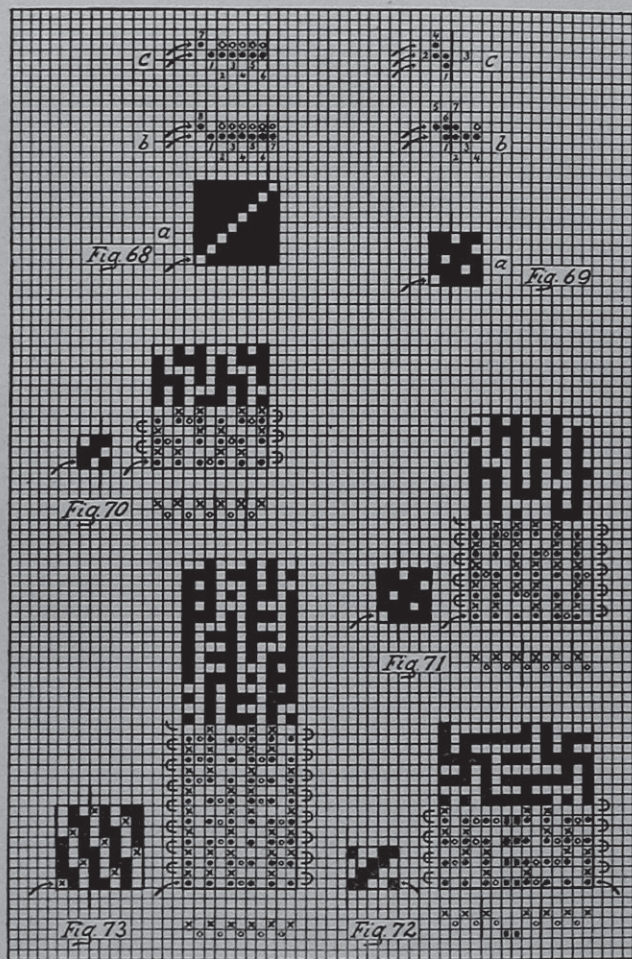


If, however, considering the entering of the filling from the right hand side, we then find only 6 warp threads up between the two sinkers and when consequently one warp thread must be added to the repeat of the weave. The foundation number then is $(8+1=9)$ nine.

Fig. 69 shows us the 5-harness satin, warp effect, used as the single weave. The interlacing of this weave is 4 up 1 down. Considering the entering of the filling to be done from the left, we then find if reading from the first to the second sinker, 7 risers in the place of 4 (see Fig. 69^b). For this reason, we then



have to cross off three warp threads from the repeat of the weave, obtaining in this manner the foundation number $(5-3=2)$ two. However, if entering the filling from the right hand side, the foundation number then would be three.

The most often used arrangement of face and back is 1 : 1, although others may be called upon.

Fig 70 is a hollow-cord weave interlacing with the 3-harness twill. The foundation number is 2. The design shows three repeats of the single weave plus the foundation number $(3 \times 3 + 2 = 11)$ ends. The weave formation for the single 3-harness twill is 2 up 1 down, for the double cloth weave 2 outside 1 inside.

Considering the first pick of the weave (back pick from left to right) shows the first two back warp threads outside (down); the third, inside (high); the

next two back warp threads outside (down). With the second pick (face pick from right to left) the first face warp thread must (from the right) consequently rest inside (down), the two next outside (up), the fourth face warp thread inside (down) etc. Filling ways, build up the weave as explained in the chapter on hollow selvages (*i. e.*, double cloth, minus stitching). In connection with complete weave, Fig. 70, as well as those given hereafter, empty squares indicate sinkers, all others, risers.

Fig. 71 shows us a 5-harness, warp effect satin, hollow-cord weave, showing two repeats, plus the foundation number $(2 \times 5 + 2 = 12)$ ends. The weave plan, 4 outside 1 inside, is then (according to the insertion of the picks) on the back pick placed in the back warp threads and at the face picks in the face warp threads. Provided the correct foundation number is obtained, the satin weave will then connect properly.

Fig. 72 shows us a hollow-cord weave, interlacing with the 4-harness even sided twill, having stuffer ends in the centre.

Fig. 73 is a hollow-cord weave, showing the 5 up 3 down 8-harness 70° steep twill. One repeat plus the foundation number $(8+3=11)$ ends is given. The filling interlaces after the following formulæ: 2 up 1 down 2 up 1 down 1 up 1 down and which considering the fabric structure means: 2 outside 1 inside 2 outside 1 inside 1 outside 1 inside, this arrangement then being indicated onto the warp threads.

Not every weave can be as successfully used as a hollow-cord weave, for instance, no perfect edge can be designed in connection with the warp rib weave.

(To be continued.)

A PRACTICAL TREATISE ON THE KNOWLES FANCY WORSTED LOOM.

By E. P. Woodward,
Master Weaver.

(Continued from page 77.)

Timing the Shuttle Boxes.

The preceding article treated the timing of the head parts involved, to the chain's movements. As previous articles have treated on the adjusting and timing of all parts relative to the picking motion, the timing of the box motion to the picking motion and the protection, can now be taken up.

TO TIME THE BOX MOTION, first close the clutch on the upright shaft. Bring the lay forward until the daggers engage the knock off levers. With the clutch closed on the upright shaft turn the entire head drive forward by means of the hand wheel on cylinder gear shaft until the shuttle boxes have moved about $\frac{3}{16}$ inch. This will leave the time of the boxes where they will change after a slow moving shuttle has struck the picker. The set screws may now be tightened and the loom is then ready to pick.

In these directions for timing, it is assumed that the head is driven by concentric gearing and the shuttle boxes are running with no skips. Where the boxes skip or eccentric gears are used to drive the head, it might be necessary to change the timing of the boxes

a little, much depending upon what part of the eccentric gears are in mesh during the box changing time. There are times, when a full change is unavoidable. It should be used only when necessary.

The loom will make this box change steadily; but in many cases because of retarding, the changing time of the shuttle boxes the fixer will be prevented in a measure from getting the best results from the head, so far as early shedding and safety in boxing the shuttles, are concerned.

The loom is now ready for the strapping, and assuming that the harnesses are connected to the jacks by two lines of straps above and one line of straps and bow wires below, the harness wires can now be placed in their respective positions on the jacks. On ordinary fabrics one will get ample shed room by beginning at the notch in the jacks nearest their fulcrum bar, and building up the harness wires in sets of three wires for each step of sweep. By this is meant, place the first three jack eyes or stirrups in the first notch of their respective jacks, the next three jack eyes in the second notch of their respective jacks and so on.

The warp can now be placed in the loom and the harnesses raised from the ways and hooked to their positions.

Before leveling the harnesses it is well to see that the sheave rolls on both top and sides are about midway of their extreme positions. This will give ample chance to make any desired change necessary in the hanging of the harnesses in order to bring the lower part of the shed to its proper position with the race plate.

Each harness ordinarily should receive the same tension when strapping and none should be strapped tighter than is necessary for the work required. The desired elevation of one harness over the other should be given when leveling the harnesses and after that all harnesses should be treated as one, *i. e.*, all are raised and dropped equally by the use of the sheave roll screws. This may not be a common practice but it is as easy as any way if one works knowingly. When handled in this way, the looms have a much more tidy and workmanlike appearance. By following any good method one acquires good shop habits and in this case habits which will help him as a fixer to look for certain arrangements each time that a warp is hung in the loom, and failing to find such as he should, it shows him at once that something is wrong.

After a suitable heading is woven, the harnesses are all dropped and raised separately in order to find any errors in drawing in.

Adjusting and Setting the Temples.

The fixer now can set the temples. They should be set with their axial line parallel with the reed and the shuttle race and should hold the cloth to the full reeded width of the warp. When they do not do this there is something wrong somewhere and a few words here about setting and adjusting a temple where it will do its work well, may not be out of place. A

good temple for all heavy work is the *Hardaker* type and it needs no further description as it is the type of temple common to almost all weave shops.

A properly working temple should accomplish the following: (1) It should conform to the shed line and offer no hindrance to the shuttle in entering or leaving the shed. (2) It should follow the beat of the cloth as it works slightly back and forth in weaving, as otherwise the cloth would be in more or less danger of being cut by the temple. (3) It should be free to rise and fall with the different shedding heights, inseparable from many weaves.

It should be set where the delicate pins of the temple rings cannot come in contact with the race plate and if set as the makers intended it to be set, they never will. This can all be easily accomplished by first being sure that the bar upon which the temple stirrup is mounted, swings freely and does not pinch nor bind anywhere, when the cloth strain comes on the temple. Next see that the temple barrel is up well under the temple cap and that the cap is held down as it should be by its lock screw, also that the rings turn freely.

When hanging the temple, the head which slips into the swivel plate or head holder should stand higher than the barrel and the brackets should be mounted with this object in mind. The pin which holds the swivel plate or saddle to the stirrup should be well fitted in order to keep the temple square to its work. For the same reason, the head should fit well in the slides of the head holder.

When lining the temple to its work, the axial line should stand parallel with the reed and the shuttle race. The check link and screw hook should then be adjusted to let the lower part of the head (through which the bar for the rolls passes) down to within $\frac{1}{16}$ " of the shuttle race.

When the temple has been given its final adjustment in action, the coil spring can then be adjusted to let the temple work with the cloth and yet not go far enough ahead for the reed to strike it. The stirrup should stand upright when the temple has made one-half of its motion and the temple when to its forward position, should be about $\frac{1}{16}$ " from the reed line when the lay is as far forward as it can swing. Should the temple not reach to this position, do not set it forward by means of the stirrup, but loosen the bolts which clamp the head holder to the saddle and set the head holder forward to the desired position. The saddle and head holder were designed with this adjustment in view. The same feature of construction also admits of keeping the temple properly lined when otherwise it would not be so, on account of excessive wearing of the saddle pin and the holes through which it passes. Temples set as described, will help to make a bad running warp weave much better for the following reasons:

(1) The shed can be run without bearing on the shuttle race and without danger of splitting the filling bobbins or roughening the shuttles. This helps to prevent the wearing of the warp on the shuttle race

and increases the size of the shed (without increasing the throw of the harness), thus giving the shuttle room to make a true and unhampered flight.

(2) As the temples conform to the shed line and work freely, they do not in any way interfere with the straight throwing of the shuttle, thereby avoiding the danger of the shuttles cutting the warp.

(3) The temples being set with their axial line parallel to the reed and shuttle race, admits of setting them as near to the race as required and as close to the reed as necessary *to temple the cloth and hold it* while the lay is at its forward position. These two features help to improve the running of the warp and the weaving of the cloth for the following reasons: The cloth will measure wider at the reed, thus helping the warp to take the picks easier and the side wear of the warp against the reed will be prevented.

