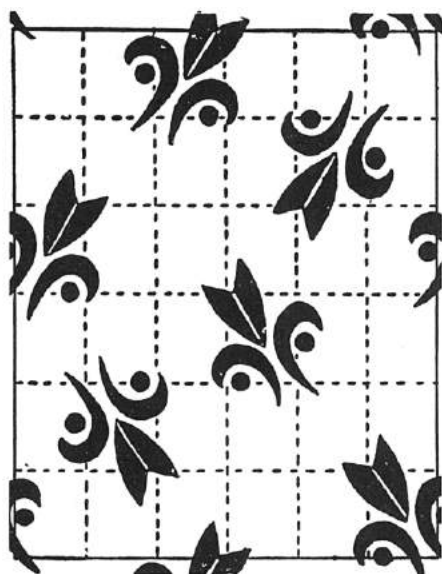


Figure 13.52



Figure 13.54

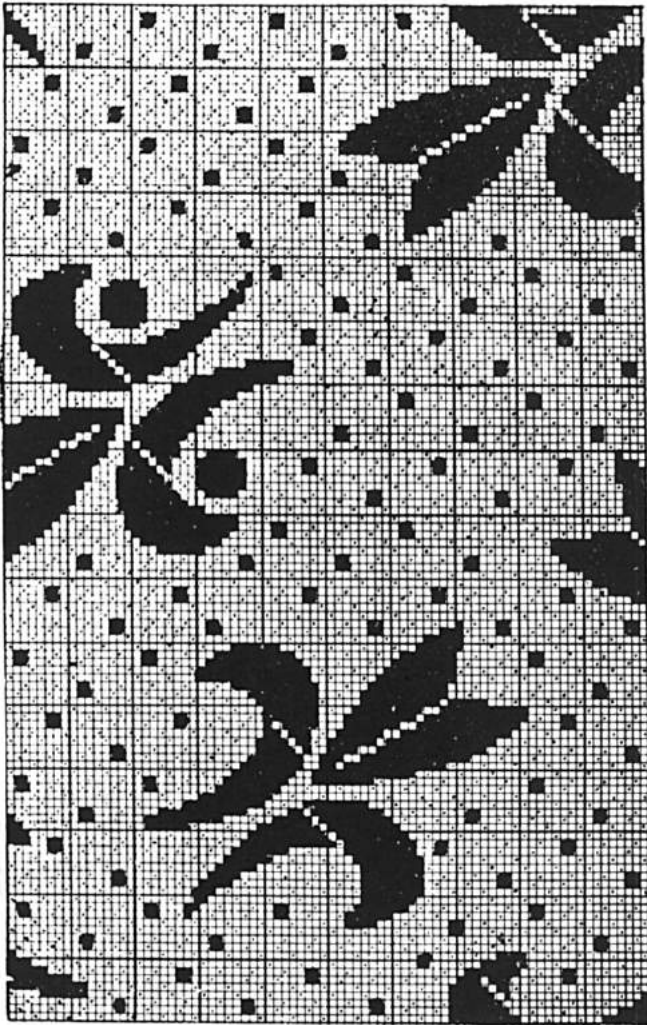
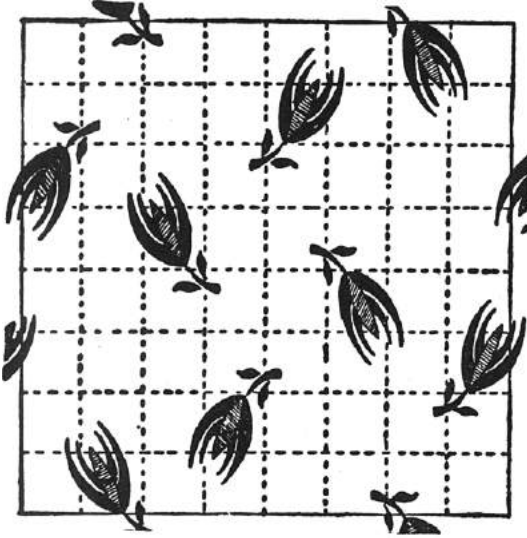


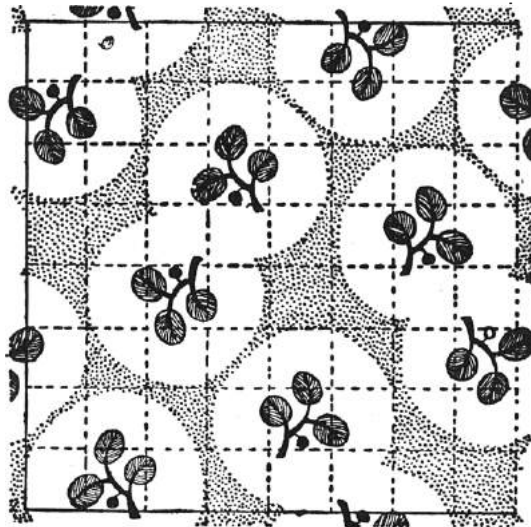
Figure 13.55

3. This enables the grouping of the figures to be more readily seen, but the chief advantage is that the figures are in such positions in relation to the boundary lines of the repeat that the design can be readily made with the lower half exactly like the upper half turned over. An examination will show that *Figure 13.52* to *13.54* are thus arranged, and the feature may be made use of to simplify the construction of the design paper plan, in the same manner as in drafting a drop-reverse arrangement. Thus, *Figure 13.55* shows



