

36, the unit of the figure stripe. This will give us  $(18 + 6 =)$  24 harnesses for the drawing-in draft to use.

Two figure warp-threads have been drawn on one harness, a feature which shows an enlarging (doubling) of the original design. The same principle can be applied (with proper modifications) to any one of the figure stripes given previously in this article, to produce larger, *i. e.*, more prominent effects.

(To be continued.)

### HOW MITCHELINE QUILTS ARE MADE.

By *W. Watson.*

The Mitcheline quilt structure is a double cloth in which two plain fabrics are so firmly bound together as to be inseparable. The design is due to the interchange of the two fabrics, and the cloth is equally compact and solid in every part. A representation of a cloth is given in Fig. 1, while Fig. 2 shows a portion of the point paper design to correspond.

The following are the weaving particulars of a medium quality of cloth:

*Warp:* 2 ends of 18's cotton to alternate with 1 end of 32's cotton.

*Filling:* 2 picks of 40's cotton to alternate with 2 picks of 8's soft spun cotton.

64 ends and 96 picks per inch.

The 18's warp contracts about 2 per cent, and the 32's warp (which is placed on a separate beam) from 20 to 25 per cent, while the shrinkage in width varies from 10 to 15 per cent.

The 18's warp and the 40's filling form the plain ground fabric, and the 32's warp and the 8's filling the plain figuring fabric, on the right side of the cloth, and vice versa on the reverse side. The 32's



Fig. 1

warp of the plain figuring fabric is really a binding warp which interweaves regularly with the 40's filling of the plain ground fabric, and thus binds the two

fabrics solidly together. The cloths are mostly woven in the grey, and then bleached, but sometimes the ends which form the ground (the 18's) are all

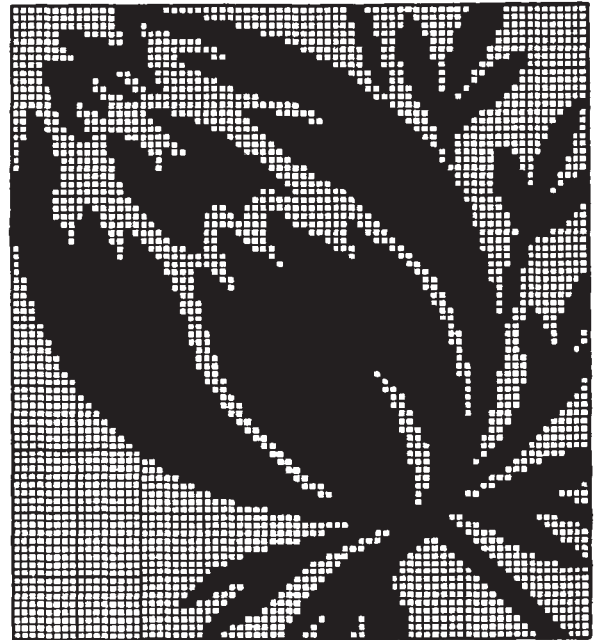


Fig. 2

colored, or are arranged in stripes of white and color; a white figure then being formed upon a colored or a striped foundation.

#### Method of Loom Mounting.

The same as in weaving Marseilles quilts, a combination of two working comber-boards and two harness-shafts are employed. Diagram *A* in Fig. 3 illustrates the principle of the tie-up of the Jacquard harness, while diagram *B* in Fig. 3 shows the system of drafting.

Two-thirds of the warp-threads (the 18's) are drawn upon the Jacquard harness, and one-third (the 32's) upon the two shaft harnesses, as shown in diagram *B*. Two harness cords, however, are connected to each neck-cord (as shown also at *A*); one of these harness cords passes through the front comber-board, the other through the back board, so that including a thread drawn in one of the harness shafts, each neck-cord and its corresponding hook in the Jacquard machine, is equivalent to a group of three threads.

By raising a hook, two harness threads—one on each side of a thread drawn in a shaft harness are lifted together, but by raising the comber-boards separately, the two Jacquard harness threads, by means of knots tied to them, resting upon the boards, are operated independent of each other.

#### Method of Designing and Structure of Cloth.

Taking the arrangement of the filling as 2 picks fine (40's) and 2 picks coarse (8's) the order of shedding then is as follows: The comber-boards lift in alternate order on the two fine picks, and form the plain weave, represented by *dots* in the diagrams *C* and *D* in Fig. 3. The harness shafts lift in 2-and-2 order alternately and produce the weave shown by *crosses* in diagrams *C* and *D* in Fig. 3. The Jacquard is raised on the first coarse pick and remains up on the second coarse pick and lifts the harness threads

in pairs (one on each side of harness shaft thread) according to the design required, so that the weave *C* is formed in one portion and weave *D* in another portion of the cloth. The figure is formed chiefly by the floats of the thick filling, and in weaving the cloth right side up in the loom, the marks in the design given in Fig. 2 indicate warp-threads down, or filling up. Taking the marks in diagrams *C* and *D* Fig. 3, also to indicate filling, the former shows the ground weave and the latter the figure weave on the right side of the cloth; but in weaving the cloth wrong side up the marks represent warp, and diagram *C* forms then the figure weave and diagram *D* the ground weave.

