The *negative* arrangement produces movement in the heddles in one direction only, the reverse motion being accomplished by the addition of external mechanism involving the use of springs, weights, pulleys and levers, and springs and levers.

The *positive* arrangement controls the shedding apparatus in both directions, without the aid of any external mechanism.

Treadle, Cam and Dobby systems are designed for either the negative or positive. All Jacquard machines are necessarily negative in their action upon the warp-threads. Single lift Jacquards are constructed so as to produce motion in the upper division of the warp-threads only, *i. e.*, they produce a *warp shed* on the closed principle of the *bottom type*. The depression of the lower division is accomplished by the use of weights called *lingoes* suspended from the heddles, *i. e.*, the harness cords. Double lift Jacquards cover the bottom, centre and semi-open principles. The ideal open shed is still desired in Jacquard weaving.

MANUFACTURE OF NARROW WARES.

Ribbons, Trimmings, Edgings, etc.

(Continued from page 149.)

Tubular Selvages.

The same play a most important part in the manufacture of ribbons and appear either as full, half or three-quarter tubular selvages.

FULL TUBULAR SELVAGES contain a separate face and back structure (face and back warp and filling), both having the same number of warp-threads.

HALF TUBULAR SELVAGES are such as contain a face and a back filling, but only one system of warp, and which interlaces with the face filling, the back filling floating, *i. e.*, is not interlacing with the warp-threads.

THREE QUARTER TUBULAR SELVAGES have a face and back warp and filling; however, the face carries in this case more selvage threads. The term three-quarter is only taken to indicate the difference between full and half tubular selvages, it has nothing to do with the proportion of face and back selvage threads used, and which vary according to character of fabric structure under consideration.

For double face ribbons as well as the better class of one face structures, full hollow selvages are mostly used, the other two kinds of selvages referring more particularly to the medium and cheaper grades of one faced structures.

Full and Three-quarter Hollow Selvages.

The weaves used for these selvages belong to the class described before under Tubular and Double Cloth Weaves. In addition to directions then given, be careful that a perfect edge (no curling up) of the selvage is produced by the filling traveling from one ply into the other.

When planning the draft for such a fabric be sure to indicate on the point paper the entering of the first pick into the structure, *i. e.*, whether said pick enters the shed at the left or at the right, and after this trace the run of the filling throughout the repeat of the weave.

The filling traveling on every two picks from one ply into the other is the cause of connecting the face and back selvage structures. These two picks, successively following each other, are known as a *return pick*. Severing the hollow selvage, next to the structure lengthwise in the fabric, and opening out the same so as to represent a single cloth structure, such a return pick will then show as one pick. Provided the shuttle enters the shed at the left, the first return pick for the right hand selvage then will be picks 1 and 2, the second return picks, picks 3 and 4 and so on. At the same time the first return pick for the left hand selvage then will be picks 2 and 3, the second return pick, picks 4 and 5, etc. Changing the entering of the shuttle will naturally also change the number of the two picks as form a return pick. Having obtained a clear understanding of this return pick, remember that when planning the weave, these return picks must form perfect single cloth if opened out as before explained. How to proceed, will be best explained in connection with a practical example.

Suppose a hollow selvage showing 3-harness warp effect twill is required. After indicating on your point

