

WEAVES FOR BACKED COTTON FABRICS

Serial 510

Edition 1

FILLING-BACKED CLOTHS

1. In many cloths, an extra system of warp or filling is adopted for the purpose of adding weight, bulk, or warmth, in which case the extra yarns are bound to the cloth at regular intervals in such a manner that they do not show at all on the face. Cloths of this description are known as **backed fabrics**. The manufacture of backed cloths is often resorted to for the purpose of making a heavy and yet cheap fabric, since by using a cheaper extra warp or filling a thicker and more substantial cloth can be obtained at a low cost, while at the same time the necessary thickness and weight may be obtained without altering the fineness of the face of the fabric or without changing its appearance.

2. Under the head of backed fabrics are found two subdivisions; namely, cloths backed with *filling* and cloths backed with *warp*. A **filling-backed fabric** may be considered as a single cloth consisting of one warp and one filling, but having bound, or tied, to the back an extra set of filling threads, which are interlaced with the face cloth just enough to keep them attached and prevent the floats on the back of the cloth from being so long that they will be loose. This effect is obtained by raising the warp yarn in such a manner that when the face, or regular, filling is inserted it will interlace with the warp and form the pattern desired.

When, however, the pick of backing filling is placed in the cloth, all the warp ends are raised with the exception of a few that are left down, in order to bind the backing filling to the face cloth. This has the effect of making the picks of backing filling float on the back of the cloth, except where they pass over the few ends that accomplish the *binding*, *tying*, or *stitching*, as it is sometimes called.

The filling in filling-backed fabrics may be arranged 1 pick of face and 1 pick of back, 2 picks of face and 1 pick of back, or 2 picks of face and 2 picks of back. All filling-backed fabrics, since they are composed of two different fillings, require a box loom for their production, unless the same yarn is used for the backing filling as for the face, which is not usually the case. In case the cloth is woven in a loom that has but one box on one of its sides, the filling must be inserted 2 picks of face and 2 picks of back, since in this type of loom it is not possible to put in a single pick of one kind of filling, as the shuttles must always return to the box side before changing. Fabrics in which a single pick of the backing filling is inserted at a time require a loom with more than one box at each side, in which it is possible to change the filling at either side of the loom and consequently on any pick. When, as is often the case, coarser yarns are used for the back than for the face filling, the fabric is often woven with 1 pick of backing and 2 picks of face, and sometimes in extreme cases, 3 or even 4 face picks are used to 1 pick of backing.

Weaves for filling-backed cloths woven with face and backing filling in the proportions given are not always arranged in exactly the order stated. For instance, the weave for a cloth woven with 2 picks of face alternating with 1 pick of backing may be arranged 1 face, 1 back, 1 face. This, of course, makes no actual difference in the cloth and is simply mentioned so that if a weave is noticed in which the first pick is a face pick and the next pick a backing pick, it will not be thought that the weave is necessarily arranged 1 face and 1 back, since the next 2 picks may be face picks, and so on.

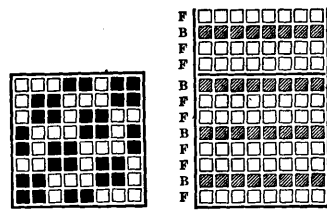
3. When binding the backing filling to a filling-backed cloth, the tying places should be so arranged that the backing picks will be over the face-warp ends between two floats of the face filling. The object of this is to cover the tying places so that they cannot be seen on the face of the cloth, the two floats of the face filling, one float on each side of the backing filling, crowding over the backing pick where it passes over the warp and thus hiding it from view.

In addition to so tying the backing filling that it will not show on the face of the cloth, the tying places should be placed uniformly throughout the fabric so that the cloth will not cockle. The best method of distributing the tying places is in satin order, since by this method not only are they evenly distributed, but all liability of the binding places forming twill lines on the face of the cloth is obviated. Although the method of distributing the tying places in satin order is the most satisfactory, because of the scattered yet uniform disposition of the interlacings of the back filling with the face warp, it often happens that the character of the face weave is such that the tying places cannot be distributed in this manner and at the same time each be located between two flushes of the face filling. When such is the case it is always better to adopt some other system of binding, such as twill, broken crow, etc., rather than run the risk of having the backing yarn show on the face of the goods. With filling-backed fabrics, it is impossible to form any fancy effects on the back of the fabric, and, in fact, this is not desired, since the main object is to obtain a heavy- or medium-weight fabric with a fine face produced with yarns of fairly high counts.

