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Posselt's Textile Journal

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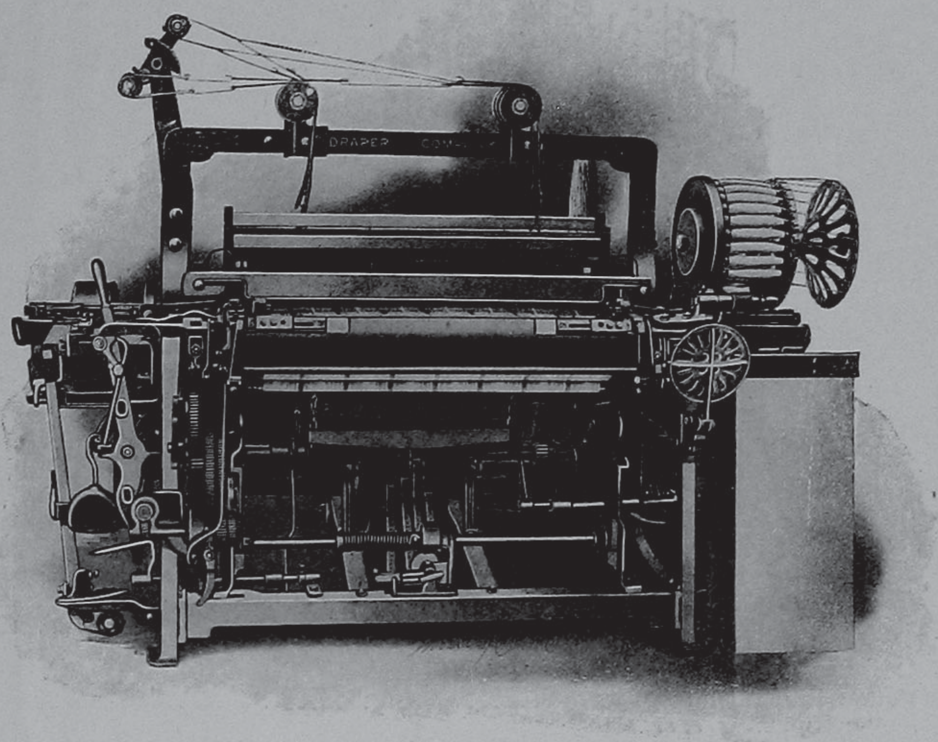

POSSELT'S
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EDUCATIONAL JOURNAL

DEVOTED TO

THE TEXTILE INDUSTRIES.

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WOOL, COTTON AND SILK DESIGNING AND FABRIC STRUCTURE FOR HARNESS WORK.

BROKEN TWILLS.

The same are the first division of the DERIVATIVE WEAVES obtained from our regular, *i. e.,* 45° twills, and in turn are divided into such as *broken warp ways,* and such as *broken warp and filling ways.*

Broken Twills—Broken Warp Ways.

After selecting the required foundation twill, the rule for constructing these weaves is: Run your twill for a certain number of warp threads in one direction, and then in the reverse direction; arranging a clear break (risers opposite sinkers) wherever two directions of twill lines meet. Continue this drafting of the twill lines in one direction and then in the reverse direction, until repeat for the new weave is obtained. In most instances, drafting twill for a given number of threads in one direction and then in the reverse direction will complete the repeat of the broken twill weave, again drafting the foundation twill two or more times in either direction may be required, until repeat of the broken twill is obtained.

Even sided twills are used for foundation weaves, since this is the class of twills which permit a clear break where direction of twill lines meet, without increasing the number of harnesses required on the loom for the broken twill, compared to that of its foundation, the regular or 45° twill.

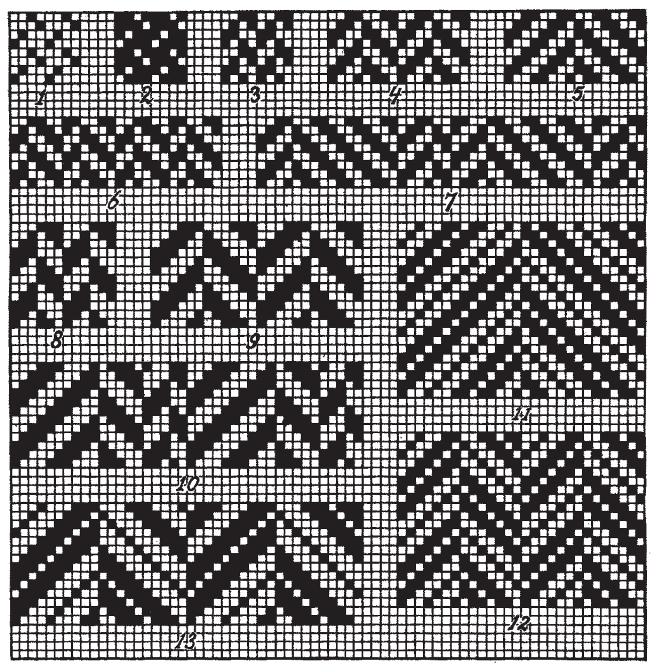
The only broken twill we will come across, in practical work, which has for its foundation an uneven sided twill, is the broken twill shown in Fig. 1, and which weave has for its foundation the uneven sided, *1 up 3 down,* 4-harness twill; drafting 2 threads from left to right followed by drafting 2 threads in the reverse direction. As will be readily understood, no clear break or cut-off at the point where twill lines meet can be made when dealing with an uneven sided twill for foundation weave.

Fig. 2 shows us the warp effect of the thus explained weave, or in other words, the broken twill having for its foundation the *1 down 3 up* 4-harness uneven sided twill; drafting 2 threads from left to right followed by drafting 2 threads in the reverse direction. Repeat of weave 4 warp threads and 4 picks.

Fig. 3 is the broken twill obtained from the *2 up 2 down* 4-harness even sided, common, regular or cassimere twill, as this weave is variously called. The drafting for this broken twill is done with 2 threads drafted from left to right to alternate with 2 threads drafted from right to left. In this weave, as well as in any other weave treated hereafter in this lesson, a complete break, or cut-off, is made at every point where direction of twill lines meet, or diverge from. We will not again refer to this feature.

Weaves Figs. 4 and 5 have the same 4-harness even sided twill for their foundation weave, the drafting in connection with weave Fig. 4 being to draft 4 threads alternately in one and then in the other direction; resulting in the broken twill shown, repeating on 8 warp threads and 4 picks. In connection with weave Fig. 5 the drafting employed is 8 threads drafted alternately in one direction and then in the reverse direction. Repeat of weave: 16 warp threads and 4 picks.

Weaves Figs. 6 and 7 have again the same 4-harness even sided twill for their foundation weave, requiring in both examples more than two pieces of twill lines for their repeat.



