are required for producing the design, and which is the size of the design Fig. 39.

As mentioned before, only the floating of the figure filling is indicated on the point paper design, which is painted filling up, *i. e., empty squares* are to be considered for *warp up* when cutting the Jacquard cards.

We next come to the selection of the weave for the ground structure. In our example we used the 10-harness granite weave Fig. 40. Care must be taken when selecting this ground weave that its repeat is evenly divisible into the number of warp threads as well as figure picks of the design. This is the case with our granite weave selected, since the design Fig. 39 calls for 200 warp threads and 200 figure picks, and 10 warp threads and 10 picks, *i. e.,* the repeat of the ground weave, are a multiple of the 200. This ground weave, a neat little granite weave, must be cut 20 times over to give us the 200 Jacquard cards for the loom, required to balance the 200 Jacquard cards (figure picks) of the design Fig. 39. (Use one ground card to alternate with one figure card, when lacing the set of cards.)

In Fig. 41, the analysis of the plan of weaving is given. Picks 1, 3, 5, etc., are the ground picks, see *dot* type; all the even number picks, see *black* type, are the figure picks. The *dot* type and *black* type is for warp up, or is the reverse effect as used in design Fig. 39. This portion of the plan of the complete weave, Fig. 41, calls for 100 warp threads and 32 picks, illustrating the interlacing in the fabric of 100 warp threads and 16 picks of the design Fig. 39, taken from its left hand, lower corner.

In the analysis of fabric structure Fig. 41, we see that the figure pick is floating on the back, when not called for by the design on the face of the fabric. In a design, of a character like ours, this feature of the filling floating on the back of the fabric would not be so great a disadvantage, however there are any number of designs where excessive floating would occur, in turn proving a disadvantage to the fabric structure, except the said floating picks, known as bridge threads, are cut off by special machinery. If the latter is not done, large floating figure picks must be stitched (not visible on the face) to the ground structure. This subject is clearly explained by means of Figs. 42 and 43. Considering *black* type only in Fig. 42 it is a duplicate of 100 warp threads and 32 picks of the lower left hand corner of the complete design Fig. 39. The *dot* type indicates the places where the filling, when floating on the back of the cloth, is to be stitched (not visible on face) to the ground structure. The arrangement of this stitch, is the 8-leaf satin.

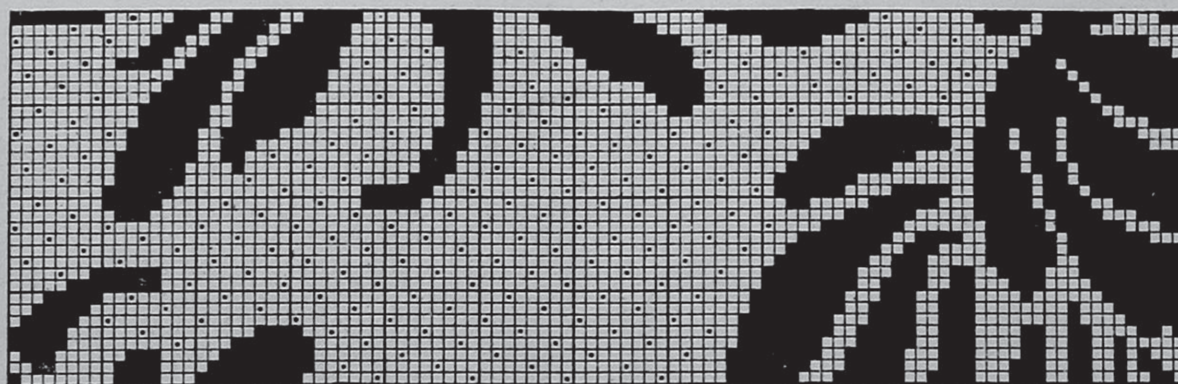


FIG. 42.

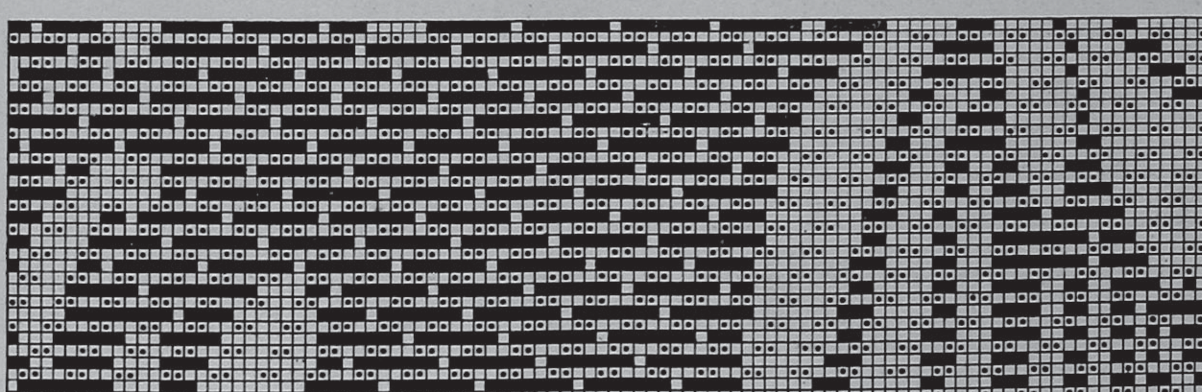


FIG. 43.

Thus the execution of sketch 38, requires for one repeat on the loom:

200 warp threads and 200 figure cards
+ 200 ground cards or
——
400 Jacquard cards, total.

The weave for the ground structure and the weave for the stitching must be well understood by the desinger, they each must be of such a character so as to make their combination possible, without showing the floating pick on the face at any place of stitching, *i. e.*, the interlacing must be done by the warp being down on the pick preceding and the pick following the figure pick, where said warp thread has to interlace; or in other words, three sinkers must always show in rotation wherever the warp threads stitch the figure picks on the back, to the fabric structure. Fig. 43 shows the working plan of the lower half of the design portion Fig. 42, *i. e.*, the first 16 picks of design Fig. 42, are shown in combination with 16 ground picks. For ground weave, we selected the 4-harness, even sided twill (see *dot* type) and which weave permits a perfect stitching with the 8-leaf satin as used for stitching the figure picks, when floating on the back, to the fabric structure.

THAT HEDDLE QUESTION.

Editor, Posselt's Textile Journal.

The July number of Journal to hand and I enjoyed it very much. Your article on the *"Flat Steel Heddle"* is alright and I am anxious to hear what will be said against it in next number. I always enjoy reading the articles on designing. 7-19-08. R. Y.

Editor, Posselt's Textile Journal.

Will say I am now using *"Flat Steel Heddles"* on the finest silk warps with very good results. I have also used the same heddles on cotton and worsted warp, fine yarn counts, and I believe they can be made to give good results on heavy worsted and woolen yarns, if they would make the heddles wider, so as to give more strength at the eye, and at top and bottom so they will not give way on the heddle rods. By making them wider, I don't mean thicker. I am well satisfied with your paper and wish you success with it. 7-25-08. R. P.

Editor, Posselt's Textile Journal.

The July number certainly was a dandy, fine.

Now as to this Heddle question. I cannot see where the *"Flat Steel Heddles"* are the equal of the German soldered heddle. Neither do I consider them nearly as good as the best of the American made heddles. First, in the handling of the heddle when putting them on the frames, they cannot be changed nearly as rapidly as the wire heddles. Being flat, they handle very awkwardly and the drawing in hands cannot do their work nearly as rapidly and are apt to let extra heddles go by, when drawing in.

When the flat type of heddle is used, it takes up much more space in the harnesses than the wire heddles, and while the flat type of heddle, in some cases, appears thinner in the direction of the warp thread drawn through it, it is also broader in the same direction. The warp threads, running through a heddle of this type, will chafe more on unsized yarns than it will on the wire heddles.

To sum these features up briefly, the yarn has to pass through a larger mass of wire in the aggregate with the flat heddle, than it does with the wire one. The eyes of the heddles appear very smooth and are cleanly punched, but they have a cutting edge which can be readily found by looping a fine worsted thread in it, and rubbing it on the edge. This test will cut the thread quickly on the flat heddle, while the German heddle, with the same treatment, will not injure the thread in the least.

My choice for fine woolens and worsteds is the German soldered steel wire heddle with the American goods of the same type a close second choice. We run 60's single silk through the German heddles and have no trouble with it. I have had no experience on all silk and cotton goods, excepting that which I got when at C. & K. Loom Works, in Worcester. On velvets and silk ribbons we then used a very fine wire heddle of the German type, laced on the harness shaft to agree with the texture of the goods woven and had no trouble from chafing yarn. This letter may look like a throw down on my part of the flat steel heddle, but I have simply told my experience with the heddles and the wire heddle is here to stay in the lead in my opinion. 7-15-08: W. P.

Editor, Posselt's Textile Journal.

The July issue certainly was a fine Journal. Best ever issued here. Regarding this heddle question, I think for an all around heddle, for all classes of work that is met with in the majority of mills, possibly from the lightest dress goods of 2/50's or 2/60's worsted to an 8 cut wool storm skirting, to which extremes I have often seen them go, where one size and style of heddle has to do service, for all the different grades of work, to my mind the German Steel wire heddle cannot be beaten. However, the *flat steel heddle* has some very good qualities which commends its use, especially on fine high texture work. Then another question arises where it is possible to do so, if it is not better to use a larger number of shafts than to overweight your harnesses, where you have a light head motion to deal with, which often will give you lots of trouble owing to the weight the harnesses have to carry.

Then another feature of the *flat steel heddle* is, that the thread pulls at an angle through the eye. The manufacturers of the heddle advise you to get the proper width of the eye to suit the count of yarn you are to use. Now I will say, who can tell that, where such a variety of yarn is used, as we have to do in Philadelphia. How many manufacturers are willing to buy three or four sizes of heddles? We Boss Weavers consider ourselves always lucky to get one, and if it happens to be the German wire heddle, a luxury at that.

For all around work, the best and cheapest heddles, barring the first cost, to my mind are the German Wire Heddles. 7-22-08. S. G.

DESIGNING AND FABRIC STRUCTURE FOR HARNESS WORK.

CHECKERBOARD TWILLS.

The same are another sub-division of our regular twills, the principle observed being to combine the two effects (warp and filling effect) of an uneven sided twill, after a given motive.

When using the plain weave or a fancy basket weave as the motive, a pure checkerboard effect is obtained, whereas if using figured motives, broken up checkerboard effects are the result. In the latter instance, we however, must be careful that motives used call for few changes, since otherwise the checkerboard twill obtained, will be beyond the reach of the dobby of the loom. These checkerboard twills can be divided into:

(*a*) Plain Checkerboard Twills,
(*b*) Fancy Checkerboard Twills and
(*c*) Figured Checkerboard Twills.