4. When making designs for filling-backed fabrics, the first step is to indicate the face and back picks on the design paper, in order that they may not be mistaken and the weave placed on the wrong pick. This may be accomplished by placing a small mark at one side of the design opposite each backing pick or, preferably, by shading the backing picks with a colored pencil. If the design is to be composed of

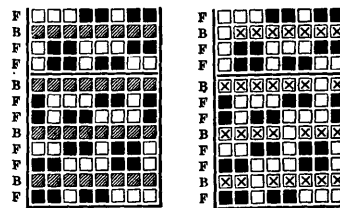
1 pick of face alternating with 1 pick of back it is better to start at the bottom of the design and make the first pick a face pick. The second pick should be made a back pick, by shading, and so on until the required number of picks have been treated in this manner.

5. Suppose that it is desired to back the 8-harness twilled basket weave shown in Fig. 1 with filling, in order to obtain



a heavier fabric, the filling to be inserted 1 pick back, 2 picks face. This will give 4 picks of back and 8 picks of face, or 12 picks altogether, in 1 repeat of the design. When making a filling-backed design of any description, care must be taken to have both the back and face weaves evenly repeated on the back and face picks, respectively. The method of backing must also be considered when determining the size of the completed design. The first operation is to indicate the backing picks, which may be done by shading them, as shown in Fig. 2. The face weave, Fig. 1, is then placed on the face picks in Fig. 2, as indicated in Fig. 3, the backing picks still remaining unmarked.

The next step in the formation of the design is to raise all the warp on the backing picks, except such threads as are required to be left down



for the purpose of binding the backing filling to the body of the cloth. The method of doing this is shown in Fig. 4, the squares marked with crosses indicating where the warp is raised over the backing picks. By referring to this design, it will be noticed that the tying points are distributed in twill order, as this is the best method by which the filling can be bound with this weave, it being obviously impossible to use satin order of tying without repeating the design,

since there are only 4 picks of backing filling. It will be noticed that the binding places, where the backing filling comes to the face of the cloth, are placed on ends over which the face filling passes on the preceding and succeeding pick, thus hiding the pick of backing filling. Thus, for example, on the first and third picks, which are face picks, the filling passes over the same end as does the backing filling on the second pick. This method of raising the picks of backing filling occurs throughout the weave. Each pick

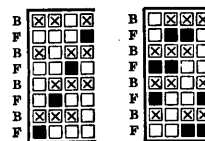


FIG. 5 FIG. 6

of backing filling in this design is tied to the face only once in 8 ends, but it would be possible with this design to bind the backing filling twice in 8 ends, if it were desired to produce a firmer piece of goods.

6. Fig. 5 shows a filling-backed design arranged 1 face and 1 back. In this design, every end of the warp serves at one time in each repeat of the weave to bind the backing filling to the face. Tying on every end of the warp in filling-backed fabrics makes the most perfect cloth, since all the

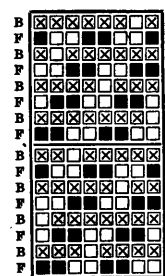


FIG. 7

ends will then take up the same and there will be no liability of the cloth wrinkling. However, this is not always done, especially when a soft cloth is desired. Very often every other end of the warp serves to tie the

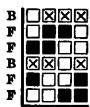


FIG. 8

backing filling, as is the case in Fig. 4. It is not best, however, to tie on every other warp end if a very thick or coarse backing yarn is to be used, since this will surely make a faulty cloth unless two warp beams are

used, which is rarely done with a filling backed fabric. When designing filling-backed cloths, it is always best to use soft-twisted yarn for the backing; hard-twisted or too coarse backing yarn is more or less liable to show on the face of the cloth, especially if fine yarns are used for the face weave.

The cassimere twill $\frac{2}{2}$ is a weave that is often required to be backed with filling, and in Figs. 6, 7, 8, and 9, four standard methods of accomplishing this are shown. The designs in Figs. 6 and 7 are to be preferred, as the backing filling is tied an equal number of times on each end of the warp. Figs. 8 and 9, while not tied perfectly, may be successfully used in cases where the backing filling is not too coarse.

7. In constructing weaves for filling-backed cloths, the best relation of the face weave to the back weave should always be determined. For instance, suppose that a face weave is placed on design paper as shown in Fig. 10. In this case, there is no place where the backing pick can be raised for tying without having the face warp up on one side of the

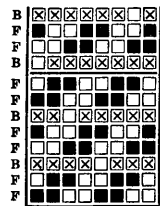


FIG. 9

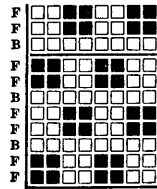


FIG. 10

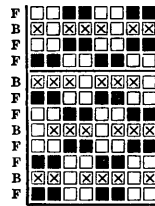


FIG. 11

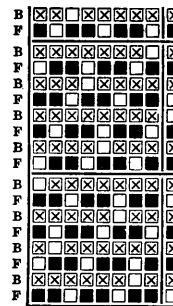


FIG. 12

tying point, which is liable to cause the binding to show on the face of the goods. If, however, the face weave is placed on the design paper as shown in Fig. 11, the backing can readily be tied to the face without any danger of its showing. The backing weave in this design is the broken crow weave.