(4) On goods susceptible to filling cutting by the temples, it will prevent the temples cutting the fillings since the cloth is not dragging back and forth through the temple each pick to the full extent of the beat, but the temple clings to and moves with the goods.

By this it is plain to see that the only motion the cloth makes in excess of the motion of the temples, is that, given it each pick by the take up roll.

For comparison take the following example:

A beat of $\frac{1}{4}$ " and 56 picks.

$56 \times \frac{1}{4} = \frac{56}{4} \div 4 = 14$ " of extra motion of the cloth through the temple to weave one inch of cloth. To this add the one inch woven and there is a total of 15" of motion for each inch of cloth woven. Not only is this excessive motion the cause of temple cuts in the cloth, but it is also detrimental to the weaving in that the constant *see-sawing* will not allow the temples to hold the cloth securely, it is never properly in the temples. Does not this *fixed* temple mounting compare poorly with a swinging temple where the only motion of the goods through it is that which the take up roll gives?

On the outside temple bracket is placed a check block against which the end of the stirrup bar should come on each pick. It moves from this position to whatever lead the beat carries it, the only adjustment needed being, making the springs strong enough to return the end of the bar to the check block on each pick. The beat takes care of the rest. The rings of the temples should be examined occasionally and any hooked points smoothed off.

This article on the temples may appear overdrawn to the learner and probably to some who are not learners. Fabrics which have been difficult to handle as to templing, weaving and temple cutting, have proven the truth of this article and also the necessity of setting temples as here described.

Minor details, such as setting the barrel of the temple nearer to, or farther away, from the reed cap, pitching the temple end down or a trifle forward, have not been taken up here because such details are un-called for, that which is considered essential having been only dealt with.

FOAM-DYEING COPS.

Recent progress in the art of dyeing has made it possible to dye cotton yarn in the cop or bobbin. This can now be done even with dyes which are difficult of application to hanks, such as Turkey-red, indigo blue, and oxidation blacks, to say nothing of dyes used in connection with raw material (fibres). There are now a variety of dyeing machines, which, when properly used, give satisfactory results. The only reason why they are not more generally employed is the conservatism of dyers.

The dyeing of cops is often carried out as a special branch in order to save the unwinding and rewinding of the yarn, a point of importance as regards production. 1,000 lb. of yarn can be dyed in one day on a single machine, with the labor of two men at the most. If, however, experienced hands are available, there is a still further saving, as one man will then suffice at a wage considerably below the wages of the two. Another advantage of dyeing cotton in the wound state is that it is then less liable to breakage, and is more likely to preserve its softness and elasticity, on account of its compact condition.

At the same time this sort of dyeing is sometimes difficult for colors other than black. If bobbins or cop are dyed packed in the machine, the choice of dyes is restricted, whereas if cops or bobbins are dyed on spindles, the daily production is low, although matching is made easier.

The solution of the problem, so far as dyeing the yarn on cop or bobbins with substantive and sulphur dyes is concerned, lies in the adoption of foam-dyeing. Very simple and cheap machines for this process of dyeing are now on the market, and will dye any quantity up to 200 lb. of goods at a single operation. As a rule the right shade is at once obtained, thus matching simplified, with the result that from 3 to 5 batches a day can be turned out, depending upon the skill of the dyer. It is advisable to examine the bobbin or cop at rare intervals, by unwinding, to see whether the dye has penetrated properly.

In heating the dye-liquor, direct steam should be always employed in foam-dyeing, so that the water which evaporates is constantly replaced by condensation. At the same time, the bubbling of the steam through the bath aids both the formation and the maintenance of the froth.

Foam-dyeing is applicable also to mercerized yarns. It is as yet not understood why cops and bobbins are readily dyed through in the foam-dyeing machine even when they are very difficult of penetration in an ordinary dye-bath however long the bath may be boiled. The soap, no doubt, acts in several ways, and the froth certainly presents the dye to the yarn in an excessively finely divided form—in a state of division, in fact, measurable by the thickness of the film forming the bubble. Hence penetration is probably promoted by increased osmotic action.—(Färber Zeitung.)

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COPY FOR ADVERTISEMENTS must reach this office not later than the 25th of month preceding date of issue, to insure proper attention.

ALL COMMUNICATIONS WILL BE CONSIDERED AS CONFIDENTIAL.

Letters to receive attention must be accompanied by the signature of the sender, but this will not be published unless so requested.

We will always be glad to receive articles of a practical nature relating to the textile industries, and will publish such as are available.

EUROPEAN AGENTS: Sampson Low Marston & Co., Ltd., 100 Southwark Street, London, S E., England.

Textile Association of Overseers of Philadelphia.

An association which took the above name was formed on Saturday afternoon, September 26th, at 2028 Berks Street.

The object of the association is for the general discussion of subjects relating to the textile industry; social intercourse and general advancement of those engaged in the textile industry.

The membership of the association is open to any overseer who is in charge of any department at the time he makes his application.

The next meeting will be held on Saturday afternoon, October 17th, at 3 P. M., at 2028 Berks Street, when applications for membership may be made.

The officers of the association for the present are:—

President: Wm. Secor.

Vice President: James Stocks.

Treasurer: John Bellis.

Secretary: A. Mumford.

Further information may be obtained by addressing the Secretary.

FROM NEW YORK CITY:

Posselt's Textile Journal:—I wish to inform you of my change of address from — to —. I find it the best Textile Journal on the market, and I don't wish to miss a number. J. W. H. 10-3-08.

FROM A PROMINENT PATERSON SILK MANUFACTURER:
Posselt's Textile Journal:—I would like my subscription for the Journal renewed for the coming year. I have found it to be all you claimed it to be. J. C. D. 9-30-08.

FROM THE SUPERINTENDENT of one of N. J. largest Silk Mills, running over 800 looms:

E. A. Posselt:—Enclosed please find cash for renewal of subscription for one year. — I think the Journal O. K. J. N. 9-30-08.

FROM CHICAGO:

E. A. Posselt:—I am favorably impressed with your publication. Kindly send "Journal" commencing January, 1908, check enclosed. Best wishes and all success to you. F. C. M. 9-25-08.

FROM RHODE ISLAND:

Mr. Posselt:—I have taken your magazine for nearly one year now, and like it very much. F. A. McV. 9-27-08.

FROM PASSAIC, N. J.:

Posselt's Textile Journal:—Enclosed, please find cash for Journal, with which I am well pleased. C. V. H. 9-24-08.

FROM A SUPERINTENDENT of a N. E. Cotton Mill:

E. A. Posselt:—I have seen only a part of your Journals, and was so much pleased with it that I should like to see the whole. Please send back numbers. W. W. D. 10-3-08.

FROM AN OVERSEER OF A PROMINENT N. J. SILK MILL:

E. A. Posselt:—Enclosed find check for another year's subscription of your Textile Journal. It is without doubt

THE BEST JOURNAL PUBLISHED:

Its articles being practical and instructive.

I can assure you that it has been greatly appreciated by myself and others of my personal acquaintance. Wishing you still further success I am your very truly, F. A. C. 10-3-08.

Letters like the few samples quoted are continually received. Coming in every instance unsolicited, they speak for themselves.

In answer to all these letters, the Editor and Publisher of the Journal herewith expresses his thanks for the kind words said, also that he will preserve the standard character of the text matter and the superior designing and execution of illustrations in the Journal, trying at the same time to improve both, wherever possible. Suggestions to the latter effect are always invited and will receive prompt personal attention.

What is Plain Cloth? What is a Plain Weave?*

A. M. Goodale, Boston, Mass.

Some time ago President PLUNKETT appointed a committee to prepare "standard specifications for plain cloth." At the first meeting of the committee the question arose: What is plain cloth? The writer was appointed to bring in a definition of plain cloth, and having the pleasure of a very large acquaintance among manufacturers, decided to write to about thirty men, the list to include treasurers, agents, designers and converters:

"The writer has to prepare the definition of both plain cloth and plain weave, and if you would help him by writing to him your own opinion as to what is meant by *plain cloth* and by *plain weave*, you would confer a favor."

The answers to this letter being extremely interesting no one will wonder that after reading these letters the committee diplomatically and gracefully side-stepped this question and substituted *staple grey goods* for *plain cloth*.

ABSTRACTS OF THE ANSWERS:

(1) "I would say that I consider *plain cloth* a two harness weave only.

(2) "In our line of business we consider a *plain cloth* or *plain weave* one thread up and one thread down, every other thread."

(3) Standard dictionary defines the word *plain*—"having no noticeable elevation or depression; flat, smooth, unadorned, unvariegated," which seems to sustain my view that a piece of *plain cloth* is one that is woven one thread over and one thread under, whether one or more in a dent. A double warp is not a plain fabric but is described as written. Twill fabrics

*Abstract of Paper presented at the Semi-Annual Meeting of The N. A. of C. M., Sept. 29-30, 1908.

are not plain. We have three leaf, four leaf, and so on, twills. Fancy weaves usually have separate names, such as Armures, Momies, Plaids, Jacquards, and other fancies. It occurs to me to add that when plain cotton cloths are dyed they are usually given some special or arbitrary name. I understand that *plain cloth* and *plain weave* which you mention are grey cloths woven one up and one under like a piece of standard print fabric. My understanding of both these terms is, that they both refer to cloth woven on a plain two harness loom without Jacquard, Dobby, or Lappett attachments, one up and one down, that is where every filling thread alternately goes under and over the warp threads, and where vice versa, every warp thread goes alternately over and under the filling threads, every thread both warp and filling being woven in singly. You will from this see that in my understanding of plain cloth, I do not include any goods such as twills, etc."

(4) I understand that all *plain cloth* must be a plain weave, but that every plain weave is not plain cloth, as for instance a piece of *plain weave* might have twenty threads in the warp of 70's yarn, the next twenty of 10's yarn and so on, thus forming a stripe, or it might have simply one thread of very heavy yarn on a ground work of light yarn, the weave still being plain, forming a cord, neither of which would be plain cloth, or in a plain weave, colored yarns might be introduced, in which case the fabric would no longer be plain cloth, or in a plain weave the warp might be made of 100's and the filling say of 10's forming a ribbed or poplin effect, which would not be plain cloth. A *plain weave* is one in which each thread of the warp alternately goes under and over each thread of the filling. *Plain cloth* is cloth made in a plain weave in which all of both the warp and filling threads, except the selvage, are made of one number of grey yarn, but not necessarily the same number, and in which in case different numbers are used the difference is not so great as to produce a noticeable effect.

