

for waste in warp at beaming and waving and 4 per cent for waste of filling on the looms, we find:

$$\text{Face warp: } \frac{2630 \times 100 \times 90 \times 128 \times 100}{840 \times 36 \times 100 \times 98} = 1022 \text{ lbs}$$

$$\text{Back warp: } \frac{1315 \times 100 \times 90 \times 103 \times 100}{840 \times 32 \times 100 \times 98} = 463 \text{ lbs}$$

$$\text{Filling: } \frac{43.8 \times 120 \times 100 \times 90 \times 100}{840 \times 20 \times 96} = 2933 \text{ lbs}$$

Amount of material required..... = 4418 lbs

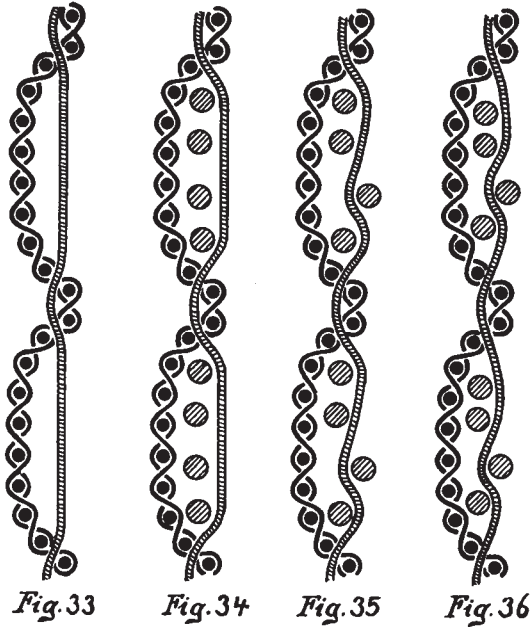


Fig. 24 shows us the same welt weave as given in the previous example arranged for looms with one box on one side; repeat 3 by 10.

Fig. 25 is the mate weave to Fig. 23 showing in this instance the back warp (see shaded type) stitched to the wadding pick once in one repeat of the weave. In the same manner weave Fig. 26 is related to weave Fig. 24 previously explained.

Diagram Fig. 27 and weaves Fig. 28 to and inclusive 32 show the welt weave, with 10 picks to the round for its face, adding in this instance 4 wadding picks to the repeat in connection with the last four examples of weaves. Type for indicating the different kinds of warp and filling used is the same as in the previously given examples, hence no special reference necessary.

In order to clearly illustrate the method of interlacing of these welt weaves to the reader, diagrams of fabric sections produced with weaves previously illustrated and explained are given, and of which:

Diagram Fig. 33 shows in section a fabric interlaced with weave Fig. 28.

In the same manner:

Diagram Fig. 34 refers to weave Fig. 29  
 " " 35 " " " " 31  
 " " 36 " " " " 32

Notice the difference in the position of the wadding picks between diagrams Fig. 35 and 36; although the same interlacing, they are more evenly distributed in the first one.

Every diagram is shown considering the fabric cut in the direction of the warp in order to show up the indented and the raised effects as are produced in the fabric by the nature of the weave and by the method of mounting (let-off) of the loom. Two repeats of the filling pattern are given in each diagram.

Full lines indicate face warp  
 Shaded " " back "  
 Full circles " face filling  
 Shaded " " wadding picks.

**Fancy Welts.**

This consists in imparting to the fabric rib or cord effects of two sizes, *i. e.*, wide effect lines to alternate with narrow effect lines.

Diagram Fig. 33 and weaves Figs. 34 to and inclusive 38 are given to illustrate the subject.

Two size rib effects are shown, one covering 10 picks distance between interlacing of back warp with its face filling, the other only four picks.

Weave Fig. 38 is the welt weave showing the back warp floating while not stitching; repeat of weave 3 by 18.

Weave Fig. 39 shows single wadding picks added *viz:* 4 for the large rib and 2 for the small rib; repeat of weave 3 by (18 + 4 + 2 =) 24.