Weaves that have a large percentage of warp on the face, especially warp-flush twills, are the hardest to back with filling, on account of there not being places in the weave where the tying places may be perfectly covered. When such weaves are backed with filling and it is impossible to have a face-filling flush on each side of the tying place, the design should be so arranged that the flush of face filling next to the tying place shall follow rather than precede the flush of backing filling. When the face flush precedes the

backing flush, the tie will show prominently on the face of the goods; but when the face flush follows the backing flush, the reed, in beating up the filling, will push the face pick over the backing pick. This method is employed in the weave shown in Fig. 12, where the warp-flush prunelle twill has been backed with filling, the backing weave being the 9-end satin weave.

8. In Fig. 13 a 10-harness regular twill $\frac{5}{5}$ is shown, while in Fig. 14 the same twill is shown backed with filling arranged 2 face and 2 back. Particular notice should be taken of the arrangement of the tying places in this design,

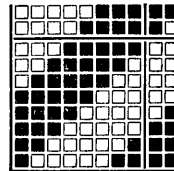


FIG. 13

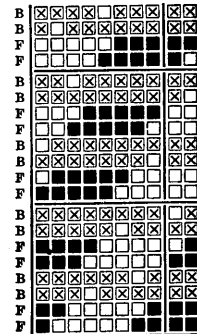


FIG. 14

as well as those in Fig. 15, which represents two repeats of the same twill backed with filling and arranged 2 face and 1 back. In Fig. 15, the backing filling is tied on every other end by two lines of twills, thus tying on all the ends in the warp.

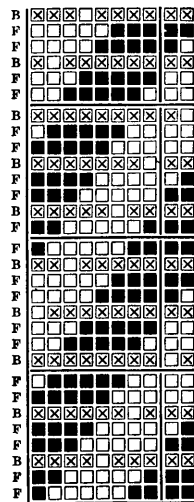


FIG. 15

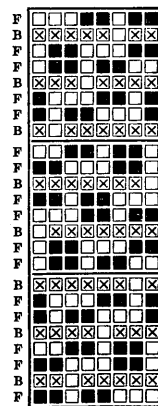


FIG. 16

In order to obtain a good system of tying, it is often necessary to repeat a design. Thus, for instance, if it was desired to use heavy or coarse backing filling in the design shown in Fig. 4, it would be necessary, in order to tie on every end to either bind the filling once in every 4 warp ends or repeat the design and bind as shown in Fig. 16, which shows Fig. 4 repeated in its picks.

When tying a backing filling to a face cloth that has long filling floats, the tying places should always be as near the center of these floats as possible, since, when tied in this manner, the binding points will be more easily covered.

EXAMPLES FOR PRACTICE

1. Make a filling-backed weave arranged 1 face, 1 back, using the $\frac{4}{4}$ regular twill for the face; tie the backing filling perfectly once on each warp end.
2. Make an 8-end filling satin and back it with filling, arranging it 1 face and 1 back.
3. Back the cassimere twill with filling, the weave to be arranged 1 face and 1 back and capable of being woven on 4 harnesses.
4. If a 12-harness regular twill is backed with filling, the weave being arranged 1 face, 1 back, 1 face, on how many ends and picks will the weave be complete?
5. Back the regular twill $\frac{2}{2} \frac{2}{2} \frac{1}{1}$ with filling, arranging the weave 1 face and 1 back. Tie each backing pick once in 10 warp ends.
6. Back the $\frac{2}{1}$ twill, twilled to the left, with the 8-end satin, arranging the weave 1 face and 1 back; have the face-filling flush follow rather than precede the back-filling flush.

WARP-BACKED CLOTHS

9. Warp-backed fabrics are those cloths constructed with one system of filling and one system of warp yarns for forming the face of the goods and also an extra system of warp yarn for making a heavier and warmer fabric than would be possible with a single cloth. These cloths require more harnesses than filling-backed cloths, on account of the extra, or backing, warp, while on the other hand they can be woven in looms with single boxes, since there is only one system of filling to be placed in the cloth. This is a great advantage in those cases where single-box looms are all that can be used. This of course applies only to cloths in which one kind or color of face filling is used, since if more than one kind is used a box loom will be necessary.