(5) My idea in regard to a *plain weave*, is any cloth whatever that is woven with two harness, one up and one down. I have always considered a *plain cloth* was a cloth with two harnesses one up and one down either in the grey or in the bleached, such as long cloth, cambrics, muslins, sheetings or shirtings, or any cloth of this nature. I consider that a plain weave, but not a plain cloth, and could be called a fancy cloth, would be such a cloth as a chambray or a plain gingham or stripe, where the weave was two harness, one up and one down. I discussed the matter thoroughly with a friend, and he says that a *plain weave* and a *plain cloth* is identical. That any cloth whatever woven with two harness, one up and one down, irrespective of whether it is in the grey, bleached, got colors in it or not, is a plain cloth, and that the term plain cloth covers everything that has a plain weave, namely, one up and one down, two harness. I begged to take issue with him, but he seemed to think that I was in the wrong.

(6) It is the opinion of the writer that *plain cloth* and *plain weave* do not mean one and the same thing. My understanding of the phrase plain weave is a piece of cloth of one color without ornamentation of any kind in any manner. It may be plain white or any solid color made of cotton or wool, and I should consider it plain cloth. This piece of cloth would be woven with a warp and filling interlacing at right angles and alternately warp and filling. A plain weave is that weave used on cloth interlacing at right angles and alternately warp and filling. It is one of the foundation weaves called, or known, as the plain weave or cotton weave, but fancy effects are produced with the plain weave; hairline effects, rep effects, stripes, gingham, and many other cloths using one or more shuttles.

(7) I have lain awake nights trying to think up a plausible explanation of what constitutes plain cloth and also plain weave. The result of my efforts is that a *plain weave* is one and one woven alternately with either single or double yarns. *Plain cloth* is the product of that kind of weaving. Any uneven weaving such as two and one, three and one, or cloth that has any pattern whatever to it should not be classed as plain cloth.

(8) I should think the definition of *plain cloth* might be broad enough to include not only so-called distinctively plain weave but a cloth of any color that has a smooth, flat weave and has no ornamentation on the face, either woven or printed. *Plain weave*, I should suppose would have to be confined to a 1 up 1 down weave, half of the warp is raised for one shed and the other half for the next shed.

(9) *Plain cloth* is a fabric made from single yarns and in which the quantity of warp threads and filling threads are equal, the diameters of warp and filling threads being the same, and the space between the same equal to the diameters and the warp and filling threads cross each other at right angles and pass under and over each other alternately. *Plain weave* is the alternate intersection of each warp and filling thread in passing under and over each other at right angles, and singly as in the plain cloth. It is to be understood that the plain weave is capable of ornamentation in several ways, among which may be mentioned; first, by varying the thickness of the threads technically called the numbers of the yarn, in either warp or filling or both, in the same fabric; second, by varying the number of threads per inch in warp or filling, or both, in the same fabric; third, by using more than one material for the same, as cotton and silk, etc.; fourth, by an arrangement of colors in combination with any of the previous named effects.

(10) We consider the two terms practically synonymous and should define them as the alternate interlacing of ends and picks in both warp and filling. The warp and filling must each be of the same fibre and size of yarn throughout, also count the same per inch or fraction thereof throughout the width and length of the cloth, but the warp and filling need not necessarily be the same in fibre, count or construction. We do not consider that certain ducks (2 ends as 1) nor repps (2 picks as 1) are plain cloths. The only distinction we can see between the two terms is where colored yarn effects are used on a plain weave, checks or stripes for example.

(11) I would describe *plain cloth* to be that woven of the simplest possible construction i. e., 1 up and 1 down and unbleached, not dyed, printed or ornamented in any way. I would designate a *plain weave* as any two harness work or four harness work drawn skip shaft 2 up and 2 down, using any style of yarn. (?)

(12) A perfect *plain cloth* is one in which the sley and pick are equal, with warp or filling of the same size or count and of a size or count in relation to the sley and pick to give the proper angle or curvature to the threads. A cloth continues to be a plain cloth wherever the warp and filling intersect alternately until there is such a preponderance of one (warp or filling) over the other, that the cloth is given a distinctive characteristic peculiar to its own construction. All cloths made by the alternate intersection of the warp and filling are *plain weaves*.

(13) I should say in a general way it would mean any goods that were woven on a plain loom, but as you know, there are hundreds of varieties of goods of this kind. The yarns might run as low as No. 10 and as high as No. 120 and there might be peculiar combinations of very fine filling and very coarse warp or vice versa, and still come within the description of plain cloth; and I do not see how a specification can be prepared for such cloths that could be called a "standard." It seems that the purchaser determines the specifications largely. I do not think the question as quoted in your letter is very intelligent, unless there are some qualifications which you have not stated.

(14) I have always associated the term *plain cloth* to mean plain weave, but presume, however, that technically some *plain weave* might be classed as fancies, for instance: a crepe cloth that is drawn up by reason of excessive twists in the yarn, or a cloth where the difference in the size of the yarn introduced would produce a corded effect, or something of that nature.

(15) My idea of *plain cloth*, or a *plain weave*, is a fabric that can be woven with two harnesses and one shuttle and contains grey yarns.

(16) It would seem to me that *this* would be simply two-harness work, ordinarily, but I suppose there are ways by which the warp threads can be drawn on two harness work so that the cloth is neither plain cloth nor the weaving plain weaving.

(17) My understanding of *plain cloth* and *plain weave* is simply the ordinary print cloth or sheeting fabric, in distinction from anything in the way of a twill or fancy weave of any kind, calling for more harnesses.

(18) I should say that *plain cloth* is a cloth without ornamentation of any kind with a warp of uniform number of yarn and a filling of uniform number of yarn, woven in perfectly

regular count having neither cords inserted or fancy stripes in weave or check and without color in either warp or filling. *Plain Weaving.* The result of plain weaving must be plain cloth except that yarn in colors making stripes, chambrays and a few corded goods not requiring two or more beams in the weaving may be made in plain weave. Result of plain weaving may be obtained from looms equipped with fancy motions.

(19) I have always considered *plain weave*, to be a weave with two harnesses plain drawn. Goods with a stripe would be a plain weave, but not plain cloth. *Plain cloth* is two harness weave, with the warp all one number and the filling all one number, to get the desired weight and pick.

(20) By a *plain weave*, I mean a cloth with pick and pick weave and uniform. By *plain cloth*, a cloth with this weave and with the warp and filling near enough in size so that neither of them is prominent to the eye over the other. Commercially, I understand that any cloths that can be woven on plain looms with *no more attention* from the weaver than plain cloth, would for simplicity be classed with plain cloth. This would include twills and satteens up to five harnesses.

(21) In our work, it is customary to classify *plain cloth* entirely on a two harness weave, thus twills and satteens would not come under the head of a plain cloth, nor would any style requiring a Dobby. Should think it might apply to any cloth not requiring a Dobby.

(22) I divide weaves into three kinds, plain, twilled and fancy. The *plain* includes all two harness work. The twilled take in three (or more) harness work made with regular cams. The fancy cover all cloths requiring head motions or dobbies. As gingham require drop boxes, some may not class them as plain weaves, but I incline to letting the harness work determine the weave regardless of shuttle boxes. So much for weaves. A *plain cloth* I understand to be one made without dyed material and in a plain (and possibly a twilled) weave.

(23) I should say that a piece of cloth made with the ordinary selvage or tape selvage where the filling is about the same number as the warp with single yarn, or finer, would be defined as a *plain weave*. I do not consider that where the filling is coarser like a soiesette construction or a repp that it is a plain cloth or any cloth that requires a Dobby selvage. While a poplin, soiesette, mull and repp are woven on a plain loom it does not seem to me as though they should be classed as plain cloth.

(24) Looking at it from a designer's point of view, the definition of a *plain* standard weave would be a piece of cloth made with two harness, one thread drawn in one eye, and two threads in one dent of the reed; this would be considered a strictly plain weave. A warp drawn into three harness, an equal amount of it on each shed, one thread in each eye, and three ends in one dent or two ends whichever way might be desired, would not be considered a standard plain cloths, as a variety of quite fancy cloths could be produced in this way. Standard checks like gingham, must be considered in a class by themselves.

(25) Our understanding of the matter has been that by *plain cloth* is meant a two harness cloth woven by two harnesses, one up and one down and we cannot conceive of any other construction being put upon it.

(26) My understanding of this matter is that *plain cloth* is not necessarily made with a plain weave. My definition of plain cloth would be a cloth woven with uniform warp and uniform filling, having a uniform surface with no ornamental effect either in stripe or spot, and a *plain weave* is cloth that may be made with two harnesses, with one-half the warp raised for one shed and the other half raised for the next shed, each half of each shed being formed of alternate warp threads.

(27) *Plain cloth* is a two harness weave with every other thread in the same harness and only one pick in a shed. A *plain loom* is a loom without a head.

The great divergence of opinion in the correspondence shows forcibly the need of definition that shall be comprehensive, complete, and standard.

In all twenty-seven answers were received, and after threshing them all out, the writer with much diffidence offers the following definitions:

(28) A *plain weave* uses two harnesses, each harness carrying one-half of the warp threads drawn in uniformly

and alternately, and each thread of the warp alternately goes over and under each thread of the filling. Any number, any kind of yarn may be used either in warp or filling.

Plain cloth is cloth made in a plain weave of grey yarn (*i. e.*, not colored), in which all of the warp threads, except the selvage, are made of one number of yarn, drawn uniformly one or two ends in one dent through reed and with practically uniform tension, and in which the filling threads are one number of yarn. The numbers of the warp and filling need not be the same, but when different numbers are used, the difference must not be so great as to produce a noticeable effect in the cloth, and both the warp and filling threads must have approximately standard twists.

Cancellations of Orders. Their Cause and Remedy.*

By Walter S. Newhouse, of the New York Bar.

The dry goods trade presents to one not familiar with the cause, a condition of affairs which, if not unique, is at least extraordinary. In all other trades and kinds of business a contract, whether verbal or written, is still a contract with all the word implies. In the dry goods trade a contract appears to be such only in the event that both parties find it to their mutual convenience to acknowledge its existence.

From the earliest times the law of contracts has been recognized and upheld, and the observance of a contract is the foundation stone upon which the whole of our business structure is built. Why should the dry goods trade be conducted upon different lines?

If a man gives an order for a thousand pounds of sugar, at a certain price per pound, it is presumed that he expects to take what he has contracted for, and if he does not, the seller compels him to accept the same; on the contrary, if a man gives an order for a thousand yards of cloth, at 50 cents a yard, he gives it apparently with the mental reservation that he will take it upon two conditions: First, that he cannot buy elsewhere and before the time of delivery, at a lower price, goods that will answer the same purpose as those for which he has contracted to pay 50 cents. Second, that when the time of delivery comes he will take only as many of the goods as he can use, simply canceling the order in whole or in part, and leaving the seller with the goods on his hands.

Whose fault is this? Is it the mills, is it the commission house, is it the selling agency's, or is it the purchaser's. The blame must be laid somewhere.