*Empty* or *Full* squares in design Fig. 2 are cut according to whether the cloth is woven right or wrong side up. It will be seen from diagrams *C* and *D* that the harness shafts are raised alternately on the thick picks (the third and fourth in each group) in order to form the plain weave of the figuring fabric. The regular binding of the two cloths together is effected by the alternate lifting of the harness shafts on the fine picks (instead of both being raised, or both left down, which would be necessary in order to form two separate fabrics). On the third and fourth picks the Jacquard is raised while the same card presses; then the Jacquard is lowered between the fourth pick and the first pick of the next group of four, and the card cylinder is turned in readiness for the following pair of thick picks.

Variations cannot be produced in a design by altering the structure of the cloth, but a subsidiary effect can be woven by painting upon alternate horizontal spaces only, as shown on the left of the small plan given at diagram *E* in Fig. 4, or the marks of the design may be arranged so as to form a special effect, as indicated on the right of diagram *E*. The complete weave, to correspond with the picks 1 to 10 of *E*, is given at diagram *F* in Fig. 4. Taking

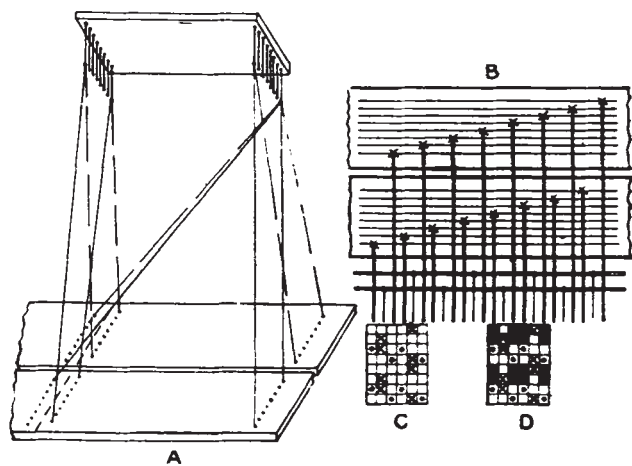


Fig. 3

the marks to indicate filling, the drawing *G* shows how the picks 1 and 4 of diagram *F* interlace with the ends 1 to 24, while diagram *H* represents the interlacing of the last three ends of diagram *F* with the picks 1 to 16. In diagrams *G* and *H* the thick picks and fine ends, which form the figuring cloth, are shown in solid black, in order that they may be distinguished, and connecting lines are indicated to enable the threads to be compared.

The counts of design paper for a cloth counting 72 ends and 96 picks per inch is in the proportion of  $(72 \div 3)$  to  $(96 \div 4) = 8 \times 8$ , or  $12 \times 12$ .

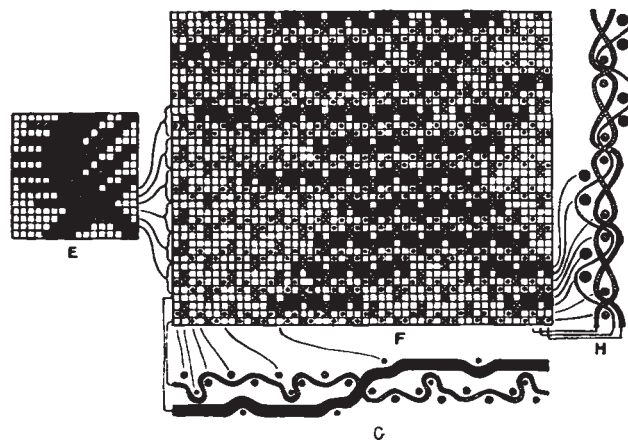


Fig. 4

On account of each horizontal space representing two thick picks, the figure in coarse cloths has a steppy outline, and in order to avoid this, sometimes a separate card is employed for each thick pick, the operation of the Jacquard and the card cylinder being then modified to correspond.

### HOW DIAGONALS ARE MADE.

There are different ways of constructing diagonals practiced by textile designers, the one giving the most satisfactory results being the drafting of diagonals from one of our regular 45 deg. twills by means of warp-drafting, and which method we will take for the subject of this article.

The rule observed for constructing diagonals in this way from our regular twills is thus: Draft (use) only every other warp-thread of your regular twill for your diagonal.

By this is meant that, for instance, in connection with a 10-harness regular twill for foundation, warp-threads 1, 3, 5, 7 and 9 are the ones only used in the formation of the diagonal, omitting the other warp-threads (not quoted) of the regular twill.

This then explains to us that a diagonal constructed from a regular twill repeating on an even number of warp-threads will call for one-half the number of threads only for its mate diagonal; a 12-harness twill will thus result in a 6-harness diagonal; an 8-harness regular twill will produce a diagonal repeating on 4 warp-threads etc.

In the same way as we used all the uneven warp-threads of the regular twill for its mate diagonal, we might have used every even number warp-thread only, omitting all others, obtaining in this way the same diagonal as before.

For dealing with regular twills of an uneven number of harnesses for their repeat for foundation weave, the number of harnesses required for their respective mate diagonals will not be reduced, it will remain the same. For instance, a 13-harness regular twill will produce a diagonal repeating on 13 warp-threads, again, a regular twill repeating on 9 warp-threads will produce a mate diagonal repeating on 9-harness or warp-threads, etc., etc.

This is caused for the reason that after drafting