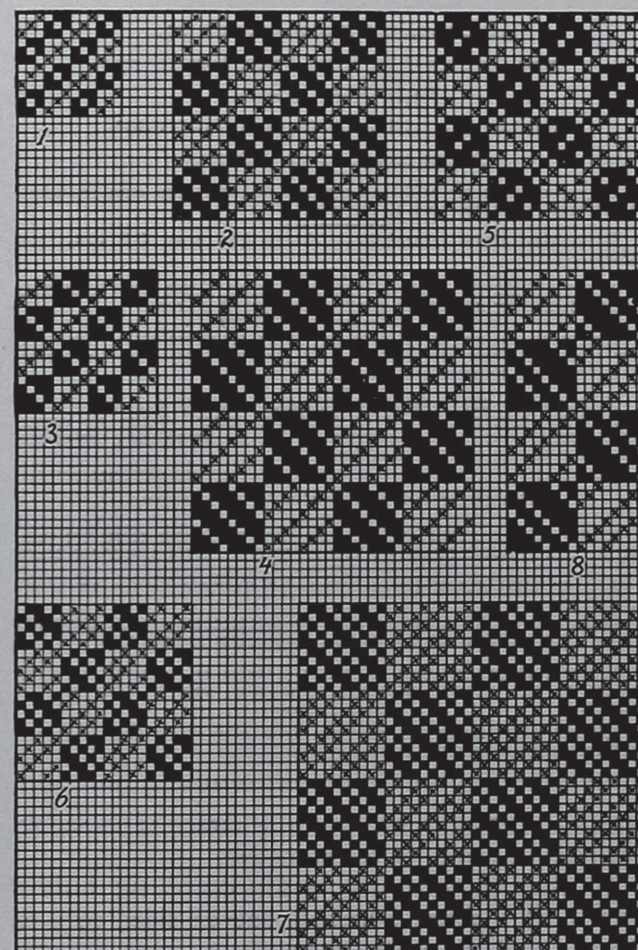
Plain Checkerboard Twills. The same are obtained by dividing the repeat of the new weave into four even squares and insert alternately either the warp or the filling effect in these four squares. The direction of the twill line in either effect must be reversed, by that we mean, that if the filling effect twill runs from the left to the right, the warp effect twill must run from the right to left, in every instance; or vice versa, at the same time, producing a clear cut off (risers opposite sinkers, and vice versa) wherever warp and filling effect join. The construction of this sub-division of checkerboard twills will be readily understood from weaves Figs. 1 to and inclusive to 8.

Weave Fig. 1 has for its foundation the 3-harness twill, using 3 warp threads and 3 picks of the filling effect to alternate with 3 warp threads and 3 picks of the warp effect; of this 3-harness twill, the complete weave repeating on 6 warp threads and 6 picks; two repeats each way of the weave is given to more clearly show its construction. The resultant weave is a small broken up effect, very little resembling the idea of a checkerboard affair, for the fact that only three ends, of warp and filling, are used for each effect. In the same manner we have in connection with all our other weaves of this subdivision of twills, used small effects in order to bring the collection of weaves within compass of the page, the student understanding that provided he is after pronounced checkerboard effects, that in place of using one or two repeats of the foundation weave, for each effect, he will have to use in the same way four, five or more repeats of the foundation weave for each effect.

Weave Fig. 2 has for its foundation again the same 3-harness twill, using, however, in this instance 6 warp threads and 6 picks for each effect, the complete weave repeating on 12 warp threads and 12 picks, which, however, if required, could be woven on six harnesses, by using a double draw, drafting for each effect twice over in rotation, *viz:* 1 2 3 1 2 3, 4 5 6 4 5 6.

Weave Fig. 3 shows us the two effects of the 4-harness uneven sided twill, used in the formation of the checkerboard twill, using in this instance 4 warp threads and 4 picks of each effect, to exchange with the same number of warp threads and picks of the other effect, the resultant weave repeating on 8 warp threads and 8 picks.

Weave Fig. 4 is the same foundation weave, using in this instance two repeats of each effect to alternate with two repeats of the other effect, the complete weave repeating on 16 warp threads and 16 picks, and which by means of its double draw can be woven on eight harnesses, if such is necessary.



Weave Fig. 5 shows us the 4-harness broken twill used as foundation weave, using a repeat and a half of the weave for each effect, *i. e.,* 6 warp threads and 6 picks of the filling effect to alternate with 6 warp threads and 6 picks of the warp effect, throughout the repeat of the weave, and which calls for 12 warp threads and 12 picks. If necessary on account of the compass of the dobby, this weave could be produced on eight harnesses, by means of its fancy draw 1 2 3 4 1 2, 5 6 7 8 5 6.

Weave Fig. 6 has for its foundation the two effects of the *1 up 1 down 2 up 1 down,* 5-harness uneven sided twill. Five warp threads and five picks of each effect are used in the formation of the steep twill, and which repeats on 10 warp threads and 10 picks.

Weave Fig. 6 shows two repeats of this 5-harness twill used for each effect, before changing onto the other effect, the complete weave repeating on 20 warp

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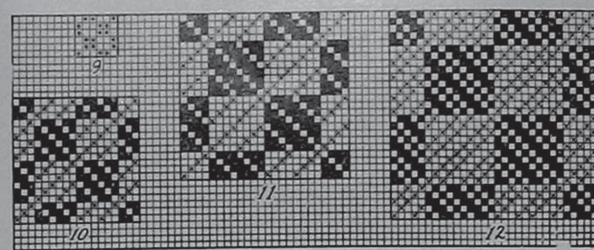
threads and 20 picks, and which by means of its double draw, can be woven on ten harnesses.

Weave Fig. 8 has for its foundation the *1 up 2 down 1 up 3 down,* 8-harness uneven sided twill to alternate with its mate, warp effect, every 8 warp threads and 8 picks, the checkerboard twill repeating on 16 warp threads and 16 picks. Only two repeats, warp ways, are given in this example.

Fancy Checkerboard Twills. In this instance we exchange warp and filling effect after a given motive, using a given number of warp threads and picks for each square of the motive, the motives used in this instance, being our fancy basket weaves. The affair will be best explained in connection with a few practical examples and for which reason weaves 9, 10, 11 and 12 are given.

Fig. 9 is the motive, selected for our examples, the same being the *1 up 2 down 2 up 1 down* 6-harness fancy basket.

Weave Fig. 10 is the fancy checkerboard twill, obtained from the motive quoted, using 3 warp threads and 3 picks of either effect of the three harness twill, respectively, for each square of the motive, and which naturally will bring the repeat of the checkerboard twill to (3 × 6 =) 18 warp threads and 18 picks. Every square indicated by a dot in our motive, we used 3 warp threads and 3 picks of the filling effect foundation twill in the new weave, and vice versa, for every empty square of the motive, we used 3 warp threads



and 3 picks of its mate warp effect. The checkerboard twill obtained, will require six harness for its execution on the loom.

Weave Fig. 11 shows us the application of the motive (Fig. 9) in connection with the two effects of the 4-harness uneven sided twill, using in this instance 4 warp threads and 4 picks, *i. e.,* one repeat of the 4-harness twill for each square of the motive. We have used again filling effect for squares indicated by a *dot* in the motive, and warp effect for every *empty* square of the motive. The repeat of the checkerboard twill is (6 × 4 =) 24 warp threads and 24 picks, and which by means of its proper double draw, can be produced on eight harnesses.

Weave Fig. 12 shows the application of our motive (Fig. 9) for the 1 *up* 1 *down* 1 *up* 2 *down* 5-harness uneven sided twill, and its mate effect, the 1 *down* 1 *up* 1 *down* 2 *up* 5-harness uneven sided twill warp effect, using 5 warp threads and 5 picks of either effect for each square in the motive, using again filling effect for every square indicated by means of a *dot* in the motive and warp effect for every *empty* square in the motive. The checkerboard twill repeats on (6 × 5 =) 30 warp threads and 30 picks and can be drawn on ten harnesses.

Figured Checkerboard Twills. To explain this sub division of checkerboard twills, weaves Figs. 13 to and inclusive to 17 have been given, and which will readily explain themself, for the fact that the motive is distinctly visible in the complete weave. In every instance we used the 4-harness uneven sided twill, warp and filling effect. Any other uneven sided twill for any number of harness repeat, can be used in this way, we selecting the 4-harness twill so as to bring the resultant checkerboard twill within compass of the average dobby. A good range of motives to use in this instance are our broken twill weaves, since they will permit the reducing of harnesses for the checkerboard twill obtained by their use. We have used these motives in our examples, using one repeat of either effect of the 4-harness uneven sided twill, respectively, for each square in the motive.

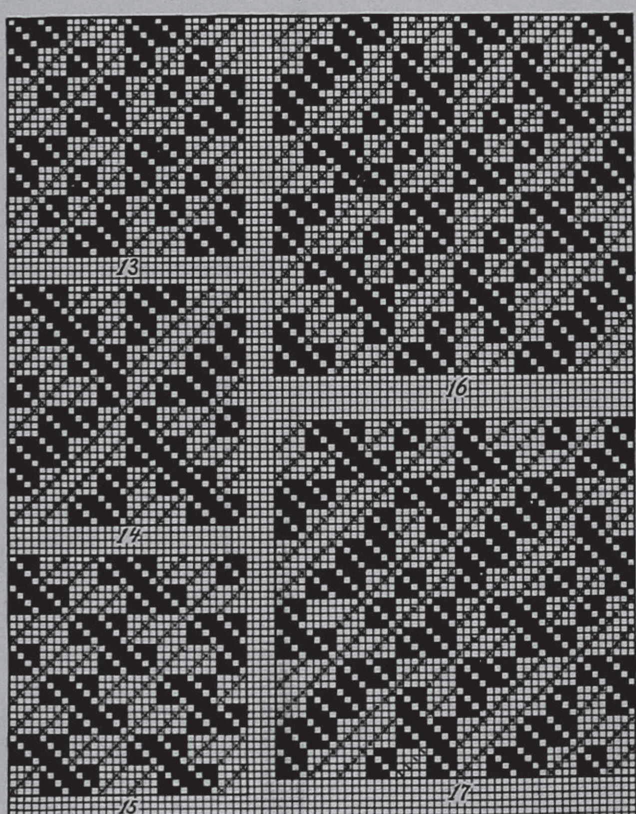
Weave Fig. 13 repeats on 16 warp threads and 16 picks, no reduction of harnesses is possible, since there is no reduction possible in the motive. Two repeats of the complete checkerboard twill are given each way. The motive used is a broken twill, using only 2 warp threads between the breaks, hence a well broken up effect is the result in the checkerboard twill.

Weave Fig. 14 repeats on 32 warp threads and 32 picks. The same has for its motive the 4-harness broken twill obtained from the 4-harness even sided twill, and when naturally the resultant checkerboard twill can be drawn on (4 × 4 =) 16 harnesses.

Weave Fig. 15 has for its motive a skip twill, skipping filling ways, the same being selected in order to give us a resultant checkerboard twill which calls for a low number of harnesses in connection with twice the number of picks required for its repeat, the new weave repeating on 16 warp threads and 32 picks, two repeats of the weave, filling ways, being given.

Weave Fig. 16 has for its motive again a broken twill, which has for its foundation the 4-harness even sided twill, and when naturally the resultant checkerboard twill, repeating on 48 warp threads and 48 picks, can be drawn on (4 × 4 =) 16 harnesses.

Weave Fig. 17 is another figured checkerboard twill, having again a broken twill obtained from the regular 4-harness twill as its motive. The repeat of the checkerboard twill is again 48 warp threads and 48 picks, and which by means of its fancy draw can be woven on (4 × 4 =) 16 harnesses.



As mentioned before, any other uneven sided twill can be used in this way for the formation of a new checkerboard twill, a feature which will be readily understood by the student after having mastered the present lesson.

Questions:

(1) Produce the plain checkerboard twill, having the 3-harness twills (warp and filling effect) for their foundation, using 24 warp threads and 24 picks of each effect. Repeat: 48 by 48.

(2) Produce the fancy checkerboard twill having the 1 *up* 1 *down* 1 *up* 2 *down* 5-harness twill for its foundation. For its motive use the 1 *up* 2 *down* 3-harness basket weave, using 10 warp threads and 10 picks of each effect of the 5-harness twill, respectively, for each square of the motive. Repeat 30 by 30.

(3) Produce three different figured checkerboard twills in connection with the 1 *up* 1 *down* 1 *up* 2 *down* 5-harness twill and its mate effect, using for motive the same broken twills as used by us, in the lesson, in connection with weaves Figs. 13, 14 and 15, the repeat of the resulting checkerboard twills being 20 by 20, 40 by 40, and 20 by 40.

A PRACTICAL TREATISE ON THE KNOWLES FANCY WORSTED LOOM.

By E. P. Woodward,

Master Weaver.