It requires only the same amount of time to weave warp-backed fabrics that would be occupied in weaving any cloth with the same number of picks per inch, since there are no extra picks of backing filling to be placed in them. Color can also be applied to the back of warp-backed fabrics to advantage, since stripe effects can be easily made, while with filling-backed cloths only bars across the cloth can be made, which is rarely a satisfactory method of applying color. However, care should be taken in all cases where a different color from that of the face yarn is applied to backed cloths, to have the binding points perfect, so that the color of the backing yarn will not show on the face of the goods.

In weaving the majority of cloths backed with warp two beams are required, since the backing warp is generally of a coarser yarn and has different interlacings with the filling than has the face warp, thus causing a different amount of contraction. It is necessary that the backing yarn in a warp-backed fabric should be harder-twisted than the backing yarn in a filling-backed fabric, since it has to withstand the strain that comes on all warp yarn during weaving. On this account warp-backed fabrics will feel harsher and stiffer than filling-backed fabrics, in which soft-twisted yarns are almost exclusively used for the backing filling.

10. There are several important points that should be noted when considering warp-backed fabrics. (1) The backing-warp must be raised over a pick in every instance where it is desired to bind the backing warp to the face cloth; this, it will be seen, is the reverse of the case with filling-backed fabrics, where a warp end is depressed, in order to bind the cloth. (2) In warp-backed fabrics, the tying places should always be placed between two warp flushes of the face cloth, in order that the tying may be covered and not show on the face of the cloth; if in any case this is impossible, the backing warp may be raised either to the right or left of a face-warp flush. (3) If there are more interlacings of the face warp with the filling than there are of the back warp with the filling in a given number of

picks, or if one series of warp yarn is coarser than the other, it will be necessary to place the two warps on separate beams, since the take-up of the warps in weaving will be different. (4) It is always best to select weaves of regular structure, such as satins, broken crow, etc., for the backing weave, so that each backing end will have the same number of interlacings. (5) If a warp-backed fabric is arranged 1 face and 1 back, the backing warp should never be of heavier yarn than the face, since if this is the case the back will show through on the face of the cloth. (6) If the design is arranged 2 face and 1 back, a proportionately heavier yarn can be used for the back warp.

11. Suppose that it is desired to back the cassimere twill with warp, using the 8-harness satin weave for binding the backing warp to the cloth, the design to be arranged 1 face end and 1 back. As the back weave in this case will require 8 ends, it will be necessary to show two repeats of the face weave in the complete design, the cloth being woven 1 and 1. Therefore, the finished design will be complete on 16 ends and 8 picks. The first operation is to shade or in some other manner to indicate the backing ends, in order that

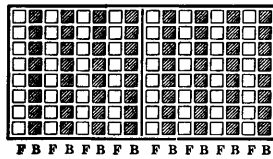


FIG. 17



FIG. 18

they may be distinguished from the face ends. The method of doing this is shown in Fig. 17, where the vertical rows of squares for the backing weave are shaded, while those for the face weave are left blank. Fig. 18 shows the cassimere weave, which is to be used for the face weave in this design, placed on the face ends. The next step is to place the backing weave on the design. As the back weave, which is to be the 8-end satin, must flush on the back of the cloth, each back-warp end should be raised only once in 8 picks and in

satin order. The method of placing the back weave on the design paper is shown in Fig. 19, where the design is shown complete, crosses indicating where the backing warp is raised. In this figure, the method of raising the back warp at the

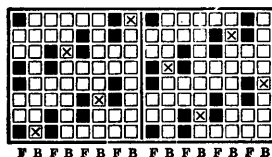


FIG. 19

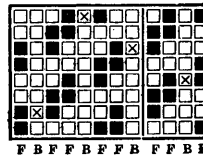


FIG. 20

tying places between two face-warp flushes should be carefully noted, the object of course being to allow the floats of face warp to crowd over and hide the tie.

12. Fig. 20 is another design showing the cassimere twill backed with warp. In this case, however, the ends are arranged 2 face and 1 back and the back warp is bound in left twill order. Fig. 21 shows still another method of back-

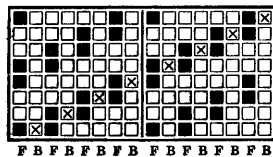


FIG. 21

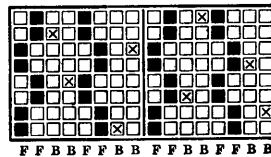


FIG. 22

ing the cassimere twill with warp, each backing warp end being tied once in 8 picks and the ends arranged 1 face and 1 back. Fig. 22 is a design for a basket weave backed with the 8-end satin weave, the ends being arranged 2 face and 2 back.