The mills are naturally, continually pressing the selling agent for orders, so that their plants shall not lie idle. The commission house is equally interested in large sales, upon which its commissions is based. The selling agent is between the two horns of a dilemma. On the one hand he is being continually prodded by his mill for more orders. On the other hand he hesitates to send in too large orders to his mill for fear of cancellation, while the buyer, secure in the knowledge that he will not be called upon to live up to the terms of his contract, gives orders greatly in excess of the quantity he can use.

Another cause of this unsettled condition is that the selling agent frequently sells goods which he knows it is beyond the power of his mill to manufacture. In other words, although the mill is sold upon a certain line the agent still continues to take orders on that line, presumably with the expectation and, indeed, the hope that some of his other customers will cancel their orders, and thus afford him a chance to fill all orders at least in part.

It thus appears that the root of the evil lies in the fact that cancellations of orders once given are accepted as a matter of course by the seller.

THE REMEDY. There has been in existence from early times a statute known as the Statute of Frauds and Perjuries, and this statute of English origin, has become a part of our law. In brief, it provides (so far as is applicable to the subject under discussion) that no contracts for the sale of merchandise shall be enforceable where the amount involved is over Fifty Dollars, unless there has been a part delivery and acceptance under the contract, or unless there has been some memorandum in writing made, signed by the party to be charged.

This statute, originally intended as a safeguard against unscrupulous sellers who might claim that a certain contract of sale existed and perjure themselves to prove its existence, has become a shield in the hands of equally unscrupulous buyers, who enter into contracts of purchase of goods, at a

*Abstract of Paper presented at the Semi-Annual Meeting of The N. A. of C. M., Sept. 29-30, 1908.

certain price and secure in the knowledge that they cannot under existing conditions, be compelled to perform owing to the protection of the statute, decline to fulfill and when called upon to do so, say to the seller "you have nothing in writing from me to prove the contract and I have not accepted any portion of your goods and you cannot hold me to the bargain." Under the circumstances the mill or other producer is helpless.

The impression is prevalent throughout the trade that the mere receipt of a "copy of order" by the buyer binds him to accept the goods and creates a written contract. Such is not the case. The statute provides that the memorandum in order to be binding must be signed by the party to be charged; in the majority of cases this is the buyer. It is not necessary that either party shall sign any printed contract or form. The contract may, and in many cases is evidenced by letters passing between the parties in reference to the particular transaction, but such letters in order to form a valid contract, must contain all the material terms of the contract, such as quantity, quality, price, terms and date of delivery. If any of these elements is lacking in the correspondence, the memorandum is not such a one as satisfies the statute, unless by the terms of the correspondence it is clear that the particular order in question was given for the same quantity of goods and upon the same terms as other and previous orders between the same parties.

Going upon the assumption that the seller has acted in good faith, and intends to deliver in accordance with his contract, he should send for the buyer's signature with each "copy of order," a printed slip referring in terms to the particular "copy of order," and acknowledging its receipt with a request that the buyer sign the slip and return the same to him. This slip the buyer should sign and return to the seller thereby acknowledging receipt of the "copy of order" referred to therein.

The writer in making the above suggestions to various houses, has been met by the objection, "We don't like to insist upon such a thing, for the buyer might think that we were questioning his good faith." The answer to this is, that when a man enters into an obligation which he intends to fulfill, he does not hesitate to commit himself in writing, and if the buyer refuses to sign such a memorandum it must certainly be apparent that he will not fulfill his contract unless it suits his interests so to do. It would seem that such a class of trade can well be dispensed with.

In order to establish such a system in the present demoralized condition of the trade, concerted action is necessary, and it is believed that the time must come, and soon, when a policy similar to the one outlined will be adopted by all mills and commission houses, and in fact this course has been adopted with satisfactory results by many houses.

PART DELIVERY AND ACCEPTANCE. In the event that an order has been given which the buyer declines to acknowledge, and there is not a sufficient memorandum in writing to create the contract, the next question to determine is whether there has been such a part delivery and acceptance of the order as will enable the seller to enforce the contract.

Thus, if an order has been given for five hundred pieces of a certain quality and price of goods, a delivery of a "selling sample" will not, it is believed, constitute a part delivery and acceptance, whereas a delivery of a "sample piece" would constitute an acceptance under the contract, provided the mill could show that the piece was delivered with that intent and was charged up against the particular order. The mere fact that the buyer has not paid for the piece delivered, and subsequently cancels his order, does not release him from responsibility. The statute does not require payment on the part of the buyer, merely acceptance.

REASONABLE TIME FOR ACCEPTANCE. The receipt by the buyer of sample pieces does not of itself constitute the acceptance required by the statute. The buyer must have a reasonable time within which to inspect the goods to see whether they conform to the order. What is a "reasonable time" is, of course, a matter to be determined by the facts of each particular case.

If a buyer receives a part of the goods, and after a reasonable opportunity to inspect, does not raise any objection to the quality of the part received, he will not be permitted for the first time upon receipt of the balance of the order to raise such objection, provided the balance is of the same quality as the part delivered.

SALE BY SAMPLE. Where there is a sale by sample the sole obligation on the part of the mill is to furnish goods in accordance with the sample shown, and goods which so conform must be delivered. The mere fact that goods when received may not "make up right" affords no excuse for a

cancellation of the order, and the buyer can be compelled to perform, if the goods offered are of the same quality as the sample shown when the order was given.

As disputes between buyer and seller most frequently arise on the point as to whether the goods delivered are like sample, it will afford protection to the mill to have it appear upon the written "confirmation of the order" that the sale was made by sample, and to attach thereto a small sample of the goods ordered, leaving a duplicate sample with the buyer.

In cases where sale is not made by sample, but merely by description, as often happens, the only thing that the seller warrants is that the goods are merchantable—that is, that they are free from extraordinary defect, and such that they would be saleable among merchants in that particular class of goods under the description given.

GOODS TO BE USED FOR A SPECIAL PURPOSE. Unless goods are bought for the special purpose of being made up into a particular line of garment, and this fact is made known to the seller at the time of giving the order, there is no implied warranty on the part of the seller that the goods sold will make up satisfactorily for that or any other particular use.

If it is the intention of the parties to the contract at the time of the giving of the order that the goods ordered are to be used for such a special purpose, that fact should clearly appear upon the face of the contract, and if it does not, there is no responsibility on the part of the mill, provided the goods are either like sample or merchantable.

GOODS MADE TO ORDER. The general rule, that in order to constitute a valid contract for the sale of goods, there must be either part delivery and acceptance of the goods or a sufficient memorandum of the contract in writing, has, in most States of the Union, an exception in cases where the goods ordered are not in existence at the time of the giving of the order, and are manufactured out of raw material solely for the purpose of filling the particular order given. In other words, if the order is not filled out of stock, but the goods are especially manufactured to order and their manufacture is not begun until after the giving of the order, the purchaser can be held to his contract if the goods have been made in whole or in part before the cancellation of the order, even though there is no memorandum in writing signed by the party to be charged and although no part of the goods has been received by the buyer.

REMEDY OF THE BUYER. Although in the vast majority of cases it is the buyer who attempts for various reasons to rescind the contract of purchase and to relieve himself from the necessity of accepting goods ordered, yet on occasion the seller may likewise find himself unable to make deliveries in accordance with his contract. Under such circumstances if he declines to release the seller, the buyer of the goods has the following remedies.

(1) He may go into the open market and buy at the market price goods which most closely resemble those contracted for, and hold the seller for the difference between the contract price and the market price.

(2) He may recover at once from the seller the profit which he would have gained had the seller lived up to his contract to deliver, and that profit would usually be the difference between the agreed price of the goods and their fair market value as advanced at the time and place of delivery together with interest.

Of course if the price of the goods has declined between the date of the contract and the time of delivery, there will be no loss, and hence can be no recovery.

If, however, the buyer upon the faith of his contract of purchase has entered into other contracts dependent upon the original contract and cannot perform such other contracts because of the failure of the mill to furnish the goods, he is then entitled to recover from the seller not alone the difference in price, but also such other damages as he has sustained on account of such failure of the mill to deliver.

This rule will apply in cases where the buyer has resold in advance at a profit the goods purchased from the mill.

THE SELLER'S PRIVILEGE. When a sale has been made under such circumstances that the seller can enforce his contract and the buyer refuses to perform, the seller has three remedies to pursue:

(1) He may store and retain the property for the buyer and sue the buyer for the entire purchase price.

(2) He may sell the property for the buyer's account and recover the difference between the contract price and the price obtained upon the resale; or,

(3) He may keep the property as his own and recover the difference between the market value of the goods at the time and place of delivery and the contract price.

THE WHITIN GINGHAM LOOM.

This loom is designed for the manufacture of plain, fancy and figured gingham, constructed with up to and including 6-harnesses.

Head Motion. The same is of the cam-loom type, *i. e.*, the harnesses are operated (raised and lowered) by cams, located below the travel of the warp. These cams are secured to an auxiliary shaft, independent from the cam shaft, and are driven from the latter by means of a chain of (3) gears. The *driver* of this chain of gears is secured to the cam shaft which also has secured to it a stud, carrying an *intermediate* gear for transmitting motion to the *driven* gear, fast on the auxiliary shaft, previously referred to as carrying

THE COMBINATIONS OF GEARING USED ARE THUS :

For 2-harness, i. e., the plain weave, use :

36 tooth driver (gear on cam shaft),

36 " intermediate, and

36 " driven (change gear on auxiliary shaft).

For 3-harness, i. e., the 3-harness twills, use :

24 tooth driver,

36 " intermediate, and

36 " driven.

For 4-harness weaves use :

18 tooth driver,

36 " intermediate, and

36 " driven.

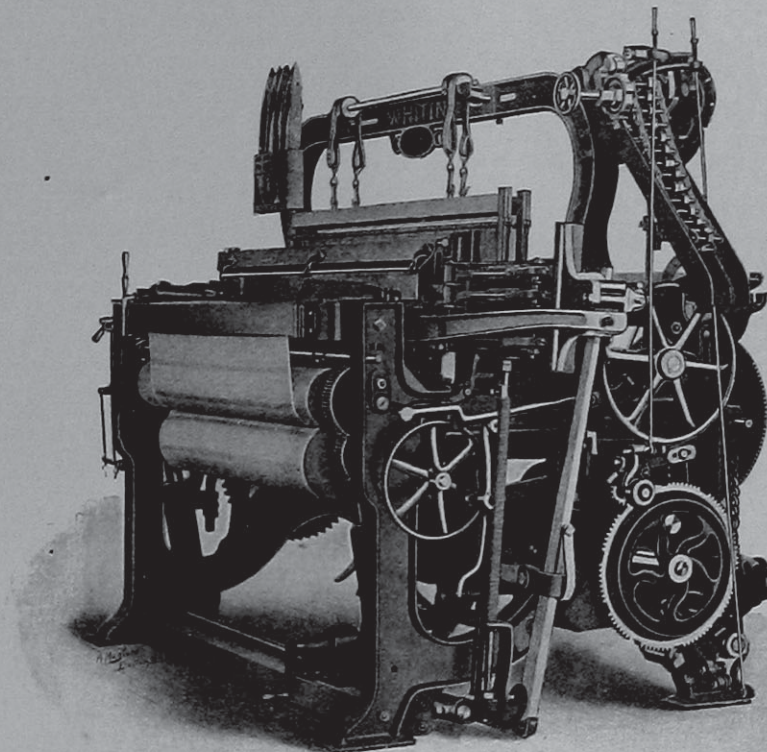


FIG. 1. THE WHITIN GINGHAM LOOM.

the cams. This driven gear is a change gear and by means of it changes as to the rounds of picks in pattern are made, *i. e.*, whether weaves repeating with 2, 3, 4, 5 or 6 picks are to be used.