The drafting in connection with weave Fig. 6 is: 2 threads drafted from left to right to alternate with 4 threads drafted the reverse way. This, on account of 2 (the first draw) being only one-half the number of ends of the foundation twill, a full repeat of the latter being used for the second draw, will require twice drafting over in order to get the complete repeat of the broken twill Fig. 6, and which is 12 warp threads and 4 picks.

The drafting as is done in connection with weave Fig. 7 is thus:

4	threads drafted from	left to right,
12	" " "	right to left,
4	" " "	left to right, and
2	" " "	right to left
—		
22	threads, repeat of arrangement for drafting.	

Adding threads drafted from left to right = 4+4= 8
" " " " right to left = 12+2=14
8÷4=2 repeats of the foundation twill.
14÷4=3 repeats of the foundation twill plus 2 threads left over.

2 being one-half the repeat of the foundation twill, it follows that the drafting previously quoted has to be repeated once more over before repeat of broken twill is obtained, a feature readily seen by consulting weave Fig. 7—repeat 44 warp threads and 4 picks.

This example will give us a handy rule for ascertaining the repeat of broken twills: Add threads drafted one way, then add threads drafted the reverse way; divide either sum by repeat of foundation twill and consider only the remainders. If remainders are alike, the repeat is at once obtained, whereas if they differ, subtract the smaller from the larger number. When then the difference equals one-half the repeat of the foundation twill, the drafting then has to be done twice over before repeat for the broken twills is obtained. If the difference is one-third or two-thirds of the foundation twill, you will have to draft three times over before the repeat for the broken twill is obtained. If the difference is one-fourth or three-fourths of the foundation twill, you then will have to draft four times over before the repeat for the broken twill is obtained, etc.

Weave Fig. 8 has for its foundation the 6-harness even sided twill, with 3 threads of this weave drafted from left to right, to alternate with 3 threads drafted from right to left. Repeat of broken twill 6 warp threads and 6 picks.

Weave Fig. 9 has for its foundation again the 6-harness even sided twill, with 6 threads drafted from left to right to alternate with 6 threads drafted from right to left. Repeat of weave 12 warp threads and 6 picks.

Weave Fig. 10 has also again the 6-harness even sided twill for its foundation, the drafting in this instance being:

10 threads drafted from left to right
5 " " " right to left
3 " " " left to right, and
2 " " " right to left
—
20 threads in repeat of drafting.

$10+3=13\div6=2$ and 1 over

$5+2=7\div6=1$ and 1 over, *i. e.,* 1 is the remainder in either division of drafting, hence repeat of weave obtained by one drafting = 20 warp threads and 6 picks.

Weaves Figs. 11 and 12 have for their foundation weave the $\frac{2}{1}\frac{2}{2}\frac{1}{2}$ 10-harness even sided twill. Weave Fig. 11 calls for the drafting of 14 threads of this weave alternately in one direction and then in the other direction, repeat of weave being 28 warp threads and 10 picks; whereas weave Fig. 12 calls for drafting only 7 threads in either direction, this weave thus repeating on 14 threads and 10 picks.

Weave Fig. 13 has for its foundation the $\frac{3}{1}\frac{3}{3}\frac{1}{3}$ 14-harness even sided twill with 10 threads drafted in either direction, the broken twill thus repeating on 20 warp threads and 14 picks.

Questions:

(1) Foundation weave: the 4-harness even sided twill.

Draft: 8 ends from left to right
4 " " right to left
2 " " left to right and
2 " " right to left
—
16 ends repeat of drafting.

$8+2=10\div4=2$ and 2 over

$4+2=6\div4=1$ and 2 over, hence repeat of broken twill will be 16 warp threads and 4 picks.

(2) Foundation weave again the 4-harness even sided twill.

Draft: 12 ends from left to right
5 " " right to left
20 " " left to right
6 " " right to left
4 " " left to right and
3 " " right to left
—
50 ends repeat of drafting.

$12+20+4=36\div4=9$

$5+6+3=14\div4=3$ and 2 over, hence repeat of broken twill will be (50×2) 100 warp threads and 4 picks.

(3) Foundation weave: the 6-harness even sided twill.

Draft: 12 ends from left to right
8 " " right to left
10 " " left to right and
6 " " right to left
—
36 ends in repeat of drafting.

$12+10=22\div6=3$ and 4 over

$8+6=14\div6=2$ and 2 over

$4-2=2$, and $6\div2=3$, and $3\times36=108$ warp threads and 6 picks, repeat of broken twill desired.

Broken Twills—Broken Warp and Filling Ways.

Explanation and rules given for the construction of the previously explained system of broken twills broken warp ways, refer in this instance to both warp and filling ways; or in other words, the construction of broken twills, broken warp ways, as previously explained, is in the present instance extended in the same manner to the filling, resulting, as will be readily understood, in this case in *check effects,* whereas in connection with broken twills broken warp ways only, *stripe effects* are the result. These check effects, as will be readily understood, will be prominently visible when drafting a great many threads of the foundation twill; drafting or using only few ends of the twill, before arranging a break, resulting in what we term *small broken up effects,* in many instances closely resembling *granite effects.*

In order to explain the construction of these broken twills to the student, the accompanying plate of weaves, Fig. 14 to and inclusive Fig. 22 has been given, a study of which will explain how to construct any broken twill required for any class of fabric, the student may come in contact with.

Weave Fig. 14 has for its foundation the 4-harness even sided twill, drafting 4 ends first in one direction and then in the reverse direction, both warp and filling ways; the affair resulting in a weave repeating on 8 warp threads and 8 picks.

Weave Fig. 15 has for its foundation the same 4-harness even sided twill, the draft in this instance being

4 ends drafted from left to right and
2 " " " right to left
—
6 ends in repeat of draft.

From previously given rules, we will see that the drafting given has to be done twice over, warp and filling ways in order to obtain the repeat of the weave —12 warp threads and 12 picks.

Weave Fig. 16 has for its foundation again the 4-harness even sided twill, the drafting—warp and filling ways—being in this instance:

4 ends drafted from left to right
2 " " " right to left
2 " " " left to right and
4 " " " right to left
—
12 ends in repeat of drafting.

Since number of ends drafted in one direction correspond to those drafted in the opposite direction (for reasons explained before in connection with broken twills broken warp ways only) the repeat of the weave is obtained by one draft; 12 warp threads and 12 picks.