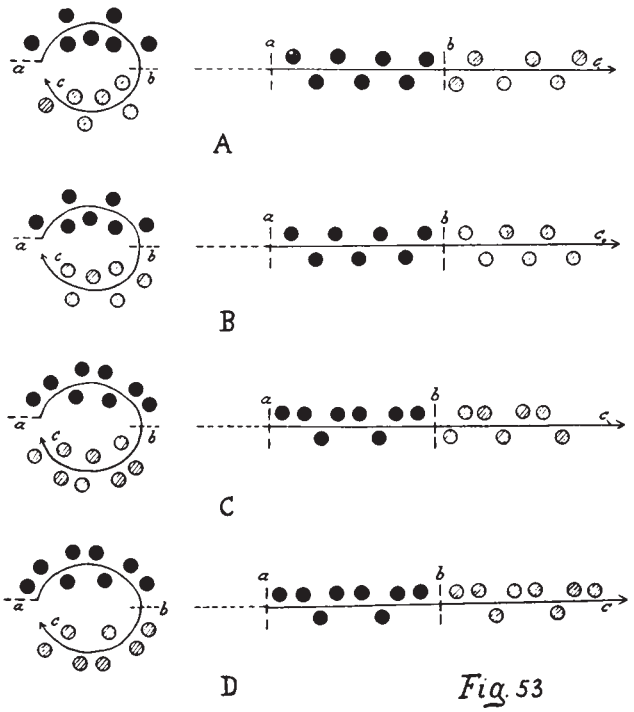

Fig. 53

paper face and back warp-threads and picks, as well as return picks, raise first all the face warp-threads on every back pick. The method of interlacing of the 3-harness twill (warp effect) is *2 up 1 down* and what we change in the present instance to *2 out 1 in*. Following this formula, insert the weave for the face structure in plan mapped out previously on the point paper; next insert the weave in the back ply, being careful that the formula in the back pick, as forming with the face pick together a return pick, connects properly to the respective face pick, remembering at the same time that *2 out* in connection with the back pick, means the lowering of 2 back warp-threads and *1 in* the raising of a back warp-thread, since in the lower ply the *down* of the back warp-threads forms the face of the fabric.

Any number of warp-threads can be used for these selvages, the number to use depending upon the character of the fabric under consideration.

The accompanying four diagrams Fig. 53 *A*, *B*, *C* and *D*, illustrate sections of differently interlaced hollow selvages and their plans of interlacing if severed from the fabric and turned flat, as we previously referred to.

The face warp-threads are shown in full black circles.

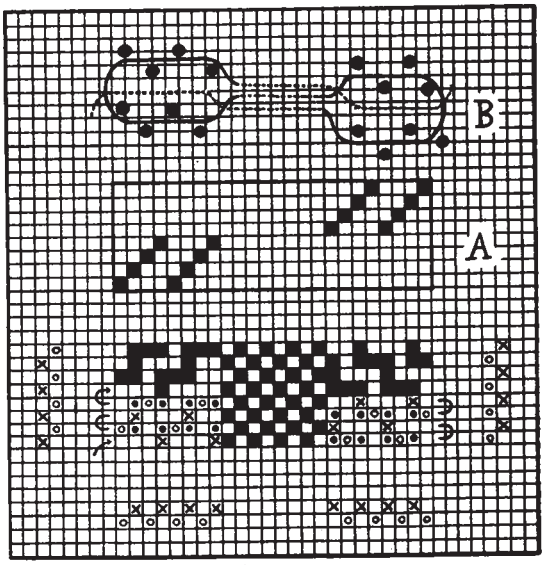

Fig. 54

The back warp-threads are shown in shaded circles.

a to *b* = face pick.

b to *c* = back pick.

Diagram *A* shows a perfectly interlacing return pick in connection with interlacing face and back structure with the plain weave (see *b* in flat diagram).

Diagram *B* shows the same weave used in connection with an imperfectly interlacing return pick (see *b* in flat diagram, showing 2 warp-threads up, *i. e.*, interlacing the same).

Diagram *C* shows a perfectly interlacing return pick in connection with the 3-harness twill warp effect (see *b* in flat diagram), whereas

Diagram *D* shows an imperfectly interlacing return pick (see *b* in flat diagram, showing 4 warp-threads up, side by side, in place of 2, the formula of the 3-harness twill).

If dealing with Jacquard work, it will be found advisable to balance the interlacing of the two selvages of the fabric with reference to face and back pick,

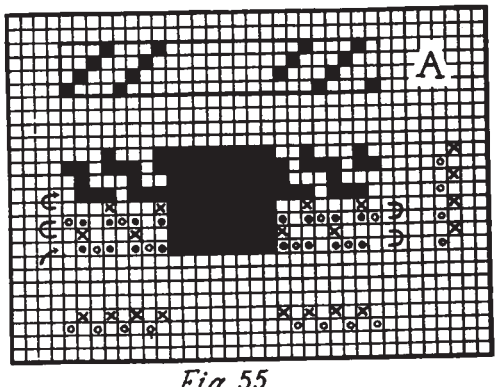

Fig. 55

i. e., when one of the selvages interlaces back pick, plan in your design that the other weaves face pick, and vice versa. In connection with harness work, to reduce the number of harnesses required, this feature is, as a rule, not made use of.

Stuffer warp threads, inserted into these hollow selvages, so as not to show on either side of the fabric, must be raised on every back pick and lowered on every face pick.