HARNES AND CHAIN DRAFTS

13. Ordinarily, with filling-backed fabrics, only as many harnesses are required to weave the design as are required for the face weave alone. In the case of warp-backed fabrics, however, as the backing warp always interlaces with the filling differently from the face warp, it must be drawn in

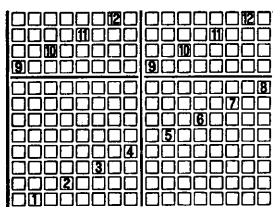
on separate harnesses. A warp-backed weave may be drawn in exactly as a single cloth if it is so desired. In this case, if the weave is arranged 1 face and 1 back, the first harness will be used for the face warp, the second harness will have the backing warp, and so on, each alternate harness being used for the backing harness. This method of drafting is adopted in some instances in connection with warp-backed fabrics of simple design, but in the majority of cases it is desirable to separate the harnesses for the backing warp from those through which the face warp is drawn, since it makes the harness draft much simpler for the weaver, thus rendering the liability of broken back-warp ends being tied in on harnesses through which face ends should be drawn, or vice versa, less probable.

There are two methods of separating the harnesses carrying the backing warp from those carrying the face, the first being that of drawing in the back warp on the back harnesses and the second being that of drawing the back warp through the front harnesses. Both methods are largely in use, but for certain reasons the latter is to be preferred. By drawing the backing ends through the front harnesses they are more readily accessible to the weaver, and as the backing ends are frequently of poorer material and thus break oftener, this is somewhat of an advantage. For the same reason, namely, that the backing ends are often weaker than the face ends, it is also an advantage to place the backing warp on the front harnesses, since the back harnesses are lifted higher during weaving, thus bringing more strain on the yarn drawn through them.

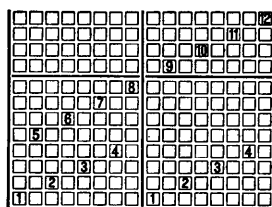
14. The method of making the drafts for a warp-backed fabric will be explained, taking Fig. 19 as an example. The first step is to make the harness draft. In drafting this design, the back warp will be placed on the front harnesses and consequently will be drafted first. Since in this example the backing weave is an 8-harness satin, it will require 8 harnesses. Proceed exactly as in single cloth, taking care, however, as this weave is arranged 1 face and 1 back, to

leave every other vertical row of squares on the design paper for drawing in the face warp. Next make the harness draft for the face weave, placing it above the draft for the back weave but on the vertical rows of squares reserved for the face warp. As the face of Fig. 19 is a 4-harness weave, there will be two repeats of the face drawing-in draft to one repeat of the back. The complete drawing-in draft obtained as explained above is shown in Fig. 23 (a), the back warp being drawn in on the front harnesses.

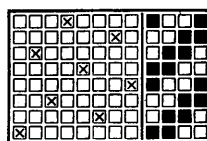
In making the chain draft, the same system as that explained in connection with single cloths is adopted; and



(a)

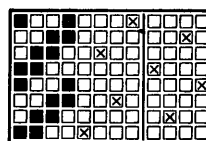


(a)



(b)

FIG. 23



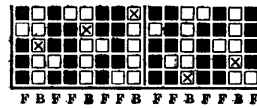
(b)

FIG. 24

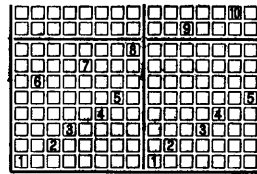
since the warps have been separated and drawn in on separate harnesses, the face and back weaves will be separated in the chain draft. Fig. 23 (b) shows the chain draft for Fig. 19 drawn in according to the harness draft shown in Fig. 23 (a); the crosses show the picks on which the back-warp harnesses are raised.

If it were desired to draft Fig. 19 with the back warp drawn in on the back set of harnesses, the harness draft would be made as shown in Fig. 24 (a). When making the chain draft for Fig. 19 according to the harness draft shown in Fig. 24 (a), the same method is observed as with single cloth, which gives the draft shown in Fig. 24 (b).

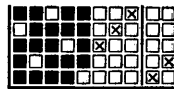
15. When drafting warp-backed weaves that are arranged 2 face and 1 back, the same methods are employed as those previously explained except that 2 face ends are placed consecutively on the drawing-in draft



(a)



(b)



(c)

FIG. 25

in accordance with the design. The method of making this style of drawing-in draft is shown in Fig. 25 (b), which is the drawing-in draft for Fig. 25 (a). The chain draft for Fig. 25 (a) according to the drawing-in draft shown in Fig. 25 (b) is shown in Fig. 25 (c).