(*Continued from page 11, Vol. III.*)

Timing the Head Motion.

When timing the head motion, there are a number of things which the fixer should keep in mind, that he may work with the assurance of doing things right and doing the right thing at the right time. The parts of the head here treated are:

1st. The filling and warp chains.
2nd. The chain cylinder.
3rd. The chain cylinder gear.
4th. The vibrator levers and their gears.
5th. The cylinder gears which operate the vibrator gears.
6th. The forward pinion gear.
7th. The reverse key.
8th. The lock knife, its stand, shaft and spring.
9th. The lock knife finger.
10th. The lock knife cam.
11th. The reverse pinion gear retaining pin, spring and collar.
12th. The double reverse gear and its stud.

The foregoing parts are all numbered in the order in which they will be taken up in the assembling and timing of the head, in order to impress it plainly on the mind of the learner. The actions of the different parts are as follows: The chains, by means of the raisers, lift and hold all desired vibrator gears in meshing contact with the top cylinder gears for a definite length of time. The time which they can be held there is governed by the speed of the chains passing by the arc of the circle on the chain runs. This arc is a part of a circle whose radius equals the radius of the chain cylinder, plus the diameter of the raiser or chain roll. The chain run is so positioned on the vibrator lever as to be in the exact path of the circle described by the chain roll, when the lever is at its highest position and the vibrator gear is well in mesh with the top cylinder gear.

With the chain run thus located, and the head properly timed, the vibrator gear is held in its true and fixed position during its gearing contact with the top cylinder gear. The chain run arc is as great as it can be, considering the different parts which act upon and in conjunction with it. The lower cylinder has no more time of gearing contact than the top one. The lock knife stays where it holds all its levers down during this time and is there for the purpose of holding the vibrator gears in the *lower cylinders only*. By means of the lock knife cam and finger, the lock knife releases the levers in time for the chains to change them to their next desired positions.

It will be noticed, that the box section of the top cylinder gear is so timed as to engage the vibrator gear a little later than the box section of the lower cylinder gear does. The reason for this has been told in a previous article. The action of the head thus described, the way to get the timing of the head in detail, is as follows: First, turn the chains (#1) forward (*i. e.*, in the direction they move when the loom is running) by means of the chain shaft (#2) and the chain cylinder gear (#3) until the vibrator gears (#4) and their levers show their extreme positions, *i. e.*, all going up and all going down are as far as they can go. Now turn the cylinder gears (#5) by means of their hand wheel, until the box section of the top cylinder gear has turned the vibrator gear which meshes with it, to a point where the gear by its own weight is carrying itself out of driving contact with its cylinder gear. With the cylinder gears held in this position, turn the chain cylinder forward until the vibrator levers begin to change, and with the chain cylinder and cylinder gears each held in these fixed positions, put the forward pinion gear (#6) in mesh with the chain cylinder gear, at the same time so placing it on its shaft that the key ways will match, and put in the reverse key (#7). This method of timing gives the latest point at which the box section of the top cylinder gear should be, and the earliest point in relation to it at which the levers are designed to move.

Now (with the forward pinion gear still held in position by the reverse key) turn all the cylinders forward by means of the hand wheel on the top cylinder shaft until all of the vibrator levers have reached their extreme positions. Hold all the shafts fixedly at this point and turn the harness sections of the cylinder gears forward until they engage the first tooth of their respective vibrator gears. Tighten the cylinder gears (by means of their set screws) to their shafts and the cylinders are timed to the forward movement of the chains. The lock knife stands (#8) can now be fitted and while the looms are built with a lock knife stand for the harness section and another for the box section, it should be remembered that, theoretically, one lock knife will do all that both can do, and it is immaterial which of the lock knife cams are used.

Two lock knives and stands are used only for the convenience of the builder and for a more satisfactory construction of these parts. The lock knife on both, harness and box section, should be so fitted as to easily clear the vibrator lever points *only when they are at their lowest position*. It should also come in contact with all of the plane surface of the point with which it is designed to engage. This position it must have, to insure proper results on heavy work, and it is better to have the lock knife throw down a trifle than to have it throw up, as it insures a safer locking contact.

Thus fitted, a spring, which is strong and active enough to work the lock knife finger to a close following of the lock knife cam, is sufficiently strong to hold the lock knife in position during the shedding part of the head movement. The lock knife being well set, the lock knife finger (#9) can now be adjusted as to its height. The position for the end of the lock knife finger (which comes in contact with the cam) is on the line of a circle whose centre is the centre of the arbor on which the lock knife stand swings, and whose radius is to a line of a circle described from this centre and passing through the centre of the lower cylinder shaft.

With this as a starting point, the lock knife finger can be raised or dropped a trifle as may be convenient to the fixer in timing which may come later on.

With the lock knife positioned as described and its curved part so bent as to be sure the point is the only part on which the cam touches, it can now be bent towards the cam, enough to always keep it in contact with it and at the same time be sure to have the lock knife well home—but not set close enough to pound the comb and batter the vibrator ends.

This careful setting of the lock knife will be of help in preventing harness misspicks, as a burred lever and a battered comb are quite apt some time to prevent the vibrator levers from dropping freely and on time.

It also looks decidedly unworkmanlike to see a comb battered by the lock knife, and it is as bad, when the vibrator levers are given similar treatment.

The lock knife cam (#10) can now be timed as follows: Turn the cylinders forward by means of their hand wheel until the vibrator levers have reached their extreme positions, and at this point the lock knife finger should have made its change from the highest point on the cam and just reached its lowest point, and carried the lock knife home. This completes the timing of the head and adjusting of all parts to the forward movement of the chains. This method of timing may seem strange and unhandy to those not familiar with it, but it is a direct and sure method of *timing all parts* and *guessing at none*.

(*To be continued.*)

A New Design for a Rug.

The accompanying illustration shows the latest original and ornamental design for an Axminster rug, patented by Messrs. John Bromley & Sons, the well known Carpet Manufacturers of Philadelphia.

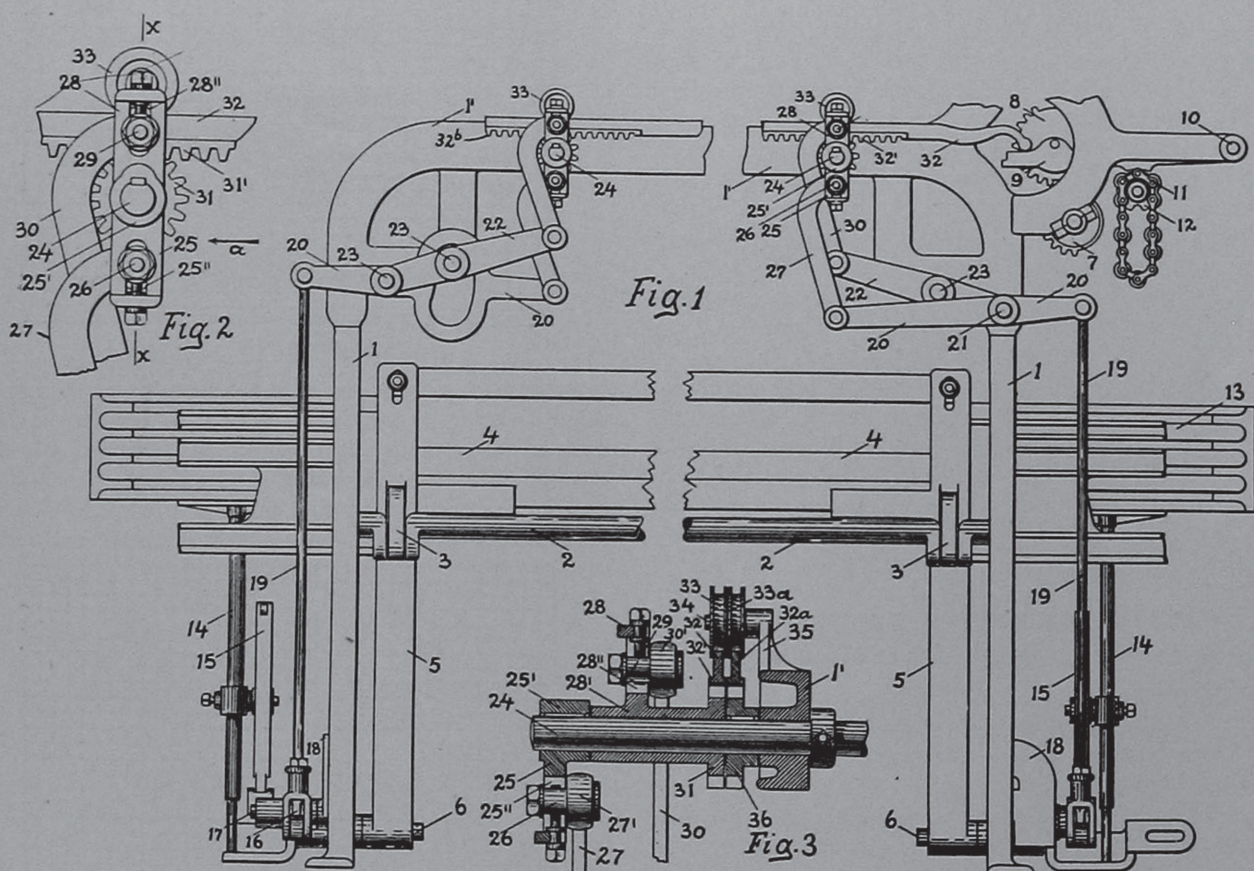
THE SHUTTLE-BOX MOTION OF KNOWLES LOOMS.

In order to more readily understand this mechanism, the accompanying three illustrations are given, and of which Fig. 1 is a rear view of the loom frame, and some parts of the loom thereon, being given to be able to more clearly show the construction and working of the box motion. Fig. 2 is a detached view, on an enlarged scale, of the cranks and other parts shown at the right in Fig. 1. Fig. 3 is a vertical cross section, on line x-x, Fig. 2 looking in the direction of arrow *a*, same figure.

which is pivotally connected to a lever 20, pivoted on a stud 21 carried on one end of a lever 22, pivotally supported on a stand 23.

The levers 22 and 20, together form a compound lever, for moving the four shuttle boxes into four different positions relatively to the race-way of the lay, through the indications of the pattern surface 11.

A shaft 24 extends transversely between the arches 1′, and is mounted in bearings on the arches. The shaft 24 extends beyond the rear arch 1′ (as shown in Fig. 3) and has splined thereon at its outer end the hub 25′ of a crank 25. The latter has a slot 25″



Numerals of references accompanying the illustrations indicate the following parts of the loom and the box motion: 1 the loom sides, 2 is the crank shaft, 3 the crank connectors to the lay 4, which is carried on the lay swords 5, which are pivotally mounted at their lower ends on studs 6.

With reference to the portions of the pattern mechanism shown, 7 is lower cylinder gear, 8 the vibrator gear as pivotally mounted on the vibrator lever 9, which is pivotally supported at its outer end on a rod 10 which extends over the pattern surface 11 carried on the pattern cylinder 12.

13 are the drop shuttle boxes, supported on the upper end of a vertically moving rod 14, which is connected with a give-way connection 15, pivotally connected at its lower end with one end of a lever 16, centrally pivoted on a stud 17 and secured to a stand 18 bolted to the loom side 1. The other end of the lever 16 is pivotally connected to the lower end of the vertically moving connector rod 19, the upper end of

therein (see Fig. 3) through which extends a crank pin 26, adjustable in the slot 25″, and having pivotally mounted thereon the hub 27′ of the crank connector 27, to the lever 20.

On the extended end of the shaft 24, which is inside of the hub 25′ of the crank 25, is loosely mounted the hub 28′ of a crank 28, having an opening 28″ therein for the crank pin 29, which is adjustably mounted in said opening, and has loosely mounted thereon the hub 30′ of the crank connector 30 to the lever 22.

