pattern, in which one portion of the scroll crosses over another, in some cases it would be advisable to run in a close dotting on the under portion, immediately against that which crosses it. This would have the effect of sinking the under and raising the upper portion, which would produce clearness in the formation of the pattern. The same idea might be adopted with leaves over-wrapping each other, or with leaves partly covered by flowers, but the numerous cases in which this or some similar plan might be carried out with advantage will be readily understood.

Silk damasks offer more complications than either worsted or linen, because more is done in the way of colour. For instance, if the pattern given in Fig. 10 ("Hints on Designing Fabrics") is used, the figure would be in brown satin, and the ground in gold. The figure would be made with a silk warp, and the ground, end and end weaving, that is, alternate shuttles, of gold and brown, the former only showing on the surface. The yarns being much finer than those employed for other damasks would probably necessitate the use of about 250 ends per inch, and dottings up to sixteen shafts or so could be used. Besides, there are fabrics in which the figure is woven in various colours, and many fancy effects are introduced—diamond, basket, lozenge, etc., such as those figured later in tapestry fabrics, being employed with good results.

This subject has not been fully dealt with, but enough has been said to enable the intelligent student to grasp the methods employed in the making of damask fabrics.

TAPESTRY FABRICS.

THE LOOM AND JACQUARD.

The chief feature of the manufacture of tapestry fabrics consists of the application of the Jacquard machine, together with the box loom. This loom is familiar to all having the

slightest knowledge of weaving, and, for that reason, it will be enough to mention the fact that the boxes are arranged upon a rising and falling or upon a circular principle, each one receiving a shuttle containing a different coloured yarn, which the manufacturer or colourist may wish to use in the production of a pattern. This may be said to be the first principle in procuring the varied and beautiful colour effects which lend so much charm to the better qualities of tapestry fabrics. But the box loom permits a manufacturer to go so far and no farther in the attainment of his object, and therefore many and varied are the means employed to satisfactorily overcome difficulties in the arrangement of colours, and it is only after repeated trials that certain desired effects are produced. The frequent changing of shuttles, beyond those which the boxes themselves will effect, is often resorted to, but this, in many cases, necessitates extensive alteration to a design, and the consequent re-stamping of cards, in order to attain the end at which he aimed. Extra colours may cause a design to assume a liney or stripey effect, and whenever this defect is apparent means must be employed to obviate it.

In the case of complicated patterns, where the changing of the shuttles does not give a satisfactory result, the manipulation of the warp must be resorted to. This may be done by single, double, and triple warp arrangements, and also by what is known as "end and end" effects, which we shall mention later.

TAPESTRY DESIGNS.

The first consideration in designing for tapestry fabrics is the size of the design required. The usual width of woven tapestry is six-quarters and eight-quarters, that is, 54 in. and 72 in. For weaving a 54 in. cloth, the harnesses are tied up in divisions for weaving patterns of $6\frac{1}{2}$, 9, $10\frac{1}{2}$, 13 and 26 inches, respectively. When tied up for centre patterns, such

as Fig. 10, in "Hints on Designing Fabrics," a $6\frac{1}{2}$ division will produce a 13 in. pattern; the same will apply to the other widths, *viz.*, 9, $10\frac{1}{2}$, 13 and 26 inches. There are cases in which other sizes of patterns are used, but these are to meet some special demand, when the manufacturer and designer must work in unison, the former having his harness tied up in a suitable manner, and the latter adapting his design upon ruled paper to suit this tie-up.

In drawing a sketch for a pattern for a 54 in. cloth, the designer must, therefore, conform to one of the sizes; in other words, he must make the width of his repeat $6\frac{1}{2}$, 9, $10\frac{1}{2}$, 13 or 26 inches, as may be required. In the length of repeat there is no restriction, providing it be kept within reasonable bounds. The sketch, previous to being drafted upon ruled paper, is highly coloured, in order to be an exact representation of what the cloth must be when woven. The shuttling and warping arrangements are all indicated, and considered from a weaving point of view. The sketch is then passed to the drafting designer, whose business it is to work out the pattern upon the ruled paper, from which the cards for the Jacquard machine are stamped.

The successful tapestry designer must be possessed of much originality of idea, combined with skilful powers in the use of his pencil and brush. As a colourist, his imagination must be of no mean order. A well-formed pattern may be ruined by indifferent colouring, and the most artistic colour effect may be equally spoiled by defective drawing. And thus, the best designer is he who possesses a combination of these necessary qualifications. The student who desires to enter upon the study of designing for tapestry fabrics will find much in "Hints" given in the earlier chapters that will be of service to him, as many of the patterns described and figured there might fittingly be introduced into this chapter. The straight-over repeat, the drop pattern, the centre or

reverse pattern, the reverse drop pattern, the border, table cover, and dado curtain designs are all examples of those in daily use in the tapestry fabric trade.

CONSTRUCTION OF CLOTHS.—In the manufacture of tapestry fabrics an almost endless amount of information might be written, but this would only lead to such complications as none but experienced minds could be capable of understanding, and thus the object in view would be defeated, *viz.*, the rendering of these chapters as simple as possible.

PLAIN PICK AND PICK.—Probably the simplest formation of a tapestry is a cloth similar to an ordinary damask, but with an extra shuttle thrown in, that is, two wefts and a warp. The design shown in Fig. 61, consisting of flowers and leaves, will form an example for the better understanding of our observations. Supposing the two wefts were maroon and green, the maroon shuttle would be utilised wherever required to make the flowers, whilst the green would go to the back, by the lifting of the warp, which would be arranged for upon the Jacquard cards. The maroon and green run alternately, and that which is intended to float on the face must not have the warp threads lifted. It will thus clearly be seen that when the maroon shuttle runs, the warp must lift on the leaves, and where the green shuttle runs, the warp must lift on the flowers. In this case the warp would make the ground, which would probably be dotted five or eight shaft satin, or a fancy effect could be used, as would be found most suitable, according to the tightness of the cloth required, which would also have the effect of fastening up the two wefts floating on the ground at the back of the cloth.

This may be described as the rudimentary principle of the construction of a tapestry fabric. Having grasped this, it will be easily seen how it may be further employed for the utilisation of three or more shuttles. It is, however, seldom that manufacturers go so far without resorting to the use of

two or more warps, as these being upon the beam do not take up time, as is the case in the travelling and picking of shuttles.

END AND END WITH PICK AND PICK.—It will be seen what effect may be produced in the design shown in Fig. 61, by using three warps of red, citron and maroon cotton. The ground should be made with a shuttle of maroon worsted,

FIG. 61.

and the leaves with a shuttle of green worsted. The red would be used for the flowers, and the citron to light up these and the leaves. The maroon warp should be used with the object of tying down the maroon worsted ground, say, with a five shaft satin. By this means a spotty appearance would be avoided, such as would result from the use of a lighter shade, and a worsted weft ground of a good solid colour.

bound by a thin cotton warp of the same shade, would be produced.

In the ruled-paper drafting of this it is necessary to consider how these ends of warp are tied up, and design for them accordingly. Supposing a 600 Jacquard is in use, and the harness is tied up for a 10½ in. repeat, the warp would be divided into three parts of 200 ends of each colour, as follows: 200 ends red, 200 ends citron and 200 maroon. This is the "end and end" principle before mentioned. In order that the card stamper may know how to cut his Jacquard cards, it would be needful to show upon the ruled-paper design three distinct colours, worked according to the sketch, but these colours would be on different ends, thus—the red for the flowers, and the citron for the lighting up of the flowers and leaves by upright lines, the former on the first, fourth, seventh and tenth ends, and the latter on the second, fifth, eighth and eleventh ends, and so on across the width of the pattern, whilst we should use the third, sixth, ninth and twelfth ends for the binding of the ground in maroon, and also for the green weft. *See the examples given in Figs.* 62, 63 *and* 64.

It must be understood that, in following these diagrams, two shuttles are represented by one square. The diagrams, simply for illustration, show 12 ends and 12 picks. The 12 picks really mean 12 of maroon and 12 of green, each of the shuttles picking 12 times. This observation is necessary in order to understand how the combinations are formed. To get the utmost value out of a cloth and to show how far these combinations may be carried—and are carried in many of the cheaper continental cloths—the method may be pointed out of combining the wefts with the warps, so as to produce what cretonne manufacturers understand as *super-position*, but which in tapestry fabrics scarcely approaches the same satisfactory results. This arrangement is known as a "tabby,"

that is a half-and-half effect, or equal portions of warp and weft up and down. Therefore, if the red flowers were to be shaded (warp) on the under and darker side, the lines one, four, seven and ten should be dotted every other pick, alternately, in the colour representing the maroon shuttle, as shown in Fig. 65 by the ×, the first and seventh ends, with the fourth and tenth ends. This would produce a shaded sunken effect for the shadows of the flowers, *i.e.*, a shade between the red and the maroon.

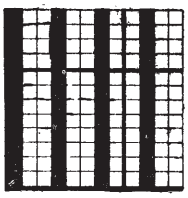

FIG. 62. Red.

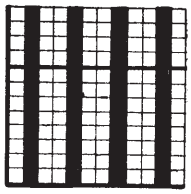

FIG. 63. Citron.

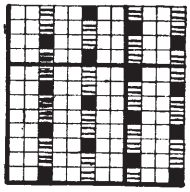

FIG. 64. Maroon.

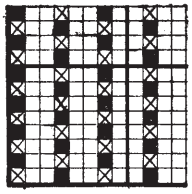

FIG. 65.

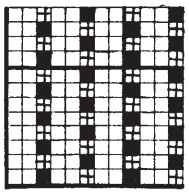

FIG. 66.

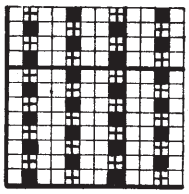

FIG. 67.

Now apply the same idea in the shading of the darker side of the leaves, reversing the warp and weft. As in the case of the flowers, the red is the warp, and consequently a mixture of two colours is obtained by adding the maroon weft for binding purposes, for the making of good cloth. As the foundation of the leaves is green weft, the maroon warp is added, which means that each pick marked + is dotted alternately on the third and the ninth, and the sixth and the twelfth ends, as in Fig. 66. Whilst engaged upon the green weft of the leaves and as the warp is light citron, which is in

shade lighter than the green, it readily suggests itself for the lighting up of the green leaves. This would be worked in the same way, bringing up the ends occupied by the citron, *viz.*, the second, fifth, eighth and eleventh, in Fig. 67.

So far, effects produced by the combination of warps tied by wefts have been dealt with, but other combinations are adopted by mixtures of the two warps floating down the first, third, fifth and seventh picks, as may be considered necessary, in order to produce a particular appearance or handle of

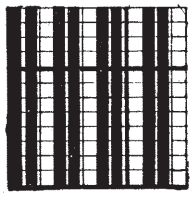

FIG. 68.

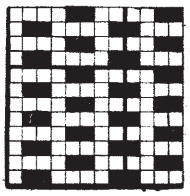

FIG. 69.

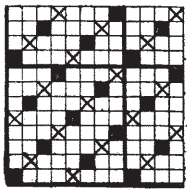

FIG. 70.

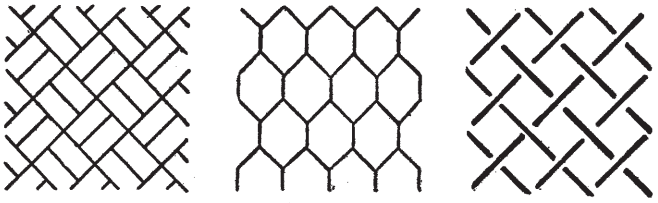

FIG. 71.

the cloth. This is a point which must always be considered in the application of various methods.

In the foregoing diagrams, we have illustrated the use of the warp separately. Now let us use the double ends, as such has become the invariable treatment in low and medium quality tapestries, by which means, many very happy arrangements of colours can be produced. Thus the citron and the red running together on the first, second, fourth, fifth, seventh, eighth, tenth and eleventh ends, as shown in Fig. 68, would vary the flatness of a field of one colour, and would

tend to lighten the flowers in the opposite direction to the shadows produced by the maroon—pick and pick with the end and end, whilst working on the second, third, fifth, sixth, eighth, ninth, eleventh and twelfth ends, as in Fig. 69, a darker shade of citron.

These combinations must always be considered with special reference to the most appropriate manner of binding, and this should be regulated by the type of figures in the design and by the space to be covered. If this latter be fairly large, many fancy effects may be adopted, such, for instance, as the diamond, lozenge, basket, etc., examples of which are given in Fig. 71. But we must always remember that these forms must, in all cases, be subservient to the length of float required for the making of a good fabric.

BINDING THE BACK.—The next consideration is the binding of the fabrics, in order to prevent long ends of warp floating. The usual method of accomplishing this is to run a special dotting on the face, an intermediate one running between those already in use, as shown in Fig. 70. This should be indicated in the opposite colour to that which is used for the dotting of the warp upon the face, the dotting, of course, covering every square or end downwards, excepting the one which is immediately up, whilst in dealing with the ground colour, this particular end would be used for the face, and a twill or intermediate dotting would be employed on the other two ends, with the opposite shuttle to that working where the ground comes.

STRIPED WARPS.—In tapestry fabrics, many very artistic effects are produced by striping or planting colours in one of the warps. For instance, taking the design given in Fig. 61, we might bring up the two large flowers—which are placed side by side—in different colours, shading each flower inwards, which would enable us to get some touches of another shade for the smaller flowers immediately under the larger ones.

By a careful manipulation of a planted warp, a good colour effect could be produced throughout the design, which would be further enhanced by the changing of the shuttles.

The principles treated upon in this chapter are all open to variation, and the intelligent manufacturer and manager are continually studying to extend upon them, in order to produce novel and good selling effects. Much of the success of tapestry manufacturers depends upon the manipulation and extension of these principles, which can only be accomplished through the possession of a thorough knowledge of the capabilities of the looms at their service.

CHAPTER XII.

SCARF SILKS AND RIBBONS.

As it is intended in these chapters to give information upon all classes of ornamental textile fabrics, it is proposed now to deal with the manufacture of silk, treating upon neckties, scarfs, ribbons and dress fabrics in the order here given. But on entering the last-named branch of the subject, it will be hardly possible to separate it from dress fabrics made from other varieties of yarns, so closely do the methods employed in the designing of the cloths resemble each other, therefore these tissues will be considered in a separate chapter.

The silk industry is one of great antiquity, the rearing of silkworms and the reeling of silk having been practised as far back as 2640 B.C. It was, however, owing to the revocation of the edict of Nantes, about 1680, that a great number of French artisans settled in Spitalfields commenced hand-loom weaving, which flourished, and has continued with more or less varying fortune down to the present day. The silk trade extended to other places, notably, to Coventry, Macclesfield, Leek and Congleton, and, although power-loom weaving has superseded hand-loom, yet with the Spitalfields' weavers the latter holds the field. The majority have looms in their own homes, and may be seen any morning, with bags upon their shoulders, bringing their finished pieces to the city or returning with a fresh supply of warp and weft. But it is a declining industry, and, ere

long, may be a thing of the past, and yet some lovely fabrics are made in the district, and one or two London firms are noted throughout the whole range of the trade for the artistic beauty of their productions.

Simpler in design, but not less perfect as fabrics, are the scarf and necktie silks, which these Spitalfields' weavers produce, and which form the first item for treatment in this chapter.

SCARF AND NECKTIE SILKS.

The silks most popular for scarfs and neckties are the satin, the matt and the ottoman, in each of which is much scope for pretty effects, and in dealing with them, such drafts and particulars as may be necessary to effect our purpose will be given. Before doing so, however, it is necessary to say a few words on the machinery used by the Spitalfields' weavers, passing over the loom, the Jacquard, and the harness, about which there is nothing special to be stated, yet there is one machine in use in this and in some other branches of the silk trade which, from its antiquity, requires mentioning—this is the reading-in machine.

