

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

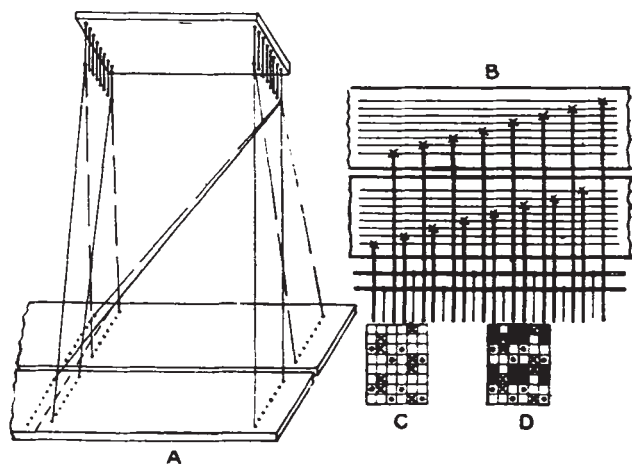


Fig. 3

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 12×12 .

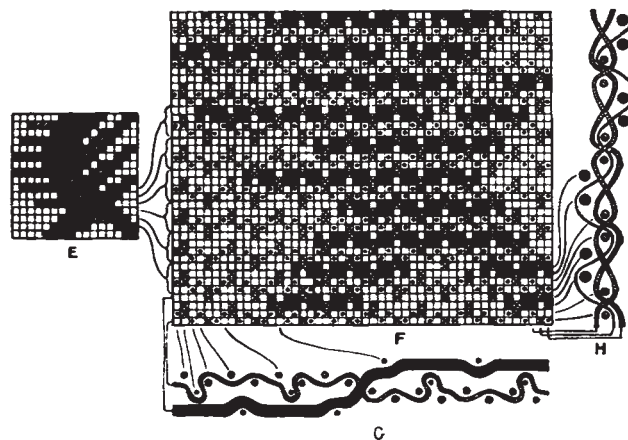


Fig. 4

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.

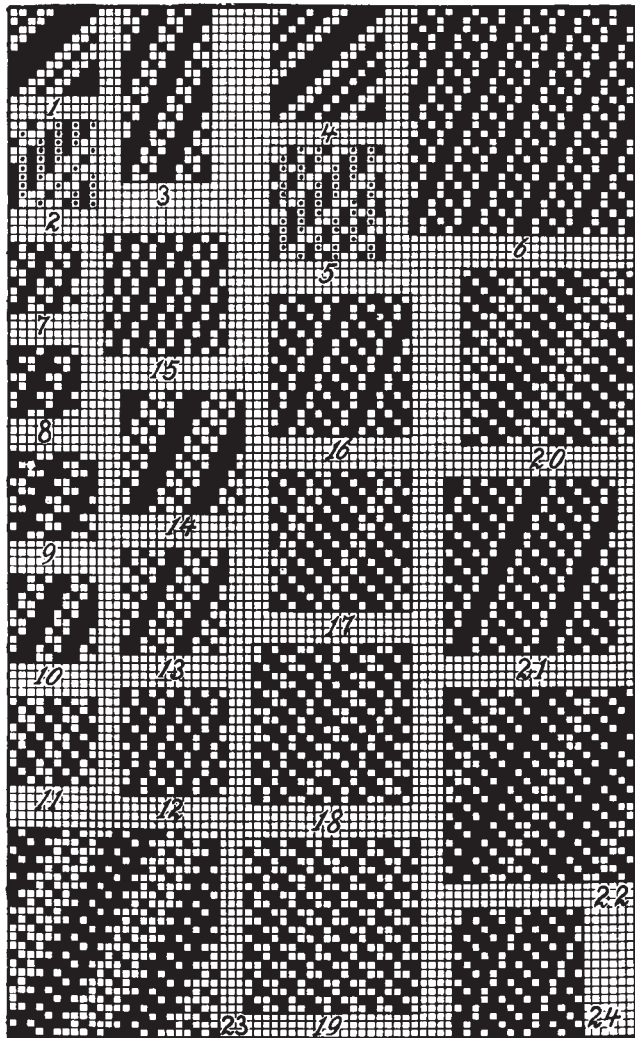
This then explains to us that a diagonal constructed from a regular twill repeating on an even number of warp-threads will call for one-half the number of threads only for its mate diagonal; a 12-harness twill will thus result in a 6-harness diagonal; an 8-harness regular twill will produce a diagonal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

from the regular twill, first every uneven warp-thread for the diagonal, we then in turn have to draft every even warp-thread of the foundation twill before the repeat for the mate diagonal is obtained; or what would mean the same, we have to use two repeats with ways of the regular twill repeating on an uneven number of warp-threads for the foundation for its mate diagonal, using then every other warp-thread throughout said two repeats of the foundation weave.