Weave Fig. 17 shows us a more pronounced check effect, *i. e.*, using more ends of twill lines before reversing the twill. The foundation weave used again is our favorite 4-harness even sided twill, the drafting done being:

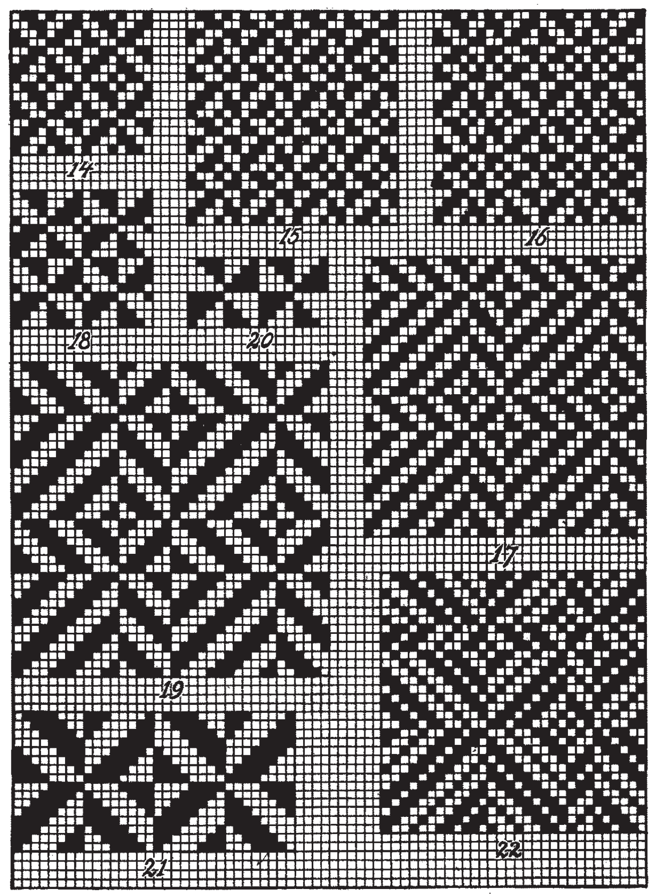
12 ends drafted from left to right and
4 " " " right to left
—
16 ends in repeat of draft, and also in repeat of weave for warp and filling, since 12 and 4 are both multiples of 4, the repeat of the foundation weave.

Weave Fig. 18 shows us a somewhat broken up effect, the same being the 6-harness even sided twill drafted for 4 ends in one direction and then for 4 ends in the reverse direction, both warp and filling ways. Drafting the same number of ends one way as the other way will naturally result in one draft only required for repeat of weave, 8 warp threads and 8 picks in our example.

Weave Fig. 19 shows us the same foundation weave used as referred to in the preceding example—the 6-harness even sided twill, the drafting done being 12 ends drafted from left to right, and 6 ends drafted from right to left—18 threads in repeat of draft as well as in the repeat of the weave, both warp and filling ways, since 12 and 6 are multiples of the foundation weave.

Weave Fig. 20 has for its foundation the 8-harness even sided twill, the broken twill being obtained from it by means of drafting alternately 4 ends in one way and 4 ends in the other way, both warp and filling ways, the repeat of the broken twill being 8 warp threads and 8 picks.

Weave Fig. 21 shows us the previously given example enlarged, the same foundation weave being used in this instance with drafting 8 ends, both warp and filling ways, in one direction and then in the other direction, the repeat of the broken twill being 16 warp threads and 16 picks.



Weave Fig. 22 has for its foundation the $\frac{2}{1}\frac{2}{2}\frac{1}{2}$ 10-harness, *fancy*, even sided twill; drafting observed being:

12 ends drafted from left to right
9 " " " right to left
3 " " " left to right and
6 " " " right to left
—
30 ends in repeat of drafting.

$12+3=15$

$9+6=15$; hence one repeat of the draft results in the repeat of the weave, 30 warp threads and 30 picks.

Questions:

(4) Construct the three broken twills broken warp and filling ways, to correspond to questions 1, 2 and 3 previously given in connection with broken twills broken warp ways only, and when explanation given then with reference to warp drafting, in this instance will refer to drafting both warp and filling ways.

(5) Construct the broken twill, broken warp and filling ways: Foundation weave the $\frac{2}{1}\frac{2}{2}\frac{1}{2}$ 10 harness even-sided twill; Draft 15 ends from left to right to alternate with 15 ends drafted from right to left. Repeat: 30 warp threads and 30 picks.

A PRACTICAL TREATISE ON THE KNOWLES FANCY WORSTED LOOM.

By E. P. Woodward.

(Continued from page 143.)

The Setting of the Picking Motion.

The shuttle boxes and reed being lined and loom belted and geared to required speed, the next step will be the setting of the parts comprising the picking motion *i. e.,* the parts of the loom which when working as they should, throw the shuttle to and fro in its passage through the shed, formed by the opening of the warp threads, in time for its traverse.

As this part of the loom has much to do with production of good cloth and also much to do with the economical running of the loom, concerning the question of supplies and power, it deserves the best attention the fixer can give it, and the time required for its best adjustment is time well spent, if the proper results are finally attained.

This article is written with the object in view of setting both sides of the loom alike, therefore having both sides pick alike Each side being an exact duplicate of its opposite in construction it should be an exact duplicate in its assembling and running.

Begin by locating the positions of the picking shoe on the bars. This can readily be done with a twelve inch combination square. The bar of this square is fitted to receive two parts which will slide its entire length and both can be used on the bar at once if necessary. One of these parts is a mitre angle of 45 degrees to the bar; the other part is a right angle to the bar and carries a level. This is the part which now comes into use in setting the picking motion. Using the combination of bar and right angle attachment gives a twelve inch square and level to work with. With the bar of this square held in an upright position against the front of the picking shaft *A* at the same time letting the part which carries the level rest on the shoe bar *B*, taking care to have the bubble show level. This will give a line plumbed from the front of the picking shaft to a point located on shoe bar as shown at *a*. Now using a scratch awl, score the shoe bar across the top at this point just located and there will be a permanent mark from which to set the shoe, it being a permanent mark for reference if at any time the shoe should become loose on the bar.

Locate the measuring point for the picking shoe on the opposite shoe bar in the same manner and the shoes when set from measurements taken from these marks must be truly located so far as their relative positions, on the shoe bar, to the picking shaft is concerned. Measurements taken from the back girt or the back socket for the shoe bar cannot always be relied on, as quite often a back girt and back sockets will be found out of a parallel position to the picking shaft, even to the extent of making over ¼ inch difference in the position of the picking shoes in their relation to the picking shaft. As all fixers know that this one point alone (of one shoe being ¼ inch ahead of its opposite) would make much trouble in the picking, other things being equal on the picking motion, it can readily be seen that it is best to work to *accurate measurements* taken from points *correctly located.*

The locating of the picking rolls as to their being the same distance from the picking shaft and working in the same plane at the same time are other points which are very essential to the proper working of the picking motion. To know that these are right the following method can be used, the same being correct and simple and can be accomplished by the proper use of the same little combination square.

