5

Miscellaneous Elementary Structures

FURTHER EXTENSION OF HOPSACK WEAVES

The mat and basket weaves, given in *Figure 3.4* can be modified in various ways with the object of obtaining further variety of pattern, and in order to make the structures firmer. Examples are given in *Figure 5.1*, in which A shows the 3-and-3 hopsack stitched in the centre of each small square, while B and C represent two methods of stitching the 4-and-4 hopsack. The small squares are not so clearly defined as in the ordinary hopsacks, but the weaves are firmer. The design D shows a modification of A obtained by extending or doubling the latter.

The design E, which is derived from the 3-and-3 hopsack, shows how a weave may be modified by reversing the float at one corner of each small square, while the design F, which is based upon the 4-and-4 hopsack, shows the floats reversed at opposite corners of each square. In both cases, the complete design results from reversing the section in which the shaded squares are indicated.

Barley-corn weaves

A mat weave also forms the foundation of each of the designs G, H, I, and J in *Figure 5.1*, to which the term 'barley-corn' is applied. The cross-twill in the designs gives a considerable degree of firmness to a cloth as compared with ordinary hopsacks of similar sizes, particularly when the cross-twill is in double lines of marks, as shown in I and J. In all the foregoing examples the floats of warp and weft cut with each other perfectly.

Stitched hopsacks

The designs K and L in *Figure 5.1* illustrate methods of imparting firmness to large weaves by the introduction of plain stitching threads. In K the plain threads are introduced only in the warp, so that the floats in the weft sections of the design are broken. In L, however, certain threads of both series interweave plain, and similar warp and weft sections are formed.

The design M in *Figure 5.1* is really a stitched warp rib weave that repeats on four ends, and the cloth is entirely warp faced. By colouring the ends

indicated by the solid marks and the crosses 1 dark, 1 light, for 16 ends, and 1 light, 1 dark, for 16 ends, distinct squares in light and dark are formed. The cloth should contain about twice as many ends as picks per unit space, the sections then being square, so that the design looks like a hopsack.

Twilled hopsacks

The designs N to S in *Figure 5.1* are twilled hopsacks, in which the small squares, which are formed by only one series of threads (either warp or weft), run in twill order. The weaves are not so stiff as the ordinary hopsacks, and are generally more suitable than the latter for suitings and trouserings. The

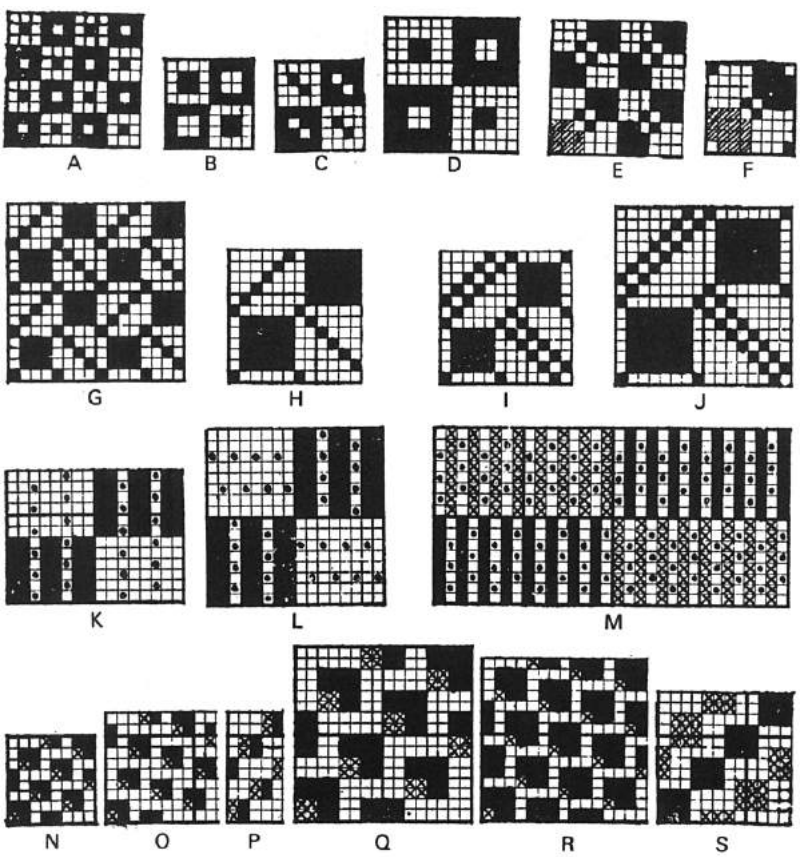

Figure 5.1

2 × 2 hopsack effect given at N, is based on an 8-thread sateen; that at O on a 10-thread sateen; and that at P on an extended 5-thread sateen. The 4 × 4 effect, given at Q, is constructed on an extended 8-thread sateen basis, or by doubling the weave N. R and S represent 3 × 3 twilled hopsacks, the former being constructed on a 15-thread sateen base, and the latter by inserting two rows of squares as equally distant from each other as possible on 12 threads.

CONSTRUCTION OF WEAVES BY REVERSING

The principle of construction of new weaves by reversing has been already explained in connection with the herringbone twills and the diaper effects based on such twills. In this section the principle is extended to illustrate the construction of new designs from incomplete twills and from other weaves.

The examples A to E in *Figure 5.2* illustrate a method of employing the reversing principle by which neat little check designs are formed. A small unit weave (which need not be a complete weave in itself) is first made on any suitable number of ends and picks, and the complete design is then constructed by reversing the unit vertically and horizontally. Thus, taking A as the unit weave, B is obtained by reversing the ends of A, and C by reversing the picks, while D results either from reversing the ends of C or the picks of B. Corresponding threads are connected by lines, and it will be seen that the ends of A are the reverse of the ends of B; the marks in one coinciding with the blanks in the other, while the weave is turned in opposite directions. In the same manner the picks of A are the reverse of the picks of C, the ends of C the reverse of the ends of D, and the picks of B the reverse of the picks of D. The design E, which shows the parts A, B, C, and D put together, repeats on twice as many ends and picks as the unit weave, and consists of four sections which cut with each other where they are in contact exactly like the sections of a diaper based on the herringbone twill.

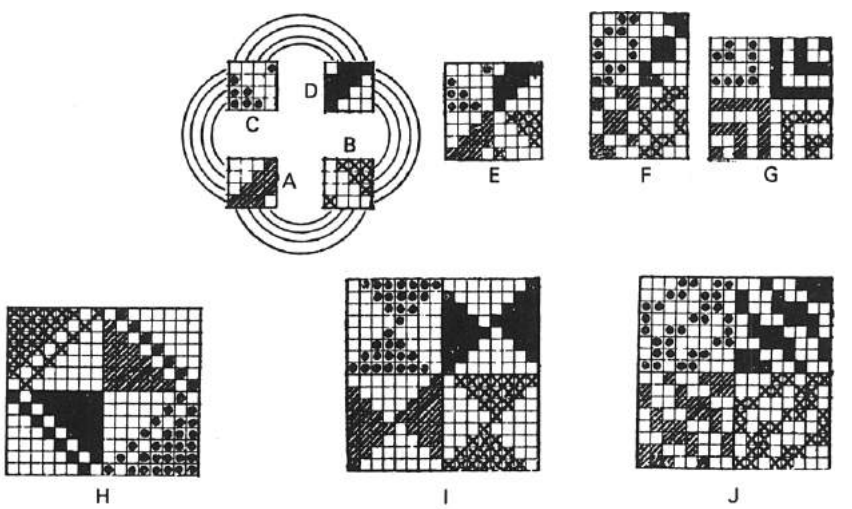

Figure 5.2

The remaining examples in *Figure 5.2* are constructed in the same manner as E, the different stages of working being represented by different marks. The unit weave of F is on four ends and six picks, and produces a design of a *crêpe* character that repeats on eight ends and twelve picks. The design G is sometimes termed a *basket* weave, and is constructed from a 5 × 5 unit, while the designs H and I, to which the term *barley-corn* is applied, result from 8 × 7, and 8 × 8 units respectively. The unit of J consists of one repeat of the Mayo weave, and this design can be used in the form shown, or each

section may be extended a number of times so as to form large check designs. The construction of large check designs on the reversing principle is illustrated in *Figure 7.7*

CRÊPE WEAVES

The term crêpe is applied to weaves that contain little or no twilled or other prominent effect, and which give a cloth the appearance of being covered by minute spots or seeds, as shown in the fabric represented in *Figure 5.3*. The weaves are used alone, and in combination with other weaves in a great variety of cloths, and very frequently are employed in forming the ground

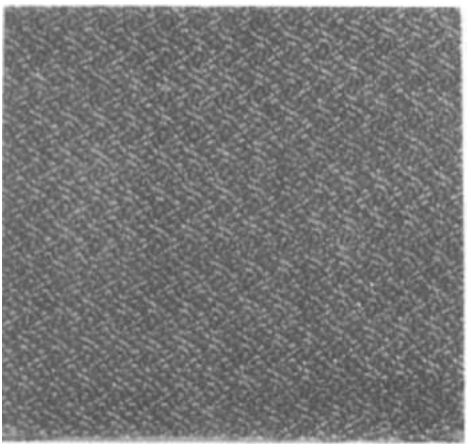

Figure 5.3

of figured fabrics. These constructions, also known as oatmeal weaves, must not be confused with crêpe cloths in which the broken surface effect is due entirely to the use of high twist yarns which, upon controlled shrinkage in the finishing, produce a highly irregular texture although woven in the plain weave. (See Appendix I.) High twist crêpe yarns are occasionally employed in conjunction with the crêpe weaves and this combination results in cloths very markedly pebbly and puckered in appearance.

Construction of crêpe weaves upon sateen bases

The weaves are constructed in a number of different ways, one of the simplest of which consists of adding marks in certain orders to some of the sateen bases. A and B in *Figure 5.4* are constructed on an 8-thread regular sateen base. In the former both the warp and the weft are floated, the same effect being produced on both sides of the cloth, whereas the latter, in which chiefly the ends are brought to the surface, is arranged to suit a cloth in which the warp is better material than the weft. C is constructed on a 10-thread sateen basis, and contains equal floats of warp and weft; the term 'sponge' is applied to this weave.

The irregular sateens, because of the entire lack of twilliness, are particularly suitable to use as bases in the construction of crêpe weaves. D in *Figure 5.4* is a simple, but very useful, crêpe which is based on the 4-thread satinette, and in effect can be classed also as a 2-and-2 broken twill; E is constructed on a 6-thread irregular sateen, and F and G on 8-thread irregular sateen bases.

Combinations of a floating weave with plain threads

In this system of constructing crêpe weaves threads that work plain are combined with threads of a floating weave which are arranged in sateen order. H in *Figure 5.4* illustrates one method of arrangement in which plain marks are indicated on the odd ends, as shown by the dots, and sateen marks on alternate picks of the even ends, as shown by the crosses. Marks are then added to the sateen base marks in an order which fits with the plain weave, as shown at I, in which the floating threads are arranged on the basis of a 4-thread satinette. The designs J and K are similarly constructed, the floating threads in the former being arranged upon the basis of a 5-thread satin, and in the

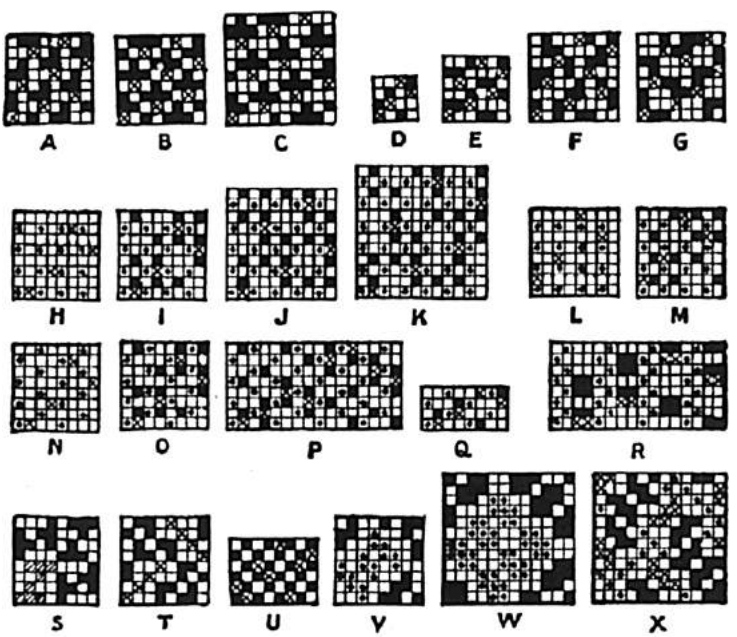

Figure 5.4

latter upon the basis of a 6-thread satin. In each case the design repeats upon twice as many ends and picks as the satin base that is employed. The plans L and M, which correspond with H and I, show how the floating weave may be inserted horizontally. The designs appear rather different in the two methods and by comparison it will be seen that whereas in the design I the number of healds can be reduced by drafting the plain ends on to one shaft, in design M as many healds are required as there are ends in the repeat of the design.