Diagrams Figs. 54, 55, 56, 57, 58 and 59 show six examples of these hollow selvage weaves. The centre of the ribbon is shown in Fig. 54, but is omitted (shown black) in the other five diagrams.

Fig. 54 shows a weave plan for a hollow selvage, plain face and back, reverse working.

x = face warp and filling.

o = back warp and filling.

Centre of ribbon = common plain weave, *i. e.*, taffeta weave.

Selvage requires 8 harnesses, *i. e.*, four harnesses for each side (see Diagram *A*), no attention being taken to the centre of the ribbon, and for which 4 or any other multiple of 2 harnesses, additional, are required.

B shows diagrammatically the interlacing of one return pick from both selvages.

Combining a hollow selvage with taffeta, *i. e.*, plain weave for centre of ribbon, see that the first

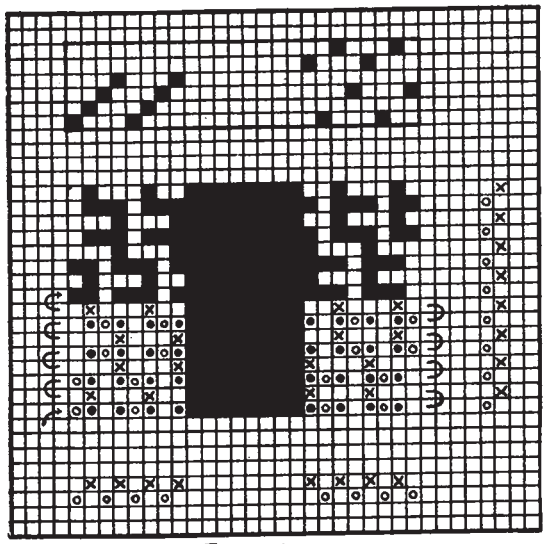

Fig 56

taffeta thread next to the selvage, raises on the face pick of the latter, and is down on the back pick of the latter; the reverse being the cause of it simply acting as a stuffer for the selvage.

Diagram Fig. 55 shows a similar hollow selvage as the one just explained, only that in this case selvages are working face and back pick alike, requiring only four harnesses for their execution (see Diagram *A*).

Fig. 56 shows us a hollow selvage produced with the 2 by 4 warp rib weave, *i. e.*, 2 picks in a shed of the plain weave.

Fig. 57 is a hollow selvage with 3-harness twill, warp effect, for both sides of the selvage.

Fig. 58 shows us a hollow selvage with 5-harness satin, warp effect, for both sides of the selvage, showing also the application of stuffer warp-threads. Selvage threads and stuffer warp-threads are shown in fabric section *A*, showing two return picks in connection with it.

Fig. 59 illustrates a hollow selvage with a 4-harness

broken twill, warp effect, for face and back, designed for using 2 shuttles; each shuttle successively interlac-

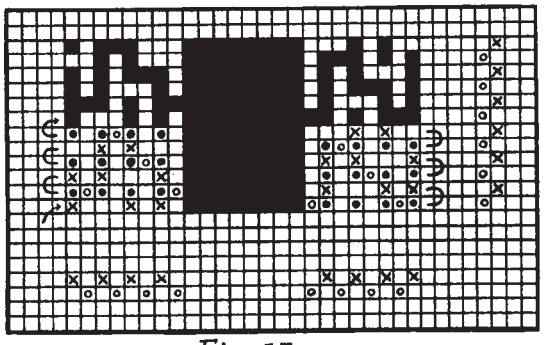

Fig. 57

ing once in one ply then in the other ply. If using the arrangement of one face to alternate with one

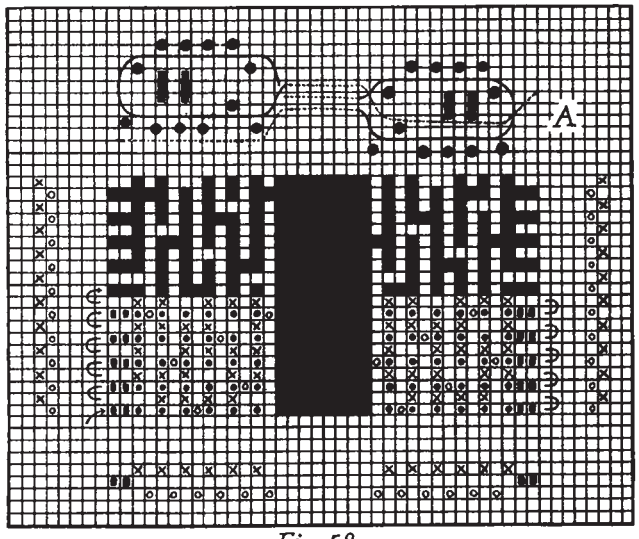

Fig. 58

back, the threads as coming from one of the shuttles would cross only in the face warp, the other in the