First measure from a point on the circumference of the picking shaft *A* to a point on the circumference of the picking roll on the side farthest from the picking shaft (see *C* in our diagram) and while the slide head of your square is set to this measurement locate the opposite roll in the same manner and then you have both rolls located the same distance from the picking shaft. This duplicate adjustment of the picking rolls is essential to the final adjustment of the *time* and sweep of the picker sticks.

The picking rolls having been set equally distant from the picking shaft they may then be tried as to their working in the same plane at the same time. It is necessary to know this and if one roll is found running ahead of the other, both should be made to work together. To set the rolls working in the same plane turn the picking shaft, until, with the bar of the square held in an upright position against a point on the circumference of the picking shaft and the picking roll, the bubble on the square shows level. Block the gears which connect the crank shaft and the picking shaft and then test opposite roll and make it agree with one just set. The picking roll studs can now be tightened securely and suitable marks made showing true location of the roll studs in their slots and if they become loose the fixer has no trouble to set them readily.

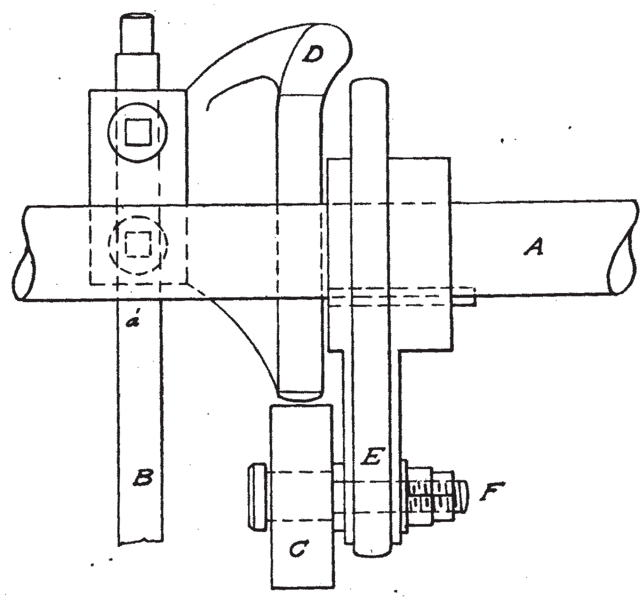
These directions for locating the picking rolls regarding their position to the picking shaft and their position as to one roll traveling ahead of the other are things which it is necessary for a fixer to consider. For that reason it has been treated fully here. It will be found, however, that on the Knowles loom of to-day the rolls are truly positioned on leaving the shop so one seldom has this feature to contend with when fixing new looms.

Next comes the setting of the shoe bar as to its distance from the picking shaft. On a loom where the picking parts are in good repair one can begin by setting back sockets for shoe bar as low as their construction will admit. With this as a starting point, level the bar by adjusting the sockets for the front end of the bar. This will give about 5⅛ inches from the top of the shoe bar to the bottom of the picking shaft, and then make sure that both are set alike.

The picking stick studs can now be located, and a good place to locate them is as far in toward the loom side as their slots in the rocker castings will admit. The rocker castings are located where they will leave the box lifting rod parallel to the loom side and at right angles to the race plate.

With the picker stick studs set at the same distance on each side from the shoe bar, the length of the sweep connections can now be found. First set the sweep arm as far forward on the shoe bar as it will go and clear the lay sword when the crank shaft is on the back centre. Now with the picking arm resting on the check block, and the check block set as low as possible, measure from the centre of the stud on the sweep arm to a point on the back of the picker stick about one inch higher than a line which would carry the sweep connection level. This line will be about 17 inches long and as it is well to have a little *play* between the picker stick and the sweep strap, a good length to use is about 17½ inches from the centre of the hole in the sweep stick to the inside of the back of the lug strap. These measurements for sweep stick and distance for hanging same on picker stick apply to loom when adjusted for speed of about 110 picks per minute. 4¼ inches is a necessary length to punch the lug strap, measuring from the centre of the hole to the inside of the back of the strap. With the lug straps hung at the same height from the picker stick studs on each side (as they will be when the length for the sweep stick is found) the loom is now ready to be tested as to the *time i. e.* the starting of the picker sticks together and the sweep *i. e.* if both picker sticks have the same length and also the right length of stroke.

It will be remembered that, although points have been determined on the shoe bars from which to measure in positioning the picking shoes, they have not yet been positioned as to their location under the picking shaft. The shoe should now be set on the bar where it will send the picker stick to within about 2½ inches of the *bumper* or a 15½ inch stroke. This will make the distance from the back shoulder of the shoe bar to the back of the picking shoe about ¾ inch. Set the shoe on the opposite bar at the same distance from the locating mark as the one just set. If it does not give the same stroke in the same time, as its opposite, do not move the shoe nor look for the trouble on parts which you have set and know are alike and right. The trouble is somewhere else and in a place quite often where the learner will not look for it. The trouble in the majority of such cases will be found in the assembling of the picking shoe, the shoe bar, and the sweep arm, and is caused by the end of the sweep arm, on which the sweep stick fits, and the picking shoe not always taking the same relative positions. This may be caused by a bar being slightly twisted, or the bar may be true and the hole in the casting where it fits on the bar may be a trifle different to it's opposite, or it might be a little of both. It matters not which of these causes is making the trouble the effect is there and it can be made right in two ways. The casting can be filed to throw the end of the sweep arm, or the bar can be twisted to the proper position. It can also be remedied by cutting the sweep connections a suitable length, but the better way is to true the bar. This can be done without heating the bar if a device is made for such work and kept in the shop. All who are fixing Knowles equal geared looms and running them from 100 picks per minute up, know that the shoe bars become twisted at times to such an extent that the proper sweep cannot be obtained until the shoe bar is trued, because of the sweep arm striking the loom side when at rest. With a device such as spoken of a bar can be quickly trued and with better satisfaction to the fixer than the blacksmith would give. It also saves time and money. The sweep now being equal on both sides and both picker sticks starting at the same time, the loom can then be geared to the proper picking time, which is done by loosening the caps of the bearings on the crank shaft and turning the crank shaft until the picker sticks start to move forward. Now take the crank shaft gear out of mesh with the picking shaft gear and turn the crank shaft



PICKING MOTION.
¼ size, showing true proportions and running positions of parts.

until the crank is on the top centre. Put the gears in mesh and screw down the caps and the loom is in picking time and ready to try throwing the shuttle, but not running the head motion, since this may need the fixers attention before starting.

The foregoing directions are of course theoretically correct. They are also correct in practical shop work. One can be sure that a loom set as described will work both sides of the picking motion alike. This also can be depended on as a fact—both sides will work as nearly alike as the fixer has set them alike. Like conditions cannot fail to produce like results.