Three different sizes of driver gears (36, 24 and 18 teeth) are placed by the builders on the cam shaft, either one of which can be used, so as to take in any weave up to 6-harness.

The intermediate gear used is in every instance a 36 tooth gear, for the reason that this gear only transmits the motion from the driver to the driven, and does not come into any consideration in calculations.

The driven gear, *i. e.*, the change gear on the auxiliary shaft, is either a 36, 45 or 54 tooth gear, according to whether 2, 3, 4, 5 or 6 harness weaves (cams) are used.

For 5-harness weaves use :

18 tooth driver,

36 " intermediate, and

45 " driven.

For 6-harness weaves use :

18 tooth driver,

36 " intermediate, and

54 " driven.

THE CAMS. In order to provide an easy running loom and to produce a perfect *cover* to the cloth woven, the Whitin Machine Works take the greatest of care in the construction, *i. e.*, design of their cams. They are drawn out with mathematical precision, allowing proper time for the opening and closing of the shed for different widths of cloths and sizes of shuttles to be used. The rise and fall of the cams are designed

according to the well known *crank-motion movement*, whereby the motion of the harnesses is without jar and of the smoothest possible action.

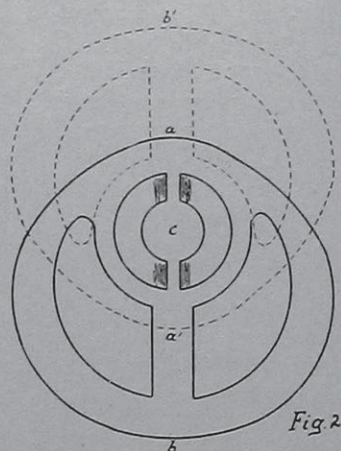
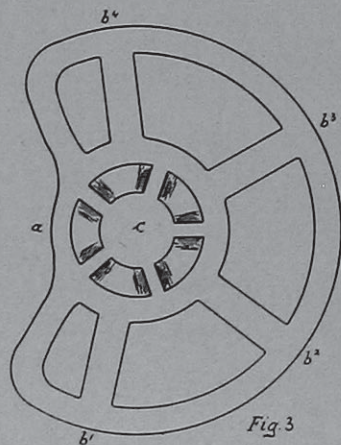


Fig. 2 shows us a pair of their 2-harness cams (cast in one piece), one cam being shown in solid lines, and the other in dotted lines. *a* and *a'* respectively show the *up* for the harnesses, and *b* and *b'* respectively the *down* for the harnesses.

As will be readily understood, one revolution of the auxiliary shaft *c*, as carrying the set of cams, is made for each 2 picks of the loom. Each cam is provided with a depression or slot in one side, which engages the raised portion or lug on the cam to which it is secured. These two cams, placed on the cam shaft, are held together by means of a nut on the auxiliary shaft, and so secured as a unit.

Fig. 3 shows us one of a set of five cams as necessary for weaving a *one up four down* 5-harness twill or satin.

a shows the *up* of the harness, and *b*¹, *b*², *b*³, and *b*⁴ the *downs* of the harness. Five similar constructed cams are needed for the set, each cam being set (with reference to point *a*) one pick ahead or back (according to direction of twill line desired on face of fabric)



for the twill weave, and either 2 or 3 points ahead (depending again on direction of twill line desired on face of fabric) for the satin. *c* indicates the auxiliary shaft, onto which the cams are secured. Each cam is provided with a depression or slot in one side, which engages the raised portion or lug on the cam to which it is secured. The five cams, placed on the cam shaft,

are held together by means of a nut on the auxiliary shaft, and so secured as a unit.

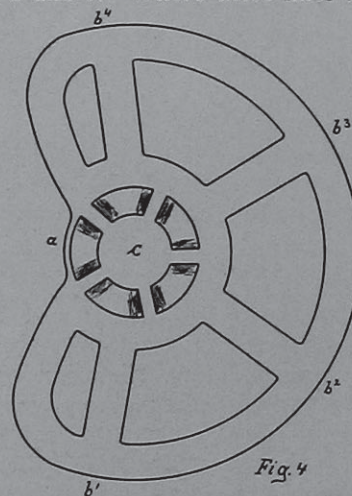
Cams can be made somewhat larger or smaller, to suit the class of fabrics they are used for, *i. e.*, whether a large or a small shed required.

Fig. 4 shows a similar cam for the *one up four down* 5-harness twill, showing a *large shed cam* compared to the cam shown in Fig. 3 and which we can designate as a *small shed cam*.

THE CONSTRUCTION OF CAMS. The same is readily explained by means of diagrams Figs. 5, 6, 7 and 8.

Fig. 5 shows the construction of a 4-pick cam (commonly called a 4-harness cam) working 2 picks *down* (see 1 and 2) and 2 picks *up* (see 3 and 4).

In laying out this cam, ascertain first height of shed desired, giving you in turn the dimensions, *i. e.*, distances apart of circles *a* and *b*. Next divide circumferences of circles *a* and *b* into four quarters, see dotted line *d* and *e*. Where these lines *d* and *e* touch



the outer circle *a*, it indicates where the *down* on the cams come in (see 1 and 2 in our diagram), again where lines *d* and *e* cross the small circle *b*, it indicates the places where the *up* on the cam comes in. The connection between *up* and *down*, or vice versa, according to weave desired, must then be drawn so as to allow a most easy changing of the harness from *up* to *down* or vice versa.

Fig. 6 shows in a similar way the planning for a 4-pick cam, designed for raising the harness for one pick *up*, and leaving the same for 3-picks *down*. Letters and numerals of references are selected to correspond to those given in the preceding example, hence no special explanation required.

Fig. 7 shows us the planning for the reverse cam from the preceding example, *i. e.*, cams designed to weave one pick *down* 3 picks *up*. Letters and numerals of references being again used to correspond to those used in the former examples, hence, no special explanation is necessary.

Fig. 8 shows the planning for a cam with 6 picks to the round, for weaving 1 pick *up*, 2 picks *down*, 2 picks *up* and 1 pick *down*. Numerals 1, 4 and 5 show the *ups* on the cam surface and 2, 3 and 6, the *downs*.

These four examples, in connection with the three diagrams taken from actual cams, will readily explain

to any boss weaver how to proceed to construct any cam for any weave desired.

A COLLECTION OF WEAVES for fabrics of this loom is given on plate Fig 9.

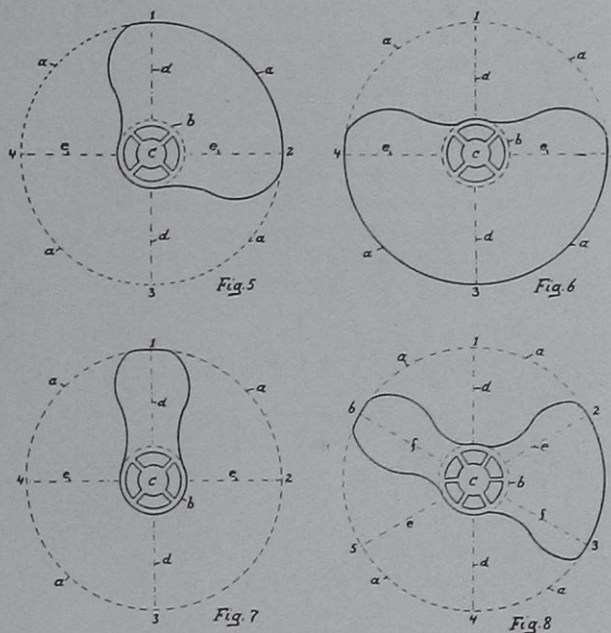


Diagram #1 shows the plain weave and which can be woven with either 2, 4 or 6-harness.

#2 is the common filling rib effect or flat cord effect weave, derived from the plain weave by drawing 2 warp threads in rotation on each harness. In the same manner, 3 or 4 warp threads to the cord can be used, by simply drawing correspondingly 3 or 4 warp threads in rotation on each harness.

#3 is the 3-harness twill, filling up.

#4 is the 3-harness twill, warp up.

#5 is the 4-harness, uneven sided twill, filling up.

#6 is the 4-harness uneven sided twill, warp up.

#7 is the 4-harness even sided twill.

#8 is the 4-harness uneven sided broken twill, filling effect, and

#9 its mate or warp effect. This weave produces a very smooth face and is frequently also considered as the 4-harness satin weave.

#10 is a small check, *i. e.*, a granite effect for 4-harness. This weave requires two kinds of cams used, *i. e.*, 2 cams weaving plain and 2 cams taken from the 4-harness even sided twill.

#11 is the 4-harness even sided broken twill, a most excellent weave and extensively used by the cotton mills when required to produce small broken effects.

#12 is the 4-harness basket weave.

#13 and #14 are the two granite weaves for 4-harness, each calling for two different styles of cams used.

#15 is the 5-harness 4 up 1 down twill, warp effect.

#16 is the 3-harness, 3 up 2 down twill, warp effect.

#17 is the 5-harness, 2 up 1 down 1 up 1 down twill, warp effect.

#18 is the 5-harness satin, warp effect.

#19 is the 5-harness corkscrew.

We only have shown the warp effect for standard 5-harness weaves #15 to #19; if its mate filling effect desired, consider *empty squares* for risers or warp up.

#20 to #26 are seven granite weaves for 5-harness.

#27 is the 6-harness, 5 up 1 down twill, warp effect.

#28 is the 6-harness, 4 up 2 down twill, warp effect.

#29 is the 6-harness, 3 up 3 down, even sided twill.

#30 is the 6-harness, 3 up 1 down 1 up 1 down twill, warp effect.

#31 is the 6-harness, 2 up 1 down 1 up 2 down, even sided twill.

#32 is the 6-harness satin, warp effect, one of the most prominent weaves for fancy cotton mills.