EXAMPLES FOR PRACTICE

1. Back the $\frac{4}{2}$ regular twill with warp, arranging the ends 1 face and 1 back; tie each backing end perfectly.
2. Back the $\frac{4}{1} \frac{3}{2}$ regular twill with warp, arranging the ends 1 face and 1 back; tie the backing warp in 12-end satin order.
3. Make a design for a warp-backed fabric having the $\frac{3}{1}$ regular twill on the face and the 8-harness satin weave on the back, arranging the ends 1 face and 1 back; show harness and chain drafts with the back warp drawn in on the front harnesses.
4. Back the $\frac{4}{1}$ regular twill with warp, arranging the ends 1 face, 1 back, 1 face; tie the backing warp in 5-end satin order and show harness and chain drafts with the face warp drawn in on the front harnesses.

PIQUÉS AND BEDFORD CORDS

PIQUÉS

16. Although piqués cannot strictly be classed with either filling-backed or warp-backed cloths, they have features similar in many respects to both types. For example, a piqué cloth has a separate system of filling, known as the **wadding filling**, and in this respect resembles a filling-backed fabric. It also has a separate system of warp ends, in which respect it resembles warp-backed fabrics; but unlike warp-backed fabrics these backing ends in piqués are for the purpose of holding the wadding filling and also to cause ridges across the cloth, not to add any weight or warmth to the fabric.

In making a design for a piqué, the following points should be noted: (1) When placing the weave on design paper, the first step is to indicate the vertical rows of squares on which the face ends are to be placed and also the vertical rows of squares on which the backing ends are to be placed; this can be done by shading the vertical rows of squares representing the backing ends, as was done when making warp-backed designs. (2) The proportion of face ends to back ends in piqués is generally 2 face and 1 back; that is, every third end on the design paper will be a backing end. (3) The picks on which the wadding filling is to be inserted should be indicated in some way. (4) The proportion of face picks to wadding picks depends to a large extent on the kind of yarn to be used for the wadding; in case it is coarser than the yarn for the face picks, the proportion is generally 2 face to 1 wadding, although different proportions are used to suit different requirements. (5) In addition to the face

and wadding picks there are what are known as the **cutting picks**; these are the picks on which the backing ends are brought to the face for the purpose of pulling down the face cloth between the wadding picks, thus forming furrows across the cloth, and should be indicated on the design paper in some manner. (6) The number of picks between the cutting picks is determined by the design to be woven; however, if possible, there should be at least 2 picks of the face weave between the wadding picks and the cutting picks. (7) The face weave is placed on all the face ends, neglecting the backing ends and wadding picks entirely; this is done

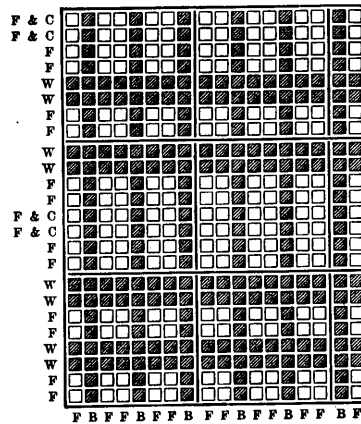


FIG. 26

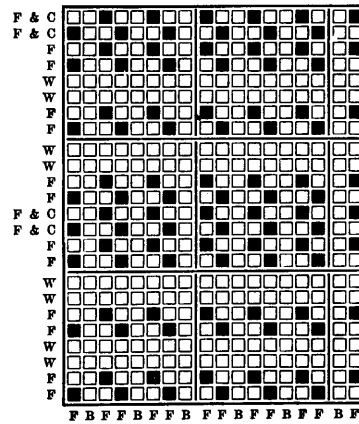


FIG. 27

in exactly the same manner as was explained with warp-backed fabrics. The face weave of piqués is generally the plain weave. (8) All the face ends are raised on the wadding picks. (9) All the backing ends are raised on the cutting picks.

17. Fig. 26 shows the design paper marked out for a piqué design occupying 18 ends and 24 picks. The shaded squares indicate those on which the backing warp and the wadding filling are to be placed. The ends and picks are also marked with the letters *F*, face; *B*, back; *W*, wadding; *F & C*, face and cutting. The next step in the formation

is the placing of the face weave on the squares that are not marked for back ends and wadding picks. Fig. 27 shows the design with the plain weave inserted for the face. The next step is to mark the design to show all the face warp ends raised on the wadding picks, since these are inserted so as to cause the face cloth to be pushed upwards between the cutting picks. The back warp must remain down on the wadding picks to bind the wadding picks to the fabric. The next step is to raise the backing ends on the cutting picks. This requires the backing ends to be raised on the eleventh and twelfth, also the twenty-third and twenty-fourth picks. The effect of this is to bind the backing ends to the fabric and pull down the face cloth to form a hollow place after a certain number of wadding picks have been inserted, in this case 4 picks, and after a certain amount of face cloth has been woven, in this case 6 picks.