THE READING-IN MACHINE.—The machines commonly used for the purpose of preparing the Jacquard cards are well known, but there is one of which, probably, very few of our readers know anything, as it has long ago been superseded by much superior inventions: it is now thoroughly out of date. Roughly speaking, this machine consists of a stout, upright framework of wood. To the front are two side-posts or uprights. Now imagine an endless warp of thin but strong cords suspended between the uprights and running under two rollers, placed at the bottom of the machine. These cords then pass up the back of the machine and across the top, where lingoes are hung, similar to those used in a Jacquard. Running down each side-post

is a stronger cord, which, for description, may be called the selvage cords. The selvage cord to the left hand of the operator has strung upon it a quantity of cords knotted together in lots of eight—that is, supposing the design paper most commonly used is 8 × 8. These cords may be called the weft. There are thus warp and weft cords. Then there are needles, as in a Jacquard machine, as many of these being employed as there are warp strings. The latter are suitably connected with the needles. A punch box is perforated on its face—the number of holes corresponding to the number of needles. Each of the holes contains a punch, all of which work in unison with the needles. At each side of the box is a peg upon which the punch-plate slides, face forwards, into close contact with the box. The warp threads are divided by a comb into lots of eight each, and, to further facilitate matters, two rods are inserted crosswise of the warp threads.

The operator sits in front of the machine, his ruled paper suspended before him, a movable straight edge indicating the particular point upon which he is working.

As he reads the pattern off, he picks out the required warp strings with the fingers of his right hand, passing them on to his left, where they are held until divided from the remaining strings by cross or weft cords. When eight rows have been read in, the whole eight are knotted together upon the selvage string to the right hand. In this manner, all the design is read in by the interlacing of the strings representing warp and weft. In the next step certain adjustments of the machine are required, and the cutting of the cards commences. Each of the weft strings is operated upon separately. Taking up the first string, we insert a roller in its place, which, in its turn, operates in connection with a lever arrangement, and upon depressing which, we draw the warp strings tight: this has the effect

of shooting the required punches into the plate fitted against the punch box. The plate is then operated upon by any ordinary cutting-machine, after which it is replaced against the box into which the punches are returned by the aid of a board, studded with pins, corresponding to the holes in the plate. This operation is repeated upon every weft string until the cards for the whole pattern have been cut. For the repeating of cards, there is a machine constructed upon similar lines, but there is no need to enter upon it here. That there are variations of this reading machine

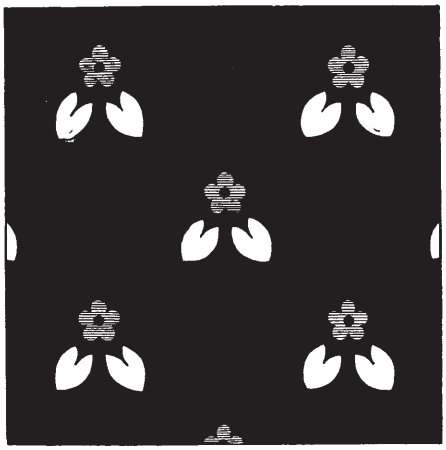

FIG. 72.

there is no doubt, but the one described has been used largely for a long time. A well-known machine maker states that he ceased making this apparatus twenty-five years ago, and yet it is largely used in the silk trade at the present day.

FIGURED SATINS.

Of all the varieties of weaves in use in the manufacture of scarfs and neckties, perhaps the most popular is the satin. They are to be seen in every hosier's window. The matt or the ottoman may be conspicuous by its absence, but

never the satin. From the small spot or ball to the all-over method of ornamentation, nothing is more saleable than this class of fabric, when offered for the personal adornment of the male sex. Fig. 72 is a design for a small figured satin, in which two wefts and a warp are employed in weaving. In designing these small effects, in which the figures are dotted over the surface at regular intervals, it is necessary to observe one point, for the demonstration of which we have inserted this pattern. The figure should be so constructed that it may be clearly divided in shuttling so as to produce an extra colour effect, without additional expense in weft. In Fig. 72 the rosette is kept quite clear of and does not overlap the two leaves under it. This pattern with the leaves may be produced in, say, pale blue and the rosette in pink, or some such combination, or the figure may be woven entirely in one shade of colour. In drawing the pretty all-over figures often seen in scarfs, the same principle may be adopted, if proper care is taken in the composition of the pattern. In these days especially, anything which can reduce the cost of an article, whilst maintaining its quality intact, should receive due attention. And really, in the present instance, a waste of weft is not necessary, because, in the majority of cases, good and effective all-over patterns can be produced, where changing of shuttles can be accomplished with the best results.

In showing the drafting of a figured satin, where two wefts are employed, take the example, Fig. 73, which is a small ball pattern, and here, again, it may be observed that the two balls are quite clear of each other, so that each may be in a separate colour. This figure shows the open style of drafting, *i.e.*, pick and pick, the light dots giving the satin and the black dots the figure weft binding. It will be observed that the latter binding comes exactly in the same position as the satin, or, to use a technical term understood

in the trade, the two dottings are on the same "foot". This is necessary, as, otherwise, the satin face would have a broken appearance. This is the principle adopted in drafting a pattern of this nature, whether it be a spot, a small figure, or an all-over effect. But in actual practice, a more

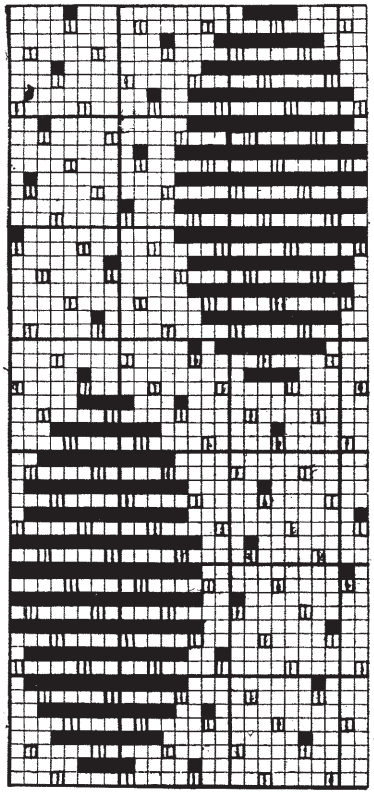

FIG. 73.

ready method would be employed. That is, the pattern would be drawn on every pick, and only the figure binding would be indicated upon the ruled paper, the ground satin being understood. In cutting the cards, all that would be necessary would be to cut five cards for the ground satin and to repeat them as many times as required for the full

design, the cards being laced alternately ground satin and figure. In some branches of weaving, floating of the weft on the face is specially guarded against, but, in the present instance, floating often improves the beauty of the face. In Fig. 73 the float is over fourteen ends, and this is not too long.

A satin composed of a warp and two wefts has been dealt with, but in some instances there is a ground warp as well as a satin warp, in which case the figure weft should be bound with the former and not with the satin warp. This has the effect of keeping the satin clear of the figure weft. The broad principles upon which figured satins for scarfs and neckties are designed have been given, but it will be obvious

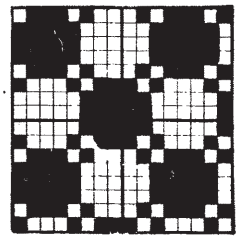

FIG. 74.

that these principles may be applied to the drafting of any satin fabrics, irrespective of the scope of the design.

MATT PATTERNS.

This class of weave is much in vogue for the fabrics under notice, as some very pretty effects can be produced by the use of warp and weft of different shades of colour. Fig. 74 is an example of a matt weave, which produces a tissue exactly alike on both sides. Of course, in this pattern, the number of warp and weft threads may vary according to the quality of the material to be woven. With 200 ends per inch and 100 picks per inch, it would be necessary to draft double the number of warp ends in comparison to the weft, thus

requiring the use of 8 × 4 ruled paper. The same weave could be drawn on a greater number of ends and picks than is shown in our example, with good results.

Fig. 75 is another weave for a matt. This is a fairly good specimen, and would make a saleable cloth for any purpose where both sides are not required to be exactly the same. Fig. 76 would also make a matt, but in this case the pattern would be the same on both sides. The beauty of a good matt lies in the floating of the warp and weft being unbroken, and also in its being a perfect reversible fabric, and we therefore give preference to the example in Fig. 74, but, at the same time, the others will be found useful.

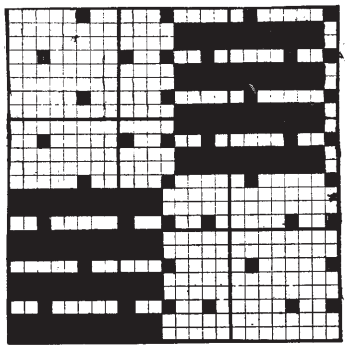

FIG. 75.

This class of weave has been dealt with as far as the ground fabric is concerned, but many very good effects are produced by introducing figures dotted about at intervals, keeping, however, within the matt formation. For instance, by using an extra shuttle, a diamond or a zig-zag, or other small figures can be introduced which can be varied in colour by a change of shuttle. Take, as an example, black and steel blue for warp and weft, and a small figure with the extra weft of rose pink changing to white. Further good effects are obtained by the use of striped warps, bringing up the squares of the matt in different colours by the aid of a

change in shuttles. Take, for instance, Fig. 74, and stripe the warp alternately with five ends of tan and five of white, then, in the weft, give ten picks of white and ten of steel blue alternately, and a very pretty cloth is produced. The same method might be employed in the production of large checks or tartans, of course more colours being employed. Some such weave as that given in Fig. 76 could be used with a satin effect, that is a satin ground and figure in navy blue, surrounded by a matt check of white and navy blue. In this case the warp of navy blue would be striped by white—say about 264 blue and 96 white. There would then be a change of blue and white shuttles in similar proportion, resulting in

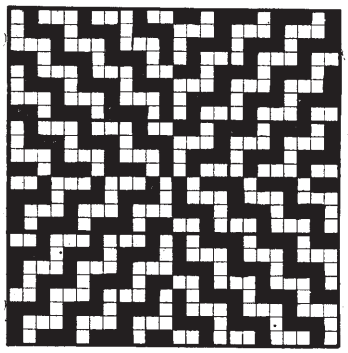

FIG. 76.

navy blue satin figure and ground, surrounded by blue and white matt check, with white matt corners.

OTTOMAN PATTERNS.

To produce a perfect ottoman pattern, the rib should be the same on both sides, and the weave—Fig. 77—possesses this qualification. Of course, the same weave could be used to produce a heavier rib, by introducing more picks. The example given is known in the trade as a "four and four shoot". The dotting shown by the × indicates the use of a ground warp, which is necessary in order to keep the fabric flat. This ground warp may be of cotton, without in any

way injuring the appearance of the face of the fabric. A second weave is given in Fig. 78, which is useful for fabrics to be made into ties, because it is only a one-faced ottoman, whereas Fig. 77, being both sides alike, can be used for loose scarfs, that is, scarfs which the wearer folds and ties himself.

Striping and dotting are favourite methods of ornamenting ottomans. As to the former of these, weave, say, twenty ribs of the ottoman in black weft, of course having a black warp, then change the shuttle and throw in about twenty picks of cardinal, say, a satin effect; then a few more ribs

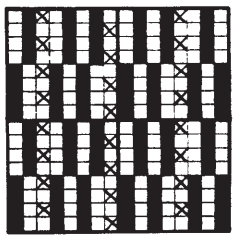

FIG. 77.

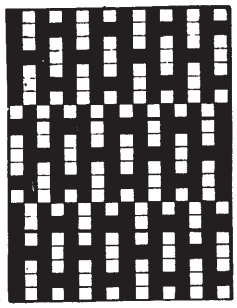

FIG. 78.

succeeded by another twenty picks of cardinal; then repeat the order. By this means a good striped fabric is obtained.

More might be said on the subject of scarf and necktie silk designing, but this would require much more space than we can devote to this branch of our subject, besides which, we should be introducing complications that are best avoided in a plain, straightforward explanation of the subject.

FANCY RIBBONS.

The home of the British ribbon industry is situated in Coventry, where the power-loom is mainly used for the production of the beautiful tissues which come from that quaint and pretty city. The bulk of the weaving is done in the

operatives' own homes. But if power-looms are used, how can this be? say some. The houses are built in rows, as is the case with most working men's homes. The weaving "shops" are usually at the tops of the dwellings, a line of

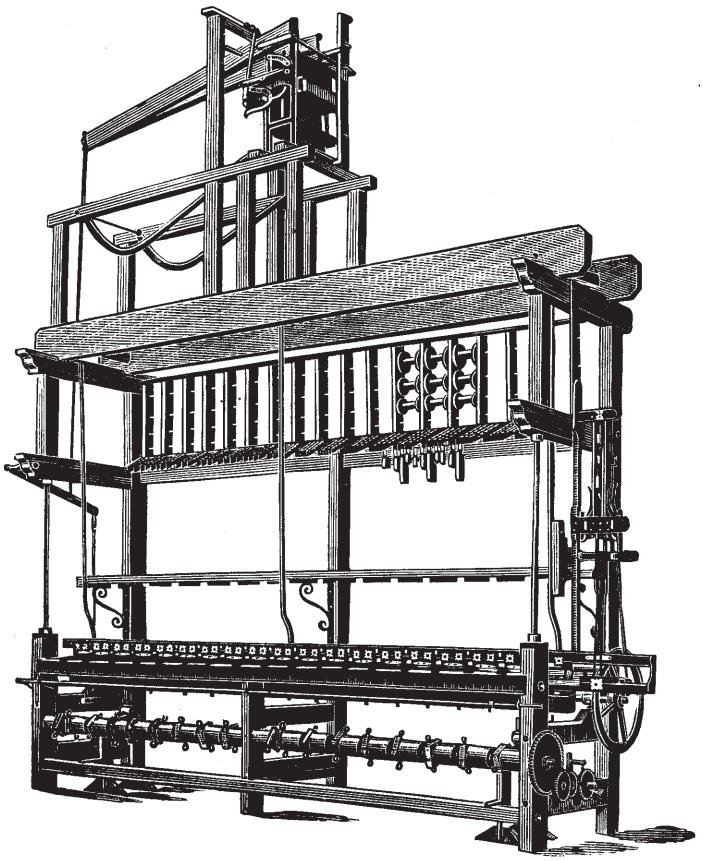

FIG. 79.

shafting running the full length of a row, and the same gas or steam power turns the whole. Of course, there are hand-looms in use, but these are for the making of narrow goods, and never for fancy fabrics. The proportion of power-looms

compared with those worked by hand and treadle, is 50 to 1 in favour of the former.

THE RIBBON POWER-LOOM.

In Fig. 79 is an illustration of a power-loom made by Mr. T. Wilkinson. The Jacquard used upon this loom is an ordinary 300 machine, no special features being introduced in its construction. Neither is there anything unusual in the nature of the harness, which is omitted from the illustration. The loom is of the type known as an "eighteen space," that is to say, it will weave eighteen ribbons at one and the same time. The harness would therefore be tied up for eighteen patterns, but each pattern would be complete with selvages instead of being closely repeating patterns, as would be the case for any ordinary broad goods. For each of these ribbons there are separate sets of shuttles. The box motion is not used in these looms, but the shuttles are arranged in tiers, run in slots, and are worked by a rack and pinion motion. The front of the batten, *i.e.*, that which carries the shuttles, rises and falls as required to place the latter in the desired position to be engaged in the warp. In some looms, there are as many as ten shuttles in a tier, and besides the use of these, changes are often resorted to when a great number of colours are being used in a design. The loom shown in the engraving, as already stated, weaves eighteen ribbons at one time, but other looms are made to produce from ten to twenty-four at one operation. In the present instance, the fronts of the shuttles are removable, to allow of other colours being placed therein. It is likewise fitted with an automatic marionette, for the working of the shuttles. Not only are ordinary figured ribbons woven on these looms, but also book markers, hat bands, coat and skirt bands, etc. A machine for reading-in the patterns for the card cutting, constructed in a similar

manner to the one described already, is used in the Coventry trade.

FANCY RIBBON DESIGNS.