In the designs I, J, and K all the odd ends work alike; but good crêpe designs are also produced by operating them in opposite order, as shown at N in *Figure 5.4*, and combining the threads with similar floating weaves. Thus in the design O the floating weave is arranged in the same manner as in I, but the resulting design is quite different. A different basis of the floating weave is employed in the design P, which, however, is simply a modification of the satinette, a base mark being indicated on every pick, so that the repeat is on twice as many ends as picks. This is also the case in the design Q, which is a simple but effective crêpe that can be woven by means of a combination of 2-and-2 twill tappets, and plain tappets. The design R shows another variation in which two plain threads alternate with two floating threads, the latter being again arranged on a 4-thread satinette basis.

Crêpe weaves produced by reversing

The reversing principle of constructing designs, illustrated in *Figure 5.2*, can be employed in the construction of neat crêpe effects, and an example is given at S in *Figure 5.4* in which the shaded marks indicate the base weave. Also, weaves containing minute floats are built up in stages, as shown at T to X in *Figure 5.4*, one portion being reversed or turned in the opposite direction to another portion, as indicated by the different marks in the designs. The fabric represented in *Figure 5.3* corresponds with the design V in *Figure 5.4*.

Insertion of one weave over another

This method of constructing crêpe weaves consists of inserting two different weaves one over the other. In order to produce an irregular effect one at least

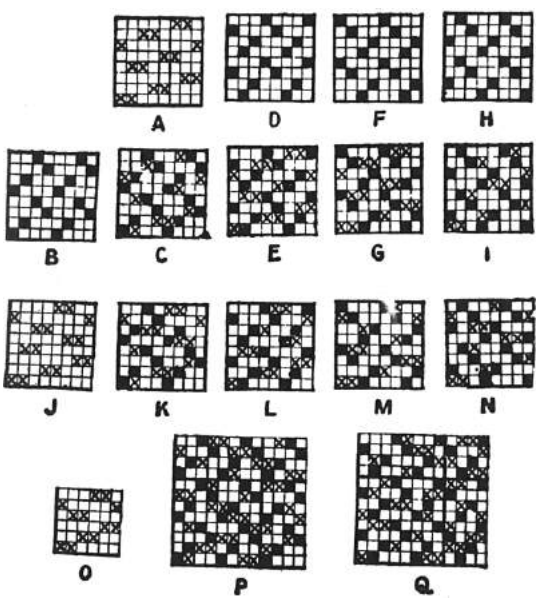

Figure 5.5

of the weaves should be irregular in construction, and it is usually better if both are irregular. The method is illustrated in *Figure 5.5*, in which A shows an 8-thread regular sateen derivative, and B the satinette; while at C the marks of both A and B are combined in the same design. As the marks of the two weaves coincide in certain places, in order to prevent confusion the weave that is marked in first should be indicated lightly, the second weave being then inserted in a different kind of mark. Afterwards the marked squares may be filled in solid in order to show the complete weave properly. In most cases, if the repeats of the two weaves have a common factor different effects are formed by changing the position of one weave. Thus by inserting the weave A in the same position each time, and changing the satinette to the positions shown at D, F, and H in *Figure 5.5*, the combinations produce the designs given at E, G, and I respectively. In the same manner, the combination of the 8-thread irregular sateen derivative, given at J, with the weaves B, D, F, and H produces the designs indicated at K, L, M, and N respectively.

The number of threads in the repeat of a design is equal to the l.c.m. of the threads in the repeats of the weaves that are combined. The combination of the 4-thread satinette B with the 6-thread weave given at O in *Figure 5.7*, thus produces a design repeating on 12 ends and 12 picks, as shown at P. The design Q shows the weave O combined with the satinette in the position indicated at D, but this is a case in which a change of position of one weave does not produce a real alteration in the resulting design, as will be evident from a careful comparison of Q and P. The method of construction can be further extended by inserting three different weaves over one another.

Armures

The term 'armure' is frequently applied to weaves of a somewhat irregular or broken character which produce more pronounced effects than crêpe weaves. In some designs a small form is arranged twice in the repeat of a

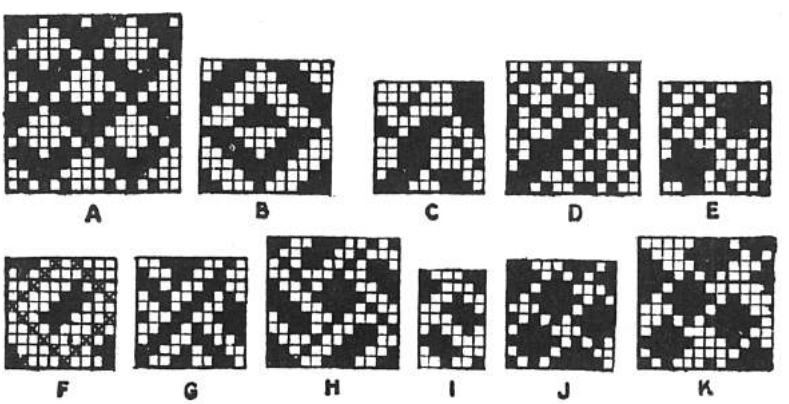

Figure 5.6

design, as shown at A and B in *Figure 5.6*. If the form is inclined it may be turned in opposite ways, as shown at C, D, and E, in each of which it will be seen that the ground weave and the figure are arranged to fit very neatly with each other. F, G, and H are arranged on small diamond bases. The form may

be indicated several times in the repeat of a design; thus in the design I a small spot occurs three times in the repeat; in J, five times; and in K, six times.

HONEYCOMB WEAVES

In the cloths produced in honeycomb weaves the threads form ridges and hollows which give a cell-like appearance to the textures. Both the warp and the weft threads float somewhat freely on both sides, which, coupled with the rough structure, renders this class of fabric readily absorbent of moisture. The weaves are, therefore, suitable for towels; they are also used in various forms for bedcovers and quilts, and in combination with other weaves for fancy textures. The weaves are of two classes: (1) ordinary honeycombs which give a similar effect on both sides of the cloth; (2) Brighton honeycombs which produce the cellular formation on one side of the cloth only.

Ordinary honeycomb weaves

In most cases these can be woven in point drafts, and a method of constructing the designs on this principle is illustrated at A, B, and C in *Figure 5.7*. A point draft is indicated on the required number of healds—in this case, five,

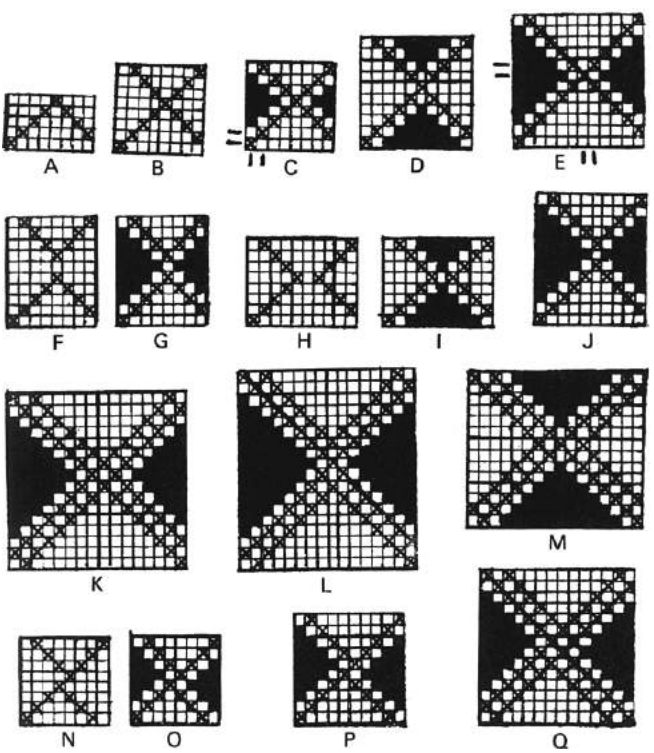

Figure 5.7

as shown at A; then the marks are reversed, as indicated at B. Afterwards, one of the diamond spaces is filled in while the other is left blank, as represented at C. D shows a similar honeycomb design which is weavable on six

healds, and E a design that requires seven healds. In the foregoing system of arrangement either diamond space may be filled in, as will be seen from a comparison of D with C and E, but one yarn is floated on the surface more than the other. Thus, in the design D the weft floats are 9, 7, 5, 3, and 1, as compared with floats of 7, 5, 3, and 1 in the warp. The fabric represented in *Figure 5.8* corresponds with the design Q in *Figure 5.7*

The plan F shows a method of arranging the base so as to obtain equal warp and weft float; the resulting design repeating on two more picks than ends, as indicated at G. The basis may also be arranged on two more ends than picks,

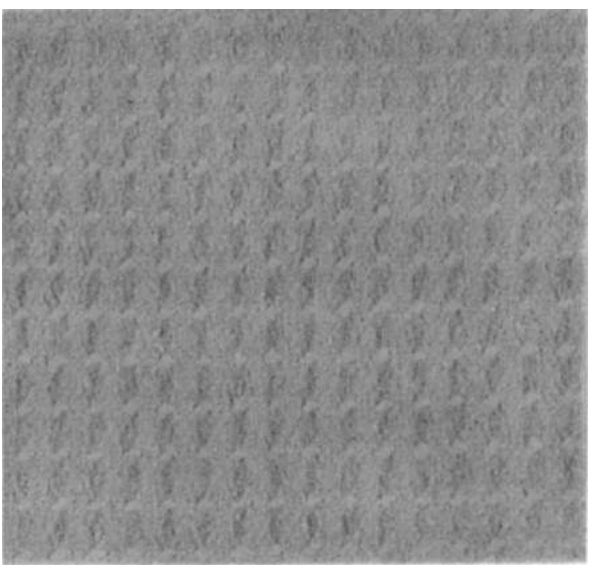

Figure 5.8

as shown at H, the complete design for which is given at I. The latter method, however, requires a heald more than the former in producing the same length of float. The design J, which is constructed in a similar manner to G, produces the same weft float as D, and the same warp float as E. In each design G, I, and J it is necessary for the marks to be inserted in the larger diamond space.

Large honeycomb weaves are liable to be loose in structure when constructed in the ordinary manner, and in order to secure firmness of texture a double row of base marks is inserted, as shown in the design K in *Figure 5.7*, which is weavable on nine healds. The designs L and M, each of which requires the same number of healds as K, illustrate the two methods previously described, of obtaining equal warp and weft float in the firmly stitched weaves.

The plan N in *Figure 5.7* shows a base that is sometimes used in constructing honeycomb weaves; but in this system a straight draft is required. One space is filled in and the other left blank, as shown at O. The design P illustrates a similar weave which repeats on a larger number of threads, and Q a firmly stitched large weave.