For example: 7-harness regular twill calls for a 7-harness mate diagonal, the latter being obtained by the following drafting: 1, 3, 5, 7, 9 or 2, 4, 6, 8 or 1, or repeat.

In order to illustrate the construction of these diagonals, the accompanying plate of 24 weaves and diagrams has been given, *viz*:

Weave Fig. 1 is a 10-harness regular twill one complete repeat of the weave being given, shown in *full* type.

Diagram 2 is the same weave as Fig. 1 shown in two kinds of type, every uneven warp-thread being shown by *full* type and every even warp-thread being shown by *dot* type.

Using only *full* type of Diagram 2, *i. e.*, missing all warp-threads shown in *dot* type, produces diagonal given in Fig. 3, the same repeating on 5 warp-threads and 10 picks. The same diagonal would have been the result if using all the warp-threads shown in *dot* type

in Diagram 2, missing all the warp-threads shown in *full* type.

This example clearly explains the previously made assertion that regular twills repeating on an even number of warp-threads reduce to one-half the number of warp-threads in the repeat, for its mate diagonal.

Fig. 4 shows us a 13-harness regular twill shown in *full* type; Diagram 5 shows the same weave in two kinds of type, every alternate warp-thread being shown either in *full* or in *dot* type.

Using every other warp-thread of two repeats width ways of weave Fig. 4, or what means the same, using every warp-thread shown by *full* type in Diagram 5 for the first part of the draw, using then warp-threads shown by *dot* type for the continuation of the draw, in turn produces the diagonal shown in Fig. 6, repeating on 13 warp-threads and 13 picks.

Weave Fig. 7 is a diagonal repeating on 4 warp-threads and 8 picks, which has for its foundation the regular 8-harness twill, taking any one of the warp-threads in the diagonal for the foundation of the first warp-thread of the twill.

Weave Fig. 8 is another diagonal repeating on 4 warp-threads and 8 picks.

Weaves Fig. 9, 10, and 11 are three diagonals, repeating on 5 warp-threads and 10 picks, either one having for its foundation its mate 10-harness regular twill, the foundation of which is obtained by reading off the interlacing of any one of the warp-threads in the repeat of the diagonal.

Weaves Figs. 12 and 13 are two diagonals repeating on 6 warp-threads and 12 picks; weaves Figs. 14 and 15 are two diagonals repeating on 7 warp-threads and 14 picks; weaves Figs. 16 and 17 are two diagonals repeating on 8 warp-threads and 16 picks; weave Fig. 18 is a diagonal repeating on 9 warp-threads and 18 picks; weaves Figs. 19, 20 and 21 are three specimens of diagonals repeating on 10 warp-threads and 20 picks; Fig. 22 is a diagonal repeating on 11 warp-threads and 22 picks; Fig. 23 is a diagonal repeating on 12 warp-threads and 24 picks, and weave Fig. 24 a diagonal repeating on 15 warp-threads and 15 picks.

In connection with diagonals Figs. 7 to 24, such as have for their foundation regular twills of an uneven repeat, only one repeat of the diagonal has been given, whereas in connection with diagonals having regular twills of an even repeat for their foundation, two repeats of the diagonal have been given.

Dye Vessels for Woolens.

From a general consideration of the subject as to the best material to be employed in the making of dyeing vessels for the treatment of woolen piece-goods, selected wood undoubtedly comes first. Our pitch-pine is the most serviceable variety. It has been suggested that vessels of enameled iron would be very serviceable, perhaps because these could be cleaned out more easily than those of wood, but the idea does not appear to have secured any but scarce adoption. Putting aside the question of initial cost, and the liability of the enamel to crack, count must be taken of the loss of heat involved in using these vessels, and this forms a great drawback. In circumstances where the cleaning question is one of importance it is far more satisfactory to use wooden vessels and to line them carefully with sheet copper. To complete the attainment of cleanliness it becomes advisable to provide also rollers and a winch not of wood, but of porcelain.