In entering into particulars on the subject of fancy ribbon designs, a few serviceable drafts will be necessary to show the methods adopted in the trade for procuring various effects. The weaves and instructions already given for scarfs

FIG. 80.

and neckties are equally applicable to this branch of the silk industry. There is scarcely any need to state that there are the satin, the matt and the ottoman ribbons, and, moreover, the information given upon tapestry and damask fabrics in another chapter, might well be repeated here. There are tapestry and damask ribbons, and the end and end and pick and pick principles are extensively used in the trade. Warp as well as weft figuring is employed, and the striping of the warp is adopted in some varieties with good results. Some

floral designs show no fewer than ten changes of colour in the warp in about $2\frac{1}{4}$ inches. In special cases, portraits and pictorial effects are produced with remarkable results. In a portrait, for instance, the lights and shadows are procured with a delicacy of toning which is almost surprising. To

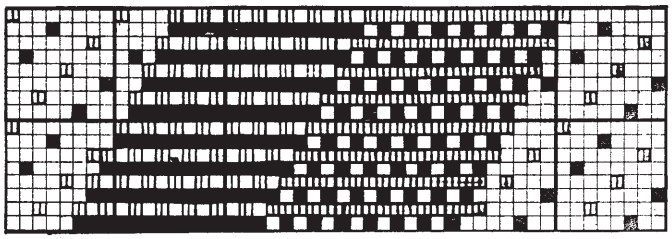

FIG. 81.

design a thing of this description is a matter of skill and experience. It is quite necessary to understand the value of every dot put upon ruled paper, as, for example, in a black and white portrait, single grey dots representing black weft would go through with white ground weft, thus producing a

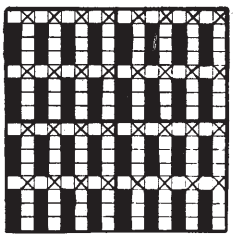

FIG. 82.

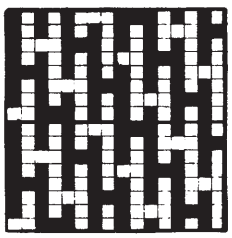

FIG. 83.

soft shade. Single black dots would be black weft only, the warp not rising for the white ground weft. This gives a darker shade. When two or more brocade shuttles are used, very beautiful shading and toning effects are procured, by "mixing" or passing two or more colours through the same *shed* or lift.

SOME USEFUL WEAVES.

The illustration, Fig. 80, represents a pretty style and is shown in the actual size when woven. In Fig. 81 the method of working the ruled paper is given. There are two

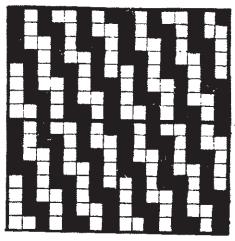

FIG. 84.

shuttles and a warp, one shuttle being used for the flowers and the other for the leaves. As the draft explains, it is designed on the pick and pick principle, with a satin ground.

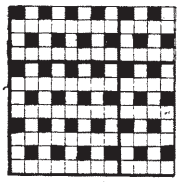

FIG. 85.

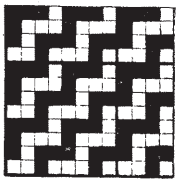

FIG. 86.

Some very pretty effects can be gained in this class of ribbon, and shading can be obtained in the leaves and flowers by bringing up a warp dotting, carefully manipulated. A delicate

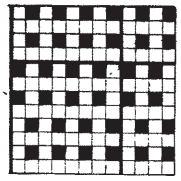

FIG. 87.

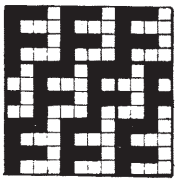

FIG. 88.

fabric would result from the employment of a white warp ground, the leaves in a yellowish green, and the flowers in a salmon pink. A more serviceable result would ensue from

the use of a black ground, with the leaves in tan and the flowers in steel blue.

In Fig. 82 is shown a weave for a terry or ribbed fabric. This is usually made with two shuttles, a fine weft being used for the single pick (×) and a coarser one for the remaining three picks. This could be employed in combination with many fancy effects, with good results. Fig. 83 gives a double satin weave on sixteen shafts. This weave, as its name implies, produces a satin effect, both sides of the cloth being the same. Fig. 84 is for a satinette, also reversible. There are many other weaves used in the ribbon trade, but those already noticed will be found sufficient, as they represent the most common. It must be understood that the satin, the matt and the ottoman, illustrating the remarks on scarfs and neckties, are, as previously stated, included in the list of those given for and used in the ribbon trade.

EDGING WEAVES.

As no treatise on the methods of constructing ribbons would be complete without some reference to the composition of the edgings or selvages, a few drafts are given showing the principal styles in use. Fig. 85 is what is known as a two-cord, or pull-over edge, and is generally adopted in one-sided fabrics, that is, tissues which are not reversible. The warp floats on the face only, but is partly pulled over by the weft on returning, which is done when the whole of the warp in the edge lies down. Fig. 86 is a four-cord edge, and is the same on both sides. It is, therefore, used for reversible ribbons. Fig. 87 is a one-sided bead edge, and is much the same as Fig. 85, but looks richer, on account of the warp floating longer. Fig. 88 is also a bead edge, but two-sided, that is, the same on both sides of the fabric.

CHAPTER XIII.

SILK HANDKERCHIEFS.

In the last chapter necktie silks and ribbons were dealt with; silk handkerchiefs come next. As most people of average intelligence are aware, Macclesfield is a centre of the silk industry, some eighty firms being engaged in the manufacture in that town. An immense quantity of handkerchiefs are made there, and many beautiful patterns and delicate textures owe their origin to the designers and workers in that Cheshire town.

SILK HANDKERCHIEFS.

Much of the information already given on scarfs and ribbons is applicable in discussing the subject of silk handkerchief designing. It is exceedingly difficult to separate one particular class of silk fabric from another, as the various methods of obtaining desired effects, the weaves employed, etc., etc., are commonly used in every case. Hence, much of the substance of the last chapter might be repeated here. Indeed, to be complete, it would be necessary to begin with the twill and satin weaves, introduced in the chapter on "Damask Fabrics," continuing with the figured satins, the matts, the ottomans, the terry or rib, and the edgings, given in the remarks upon scarfs and ribbons. All such weaves are useful in the designing of silk handkerchiefs, and combinations of them tend to the production of very effective fabrics. Examples of handkerchief designs are given next with ruled-paper diagrams, showing the method of drafting most suitable for the production of good and effective tissues.

A HANDKERCHIEF DESIGN.

The first example, Fig. 89, is offered as a suitable design for a one-coloured handkerchief of white, cream, pale blue, pale salmon, or of any delicate shade. The main portions of the figuring would be best produced in a satin weave and the ground in a four-shaft twill. The various fancy effects introduced in

FIG. 89.

the figuring tend to add to the effectiveness of the pattern, but it is impossible to show these upon the ruled-paper example in Fig. 90, as to give the whole would occupy too much space. The design, Fig. 89, is, however, carefully worked out, and the student who desires to make the attempt should not have much difficulty in drafting the full pattern upon ruled paper with advantage to himself. In this task, the

particulars given in these pages upon silk designing will be of considerable help to him. So much for the centre portion of the pattern. A comparatively plain border enhances the

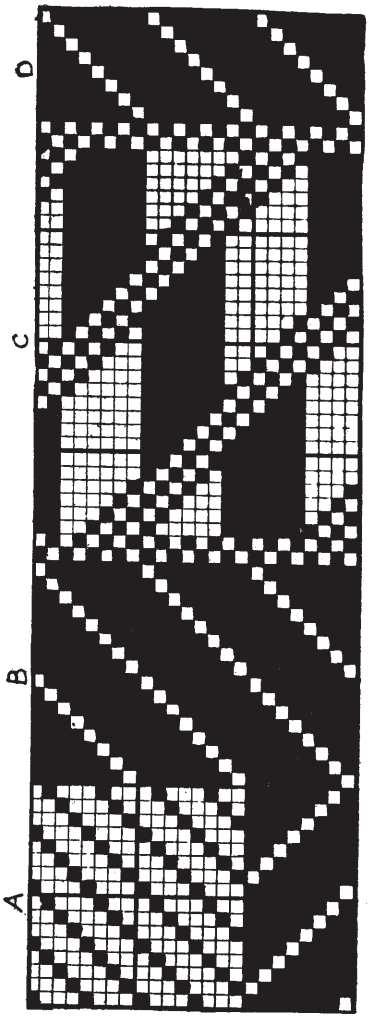

FIG. 90.

effect produced by the ornamental centre; an ornamental border, however, might be employed in the present case with good results, but what, for purposes of distinction, we

have termed a "comparatively plain border" has a remarkably rich effect if drafted as shown in Fig. 90, in which a bold twill band is succeeded by a fancy diamond effect, these being again followed by the twill. Attention must now be given to working out the draft for the complete border. In the first place, a small portion of the bold twill and diamond

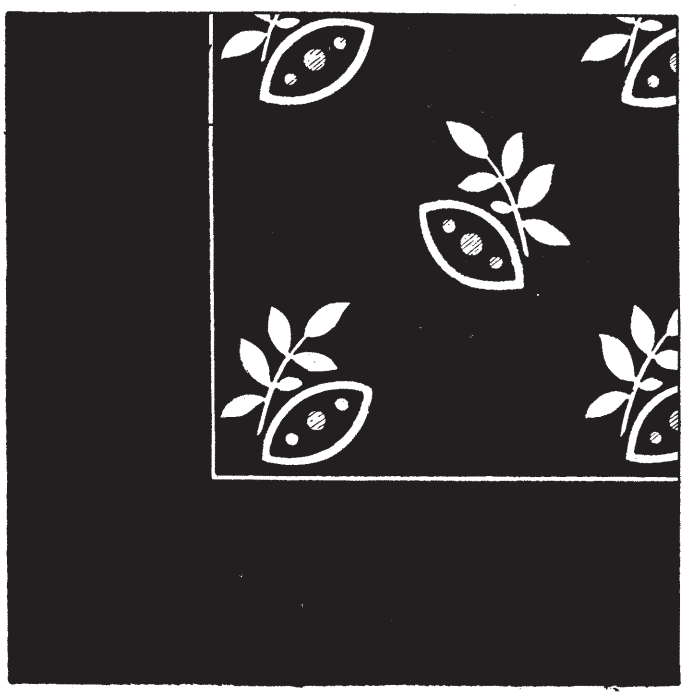

FIG. 91.

weave only is shown. The number of ends per inch would be 120, and the picks per inch, 100; thus the pattern would be more correct if drafted on 12 × 10 paper. The twill, A, represents a portion of the body. In drafting the border, about 60 ends should be allowed for the twill, B, or about half an inch when woven. The fancy diamond weave, C, should be drafted on, say, 90 ends, or about three-quarters

of an inch in the cloth. For the twill, D, this should be continued for about one and three-eighths inches of cloth. This is for the side border. For the bottom, repeat the side

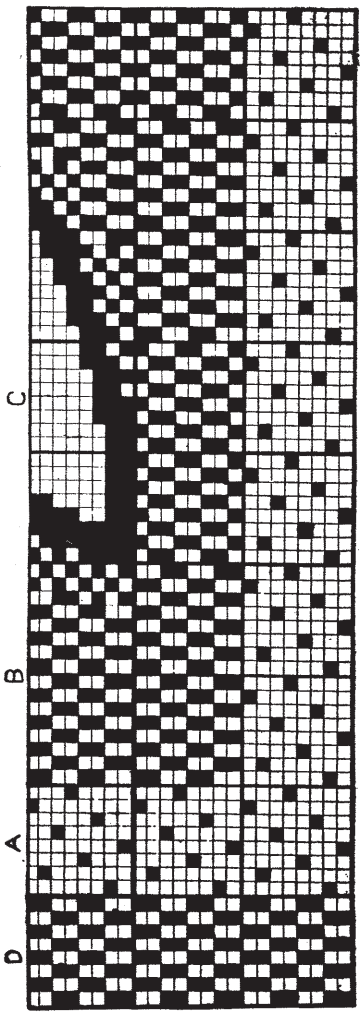

FIG. 92.

border, allowing the same proportions for the twills and diamond weave. Thus for the inner twill band allow 50 picks, for the diamond 75 picks, and for the outer twill band con-

tinue for the same width as that running up the side. The corner would consist of a continuation of the diamond bands crossing the outer twill band. A variation in the border might be made by having the different bands narrower and finishing off with a broad satin weave.

ANOTHER HANDKERCHIEF DESIGN.

Fig. 91 is a small pattern, repeated at intervals upon a fancy ground. The method of working is illustrated in Fig. 92, but again it is not possible to show the whole ruled-paper drafting, on account of the amount of space which would be required. The figure should be drafted in satin, and a plain satin border given. Thus A shows a portion of the satin border, B is the ground weave for the body or centre, C is a small portion of the satin figure, and D is the edging or selvage which goes up each side of the ruled paper. A variation could be made by the use of an ornamental border, or one such as that in Fig. 91 could be employed with good results. For instance, there might be half an inch of satin and the same width of ground weave, finishing off with satin. The effect of some handkerchief patterns is greatly enhanced without the use of extra colour shuttles, by the simple expedient of printing upon the figured portion in some bright colour. Thus, in Fig. 91, the balls show that which would be printed. Supposing we made our cloth in a delicate blue, a charming effect might be produced by printing the balls in crimson. Although the designer would show both the woven and the printed portion upon his sketch of the design, it goes without saying that he would take no notice of the latter when working out his ruled paper. This pattern would produce the best result if woven with 312 ends and 80 picks per inch, and would, therefore, be more correctly drafted if 4 × 16 ruled paper were used, instead of that we have employed to simply illustrate the method of working out the pattern.

CHAPTER XIV.

DRESS FABRICS.

In the remarks upon damask fabrics, it was stated that some seven centuries ago these materials were extensively manufactured in Damascus, but they were composed of silk, and the trade came to recognise any silken texture as a damask. In treating upon this class of goods, various drafts were given which are all equally used in the manufacture of dress fabrics. The twill, the satin and the fancy weaves are of equal importance in the present case. It is necessary to mention this fact in order to render this chapter complete in itself. In the course of the observations made designs and drafts will be given, and, although these have been drawn specially for silk fabrics, the general scope of the chapter will be equally applicable to fabrics manufactured of other yarns.

SATIN EFFECTS.

There are many beautiful designs for silk goods, particularly those for high-class fabrics for evening wear, which are manufactured in a simple satin weave. Many of these patterns are somewhat extensive, consisting of long sprays of flowers and leaves, in some cases, executed in their natural size. The drafting of a pattern of this character would be the same as that given in Fig. 90, in the last chapter. Suppose two colours are employed for the figure, the pattern would be drafted as shown in Fig. 81 (Fancy Ribbons), and if it was desired to introduce a third, then proceed in the same manner, employing a third shuttle wherever required—this

would be bound on the back on the satin foot. Considering all that has been said in the two previous chapters applicable to the drafting of designs with the satin weave, there is no necessity to enter further into this part of the subject here.

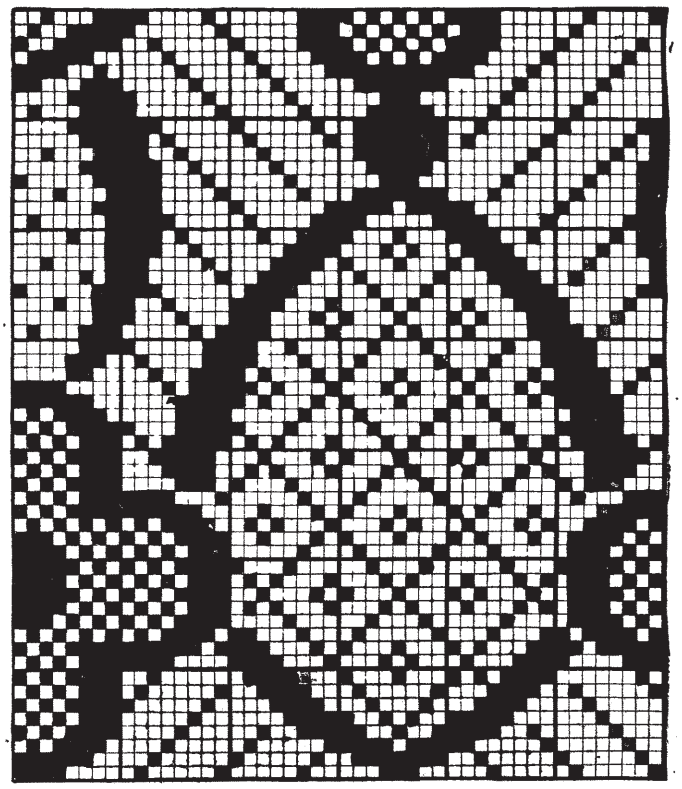

FIG. 93.

A SIMPLE DESIGN.