In the designs given in *Figure 5.7* the ridges occur where the long floats of warp and weft are formed and the hollows where the threads interweave in plain order. Thus, in each of the designs C, E, G, J, K, and L, a warp ridge is

formed by the first end, and a weft ridge by the first pick. The plain weave, about the centre of these designs, tightens the threads, and causes a depression to be formed; and although the weaves are constructed on a diamond basis, the cellular formation makes the patterns appear rectangular in the cloth. In the design D the ridges occur on the sixth end and pick, in I on the sixth end and fifth pick, and in M on the ninth end and eighth pick; while in O, P, and Q, two threads form a ridge—the first and last end, and the first and last pick in each case. Suitable weaving particulars for the design D in a heavy cloth are: 95/2 tex cotton warp and weft, 20 ends and picks per cm; and in a lighter cloth, 24/1 tex cotton warp and 33/1 tex cotton weft, 35 ends and 32 picks per cm.

Brighton honeycomb weaves

These are quite different in construction from the usual type of ordinary honeycomb, and require to be woven in straight drafts; also the number of threads in a repeat must be a multiple of four. The construction of a Brighton weave on 16 threads is illustrated at R and S in *Figure 5.9*. A diamond base is first made by inserting a single row of marks in one direction, as shown by

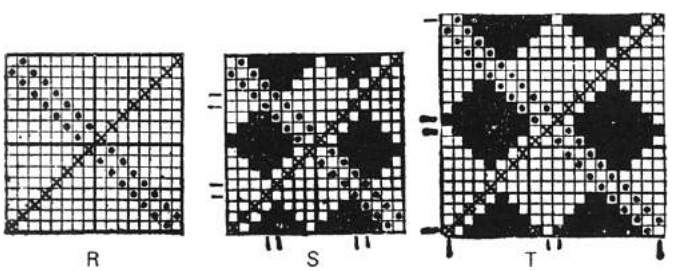

Figure 5.9

the crosses in R, and a double row in the other direction, as indicated by the dots. Marks are then added to the double rows so as to form a small warp diamond in the right and left corners of each diamond space, as shown in S; a similar weft diamond being left in the upper and lower corners. The length of float of the centre thread of each small spot is one thread less than half the number of threads in the repeat. Thus in the design S each centre float passes over $(16 \div 2) - 1 = 7$ threads, while in the design T, which shows a Brighton weave on 20 threads, each centre float passes over $(20 \div 2) - 1 = 9$ threads.

In the same manner as in ordinary honeycomb weaves, the long centre floats of warp and weft form vertical and horizontal ridges; but in the Brighton weaves two sizes of hollows are formed, a large hollow at each place where the double line of marks crosses the single line, and a small hollow in the centre of each diamond space. There is also the difference that in an ordinary honeycomb weave each repeat only forms one cell, whereas a Brighton weave produces two large and two small cells. The fabric represented in *Figure 5.10* corresponds with the design S in *Figure 5.9*. About the same weaving particulars may be employed for the design S in *Figure 5.9* as those given for the design D in *Figure 5.7*. The Brighton structure is sometimes made, however, with two thicknesses of yarn arranged in 2-and-2 order; the two thick threads being inserted where the longest floats are made.

In both classes of honeycombs there are two places where coloured threads may be effectively introduced: First, where the long floats are formed on the surface, as indicated by the position of the marks along the bottom and at the side of the design C in *Figure 5.7*, and S in *Figure 5.9*. Second, in the intermediate positions, as similarly indicated along the bottom and at the side of

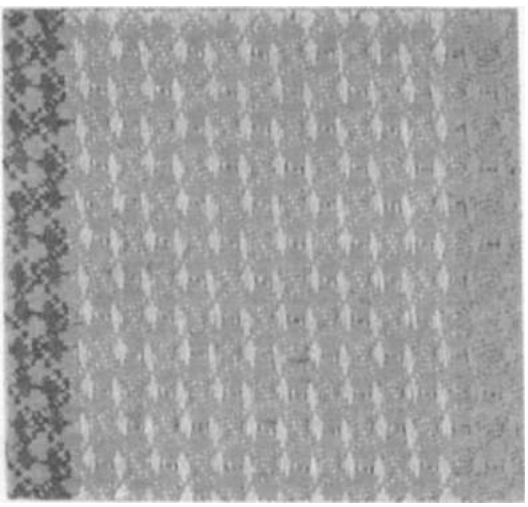

Figure 5.10

E in *Figure 5.7*, and T in *Figure 5.9*. In the first position the colours follow the ridges, and show very distinctly on the surface in the form of a small check. In the second position the colours are only brought to the surface where the threads interweave plain, so that small spots of colour are formed at the bottom of the cells.

HUCKABACK WEAVES

These weaves are largely used for linen and cotton towels, glass-cloths, etc. The structure is so arranged that areas of plain weave give firmness and hard wearing qualities whilst areas of loose floats provide good moisture pick-up. The standard weaves are given at A and B in *Figure 5.11*; the former, which is termed the 6-pick or 'Devon' huck, being used for the lower grades of cloths and the latter for fine qualities.

The draft which is generally used is so arranged that the odd threads are carried by the two front healds, and the even threads by the back two healds as shown at C. A tappet shedding motion is usually employed and the lifting plan for the design A is given at E, and for the design B at F. The purpose of the special draft is to enable plain cloth to be woven in the healds (without re-drawing the warp) by coupling the healds 1 and 2 together, and 3 and 4 together, and operating them by the first and fourth tappets.

The weaves tend to draw the ends into groups of five, and, to prevent this, it is customary to place the last end of one group in the same split of the reed as the first end of the next group, while the centre three ends are placed in one split. The threads are thus dented in the order of two and three alternately, as shown at D in *Figure 5.11*.

The ordinary huckaback weaves are modified in various ways; thus G in *Figure 5.11*, which is derived from A, contains four groups of floats in the repeat; H shows a variation of B that repeats on 8 ends and picks; I repeats on 10 ends and 8 picks and produces the same effect on both sides of the cloth; while J, although not reversible, shows both warp and weft floats on each side of the cloth.

The principle of the huckaback weave is also used in the construction of designs which repeat upon a larger number of threads and contain longer floats, as shown in the design K in *Figure 5.11*. The term *honeycomb-huckaback* is applied to this weave. A further development is illustrated by the

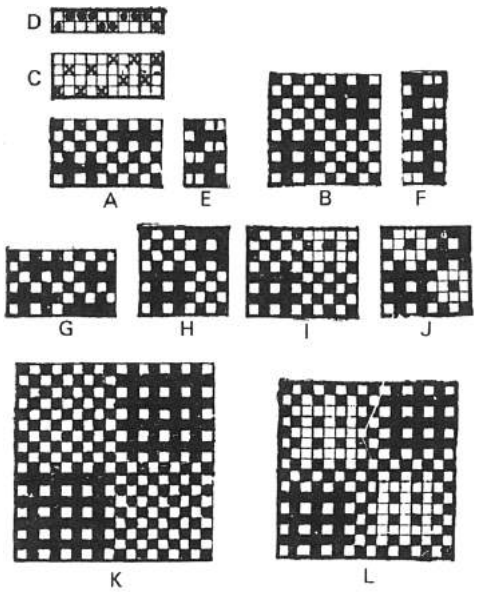

Figure 5.11

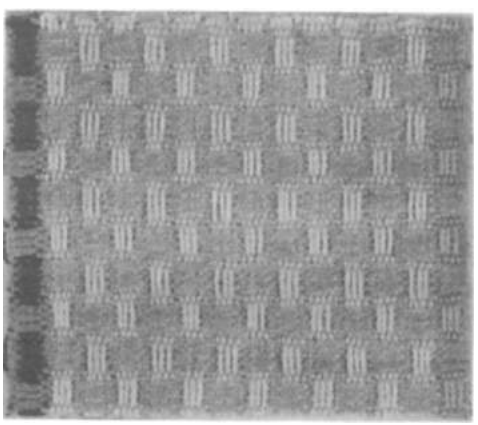

Figure 5.12

design L which, when woven in coarse yarns, belongs to a class termed 'Grecian'. *Figure 5.12* represents the appearance of the design L in the woven fabric.

MOCK LENO WEAVES

The weaves included under this head produce effects that are similar in appearance to the gauze or leno styles obtained with the aid of a doup mounting (see *Watson's Advanced Textile Design*). Two kinds of structures are produced by the weaves—(1) perforated fabrics in imitation of open gauze effects, an illustration of which in stripe form is given in *Figure 5.14*; (2) distorted thread effects in imitation of *spider* or *net* leno styles, examples of which are represented in *Figures 5.16* and *5.19*.

Perforated fabrics

Illustrations of weaves of this class are given in *Figure 5.13*, in which A, B, and C respectively show the 3 × 3, 4 × 4, and 5 × 5 imitation gauzes. Each weave is constructed by reversing a small unit, which in A, B, and C is indicated by the crosses. The weaves are in sections which oppose one another, and there is a tendency for the outer threads of adjacent sections to

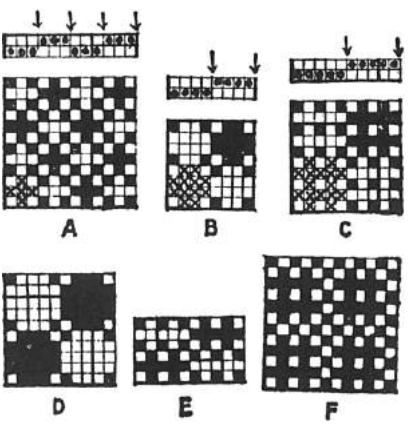

Figure 5.13

be forced apart, whereas in each section the order of interweaving permits the threads to readily approach each other. The warp threads thus run in groups with a space between, and are crossed by weft threads which are grouped together in a similar manner. The open appearance of the cloth, however, can be either improved or obscured by the system of denting that is employed. If the last end of one group is passed through the same split as the first end of the next group, the tendency of the threads to run together is counteracted; but if each group of ends is passed through a separate split the reed naturally assists in drawing the threads together in groups. Thus the designs A, B, and C should be dented 3, 4, and 5 ends respectively per split as shown above the plans. The open appearance of the weaves may be further increased by using a rather fine reed and missing alternate splits; the arrows above the denting plans in *Figure 5.13* indicating the positions of empty

splits. The distance between the groups of picks can be also increased, if desired, with the aid of an interrupted take-up device but this is rarely employed as the groups of picks are quite effectively separated by the weave provided that the count and the spacing of weft yarns is selected correctly. Also, such a device is confined to an all-over open cloth and as the most common occurrence of the perforated effect is in the form of stripe or isolated figure the separation of picks over the full width of the cloth is not usually desired.

The design D in *Figure 5.13* is simply a modification of B, and E of C, and both weaves should be dented five ends per split. The design F shows a style in which the ends and picks one to five group together, and are clearly separated from the sixth end and pick. In a coarse reed the ends may be dented

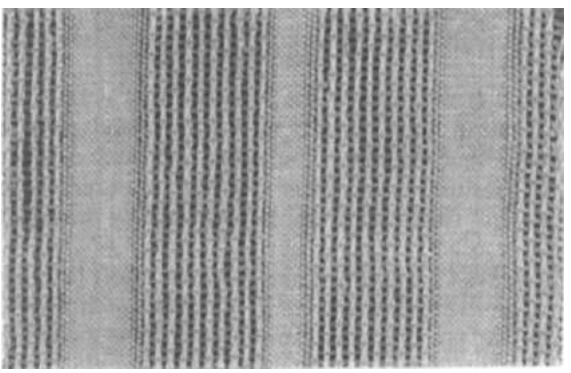

Figure 5.14

five and one per split alternately; in a reed of medium fineness, five in two splits, one split missed, one per split, one split missed; while in a fine reed (16 to 20 splits per cm) a suitable order of denting is two, one, and two ends per split, one split missed, one per split, one split missed. In the design F only one yarn is floated on the surface, whereas in the other designs the warp and weft are floated equally.