#33 is the 6-harness even sided broken twill, broken every three threads warp ways, and

#34 the same weave but broken warp and filling ways.

#35 is what is known as the 6-harness imitation gauze weave, used frequently also for interlacing solid structures.

#36 to #41 are a collection of figured 6-harness weaves, comprising skip twills, broken twills, checker board twills and granites.

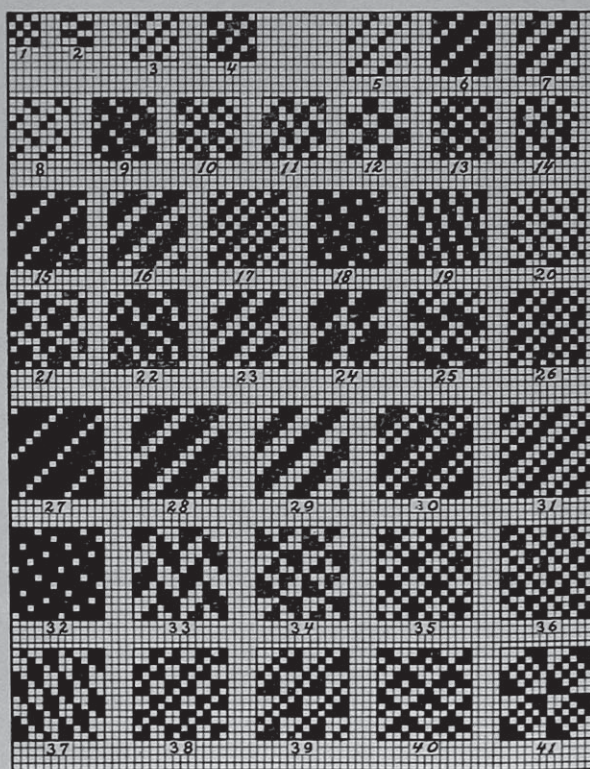


Fig. 9

As will be readily understood, most of the weaves quoted can be used with filling for face; again any number of new ones can be designed.

COMBINATION WEAVES, are also used frequently in order to produce figured stripe effects in the fabric. Four examples are given on plate Fig. 10, viz:

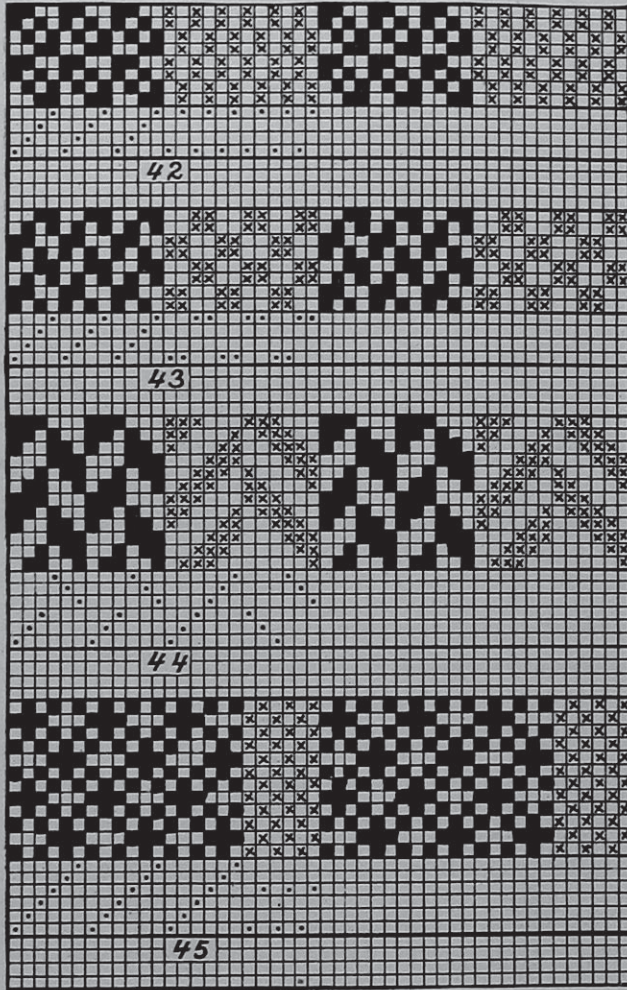


Fig. 10

#42 shows the combination of
 12 ends granite (see #10)
 12 ends warp rib weave
 —
 24 ends repeat of pattern with 4 picks to the round.

#43 shows the combination of
 12 ends 4-harness, even sided, broken twill
 12 ends 4-harness basket weave
 —
 24 ends repeat of pattern with 4 picks to the round.

#44 shows the combination of 2 different size 6-harness even sided broken twills, each drafted for 12 ends. Repeat of pattern, 24 ends with 6 picks to the round.

#45 shows the combination of
 18 ends imitation gauze weave
 6 ends plain weave
 —
 24 ends repeat of pattern with 6 picks to the round.

This weave, if desired, can be arranged for 4-harness, *i. e.*, 4 cams, with 6 picks to the round.

Each one of these four combination weaves is shown in two kinds of crochet type, it being readily understood that each one of these two weaves can be drafted for any number of threads desired. We only use a few ends of each in order not to take up excessive space for the illustrations.

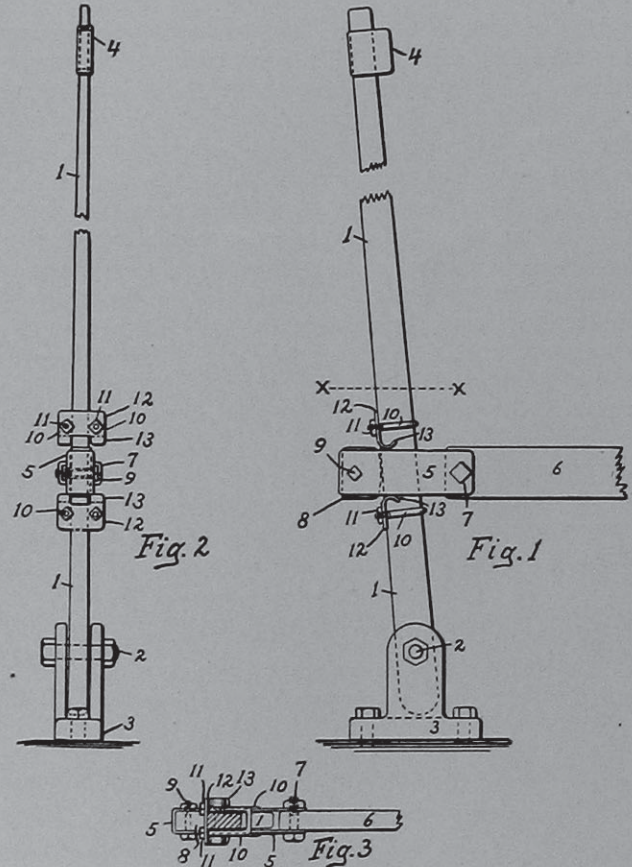
Below each weave is shown in *dot* type the foundation draft of the combination weave, or the drawing in draft for the loom.

(To be continued.)

A NEW PICKER-STICK CONNECTION FOR LOOMS.

The object is to increase the life of picker-stick by the employment of a metal lug-strap and means for adjustably fixing the position of the same upon the picker-stick without the necessity of perforating the latter when changes in the power required to throw the shuttle have to be made, and what in turn weakens said picker-stick by means of holes drilled into it for holding the screw which in turn holds the lug strap.

This metal lug strap is provided with a bunter of leather in the bend of the strap, securely held in place, and with eyes in the free ends for the insertion of a bolt for connecting the strap to the sweep-stick.



Adjusting clips are secured to the picker-stick, both above and below the lug-strap, for positioning the latter as desired.

In order to more clearly show this adjustment between picker-stick and lug-strap the accompanying

three illustrations are given, of which Fig. 1 shows picker-stick, lug-strap and sweep-stick in side elevation. Fig. 2 is an edge elevation of parts shown in Fig. 1; and Fig. 3 a sectional plan at the dotted line $x-x$, of Fig. 1.

A description of the new arrangement of securing lug-strap to picker-stick is best given by quoting numerals of references accompanying our illustrations and of which 1 is the picker-stick connected by a pivot shaft 2, to a cast base 3, of the loom. 4 indicates the picker, 5 represents the lug-strap and 6 the sweep-stick. The lug-strap, as previously referred to, is made of metal, of elongated U-form and straddles the picker-stick, and its free ends receive between them the sweep-stick 6, a bolt 7 passing through the parts and connecting them together. The lug-strap passes at each side of the picker-stick 1, and in the end thereof there is placed a leather bunter 8, connected in place by a bolt 9 which passes through the lug-strap and through the bunter; the surface of the bunter bearing against an edge of the picker-stick.

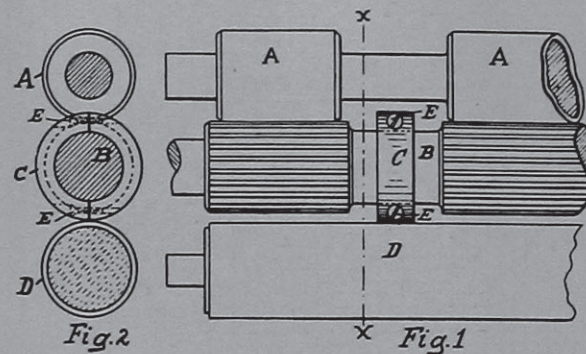
FOR POSITIONING the lug-strap and determining the relation thereof along the picker-stick and its distance for the pivot shaft 2, two adjusting clips are provided. The same are made alike, but are reversed when in position on the stick. Each clip comprises a metal yoke 10, with free threaded ends, on which there are nuts 11, and a plate 12 notched and provided with forked or curved ends 13. The plate 12 presses against the back edge of the picker-stick, while the bent portion of the yoke passes around the front edge of the picker-stick, and the threaded ends of the yoke pass through holes in the plate, the nuts clamping the parts together upon the picker-stick. The curved ends pass over the opposite faces of the picker-stick toward the centre, and when these clips are arranged in opposite positions the curved ends 13 come closely adjacent to the opposite top and bottom edges of the lug-strap 5; in fact the latter rests upon the curved ends of the lower clip, rocking thereon with the swinging movement of the picker-stick. Should the yoke strap, as a result of the momentum of the parts, tend to rise from its support on the lower clip, it will momentarily come in contact with the curved ends of the upper clip, and when its upper movement becomes arrested, it then temporarily rocks on the curved ends of the upper clip.

Underclearer for Ring Frames.