If both sides of the loom are not acting alike the fault must be in the setting, even though all may seem right.

The following are a few things which may be troubling the fixer and deceiving him at the same time:

(1) A picking roll not truly centered can be a means of giving uneven picking *i. e.* throwing the shuttle with more force at one pick than at another.

(2) A roll with a flattened surface will do the same thing.

(3) A shoe which at first glance looks in good condition is responsible for many of the so-called *weak picks* and *backlash.*

For these reasons alone the picking shoe deserves mention as to what its good running condition should be. The picking shoe, even when new, should have the fixers attention, for it is liable to show places where a judicious touch of an emery wheel will smooth both the shoe and the fixers future troubles, besides helping to keep the picking motion running smoothly. By this it is not meant that the shoe should be ground when new nor its form changed, but, anything of a rough and flinty nature should come off and the shoe should show a smooth, chilled surface along its entire face. A picking shoe after continuous running will show an uneven surface where it comes in contact with the picking roll. This uneven surface will give to the picker stick a more or less jerky motion. This motion transmitted to the shuttle cannot give it the steady throw which is so necessary for its steady running and even boxing, for the reason, that, the picker stick when actuated by the uneven place on the shoe has given to the shuttle an accelerated speed. One of two things must occur:

(a) If this extra speed is given near the finish of the picker stick stroke, the shuttle will take its flight from the picker at that point, for the reason that the stick has made its quickest motion, and as the shuttle is not fastened to the picker it will be compelled to travel away from it.

(b) If the unevenness of the shoe comes where the picker stick is affected by it at a point soon after the starting of the shuttle (as is quite often the case) the result would be that the shuttle would not have a close following or steady push by the picker and it would get the same driving effect (in a sense) as if the shuttle were started by a sudden blow and then driven the remaining distance by another blow and it would not in either case derive the benefit of a smoothly delivered and accelerated stroke of the stick from its start to its finish.

It may be well to state here for those who are learning that a careful laying out of the Knowles equal geared picking motion (and of the picking motion used when the loom is geared two turns of the crank shaft to one of the picking shaft) will show that something must help to get the shuttle across (in time to clear the protection) besides the speed of the picker stick in its relation to the speed of the crank shaft. A glance at the following figures will show what is meant. The loom has gearing on crank shaft of 58 cogs and the picker stick makes its stroke of 18 inches while the gear is travelling a little over 7 cogs. 31 cogs on the crank shaft gear are required to drive the crank shaft from the time of the starting of the shuttle on the top centre to the protecting point (when the shuttle must clear the protection) when the crank shaft will be about 2 cogs past the bottom centre. If 18 inches of shuttle traverse equals 7 cogs on the crank shaft gear, 31 cogs on the same gear will equal 31 times 18 inches divided by 7 (cogs) which will give $79\frac{5}{7}$ inches shuttle traverse when the gear is travelling the distance between the starting of the shuttle to the time the loom must protect, if the shuttle is not there. As the shuttle must travel at least 90 inches in the time when figures show but about 79 inches it is plain something must help the shuttle across in time. This something is where the good fixers skill and care shows to advantage over an inferior man and also where he saves both for the loom owner and the weaver. This *something* which the good fixer uses to such good advantage is momentum, and he does not get it by tightening the binders or binder springs, but depends on the weight of the shuttle and a nicely adjusted picking motion *i. e.* one on which his stroke is not so short as to give a clubbing pick and a stroke which is not carrying his picker stick so close to the bumper as to let it check the stick and thus lose this desired momentum. One can prove the truth of this statement readily by just two experiments.

(1) On any loom which is running with a smooth stroke of about 15 inches take up the sweep until the stick just clears the bumper on the finish of its stroke and you will find at once that the shuttle will not get across in time to clear the protection.

(2) Now lengthen the sweep connections until the picker stick shows about a 12 inch stroke and you will find the shuttle travelling faster than it did with the proper stroke of $15\frac{1}{2}$ inches. In this last case the extra power is gained at the expense of the whole loom, since there is more jar on the loom including the picking motion from the fact that the roll is engaging the shoe to start the stick at a point where it is intended the roll should be in contact with the shoe when the shuttle is partly thrown. Briefly stated these are the results of the three different lengths of sweep.

(1) With a short stroke of picker stick a powerful and jerky clubbing pick is produced at the expense of the whole loom and in many cases the goods.

(2) With a 15 or $15\frac{1}{2}$ inch stroke, the shuttle is thrown smoothly without undue strain on the picking motion or jar to other parts of the loom.

(3) With a sweep which closely approaches the bumper the pick will be steady and smooth but the picker stick will lack the freedom of action and throwing power which the shoe should give it and the parts will wear out much quicker on account of undue and unnecessary strain.

The points then to keep in mind when setting the picking motion are:—

(a) Locate the shoes in the same relative positions to the picking shaft, both as to their distance below the shaft and their positions on their respective bars.

(b) Bars should be level.

(c) Locate the picking rolls at the same distance from their picking shaft and see that they are working in the same plane at the same time.

(d) Be sure that the rolls strike and travel on the surface of the shoe properly. (If they do not they will fail to engage the wing *D* of the shoe, which is on there in order that the picking rolls, when in their backward movement will ride this part of the shoe, otherwise they might cause trouble.)

(e) Picker stick studs should measure the same distance from the shoe bars on each side of the loom.

(f) The sweep connections should be equal as to their length over all, and their height of hanging on the picker sticks.

(g) Picking shoes should present a smooth even surface for roll to travel on.

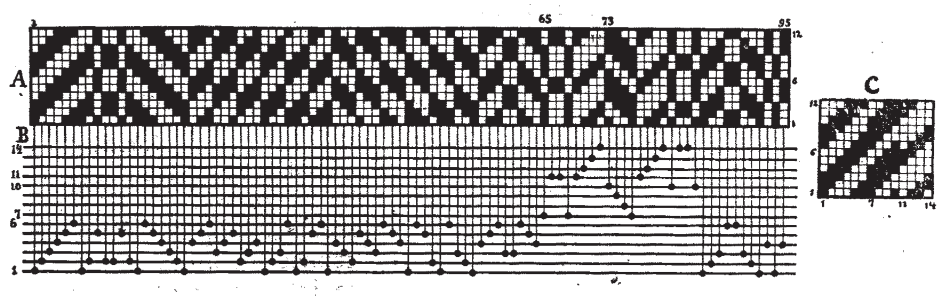
(h) The picker stick stroke should be of a length where a smooth pick will be obtained without checking the momentum of the stroke by driving the picker stick too close to the bumper.