The hub 28′ of the crank 28 has fast on its inner end, a pinion 31, which meshes with the rack 32′ on the vibrator connector 32, pivotally attached to the vibrator gear 8. A groove roll 33, mounted on a stud 34 secured on a stand 35 extending up from the rear arch 1′, see Fig. 3, extends over the upper side of the vibrator connector 32, and holds the same in engagement with the pinion 31. Fast on the extended end of the shaft 24, just inside of the pinion 31, is a second pinion 36, which meshes with a second vibrator connector 32^a located on the inside of the vibrator connector 32. A second grooved roll 33^a extends over the upper side of the vibrator connector 32^a and holds the same in engagement with the pinion 36.

In addition to the two vibrator connectors 32 and 32^a, are two other vibrator connectors, which extend across the loom, at the rear of the arch, as shown in Fig. 1, so that the same pattern mechanism will operate both sets of shuttle boxes from one end of the loom. The vibrator connectors (only one 32^b being shown) have teeth or rack surfaces to engage and operate two pinions, and through these two cranks, shown at the left in Fig. 1, and through said cranks and connections to the shuttle boxes, operate the shuttle box rod and the shuttle boxes supported thereon.

In the Operation of the Loom, the movement of the pattern cylinder 12 carrying the pattern chain, will move one of the vibrator levers 9 to bring a vibrator gear 8 into engagement with the upper or lower rotating cylinder gear; the rotary motion of a vibrator gear will communicate longitudinal motion to a vibrator connector, and, through the teeth thereon meshing with the pinion, will rotate said pinion and the crank, loose on the shaft 24, or the crank fast, on the said shaft, through an arc of substantially one hundred and eighty degrees, and through the crank connector to the compound box lever, will raise or lower the vertically moving box rod and the boxes thereon to the desired position relative to the race-way of the lay, according to the indications (balls or tubes) put on the pattern chain 12.

RIBBONS, TRIMMINGS, EDGINGS, ETC.

A Treatise on Narrow Ware Manufacture.

By O. Both.

(*Continued from page 7*)

Three-quarter Hollow Selvages. The same are worked similar as the complete hollow selvages. It must be remembered that the outside warp thread of the back warp connects properly with the outside warp thread of the face warp, since the same are not always drawn-in side by side, as is the case in connection with the construction of complete hollow selvages. Diagram Fig. 60, shows us such a three-quarter hollow selvage,

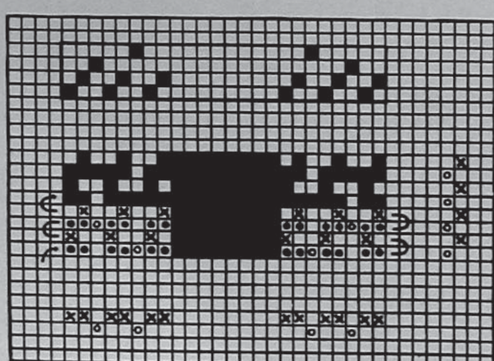


Fig. 60

requiring four harnesses for its execution on the loom. Below the weave is given the scheme for the warp, at the right hand side, the scheme for the filling, and above the weave, the drawing-in draft.

Half Hollow Selvages. These selvages contain two systems of filling and one system of warp; the latter

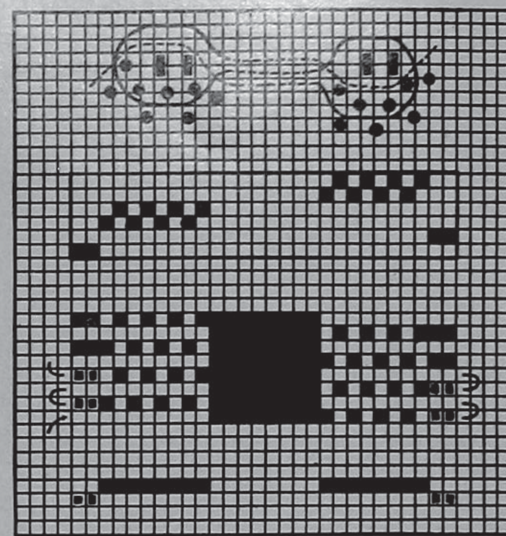


Fig. 61

interlaces only with one of these systems of filling, the other floating respectively, either on the face or the back of the structure, in the loom, according to whether the fabric is weaving face or back up. As will be readily understood, in the finished fabric, the floating picks of the filling rest on the back of the structure.

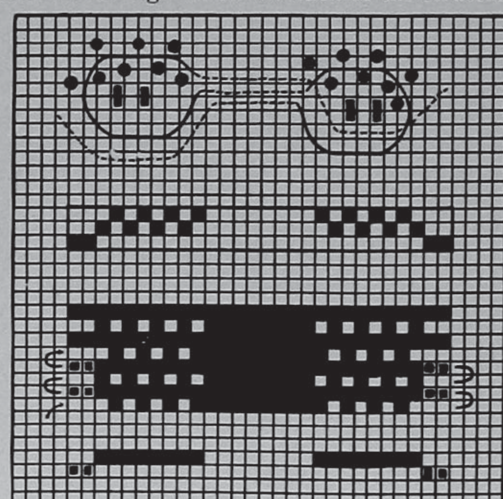


Fig. 62

If using a rather tight tension on the filling, the outside warp thread will be drawn somewhat towards the back of the structure.

Fig. 61 is the weave for such a half hollow selvage, calling for six harnesses; viz: four harnesses for the face warp and two harnesses for the stuffer warp (using one harness for the left, and one harness for the right hand selvage). Considering *black* squares for risers, the weave is given with face down (cut *empty* squares, if face up in the loom is desired).

Below the weave, is indicated the scheme for the warp, viz: 2 ends stuffer, 8 ends face warp, for left hand selvage, and the reverse arrangement for the right hand selvage.

Above the weave is given the drawing-in draft—for six harnesses, and above the latter, a diagrammatical section of the fabric structure.

Fig. 62 shows us another weave for such half hollow selvage. The plain weave is used again for interlacing every other pick, both selvages either interlacing or floating the filling on the same pick, with the result of using only two harnesses, where the arrangement in the preceding weave, called for four harnesses. In the same way, are the stuffer warp threads interlaced, with one harness in place of the two harnesses called for in the preceding weave. The scheme for the warp, drawing-in draft and diagrammatical fabric section are also given. *Black* squares for warp up, show face up in the loom.

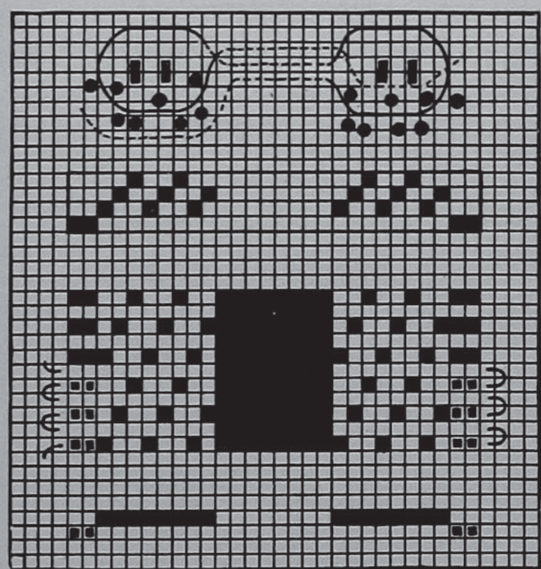


Fig. 63

Fig. 63 shows us another weave for such a half hollow selvage. The interlacing is in this instance done with the 3-harness twill. The filling either interlaces or floats simultaneously on both selvages, hence only three harnesses are required for both selvages, plus one harness for the stuffer warp. The scheme for the warp, drawing-in draft and diagrammatical fabric section are also given. *Black* squares for risers show face down in the loom, hence take *empty* squares for warp up, *i. e.*, risers, to have face of fabric up in loom.

A Novel Way of Weaving Double Pile Fabrics.

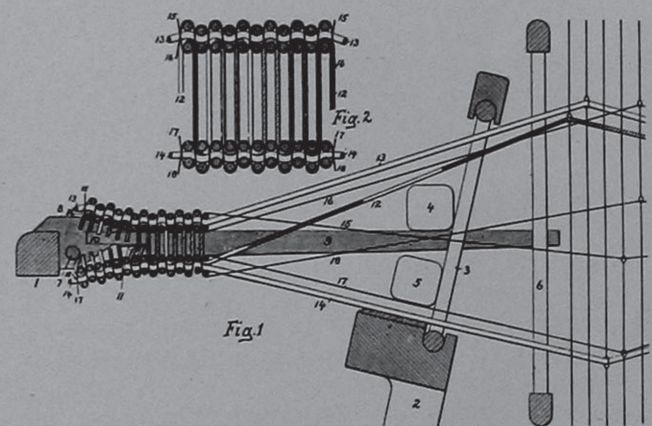
The same will be readily understood by consulting the accompanying illustrations, of which, Fig. 1, is a diagrammatical view, showing the formation of the fabric in the loom. Fig. 2 shows a section of the fabric structure enlarged, compared to the one shown in Fig. 1.

Numerals of references accompanying illustration Fig. 1, represent thus: 1 the breast beam, 2 the lay, 3 the reed, 4 and 5 upper and lower shuttles, and 6 a fixed reed, placed in the rear of the lay.

Mounted upon a bar 7, just behind the breast beam, are a series of separator blades, (one for each set of warp threads) each passing through a space of the reed 3 and engaging the fixed rear reed 6, in order that they are permanently retained in the loom.

These separator blades are made in two parts (8 and 9) the part 8 being mounted upon the bar 7, and the part 9 passing through the reeds and having its forward end reduced in thickness to form an upper tongue 10 and an undercut recess in the bottom of the blade, the tongue engaging and being soldered to the part 8 and the recess receiving the cutting knife 11, whereby the web is separated.

Through spaces of the swinging reed 3, and fixed reed 6, alternating with those which receive the separator blades, pass the sets of warp threads employed, each set of such warp threads comprising a parti-colored pile warp thread 12, as are used in connection with tapestry carpets, two stuffer warp threads 13 and 14 (one for each fabric) and four binder warp threads 15, 16, 17, and 18, two for each fabric. In connection with these warp threads are employed four picks for each web, the picks of the upper web being introduced by the upper shuttle 4 and the picks for the lower web being introduced by the lower shuttle 5. The pile warp threads 12 are shedded alternately above the upper shuttle 4, between the two shuttles, and below the lower shuttle 5, while the stuffer warp threads and the binder warp threads are shedded with reference to the individual shuttles thus:



the upper stuffer warp thread 13 and the upper binder warp threads with reference to the upper shuttle 4, and the lower stuffer warp thread 14 and the lower binder warp threads with reference to the lower shuttle 5.

The picks are introduced simultaneously in pairs, one by the upper shuttle and one by the lower shuttle as follows:

For the first two picks: Warp threads 13, 15 and 17 are raised and the warp threads 12, 14 and 18 lowered.

For the introduction of the next two picks: Warp thread 13 is lowered, warp thread 14 is raised, and the fancy printed pile warp thread 12 adjusted to a centre position.

For the introduction of the next two picks: Warp thread 12 is raised, also warp threads 13, 16 and 18: warp threads 14, 15; and 17 being lowered.

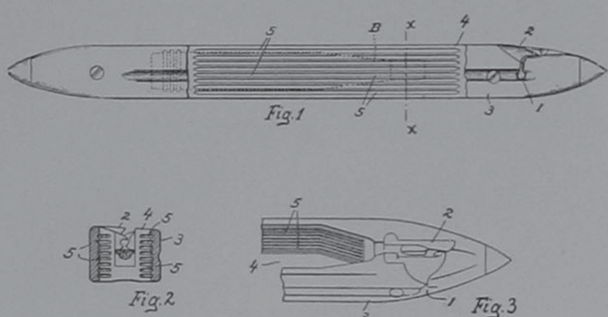
For the introduction of the next two picks: Warp thread 13 is lowered, warp thread 14 raised, and warp thread 12 lowered to centre position.