The matt, the ottoman and such-like weaves, of which examples have been given before, are much used in the production of a variety of dress fabrics, not only in silk, but also in cotton, wool, etc., and, when used in combination with ornamental figuring, some really good results ensue. Many very pretty fabrics are woven by the simple expedient of

utilising two or three ordinary weaves in one pattern. As an instance of this see Fig. 93. This consists of a design in outline, four of the most elementary effects being included in its composition. Yet a texture of this description, if woven in silk, say 112 picks and 136 ends per inch, has a remarkably tasteful appearance.

As no treatise upon the subject of dress fabrics would be complete without some reference to the subject of swivel weaving, this matter must be dealt with briefly here.

FIG. 94.

SWIVEL WEAVING.

This consists of introducing extra colour effects into fabrics in such a manner that the yarn runs on the back of the fabric at intervals only—that is to say, it is employed only in the formation of the figure, spot, or whatever may be the character of the ornamentation, and does not, therefore, as in the ordinary form of shuttling, run across the whole width of the piece. The arrangement is used to a

great extent upon hand-looms and also upon power-looms. There have been a great number of inventions during the past few years for various forms of mechanism for swivel weaving, but all are more or less upon similar lines. In the last chapter, a ribbon-loom was described. This was constructed to weave eighteen ribbons at one and the same time. In this case, there are, of course, eighteen shuttles running at once. Swivel weaving is the application of the principle

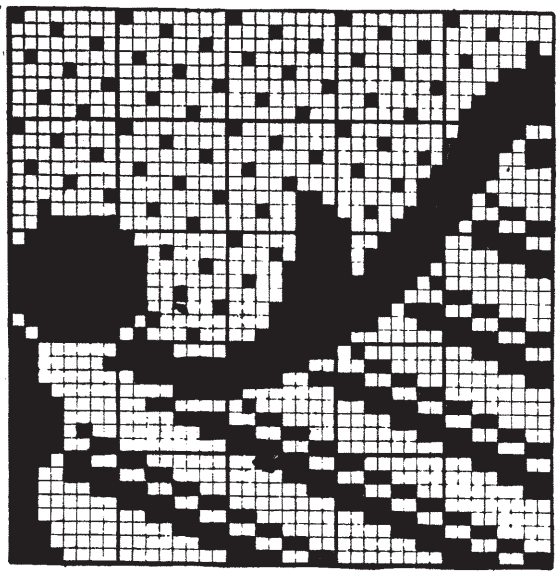

FIG. 95.

of a number of ribbon shuttles to an ordinary loom, the ribbon shuttles working in unison with the ordinary loom shuttles. The small shuttles are arranged at intervals, across the loom, in a frame attached to the front of the slay. This frame is so arranged that, through the action of the Jacquard, it may be raised or lowered as required. The frame may thus remain up or down as long as may be necessary for the weaving of any particular pattern, according as the cards which govern it are plain or punched.

Suitable mechanism is provided for the running of the small shuttles, and means are also afforded for throwing the ordinary picking motion out of gear when necessary. One great drawback to swivel weaving lies in the fact of the prescribed limits to its use. For instance, there must be a specified distance, crosswise of the loom, between each leaf, figure or spot, where extra colour is to be inserted, and, although the frame for the next row of spots or figures may be moved, so that they appear in the fabric midway between the previous

FIG. 96.

row, this does not tend much to obliterating the set and formal appearance often noticeable in fabrics made on the swivel loom.

A variation of the swivel motion is provided by what are known as circles, which accomplish the same purpose as the swivel, but the yarn enters the shed with a circular motion, and by this method, a greater number of spots or figures can be woven in a row than is the case with the swivel motion. The shortest possible descriptions of these mechanisms have

been given; they are, however, sufficient to give a general idea of their method of working. They are by no means

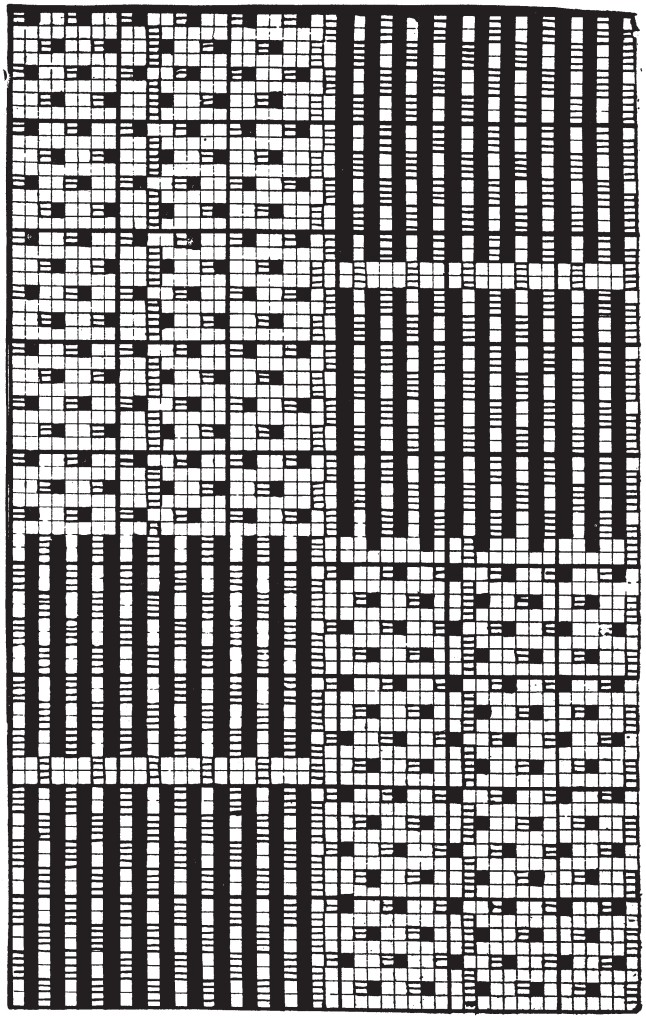

FIG. 97.

universally regarded as successfully accomplishing their object; for one reason they are too slow in their action, and therefore a sufficient quantity of work in a given time

cannot be got by their use. A prominent loom-maker says that he does not make them, as he considers them out of date when compared with embroidering machines. It is quite true that some beautiful effects are produced upon silks and other varieties of fabrics by the aid of embroidery machines, but the subject being dealt with is swivel weaving, and therefore it may not be out of place to give one or two designs which may be produced by this method.

EFFECTS BY SWIVEL WEAVING.

The design illustrated in Fig. 94 has been specially drawn for silk dress goods. It is intended to be woven with a black warp and a coloured weft, such as a pale sage green. The small portion of ruled-paper drafting, Fig. 95, explains the method of treating the design throughout. The figure portion is clearly distinguishable, as likewise is the diagonal ground. The half-tone dotted portion of the design, Fig. 94, is the satin. If the pattern is worked out to these instructions, a very good and rich effect will result, say a sage green figure, black satin panel, and a diagonal ground of sage green and black, in weaving which, allow 290 ends and 100 picks per inch. It has already been stated that in swivel weaving colours can only be introduced at intervals; in Fig. 94 this point is illustrated. In this design the flower is shaded by lines, and would be woven by the swivel mechanism. The design being arranged on the drop principle causes the second row of flowers to come midway between the first row, and thus tends to lessen the set appearance inseparable from the system of introducing colour into a fabric by the aid of swivel weaving. This flower should be in salmon pink, which will harmonise nicely with the black and sage green of which the fabric is woven.

The next illustration of a dress goods design, Fig. 96, shows a ground of the matt or basket character, an old and

valuable formation in many classes of designing. In the present instance it forms a good pattern for our purpose, and is given in the exact cloth size. The scrolls and balls are intended to be produced by the aid of the swivel. A full repeat of the matt draft is given in Fig. 97. The light dots in the draft indicate ground warp and weft. The black is figure weft and the white the warp. In weaving it will be found expedient to have the ground weft on a separate beam. With reference to colour, black warp and weft, with the swivel figure in any delicate shade—blue, mauve, rose pink, etc.—may be used, which would produce a good useful class of silk fabric, as would also be the case if navy blue for warp and weft, and gold for scroll were employed. Another effective colouring would be ground myrtle green and figure pink. Other colours that harmonise well are brown and pale blue, and maroon and gold. The weave given herewith would be found serviceable if used alone, the basket formation giving to the surface of the fabric a beautiful lustrous appearance. In fact, the designs—Figs. 94 and 96—form examples of good useful styles when employed without the aid of the swivel, but, as it is necessary to deal with this portion of the subject, it would be difficult to show two patterns which more clearly illustrate our remarks upon this class of figure weaving.

DRESS GOODS.

Having briefly described the process of swivel weaving, one or two other designs for dress goods may be considered. The designer may obtain an almost endless number of effects by the exercise of a skilful arrangement in the drafting of a pattern, and in this respect much can be done by the use of fancy ground weaves, some of which have been previously given, but it will be advantageous to show a further specimen of this variety of design.

A DIAGONAL WEAVE.

In Fig. 98 a sketch of a design is given in the actual size it would appear when woven. This should preferably be in delicate shades of colour—a pale blue ground being very suitable. The figuring of the design shown in white should be in pale salmon pink, the dotted portion representing the blue weft floating. The pattern is drafted on the pick and pick principle, the figure being treated exactly as in the examples previously given, notably the one for drafting the figured

FIG. 98.

satin. Thus the main portions of the ornamentation would come up in pink, the small spray of leaves being blue, with a pink outline. The floating of the blue imparts to the pattern a rich appearance. As this has been drawn with the special view to the utilisation of a fancy ground, it becomes a question as to the form this should assume, in order to produce the very best result. Many styles will readily occur to the mind of the practical designer, and, amongst these, small diaper effects, such as the diamond and the lozenge,

would stand prominently forward as serviceable *motifs* for employment. But for the production of a remarkably rich and pretty fabric, it would be difficult to find a better weave than the diagonal, given in Fig. 99. We have already mentioned that the pick and pick principle of drafting is used, a further illustration of which is given in this figure, which requires little in the way of explanation. The black represents the blue weft, the white is the floating blue warp, and the

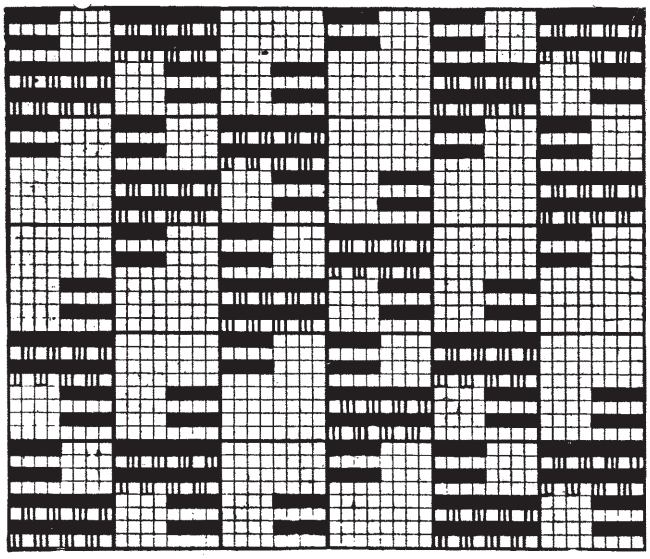

FIG. 99.

light dots show the binding of the pink weft on the back. The best result will be obtained by allowing about 360 ends and 96 picks of each shuttle per inch.

REVERSIBLE WEAVES.

Many neat and taking fabrics may be woven by the expedient of drafting minute figures in such a manner that they produce a reversible pattern. In accomplishing this, it is necessary to so construct the pattern as to produce an

exact equality in warp and weft on each side of the fabric. The double satin and two of the three matt weaves, etc., show this feature. Although it may appear simple, it is by no means an easy thing to construct a good ornamental weave of this description, such as the one illustrated in Fig. 100. Here we make use of one figure, repeating it upon the drop principle, and, at the same time, reversing the order of

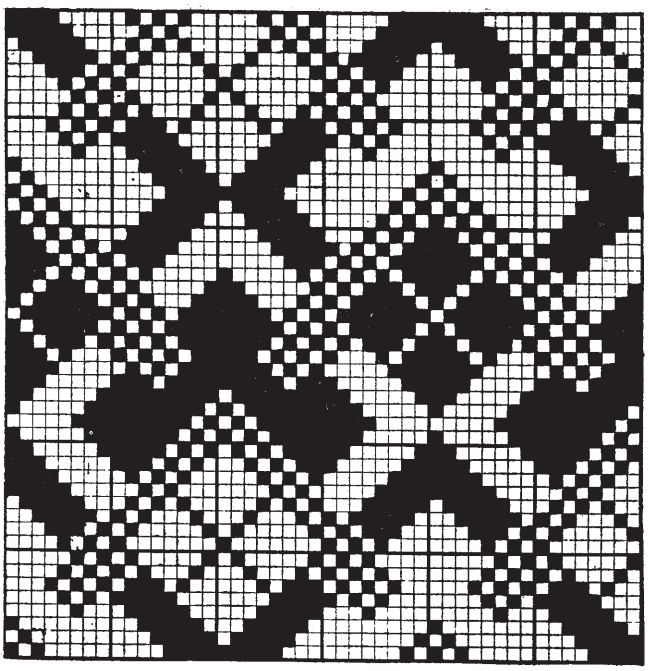

FIG. 100.

the warp and weft—that is, the weft in the one figure becomes the warp in the other, and *vice versâ*, and thus we have equal portions of warp and weft up and down in the whole pattern. In the production of this, suppose a white warp and a lavender weft are employed, or a delicate pea-green for the warp and a gold for the weft, or, say, pale blue and pink—the colours should only be a few shades removed

from white—we should procure a neat and good result, the general appearance being greatly enhanced by the effect of the light and shade which play upon the figures. Much of the admiration bestowed upon silk, as well as upon many other fabrics, is in no small degree due to effects produced by light and shade. For instance, the floating of silk is so much resorted to because the light striking it gives it a beautiful, lustrous appearance, which would not be the case, at all events to so great a degree, if floating were avoided.

Much may be done with this small pattern by a judicious combination with other weaves. It can be seen how the idea works out, using this figure in combination with the first of the matt weaves and the double satin given in the chapter on "Scarf Silks and Ribbons". Supposing a stripe is to be attempted with warp and weft of the same shade, allow two inches of figure, then half an inch of double satin, the figure and satin being divided by a few ends woven plain. The double satin might then be succeeded by a similar width of the matt weave, followed by satin, and finally repeating the figure. The pattern would require about 200 ends per inch, but, where the double satin comes, about 400 ends per inch would be required.

This type is useful as a groundwork for further ornamental effects, and much may be done in this direction by the aid of one shuttle only, the designs most suitable being those of a trailing or open character, that is, patterns which do not cover the ground too much. But in preparing ruled papers for these, it is advisable to entirely surround the ornamentation by a little plain drafting, in order to throw it clearly out from the ground effect. The figure upon the face would be formed by the weft, that upon the back by the warp, and thus the reversible character of the pattern would still be maintained.

END AND END WITH PICK AND PICK.

Many very good fabrics are produced upon the end and end and pick and pick principle, but as this was fully dealt with in the chapter on "Damask and Tapestry Fabrics" there is no need for repetition here. Not only is the principle adopted in the manufacture of silk fabrics, but also in those composed of cotton and worsted yarns, etc. The designs usually employed are such as cover the ground well, and there is therefore much scope for the skilful designer in the production of good ornamental patterns, such as those illustrated in Figs. 12 and 15, in one of the chapter on "Hints on Designing Fabrics," and, for the purpose under notice, no better examples

FIG. 101.

FIG. 102.

could be given, as they furnish precisely the class of pattern usually adopted. With these observations, the end and end and pick and pick principle of drafting fabrics may be left.

TWEED DRESS GOODS.

Upon the subject of tweed and the heavier makes of dress fabrics, little needs to be said. Where ornamentation is employed, it usually partakes of the simplest character, being, in fact, seldom more than a leaf, ball, cube, diamond, lozenge, basket, zig-zag, crescent, or some such elementary device, repeated at intervals. Even where patterns of a more ornamental character are made use of, they are generally of the simplest description, such, for instance, as those given in

Figs. 101 and 102, which are very fair examples. Patterns such as these give the best effect when woven in bold repeats, six inches not being too wide for either design. The weaves employed call for no special mention, much being possible with the most rudimentary of them. An important object in many tweed dress fabrics appears to be the production of good ground effects, such as those known as heather mixtures. Camel hair yarns are used to some extent, being often introduced in the ornamental portions of the fabric, thus giving the figures a shaggy and extremely ugly appearance. Knop and curl yarns have been and will, no doubt, continue to be used largely, and grounds, figures and stripes of these materials have by no means a bad effect. Flocked yarns are also much employed, producing the irregular spots or splashes of colour often seen distributed over the surface of a tweed dress fabric. But in this make of goods, as in many others, fashion rules, and it is not always that ornamentation in them is generally acceptable.