Fig. 28 shows the design complete. The first 2 picks are plain, the backing ends being down and consequently not showing on the face at all.

On the third and fourth picks, the wadding is inserted. While this is done all the face warp is raised, as shown by the crosses, and the back warp is down; consequently, the picks of wadding will lie in between these two series of yarns and will not show on the face, but being heavier than the face yarns will tend to raise the cloth constructed by the face weave. The next 4 picks are repetitions of the first 4 picks, and then come 2 more face picks. On the eleventh and twelfth picks, in addition to the plain weave of the face cloth, the backing warp is brought to the surface, as shown by the dots. These are the cutting picks. In weaving a piqué design, the backing warp is generally placed in a separate

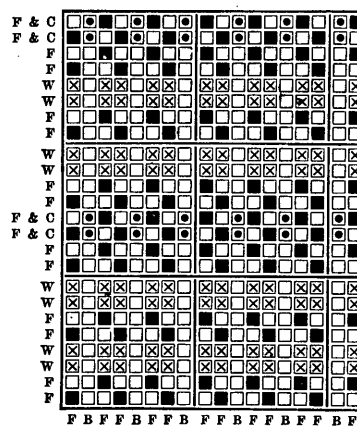


FIG. 28

beam that is weighted heavier than that containing the face warp, thus causing the backing warp to be under greater tension. When this backing warp is brought to the face, as it is under greater tension, it will of course tend to draw down the face yarns, thus causing a furrow between those parts of the cloth that contain the wadding picks.

The next 12 picks are but repetitions of the first 12 picks and consequently need no further explanation. Fig. 28 shows 6 repeats of the ends and 2 repeats of the picks, the design being complete on 3 ends and 12 picks. The design has been extended in this figure in order to show more clearly the construction of these weaves.

18. When studying the construction of a piqué design, it should be understood that the wadding picks do not show on the face of the cloth at any point, but simply lie between



FIG. 29

the face and back ends. Again, the backing ends do not show on the face of the cloth at all, except where they are raised for the purpose of pulling down the face cloth. Consequently, the face of a cloth woven with a design such as the one shown in Fig. 28 would be similar to plain cloth, with the exception of the raising of the cloth in ridges through the effect of the wadding picks, and also the floating of the back warp over 2 picks in certain parts of the cloth.

The position that the different ends and picks occupy when woven into cloth with this design is more clearly illustrated in Fig. 29, where a sectional view of 3 ends and 24 picks is shown. The heavy, dark line represents the backing end, while the other two lines running in the same direction show 2 face ends. The larger cross-sections marked *w* show the wadding picks, while the smaller cross-sections show the face picks. By referring to this figure it will be seen how the face picks interweaving with the face warp crowd over

the wadding picks, thus hiding them. It will also be seen how the backing end rising over the interlacings of the face filling and face warp draws them down, thus forming a furrow across the cloth.

DISSECTING A PIQUÉ

19. When dissecting fabrics of this type, the following points will be found to be of considerable assistance: (1) Find the proportion of face ends to the back ends by counting on the back of the cloth the number of backing ends per inch and then counting on the face of the cloth the number of face ends per inch. Suppose, for example, that there are found to be 30 backing ends and 60 face ends in an inch, then there are 2 face ends to every backing end and the pickout should be marked out in this manner. (2) Find the proportion of face picks to wadding picks. (3) Find the weave for the face cloth and place it on all the face ends, omitting the wadding picks. (4) Find the order of raising the back warp into the face; this can readily be done by taking a small part of the sample the wrong side up and pulling out the ends, one by one, instead of the picks, noting on the design paper whenever a back end is raised into the face cloth. (5) Raise all the face ends on the wadding picks.

20. In making the harness and chain drafts for a piqué design, the backing and face warps are drawn through separate sets of harnesses, as explained when dealing with cloths backed with warp. The backing warp is in most cases drawn through the back harnesses and the face warp through the front harnesses.

When piqué cloths are arranged 2 face to 1 back they are as a rule reeded 3 in a dent; that is, 2 face ends and 1 back end are drawn in each dent of the reed in such a manner that there will be 1 face end on each side of the back end in the dent. Piqués are high-pick cloths, the number of picks per inch being largely in excess of the number of ends per inch.