The pile warp threads 12 are thus interwoven first with the upper web, and then with the lower web, while the stuffer warp threads and binder warp threads are interwoven with picks of a single web only. When therefore the pile warp threads, which cross from one web to the other, are severed at a point intermediate of the two webs by the reciprocating or continuously running transverse knife 11, two complete cut pile fabrics are produced, which then are led to suitable take-up rolls.

A New Construction of Draper Shuttles.

The object aimed at in the construction of this shuttle is to impart the requisite drag on the filling, as it is drawn off the bobbin.

When using heavy counts of the filling yarn, it has been found necessary, at times to effect this drag by means of bristles, inserted through the side of the shuttle. However, such bristles only operate when the



filling is wound on the bobbin in one way. It sometimes happens that the filling is wound either way, so that while the bristles act for one wind, they will not exert the proper drag on the other wind, with the result of producing varied effects in the cloth, no matter which way the filling is wound on the bobbin, whether from left to right, or vice versa.

Of the accompanying illustrations, Fig. 1 is a front side elevation of this shuttle, showing its front wall broken out for the greater part of its length, in order to more clearly reveal its interior construction. Fig. 2 is a transverse section of the shuttle on the line x-x Fig. 1, looking toward the right. Fig. 3 is a perspective detail of the front end of the shuttle, to more clearly show the means for producing the drag.

The specimen of a shuttle shown is of the automatically self-threading type, having a side delivery eye 1 and a threading device 2, to automatically direct the filling thereto while the loom continues in operation, the shuttle body 3 having an elongated opening 4 for holding the bobbin *B* (indicated by dotted lines Fig. 1).

The inner sides of the shuttle walls 5, are longitudinally grooved, said grooves extending from at or near the front end of the opening 4 nearly to its other end, and from near the top to near the bottom of the side walls, thereby presenting opposite ribbed surfaces over which the filling must pass as it whirls around, when drawn off the bobbin by the movement of the shuttle. These ribbed surfaces in turn act as a friction upon the whirling filling, exerting sufficient friction thereon to produce the requisite drag, no matter which way the filling is wound upon the bobbin.

The History of Carpets, Rugs, etc., as made from Paper.

Some time ago, the United States consul at Plauen, Germany, sent a detailed statement to the Bureau of Manufacturers, of the invention of the paper fibre, called in Germany *xylolin,* which he said was wood fibre spun into a paper thread or yarn and then woven into any desired fabric. He claimed that one Emil Claviez was the inventor of the process. The consul's report was copied extensively in the papers throughout the country—when there came from Indian Orchard, Mass., the Hodges fibre carpet company saying: "We have been doing all that this consul tells of and more, too, right here in Springfield for the past 12 years."

Mr. Frank F. Hodges, from whom the firm takes its name, in about the year 1890 conceived the idea of making these paper fabrics, hence is the real inventor. With this idea in his mind, he began a series of experiments. At first Mr. Hodges experienced considerable difficulty in obtaining proper machinery for producing the results which he had in mind. His experimental work and the construction of machinery according to his plans brought him in business contact with the Crompton & Knowles Loom Works. At that time a Mr. Wm. M. Stevenson was in charge of the experimenting department of this well known firm, and it was he who developed the first machinery that met Mr. Hodges' satisfaction. In this way, Mr. Stevenson became interested in Mr. Hodges' enterprise, and soon after left Crompton and Knowles to give his whole time to the construction of paper fabrics. With the combined efforts of Mr. Hodges and Mr. Stevenson the enterprise progressed, but the present success was not attained until many difficult problems had been overcome. It was an absolutely new enterprise, new machinery had to be constructed at every step, products had to be conceived, constructed and then tested. And after all this had been done, it was necessary to gain a place in the market for the output. Naturally, the firm encountered great prejudice against a fabric made of paper among both retailers and the purchasing public. The word paper had but one meaning for the public, and it was impossible for it to believe that it could be woven into a fabric that would be desirable in any way. It was not known that the paper was especially prepared from fibres that were more strong and lasting than ordinary wood pulp. It was not known that these fibres would take faster colors than ordinary fibres, and at the same time be able to stand up under the wear and abuse that a floor covering is subjected to.

The Hodges fibre carpet company was organized in 1895 and its mill established at Indian Orchard. Mr. H. K. Wight of Indian Orchard, the members of the firm of Crompton & Knowles and several local investors took a hand in the organizing of the new company. In the beginning only 12 looms were set up.

As the name of the firm indicates, it intended primarily to produce floor coverings. For a time only soft, pliable, floor coverings were produced in the usual carpet widths. Following the manufacture of carpets, Mr. Stevenson turned his attention to the weaving of rugs and art squares of all sizes, which at once became one of the staple products of the plant. Soon it became necessary to increase the size of the plant, and now it occupies 150,000 square feet, has 250 looms and employs about 400 hands.

For the manufacture of paper fabrics a long staple vegetable fibre is made, by a process controlled by the Hodges company. This is brought to the Indian Orchard plant in large rolls, having been dyed while in the pulp stage into several standard colors. These rolls are cut into ribbons, varying in width from one-quarter of an inch to an inch and a half, according to the use for which they are intended. These ribbons are twisted by machinery into long strings which are wound and later fed into the looms like ordinary yarn. At present the factory consumes $3\frac{1}{2}$ tons of tissue per day, and its annual output, including all lines, is 1,500,000 square yards.

Added to the qualities of durability and fastness of color which the paper fibre rugs possess to a marked degree, is the fact that they are elastic to the tread, do not retain dust easily and are quickly cleaned by beating or even washing without fear of injury. Possessing all the qualities of straw mattings, they do not have that odor which makes the latter objectionable to many. They are unpalatable to moths and are never injured by such insects. Clean and fresh, they are particularly adapted to use in summer houses and on verandas. They also have quite a large sale with hospitals.

Among a few of the things which are being produced by the Hodges company, besides carpets and rugs, are linings and interlinings for women's skirts and jackets, coat linings, hat trimmings, crinoline, upholstery goods, burlap wall coverings, fancy pillow coverings, chair seats, utility boxes, sandals, screens, table covers, etc. Many of these articles have already been successfully introduced and are meeting with an increasing demand. The latest product developed by the Hodges company is a covering for dress-suit cases to take the place of straw which has come in vogue because of its lightness.

The company claims that they have successfully introduced paper fabrics into every town in the United States of over 10,000 inhabitants, and that there is also a large foreign consumption which receives its goods, marked plainly "Made in U. S. A."

FROM THE EDITOR OF PROMINENT TECHNICAL JOURNAL: For some time I have been watching this publication. I am of the opinion that you are publishing the best Textile Journal *from the technical standpoint* of any appearing in this country—and practically every one published comes to my desk for review. 7-15-08. R. W. C.

An Improved Dresser for Woolen Yarns.

The improvement relates to the mode of construction of the sizing device of a dresser, as used in our woolen mills, for transferring woolen yarn from the dresser spools onto the warp beam for the loom.

In thus treating yarn, a large number of ends (up to about 500, according to the number of ends used

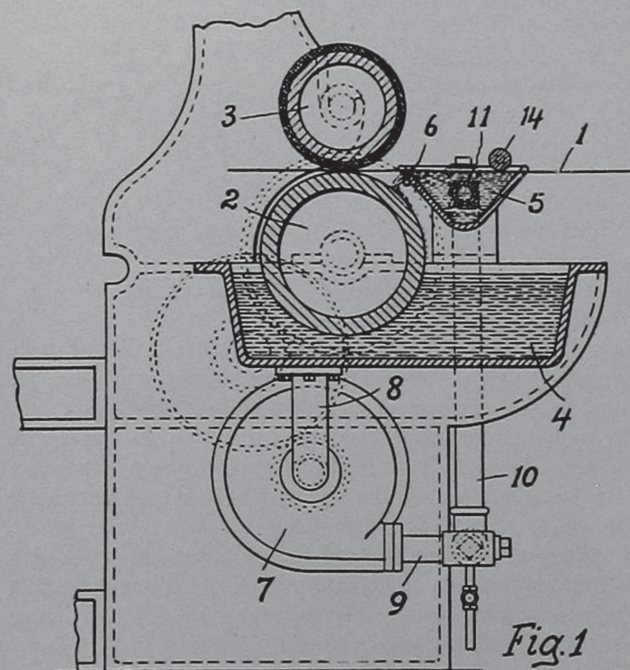


Fig. 1

in a section of the warp) are drawn from the dresser spools, and led, side by side, through a reed to the sizing apparatus and from there in turn to the drying chamber. The yarn, in being thus drawn from the spools, frequently breaks and necessitates stopping of the machine to tie together the separated ends, and while the machine is thus stopped and the yarn stationary, it is necessary to remove it from the size. To avoid this necessity is the object of the new device, the yarn in this instance being fed at a certain predetermined level, means being provided for raising a quantity of the sizing, so that it will act on the yarn when the latter is moved, and will subside below the yarn when the latter stops, and thereby leave the yarn above and out of the sizing.

Of the accompanying drawings, Fig. 1 represents a longitudinal section of those portions of a dresser to which the improvement more particularly refers to. Fig. 2 represents a similar section on an enlarged scale, of the auxiliary vat containing the sizing composition through which the yarn is drawn.

A description of the construction and operation of the new device is best given by quoting numerals of reference accompanying the illustration and of which 1 represents one of the ends of yarn, which are led from a spool-stand through a lease reed to rolls 2 and 3, which squeeze the yarn between them and feed it. The lower roll 2 dips into the vat 4 containing the size, so that it may lift a quantity of the size and deposit it on the yarn.

As woolen yarn is composed of fibres which are so close together that the size cannot work thoroughly into them during the short time the yarn is gripped by the rolls, it is necessary to provide additional means for depositing the dressing on the yarn and more evenly sizing the latter. This means consists of an auxiliary vat 5, located above the main vat 4, slightly below the plane in which the strands of the yarn are carried. One of the sides of this auxiliary vat is of less height than the other sides, and has an

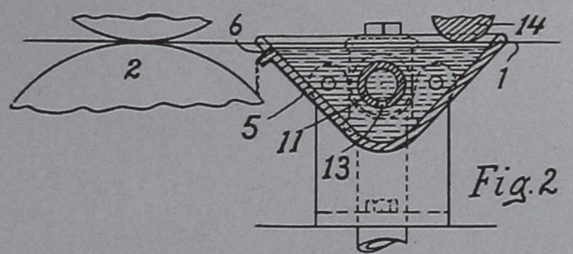


Fig. 2

edge 6, located slightly lower than the nip of the rolls and above a portion of the lower roll 2. When the vat 5 is full and more of the sizing is supplied to it, the excess overflows the edge 6 and drops upon the surface of the roll 2, and this edge accordingly determines the level of the composition in the vat when the supply thereto is interrupted.

The yarn to be treated is led over the auxiliary vat, as shown more clearly in Fig. 2, at a slight distance above the edge 6 and the level of the sizing composition determined thereby.

To supply size to the auxiliary vat, a pump 7 is provided and to which the composition is supplied through a pipe 8 leading from the bottom of the main vat 4, and from which it is forced through pipes 9 and 10 to a delivery pipe 11, passing horizontally through one end of the auxiliary vat and extending the length of the latter. The pipe 11 is closed at its further end by a cap and has a number of outlet openings 13 in its lower portion through which the liquid size is discharged downward simultaneously at a number of points.

When the pump is operated, the auxiliary vat 5 is filled to overflowing, and the level of the composition therein is raised above the normal minimum level established by the edge 6. The discharge capacity of the pump is sufficient to raise the level in the auxiliary vat a considerable distance above the minimum, an adjustable guide roll 14 locating the yarn so that it will be reached by the sizing when the level thereof is thus raised.