*Figure 13.56*

the half-repeat of *Figure 13.52* drafted upon 128 ends and 80 picks, and so far as regards the figure the marks from left to right in this half correspond with those from right to left in the second half. With ground weaves that will reverse the arrangement enables all the cards to be cut from the half-repeat, but the ground weave shown in *Figure 13.55* requires the full design to be made.



*Figure 13.57*

*Irregular eight-sateen arrangements*

Standard irregular 8-sateen arrangements are shown in *Figures 13.56* and *13.57*, the object in the former being placed on the spaces in the order of 2, 4, 8, 6, 3, 1, 5, 7, and in the latter in the order of 2, 5, 8, 3, 7, 4, 1, 6. The chief difference between the arrangements is in the manner in which the figures group in pairs. Even distribution of a given mass can be secured upon either basis, by suitably proportioning the length and width of the repeat, but the shape of the ornament generally decides which arrangement is the more suitable. Thus, in *Figure 13.56* the figures group in pairs outwardly, the

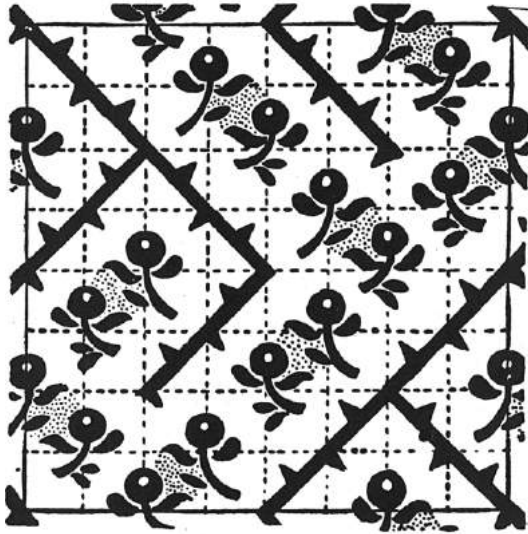


Figure 13.58

greatest distance between them being in a vertical direction, so that the arrangement is suitable for figures which are longer than they are broad. In *Figure 13.57*, on the other hand, the figures group in pairs vertically, and the greatest distance between them is in a horizontal direction, hence this arrangement is more suitable for flat figures.

The designs given in *Figures 13.56* and *13.57* are constructed in a manner that enables them to be readily drafted upon squared paper. Thus an examination of *Figure 13.56* will show that the figure is so reversed, and the boundary lines are in such positions, that the design appears the same whether viewed from the top or the bottom. Therefore if the ground weave is suitable, the design may be drafted, as illustrated by *Figure 13.48*. In *Figure 13.57* the upper half of the design is exactly like the lower half turned over, and the design can therefore be drafted in one of the methods previously described in reference to a drop-reverse arrangement. It will be appreciated, of course, that if a different shape of figure is used in each position no simplification of the point-paper work is possible.

*Figure 13.58* illustrates a third grouping of the figures in the 8-sateen irregular order, which can be used to yield good results. The flowers which form the masses are placed in the order of 3, 1, 5, 2, 6, 8, 4, 7, and each unit is formed of two figures, which are reversed in such a manner that they fall into straight lines. The example illustrates that the basis readily lends itself

to the production of a design of a geometrical character, which is arranged on the drop-reverse principle. *Figures 13.57 and 13.58* show, by comparison, how widely different styles can be constructed in the same basis of arrangement, the ornament in the former being as free as in the latter it is stiff.

## Construction of Designs from Incomplete Repeats

Frequently designs have to be reproduced from small cuttings of cloth which show only a portion of the complete repeat of the figure. This is due, in many cases, to the original sample having been cut by the merchant into several pieces to enable quotations to be obtained simultaneously from different manufacturers. In some instances, it is only necessary for the ornament which is introduced to complete the design to be in keeping with the given portion of figure. In other cases, however, and particularly in certain traditional cloths, it is very necessary that as little deviation as possible be made from the original design. Good judgment, combined with an intimate knowledge of the various bases upon which designs are constructed, and of what constitutes a well-balanced design, will generally enable an accurate copy of the original figure to be obtained in an expeditious manner.