BEDFORD CORDS

21. Although Bedford cords have the same general appearance as piqués with the exception that the furrows run lengthwise of the cloth instead of across the cloth, their construction will be found to differ to a very large extent. Thus, in Bedford cords there will be found to be wadding ends instead of wadding picks. These wadding ends are held in the cloth by means of the same picks that form the face of the cloth instead of using backing picks, while 2 ends

working plain throughout the entire length of the cloth form the furrow.

Fig. 30 (a) shows one repeat of the ends and two repeats of the picks of a Bedford-cord design; the furrows lengthwise of the cloth, which are characteristic of Bedford cords, are formed by the first and second, also the eleventh and twelfth ends, which work plain throughout the cloth, while

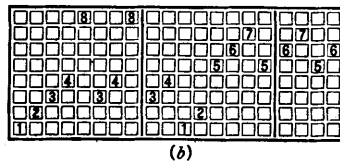
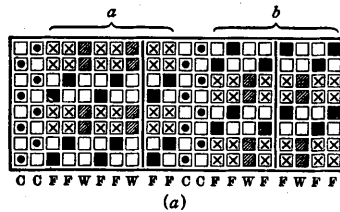


FIG. 30

the weaves between them form the ridges. The parts of the design between the ends working plain are marked *a* and *b*. In section (a) the fifth and eighth ends, marked *W*, are the wadding ends. Dealing now only with the third, fourth, sixth, seventh, ninth, and tenth ends it will be noticed that they work plain on the first and second picks and are all raised on the third and fourth picks. This being one repeat of the design in its picks, the others are only repetitions of these first 4 picks. The effect of raising the ends in this manner is to cause the second and fifth picks and also the first and sixth to come together and thus produce a plain weave on the face of the cloth. It will also be noticed that on those picks on which all these ends are raised the wadding ends are also raised. The filling floating at the back will in this manner bind the wadding ends between the face

cloth and these picks of filling, not allowing the wadding ends to show on the face and yet holding them securely in position.

Referring now to section (*b*), it will be seen that this corresponds to section (*a*) with the exception that the position of the picks is reversed; that is, while in section (*a*) the face ends are working plain on the first and second picks, in section (*b*) they are all raised; and while in section (*a*) all the face ends are raised on the third and fourth picks, in section (*b*) they are working plain. Thus, the same picks, that are weaving plain to form the face cloth in section (*a*) are floating at the back to hold the wadding ends in section (*b*); and the reverse is also true.

The first, second, eleventh, and twelfth ends, which work plain throughout the cloth, will work tighter than the rest of the ends in the warp, and make the furrows between those parts of the cloth that contain the wadding ends.

DISSECTING A BEDFORD CORD

22. In dissecting a cloth of this character, the following points will be found of assistance: (1) Notice the ends that work plain throughout the weave and that form the furrows running lengthwise of the cloth; these are the ends that correspond to the first, second, eleventh, and twelfth ends in Fig. 30 (*a*). (2) Count the ends working plain on the face of the cloth in the raised portion between the furrows. It will be seen that in Fig. 30 (*a*) there are 6 ends. Then by looking at the back of the cloth the number of wadding ends can readily be determined, thus learning the proportion of face ends to wadding ends. (3) Arrange the ends on the design paper after the manner shown in Fig. 30 (*a*), taking care to have the wadding ends come between the face ends and also to have the face ends that are working plain in one section raised in the next, and vice versa.

It is not possible to pick out one of these cloths in the same manner as is done with cloths containing but one system of warp and one system of filling, but by having a

good general knowledge of their construction it is possible to learn the weave of any sample by simply studying the cloth by means of a pick glass. Bedford cords are high-sley goods and the number of ends per inch is always in excess of the number of picks per inch.

23. When making the drawing-in draft, the wadding ends are generally drawn through the back harnesses, while the face ends are drawn through the front harnesses. In reeding these cloths, each wadding end should be drawn into a dent with 2 or more face ends if possible. Fig. 30 (b) shows a drawing-in draft for Fig. 30 (a). In reeding the ends when drawn through the harnesses in this manner the best plan would be to draw 5 ends in a dent, commencing with the second end; that is, the second, third, fourth, fifth, and sixth ends would occupy one dent; the seventh, eighth, ninth, tenth, and eleventh, another; the twelfth, thirteenth, fourteenth, fifteenth, and sixteenth, another; and the seventeenth, eighteenth, nineteenth, twentieth, and first, another. This will bring each wadding end in a dent between 2 or more face ends.