The open gauze weaves are sometimes used alone, as in canvas cloths, and in cheap fabrics for window curtains; but for light dress fabrics, blouses, aprons, etc. they are, to a large extent, employed in combination with other weaves. In *Figure 5.14* the 3 × 3 imitation gauze weave, given at A in *Figure 5.13*, is shown arranged in stripe form with plain weave, while the 5 × 5 structure indicated at C, is shown as a ground weave to a figure in *Figure 12.15*. When the same threads have to form both an open effect and ordinary interlacing, as shown in *Figure 12.15*, it is, of course impracticable to leave splits of the reed empty; and in some cases, in order that the figure will be properly developed, each group of threads is placed in more than one split, but care is taken to split the groups of threads by the reed in regular order. Imitations of open leno effects are obtained in plain weave simply by missing splits in the reed; as for instance, a stripe effect might be woven in a fine reed with three plain ends in one split alternating with two splits missed.

Distorted thread effects

The imitation gauze weaves of this class may be arranged to distort certain threads in either the weft or the warp, or in both weft and warp. J in *Figure*

5.15 illustrates one of the simplest methods of producing a distorted warp effect. The ground structure is plain weave, and the fourth and eleventh ends, which are distorted, float over all the plain picks, but pass under the fourth and eleventh picks. The latter float over one group of plain ends, and under

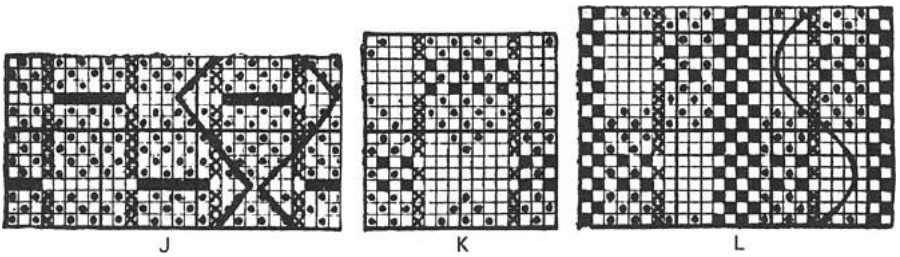

Figure 5.15

the next group in alternate order. The distorted ends are placed on a separate beam and are given in more rapidly than the ground ends, hence they are drawn towards each other where the picks four and eleven float over the ground ends. As the latter floats occur in alternate order, the ends are drawn together in pairs, and then separated, as indicated by the zig-zag lines on the right of J.

The design K in *Figure 5.15* produces a similar effect to J, but the distorted ends (5 and 13), and the picks (4, 6, 12, and 14) which float over them, are more firmly interwoven. Also the ground ends float loosely on the back of the cloth where the distorted ends are drawn together, the bending of the ends being thus facilitated. The fabric represented in *Figure 5.16* corresponds with the design K.

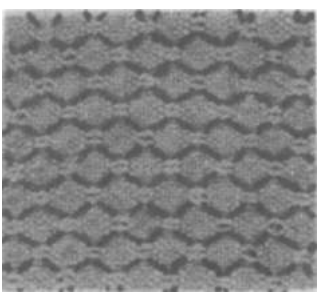

Figure 5.16

The design L in *Figure 5.15* shows a modification of K, in which all the distorted ends work alike, and produce independent zig-zag lines in the cloth, as indicated on the right of the design.

The distorted warp effects are chiefly used in combination with other weaves in stripe form, and an example of this is given in *Figure 5.17*. When used in stripe form the ends which form the zig-zag effect should be somewhat crowded in the reed; and in producing the above pattern, the nine ends which form each group, as indicated above the plan given in *Figure 5.17*, were dented in three splits, while the ground ends were woven two per split.

Examples of distorted weft effects are given at R and S in *Figure 5.18*. The design R is arranged with plain ground on the same principle as J in *Figure 5.15*. The floating ends pass over all the distorted picks, and alternately over

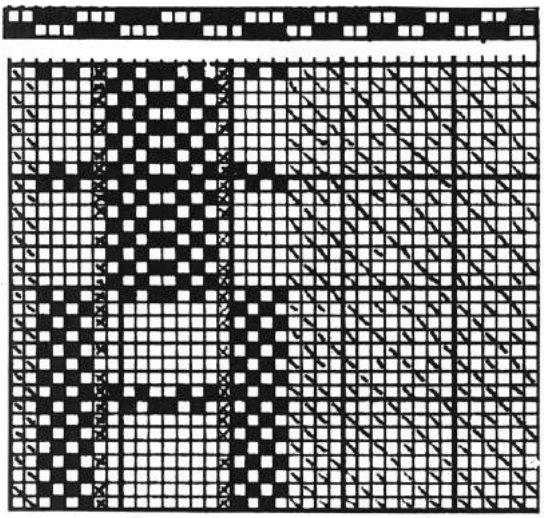

Figure 5.17

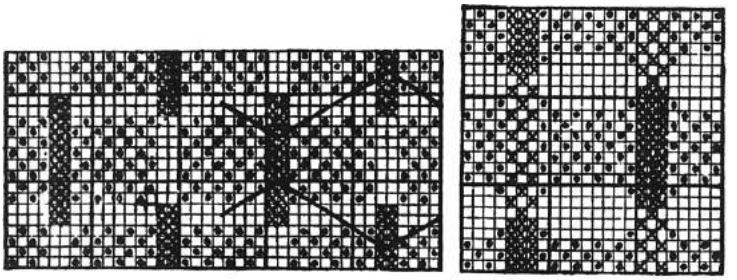

Figure 5.18

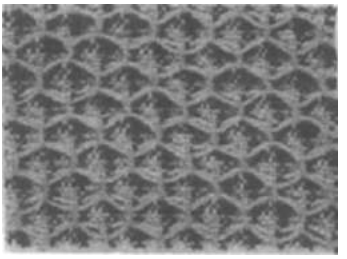

Figure 5.19

the ground picks between; therefore the distorted picks, which float over all the ground ends, are alternately drawn together and separated, as shown by the zig-zag lines on the right of R. *Figure 5.19* represents a fabric woven in the design R. In this method, the degree of distortion varies according to the difference in the shrinking of the distorted picks, which float loosely, and the ground picks, which interweave frequently; hence the best results are obtained when a ground texture is formed that shrinks considerably in width.

The design S in *Figure 5.18*, illustrates a style which is used to some extent in thick yarns. In order to develop more fully the zig-zag effect two picks are floated on both sides of each distorted pick, and the ends, which draw the floating picks together alternately float and interweave plain. The loosely-woven picks are beaten up close together so that those in the centre are forced prominently to the surface, and are in a proper position for being drawn together, and then the plain interweaving of the floating ends produces the most suitable conditions for forcing the distorted picks apart.

SIMPLE SPOT DESIGNS

Designs in which the ornament consists chiefly of small, detached spots or figures are employed in nearly all classes of yarn and yarn combinations, for dress fabrics, fancy vestings, and other textures in which elaborate figure ornamentation is not desired. Spotted effects are produced in cloths in different ways—e.g., by employing fancy threads in which spots of contrasting colour occur at intervals, and by introducing extra warp or extra weft threads which are brought to the surface where the spots are formed. In the following, however, only the system of producing spot figures is considered in which the spots are formed by floating the ordinary weft or warp threads on the surface of the cloth in an order that is in contrast with the interlacing in the ground. (The examples will be found useful as an introduction to the designing of figured fabrics, which is fully dealt with in subsequent chapters.) The figures show most prominently when the warp and weft threads are in different colours or materials; but if the two series of threads are alike the difference in the reflection of the light from the different weave surfaces is sufficient to render the figures clearly visible. Other things being equal, the weft usually forms brighter and clearer spots than the warp: (1) because it is more lustrous and bulky on account of containing less twist; and (2) because cloths generally contract more in width than in length, the weft thus being brought more prominently to the surface than the warp.

Methods of drafting spot figures

Simple spot figures are readily designed directly upon point paper, and the outline may be first lightly indicated in pencil, as represented at A in *Figure 5.20*. The squares are then filled in along the outline, as indicated at B, and this is followed by painting the figure solid, as shown at C. If the ground weave is plain, in painting the outline, the moves should be in odd numbers of squares, as shown at D, in order that the edge of the figure will fit correctly with the plain marks. If only short floats are required in the figure a simple weave (e.g., a twill or sateen) may be inserted upon it in a colour of paint that

is in contrast with the first colour, as represented by the blanks in the figure shown at E. On the other hand, the binding marks may be inserted in such a manner as to give a special appearance to the figure as indicated at F. The prominence of the figure is usually reduced about in proportion to the firmness of the binding weave, but, as a rule, however pronounced a figure is required to appear, a longer float than 0·5 cm in the cloth should not be made, or the structure will be too loose.

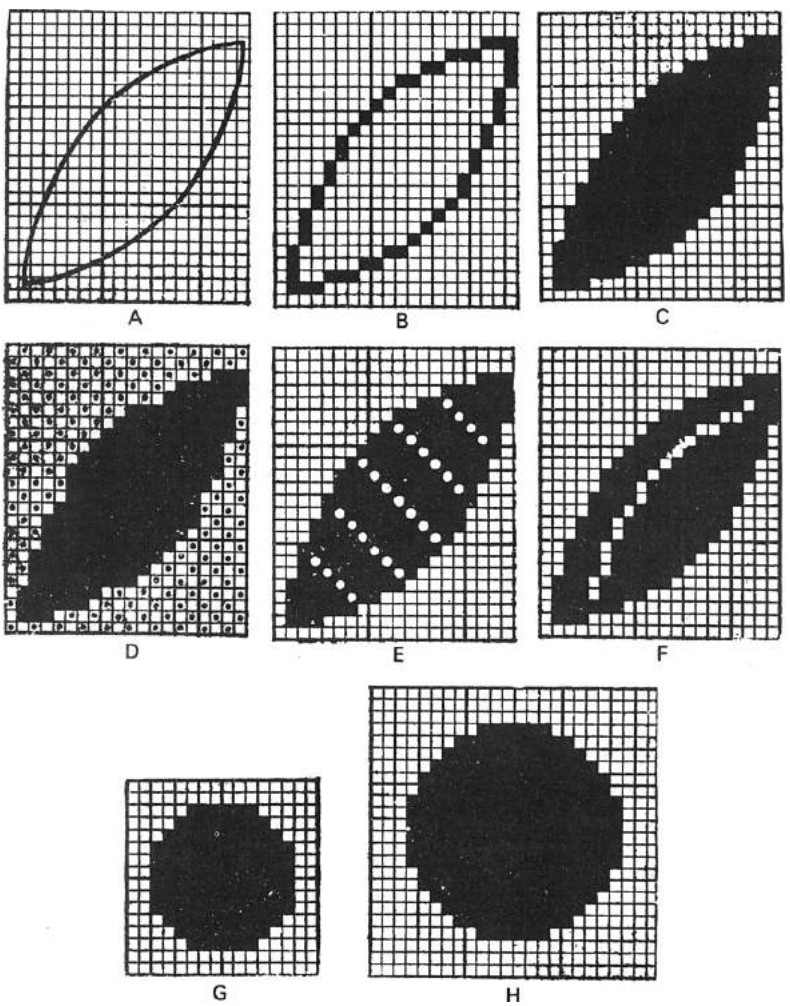

Figure 5.20

In producing a given size of figure in the cloth the number of threads, upon which it is designed, varies according to the sett of the cloth. For instance, if a spot 0·5 cm in diameter is required: For a cloth containing 24 ends and 24 picks per cm, the spot will be designed upon 12 squares in each direction, as shown at G in *Figure 5.20*; whereas for a cloth counting 36 ends and 36 picks per cm it will be designed upon 18 squares, as indicated at H. If the ends

and picks per unit space are unequal, to enable the figure to be drawn in proper proportion, design paper should be used which is ruled to correspond (see *Figure 11.15*).