LENO OR GAUZE FABRICS.

The subject of dress goods could not be left without some reference to the class of cloths known as leno or gauze fabrics; but only a passing reference to them will be made in closing this chapter. The few observations will be found equally applicable to fabrics woven from silk, cotton or worsted, and the design and section of ruled paper given are likewise suitable for all these fabrics. Any one who has taken the trouble to inspect a sample of leno or gauze cloth will have noticed that the warp threads do not lie parallel, but are twisted round each other in such a manner as to form, along with the weft, open work in the ground or figure. This twisting is accomplished by the aid of doups, forming a portion of the Jacquard harness. To be more explicit, there is employed what is generally known as the douping warp, in addition to the ordinary or ground warp, and the

intertwining of the two, in conjunction with weft threads, forms the leno or gauze.

In tying up a harness, a certain proportion of the Jacquard uprights or wires is required for the doup harness cords, the exact proportion differing in various cases, although a common division is one-third for doup and two-thirds for the remainder of the harness. The doup leashes consist of ordinary harness cords, furnished with the usual mails. A loop or slip is employed, one end of which is drawn through an eye in the mail, the douping warp passing through that part of the slip or loop which protrudes through the mail and not through the mail itself. Should an end of douping warp break, the corresponding slip falls from the mail, and, in order to obviate this, the slip is, in some cases, passed through two holes in the mail, and thus it is impossible for it to fall out. But this causes extra friction, with consequent wear and tear, and, therefore, the remedy is not regarded favourably. The doup harness is attached to the front rows of uprights, the back rows being, of course, occupied by the remainder of the harness. The use of a slackening arrangement is necessary in order to properly operate the doup warp. This may take the form of a back harness, worked by levers, arranged a short distance behind the harness proper, and through this the doup warp is drawn. But there are other methods employed—one by a Lancashire maker. In this case, the levers are dispensed with and the back harness is attached to the hooks of the Jacquard machine.

Leno weaving has formed the subject of innumerable patented inventions, some dealing with one portion of the mechanism and some with another, and to treat this process fully and quite up to date would require the consideration of many of them.

Leno weaving can, of course, be done by the use of healds

in place of the Jacquard, and some very pretty effects in small figures, checks, stripes, etc., can be produced, but then the designer has the trouble of constructing the douping plans, which are not necessary when the Jacquard is used. In any case, and particularly by the aid of the Jacquard, the designer has a wide scope for the exercise of his powers; take, for instance, alternate checks of gauze and plain, the latter having a small figure upon it. In stripes, some pretty combinations are possible. Examples are common of neat floral effect in coloured warp upon plain stripes, connected by stripes of

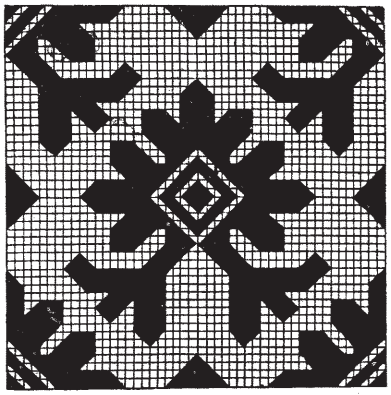

FIG. 103.

gauze. Twills and satins may be employed—in fact, there is scarcely a limit to the variety of effects which may be obtained.

A LENO DESIGN.

In Fig. 103 a sketch of a simple figure is given as an example, and in Fig. 104 a small portion of the ruled-paper drafting is shown, but the whole pattern may be completed upon 144 ends. In cutting the cards, the black and the light dots are required to lift. In this type of patterns, two ends cross two ends. In the weaving, it is necessary that the doup should be raised first and immediately before the figure

begins, if only for a single pick, as, otherwise, a float and an imperfect gauze crossing will result. The doup is shown on the ruled paper, Fig. 104, in a half-tone dotting. Although the figure is given as plain weaving, a fancy figuring may be employed, having a small portion of plain around. A further variation may be given to this design by making the ground plain and the figure gauze, a remark which may

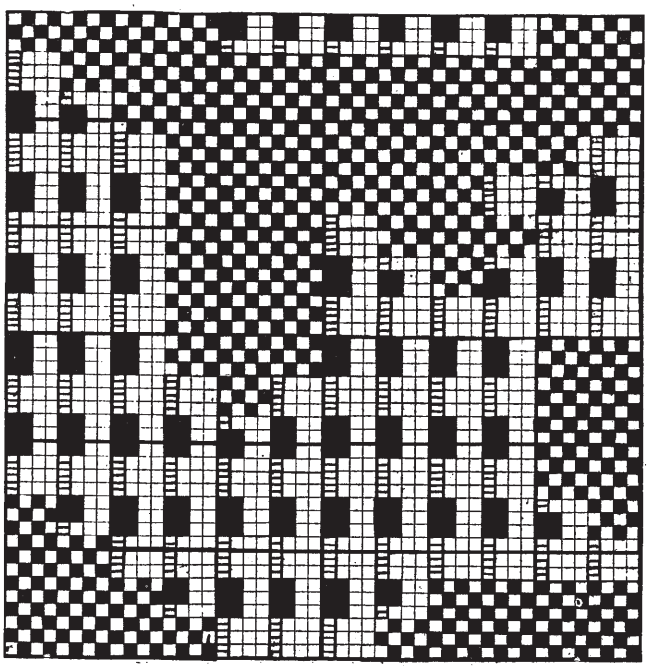

FIG. 104.

be generally accepted, as gauze figures on plain or fancy grounds are often quite as effective as are those composed in the contrary manner. For a worsted leno, this design would come out well in 2/80's yarn for warp and weft; 15's reed; 4 ends in a reed; 60 ends per inch, and 54 picks per inch. For a cotton leno, the following particulars may be taken as a guide: 1/50's yarn for warp and weft; 20's reed; 4 ends in a reed; 80 ends per inch, and 70 picks per inch.

CHAPTER XV.

MANTLE CLOTHS.

In dealing with the subject of mantle cloths, one great drawback presents itself, *viz.:* much, if not all, that has been said in the last three chapters might, with advantage, be stated here, and, therefore, it is difficult to separate handkerchiefs, dress goods, mantle cloths, and such-like fabrics one from the other, in order to treat upon each as complete in itself. A designer may select any of the weaves already given, and, from it, construct a pattern for a mantle cloth; for instance, the satin weave is very often employed for some classes of these fabrics, notably broché satins, and some of those woven in worsted yarns. Figured tissues are, however, not always admissible—they are subject to the fluctuations of fashion, at one season only the plainest cloths meeting with general acceptance, whilst at another the desire for ornamentation amounts almost to a craze, during which period one may, at times, see some startling novelties, such as an elephant's head and trunk closely repeated as a drop pattern. Dragons and serpents and such-like atrocities have also been employed, whilst birds, butterflies and insects have furnished the designer with good ideas for pretty patterns. Flowers, leaves, scrolls, etc., down to the simplest formations, are extensively used in the figuring of these cloths. In connection with the fabrics which, for distinction, are here called plain cloths may be mentioned twills, diagonals, hopsacks and similar weaves. In reversible cloths, some good things in tweeds are often to be noticed,

such as those formed by showing upon one side a diagonal of black and white and upon the reverse side the same yarns worked up in the form of a plaid. Black and grey, brown and fawn, and such combinations of colour, form pretty effects in checks. As a further example, a cloth may be constructed showing alternate diagonal lines in brown and

FIG. 105.

silver grey upon both sides. An extra effect is then produced upon one side by means of a skeleton check, in red or blue, say, two inches square, this being crossed by the same size of check in a black and grey twisted yarn. More showy examples are such as have tartans of red, black and green, or some similar combination of colours, upon the reverse side, whilst the face has, say, a flocked effect, or one woven in two

colours neatly blended by the aid of some simple fancy weave. But such cloths as these are not ornamental ones, in the sense in which fabrics are being treated in these pages, but, nevertheless, they are of sufficient importance to merit a brief reference here.

Ornamental fabrics for personal adornment assert themselves at recurring periods. They come and go; at times their reign is brief, at others they maintain their popularity until the highest and the humblest wearer are satiated, and fashion declares in favour of plainer cloths. They make

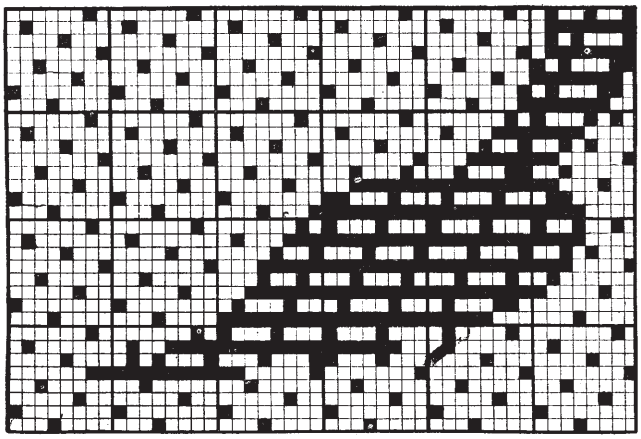

FIG. 106.

their début in the form of silk, satin, plush and other expensive varieties, and, by gradual stages, appear in inferior and still lower goods. In manufacture and design the scale is descended until the lowest point is reached, and they become a thing of the past. Such is the fate, to a greater or lesser extent, of all fabrics that are subject to the claims of fashion, and in no case is it more apparent than in that of mantle cloths. If the statement requires any qualification it is due to the fact that there is always a proportion of the population that prefers ornamental fabrics for personal adorn-

ment, and, therefore, there is a certain amount of trade constantly done in them. For instance, good figured worsteds, broché silks and satins, and broché velvets and plushes may be had at all times, and, consequently, it is advisable to deal with some of these here.

A WORSTED MANTLE CLOTH.

A very neat and effective mantle cloth may be produced

FIG. 107.

by the use of the satin weave, a design for which is given in Fig. 105—a most suitable pattern for this class of cloth. It will be noticed that in this figure the whole of the ornamentation has been drawn with a special view to avoid binding of the figure, as a much clearer and better appearance is produced by allowing the whole of the latter to float.

The method of drafting is shown in Fig. 106. The main difference between this and the one given in the chapter on "Silk Scarfs and Ribbons" is that a three and one twill is used behind the figure in place of the plain ground weave. This weave could, however, be used so as to produce two colours in the figure, by following the method shown in the chapter just quoted. This design would be effective in a repeat of from 3½ to 5 inches in width, the larger size being preferable.

A BROCHÉ SATIN.

The design, Fig. 107, is a good example of those used for broché or brocaded satins. In drafting ruled papers for this class of tissue, many simple expedients may be adopted in order to produce light and shade, to add variety, and generally to promote effectiveness in the fabric. How this desirable state of things is arrived at may be best described by considering what may be done with the pattern under notice. The ground is, of course, satin, but the whole of the figure would be in a ribbed weave. Over this latter, the large flower should be allowed to float as much as possible, but, where this would not be satisfactory, shading, by means of a tabby or twill, or the bringing up of the rib, should be resorted to. It will be noticed that this flower has been cut up by means of lines, in order to ensure floating to a large extent, but shading may be adopted in various portions; for instance, some of the petals, particularly the two largest, may be so treated, the latter at their inner terminations. This would give them a sunken effect, thereby throwing up the main portion of the flower. The stem of this flower, and those of the leaves, would come out best in the rib, and the few larger leaves should also be shown in this effect, but floating on the outlines on one side of the leaves, and also of the veins, should be allowed. The various sprays of small leaves should be shaded by means of a tabby or twill, the

portions not shaded floating. The wreath of small flowers may also be treated in the same way, but, in this case, very little shading should be adopted, as the more floating is re-

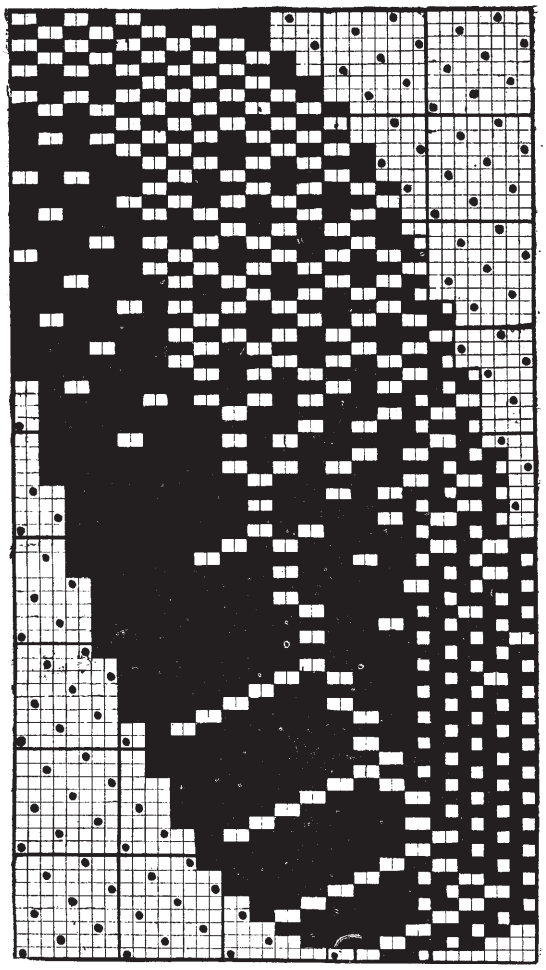

FIG. 108.

sorted to here, the better will be the result. The festoon of beads may also be floated or shown in the ribbed effect. In using the various weaves for the purpose of shading, they

may be employed simply or in combination one with another. A tabby may come first and then a twill, and the latter may run first in one direction and then in another.

In the limited space available it is impossible to give an illustration showing the many and varied means employed in drafting in order to obtain the utmost perfection of effect, but the small example given in Fig. 108 will exemplify the general method of working. This is drafted pick and

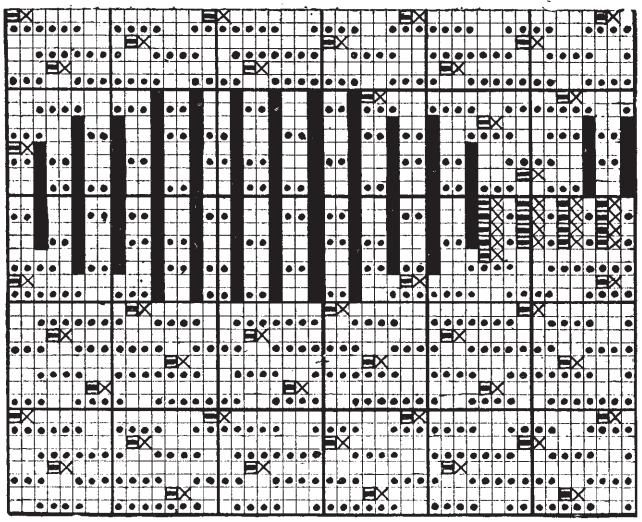

FIG. 109.

pick. In the first place, the whole design must be drafted, so that every two picks are exactly alike. Upon every odd pick the rib must be shown throughout the whole figuring of the pattern. In the illustration it is only shown on the first five odd picks. In actual practice the designer would not put this rib dotting on at all, because the card stamper takes it as understood, and cuts his cards accordingly. The floating figure, and likewise any shading of the design, are worked upon the even picks.

ANOTHER WORSTED MANTLE CLOTH.

Some very good cloths for mantlings may be woven upon the end and end and pick and pick principle, and curled or looped yarns, or such as have the curl or loop formed during the process of weaving, are often used in the figuring with good results. In such cases, the most suitable designs

FIG. 110.

are those of an irregular character—for instance, Fig. 102 in last chapter is somewhat in the style of thing which may be employed. The general run of patterns, either floral or ornamental, hitherto given in these chapters, are much too regular in formation to be of service for the particular type of mantle fabric under consideration. Fig. 109 illustrates the method of drafting that may be employed in this

instance. The cloth would have a navy blue satin face weft, with the warp figuring in blue and red, black being the curl or loop yarn. The warping would be of these three colours alternately, as shown upon the draft in black, in lines and in crosses. The odd picks shown in black dots on the draft represent a ground weft, and the white or even picks show the satin face weft.