Weave Fig. 40 has the same proportions of wadding picks used as the previously given example, but the wadding picks are in this instance introduced in pairs to suit looms with a single box on one side. Repeat of weave 3 by 24.

Weave Fig. 41 is the mate weave to weave Fig. 39, the only difference being that in this instance the back warp while floating below the 10 face picks is once (in one repeat of the weave) stitched to one of the wadding picks (see shaded type). Repeat of weave 3 by 24.

In the same way weave Fig. 42 treats weave Fig. 40.

(To be continued.)

**CONSTRUCTION OF SKIP TWILLS.**

(Continued from page 32)

(b) Check Effects.

In this instance there are break effect lines formed on the face of the fabric in both directions (warp and filling ways) in turn producing the required check effect.

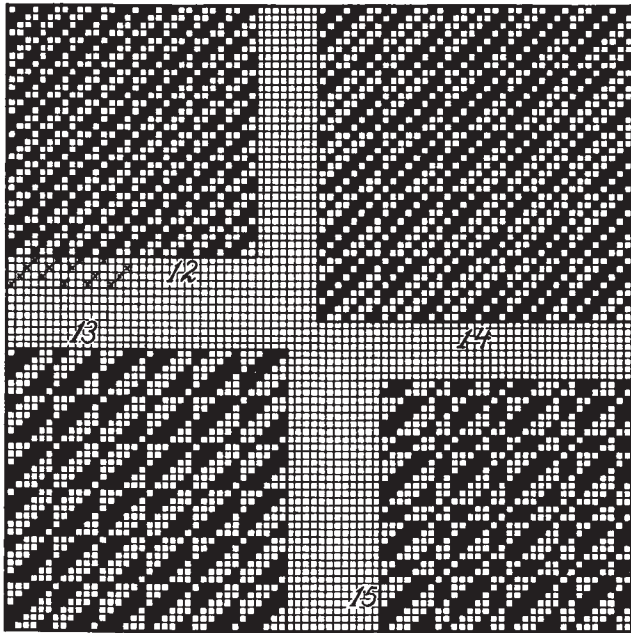
For this reason the procedure previously explained in connection with the warp-threads and which is now also observed, must be extended to the filling, *i. e.*, after drafting a certain number of picks of our foundation twill in rotation for one group, we then must skip the proper number of picks of the foundation twill (half of the repeat minus one) in order to produce the break lines running filling ways, in addition to those running warp-ways in the fabric, so as to form the check effect.

Weaves Figs. 12 to 16 are given to illustrate the subject.

Fig. 12 has for its foundation the 4-harness even-sided twill, using four warp-threads and four picks for the unit of one group.

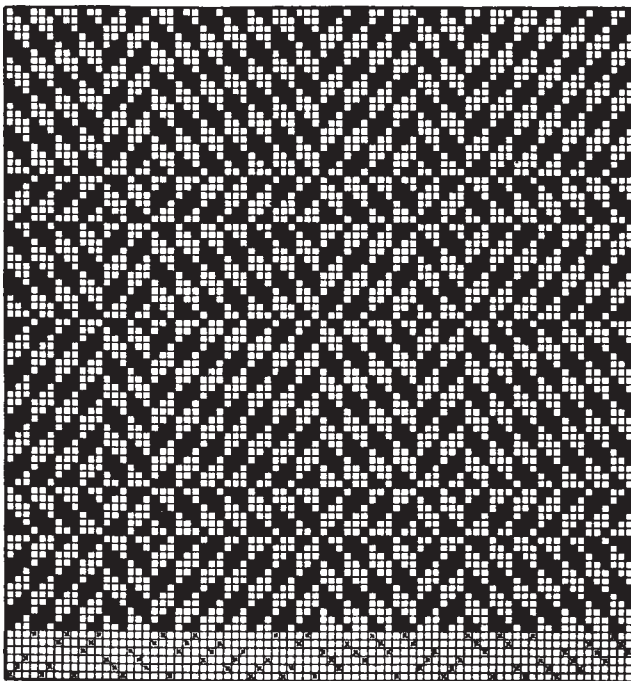
The drafting of this weave from its foundation twill then will be: Take warp-threads and picks 1, 2, 3 and 4, skip warp-thread and pick 1; draft warp-threads and picks 2, 3, 4 and 1, skip warp-thread and pick 2;