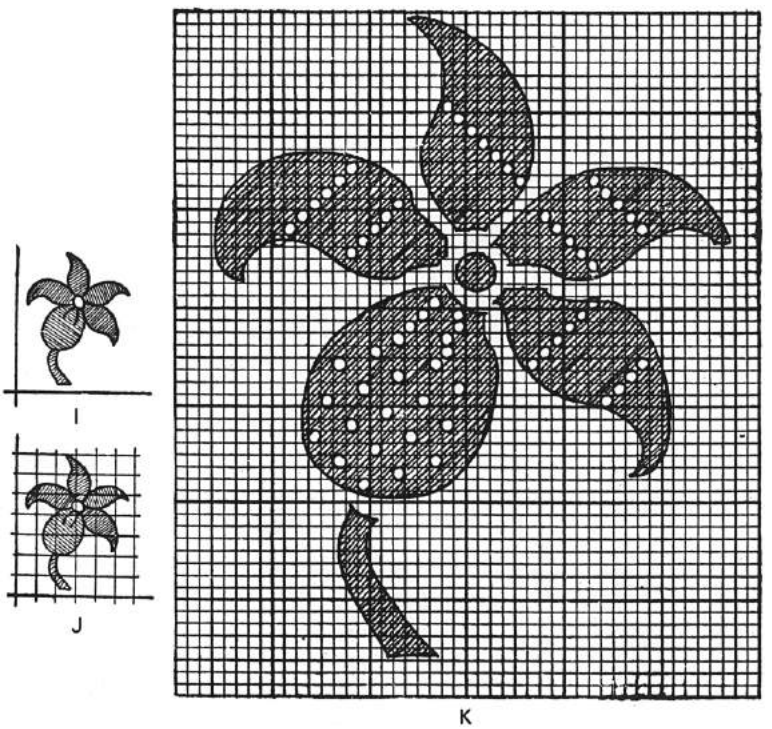

Figure 5.21

Spot figures which are rather intricate may be sketched upon plain paper, and then be drafted upon design paper in the manner illustrated at I, J, and K in *Figure 5.21*. As shown at I, two lines are drawn at right angles to each other to correspond with the direction of the warp and weft threads, the position of the lines in relation to the figure determining the angle at which the latter will be inclined in the cloth. The area over which the figure extends is then divided into equal spaces, as shown at J, each space corresponding to a number of ends and picks in the cloth. The figure is then drawn to the required scale upon the design paper, as shown at K in *Figure 5.21*, in which one large square, or eight ends and picks, correspond to one space of the sketch J. If the figure is required to appear the same size in the cloth as in the sketch, the ruling of the sketch and the number of small spaces of the design paper that each space in the sketch represents, are determined by the number of ends and picks per cm in the finished cloth. It is generally convenient, in designing small figures, to rule the lines at such a distance apart in the sketch that they correspond to the thick lines of the design paper. However, the need to sketch a figure prior to its transfer to the design paper rarely arises in dobby designs and the full procedure involved in large designs is carefully explained in the chapters on jacquard figure preparation.

Distribution of spot figures

It is only in special cases, as for instance, when a spot is arranged to fit in the centre of a coloured check, that a figure is used only once in the repeat of a design. Generally, two or more figures are contained in the repeat, and it is necessary for them to be placed at a suitable distance apart, and evenly distributed over the repeat area. The repeat must be at least so large that the figures do not encroach upon each other, and the factors which influence the number of ends and picks in a repeat are as follows: (a) The size and shape of the figure; (b) the number of figures; (c) the amount of ground space required; (d) the number of threads in the repeat of the ground weave. Even distribution of the figures is secured by employing a simple weave—such as plain and certain sateens—as the basis of the arrangement.

A method of distributing figures upon design paper, that will be found applicable to any shape of figure, is illustrated in *Figure 5.22*, which shows the spot L arranged in the order of the 5-sateen base given at M upon 30 ends and 40 picks. As shown at N, the figure is first painted in near the bottom left-hand corner of the sheet of point paper, and the square which is nearest its centre is marked, as indicated by the cross on the fifth end and sixth pick.

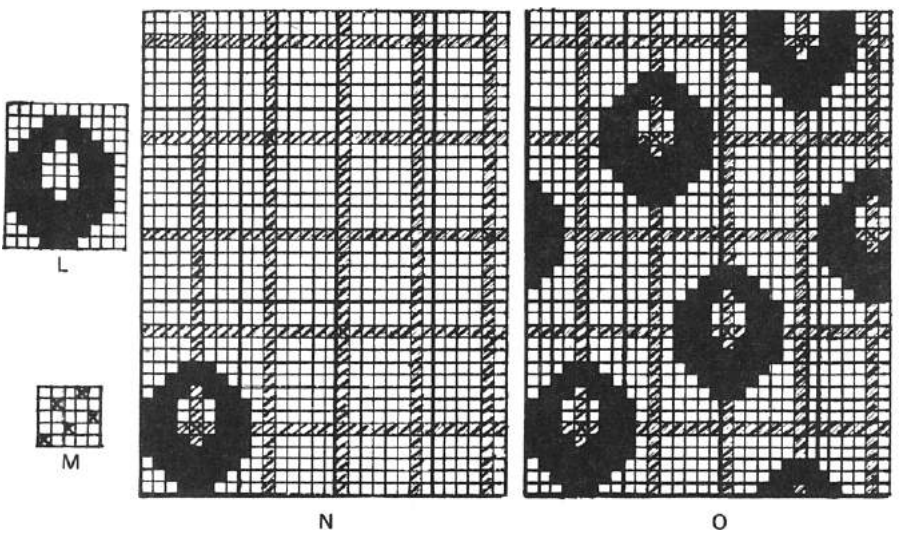

Figure 5.22

From the marked end and pick the repeat is divided in both directions into as many parts as figures to be used—in this case five; and lines are lightly ruled in pencil on the spaces, as represented by the shaded lines in N. It will be seen that the vertical lines occur at intervals of six ends and the horizontal lines at intervals of eight picks to correspond with the division into five parts each way of the repeat of 30 ends and 40 picks. Then, as indicated by the crosses in N, the squares where the divisional lines intersect are marked in the order of the sateen base. The final stage in designing the figures consists of copying the first spot square by square in the same relative position to each centre mark, as shown at O in *Figure 5.22*.

In the plain weave basis the figures are arranged in alternate order, as shown in the example given in *Figure 5.23* and the corresponding design indicated at A in *Figure 5.24*. In this case, as there are two figures in the repeat, the number of ends and picks in the design are divided into two parts from the eighth end and pick which form the centre of the first spot.

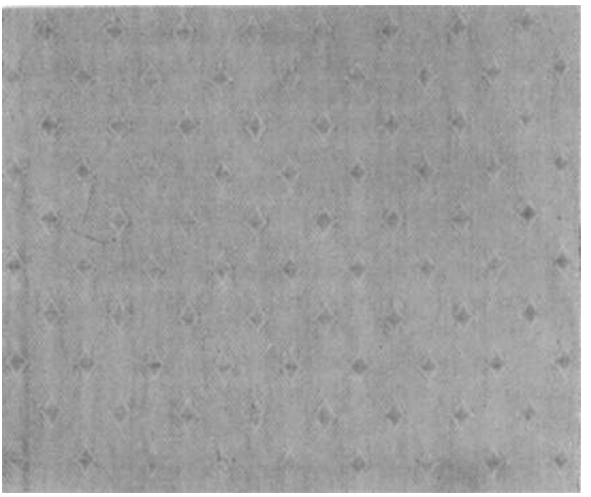

Figure 5.23

In dobby weaving point drafts enable spot figures to be produced with comparatively few healds. Thus, as shown at B in *Figure 5.24*, the design A requires only ten healds in addition to the two healds upon which the ends, which work in plain order throughout, are drawn. The lifting plan, to correspond with A and B, is given at C. With a given draft a variety of spots can be formed, and for the purpose of illustration examples are given at D, E, and F, which are suitable for the draft B.

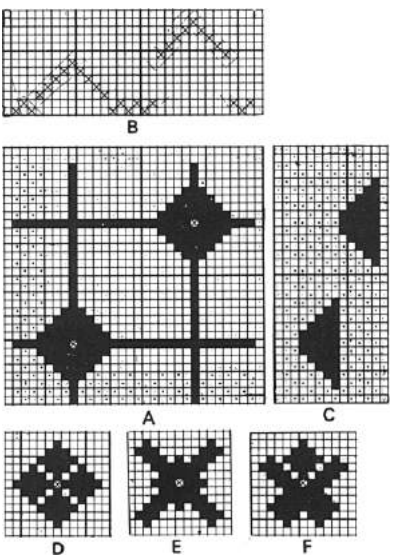

Figure 5.24

Reversing spot figures

The figures shown in *Figures 5.22* and *5.24* are symmetrical, hence they are placed the same in each position. Figures that are not symmetrical can be turned in opposite directions to each other, and in *Figure 5.25* examples are given which illustrate the different ways in which figures can be placed. In each design the centres of the figures are indicated by crosses on the ninth and twenty-fifth end and pick, and the direction in which the figures are turned is represented by a diagonal row of dots from each centre. A in *Figure 5.25* shows both figures turned the same way, a method which imparts

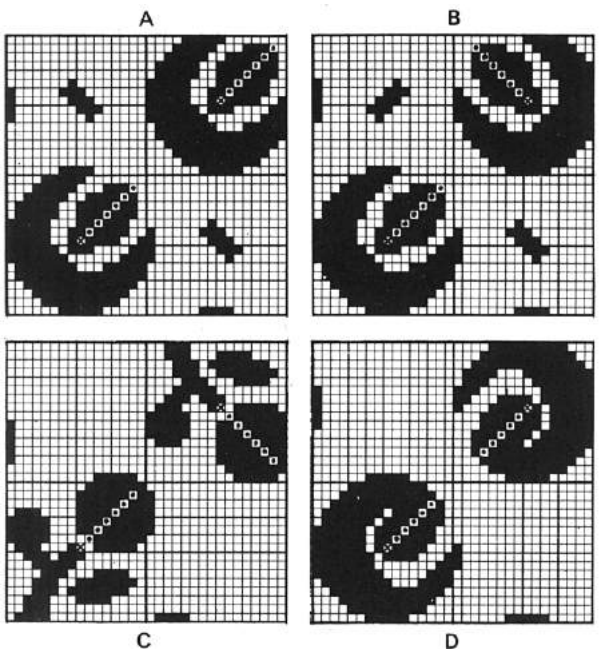

Figure 5.25

a monotonous appearance to a design, and is liable to cause the figures to fall into diagonal lines. In B and C the two figures are inclined in opposite directions, the second figure in the former design showing the first figure turned over horizontally, and in the latter design turned over vertically. In D the two figures are inclined in the same direction, but in the second position the figure is turned round 180°. The methods of reversing of elaborate figures suitable for jacquard designs are dealt with more exhaustively in Chapters 12 and 13.

Irregular sateen bases

The chief disadvantage of the regular sateen orders of distributing figures is that the systematic arrangement causes the objects to form continuous twill lines with each other in the cloth. A design appears less monotonous, and usually more pleasing, if the spots seem to be arranged indiscriminately, as

shown in the example given in *Figure 5.26*. A random appearance, combined with uniform distribution, can be secured by employing an irregular sateen (see *Figure 2.16*) as the basis of the arrangement; the 8-, 10-, and

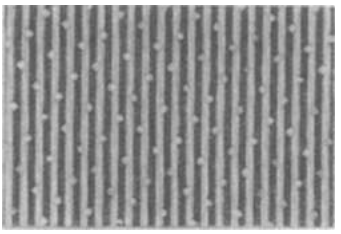

Figure 5.26

12-thread irregular weaves being particularly serviceable when the spots are small.

