SPECIAL FABRIC STRUCTURES.

COVERT CLOTHS.

When these fabrics were first brought into the market, they were mostly intended for the manufacture of coats for outdoor sports, consequently one of the main objects was to produce a tough, strong, leathery feeling fabric, a structure more or less impenetrable to water, and capable of withstanding wear and tear. To produce such a fabric they had to be made of wool possessing good felting properties, to permit heavy fulling, *i.e.,* felting during the finishing process. The weave used for interlacing warp and filling was either the five harness corkscrew, or the eight harness double satin. The fabrics were laid out in the loom with a somewhat loose texture (permitting a loose interlacing of warp and filling) and were afterwards fulled up the required amount to produce the characteristic impervious fabric structure previously referred to. The proper amount of gigging, steam lustering, shearing, etc., then produced in addition to their wearing capacities, a soft, pleasant handling of the fabric to the touch of the hand, the steam lustering setting this finish practically permanently.

The color in which these fabrics first came in the market was a drab cast, a shade probably the most serviceable, introduced to show the least amount of dirt or dust on the garment.

Coverts of this texture are still manufactured, equal to, if not surpassing the old-time cloths, but the name has been claimed by so many imitations that it practically applies to all goods used for overcoatings and costumes which have an appearance akin to the standard fabric.

The majority of the changes have been made since costume cloths were introduced for women's wear, *i.e.,* costume cloth. For such a purpose the use of a true covert cloth texture was not only undesirable, but wasteful, a substantial cloth being entirely inappropriate to the fickleness and changeableness of fashion. Imitations sprang up in many forms. All of them naturally took the name of the known cloth, until its original form became almost lost. All the changes affected were in the direction of cheapening the cloth, both as regards its adoption either for male or female wear.

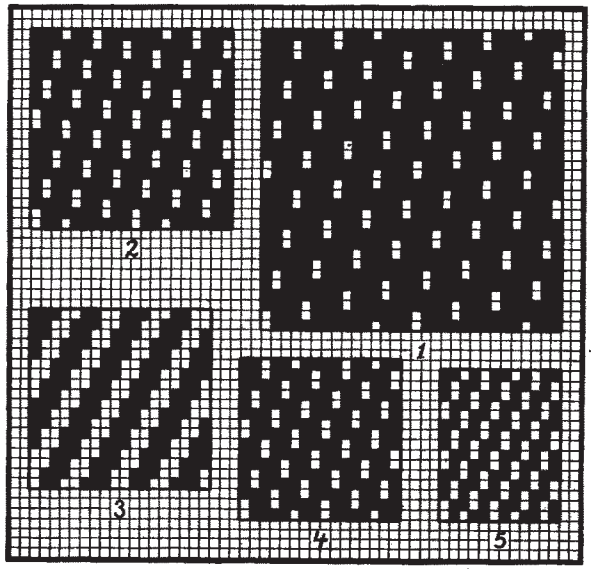
The filling being to a large extent hidden by the weave, was the first to succumb to the process of adulteration. First, a yarn of solid shade was used; this was dyed so as to be as near as possible to the mixture color of the warp, and in turn saved a certain amount of expense by the cheaper process in dyeing.

The solidly dyed woolen filling was then further cheapened by an admixture of cotton, until the filling in many cases became composed entirely of loosely twisted cotton or angola yarn. The filling being almost invisible on the face of the cloth, the alterations mentioned affect the handle of the cloth more than its appearance.

Alterations, however, were soon extended to the warp, and although many of these have been cleverly accomplished, and many of the imitations are only distinguishable at a close examination of the fabric structure, others are glaring examples of inferior cloth construction.

The change was slight at first; worsted spun yarns were substituted for the woolen warp; they wove better, and the cloth could be set closer in the reed, and so reduce the amount of fulling required afterwards. The goods made in this way have a better finish, and look much better when new than their woolen competitors, but the finish is not so permanent. The mixture coloring was obtained either by sliver mixing or melanging or in other cases by means of twist yarns.

Cheapening covert cloth received its greatest impulse when cross dyeing was introduced, which in turn discarded the mixing of colors and its consequent waste of material, obviating the necessity of employing dyed yarns, introducing at the same time a certain amount of cotton in the woolen or worsted yarn. Such covert cloths are then woven in the grey, the yarn



being prepared by mixing the two materials—cotton and wool—in the fibre, and in turn either combing or carding them together, according to whether dealing with worsted or wool spun yarns.

