warp-thread is only stitched once in the repeat of the weave, using every other pick for this purpose. Repeat: 12 warp-threads and 8 picks.

Fig. 47 is a 10 x 10 granite; Fig. 48 shows its arrangement for a back warp. Two interlacings of the back warp-threads in each 10 picks are shown, one in *cross* type, the other in *dot* type. Either one, or both places of stitching may be used, in the latter instance using every pick for stitching, in the first instance using every other pick only. Repeat: 15 warp-threads and 10 picks.

(*C*) COMBINATION OF
2 FACE : 1 BACK : 1 FACE : 1 BACK.

Two examples are given to explain this combination of face and back warp.

Fig. 49 is a 6-harness granite, shown arranged for a back warp in Fig. 50. Repeat: 10 warp-threads and 6 picks.

Fig. 51 is a 15 x 15 granite, shown arranged for a back warp in Fig. 52. On account of the large float (over 15 picks) we stitched every back warp-thread twice in 15 picks. Repeat 25 warp-threads and 15 picks.

LAPPET WEAVING.

(*Continued from page 89.*)

Figs. 6 and 7 are reproductions of two *presser* wheel types of ornament. The former repeats on 68 threads and 80 picks, and is produced by two frames working continuously—two colors of whip-thread being used. The pattern of the cloth illustrated in Fig. 7 is complete on 32 threads and 30 picks, and is also

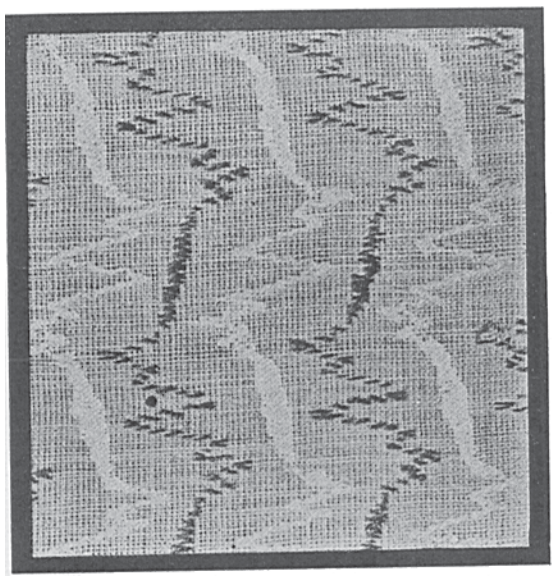

Fig. 6

produced by two frames which work continuously; at intervals, however, the needles of both frames overlap for a short distance in order to produce the heavy or thick portion of the net work.

Figs. 8 and 9 show special types of lappet ornament. The original of Fig. 8 is a 3-frame presser wheel production, one frame being used for the central zigzag stripe, which is of the usual character of lappet ornament. For the open-work side stripes, however, two frames are necessary, both of which rise for 6 picks in succession without moving to right or to left, and thus place the whip-threads on the face

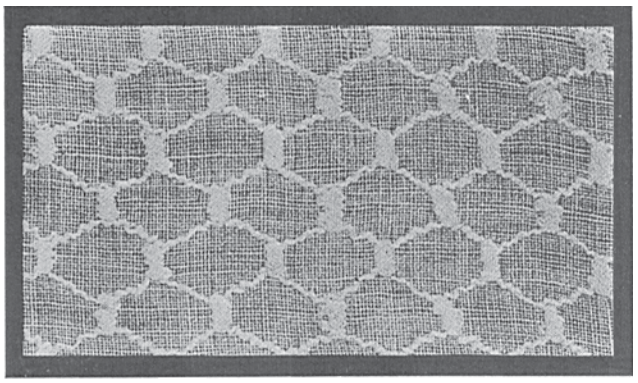

Fig. 7

side over the filling; but between the 6th and 7th picks they change positions, crossing their respective whip-threads to right and to left, under the same 8 threads, and then rise again for 6 successive picks in the new position. Between the 12th and 13th picks they again rise, or rather return, to the original lateral position. The general effect is enhanced, and a leno-like effect obtained by the omission of warp-threads from several splits of the reed at the proper points. The complete pattern repeats on 48 picks, and the open-work part on 12 picks. Although two frames are necessary for the latter effect, it will be seen that only one whip roll will be required for both, since the movement of both whip-threads is exactly alike in extent, although different in direction.

Fig. 9 illustrates a corded stripe effect, complete on 54 picks, and produced with difficulty, but perhaps most readily, by a common wheel arranged for two frames. One frame with shortened teeth, or else a plate with holes, carries the cord threads—3 strands of 2-fold cotton—close up to the under side of the cloth; the other frame carries the real lappet or stitching thread, which is lifted over the filling every pick as usual, but which also passes underneath the cord thread in the interval, and thus binds the latter to the fabric. Two successive stitches are made in the same split of the reed—one on each side of the cord thread—and to enable this to be done, the frame or plate, which controls these threads, is moved alternately to right and to left of this position by the usual common wheel movement, as well as being moved gradually from position to position in order to form the wave-like line. It will be apparent that very accurate spacing of the needles, and careful adjusting of the positions of the respective frames, are necessary in a case like this if satisfactory work is to be obtained. Indeed, in all cases care is essential for it will be seen from the photographical reproduction of the cloth in Fig. 1 that the outline of the whip figure is not nearly so accurate as that in Fig. 2.