(To be continued)

HOW TO MAKE OUT DRAWING-IN DRAFT AND HARNESS CHAIN FOR A FANCY WEAVE.

How to Make Out the Drawing-in Draft.

RULE: 'Ascertain the repeat of the weave in the direction of both systems of threads, next examine (on the point paper) each warp thread separately as to its rotation of interlacing in the filling. Every warp thread interlacing the same (in the same picks throughout the entire repeat of the weave) as one before, can be drawn on that particular harness; whereas every warp thread interlacing different, requires a new harness. This rule will hold good for any weave, single or double cloth.



To give a clear understanding of the subject, the accompanying illustrations *A* and *B* are given.

Diagram *A* represents a fancy weave repeating on 95 warp threads and 6 picks.

Diagram *B* illustrates the fancy drawing-in draft necessary to produce this weave on 14 harness (being the lowest number of harness possible to reduce this weave to).

In this drawing-in draft, the harnesses are represented by means of horizontal lines below the weave, each line representing one harness; there being consequently fourteen of these lines given to illustrate the fourteen harnesses used in the loom. The different warp threads of the weave, in connection with this drawing-in draft, are shown by means of vertical lines extending below from the centre of each warp thread in the weave, ending by means of a dot on the respective harness on which the warp thread in question has to be drawn, and when in connection with draw given, the following drafting takes place: 1, 2, 3, 4, 5, 6, 1, 2, 5, 2, 2, etc.

Representing a drawing-in draft by means of horizontal lines below the weave, as shown in our example, certainly is a most excellent plan to represent a drawing-in draft and is practiced in a great many mills; however, there are other methods in use for accomplishing the same result, using in a great many instances the point paper below the weave, and when then every row of squares width ways on the point paper represent one harness, the lowest situated horizontal row of squares representing the first harness, the next row the second harness, and so on, until finally ending with the last harness used with the horizontal row of squares nearest to the weave, *i. e.,* below the weave. Either numerals of reference corresponding to the respective harness are used for indicating the drafting; or the rotation of rows of squares, *i. e.,* the number of harnesses, can be numbered outside the draft and when then a cross or any other mark may be used for indicating on which harness to draft the respective thread on.

To represent the drawing-in draft running from the bottom to the top on the plan corresponds with the practical work of drawing-in, considering the drawer-in sitting in front of our drawing-in draft, the draw given being then a top plan view of his practical work. When making out a drawing-in draft in this way we must know the number of harnesses a weave will take, since otherwise we might run our draw into the weave, *i. e.,* being short of harnesses on the point paper, for which reason when making out a drawing-in draft and not knowing the number of harnesses it will take, it will be advisable to always leave a surplus of horizontal rows of squares between the weave and the supposed ending of the draw, *i. e.,* not to fall short of harnesses required on the point paper, when making out the draw. This is the reason why, in connection with drawing-in drafts made out abroad (the continent) the same are mostly indicated running from top to the bottom (rear to front) on the point paper, and when the trouble previously referred to is not met with, since we then have the full sheet of point paper at our disposal (except we only use a small piece of point paper).

For making out, *i. e.,* drafting, the fancy draw, always begin at the left hand side of your weave, and work toward the right, as is indicated by numerals, for warp threads 1 to 95, on top of weave *A*. The numerals on the left side of draft *B* indicate the harnesses, respectively harness 1 to 14.

Examining our weave, we find, beginning with number 1 warp thread, that the second warp thread works different from the first; the first warp thread interlaces *3 up 3 down* in one repeat of the weave, *i. e.,* six picks, whereas the second warp thread interlaces in the same number of picks, *1 down 3 up 2 down,* and for which reason we draw number 2 warp thread on number 2 harness. In the same manner we have to proceed (new harnesses) with warp threads

3, 4, 5 and 6. Warp thread 7 we find to interlace corresponding to the first warp thread, and for this reason we draw the same on number 1 harness. Continuing to examine the first 64 warp threads of the weave, in this manner, we find that the weave thus far requires 6 harnesses only.

Warp thread number 65 works different than any one before, consequently, we put it on number 7 harness.

Warp thread number 66 works different again, thus requiring a new harness. Number 8 harness would have been the next harness called upon to use in rotation, however, in order to keep the different foundations of the fancy weave together (warp threads interlacing either *3 up 3 down* or *4 up 2 down* or *2 up 4 down*) and finding four different interlacings of *4 up 2 down* (principle used later on in the weave) used, we reserved harnesses 7, 8, 9 and 10 for these ends and have drawn warp thread 66 on number 11 harness, thus reserving harnesses 1 to 6 for all the *3 up 3 down* interlacings found in our weave, harnesses 7 to 10 for all the *4 up 2 down* interlacings found in our weave and harnesses 11 to 14 for all the *2 up 4 down* interlacings found in the weave.

This example will, consequently, not only explain the drafting of weaves, but also be a guide how to keep the proper threads in a fancy weave in sections together so as to simplify the draft for the weaver.

Not always the lowest number of harnesses is made use of, since frequently too many heddles, consistent with good work on the loom, would be required for a certain harness; however, any reader will know that he can use two or more harnesses in place of one. To simplify a drawing-in draft for the drawer-in and more particularly for the weaver, in many cases may be the reason for not reducing a fancy weave to its lowest number of harnesses possible to weave it with.

How to Make Out the Harness Chain.

RULE: Reproduce in the harness chain the interlacing of any warp thread only the first time called for by its drawing-in draft on a different harness. Diagram *C* will illustrate the procedure, it being the harness chain draft required for weaving on 14 harnesses, by means of fancy draft *B*, the fancy weave *A*. The harnesses in chain draft *C* are numbered corresponding to the harnesses in draft *B*.

How to Ascertain Number of Heddles for Each Harness.

RULE: Count the number of threads drawn on a harness in one repeat of the draft and multiply this number by the number of patterns or repeats of drafts in the width of the warp.

EXAMPLE: Suppose fancy weave *A* calls for 5700 ends in the width of fabric.

QUESTION: Ascertain number of heddles required for number 1 harness. 5700 divided by 95 equals 60 repeats of draft in width of warp. Examining draft *B* we find harness 1 quoted 13 times, thus $13 \times 60 = 780$.

ANSWER: 780 heddles are required for number 1 harness, provided we want to draw weave Fig. *A* on 14 harnesses.

JACQUARD DESIGNING.

(*Continued from page 138.*)

We now come to what is known as the *satin setting*, *i. e.*, distributing the figures on the designing paper after one or the other of our different satin weaves, using in this instance the filling effect satins; the satins used being of two kinds, viz: those known as irregular satins and those known as regular satin weaves.

Irregular satins are produced on 4, 6, 8, 10 and 12 harnesses, whereas the regular satins used are our 5, 7, 8, 9, 10, 12 and 13 harness satins.