Calculations relating to spot figure designing

It is sometimes necessary to arrange a given figure, or similar figures, in different orders with the same relative amount of ground space. An indication of the number of ends and picks in the repeat of a re-arranged design can be found by the following formula:

$$\sqrt{(\text{ends or picks in given design})^2 \times \frac{\text{figures required}}{\text{figures given}}} = \text{required ends or picks.}$$

For example, assuming that the spot given in *Figure 5.22* (in which five spots are distributed upon 30 ends and 40 picks) is required to be re-arranged in 8-sateen order, with the same proportion of ground space as before:

$$\sqrt{(30 \text{ ends})^2 \times \frac{8 \text{ figures}}{5 \text{ figures}}} = 38 \text{ ends.}$$

$$\sqrt{(40 \text{ picks})^2 \times \frac{8 \text{ figures}}{5 \text{ figures}}} = 50 \text{ picks.}$$

The ascertained number of ends and picks serves only as a guide and may need modification to suit the repeat of the ground weave and to fit in with the new order of distribution. In the above case 40 ends × 48 picks would be an appropriate number for the 8-sateen distribution with plain weave ground.

More complex designs arranged in the sateen order are given in Chapter 13, while the method of inserting ground weaves to fit with the figure outline, which is very important, is described in Chapter 12.

6

Special Rib and Cord Structures

In addition to simple ribs and cords produced in plain weave, or derived from the plain weave many other effects can be obtained on varying bases. Some are comparatively simple, but others are more involved in construction and belong properly to the compound structures that are beyond the scope of this volume. However, as many of the structurally more complex weaves are within the scope of tappet and dobby shedding an introduction to the principles of their construction is given in the latter part of this chapter.

FANCY RIB AND CORD WEAVES

Soleil weaves

The designs, given at A and B in *Figure 6.1*, produce a type of warp rib to which the term 'soleil' is applied. In order to more fully develop the horizontal rib lines the warp threads are sometimes arranged alternately right and left hand twist, the direction of the twist in one rib line being thus opposite to that in the next line. For piece-dyed fabrics the reverse twist yarn is usually tinted with a fugitive colour in order that it may be distinguished from the grey ordinary twist yarn during the beaming, healding, and weaving operations.

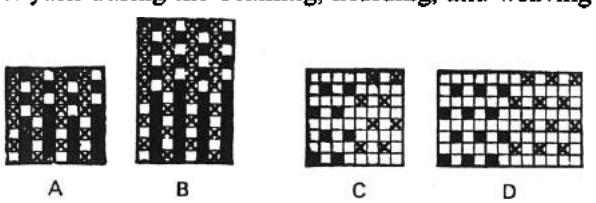

Figure 6.1

The designs C and D in *Figure 6.1* are constructed on the same principle as A and B, but in this case the surface of the cloth is covered by longitudinal weft cords. A pick-and-pick order of wefting, either in different colours, twists, or materials, may be employed.

Combination of weft cords with other weaves

The arrangement of weft cords in stripe form with another weave is illustrated by the designs A to I in *Figure 6.2*. A weft-cord stripe is produced in plain

cloth by introducing one or more thick ends, or by working together several ends of the ground warp, at intervals as explained in Chapters 2 and 3. The cord ends do not take up so rapidly as the ground ends, therefore unless they are brought from a separate beam, a difficulty is liable to be caused in weaving. The design A in *Figure 6.2* shows a simple form of cord combined with plain weave, which is produced by working four ends together in one split of the reed. The four ends group together, as represented in the section given at B,

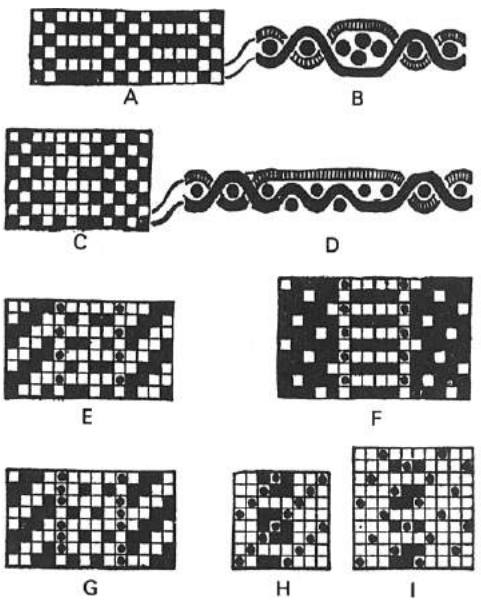

Figure 6.2

and if they are in the same colour as the weft solid narrow lines of colour are formed in the cloth. A wide cord is obtained by denting a number of ends in two or more splits of the reed, and interweaving the weft on the underside, as shown at C. The picks interweave in nearly plain order on the underside, as represented in the section D, so that the cord is kept out to the full width.

The designs E and F in *Figure 6.2* illustrate the combination of weft cords with other weaves than plain; 2-and-2 twill and 5-thread satin respectively being shown in the examples. If the cords are required to show very clearly, they should be stitched at each side with a plain end, as shown in E and F. The design G also shows a weft cord combined with 2-and-2 twill, but in this case the stitch ends at the sides are arranged to interweave with the same degree of firmness as the ground ends. The cords, however, are not so clearly defined as when the stitching ends at the sides work in plain order. The designs H and I show how weft cords may be constructed to cut with a given warp-face ground weave; the marks in this case indicating weft up.

Modified rib and cord weaves

Very neat and effective designs are constructed by commencing a rib weave in a different position in succeeding sections. Thus, in *Figure 6.3* A shows a

2-and-2 warp rib arranged in sections of 6 × 6, and B a 4-and-4 warp rib in sections of 8 × 8; while at C and D a 3-and-1 warp rib is indicated in sections of 6 × 6, and 5 × 5 respectively, the latter forming more of a warp surface than the former. The designs A to D are effectively developed by colouring the ends in the order indicated by the different marks. E shows a weft rib arranged on the same principle as D.

Longitudinal warp cords

The designs F and G in *Figure 6.3* are cord weaves which produce longitudinal cut lines at intervals of six ends. In F the first six ends interweave in plain order on the odd picks, and are raised on the even picks, while the second six ends are raised on the odd picks and interweave plain on the even picks. The

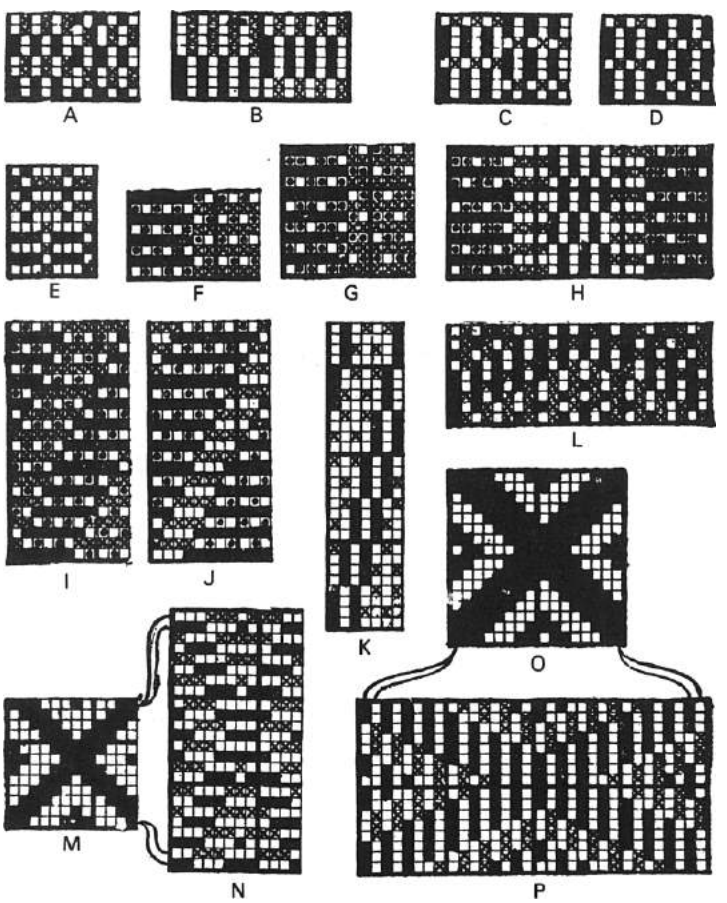

Figure 6.3

change in the interlacing of the weft from plain weave to float at the back, and vice versa, causes a fine line or cut to be made every six ends. The design G is similar to F except that the plain weave is replaced by 2-and-1 twill, which brings the warp more prominently to the surface, while the direction

of the twill is reversed in succeeding sections so as to develop the cut line more clearly. The design H shows the weave given at G combined with ordinary warp and weft rib weaves.

Diagonal and waved ribs

Different methods of constructing ribbed diagonals are illustrated at I, J, and K in *Figure 6.3*. In the design I the two weaves, indicated at F, are arranged in diagonal form, while in J a weft rib is combined diagonally with one of the weaves given at F. The design K shows a very steep diagonal in which 4-and-4 warp and weft ribs are combined.

The design L in *Figure 6.3* shows a waved rib structure which is constructed on the basis of the soleil weaves given at A and B in *Figure 6.1*.

Diamond ribs

A method of constructing elaborate weft rib designs, to suit a pick-and-pick order of wefting, is illustrated by the examples M and N in *Figure 6.3*. The marks of M are indicated on the odd picks of the design N, as shown by the solid marks, then marks are inserted on the even picks, as shown by the crosses, to correspond with the blanks of M. By introducing about twice as many picks as ends per inch, the design N will produce an effect similar to M, but with a weft surface on both sides of the cloth; and if two colours of weft are employed in 1-and-1 order the same design is formed on both sides except that one colour replaces the other.

The examples O and P similarly illustrate the construction of fancy warp rib designs, the marks of O being indicated on the odd vertical spaces of P, as shown by the full squares; while marks are inserted on the even vertical spaces, as shown by the crosses, to correspond with the blanks of O. In this case about twice as many ends as picks are required, and by arranging the ends in two colours, 1-and-1, a reversible warp-faced design in two colours is formed. The colouring of cord weaves is described in Chapter 10.

Corkscrew weaves

Weaves of the corkscrew type, which are really twilled ribs, and similar in many respects to the diagonal ribs discussed above, are used either alone or in combination with other weaves for a variety of purposes. In their simplest form they produce either a warp or a weft surface; and they are most regular in construction when the repeat contains an odd number of threads. A warp corkscrew stripe fabric is represented in *Figure 10.9*, which, if turned one-quarter round, also illustrates the appearance of a weft corkscrew texture.

Warp corkscrew weaves

Ordinary weaves of this class are constructed on a sateen base counting 2 outwards, as shown at A, B, and C in *Figure 6.4*, which repeat on 7, 9, and 11 threads respectively. As many marks are added vertically to each sateen base

mark as will make each vertical space contain one mark more than it contains blank squares. Thus, in the 7-thread warp corkscrew, shown at D in *Figure 6.4*, each vertical space contains four marks and three blanks; in the 9-thread weave E, five marks and four blanks; and in the 11-thread design F, six marks and five blanks. From an examination of the section given at G, which represents how the ends 1 and 2 of the design F interlace, it will be seen that the face and back of the cloth are nearly alike, the warp preponderating on both sides.