AN EXAMPLE IN WOOLLEN.

A very good class of reversible fabric for mantlings may

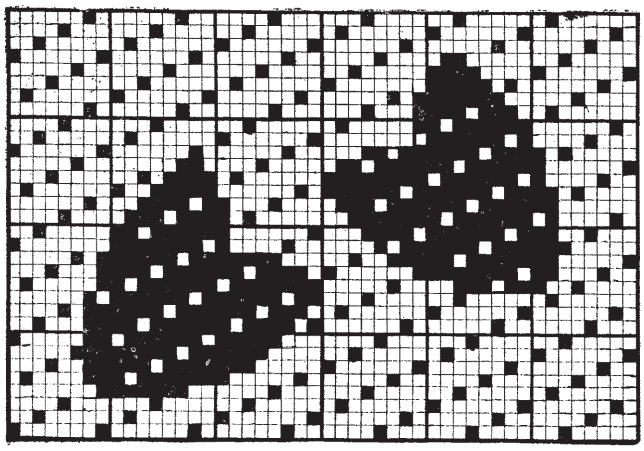

FIG. 111.

be manufactured from woollen yarns, either in a plain or figured cloth. For the latter the design, Fig. 110, will be found suitable. The method of drafting is shown in Fig. 111, which is simply a weft satin figure on a warp satin ground. A warp of 12 skeins brown woollen and a weft of 9 skeins pale blue woollen would be a good combination of colour—of course, giving a blue figure on one side and a brown one on the other. For a 56 inch finished cloth 2240 ends would be required in the warp, 34 ends per inch, woven 35 picks per inch. Lift all black.

A WOOLLEN SHAWL.

The pattern, Fig. 110, is exactly the style of design employed in the manufacture of woollen shawls so much in use amongst a certain section of the population. These tissues are produced with the body of the shawl ornamented and the border plain, or *vice versâ*. In the latter case stripes in various colours are introduced, as well as the ornamental figuring. Such cloths are reversible and may be manufactured by the aid of the following figure and ground weave, Fig. 112, which has been extensively employed for this purpose. The draft is for weft figure, and requires two

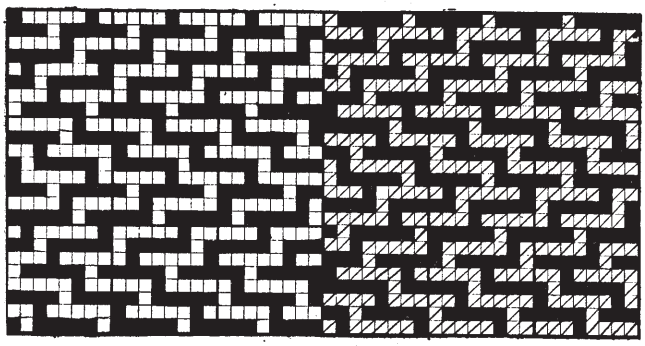

FIG. 112.

shuttles in weaving. By turning the draft on end it can be used for warp figure with one shuttle, but end and end warping would be required. The double satin weave given in a previous chapter could also be used for a warp figure for this class of cloth, if warped end and end, or by making the bottom of the draft the side and using two shuttles, a weft figure would result.

PATENT RAISING MACHINE.

Fabrics such as the woollen mantle cloth and the woollen shawl require to have a special velvety finish im-

parted to them, such as that afforded by teaseling, or by passing through the patent raising machine invented by E. Moser and manufactured by James Tomlinson. This raising machine performs its work in such an admirable manner and has gained such a wide popularity that a description of it here will be found advantageous.

For the information of those readers who may not be familiar with the mechanical construction and principle of this machine it will be well to explain that it consists of a

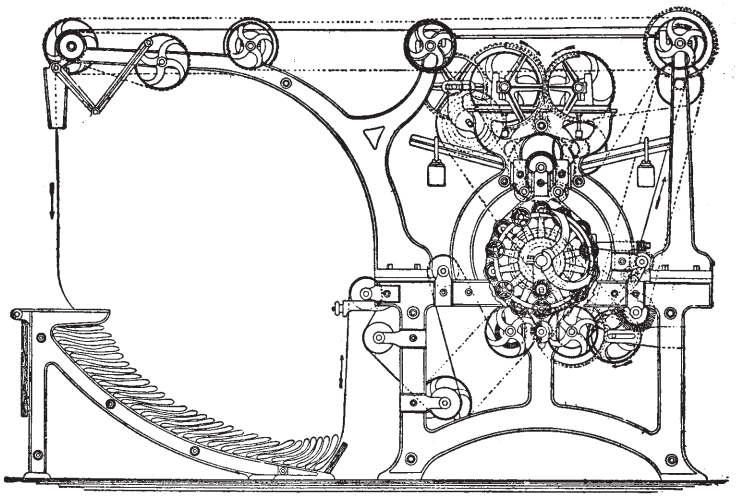

FIG. 113.

cylinder or drum, upon which is mounted a series of rollers, each covered with suitable raising cards made of steel or brass, as may be most suitable for the fabric to be raised. The machine illustrated in Fig. 113 has fourteen of these card-covered rollers; seven of these have their card points inclined in a forward direction, while the remaining seven have their points inclined in a backward direction. The cylinder is made to revolve in a forward direction and at a speed of about 800 feet per minute, carrying of course the fourteen card rollers with it. The cloth to be raised travels

through the machine in the same direction, but at a speed of about 1-20th of that of the cylinder. Upon the cylinder being set in motion, as will be easily understood, the rollers receive a rotating movement in a direction opposite to that of the cylinder itself, and, as this movement is of the character of a rolling action, no raising or napping of the fabric could be effected until the speed of the planetary rollers is increased over and above that which they receive from the cylinder itself. To do this and to accomplish the raising or napping of a variety of goods, such as are found in textile factories, the speed of each card roller is accelerated or retarded, thus the raising energy of the card rollers is more or less severe according to the nature of the fabric and to the amount of nap it is desirous to obtain. The raising rollers being furnished, as mentioned above, with card points working in opposite directions to each other, the nap obtained is very short and full, and any tendency there may be in the operation of raising to drive the weft or otherwise weaken the fabric is practically overcome.

CHAPTER XVI.

FIGURED PLUSH.

In dealing with this subject some reference will, no doubt, be expected in relation to figured plushes, those beautiful fabrics which are of such infinite value for the decoration of the home. What can be more effective or in better taste than a suite of furniture upholstered in a neatly designed plush fabric? The manufacture of plush has made great strides towards perfection, owing, in no small degree, to the skill, high inventive faculties and perseverance of Lord Masham, who, as is well known, has built up a gigantic manufacturing concern at Manningham, Bradford, and who has never wearied in bringing his machinery to the highest possible state of efficiency, as is evidenced by the great number of patented inventions in which he is interested. It is scarcely necessary to say anything further by way of introduction.

A PLUSH DESIGN.

The illustration given in Fig. 114 represents a design for plush, and is shown mainly with a view to demonstrate to what degree ornament for this class of fabric may be worked up. From this it will be noticed that too much detail is objectionable, and should therefore be avoided. A fairly balanced quantity of figure and ground, with the former carefully surrounded by the latter, may be considered as an essential feature in designs of this class. The ornament should not be too fine in drawing. In weaving this pattern, the white, of course, represents the plush, the

ground being in satin or in some similar weave, and it will easily be noticed that the marking of the centres of the flowers, the veins of the leaves, etc., are so bold that when woven they will show clearly between the pile of the plush. This is likewise the case in the lines which divide one portion of ornament from another. By following this course, an

FIG. 114.

effective pattern results, when otherwise there would be a heavy mass of indistinct and objectionable figuring, with no artistic or ornamental formation about it. Therefore, let the ornament be clear and bold, and thus it will be found possible to work it out properly upon the ruled paper, which would not be the case if too much detail were attempted upon a sketch.

PLUSH WOVEN SINGLE.

Patterns of this character may be woven in a loom either single (*i.e.*, one piece at a time) or double (*i.e.*, two pieces woven face to face), the latter being by far the more favoured method. It is, of course, understood that, in weaving plushes singly, wires are used upon which the pile is formed, much as in the case of Brussels and tapestry

FIG. 115.

carpets. The withdrawal of each wire severs the pile, each of the former being supplied with a knife-like termination which accomplishes this. The diagram, Fig. 115, gives a cross section of plush, the heavy black dots, A,

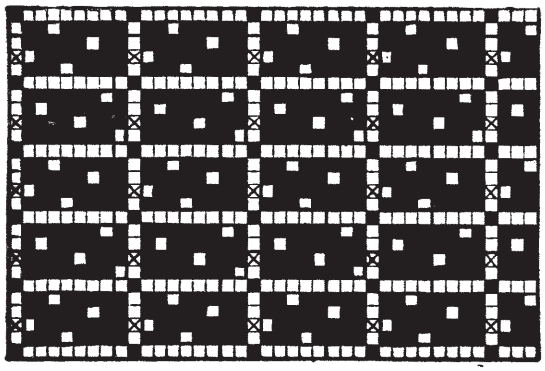

FIG. 116.

representing the wires, the line, B, the pile warp, and the dots, C, the weft. The draft given in Fig. 116 further explains the construction of the cloth. The black is the satin ground, the round dots represent the plush warp, which rises for the wire to pass under it wherever it is desired to make plush, but where it is desired to make satin, the plush warp lies down for the wire to pass over it. The

× on the second pick of the black is employed to bind the plush warp at the back of the cloth, and thus prevent floating.

PLUSH WOVEN DOUBLE.

In the weaving of two pieces of plush face to face, it is scarcely necessary to remark that no wires are requisite, the pile being formed in the loom by the plush warp passing from the upper to the lower piece of fabric, and *vice versâ*. The two pieces are, of course, severed by a cutter, as mentioned later. The diagram given in Fig. 117 shows the working of the plush warp, and also the satin ground, the black lines representing the former, and the fine lines the latter. The small dots represent the weft. Fig. 118 is a draft which will further explain matters. The black is the

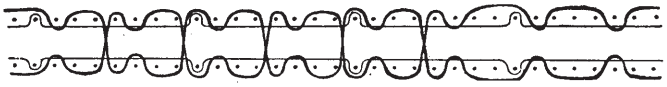

FIG. 117.

satin ground, and the dots and crosses show the plush warp. In these figures satin grounds only have been mentioned, but others are employed, such, for instance, as twills and some of the fancy effects common to the silk and ribbon trades, amongst those being the one known as the Barathea, shown in Fig. 119, which is in formation similar to a hop-sack. Here again the black is the ground and the dots and crosses the plush warp. It is necessary that some particulars should be given of the looms employed in the plush industry, and, therefore, the following short description of one for the weaving of two pieces of plush face to face will be both interesting and instructive.

A FIGURED PLUSH LOOM.

In Fig. 120 an illustration is given representing a side elevation of a loom for the weaving of two pieces of plush face

to face, at one operation. A Jacquard machine is employed for producing the figures by means of the pile warp, each thread of which is fixed in a creel, placed behind the loom. The Jacquard is in the usual position, and has, therefore, been omitted from the illustration. Whilst the figure is produced by the Jacquard acting upon each thread of the pile warp, the ground is made by a set of tappets, which also regulate the

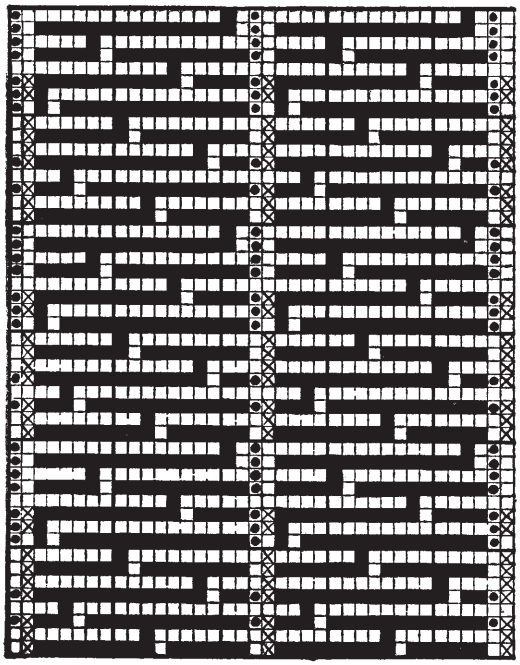

FIG. 118.

length of the pile. The ground may, of course, be in a satin, a twill, or otherwise, as above described. The tappets are so arranged that, whilst weaving the top piece, the healds belonging to the lower are kept at rest at the bottom, and, when weaving the bottom piece, the healds which control the top piece remain at rest likewise, thus causing the two pieces to separate, and by so doing taking up the length of pile given.

There are two rollers at the back of the loom, one for each ground warp, to open the said warps to a certain angle in combination with the healds. The healds belonging to the top piece are kept at a higher level than those which belong to the bottom piece. These two levels, and the angles given by the above-named rollers, keep the pile tight between the two pieces. A movable rail or shelf is attached in front of

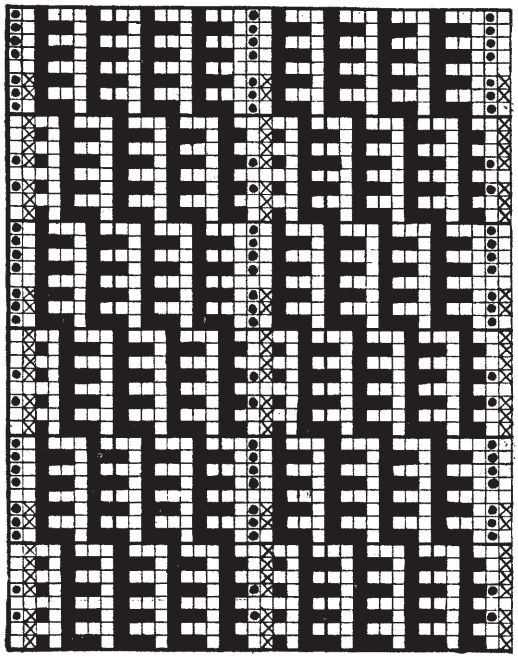

FIG. 119.

the reed in the shuttle race of the going part for the shuttle to traverse over it. The object of this is to permit the rail or shelf to descend as soon as it comes near the pile gauge, which is placed close to the fell or edge of the cloth, and to raise it again to its proper level, as the going part recedes after beating up, thereby keeping clear of the pile gauge each time the going part beats up. This rail or shelf is carried by two pivots close up to the reed, and its front part only

may be raised or lowered, or the whole rail may be raised or lowered, by means of a positive parallel motion.

Utrecht velvets may be woven, two pieces face to face, by using three combinations of tappets. Each combination makes the weft to form the loop for the temples, and also fastens all the selvages of the two pieces.