We will first deal with the latter, *i. e.*, our regular satin settings and afterwards take up our irregular satin settings.

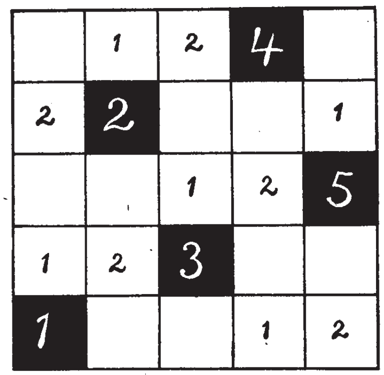


FIG. 17

Previously to going further in detail in the matter, it will be well to first give the principle of constructing satins, the object of which is to in this way arrange for a perfect distributing of the figures, the same as is the case in connection with harness weaving, *i. e.*, arrange there the interlacing of the warp threads with the filling as much distributed and at the same time as well distributed as possible.

The lowest regular satin that can be produced is the 5-harness satin, after which a regular satin can be constructed on every number of harnesses with the exception of six, since the latter number cannot be divided in two prime numbers.

The points of intersection of any regular satin is found by the following rule: Divide the number of harnesses for the satin into two parts which must neither be equal, nor the one a multiple of the other, again, it must not be possible to divide both parts by a third number; after finding this number, and which we technically call its *counter* add it, commencing to count from one until all the threads are taken up. For example, a 5-harness satin is obtained thus: $5 = 2 + 3$; we may use either one of the numbers (2 or 3) for counter; using two and commencing to count with one and adding always two points, we find:

$1 + 2 = 3 + 2 = 5 + 2 = 7$ or $2 + 2 = 4 + 2 = 6$ or 1, giving the points for intersection as 1, 3, 5, 2, 4, which means:

The first pick intersects with the 1st warp-thread.
" second " " " " 3rd "
" third " " " " 5th "
" fourth " " " " 2nd "
" fifth " " " " 4th "

This construction is illustrated by diagram Fig. 17.

In the same manner as thus explained the construction of the 5-harness satin, it will be advisable for the student to construct correspondingly the 7, 8, 9, 10, 12 and 13 harness satin, or in fact, any satin for any number of harnesses, as the case may require.

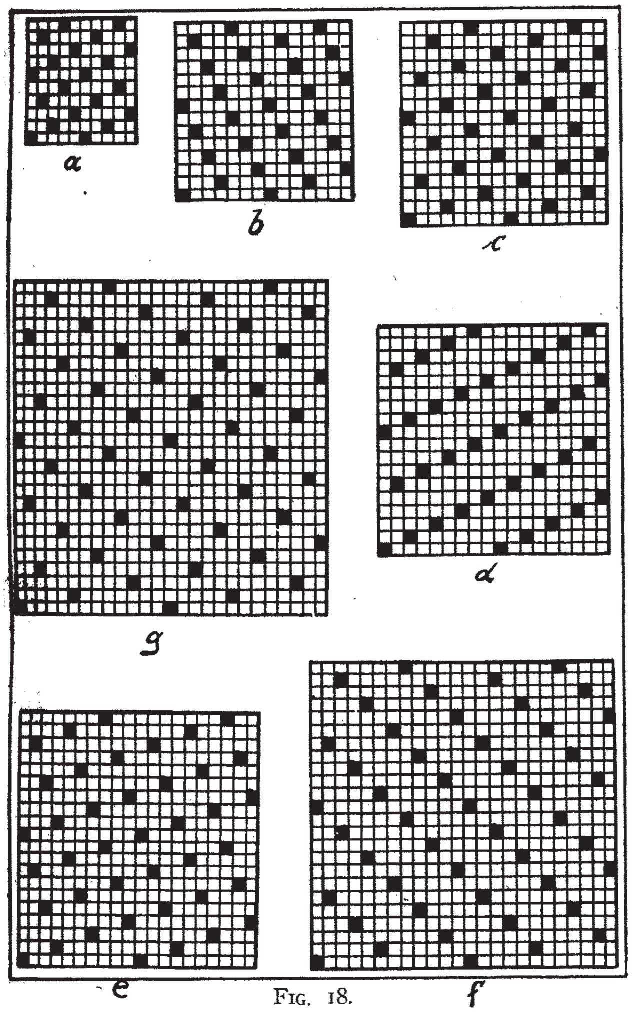


Fig. 18.

In Fig. 18 a collection of regular satin settings is given and of which

a is the 5-harness satin setting previously explained,

b the 7-harness satin setting,

c the 8-harness satin setting,

d the 9-harness satin setting,

e the 10-harness satin setting,

f the 12-harness satin setting and finally

g the 13-harness satin setting.

Of these arrangements that of the 5 and 8 is the most often met with arrangement, the 10, 12 and 13 harness settings being less frequently met with, chiefly on account of the high number of needles in the jacquard machine necessary for these settings. The 7 and 9 harness satin settings are only very seldom used, on account their twill effect in distributing figures they produce.

Diagram 19 in turn shows us five irregular satins, or as we also may call them broken satins, being settings used very frequently in connection with the designing of figured fabrics, since they all produce most excellent results, in fact some of them being superior to our regular satin settings, and all equal in good results to the latter.

Of this collection of irregular satin settings,

a is the 4-harness satin or broken twill setting as it is also frequently called,

b is the 6-harness satin or crowfoot twill setting as it is also called,

c is the 8-harness irregular satin setting,

d is the 10-harness irregular satin setting,

e is the 12-harness irregular satin setting.

If comparing our satin settings, more particular our best arrangements like for example, the four harness, 6 harness and 10 harness irregular satin, the 5, 8 and 10 harness, regular satin, with various systems of settings previously explained, it will be found that in connection with these satin arrangements, (1) an even distribution of the primary masses, *i. e.*, figures, is more readily obtained; (2) that the design itself will appear more pleasing to the eye, for the fact that we can turn each figure in every spot, in turn avoiding stiffness as well as sameness of appearance in the design.