Presser wheels are constructed on the same gen-

eral lines as common wheels, with the following differences in detail: radial lines must be drawn and a tooth formed for every pick in the repeat of the

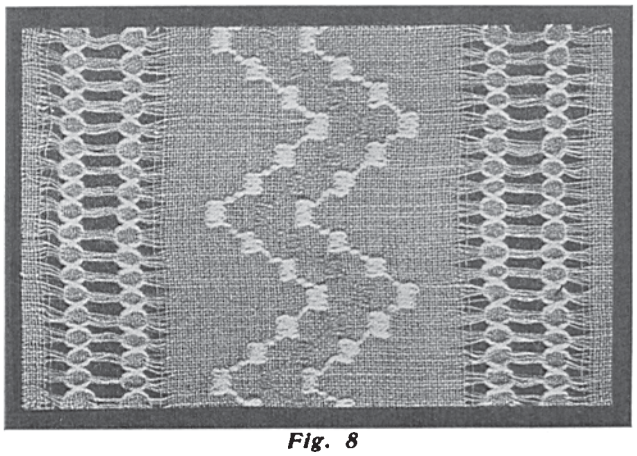

Fig. 8

weave, concentric lines may again indicate splits or pairs of splits in the reed, according as the sett of the latter is coarse or fine. The full movement of the frame, pick by pick, must be indicated on the outside

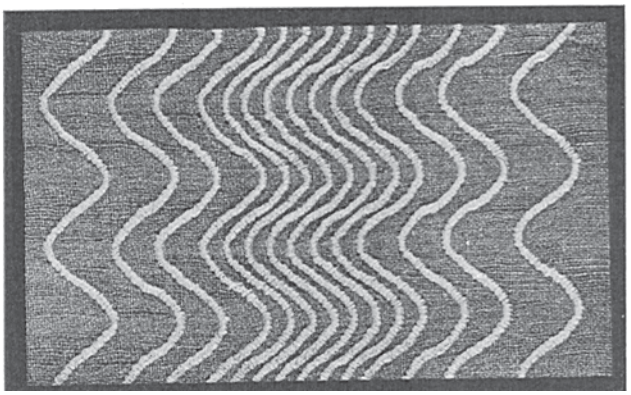

Fig. 9

of the groove to be formed in the wheel—the inside contour being of little importance provided sufficient space is left for the free movement of the peck.

DEFECTIVE SHEDDING.*

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Reediness in Cloth.

There are certain fabrics which require to have all traces of reed marks entirely obliterated, the object being to give to the fabric an appearance of fullness and density, or what is usually spoken of as *cover*. As examples of this, plain calico, also union cloths in which the warp is cotton and filling woolen, worsted, or angola, may be cited. Usually, the latter class of cloth is woven with the plain weave, with such a number of picks per inch and the filling of such a count that the cotton warp will be completely hidden by the filling. These results are best obtained by *troughing the shed,* though this practice is to deviate somewhat from the formation of a perfect shed.

A perfectly-formed shed is understood to be one in which the top and bottom shed lines of warp are equal distances from the warp line. The latter is the position taken up by a tensioned cord, passed over the back roller and the breast beam. It is evident, that when the top and bottom shed lines are drawn equal distances from the warp line, the tension on each will be the same. Under such conditions, the threads will work in groups as they are passed through the reed, showing the position of the reed marks quite distinctly, and giving to the piece a raw and lean appearance. Troughing the shed consists in adjusting the position of the back roller, and breast beam, chiefly by raising the back roller, so that the bottom shed line of warp is depressed more below the warp line than the top shed line is raised above it. The result is that greater tension is applied to the threads when at the bottom shed line than when forming the top shed, as when in this position they are practically free from tension.

When troughing the shed is resorted to, for the purpose of obtaining cover on a cloth, the alternate tightening and slackening of the threads, as they form part of the bottom and top shed lines, imparts to them a reciprocating motion. This movement of the warp-threads, as they are intersected with the filling, will naturally cause them to work towards the point of least resistance, *i. e.,* to the centre of the long filling float caused by the reed wire. In addition to the threads being more equally distributed, the shrinkage of the warp and the filling will be more uniform, giving better cover to the fabric.

The operation of troughing the shed has also a decided effect on the twill of a cloth. Observations on the results of experiments made in this direction, also from practical experience, prove that the twill is more pronounced in a cloth woven with a troughed shed. In a cloth woven without the shed being troughed, the weave being the 4-harness even sided twill, the warp black cotton, reed 12 with 4 ends per dent, and the filling white worsted, every fourth pick had the appearance of intersecting $\frac{1}{1}$ instead of $\frac{2}{2}$ This was entirely due to the reed splitting the first and fourth threads, and thus the continuity of the twill appeared broken. This defect entirely disappeared after the shed was troughed.

Another instance occurred in which the twill was more pronounced in the first part of the piece than in the latter part. The piece had been woven in a loom in which the back roller bracket was provided with two bearings, a higher and a lower, into either of which the back roller could be placed, according to the filling requirements. It was proved that the first part of the piece had been woven with the roller in the top bearing, giving a troughed shed; for the purpose of weighting the warp, the roller was then transferred into the low bearing, which had the effect of tightening the top shed line. The piece being fin-

* From "Tappet and Dobby Looms:" just published, Emmott & Co., Ltd., Manchester and London.