Underclearers are applied to spinning and twisting machines for the purpose of keeping the bottom rollers free from waste and taking up broken ends to prevent them from wrapping around the delivery rollers. As a rule, the underclearer is a roller mounted in frictional contact with the bottom drawing rollers, and thus driven by the latter at a corresponding speed. This will readily explain that any waste sliver, therefore wraps around the underclearer in exactly the same state as it leaves the nip of the upper and bottom drawing roller of the ring frame, in turn causing the sliver to wrap tightly (compressed) around the underclearer.

To overcome this disadvantage, we find that the new Underclearer is operated at a different speed of that of the drawing roller, accomplished by mounting upon the bottom fluted roller, at intervals, rings, rollers, or bosses, they acting as drivers for the underclearers and naturally drive them at a different speed from that of the drawing rollers.

This invention is of English origin and has been just lately patented here. The accompanying two illustrations will readily explain the affair. Fig. 1 shows in front elevation, portions of a set of front drawing rolls of a ring frame, also a portion of the Underclearer. Fig. 2 is a sectional side elevation on line $x-x$ of Fig. 1.



In said illustrations, *A* is the top, leather covered, roller and *B* the fluted bottom roller of a ring frame. (As will be readily understood, the affair refers just as much to the bulk of our ring frames and where "Metallic Drawing rolls" are used for both, top and bottom drawing rollers; also to twisting frames in place of the ring frame). *C* shows us one of a series of metal rings, two of which are mounted upon each section or length of the bottom fluted roller *B*. By the use of these rings *C*, the underclearers *D*, are caused to travel at a greater surface speed than the bottom drawing rollers, in consequence of which any fibres taken from the sliver passing between the drawing rollers is attenuated and in consequence made thinner and softer. It is this attenuated sliver that is taken up by the underclearer, although, as shown in the illustrations, said underclearer does not rotate in contact with the bottom drawing rollers. This will prevent compressing or hardening of the waste sliver, and owing to this, the operative can easily remove the waste sliver from the underclearer by his fingers. This change in position and surface speed of the underclearer, it is claimed by the inventors, at the same time, also minimizes the production of bad ends, *lappers* and *riders*, and makes piecing up easier.

As the sliver passes through the three pairs of drawing rollers of a ring frame, it moves in an almost horizontal direction. When the sliver emerges from the nip of the last pair of rollers, it will, if it be free, follow this horizontal direction for an appreciable distance and then curl inward and follow the circular travel of the rollers, in consequence of which feature it is possible for a roller set slightly below the bottom drawing roller to take up the waste sliver. Moreover, a number of fibres project quite sufficiently from the

outside of an untwisted sliver to enable a roughened surface to attract them and to draw the whole of the sliver from the surface of a fluted roller. The distance between the bottom fluted roller *B* and the underclearer *D* is determined by the thickness of the rings *C*, which comprises two metal half rings fastened on the bottom drawing roller, where required, by means of screws *E*.

DICTIONARY OF TECHNICAL TERMS RELATING TO THE TEXTILE INDUSTRY.

(Continued from page 66.)

- DIPHENYL OR DIPHENYLAMINE:**—A substitute aniline, which when pure is a solid crystalline body melting at 45° C. and distilling without change at 310° C. It is chiefly characterized by its power of yielding deep blue products of great tinctorial power on treatment with certain oxidizing agents. Produced by passing Phenyl chloride or iodide or aniline vapor through a hot tube; also by simply heating aniline hydrochloride to 300° C., or by treating aniline with potassium (not sodium) and acting on the product with Phenyl bromide.
- DISTAFF OR STAFF:**—A stick, about three feet long, used in the earliest practice of spinning. On this staff was wound a quantity of the material (wool, cotton or flax) to be spun. The lower end of the staff, during the spinning, was held between the left arm and the side of the spinner, the thread, passing through and being gauged by the fingers of the left hand, was drawn and twisted by the fingers of the right hand, and in turn wound on a suspended spindle, made to revolve like a top and which completed the twist.
- DIVI-DIVI:**—The native and commercial name of *Caesalpinia coriaria* and its pods. The pods which are about 2 inches long by $\frac{3}{4}$ inches broad and curled in a remarkable manner are exceedingly astringent, containing a large portion of tannic and gallic acid and for this reason are sometimes used by dyers or calico printers.
- DOBBY OR WITCH:**—The head motion of a loom which operates (raises or lowers) the harness frames; sometimes when operating a great many harnesses considered a small Jacquard machine; also called Index machine.
- DOESKIN:**—A compact, closely woven (5-harness satin, warp face) face finished woolen cloth.
- DOFF OR DOFFING:**—To take off or strip off, cotton, wool, etc., fibres from the clothing of the carding engine.
To remove or take away the full bobbins or cops from spinning machinery, so as to make room for empty ones.
- DOFFER:**—In carding, the cylinder covered with card clothing which removes the fleece from the main cylinder.
The person removing the filled bobbins or cops from the spindles of spinning machinery.
- DOFFING KNIFE:**—A finely toothed steel blade in a carding engine, operated at a high speed reciprocating motion, used for removing the sliver from the doffing cylinder.
- DOLLERAH COTTON:**—A class of East India cotton.
- DOLMAN OR DOLIMAN:**—A long outer garment, open in front, and with close sleeves, worn by Turks. A mantle with cape like appendages in the place of sleeves, worn by women.
The jacket of a Hussar, ornamented with braid and worn like a cape, the sleeves hanging close.
- DOMETT:**—A flannel cloth having a cotton warp, napped on both sides, resembling canton flannel as is napped on one side only. It shrinks but little in washing, and is extensively used for shirtings, etc.
- DOMINO:**—A loose flowing hooded cloak, forming an outer ecclesiastical vestment; also the hood separately. Also the garment of a similar pattern worn by masqueraders.
- DONSKOI OR DONSKY:**—A specie of wool of coarse quality, from Russia.
- DOPPIONE:**—A coarse, uneven, raw silk, reeled from double cocoons, *i. e.*, in the case where the worms have spun their cocoons side by side and so joined them that it is necessary to reel them together, the end of neither cocoon being free without the other. Its unevenness makes it unsuitable for good class work, hence its use is confined to the manufacturing of the cheaper silk fabrics and heavy sewing threads. It is generally of a light yellowish color.
- DORIAH STRIPES:**—Plain cloth with crammed stripes of same color. Uni-colored seersuckers.
- DORNICK:**—Damask linen, hangings and carpets, manufactured at Tournai (Flemish Doornik) Flanders.
Damask linen made at Dornoch in Sutherlandshire, Scotland.
- DORSET OR DORSET HORN SHEEP:**—A specie of sheep found in the southwest of England, principally in the county of Dorset. A clean, soft wool, rather longer but not as fine as the *Downs*. The weight of the fleece is about four pounds.
- DOSSAL OR DOSSER:**—Draperies of silk, or other handsome material, hung at the back of an altar, or of a stall, and sometimes at the sides of the chancel in a church or cathedral. Different colored dossals are used for different festivals.
- DOSTEE:**—A low grade cotton fabric woven of double threads, used for tents, floor cloths, etc.
- DOUBLE & TWIST:**—(technically written *d. & tw.*) Two threads of wool, worsted or cotton yarn twisted together. When the minor threads are of a uniform count, expressed by putting a 2 in front of the number of the single yarn, separated by an oblique dash; for example, 2/32's means that two single ends of 32's yarn are twisted together.
- DOUBLE CLOTH:**—The fabric produced by the union of two single cloth structures during weaving, either for special ornamental effects or to increase the bulk of the cloth.
- DOUBLE DYEING:**—A method of dyeing fabrics composed of distinct or mixed wool and cotton threads, in which the wool part is first dyed with a dye that has no affinity for the cotton, after which the cotton part is dyed with a dye that has no affinity for the wool; then finishing the fabric.
- DOUBLE-FACED:**—A fabric presenting a pattern (or face) on each side; as double-faced satins, reversible overcoatings, etc.
- DOUBLE KNITTING OR REINFORCING:**—Knitting producing a double instead of a single web, used for parts requiring extra strength, as for example, the heels of stockings, or with a view of securing greater warmth, for example, fleece lined underwear.
- DOUBLE PICK:**—Two picks run by mistake into the same shed of the warp during weaving.
- DOUBLE PLAIN REVERSIBLES:**—Double faced fabrics figured by exchanging two plain interlacing structures of different color or color combinations after a given pattern.
- DOUBLER:**—A doubling machine.
In calico printing, a blanket or felt placed between an impression cylinder and the cloth to be printed.
- DOUBLE SATINS:**—A subdivision of the regular satin weaves.
- DOUBLE SOLE, HEEL AND TOE:**—Indicates an extra thread added to hosiery at points mentioned. Strictly speaking, the word *double* refers otherwise than where mentioned only to single thread goods.
- DOUBLE PLUSH:**—Two pile fabrics woven together, face to face, the pile being severed by a reciprocating knife on the loom. The ends of the threads thus cut to separate the goods, form the pile or plush on each fabric structure.

(To be continued)

THE IMPROVED MODEL, PATENT BALL WARPER.

Built by The Globe Foundry and Machine Co., Inc.

The same is shown in the accompanying illustration in its perspective view and promises to revolutionize ball warping as now in vogue. The machine is of rigid construction, simple in operation and like its predecessors safeguarded by electrical stop-motions at several points.

- The machine in its entirety consists of three parts,
- (1) the creel for holding the bobbins,
 - (2) the measuring device, and
 - (3) the winding mechanism.

warp put on the shell (beam for holding the ball warp) and a small dial for measuring the length of a cut. The large dial is made to indicate up to 24,000 yards, although as a rule only up to 10 to 12,000 yards are used, the smaller dial being made to measure up to 1,000 yards. Either dial can be set to any number of yards below numbers quoted, to suit amount of yarn desired to be put on shell or desired number of yards in cut. Two leases are taken between each cut. Both dials are connected with the electric stop motion of the warper as well as with a bell. When the bell rings and machine stops, it indicates that either a cut has been wound on and leases have to be taken, or that



THE CREEL. The same is of the V-type shape, with a direct pull, the thread of each bobbin being in turn passed separately through a detector wire, loosely pivoted on an upright piece of the creel and which forms one terminal of the circuit of the electrical stop motion, the detector wires being arranged on the upright piece so as not to interfere with any movement of each other. Situated just behind this upright piece is a contact strip, which forms the other terminal for the electric circuit, so that when a detector wire swings down on its pivot, it forms a contact with the strip and thus completes the circuit with the consequent releasing of the friction drive of the differential motion.

The section of ends as coming from the creel, in turn passes through a guide reed, over and under several guide rollers, through the lease reed and in turn to

THE MEASURING DEVICE, as situated some distance away in front of the warper. Said measuring device is carried on a pedestal and is equipped with two dials, viz: a large dial for measuring the total length of

the desired length of warp has been wound on the shell and that the latter is to be doffed. When, however, the warper stops minus bell ringing, it then indicates to the operator that a thread has been broken in the creel or between the guide rolls, *i. e.*, previously to the thread coming near the lease rod.