This guide roll is adjustable, being mounted upon the arms pivoted to the opposite ends of the vat 5 which can be raised and lowered and locked in position by clamping nuts passing through slots near the free ends of the arms. This guide roll 14 is adjusted so that the yarn will be submerged to the required extent in the sizing when the level of the latter is thus raised.

The roll 2 and pump 7 are both operated simultaneously from the same driving shaft, thus when it is necessary to stop the machine for piecing together a broken strand of yarn or for any other purpose, which causes the feed roll 2 to become stationary, it immediately renders the pump 7 inoperative. Thereupon the excess of fluid in the auxiliary vat overflows the edge 6, and its level quickly subsides to that shown in Fig. 2, below the yarn, leaving the latter clear. The size is prevented from flowing back through the supply pipe by means of a check valve, mounted in a coupling, which unites the pipes 10 and 11. Thus the size cannot be lowered below the level of the edge 6, and so it can be quickly raised again to the yarn as soon as the machine is once more started. The pump, by producing a variation in the level of the sizing composition, not only performs a function similar to lowering and raising the yarn into and out of the vat, but also agitates the composition and keeps it in a uniform condition throughout the operation of dressing the warp, assuring at the same time a uniform treatment of all parts of the yarn.

The upper roller 3 has trunnions, which are retained in sockets in the frame of the machine, and rests upon the lower roll by which it is turned. It has a yielding covering by which the yarn is pressed against the hard lower roll to squeeze out the excess of the sizing composition, and to furnish the grip necessary to feed the yarn.

From the squeezing rolls, the yarn passes into a drying chamber (not shown) to which heated dry air is supplied, and in which the yarn is led back and forth several times over the rolls at each end of the chamber, and finally passes to the reel whereon it is wound in the usual manner.

When the machine is put out of use for any extended length of time, the sizing composition is drawn off from the auxiliary vat 5 through a hole in the bottom, which is normally kept closed by a plug, and is forced out from the pump and piping by steam blown through a pipe which leads from a boiler. By means of this steam blow-out, the sizing composition, which becomes stiff when cold, is expelled and prevented from clogging the pump.

SILK FROM FIBRE TO FABRIC.

(Continued from page 319, Vol. II)

Bleaching Silk. At one time, the most available bleach for silk was sulphurous acid gas, obtained either by burning sulphur, and conducting the gas into closed chambers, or by decomposing a solution of an alkaline bisulphite with a mineral acid, in a vat or tank. The former, or dry process, is known as *stoving* or *sulphuring*, the latter, or wet process, is often called *wet bleaching*. A certain amount of bleaching was also done by using a dilute solution of a mixture of hydrochloric and nitric acids, which, however, was seldom used entirely by itself, but usually as an aid to the sulphuring process. All of these processes have objectionable features; the sulphur processes because of the corrosive and irritating fumes present, the expense of the apparatus and the harsh feel, and the defect that the bleaching was not permanent, the silk so treated gradually resuming its original color on exposure to the air; the acid process because of the danger of ruining the silk by too long exposure to its action.

The discovery of peroxide of hydrogen gave the silk bleacher an almost perfect process, whose only drawback was its cost, and this has also long since been overcome by the introduction of peroxide of sodium, which gives equally good results and is much less expensive. The use of peroxide of sodium provides a process that can be perfectly controlled, that is permanent in its results, has no harmful effect on the silk and which is very simple in operation. Not only does its use avoid many of the operations required in the old processes, but the apparatus necessary is much less expensive in cost and calls for but a fraction of the floor space. As to the cost of bleaching by peroxide of sodium, this is calculated by the mills at from $1.50 to $3 per 100 pounds of cultivated silk and appropriately $10 per 100 pounds for Tussah, and the only apparatus required is a wooden vat of suitable size, with a lead heating pipe below a false bottom.

The great point of superiority of the peroxide bleach is that it is permanent. Silk bleached by peroxide of sodium will never return to its original color, while silk bleached by sulphur will regain its former color when exposed to the air for some time. The reason for this is plain; the coloring matter of the silk is *actually destroyed* (as such) by the nascent oxygen of the peroxide evolved in the bath, which by selective action, partially or completely oxidizes it. The coloring matter is converted into a stable body that cannot absorb more oxygen, hence it will not be changed by exposure to the air. The sulphur bleach, on the contrary, acts by taking oxygen *away from* the coloring matter of the silk, forming a body that is colorless, or nearly so, but which is unstable and has a strong affinity for oxygen. Consequently, this body gradually takes up oxygen from the air and is thereby returned to its original composition, this giving the silk the same appearance as it had before being bleached.

Another strong point in favor of peroxide of sodium is that silk bleached by it can be dyed any shade or color without requiring previous treatment, except washing, there being nothing left in or on the silk that can affect the most delicate dyestuff. This is not the case with silk bleached by sulphur, the traces of sulphurous acid left in the fibres affecting certain dyes very strongly, so that many shades and colors cannot be dyed on silk that have been *sulphured* unless these traces of sulphurous acid have been removed from it.

Bleaching by peroxide of sodium is a process very easy to operate and control and in which the liability of damaging the silk under treatment is overcome. The peroxide of sodium is used, in solution, in wooden vats sufficiently large to contain enough solution to cover the silk completely. The only precaution necessary as to apparatus is to see that no iron is in or around the vat, because iron is quickly rusted by the peroxide, even uncovered iron nails will be apt to cause rust spots on the silk, difficult to remove if it comes in contact with them. The heating pipes, as stated, should be of lead.

THE BLEACHING IS PERFORMED AS FOLLOWS: Cold pure water is put into a vat with a false bottom of perforated boards, sufficient to cover the silk under treatment well and allow for working; the calculated quantity of sulphuric acid is added, and the contents of the vat well agitated to insure perfect mixing. The required quantity of peroxide of sodium is now gradually added from a tin scoop, stirring well while doing so, and being careful that *all* of the peroxide is dissolved. When almost the required amount of peroxide is added, about three quarters of the acid, the bath should be tested with *blue* litmus paper, and if it turns *red*, it indicates that the bath is still acid, and this test should be repeated after each addition of small amounts of peroxide, carefully stirring the bath all over to insure perfect solution and mixture. When *blue* litmus paper is no longer turned *red*, the *red* litmus paper is taken and if it turns *blue*, the bath is too alkaline, that is, the aim has been overshot and sufficient acid must now be added until neither of the papers change color. We then have on hand a neutral solution of Hydrogen Peroxide. One volume strength is produced with about ¾ % of sodium in the bath.

The rapidity of the action of the bath can now be increased by adding a little alkali, ammonia of silicate of soda and by turning on steam and heating it up. Usually, two to four hours immersion will completely bleach the silk, the contents of the vat being worked a few times to insure uniformity. In case it is desired to slow down the action of the bath, or to preserve it for future use after the silk has been taken out, this can be done by making the solution *acid*, adding sufficient sulphuric acid to it to make the solution turn *blue* litmus paper to *red*. The nascent oxygen, which is the active bleaching agent, is set free in the bath most rapidly when this is *alkaline*, hence sufficient peroxide must be used to entirely neutralize the acid, and afterwards an alkali added.

It will be noted that the silk is to be put in the bath when cold. The reason for this is that the evolution of oxygen begins the moment that the heat is turned on, therefore, there would be considerable loss of this agent if the goods to be bleached were not present in the bath from the beginning, so that they can be exposed to its action. For the same reason, the peroxide must not be added to the water all at once, but slowly and in small quantities, the stirring, while doing so, preventing local heating and decomposition.

After the silk has been sufficiently bleached, it is taken out, drained, and thoroughly washed in clear water. This is to remove the sulphate of soda (Glauber's Salts) formed by the interaction of the sulphuric acid and the sodium peroxide, which however, is perfectly harmless to the silk, but would appear on it as a white powder if not washed off. Usually a few hours only are needed for bleaching the silk perfectly, the time depending on the nature of the silk, whether light colored or dark, and the thoroughness of degumming. *All grease* must be removed from the silk before it is put into the vat, otherwise the peroxide of hydrogen will not act on it, or else will bleach it imperfectly or unevenly.

The following formula for a bath, sufficient to bleach 100 pounds of silk, is given by an authority on this process:

Sulphuric Acid	10	pounds.
Peroxide of Sodium	7.5	pounds.
Silicate of Soda	5	pounds.
Soap	5 to 10	pounds.
Water, pure	150	gallons.

Begin by mixing the acid with the water, then add, gradually, the peroxide of sodium, as before explained, making sure that all is dissolved. Now add the silicate of soda, and after a short time, the soap, mixing thoroughly. The soap and the silicate of soda must be dissolved in a little hot water before being added to the vat. Use the bath at a temperature of about 170° to 175° F.

Tussah or Wild Silk in China.

The wild silkworm of southeastern Manchuria, commonly called by the Chinese *shan-ts'an,* produces much of the silk used in the manufacture of pongees throughout China and Japan.

To the farmers of that region the industry has become a most profitable supplement to their agricultural work, for practically all land owners whose boundaries include hilly ground, make silk raising a part of their regular business.

The announcement of two recent inventions in Tokio, is likely to bring Tussah upon the market as a competitor with the domestic raw silks of China and Japan. The first, is a new process for bleaching the silk, which will render it amenable to dyeing, the second invention being a spinning machine which makes a smoother and more uniform thread than is now procurable.

The cocoons of different years yield different amounts of silk, so that their market value depends upon two factors, viz.: the price of silk and the silk-producing qualities of the season's crop.

In 1907, the highest figure ever known to the local merchants was reached, when silk sold for 206 taels per picul (133 pounds), whereas the average price has of late years been only 162 taels (1 tael = about 70 cents).

With the cost of the raw material just covered by the returns from the silk spun, the filature owner looks to the by-product of waste silk, (approximately equal in weight to the pure silk) to pay for the labor of spinning and to provide the profit.

When just fresh from the trees, the autumn cocoon averages about $13\frac{1}{3}$ pounds per 1,000; while the cocoons in the spring, after the chrysalides have been killed and dried by the exposure of the winter, do not exceed from 8 to 10 pounds. Pierced cocoons weigh about $2\frac{2}{3}$ pounds per 1,000.

To prepare cocoons for shipment, the countrymen put about 30,000 in a basket woven of willow twigs and shaped much like a hogshead. These vary in capacity and weight, the average being about 30,000 cocoons, weighing 400 pounds net in the autumn, and 35,000 cocoons, weighing about 330 pounds in the spring.

During 1907 the total number of such baskets leaving Antung, Manchuria, was about 26,000, with a total net weight of cocoons of over 10,666,667 pounds. Of these, more than 23,000 baskets were destined for Chefoo, China, and the balance for Japan.

The silk manufactured in Shantung is of two qualities, white and pongee. The peculiar yellow-brown color of pongee silk is due to the fact that the silkworms which produce it, are fed on oak leaves instead of mulberry leaves. Numberless experiments have been made endeavoring to make the silk, spun by the worms fed on oak leaves, as good a white as that produced by the mulberry-fed worms, but it has remained for German experts to work out the process.

After the failure of a British company, some five years ago, which had made extensive and continued experiments with a solution of soda, a German-Chinese company erected a silk filature at Tsangkow, about 10 miles from Tsingtau, with the purpose of continuing the experiments, which, it is understood, have now resulted, through German specialists, in producing the finest silk made in the province of Shantung. It is similar in quality to Japanese silk, and the venture, as far as the product is concerned, is a pronounced success.

A Novel Construction of Bobbin and Whirl.