If wool is the predominant factor in the material, the whole may be treated all through the processes, with only slight variations, similar to a worsted or woolen yarn. If cotton is predominant (but which is seldom the case) then cotton machinery is best adapted for the succeeding processes.

Mixtures can be made in this manner with any blend of the two materials, the blend being usually stated by the percentage of each; for instance, a yarn composed of 75 per cent. wool and 25 per cent. cotton, and spun on worsted machinery to 16's worsted counts, would be classed as a 16's 75/25 yarn, or a thread composed of 80 per cent. wool and 20 per cent. cotton, spun on the mule to 4 run, would be classed as a 4 run 80/20 yarn.

These union yarns, whether wool or cotton predominates, whether spun on the woolen, worsted or cotton principle, are woven in their grey state, and in that state are scoured, fulled, gigged, etc., as the case may require, and when in turn they come to the dyehouse they are there double dyed or double mordanted and dyed only once. In this manner the wool fibre takes one shade of the required mixture (generally the darker) and the cotton fibre the other. The resulting shade is determined either by the dyes used or by the ratio in which the wool and cotton fibres have been combined, and may be varied by altering the pro-

portion of either. This method of obtaining a covert coloring effect by cross-dyeing has many advantages, it being more economical and more convenient to the manufacturer when different shades are required, for the fact that a manufacturer who keeps to one blend of material, by employing cross-dyeing can have his grey pieces dyed up to the required shade, instead of having to keep a stock of each shade in the yarn.

A heavy-weight covert with a bold whipcord effect may be produced by the 15-harness double satin, warp for face, as shown in Fig. 1. It is more adapted to wool mixture coloring than a worsted twist effect, the warp being a fawn mixture yarn, while the filling, which is invisible on the face, may be a solid color of a similar degree of shade.

A good lay out for this fabric structure is thus:

Warp: 5760 ends, 7 run wool spun mixture, 80 ends per inch, 72 inches wide in reed.

Filling: 76 picks per inch, 3½ run wool spun, solid color.

Finished width is calculated on 54 inches; if required to make 56 inches wide, or wider goods, add in proportion to culculations quoted in example.

A fabric thus constructed will present a soft handle, but not of tight texture, and may be modified by employing a 2/40's worsted warp in place of the woolen.

A neater and closer fabric structure is obtained by using the 10-harness satin, as shown in Fig. 2. This weave lends itself most satisfactorily to the use of a worsted warp, and is adaptable either for mixture or twist colorings, although the former give the neater effect. The particulars for a good heavy cloth are:

Warp: 5300 ends, 2/40's worsted, mixture, 76 ends per inch, 70 inches wide in loom.

Filling: 60 picks per inch, 3½ run wool spun, solid color.

Finished width calculated for lay out given equals 54 inches; if fabric is required wider calculate setting by proportion from figures given.

A finer and lighter fabric may be obtained by the use of the following texture:

Warp: 8100 ends, 40 cut or 7½ run woolen yarn, mixture, 120 ends per inch, 67½ inches wide in loom.

Filling: 96 picks per inch, single 30's worsted, mixture.

Finished width calculated is 54 inches, and from which other widths desired can be readily ascertained by proportion.

A very pretty covert cloth, but which necessarily is of expensive structure, is obtained by using a three-ply warp. For instance, a so-called 2/48's worsted yarn is made up of a 1/96's dark fawn and a 1/96's light fawn, twisted together. This 2-ply yarn then is twisted to a single 48's dark fawn, and the resulting *grandrelle yarn* used for the warp.

A design suitable for this class of covert cloth is given in weave Fig. 3, the 5 *up* 4 *down* 63 degree steep twill, the same to be used with the following data as to fabric structure:

Warp: 9760 ends 2/48's grandrelle yarn (a 3-ply yarn) as previously explained; 160 ends per inch, 61 inches wide in reed.

Filling: 64 picks per inch 8 run wool spun, solid color.

Finished width, basis calculated upon is 54 inches.

If a lighter weight structure of this fabric (less ends and picks) is required, use in connection with it the $\frac{4}{3}$ 7-harness 63 degree twill, and in which instance the warp-threads can be brought down to as low as 8000 ends, and the picks to 58 or 56.