If the repeat in width is incomplete, an endeavour should be made in filling in the missing portion, to adapt the figure to the size of repeat which can be obtained in the jacquard for which the design is intended. The missing portion of figure may be added, either by making a complete sketch of the design, or by working directly on the squared paper from the sample; and the method of drafting the figure will vary according to the basis upon which it is judged that the design has been constructed.

Assuming that the figure is required to be reproduced from the small sample of cloth represented in *Figure 14.1*, a sketch of the complete design may be constructed, as shown in *Figure 14.2*. In this method an accurate copy of the outline of the given portion of figure is first made, either by tracing or by pricking round the edges, and a horizontal line is drawn parallel with the weft threads. In *Figure 14.2* the solid black figure corresponds with the portion shown in *Figure 14.1*, while the line A B indicates the direction of the weft threads in relation to the figure. From an examination of the given portions of the design it will be seen that the parts at C and D in *Figure 14.2* are the same but turned in opposite directions from which it may be judged that the design is based on the drop-reverse principle. The length of the half-repeat of the design is therefore equal to the distance in a vertical plane between similar parts of the figure, and the two half-repeats are indicated, as shown by the dotted horizontal lines. A tracing of the given figure is turned over and placed half the repeat upward, with the horizontal lines and

duplicate parts of the figure coinciding, and a copy is made in the reversed position, as shown by the shaded portion of *Figure 14.2*. It is convenient to draw a vertical line, as shown at E F, in the same relative position to the parts of the figure which are alike at C and D, as the position where the figure reverses is indicated by the line. The proper width of the repeat (shown by the dotted vertical lines) is found by moving the tracing horizontally to a position in which it is judged that the chief parts of the ornament are evenly balanced. Missing portions of the figure are then drawn in, and the parts traced at the top, bottom, and sides, as shown by the outline drawing.

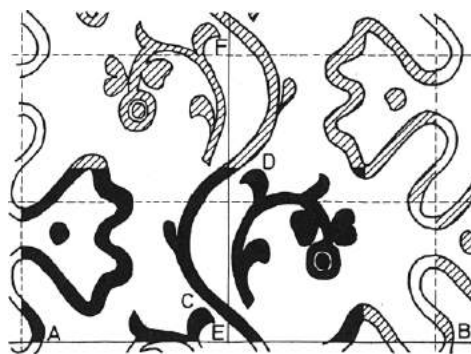
*Figure 14.1*



Having thus obtained the full design the size of repeat in terms of the total number of ends and picks per repeat can be calculated by reference to thread spacing in the sample. This provides the basis for squared paper representation of the design which can now be readily constructed by the usual method from the sketch in *Figure 14.2*. As the design is arranged on the drop-reverse principle only half the length of the repeat need be produced, the other half being obtained exactly in accordance with the rules described with reference to *Figure 13.28*.

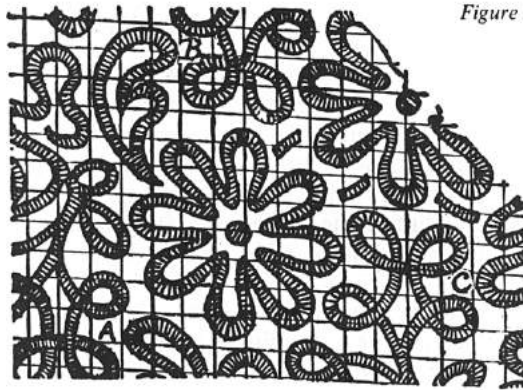
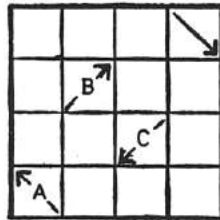
In most cases the readiest method of drafting an incomplete design is to draw the outline of the given portion of figure to scale directly from the cloth on to the design paper, some form of thread arrangement being used for squaring out the pattern. It is also convenient, although not so expeditious,

*Figure 14.2*



to sketch the given portion of figure, and divide it into spaces by ruling lines. It is not, as a rule, necessary for time to be occupied in making a complete sketch of the design, as the figure can be completed on the squared paper after the given portion has been drawn and painted in. This is illustrated by the example shown in *Figures 14.3* and *14.4*. An analysis of the sketch shown in the lower portion of *Figure 14.3*, will show that the same shape of figure occurs at the positions lettered A, B, and C. Taking A as the starting-point, at B the figure is turned over from side to side, and at C from top to bottom. The distance between two horizontal lines which pass through corresponding

parts of the design at A and B thus gives half the repeat in length, and similarly the distance between two vertical lines which pass through corresponding parts at A and C gives half the repeat in width. The basis on which the design has been constructed is therefore the satinette, the unit being placed and reversed as shown in the upper portion of *Figure 14.3*. The sketch in the lower portion is shown squared out in preparation for drawing the figure to scale