In the operation of spinning or twisting machines, it is found necessary to often remove the bobbin from the spindle during the process. In replacing the bobbin in position thereon, the rapidly revolving whirl has then to be slowed down or stopped before said bobbin can be made to properly engage the same. To

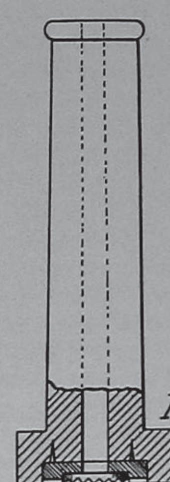


Fig.1

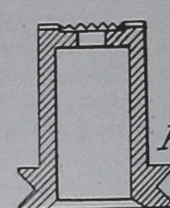


Fig.2

accomplish this purpose, a friction brake is used on the whirl which holds the same from rotating while the bobbin is being connected thereto, causing the driving band to slip around the whirl while being thus held.

To obviate this stopping of the whirl is the object aimed at in the construction of the new bobbin and whirl, the latter being for this reason provided with a set of comparatively fine tapering teeth all around the upper face of the body of the whirl, a metal plate with a set of corresponding teeth on one face being set into the lower end of the bobbin, and securely held therein. By this construction the bobbin is simply dropped over the spindle into the rapidly revolving whirl, where the two sets of teeth will engage each other and cause the bobbin to rotate, without first being obliged to slow down the whirl.

This peculiar construction of bobbin and whirl is clearly shown in the accompanying two illustrations, of which Fig. 1 is an elevation of the bobbin showing the lower portion broken away and a toothed plate secured therein. Fig. 2 is a central sectional view of the whirl showing a plurality of comparatively fine tapering teeth, formed on the upper face thereof.

It is claimed by the inventor, Mr. J. W. Collins, that this mode of shaping bobbin and whirl, on account of inserting a toothed metal plate into the lower end of the bobbin, will greatly prolong the life of the latter.

DICTIONARY OF TECHNICAL TERMS RELATING TO THE TEXTILE INDUSTRY.

(*Continued from page 351, Vol. II*)

COTTON WASTE:—The name collectively given to the sweepings of the carding and spinning rooms, the better qualities of which are sometimes re-used in the manufacture of low yarns, others in the manufacture of paper, and the poorest grades for engine cleaning.

COUNTERPANE OR COVERLET:—A bed spread, having a patterned surface produced by the Jacquard machine. According to their mode of construction they are known as Marseilles Bedspreads, Honeycomb Bedspreads, Mitcheline Quilts, etc.

COUNTS:—A system indicating the relative fineness of yarn by quoting the number of hanks of said yarn that weigh one pound. The number of yards of yarn or thread that make up a hank varies, and is known as the standard of said yarn with reference to calculations.

In connection with cotton yarns this standard length of the hank is 840 yards, with worsted yarns 560 yards, with woolen yarns either 1,600 yards if graded by the *run* system or 300 yards if graded by the *cut* system, and with linen or jute yarns 300 yards. This count of the yarn in cotton, worsted, linen and jute yarns is indicated by writing *'s* after the figures signifying the number of hanks per pound—thus "32's." If dealing with two or more ply yarn, whether doubled or twisted, the number of the ply is then placed in front of the count, separated by an oblique dash—"2/32's, 3/30's," etc., and when then the number of the ply, divided into the count will give you the number of hanks of said yarn that will weigh one pound—thus with 2/32's ($32 \div 2 =$) 16 hanks weigh one pound, with 3/30's ($30 \div 3 =$) 10 hanks weigh one pound, etc.

Spun silk has the same number of yards to one hank as cotton (=840 yards); however, if dealing with two or more ply yarn, write the ply after the count—"60/3". In this yarn, however, the single yarn equals the ply yarn, thus single 60's and 3 ply 60's (technically written 60/3's) require the same number of hanks to the pound; hence the minor yarn for the ply must be spun correspondingly finer ($60 \times 3 =$) 180's single in our example. With reference to the counts or numbering of True or Raw Silk or *Silk*, the same is graded either by the Dram, the Denier or the Ounce System. In the dram system the weight of the 1,000 yards hank is expressed in drams avoirdupois—thus if one hank weighs 5 drams it is known as a 5-dram silk. On account of the high cost of silk, 250 or 500 yards are generally only tested, and the proper count ascertained by multiplying the weight either with 4 or 2 respectively, whether 250 or 500 yards of silk have been weighed. The denier system of numbering silk is based on the weight of a skein of silk 520 yards and 20 inches (=476 meters) long, expressed in deniers—thus 10 denier silk means that a skein of such silk 520 yards and 20 inches long, weighs 10 deniers. Since silk refers to an extra fine thread, it is impossible to spin yarn exactly to one count, for which reason a variation of 3 consecutive numbers is permissible—thus 14/16's silk means that skeins of such silk, if tested, will vary between a 14's and 16's denier count.

The ounce system of numbering silk is based upon the weight of a 1,000 yard hank expressed in ounces. It refers only to heavy counts of silk yarns used for knitting or embroidery, etc., purposes.

COUTIL:—The name sometimes given to a linen or cotton canvas fabric used in the manufacture of corsets.

COVER:—A name frequently used to indicate a downy appearance of the face of cloth or yarn.

COVERLET:—The outer covering for a bed.

COVERT:—A *pepper-and-salt* effect in a fabric produced by twisting two different colors together, or working two colors in conjunction in the fabric.

COVERT CLOTH:—These fabrics were first brought into the market, intended chiefly for the manufacture of coats for outdoor sporting purposes, and consequently one of the main objects in view was to produce a tough, strong and leathery feeling fabric, a structure more or less impenetrable to water, and capable of withstanding wear and tear. As will be readily understood, to produce such a fabric then, they had to be made entirely of all wool, possessing at the same time good felting properties, in order to permit heavy fulling during their finishing process. Although covert cloth is still manufactured in grades similar to these, yet at the same time any amount of imitations of covert cloth are at present in the market, the goods at present being used in their heavier weights for overcoatings, whereas lighter weights are used for ladies' dresses, *i. e.*, costume cloth. This change in the purpose of the fabric, as will be readily understood, made a complete change in structure of covert cloth necessary. The original substantial covert cloth was undesirable, hence imitations sprang up in all its varieties, they all in turn taking the name of covert cloth, until at present the original fabric can hardly be detected in them any longer.

COWBECK:—The name given to the mixture of hair and wool, as used in the manufacture of hats.

COW TAIL:—The coarsest hair at the tail end of the fleece of wool.

CRABBING OR FIXING:—The process of setting or fixing practised in the finishing of woolen fabrics, previous to dyeing, to prevent creases and unevenness, showing in the cloths after they are dyed and finished; it also imparts a permanent and indestructible lustre and peculiar finish to the cloth. The work is done on the crabbing machine.

CRACKED BOLLS:—Unmatured cotton bolls.

CRAMMED STRIPES:—Fabrics in which stripe effects are produced by one portion of the reed containing more warp threads in a given space than another portion.

CRAPE OR CRÊPE:—A thin, transparent, gauze-like, puckered, crisp (crumpled) silk, worsted, or silk and worsted fabric, usually black, and used in mourning. Japanese and Chinese crape are usually made in bright colors. The crimped or crinkled appearance of crape is due to the method of dressing and finishing after weaving. The warp is twisted extra hard, and the threads when made thicker with size or gum have a tendency to frizzle, curl, or créper, hence the name.

CRAPE-MORETTE:—A gauzy woolen fabric of fine texture, the warp being of high counts, loosely set in the reed, the filling being of a relatively heavy count and of a fleecy nature.

CRASH:—A fabric formerly used chiefly for towelings, etc., but now also used to some extent for outing skirts, etc. The plain twills, as well as broken-up weaves are used for making these fabrics, accordingly whether a rough or a smooth finish is desired. Crash may be made from cotton or flax. When made from cotton, it is often produced in fancy weaves and patterns to imitate linen.

CRAVAT:—Originally a piece of cambric, silk, lace or similar fabric, folded and passed around the neck and shirt collar; a neck cloth. The term cravat is now applied to the narrow necktie and the scarf, both in men's and women's wear.

CRAVENETTE:—Originally, the name of a process of treating cloth to render it waterproof, invented by an Englishman named Craven, hence the name. The term is now applied to waterproof or water-resistant fabrics regardless of their nature, the designation (or proper name) of the cloth, however, not being changed by the application of the waterproofing process to them. (U. S. Custom House decision.) The process of cravenetting consists of treating the fabric with a solution that destroys the absorbent nature of the fibre and makes it water-repellent, the pores in the threads and the interstices of the fabric, however, not being filled up so that the fabric remains porous.

CRAZY-QUILT:—A kind of patch-work quilt, in which irregular pieces of different styles of fabrics are sewed together to form either fantastic patterns or without any particular design.

CREAM OF TARTAR:—It is a white crystalline compound that is soluble in water and is the source of tartaric acid. When used as a mordant cream of tartar should be employed to the extent of 2 per cent., then bichromate of potash 3 per cent.

CREEL:—The frame in which feed bobbins or spools are placed.

CREELERS:—The name given to the boys and girls employed to take out empty bobbins and replace them with full bobbins in the creels (or frames for holding bobbins) attached to ring frames, mules, roving, intermediate, and slubbing frames, as used in cotton spinning.

CREEPER:—The name applied to an endless feed or delivery apron to any machine; used to form an uninterrupted delivery of stock to a machine.

CRÊPALINE:—A light weight dress material, having a broad border of simulated crêpe stripes.

CRÊPE DE CHINE:—A very soft and drapy form of crape for dress goods purposes, made plain, figured or printed.

CRÊPE LISSE:—A fine, cotton or thin silk fabric, extremely pliable, used for ruchings, fancy dress purposes, etc.

CREPON:—A wool or silk, or silk and wool mixed fabric, the surface of which resembles the crisped effects of crêpes, but is not as thin and gauzy in its texture. This crisped effect is made larger or smaller, thus giving a somewhat different appearance to various styles of this fabric. Crepons are produced in one color and in single tones.

CRETONNE:—See Chintz.

CREWEL:—A loosely twisted worsted yarn used in fancy work and embroidery.

CRIMSON:—A red color having bluish tinge, however, lighter than purple; deep red in general.

CRINKLE or SEERSUCKER:—A fabric in which stripe effects are produced by interlacing the warp in sections, arranged to form stripes in the fabric, with two kinds of weaves, texture as well as let-off of the warp. Loose and tight weaving portions of warp are arranged to form stripes in the fabric, the loosely let-off stripes puckering up. Formerly used extensively for summer coats, but now of limited use. Originally they were made of silk, later on of worsted and of cotton.

CRINOLINE:—A stiff fabric made of cotton warp and a haircloth filling, or in cheaper grades in imitation of all cotton, usually from 18 to 20 inches wide; used for stiffening skirts, collars, or other parts of a garment.

CRIOULO COTTON:—Or Maranhão cotton or for short Mananams; a cotton grown in Brazil; a specie of Peruvian cotton.

CROCHET:—To knit, entwine or loop wool, worsted, silk or cotton into a fabric with a single hooked needle.

CROCHET LACE:—Hand knitted lace.

CROCODILE-CLOTH:—The name given to woolen or worsted dress goods, figured by the Jacquard with Bedford cord weaves; in vogue about 1891.

CROPPER:—A machine for cropping or removing all threads and fluff from the face of the cloth previous to its being mangled or calendered, by means of a series of knives working along both sides of the cloth.

CROSSBAND:—The opposite to *open band;* indicating the way of the twist in spinning. Both terms are derived from the one thread spinning wheel. When the band or string from the rim to the spindle was running open, the twist of yarn produced was called openband, and when the band was running crossed between the rim and spindle, then yarn produced was naturally called crossband twist.

CROSS-BARRED:—Marked by transverse bars, produced either by difference in material, color or weave.

CROSS BORDER:—The heading to a piece of cloth formed either by a change in color, count or quality of the filling, or by a change in the pattern.