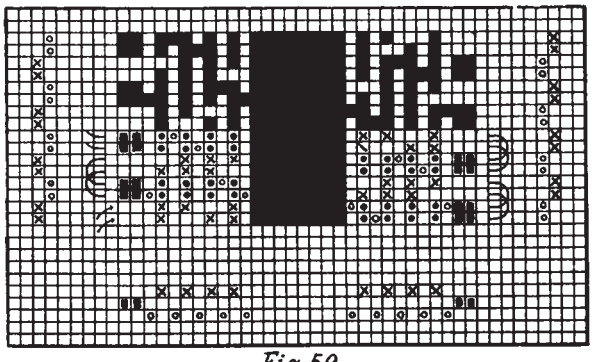

Fig. 59

back warp, obtaining no hollow selvage but a double selvage minus interlacing face and back ply.

Making Fabrics Flameproof.

According to a late French patent, any fabric can be flameproofed by steeping it in a 65 per cent solution of alum, drying without rinsing, and then soaking it overnight in a 50 per cent solution of sulphate of ammonia. The final drying must be slow and thorough.

How Absorbent Cotton Is Made.

Absorbent or *surgival* cotton is the name applied to bleached or un-bleached raw cotton freed from all foreign bodies, such as oil, wax, and mineral salts, in order to acquire the property of absorbing large quantities of water.

In a more restricted sense the designation is applied to the special sorts of cotton generally known as cotton wadding, used for surgical purposes, sold in sealed or non-sealed packets of various sizes. Many qualities have been sterilized by steaming or impregnated with antiseptic agents.

There are still other sorts of cotton which also exhibit absorptive properties, which, however, are not used for surgical purposes, but in the preparation of so-called soluble cotton for gun-cotton, artificial silk, collodion, etc.

Purified Cotton.

Absorptive cotton intended for surgical purposes must possess certain properties, and these are detailed under the heading of *purified cotton* in the United States Pharmacopœia as follows: White, soft, fine fibres appearing under the microscope as hollow, flat, and twisted ribbons; odorless and tasteless; insoluble in ordinary solvents but soluble in ammoniacal cupric hydrate. Purified cotton when compressed in the hand and thrown on to cold water should readily absorb water and sink under, and the water should show neither an acid nor an alkaline reaction. Purified cotton must be quite free from all visible impurities, and on being burnt should leave not more than 0.3 per cent. of ash.

Production of Surgical Cotton.

The treatment for the production of surgical cotton consists briefly in boiling the material in a solution of alkali, followed by bleaching and souring. Between each of these operations it is necessary to wash thoroughly, to meet the requirements of the U.S.P.

Cotton to Use.

The choice of the raw material has great influence on the quality of the finished product. The finer sorts, such as Sea Island and Egyptian, are not suitable for the purpose, because it is difficult to make them absorptive on account of the great length of these fibres. Certain other sorts, such as Peruvian and Brazilian cotton, have a too woolly character, and yet others do not bleach well because of the nature of the coloring matter they contain.

The most serviceable are the medium qualities of Allen-seed, New Orleans, Texas, Mobile, and Bender cottons. The cotton must be bleached as white and as pure as possible. Unripe fibres should be carefully removed, because they contain no central canal, and therefore cannot be made absorptive. Card waste may be used but it does not give a first-class product.

Cotton can be bleached without acquiring absorptive properties, and again it may be rendered absorptive without being bleached. In some instances the cotton is first treated with a fat solvent, such as petroleum ether or carbon disulphide, for removing the fatty bodies. Adhering impurities are removed as thoroughly as possible by mechanical means. Then the cotton is wetted out by boiling for many hours in water under circulation.

At this stage a considerable portion of the soluble impurities are removed. The insoluble impurities are attacked by the hydrolytic influence of a 1 per cent.