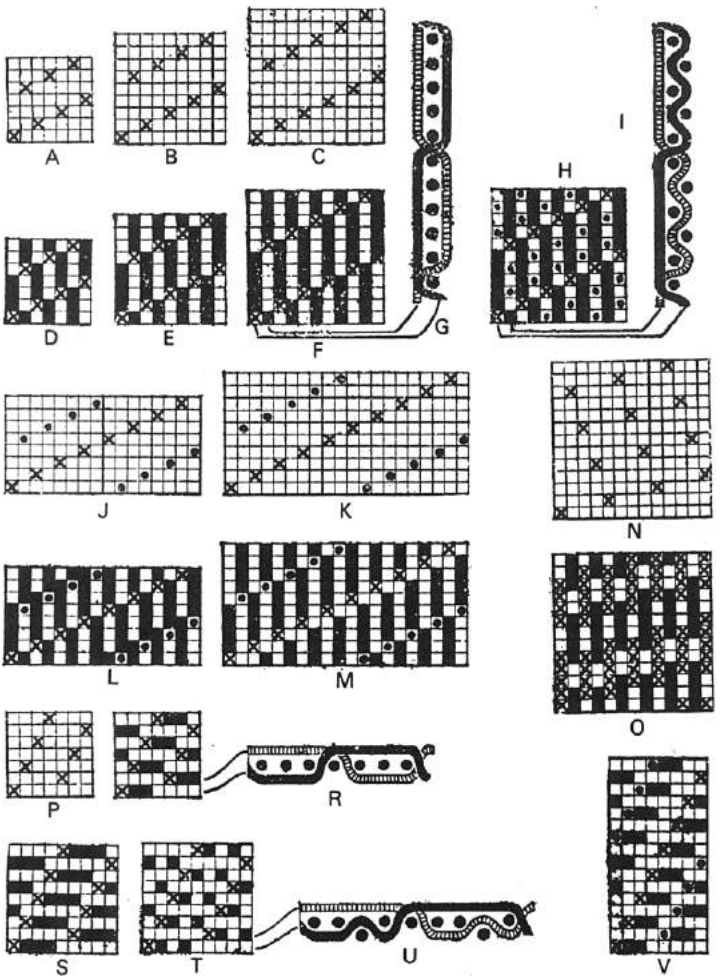

Figure 6.4

Sometimes, in order to make the weaves firmer, the floats on the back are stitched in the method indicated at H, which shows the design F modified. The threads then interlace, as represented at I, the floats on the face not being interfered with, whereas on the back the threads weave in the plain order.

In constructing warp corkscrew weaves that repeat on an even number of threads, it is necessary to employ a modification of the foregoing method. As shown at J and K in *Figure 6.4*, which represent the bases of the 8- and 10-shaft warp corkscrew weaves respectively, the repeat is upon twice as many

ends as picks. A base line of marks, as shown by the crosses, is inserted on the odd vertical spaces, counting 2; then a second line—indicated by dots—is run in on the even vertical spaces, as centrally as possible. The design is completed by arranging each vertical space with two more marks than blanks, as shown at L, or with the marks and blanks equal, as represented at M. In the latter case, however, the weft shows slightly on the surface of the cloth.

The standard 13-shaft warp corkscrew, which has been extensively used for fine worsted coatings, is based on a 13-thread sateen, counting 4 outwards, as shown at N in *Figure 6.4*. Marks are added to the base marks in the order of add 4, miss 2, add 4, and miss 2, as indicated at O, and very flat twill lines are formed in the cloth, as represented by the different marks in the design.

Weft corkscrew weaves

These are exactly the opposite of the warp corkscrews, and when the repeat contains an odd number of threads, are constructed on a sateen base, counting 2 upwards. Marks are then added horizontally to the base marks, and the number of marks on each horizontal space should be one less than the number of blanks. Thus, P in *Figure 6.4* shows the basis of the 7-thread weft corkscrew, and Q the complete design; while R represents how the picks 1 and 2 interlace with the ends, a weft surface being formed on both sides. The 9-thread weft corkscrew is given at S, and the same weave with the weft stitched on the under side at T. The section U represents the interlacing of the picks 1 and 2 of T, and shows how the cloth is made firmer on the under side without the face floats being affected. The design V illustrates the method of constructing an 8-thread weft corkscrew. The systems of applying colour to corkscrew weaves, and some further modifications of the structures are described and illustrated in Chapter 10.

BEDFORD CORDS

The Bedford cord class of weave produces longitudinal warp lines in the cloth with fine sunken lines between, as shown in the fabric represented in *Figure 6.5*.

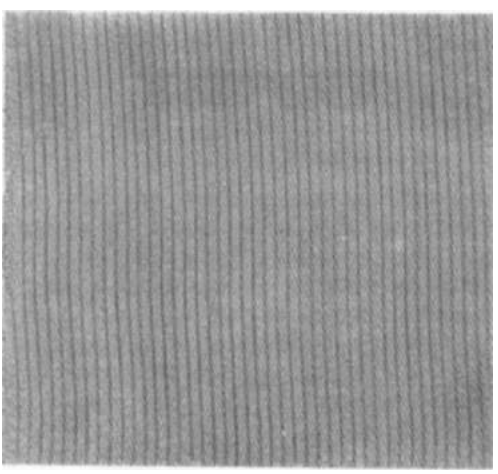

Figure 6.5

Plain-face Bedford cords

The method of constructing the *ordinary* type of Bedford cord weave is illustrated in stages by the examples A to I in *Figure 6.6*. At intervals pairs of ends work in plain order with the picks, therefore these lifts are first indicated, as shown at A, D, and G (the plain ends forming the sunken lines between the raised cords); the number of ends between the pairs of plain ends being varied according to the width of cord required. The next stage consists of inserting marks on the first and second picks of alternate cords,

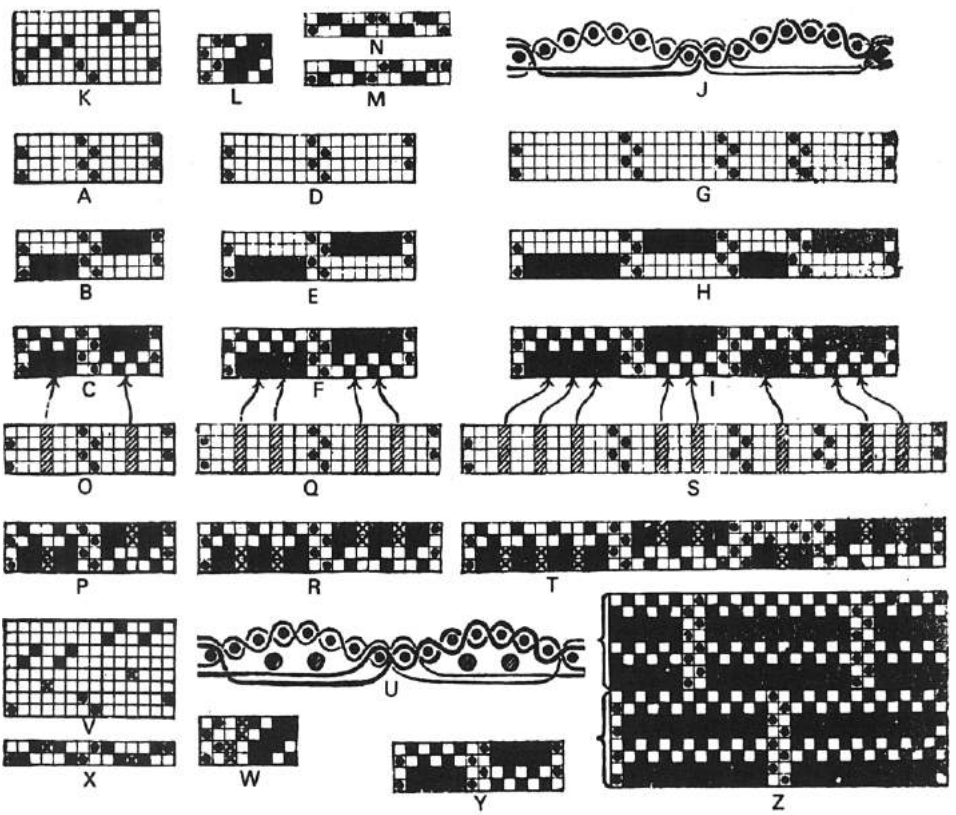

Figure 6.6

and on the third and fourth picks of the other cords, as shown at B, E, and H. The designs are then completed, as shown at C, F, and I, by inserting plain weave on the cord ends, which joins with the plain working of the pairs of ends. The cord ends float over three picks and under one, while the picks float in pairs on the back of one cord and interweave in plain order in the next cord, as shown in the section given at J, which corresponds with the design F. In the design C each cord is six ends wide, and in F eight ends wide; but I produces cords which vary in width in the order of 10, 8, 6, and 8 ends. Other widths and variations can be readily schemed.

The usual order of drafting is indicated at K in *Figure 6.6*, the plain ends being drawn on the healds at the front. The lifting plan is a combination of plain and 3-and-1 twill shedding, as shown at L. In order to develop fully the

sunken lines, the plain ends should be separated by the splits of the reed, as shown in the denting plan given at M; in some cases, however, the pairs of plain ends are dented together as indicated at N. Two, three, or more ends are passed through each split according to the fineness of the cloth (two ends per split are indicated in M and N); and sometimes the plain ends are woven two per split, and the cord ends three or four per split. The number of ends in the width of a cord has some influence upon the order of denting.

Wadded Bedford cords

These structures contain thick wadding ends which lie between the rib face cloth and the weft floats on the underside; the object of the arrangement being to give greater prominence to the cords. The method of introducing wadding ends in to the designs C, F, and I is illustrated by the examples O to T in *Figure 6.6*; the arrows indicating the positions where these ends are introduced. The wadding ends, which are represented in O, Q, and S by the shaded squares, are additional to the ordinary ends. In the complete designs given at P, R, and T they are raised where the picks float at the back, as shown by the crosses, and are left down where the picks interweave in plain order. The order in which the picks interlace with the ends is illustrated by the section given at U, which corresponds with the design R. The draft for the design P is indicated at V, and the lifting plan at W; while X shows a method of denting which is based upon two ends per split, the wadding ends being dented extra. The number of wadding ends to each cord may be varied according to requirements.

The designs may be arranged with an odd number of ends (not including the wadding ends) to each cord, but it is then necessary to reverse the marks of alternate pairs of the plain ends, in order that the plain weave will join correctly. An example, without wadding ends, is given at Y in *Figure 6.6*, which contains seven ends in each cord stripe. Suitable weaving particulars of a Bedford cord are: Face warp, 20/1 tex cotton, 42 ends per cm; wadding warp, 60/2 tex cotton; weft, 16/1 tex cotton, 34 picks per cm.

Crepon Bedford cords

In both worsted and cotton cloths, hard-twisted weft is sometimes used, the shrinking of which causes the cords to stand up very prominently. The design *Z* in *Figure 6.6* is specially arranged to suit an order of wefting in which two picks of hard-twisted weft alternate with two picks of ordinary weft; the former floating on the underside of the cords. Each section of the design, which is enclosed by brackets, should be repeated about four times; it will be noted that the plain ends in one section are mid-way between those in the other section. In the process of finishing the hard-twisted weft floats on the under side shrink, and an irregular or *crepon* surface is imparted to the cloth.

Bedford cords, arranged with alternate picks

Bedford cords are also made with alternate picks floating at the back, in which case the pairs of plain ends require to be indicated in reverse order. An example, in which each cord is ten ends wide on the surface, is shown worked

out in stages, at A to E in *Figure 6.7*. The marks of the pairs of plain ends are indicated, as shown at A; then marks, which cut with the plain marks, are inserted on alternate horizontal spaces, as represented at B. Afterwards, plain weave is inserted on the blank horizontal spaces of the cords, as indicated at C, but in this case the plain does not join perfectly with the plain

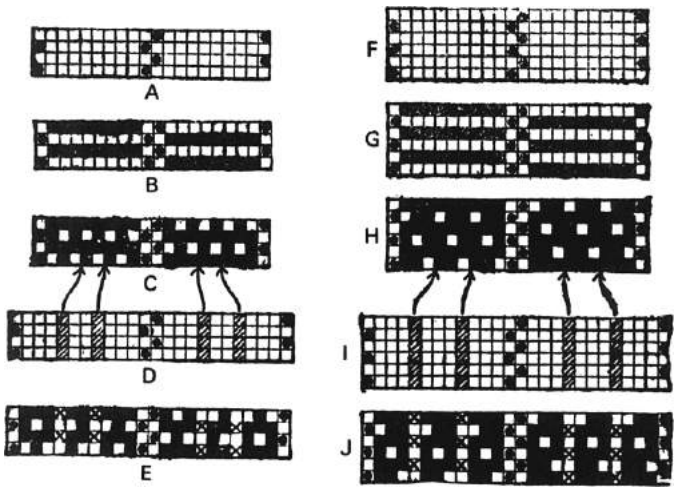

Figure 6.7

marks of the pairs of ends. If wadding ends are introduced in the positions indicated by the arrows, the complete arrangement of the ends will be as shown at D, in which the shaded marks represent the wadding ends. The complete design is given at E, in which the wadding ends are shown raised over the picks which float at the back.