CROSS DRAWING:—A fancy drawing in draft for the warp; any other drawing in draft but a plain or straight draft.

CROSS DYEING:—The process of dyeing the warp previous to weaving, and the filling in the woven fabric.

CROSS WEAVING:—One of the main divisions of weaving, in which the warp threads besides interlacing with the filling are twisted around threads of its own system; the resulting fabric showing openwork effects; gauze or leno fabrics.

CROWN LACE:—Early lace in which royal crowns were introduced as part of the pattern, dating back to the reign of Queen Elizabeth.

CROWN LINING:—Fine crinoline or stiff tarletan, used by milliners for lining the crowns of ladies' bonnets.

CROWN OF CARD CLOTHING:—The number of wires in one inch along a sheet of card clothing.

CRUMB CLOTH:—A stout kind of cloth intended to be placed under the table to receive the falling fragments and thus keep carpet or floor clean.

CUBICA:—A worsted fabric of fine texture used for linings.

CUDBEAR or ORCHIL:—A purple or violet coloring substance that may be used in dyeing purple, violet or crimson. It is obtained from various species of lichens. It is now used only in a few cases in the dyeing of silks and of woolen cloth where a beautiful lustrous color is desired; but though a rich hue is imparted to the fabric, the color is not permanent, being easily acted upon by the rays of the sun. Hence it is seldom used by itself. The fabric is first dyed by another coloring matter and cudbear applied to impart a brilliant lustre.

CUFF:—That part of a garment, made either of linen, lace, fur or other fabric which covers the wrist, either under or over the sleeve.

CUIRTAN:—A fine woolen cloth of Scotch origin, used for undergarments and hose.

CUMBER BOARD:—See comber board.

CUMBERLAND SHEEP:—A breed of sheep, originated in Cumberland, England.

CUMBI:—A cloth made in Peru and Bolivia of alpaca wool.

CURVED TWILLS:—Weaves producing wavy twill lines in the fabric by the combination of regular 45° twills with 27, 63, 70, etc., degree twills, known as reclining and steep twills.

CUT:—A length of warp required to weave a piece of cloth; also the piece when woven. One of the systems (300 yards to one hank) of numbering woolen yarn.

CUTCH, CATECHU or GAMBIER:—The Terra-japonica, an extract of an astringent nature, obtained from two plants, viz.: acacia catechu, a tree of great abundance in many of the forests of India, and the nauclea gambier, a scandent shrub, extensively cultivated in the countries lying on both sides of the strait of Malacca. From the first named plant the catechu is obtained by boiling the chips of the interior of the trunk; from the latter it is obtained by boiling the leaves. Catechu is chiefly used in dyeing browns, fawns, drabs and olives.

CUT GOODS:—Underwear made of either ribbed or flat, knitted on the machine into long rolls and cut up afterwards into sections for garments, which afterwards are sewed together.

CUT MARK:—A mark fixed on the selvage of a warp during slashing, dressing or beaming, to indicate a definite length and which during weaving serves as a guide for the weaver where one cut has to stop and a new one to begin.

CUT or VELVET PILE:—A pile or nap composed of fibres or threads standing erect, produced by cutting the loops as formed by the warp, or floats of the filling produced in the weaving of pile fabrics, as velvet, plush, wilton and moquette carpet, etc. The mate to *uncut*, terry or loop piles.

CUT WORM:—An enemy to the cotton plant; the same works at the plant in the earliest stages, and is so called because it bites the young stalks from the roots.

CYLINDER:—The square prism of the Jacquard machine which revolves on a horizontal axis and carries the pattern cards. The cylinder brings these pattern cards alternately into and out of contact with the heads of the needles of the Jacquard Machine.

(*To be continued.*)

An Ingenious Feeding Device For Knitting-Machines.

The object of the new device is to effect a saving in time on the part of the operator, otherwise required in removing the yarn from the path of the needles and turning the machine by hand to run off the previously finished work preparatory to transferring a ribbed cuff to the machine and starting the machine on the next stocking.

Of the accompanying illustrations, Fig. 1 is a side elevation showing a sufficient portion of a knitting machine to illustrate the new device. Fig. 2 is a detail showing the latch and its controlling device in plan.

The new device can be applied to any knitting machine wherein the cam cylinder or cam carrier is provided with a latch guard ring normally standing above the top of the needle cylinder, and carrying the yarn guide through which the yarn is delivered to the needles, as the knitting proceeds.

The improvement consists in means for controlling the needle latch-guard ring 1, carrying the yarn guide

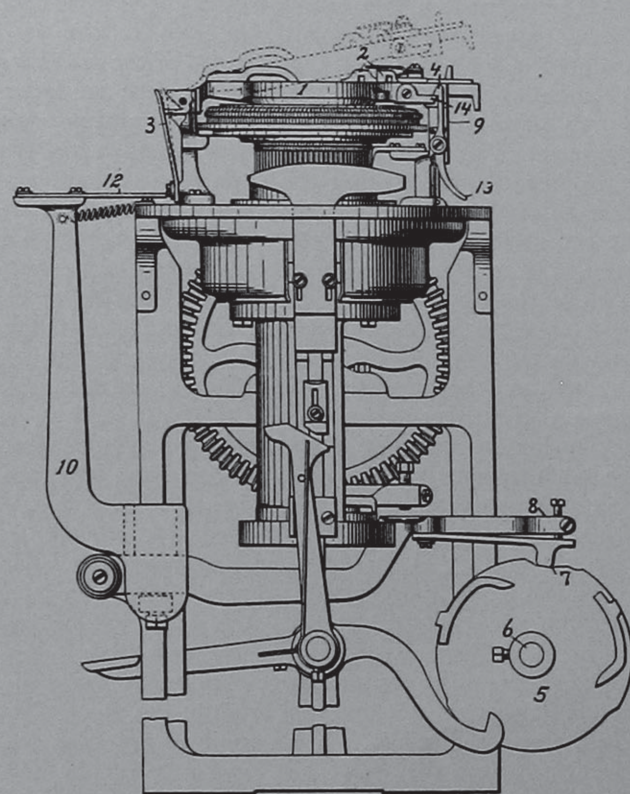


Fig. 1

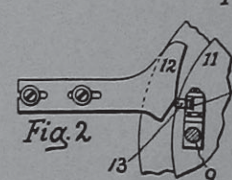


Fig. 2

2, through which the yarn is delivered to the needles. The former is pivotally supported at one side of the needle cylinder in the usual manner, and is acted upon by a spring 3, tending to throw the latch guard ring 1 up (see dotted lines) from its normal position, far enough to cause the yarn guide 2 to cease to deliver the yarn to the hooks of needles, said spring pressed latch guard ring 1 being provided with a holding device (a spring latch 4) which normally fastens the same in the horizontal or working position in which the yarn guide delivers the yarn to the hooks of the needles properly to be knit.

The latch 4 is automatically operated to release the latch guard ring 1, when the stocking is finished, by mechanism controlled by the cam disk 5 on the shaft 6, which cam shaft and disk make one complete rotation for each stocking. When a stocking is completed, a depression 7 in the surface of the cam disk 5, permits lever 8 to drop to a lower position than any occupied during the knitting of the stocking. The lever 8 is pivoted on the frame of the machine at 9, and is provided with an arm 10 which extends up to approximately the level of the knitting cam carrier 11 of the machine, being provided at its upper end with a trip cam 12 (see Fig. 2) which stands at the side of the cam carrier 11 and at the level of the end 13 of the latch 4 for the latch guard ring 1.

The depression 7 in cam 5, causes the trip cam 12 to be moved inward towards the axis of the cam cylinder to such a position that the end of the said cam 12 engages the end 13 of the latch 4, when the latter comes around in the rotation of the knitting cam carrier 11. The cam 12 thus presses the end 13 of the latch inward, disengaging the latch from the projection 14 of the latch guard ring which is then thrown by the spring 3 to the position shown in the dotted lines, Fig. 1, thus carrying the yarn guide 2 to such position that the yarn is no longer laid into the hooks of the needles, so that in the following rotation of the cam carrier the needles cast off the last course of stitches, and the finished stocking is thus entirely disengaged from the needles.

During the operation of the knitting machine, after the latch guard ring has been thus released, the cam disk 5 is again advanced and raises the lever 8 and moves the cam 12 radially outward, far enough to clear the end 13 of the latch, so that when the latch guard ring is subsequently moved down by the operator and engaged by the latch 4, it will be retained in working position until the cam disk 5 has made another full rotation, corresponding to the completion of another stocking and brought the depression 7 in the cam surface in position again to act upon the lever 8. After the work has been run off by the tripping of the latch 4, the machine is then stopped by the operator, or by automatic stop mechanism, and properly prepared for the knitting of the next stocking, after which the latch guard ring 1 is returned to working position and engaged by its holding latch 4, and the machine is set in operation.

The operation is a continuous one, automatically controlled up to the point where the stocking is completed, when the latch guard ring is automatically tripped to cause the work to be run off, as before described.

Stocking Finishing and Stripping Machine.

The new device relates to machines for finishing stockings and consists

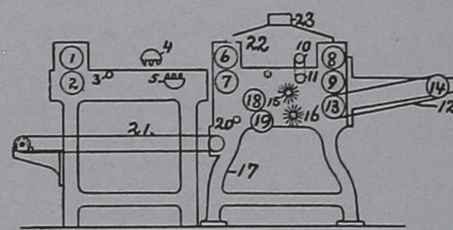
(1) in a mechanism to be used in connection with a singeing machine for the purpose of cleaning the singed particles from the goods,

(2) of stripping the stockings from the boards upon which they are stretched, and

(3) of conveying the boards back to the front of the singeing machine.

The accompanying illustration is a diagrammatic view of the new device as applied to a singeing machine, and a brief description will serve to show the several elements of such a device.

1 and 2 represent the feed rolls of the singeing machine, 3 is a supporting rod, 4 and 5 are gas burners for singeing the stockings as they pass



through; 6 and 7 are feed rolls which convey the stockings to the air blast and constitute the first set of feed rolls of the new device. The roll 7 has a projecting shaft which carries fast and loose driving pulleys. At the rear of the machine are rolls 8 and 9, constituting the second set of feed rolls, and which are driven from the shaft which carries roll 7, by means of spur wheels. Both sets of rolls 6, 7 and 8, 9 are caused to turn in unison by means of intermeshing pinions, the first set of pinions being arranged respectively upon the shafts of the rolls 6 and 7 and the second pair being in a similar manner operatively connected to the rolls 8 and 9. Between the first and second pairs of feed rolls are placed blast pipes 10 and 11, which have a multiplicity of small openings or jets arranged adjacent to the path of travel of the material which is being fed from one set of rolls to the other. The stockings which are to be treated for the purpose of removing adhering particles of dust and dirt incident to the singeing process, are mounted on boards which are cut in the shape of the stockings.

At the rear of the second set of feed rolls 8 and 9, is a conveyer 12, which consists of a belt passing over a table and around rollers 13 and 14. It is obvious with this arrangement that the boards, after passing between the rolls 8 and 9 will travel, aided by the conveyer 12, between rolls 9 and 13.

The stripping brushes as indicated at 15 and 16 are arranged directly forward of the rolls 9 and 13 and are mounted respectively upon shafts which have bearings in the frame 17. The stripping brushes are geared together by spur wheels and motion is imparted to them by means of a belt pulley.

The boards, after passing between the brushes, are released from the action of the rolls 9 and 13 and forwarded by the rolls 18 and 19 which pass the boards over the rod 20, to the conveyer 21. The roll 18 is driven from the shaft of the roll 9, by means of a belt, engaging two pulleys, the first being mounted on the shaft of the roll 18 and the latter secured to the shaft of roll 9. The rolls 18 and 19 are driven in unison by means of gear wheels.

Below the stripping brushes is placed a basket to receive the stockings after they have been removed