By reference to the illustration, it will be seen that A is the side of the loom which carries the crank shaft, B; the swords, C, of the going part, E, are connected with the crank

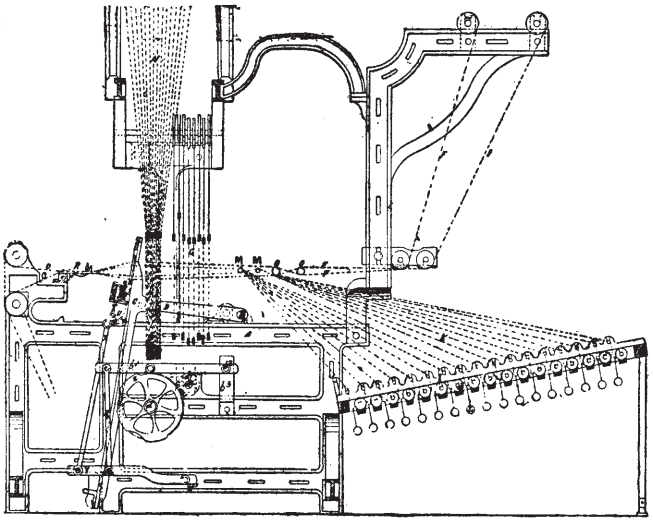

FIG. 120.

shaft, B, by the crank arm, D, which gives motion to the going part, E. The ground warps to form the back of the pile fabric are marked F, F. These warps are acted upon by the healds, G, the said healds being worked by tappets. The creel, I, is required to carry the bobbins, J, upon which the threads of the pile, K, are wound. The weights, L, are to give tension to the pile threads, K, worked by the harness, N, which is, of course, operated by the Jacquard. It has been already stated that the tappets which work the healds, G,

are so constructed that, whilst weaving the top piece, the healds belonging to the bottom piece are kept at rest at the bottom, thus causing an opening between the two pieces which take up the length of pile. Two rollers, Q Q, are placed between the warps, F, to keep them open to such an angle as to take up the length of the pile in combination with the tappets, such length of pile being given by the bobbins, J, and regulated by a swing pile gauge, R. The swing rail or shelf, S, in front of the reed in the shuttle race of the going part, E, is connected by rods, T, to levers, U, mounted on the shaft, V, which is carried across the going part, E. Upon the same shaft is mounted another lever, W, connected by the rod, X, to the lever, Y, which lever works on its fulcrum, Y^1. This is fixed to the loom side, A. The lever, Y, is also connected by the rod, *b*, to the lever, b^1. The lever, b^1, works on the stud, b^2, carried by the stand, b^3, fixed to the loom side, A. The lever, b^1, receives its motion from the tappet, Z. This tappet is keyed on a toothed wheel, both of which revolve upon the stud, *d*, fixed on the loom side, A. The tappet, Z, and wheel receive their motion from the pinion, d^1, keyed on picking shaft, d^2, which is driven from the crank shaft in the ordinary manner. The tappet, Z, is divided into six parts, each part giving the required movement to meet the swing gauge, R, and the shuttle at its proper time as follows: Whilst weaving the top piece, the swing rail or shelf, S, in the going part, E, is kept down by the tappet, Z, in order to clear the swing pile gauge when beating up, there being sufficient warp down to carry the shuttle. Whilst weaving the bottom piece, the shelf, S, is caused to rise and depress at each pick—it rises to carry the shuttle across, there not being sufficient warp down to carry it, and it depresses to clear the swing pile gauge, R, at the time of beating up.

It is most important in a figured pile fabric woven face to face to obtain a smooth back and an equal length of pile.

The swing pile gauge, in combination with the swing or movable rail or shelf, accomplishes this.

In the endeavour to give a description of a loom for the weaving of two pieces of plush face to face, it has been advisable to refer to an invention emanating from a firm well known throughout the whole textile world.

In the above description there is no mention made of the manner in which the two pieces of plush are severed, but the same firm has a method which may be briefly alluded to. A cutter is mounted upon a rail and drawn backwards and forwards by cords attached to drums, which are rotated by means of racks and pinions driven by a double cam. When the knife comes to a rest at one side of the loom, it enters between two sharpening rollers, one of which is brought into contact with the knife as it slowly passes over it, and, as the knife returns, the other roller is brought into action. The rollers consist of metal spindles, upon which are firm concave barrels, covered with india-rubber, which is again covered with leather, or a similar substance, and over this the grinding material is spread.

CHAPTER XVII.

BED QUILTS.

THE manufacture of bed quilts or counterpanes is one of the most important of the Lancashire cotton industries, there being some thousands of looms running upon this type of ornamental fabric in Bolton and the district. In Scotland there is also a considerable trade done in counterpanes. They are made in many varieties, from the very finest to the lowest quality of fabric, and are known by various names, such as the toilet, the honey-comb, the Marseilles, the Grecian, the satin, the Alhambra, and the tapestry, in the designing of which there is much scope for the production of good ornamental effects; it is, therefore, requisite, in treating upon ornamental textile fabrics, to give special attention to this subject.

THE QUILT LOOM.

It is not necessary to make many preliminary remarks with reference to the loom, as the mechanism employed will be understood by a perusal of the information given in treating upon the various makes of quilts. The warp threads are controlled by the Jacquard, in combination with healds. The former is of various capacities, ranging from 400 to 1200 needles for ordinary makes of goods. In some cases the harness is tied up for ordinary repeating patterns, whilst in others it is arranged so as to control one half the width of the cloth woven, the pattern being drawn to turn over from the centre. In the course of this chapter both these types of designs are given.

SATIN QUILTS.

Fig. 121 illustrates the class specially suitable for a satin quilt, and is an example of a pattern that turns over from the centre, both in the width and the length ; in other words,

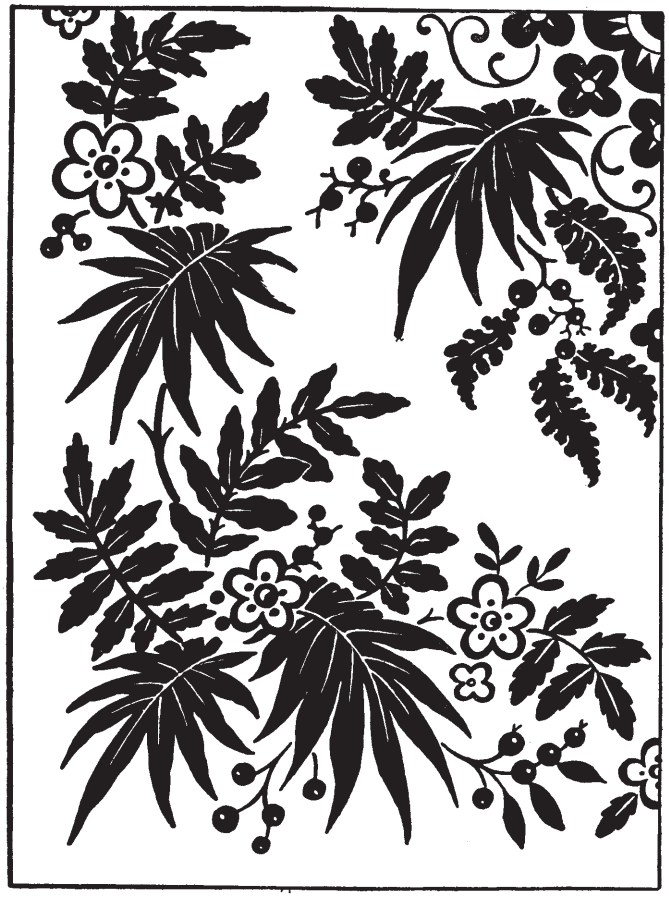

FIG. 121.

there is just one quarter of the pattern shown. In the manufacture of satin quilts, two yarn beams are employed and two shuttles, one of the latter using fine and the other coarse

weft, and two picks of each are made at one time. The best satins are woven with two ends of Jacquard to one of healds. Both grey warp and weft are employed, the quilts being bleached after weaving. In preparing a ruled-paper design for a satin quilt, it is necessary to draft the ornamentation only, as the ground and binders are made by the healds, but in order that the whole system may be properly understood, a small draft is given in Fig. 122. In this the black squares represent the figure weft and the black dots indicate the ground weft, whilst the crosses show a binder warp for the figure weft. This gives a detailed draft for a small spot, but,

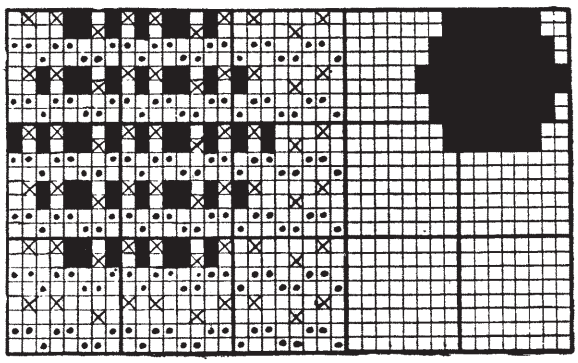

FIG. 122.

in actual practice, only the spot itself would be drafted, as shown to the right of Fig. 122. A very pretty effect may be gained by employing a coloured ground, a good way to do this being to use a striped warp. Thus the first, third, fifth, twelfth, thirteenth and fifteenth ends may be in red or pink, and the sixth, eighth, tenth, seventeenth, nineteenth, and twentieth ends in white. The draft, Fig. 123, is for the same class of cloth, but in this case the binder warp threads are more regular. The black is the figure weft, the dots are the ground weft, and the crosses are the binder warp ends for the figure weft. Here, again, it is scarcely necessary to

remark that only the actual figure requires drafting, as shown by the spot to the right of the draft.

TOILET QUILTS.

The design shown in Fig. 124 represents a toilet quilt, in preparing drafts for which there is again no necessity to show the binders. Thus the drafting becomes a very simple matter of good freehand drawing. Toilet quilts are usually made with a 1200 Jacquard machine and two shafts of healds, so that plain cloth can we woven with fine weft upon the face side of the cloth. Two yarn beams are employed,

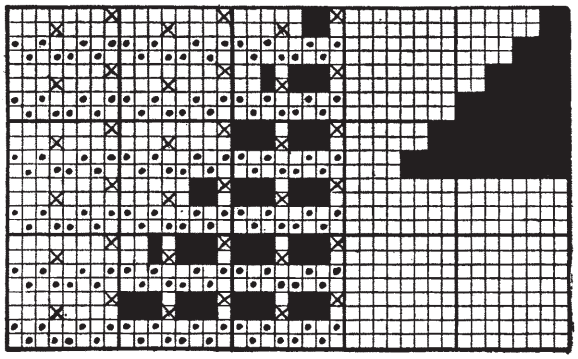

FIG. 123.

one for the Jacquard and one for the healds. There are two heald or face ends for one Jacquard end. The Jacquard ends are drawn in two comber boards one after the other, but there are always two heald ends between each Jacquard end. The comber boards work when the fifth and tenth picks are going in, in order to bind the Jacquard yarn at the back of the cloth, that is, under the figure which is made on the face side. Two shuttles also are employed, one weaving fine weft, which gives the quilt a good appearance, and the other coarse weft, which forces the pattern up, and at the same time gives weight to the fabric.

There are generally five picks to each Jacquard card, as follows :—

First pick : Jacquard up, fine weft, first heald up.

Second pick : Jacquard up, fine weft, second heald up.

Fig. 124.

Third pick : Jacquard up, coarse weft, both healds up.

Fourth pick : Jacquard up, coarse weft, both healds up. This latter is a repeat of the third pick, as it returns in the same shed.

Fifth pick: Jacquard down, fine weft, both healds up, and one of the pressure, lifting half the figure warp. This makes plain cloth at the back where the figure is.

Sixth pick: Jacquard up, fine weft, first heald up.

Seventh pick: Jacquard up, fine weft, second heald up.

Eighth pick: Jacquard up, coarse weft, both healds up.

Ninth pick: Jacquard up, coarse weft, both healds up. Repeat of eighth pick.

Tenth pick: Jacquard down, fine weft, both healds up, and one of the pressure up, lifting one half the Jacquard yarn which was not lifted by the fifth pick.

Numbers five and ten are termed pressure picks. They are both fine picks, and make plain cloth at the back of the quilt, where the Jacquard yarn has not been raised. Were it not for these, the Jacquard yarn would be loose at the back of the cloth, behind the figure. Grey yarn for warp and weft is employed, and the quilts are bleached after being woven.

HONEYCOMB QUILTS.

Honeycomb quilts, so called from the cellular appearance of the fabric, rank amongst the most effective of the many varieties of quilts manufactured. Good bold patterns are the best for this class of cloth, in order that the honeycomb may be used to the greatest advantage. Various fancy weaves are likewise employed, and when they are combined with the honeycomb, a handsome reversible fabric results. This style of quilt is made with the Jacquard alone, only one yarn beam and one shuttle being needed. The Jacquard rises and falls at every pick. The warp is always a two or threefold yarn, and in the better qualities of cloths, the weft is the same as the warp, but, in the lower qualities, poor single yarns are used. Both warp and weft are bleached before weaving.

A draft for making the honeycomb effect is given in Fig.

125. In this, the black represents the warp and the white the weft. The dots show the longest floats of each, and it is these that produce the cellular appearance, as those portions which are more tightly bound naturally fall in. Good geometrical patterns, repeating in the ordinary manner, with bold outlines and clear spaces at intervals, for the introduction of the honeycomb, and with lesser spaces filled in with other fancy weaves, form good designs for this variety of quilt. Borders of a similar character to the body pattern may be employed, and where the ground of such is made in

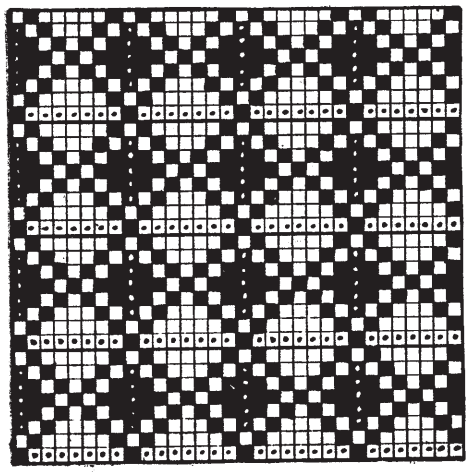

FIG. 125.

the cellular effect, a very handsome fabric results, which is much enhanced by allowing a few inches of plain honeycomb around the border as a termination to the quilt.

GRECIAN QUILTS.

In the manufacture of Grecian quilts, no healds are required, and only one yarn beam and one shuttle are used, the Jacquard rising and falling at every pick, as in the case of honeycombs. Of course, the appearance of the cloth is not the same. In Fig. 126, a design suitable for a Grecian

quilt is shown, in which the body of the pattern centres or turns over at each side, and a border may be so constructed that each side of it may be the same, although the centre

Fig. 126.

portion may not turn over. By this method, a freer and easier effect is given to the border than would be the case if it turned over from the centre. But in Fig. 126, an ordinary flowing border is shown. As a termination to the

quilt, the bars may be repeated for a few inches. In preparing a ruled paper for a Grecian quilt, the ground should be in, say, a five shaft satin, but the figure may be more loosely bound, say, in a ten shaft satin. The bars may be suitably bound with a twill. A Grecian makes a very good reversible quilt.

FIG. 127.

ALHAMBRA QUILTS.

Alhambras are amongst the cheapest varieties of quilts manufactured; they are also the most popular, if the number made and sold is any criterion. There are more Alhambras sold than of all other kinds combined. The value of full-sized quilts, measuring about 108 × 84 inches, ranges from 2s. 9d. to 6s. 6d. There are two yarn beams employed

in the weaving—one for the Jacquard, in which there is a coloured warp, making the pattern or figure, and the other containing a white warp, worked by two healds, which makes the plain cloth. In the lower qualities of cloth, a grey warp is used in place of the white. The Jacquard rises and falls at every pick, and one heald also changes at every pick. There are as many white ends in the warp as there are mails for the Jacquard, but there are two, three or four ends in each mail, according to the quality of the quilt—four ends are more expensive, but look much better than two. The weft is a very common bleached yarn, generally of from 80 to 100 yards to the ounce. One shuttle only is required, and, as a rule, a 600 Jacquard machine is employed, or a 400 is used, providing the harness is tied up specially for small repeats. There are usually twenty white ends to twenty mail ends per inch. In Fig. 127, a design is given showing an ordinary repeating pattern suitable for an Alhambra quilt. In preparing the ruled paper, draft the figure for the body pattern in red. This may be tied, to prevent an unnecessary length of float, in a suitable manner. Veins of leaves may be continued to their edges in single lines, a satin here and there where required, and in such-like manner the binding may be accomplished. The ground may be in half-and-half effect, that is equal portions of warp and weft up and down. The border should then be drafted in white, the ground being red, tied with a satin, say, of eight shafts. The border figure may be bound in a similar manner to that adopted for the body.

The small diaper pattern shown around the border must be repeated several times, in order to form a good termination to the quilt. This introduction of small diaper patterns is a common practice in the manufacture of any class of quilt, but, as one example is sufficient, the diaper has not been shown in the other figures illustrating this chapter.

Of course, in drafting, only one repeat of the diaper is necessary around the border.

With these few particulars and figures illustrating the satin, the toilet, the honeycomb, the Grecian and the Alhambra, this chapter on the subject of quilts may be concluded.

In Figs. 121 and 124, one quarter only of the design is given, but, in order that the reader may better judge of the effect, the whole of each pattern is given on our separate plates.