*Figure 14.3*

on design paper, the half repeat in width (from A to C) being divided into 11 parts, and in length (from A to B) into 10 parts. The complete paper plan is shown in *Figure 14.4*, each division of the sketch being taken to represent eight ends and picks, so that the full design repeats upon 176 ends and 160 picks. In drafting the figure on the squared paper it is first necessary to indicate the unit of the design, as shown by the portion filled in solid in *Figure 14.4*. The unit is then repeated three times, as shown by the shaded figure, either by copying square by square, or by the aid of tracing paper, the required positions being readily obtained by comparing with the pattern, and by noting that corresponding parts are half the repeat distance from each other in width or in length. A further point to note is that one vertical line (the fifth), in *Figure 14.3*, cuts similar parts of the figure in the same relative position, and is taken as the centre of the squared paper plan. The second half of *Figure 14.4*, when turned over, is therefore exactly like the first half, as in the case of a drop-reverse design.

When the given figure of an incomplete design is somewhat massive, and there is no indication of the bases of construction, a convenient method of procedure consists of arranging the mass on the drop-reverse principle. The given portion of figure is thus made full use of by being included twice in the repeat, and the style of the design is retained, while the minimum of space has to be filled in with missing figure. Inclined and non-symmetrical figures are also particularly suitable for arrangement on the drop-reverse principle and



this has been amply demonstrated earlier, but they should not, as a rule, be arranged on the half-drop system which is better adapted to accommodate evenly balanced figures.

Possibly the most difficult principles of arrangement to deduce from an incomplete sample are those based on the various sateen orders. The best indication is usually the comparatively small size of each figure in relation to the total size of sample available and, secondly, the variety of slight differences in the shape and the angle of inclination of the given units as illustrated by *Figures 14.5* and *14.6*. *Figure 14.5* shows four triangular units, all slightly different and all inclined at varying angles. *Figure 14.6* shows a sketch in which the four units indicated in solid black are the units copied directly from the sample. On close study of the distribution it will be observed that the figures marked 1, 2, 3, and 4 appear to occupy adjacent horizontal rows their



*Figure 14.4*

centres being approximately equidistant. Vertically, however, only 1 and 4 seem to occupy adjacent rows there being a gap about equal to the size of one figure between units 1 and 3, and again between 2 and 4 which suggests that at least two further figures will be required at other positions within the full repeat. Thus, it may be assumed that the area shown in the sample represents

four horizontal and six vertical rows of the repeat, the full size of which is still unknown at this stage. However, it will be also noted that, counting from the right, unit 2 is displaced from unit 1 by three spaces to the left, with identical displacement also between units 3 and 4. The step or move of 3 is suggestive of sateen distribution and, considering the most likely arrangements, it could

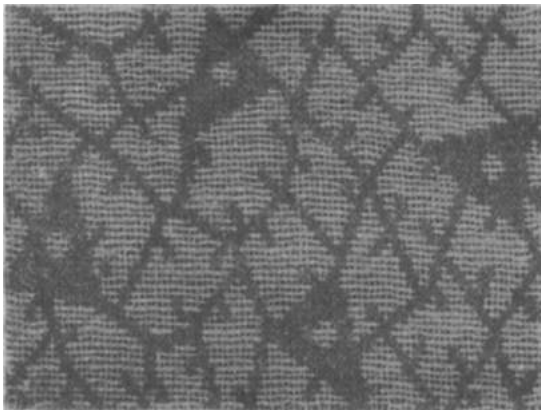


Figure 14.5

be part of a 5-, 6-, or 8-sateen order. The two lower sateen orders can be discounted as with these parts of the remaining figures would be visible within the  $6 \times 4$  area which is available. However, on trying the 8-sateen arrangement it becomes obvious that unit 3 is also displaced from unit 2 by a step of 3 to the left and, on continuing with this step, unit 5 is placed correctly in

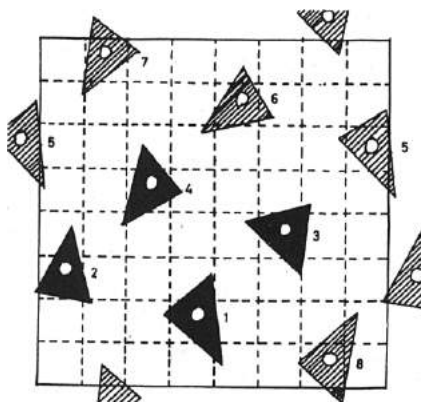


Figure 14.6

respect of unit 4, unit 6 in respect of unit 5, and so on, each fitting into its predetermined space perfectly. Before placing each unit in the proper position its angle and shape is adjusted to give the most pleasing arrangement, the main criterion being freedom from distinct twilling lines, bars or stripes. Considerable license is permissible at this stage as well as with the arrangement of any secondary ornament such as the random lines shown in *Figure 14.5*.