draft warp-threads and picks 3, 4, 1 and 2, skip warp-thread and pick 3; draft warp-threads and picks 4, 1, 2 and 3, skip warp-thread and pick 4. The draft for



the warp-threads and which corresponds to that of the picks, is shown by means of *cross* type below the weave. Repeat of weave 16 warp-threads and 16 picks. Can be woven with as few as 4-harnesses if so required.

Fig. 13 has for its foundation the 6-harness even-



16

sided twill, with six warp-threads and six picks for the unit of the group, using  $(6 \div 2 = 3 - 1 = )$  2 ends for skipping warp and filling ways in order to produce the required breaks, *i. e.*, cut lines in the direction of warp and filling in the fabric. Repeat of weave 36 warp-threads and 36 picks. Can be woven with 6-harnesses if so required.

Fig. 14 has for its foundation the  $\frac{2}{1} \frac{2}{2} \frac{1}{2}$  10-harness (balanced) even-sided twill, using eight warp-threads and eight picks for the unit of the group, with  $(10 \div 2 = 5 - 1 = )$  4 ends for skipping warp and filling ways, in order to produce the required breaks, *i. e.*, cut lines warp and filling ways in the fabric. Repeat of weave 40 warp-threads and 40 picks, to be woven with 10 harness, skip draw.

Fig. 15 has for its basis the 6-harness even-sided twill, using alternately seven and two warp-threads and picks for the units of the two groups used in this instance. This is the same foundation weave as was used in connection with weave Fig. 13, *i. e.*, two ends of the foundation weave are missed, both warp and filling ways, in order to produce the characteristic break lines warp and filling ways on the face of the fabric. Repeat of weave: 36 warp-threads and 36 picks.

Fig. 16 has for its basis again the 6-harness even-sided twill, the same being in this instance arranged for a broken effect skip twill, with 3 warp-threads taken in rotation before arranging a break line for the skip.

The units for the various broken effects used are:

12	warp-threads and picks	—	twill left to right.
6	"	"	" — " right to left.
21	"	"	" — " left to right.
12	"	"	" — " right to left.
6	"	"	" — " left to right.
21	"	"	" — " right to left.

78 warp-threads and picks in repeat of pattern.

Warp ways the skip arrangement of take 3 and miss one is observed.

Filling ways no skip arrangement is used, the twill extending the full unit of each group of 12, 6, 21, 12, 6 and 21 picks respectively; the direction of the twill is reversed when changing from one group to the other, in turn producing cut or break lines of the skip twill in each group running in the direction of the warp-threads, the broken twill effect producing the check effect of 12, 6, 21, 6 and 21 ends respectively warp and filling ways in the weave, and thus on the face of the fabric.

Below the weave the construction draft (and which is the drawing-in draft, provided only 6-harnesses are at our disposal at the loom) is given in *cross* type and which will greatly assist in explaining the construction of this broken skip twill, *vis*:

take 3 ends, twill from left to right and skip	× 4 =	12 ends
take 3 ends, twill from right to left and skip	× 2 =	6 ends
take 3 ends, twill from left to right and skip	× 7 =	21 ends
take 3 ends, twill from right to left and skip	× 4 =	12 ends
take 3 ends, twill from left to right and skip	× 2 =	6 ends
take 3 ends, twill from right to left and skip	× 7 =	21 ends

78 ends.

(To be continued)

### Cotton Spinning in Japan.

There were at the end of June, 1913, no fewer than 45 cotton spinning concerns in Japan, these owning altogether 150 mills. The combined capital of the different companies was nearly fifty-eight million dollars, of which about twenty-five million dollars was paid up. The plant in the mills comprised 2,237,904 ring spindles, 49,360 mule spindles, 309,672 doubling and twisting spindles, and 23,782 looms.