Coming now to piece-dyed coverts, a most serviceable cloth is produced by using the 8-leaf satin (warp-effect) as shown in Fig. 4. The warp then is a union mixture, containing 75 per cent. wool and 25 per cent. cotton. The percentage of the mixture may be varied, but the cottony effect becomes rather pronounced provided less than 75 per cent. of wool is used.

The following data with reference to planning these fabrics will be of interest to our readers:

Warp: 6800 ends, 7 run wool spun, grey union, 100 ends per inch, 68 inches wide in reed.

Filling: 66 picks per inch, 6¼ run wool spun, grey.

Finished width of fabric is based on 54 inches; if other widths are required, figure by proportion.

A somewhat similar cloth, but with a more pronounced effect, may be made by using the same weave (Fig. 4) employing however a cotton-wool twist warp instead of a cotton-wool union mixture. The cotton thread should be much finer than the wool spun thread, a very suitable proportion being a 2/40's approximate worsted count, referring to a 2-ply twisted yarn composed of 30's wool and 40's cotton. The proportion of cotton should be smaller rather than otherwise, for a thick twist makes the pattern look coarse and bold, irrespective of the effect on the handle, to the touch of the hand. Always have your light color appear sparingly distributed all over a dark ground.

A good lay out for the fabric (based on 54 inches wide finished width—other widths to be figured in proportion) is thus:

Warp: 6700 ends, 2/40's (approximate) union twist, 100 ends per inch, 67 inches wide in loom.

Filling: 64 picks per inch, single 16's worsted, in the grey.

A somewhat similar cloth in appearance, and made of the same kind of warp twist, is produced with the following lay out of fabric structure, *viz:*

Warp: 6800 ends 2/40's (approximate) union twist; 100 ends per inch, 68 inches wide in reed.

Filling: 80 picks per inch, 5½ run wool spun, grey.

Finished width basis figured on is 54.

Weave used is the 10-leaf satin, warp effect (see Fig. 2).

When lower sets are used, and which comprise the bulk of covert cloths made, the goods require more fulling to make a serviceable fabric. Such goods are fulled up from 20 to 30 per cent in their length, and where pure wool filling is used, to an equal extent in width. The particulars of such a cloth woven with a 10-leaf double satin, as given in Fig. 2, are as follows:

Warp: 3450 ends 2/54's grandrelle, 40 ends per inch, 86 inches wide in reed.

Filling: 60 picks per inch 3¾ run, wool spun, mix.

Finished basis, 54 inches wide.

A cloth of similar appearance may be made in a smaller warp float, giving a lighter weight fabric. The design is a 5-leaf double satin, i. e., the 5-harness corkscrew as given in Fig. 5; the particulars for its construction are:

Warp: 3450 ends 2/54's grandrelle yarn, 40 ends per inch, 86 inches wide in reed.

Filling: 37 picks per inch, 3¾ run, wool spun, mixture.

Finished width basis figured on is 54 inches; figure others by proportion.

A large number of covert cloths may be obtained similar in structure to the foregoing, but with cheaper filling. If angora yarn or loosely-spun cotton filling is used, many of the particulars given are adaptable to the change, the necessary variation being made by decreasing the width of the reed space taken by the warp and increasing the number of picks per inch. This is done to provide an allowance for the reduction of shrinkage when wool yarns are discarded.

COTTON FROM FIELD TO FACTORY.

(Continued from November issue.)

Fig. 25 illustrates the connection of a single saw gin with a condenser, showing also a simple arrangement of a Cleaner mounted above the gin. The seed cotton as conveyed to the hopper *A* is carried by the feed apron *B* into engagement with the picker roll *C*, from which it is dropped into the breast *D* to be in turn engaged by the saws *E*, brush *F*, and then travels in flue *G* to the condenser *H* by means of which and the bat roll *I* the lint is formed into a film, in which state

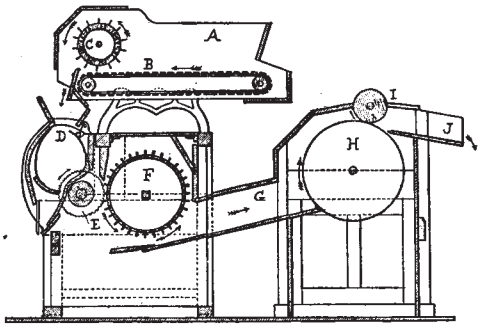


Fig. 25

it passes out of the machine through chute *J* from where it finds its way into the press.