Twill-faced Bedford cords

Another modification of the Bedford cord structure consists of using a warp twill instead of plain weave for the picks which interweave on the face of the cord stripes, the warp being thus brought more prominently to the surface. The examples F to J in *Figure 6.7* illustrate the different stages in designing a cord eleven ends wide on the face, in which 2-and-1 twill is employed for the face picks. H shows the complete design without wadding ends, while J shows H modified so as to include wadding ends, which are introduced in the positions indicated by the arrows below H.

WELTS AND PIQUÉS

A typical piqué structure consists of a plain face fabric composed of one series of warp and one series of weft threads, and a series of back or stitching warp threads. The stitching ends are placed on a separate beam which is very heavily weighted, whereas the face ends are kept at moderate tension. At intervals the tight stitching ends are interwoven into the plain face texture,

with the result that the latter is pulled down and an indentation is formed on the surface. In order to increase the prominence of the unstitched portions of the cloth, it is customary to insert wadding picks between the tight back stitching ends and the slack face fabric.

Ordinary welt structures

The term *welt* is applied to the piqué structure when the indentations form continuous sunken lines or cuts which run horizontally in the cloth, as shown in the fabric represented in *Figure 6.8*. The number of face picks in the width of a cord is varied according to requirements, but usually the number of

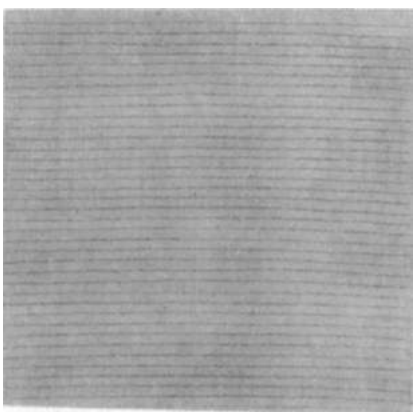

Figure 6.8

consecutive picks that are unstitched should not exceed twelve. The construction of the designs is illustrated in stages in *Figure 6.9*, in which A, E, I, and M represent the first stage of weaves repeating on 6, 8, 10, and 18 picks respectively; the plain weave of the face fabric is indicated by the dots, while the position of the stitching ends is shown by the shaded squares. The ends are arranged in the order of 1 face, 1 stitching, and 1 face, in each split of the reed, or in the proportion of 2 face to 1 stitching end. The complete designs (without wadding picks), to correspond with A, E, I, and M, are given respectively at B, F, J, and N in *Figure 6.9*, the solid marks indicating the lifts of the tight stitching ends into the plain face texture on two consecutive picks. In the design B there are four picks between the indentations or cuts, in F six picks, and in J eight picks; but in the design N, which produces two sizes of cords in the cloth, there are ten and four picks alternately between the cuts.

Weft wadded welts

The designs C, G, K, and O in *Figure 6.9* illustrate the method of inserting wadding picks (the position of which is indicated by the crosses) into the respective designs B, F, J, and N; the object being to increase the prominence of the horizontal cords, and to make the cloth more substantial. Usually the wadding weft is thicker than the ground weft, and is inserted two picks at a place, as shown in C, K, and O; the looms being provided with changing

shuttle boxes at one side only. Sometimes, however, the same kind of weft is used for both the face and the wadding, looms with a single box at each side being employed; and, in such a case, one wadding pick at a place may be inserted, as shown in the design G. Again, in some cloths thick wadding picks which are inserted in pairs, are supplemented by single wadding picks of the face weft. All the face ends are raised when the wadding picks are inserted, as indicated by the crosses in the designs, while the stitching ends

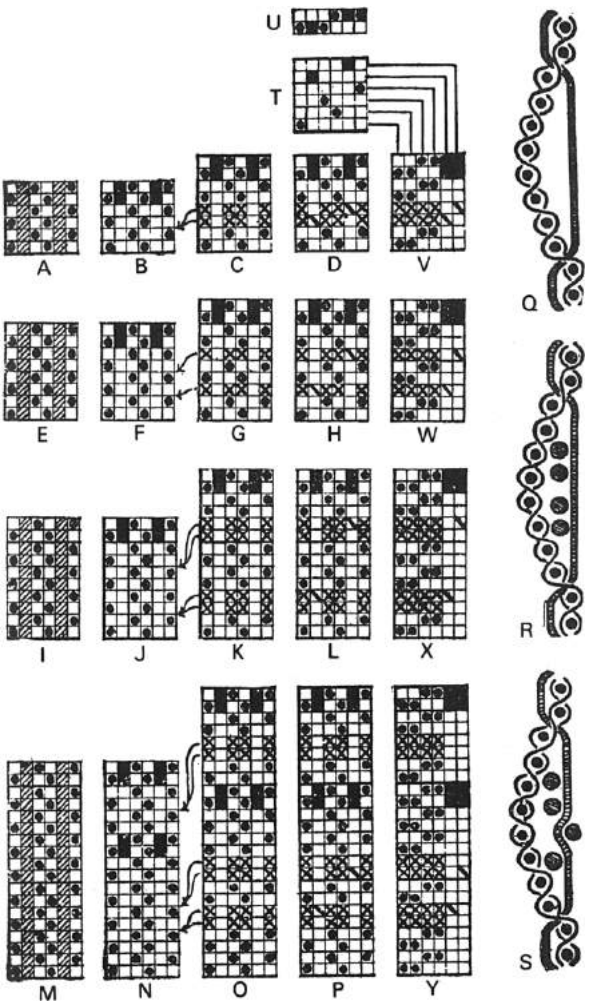

Figure 6.9

are left down. Whatever form the wadding picks take, they are inserted strictly as extra picks and the take-up motion is either rendered inoperative on wadding shots, or it is worked-out in terms of the face picks only.

Fast-back welts

In each of the foregoing designs, the stitching ends are only lifted to form the indentations, the term 'loose-back' being applied to this type of structure.

The term 'fast-back' is applied to cloths in which the stitching ends are interwoven in plain order with all, or some, wadding picks. The reduction of the float length of the stitching ends on the back of the fabric which results from this interlacing helps to produce a more serviceable cloth less liable to accidental damage. The designs D, H, L, and P in *Figure 6.9* show the respective designs C, G, K, and O made fast back, the diagonal strokes indicating where the stitching threads are raised over the wadding picks. In the designs D and H all the wadding picks are used to bind-in the stitching ends, but in the design L only one of each pair, and in P only the two wadding picks in the centre of the broad cord, are so employed.

The sections Q, R, and S, in *Figure 6.9*, which respectively correspond with the designs J, K, and L, show how the threads interlace with the picks in the three types of structures, viz., loose-back without wadding picks; loose-back wadded; and fast-back welts.

The order of drafting is indicated at T in *Figure 6.9* and the denting plan at U, each split containing a stitching end between two face ends. The lifting plans for the designs D, H, L, and P, are given respectively at V, W, X, and Y.

Waved piqués

A waved piqué is a simple modification of the welt structure in which the indentations are not in a horizontal line but are arranged in alternate groups, as shown at A in *Figure 6.10*, the marks in which indicate the lifts of the stitching ends on the face picks. The groups of marks do not overlap horizontally,

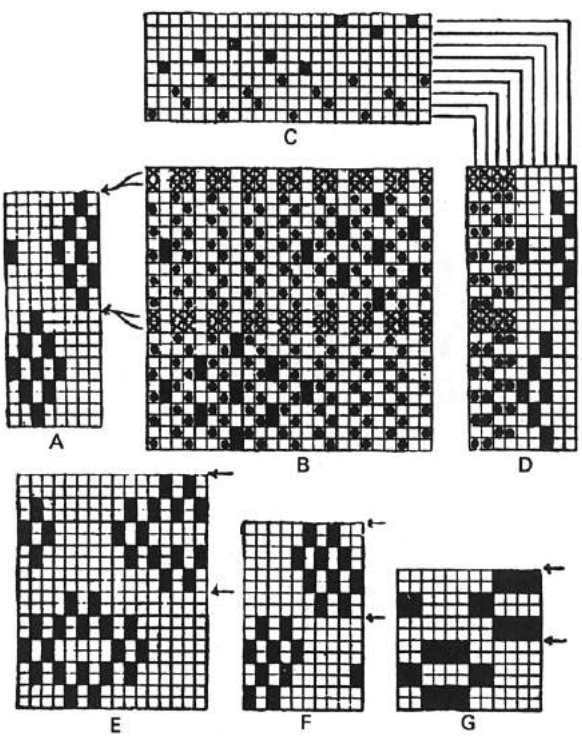

Figure 6.10

as one commences on a face pick immediately following that on which the other has finished. Between succeeding groups two wadding picks are inserted, as indicated by the arrows at the side of A. The complete design to correspond with A is given at B, in which the ends are arranged in the same order as in a welt, while there are ten face picks to two wadding picks. The lifts of the tight stitching ends force the wadding picks first in one direction and then in the other, so that waved lines are formed across the cloth. This is shown in *Figure 6.11*, which represents in the upper and lower portions respectively, the face and underside of a cloth that is similar to the design B in *Figure 6.10*. The draft of the design is given at C, and the lifting plan at D in *Figure 6.10*.

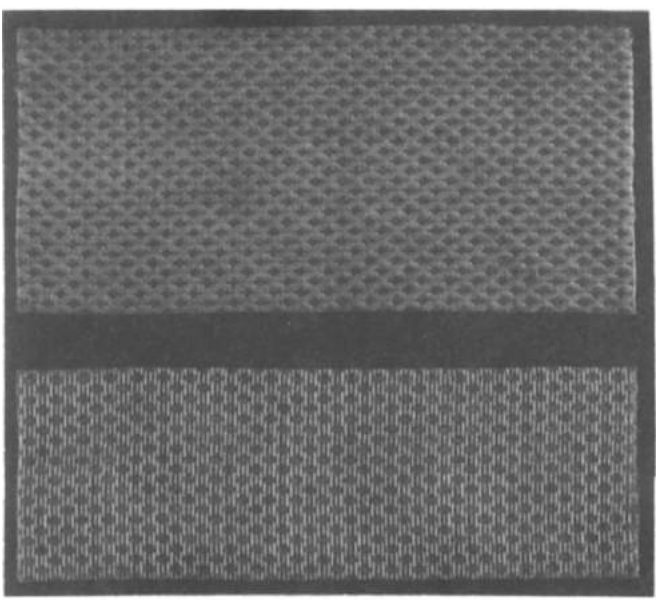

Figure 6.11

Other designs for waved piqués are given at E, F, and G, which are respectively arranged, as indicated by the arrows, to suit the introduction of 10, 8, and 6 face picks between the wadding picks. Suitable weaving particulars of a piqué cloth are: Face warp, 15/1 tex cotton, stitching warp, 21/1 tex cotton, 28 face and 14 stitching ends per cm; face weft, 12/1 tex cotton, 38 picks per cm, wadding weft, 30/1 tex cotton (wadding picks per cm dependent on the design).