THE WINDING MECHANISM. The warp is wound on the shell by a direct drive instead of by a friction roller drive as done in machines of former construction. This does away with all chafing or roughening of the yarn due to slippage of the friction roller, as well as squeezing out of layers at the ends of the ball due to the necessary pressure on the friction roller. It also preserves the elasticity of the yarn.

The Drive. The machine is driven by a fixed pulley on the driving shaft, attached to the far end of which is the differential motion or speed changing device, which in turn conveys the motion to a sprocket on the same shaft, which by means of a chain operates another sprocket on the traverse, spiral grooved shaft, carrying the guide as resting on the wound ball. This

shaft at the same time imparts motion to the shell on which the ball warp is wound, by means of a sprocket and chain, situated on the opposite side of the shaft, *i. e.*, producing a direct drive from creel to shell.

The ball is built up by what is known as the *regular wind, i. e.*, the number of inches for each layer being uniform for first and last layer on the shell, the shell wheel drive being provided with a *hunting tooth* in order to put each layer in a different position from the one before, in order to be able to build up a perfect ball. This change of layers is about the width of the warp fed.

The advantages of the new wind over the old are:

(1) More yarn can be wound on the shell in a given diameter, besides a smaller diameter shell can be used with consequent saving in freight charges. A shell as low as a 3" diameter can be used.

(2) Eliminating the jerking motion as characteristic to the old motion when rewinding a ball and where in the latter, on account of the friction drive, the larger the ball builds itself in diameter, the larger the spirals of the layers become and when finally on the last rounds, said spiral layers will go only about once around, hence the jerking action previously referred to, when re-winding balls produced on friction drives.

Speed Changing Device. The same is automatic in its operation, the speed being governed by the size of the ball wound. It is accomplished by the differential motion, previously referred to, producing a uniform speed of yarn from creel to shell, all the time, no matter what the size of the ball on the shell.

Having no slow motion on the new ball warper, the same is started by gradually increasing the pressure on one of the foot pedals, which starts the machine gradually, the operator, if so desired, guiding the start of the machine by one of the large hand wheels, secured on the spiral shaft.

Doffing. To doff the wound ball, unscrew the clamping bolt, on each side of the square shaft, as extending on each side and through the centre of the shell, turn machine forward and the ball warp will drop on a truck, previously set beneath it.

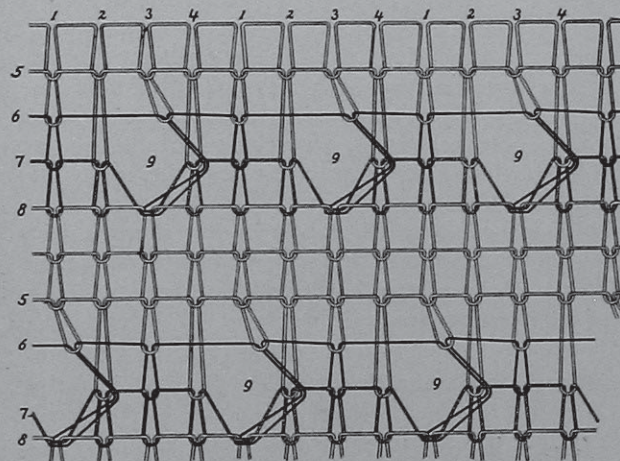
The Speed of the machine is from 50 to 60 yards per minute.

Mesh Knit Fabric.

A method heretofore practiced for making a lock-stitch mesh fabric on a spring needle knitting machine is to transfer the loop from one needle to an adjacent needle, by causing one of two loops to be pressed down over and around the two needles and then pressing off that loop from its original needle, thus leaving the two loops upon one needle. By that method, which requires a very delicate manipulation of the loops, if the mechanism fails to cause the single loop to encircle both needles, a defect, called a *drop-stitch* is the result.

The accompanying illustration shows (enlarged) an improved mesh or open work knit fabric, which has the advantage that in its construction no stitches or loops are transferred from one needle to another; but the loop of one needle is simply elongated and both sides of the loop carried around the adjacent needle,

without casting off the loop from its original needle, until the formation of a subsequent course. A failure of the mechanism to properly manipulate the loops *will not result in a drop-stitch*, the only result being the formation of plain cloth where an opening was intended. The outside of the new fabric structure as it would appear when being formed upon an ordinary circular spring-needle machine, is shown in the illustration, as this view more clearly illustrates the predominating feature of the new fabric structure, that is, the *interchanged loop*.



The new fabric structure calls for four wales of loops, 1, 2, 3 and 4, and four different courses 5, 6, 7 and 8 respectively.

A DESCRIPTION OF THE FORMATION OF THE FABRIC in connection with a circular spring-needle machine will now be given. With such a machine, the yarn of course 5 is placed in position on the needles by the ordinary stitch wheel, but the yarn of course 6 by means of a stitch wheel plugged one and one, so arranged that the beards of the needles from loops 2 and 4 are closed. The yarn is then carried outside of the beards of the needles upon which are formed said loops 2 and 4, but under the beards of the needles upon which are formed loops 1 and 3, as the cylinder rotates. This is followed by a presser, cut one and one, which co-acts with the plugged stitch wheel in such manner that the cut-presser presses off each needle under whose beard the plugged stitch wheel has carried the yarn, but fails to press off each needle that has no yarn placed under its beard.

In this manner, needle 3, when forming course 6, is flanked upon each side by a needle that was not pressed off but which had yarn furnished to it outside of the beard, thus forming a loop on each alternate needle only, thereby providing surplus material from forming the elongated and laterally extended loop 3 of course 6 by the subsequent action of the machine. After the material of course 6 has been delivered upon the needles in this manner, an interchanging wheel is caused to engage with needles 3 and 4, so as to cause their tops to be crossed before the course is pressed down, which will cause the material forming loop 3 of said course to lie in such position relatively to the needle of loop 4, that when the loops are pressed down by the cloth wheel, or otherwise, so as to permit the

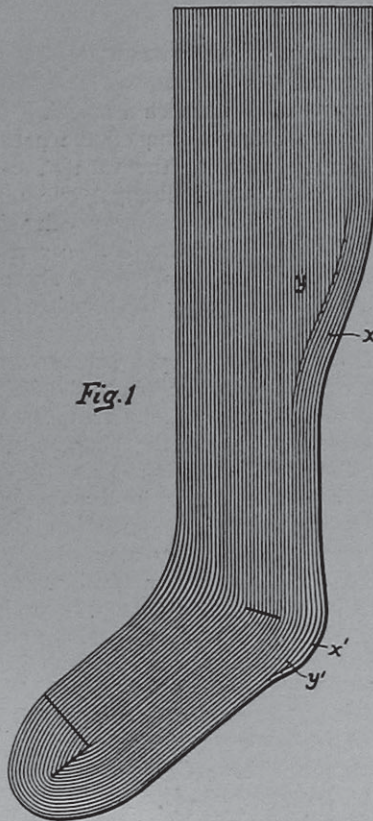
placing of the material for the succeeding course, and the needles are released from the interchanging wheel, said loop 3 will be drawn out and will extend around the needle of loop 4, and thus take up the surplus yarn or material furnished to the needles of loops 2 and 4. The material for forming course 7 is fed to the needles by the ordinary unplugged stitch wheel which is followed by the usual wheels, except that the presser wheel, cut one and three, is arranged to co-act with the interchanging wheel, so that it will not close the beard of the needle holding the closed end of loop 3 of course 6. Hence, there will be two loops retained on said last mentioned needle, while the loops on the other needles will be cast off in the ordinary manner.

The material for course 8 is fed to the machine by an ordinary unplugged stitch wheel, which is followed by the ordinary wheels, whereby all of the old loops are cast off and new loops are placed thereon ready to form the ordinary fabric.

By constructing the fabric in this manner, it will have substantially the same appearance as the ordinary knitted fabric, except that it will have regular and well defined openings formed therein.

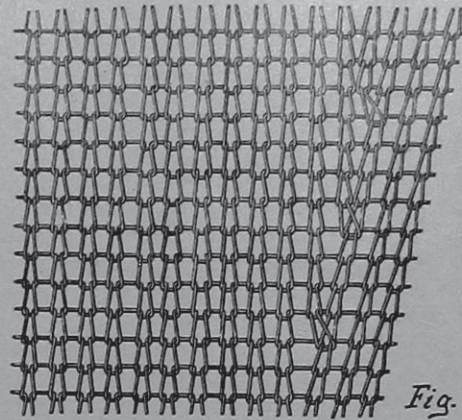
Shaped Stockings Produced on Circular Knitting Machines.

The object of this fabric structure is to produce a stocking with a seamless heel and leg and with shaped calf portion; also providing, if so desired, a seamless



toe pocket, and a seamless foot with gussets, whereby the instep portion of the stocking can be made wider than the foot portion.

In the production of a stocking as is shown in Fig. 1, a shaped calf with narrowings y and a foot tube with gussets y' are produced. Outside of these narrowings y is a band x , and outside of the gussets y' a narrower band x' ; each band consisting of a series of



continuous parallel wales, and which may be called *bordering wales*, since they border the narrowings whereby the shaping of the calf is effected and the instep gussets are produced.

Fig. 2 is an exaggerated view of part of the web, illustrating the method of narrowing the latter without disturbing the wales which represent the bordering wales.

Fig. 3 is a diagrammatic view representing an arrangement of needles in a knitting machine devised for the manufacture of these shaped stockings. In the same, the small circles, numbered from 1 to 72 inclusive, for an example, represent the cylinder needles of a circular knitting machine provided with means for knitting heel and toe pockets, and the letters from a to q and from a' to q' inclusive, represent, for an example, the fabric narrowing needles, which operate in an annular dial surrounding the cylinder above the top of the same, whereby these needles draw stitches in the same direction as the cylinder needles, and hence produce a plain knit web. The number of the needles of the cylinder and dial thus shown, are, however, purely arbitrary, as the operative machine will have more needles, both in the cylinder and dial than are here represented.

Supposing that a stocking is being knitted upon a machine of this character, the knitting operation begins at the top of the stocking with all of the needles in operation hence in our example, the tubular web produced will contain 106 wales; 72 of them being knitted upon the cylinder needles, and 34 upon the dial needles. If, now stitches upon the dial needles are transferred to the adjoining cylinder needles, and said dial needles put out of action, there will be a corresponding reduction in the size of the hose structure, *i. e.*, the latter become shaped. The dial needles, in practical work, are retired singly and this at relatively short intervals.

The dial needles c to q and from c' to q' inclusive, are employed for the shaping of the calf portion of the leg of the stocking, and the dial needles a , b and a' , b' for the production of the gussets at the instep