Fig. 26 shows the connection of a battery of gins (4 gins in this instance, although more or less might be used) to one condenser, each gin *A* being connected by a separate flue *B*, to the condenser *C*. The hood *D* as forming the connection between each gin and its flue has its ends *E* inclined at an angle, as shown, a feature which causes the lint as coming from the gin to be deflected against the curved back *F* of

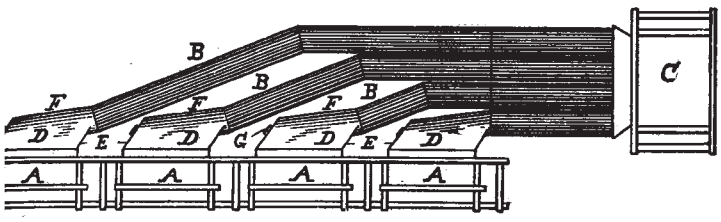


Fig. 26

said hood and thus passes readily to the flue *B*. By thus making the hood *D* with the curved back *F* and this in connection with the elbows of the flue *B*, as shown in the illustration, being bent at a very slight angle, said flue is practically shortened to a minimum, and the lint passes in the most direct line possible from the gin to the condenser, distributing the friction of the cotton over the entire length of the flue. The end walls *E* of the hoods *D* are provided with a glass covered opening at *G*, to permit of a view of the interior of the hood, said opening, when the glass is removed, serving also as a hand hole to afford access to the interior of the hood for cleaning purposes.

Like most other establishments engaged in manufacture, the tendency is toward the consolidation and enlargement of ginneries, however the necessity of being compelled to transport bulky seed cotton from the farms to the ginneries will always more or less restrict their growth. A modern equipped ginhouse is free from dust and lint, which, not only would be a great nuisance but also a chance for fire. Ginning being there carried on, under cover, the observer will fail to see cotton anywhere except he sees the lint sliding from the condenser into the press. Seed cotton (and there need never be as much of it as a bale in a ginnery, so quickly is the work of receiving and cleaning it dispatched) while easily ignited, merely flashes over, and the fire goes out, but which is different with lint cotton, which, when once on fire will burn and smolder indefinitely. A burning bale when thrown into the water will float and burn until all of it is destroyed. At the ginnery the lint passes at once into the press, and should it catch fire there, the plunger that tramps in the cotton is let down on it and smothers the fire until steps are taken to remove and extinguish it.

Although the principle of the saw gin has a tendency in its action to hurt, *i. e.*, break the staple of the cotton, gins in many instances are run too fast in order to produce production, resulting in excessive cutting of the fibres. For best results, from the point of view of the planter, the maximum speed should be about 400 revolutions per minute for 10-inch gin saws. Twelve-inch saws, which have recently come into use, are recommended because a given amount of ginning can be done with saws of this size when the machinery is operated more slowly than with 10-inch saws. With the saw shafts running at the same speed, on the other hand, a gin equipped with 12-inch saws will have 20 per cent advantage in capacity over the same gin equipped with 10-inch saws.

The question as to the speed at which gin saws should be operated is often discussed. For ginning cottons up to and including $1_{\frac{1}{16}}$ inches in length of staple, under average conditions, a speed of about 400 revolutions per minute for 10-inch saws and 333 for 12-inch saws is recommended. The capacities of gins equipped with saws of these two diameters are approximately equal at these speeds. The surface speed of the saw tooth as it passes through the seed roll determines not only the capacity of the gin but the condition of the ginned fibre. The entire American crop of cotton of approximately 15,000,000 bales has to be ginned within practically four months. Some gins are operated day and night at their full capacity. Often gins are "speeded up" in an effort to gain time, but the unfortunate result of speeding is to cut the fibre of the cotton to an extent which costs the producers a great amount of money each year.

Beside using a quickly revolving brush for removing lint cotton from the saws of the gin, in late years (as mentioned before) an air blast is used in some makes of gins to take the place of the brush. The essential difference between these two types of gins is in the method of taking the cotton lint from the teeth of the saws. It has been claimed by some operators of the air-blast system that, in effect, the same principle is used by both methods, the mechanical construction being entirely different. In the air-blast method a fan is used to force a steady stream of air