CHAPTER XVIII.

CALICO PRINTING.

THE subject of colour printing as applied to textile fabrics is one that would fill a large volume if dealt with adequately. It is necessary in treating upon ornamental textile fabrics to say something upon this highly interesting process, but it is obvious that, within the scope of a single chapter, it will not be possible to do more than treat upon those points which are of the most use to the student and designer. The printing of textile fabrics is a very ancient art, having been practised in olden times by the Egyptians and Chinese. We also find that the printing of calico was carried on in India at an early date. "Prints" were so much worn in this country that the Government prohibited their use. Such obstacles were, however, afterwards removed, so that in the year 1765 calico printing had been established as a regular branch of Lancashire industry. Of course, it is scarcely necessary to state that many other fabrics besides cotton are printed—that silk, linen, woollen, etc., are extensive branches of the art, but the processes in each case are mainly the same as that in use for calico printing.

BLOCK PRINTING.

Probably there are many who suppose that, in consequence of the inventive genius of the present age, machine printing has entirely superseded the older and more primitive method of block printing, but this is by no means the case. The latter process is extensively practised to this day, and there are those who consider themselves com-

petent judges who will assert that the result produced by block printing is greatly superior to that gained by the more modern and speedier method of machine printing. However, there is no necessity to inquire into the relative merits of these assertions and methods, still there is no doubt that

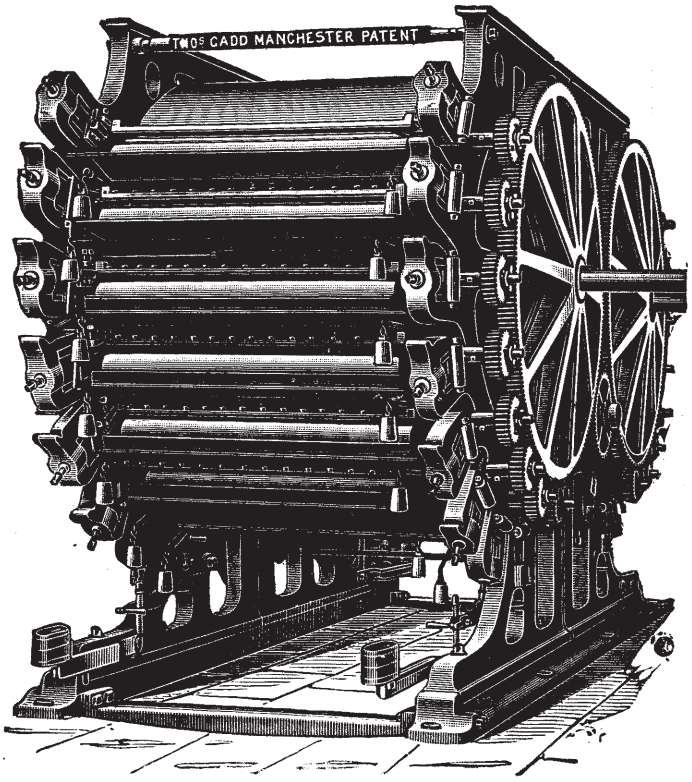

FIG. 128.

some very beautiful fabrics are printed by the primitive system. In this process as many wooden blocks are employed as there are colours in a design—that is to say, each colour is separately engraved upon a block of fir, pear tree, sycamore, or boxwood. Impressions of these blocks are often cast in type metal, and thus made use of. Each portion of

the pattern stands out in relief, and where fine effects, such as lines, etc., are employed, copper wire is used. The blocks are supplied with pins at the corner, in order that each one may successively fit exactly upon the space occupied by the previous one, and thus produce a perfect pattern. The cloth to be operated upon is stretched over a table, upon which a blanket is first laid, in order to ensure the necessary degree of softness in the foundation for printing. Each block is dipped into a colour and impressed upon the fabric. One class of block printing which may be mentioned is that commonly employed for table covers. The cloth in this case is usually of woollen, and by reason of its being easy distinguishable, and therefore forming a subject for examination by the designer or student, it is mentioned here. The fabric is usually of red or green, with a design impressed upon it in black, and to give gradation and softness of tone to the pattern, stippling is largely resorted to. In the printing of these goods the cloth is stretched over a table. A slab, upon which the colour is laid, is placed in a convenient position, and so that the block may be easily operated, a little mechanical contrivance of weighted cords is employed, by which the printer, with little manual exertion, raises the block from the cloth, swings it forward to the colour slab, and back again to the fabric. With this brief reference, the subject of block printing may be dismissed.

MACHINE PRINTING.

In times of keen competition it is apparent to all that, in order to cater for the million, block printing, however perfect it may be in its results, would be much too slow from a productive point of view. Thus, machine printing has become a very extensive industry, and the apparatus employed has attained to the very highest pitch of excellence. The illustration given in Fig. 128 represents an eight-colour

duplex calico printing machine, made by Mr. Thomas Gadd. It has been specially constructed for the production of cloths up to sixty inches wide, having a pattern on both sides, and so perfect is it in its action that the colours accurately register or come exactly opposite each other on each side of the cloth. But not only is this machine adapted for producing an eight-colour reversible fabric, but it is likewise capable of printing sixteen colours on one side only. This appears a great number to print at one operation, but it is by no means unusual, as an examination of some cretonnes will easily demonstrate; indeed, the same maker constructs machines to print as many as twenty colours. The illustration gives a perspective view of the eight-colour duplex machine, one end and side being clearly visible. Upon the latter portion of the view two drums will be noticeable, and at the end the rollers or cylinders corresponding with one of these drums are shown. At the opposite end of the machine are the rollers corresponding with the second drum. This mode of construction differs in one important point from that employed for a single-colour machine, as in the latter case there is but one drum, the rollers being arranged at each side of this instead of at one side of each drum, as in the duplex machine. A colour box with furnishing roller is fixed immediately under each roller, and steel blades called doctors are employed to remove the colour from the plain portions of the rollers. Blankets for printing upon are employed, as in the case of block printing. In this particular machine every possible improvement which can tend towards its more perfect operation has been made, but as it would be impossible to particularise these without a comparison with other machines, there is no necessity to speak of them here. Each roller employed is engraved around its circumference with the ornamentation represented by one colour of the design. In the case under notice there

are eight differently engraved rollers, and these eight are duplicated, a complete set being required at each end of the machine. The fabric to be printed upon runs tightly around the drums, and as it runs it receives the impressions from the rollers. The printing of two sides at one operation is easily understood. Supposing the fabric comes up the side and over the top of one drum during its progress, it is receiving the imprint of the pattern on one side of the fabric. When the cloth passes down between the two drums, and, crossing over to the other one, passes under and up the side of this, it receives the imprint on the reverse side. Such is a simple and brief description of one of these interesting and valuable pieces of mechanism.

INTERMITTENT MACHINE.

But a more ingenious apparatus is the intermittent calico printing machine, employed in the production of fabrics where one continuous pattern is not requisite—for instance, in dado curtains, shawls and sarees. This latter, it may be mentioned, is the principal garment of a Hindoo woman, and is wrapped around the body, one portion being taken over the left shoulder, and the other hanging down in front. These sarees are of considerable length, and certain portions are of different ornamentation. Now it is obvious that to change from one pattern to another, whilst printing upon one and the same piece of fabric, some other arrangement must be employed than that usual in ordinary calico printing, and here comes in the intermittent system. In the machine constructed by Mr. Thomas Gadd, three rollers are required for each colour, one for the border, one for the crossbar, and one for the main portion of the pattern. By the adoption of ingenious mechanism, these rollers are caused to come into, or retire from, contact with the cloth, just whenever required, so that no two are in operation at one and the same time. As soon as the pattern

engraved upon one roller has been impressed upon the fabric, the next roller is brought into contact with the cloth, and continues running and printing a new design, until it is succeeded by another roller. The crossbar patterns may be printed from rollers of 36, 45 or 54 inch circumference, and the border and body patterns from rollers of 18 inch circumference. After the crossbar design has been imparted to the cloth once, the roller is caused to retire, and in its place the

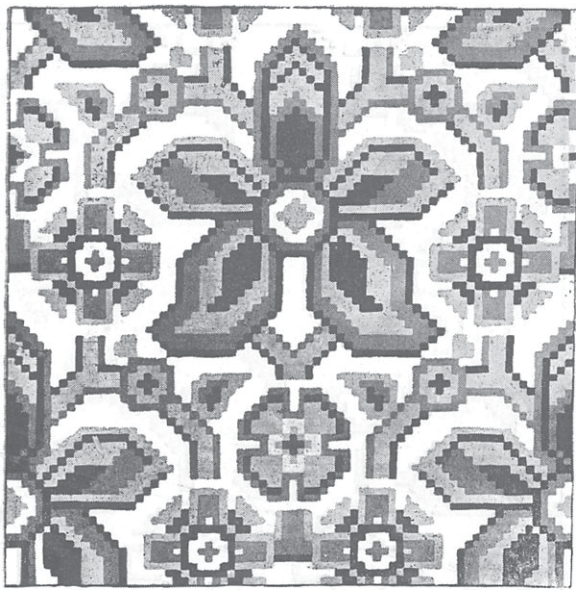

FIG. 129.

body or filling roller comes into operation and continues running until the necessary length has been acted upon. In other words, whilst the crossbar roller may revolve once only, the filling roller may make several revolutions before another change is required. With this machine, different combinations of rollers are possible—for instance, 18 inch border and body rollers can be used with crossbar rollers of any of the above-named dimensions, and various body or filling designs

may be printed between one crossbar and another. Sarees are made of varying lengths, up to ten yards, but, by the addition of change wheels, a greater length can be printed.

CRETONNE DESIGNS.

The production of cretonne patterns calls for the utmost artistic skill and ability, and in this respect French designers take the palm. Many of the patterns which come from the studios of Paris are really nothing less than

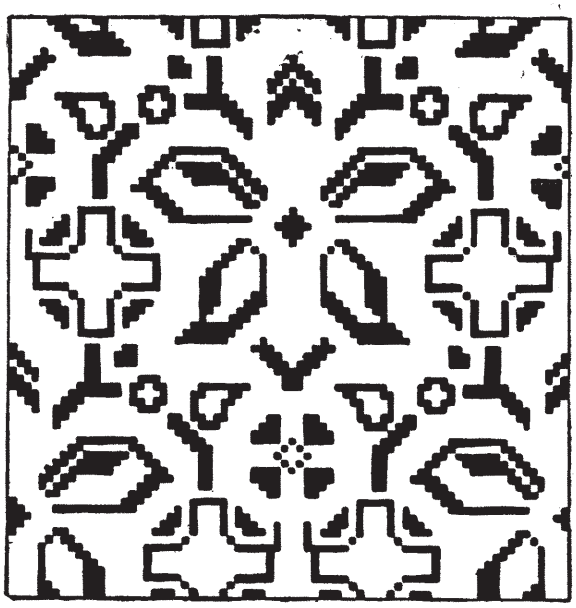

FIG. 130.

works of art. In a previous chapter, it was stated that, for certain purposes, French patterns were not at all practical —too much being attempted, with the result that, when produced in the cloth, much of the beauty had vanished. But in the case of cretonnes, this is not so. When an artist has scarcely a limit placed upon the number of colours he can use, when he can employ 12, 16 or 20 colours, or even more than these, by what is known as super-position, it will

be obvious that, with ability, such as French designers as a rule possess, the production of an artistic pattern for a cretonne becomes a much easier matter than where a design is controlled within the narrow limits of striped warps and changing shuttles. But granting to Frenchmen great skill in this direction, it is open to doubt whether English designers receive sufficient encouragement from the general run of cretonne printers. Representatives of the best English

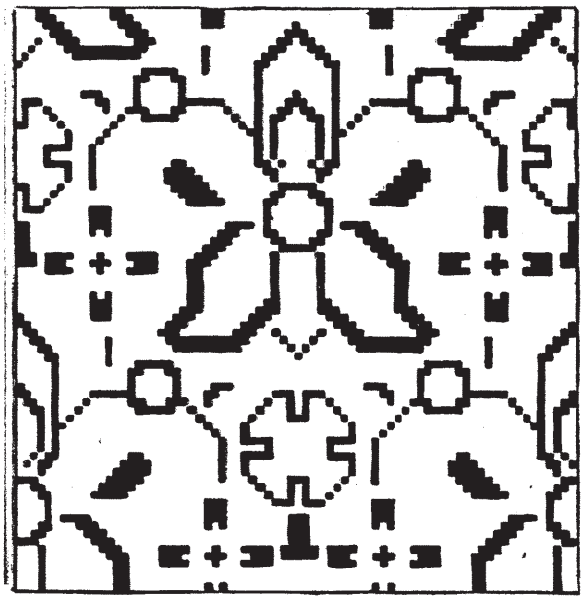

FIG. 131.

houses make periodical visits to Paris, where they spend some time in the studios purchasing designs, and, possibly, in other ways having a happy time. The English designer calls upon these firms and is lucky if he does business. There is little doubt that, with due encouragement, much of the French trade might pass into the hands of English artists at no distant period. The trade in cretonne designs is quite worthy of the attention of home artists, the main considera-

tion being the price paid, which is good. It has been stated over and over again that the charge for one of these patterns runs to a sovereign for each colour used, and, as calico printing machines are made to print up to twenty colours, the charges are easily estimated. In designing for calico prints, it is scarcely necessary to state that the pattern is in all respects an exact facsimile of the finished fabric. For every colour in the design, an engraved roller or cylinder is re-

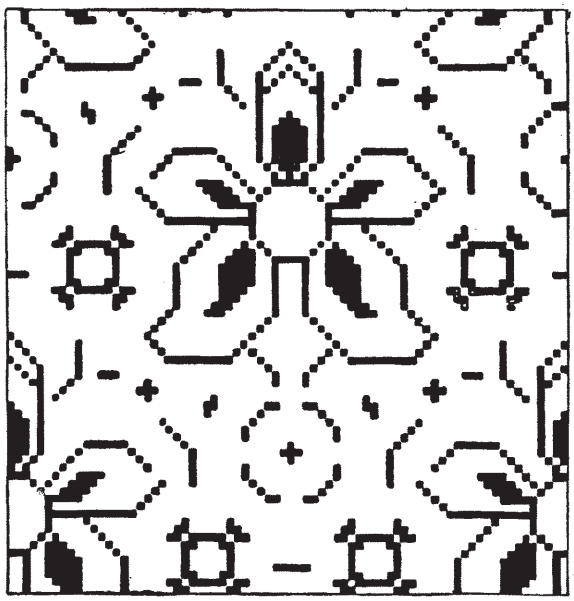

Fig. 132.

quired, and, whilst in block printing the engravings are raised, those used in machine printing are sunk. It would be impossible to give a good example of a cretonne pattern, as these are usually too extensive in repeat and contain too many colours to be reproduced in an engraving. Fig. 129 is a simple pattern in imitation of a woven design, and although this is by no means offered as a fair example, for the reason above stated, it will, nevertheless, serve the purpose of illus-

trating these remarks. The figure represents the finished cretonne. Fig. 130 shows the light grey portion of the pattern, which would be engraved on a roller by itself. Fig. 131 is the dark grey roller, and Fig. 132 represents the black roller. Thus there is a three-colour pattern on a white ground, as seen in Fig. 129. But if such a pattern were actually to be employed, it would be usually printed upon a coloured ground—pale blue, pink, primrose, or some such shade. In order to do this, the ground colour would be "padded," that is to say, it would be printed on a machine with one roller, and the pattern would be printed upon this in suitable colours. In some cases, designers of cretonnes exercise a method whereby more colours are obtained in a design than there are rollers in the machine upon which it is to be printed. This is known as super-position and is easily understood. Suppose in a certain pattern there are five colours—black, red, blue, yellow and orange. This could be printed in a four-colour machine by engraving that portion required in orange both on the yellow and the red rollers, so that, in the actual printing, the red would fall upon the yellow and thus produce orange. But this method requires the exercise of a great amount of experience before it can be successfully employed to any extent, and it is therefore better left alone by the student, or he might end in the production of patterns which would be worthless, from a practical point of view. In designing for cretonnes, nature is more closely followed, both in form and colour, than in any other branch. It is therefore essential that the designer should have a good knowledge of plant form, with undoubted ability in the use of his pencil and brush.

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