Certainly the disadvantage in connection with these satin settings as compared to plain setting, considering one size of jacquard machine in both cases, is that in connection with satin settings we must use smaller figures, a feature readily explained. For example, in connection with a design repeating on two inches in the fabric, and when with the common plain setting, only two figures come in one repeat, whereas in connection with, say for example, an 8-harness satin setting, eight of these figures will have to go in the same repeat of two inches and which naturally will compel us, as mentioned before, to use smaller figures in connection with satin settings than compared to the figures we can use for the same size of

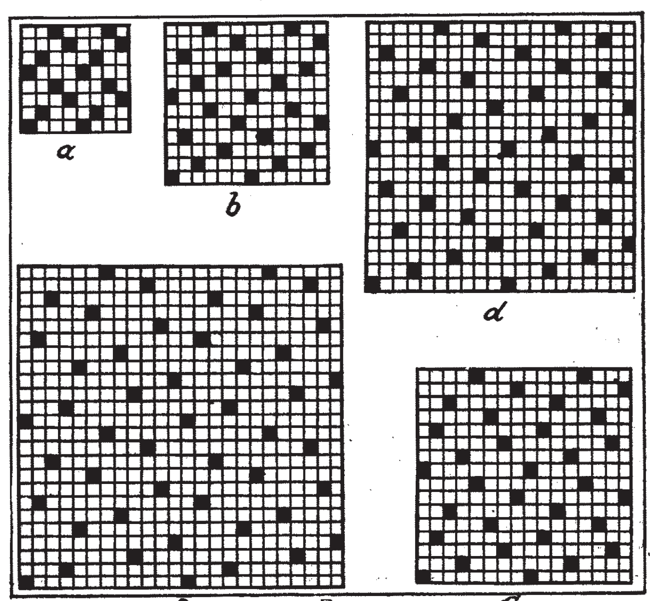


Fig. 19.

machine and texture of fabric in connection with our common plain settings as explained more particular in connection with illustrations 8, 9 and 10; the complicated plain settings or as we may call them, fancy plain settings, and as explained in connection with Figs. 11, 13 and 15, being not considered in this instance as common plain settings, the latter as already mentioned before, closely rivaling if not equaling satin settings, both in effect in fabric as well as size of jacquard machine required for their execution in the loom.

(To be continued.)

THE WASTE QUESTION IN THE WEAVING AND WINDING DEPARTMENT OF WOOLEN AND WORSTED MILLS.

By William Secor,
Master Weaver.

The yarn transferred into waste in the weaving and winding department of the mill is frequently a very large item and is often underestimated by many a superintendent as well as overseer, although they are supposed to be practical men in their different capacities. The overseers who are ever on the alert for the leakages that seem small are the ones who are the most successful and in turn will save hundreds of dollars for their employer.

For example, take the winding department, and where a great many times the yarn received there is in very bad shape, caused in many instances by improper handling in the dyeing department, allowing loose fibres to collect and dry in the skein, causing it to mat so that it is almost impossible to wind. I have seen a black cotton yarn, sulphur dyed, being matted so badly that it would run only a few turns of the swift and then snap off and when finally the winder gets disgusted with the work, it being almost impossible to find the proper end, you can't shake it loose from the skein. The winder in sheer despair then breaks any number of threads to get a start for the skein to wind off, and probably repeats this procedure several times, and this every time with a greater mix up in the affair until finally impossible to continue the work, and when in turn the remainder of said skein finds its way into the waste pile to the loss of the mill.

In Philadelphia more particularly a great deal of the yarn used in woolen mills is bought from the spinners in the grey and sent to local dyers, which then return it to the weaving plant loosely piled in the bottom of their delivery wagons. Now it would be worth while to examine these wagons of the less carefully managed establishments and when you may find any amount of bolts, nails, screws, and splinters protruding from the bottom, in turn giving a beautiful chance for the yarn to get caught and held thereby, when in turn roughly unloaded by the average teamster, who will treat this expensive yarn the same as he would treat a load of rags, this being in many instances the cause for any number of badly broken up skeins, a great deal of good yarn in this way reaching the waste pile, which with a little more precaution on the part of the dyeing establishment and their teamsters would in turn find its way into cloth and consequent profit to the mill.

Another cause for waste in the mill is that a great many winder tenders have no more knowledge of the value of yarn than they have of flying. A good winder tender, should you be fortunate enough to get one, should be appreciated and be paid full value for her services, as she more than earns her wages in production, *i. e.*, amount of yarn wound from a given weight of yarn in skeins. A great drawback for waste in winding is that many mills pay their winders by the pound, thereby causing them to become very careless unless they are closely watched by the overseer, as it is much easier for them when in trouble with a skein to get rid of their yarn in the waste bag than to put it onto the bobbins.

Some overseers think that they can easily remedy this evil by instituting a heavy *fine system* which, however, will not work successfully, as a great many times this may strike most heavily on the most conscientious winder of the department by her having a bad lot of yarn to wind, while the dishonest one will dispose of her overproduction by consigning it to the river, sewer etc.

Speaking of the disposal of waste (this time weavers waste) reminds me that when in charge of the weaving department in a prominent Rhode Island Worsted Mill, we were compelled to run the weave room up to 9 P. M. to fill orders. I was then instructed by the management to look closely after the waste question, weighing the waste every few days, but at no stated interval and using a *fine system*. A widow lady then was one of my weavers and as she lived at some distance from the mill had her supper brought to her, the mill allowing only a stop of 30 minutes for supper. After work, this particular weaver then used to do her shopping and marketing for the next day, so this night she goes into the market and among her other purchases got some meat etc. Thinking to make carrying of parcels less cumbersome, she, not thinking, concludes to put several of the smaller ones into her empty supper pail. Forgetting herself, she opened her pail and when out rolled several pounds of the best of (waste) yarn, it was of fine quality worsted and had plenty of *twist* to it, consequently made quite a showing on the floor of the meat market. Like all affairs in a factory village, it became the talk of the town and it took not long to come to my notice. There and then I decided it is better to have waste in the waste bag in the mill than not having it at all; no waste was weighed again after that.

I always found that in this department the best method to prevent making of waste is to catch the weaver in the act of pulling it from the bobbin and then try and impress them of their wrong doing, explaining to them the cost of stock, the loss to the mill by having to re-manufacture such waste into yarn, and this in a lower, cheaper grade only, besides the cost of labor to do this, showing them that the yarn thus pulled off depreciates at least 75% in value to the mill, and which lesson in most instances has the desired effect in connection with any sensible weaver.

We sometimes come in contact with badly wound filling, with waste ends hanging from the bobbin, with soft bobbins, to which the weaver will give a twist and throw them in the box holding the empty bobbins, or hide them. Throwing them around in the room, when different colors are used, and which is most always the case, it will frequently become hard to ascertain their origin, *i. e.*, the lot of filling in question they belong to, and when eventually they will find their way into the common waste bag (in place of being rewound in a weavable shape) and when we wonder why, that when we figure on a 2½% waste in the weave room, at the end of a season we are hundreds of pounds short in our calculation. Being short of filling then means ordering more yarn, with the consequent result of possibly having to wait three or four weeks for deliveries and when probably by the time the yarn is received, the balance of our orders are cancelled.

There should be a re-winding system instituted, once or twice a week, all such yarn should be collected direct from the weaver, so that we know just what it is and to what lot it belongs, in order that we don't take chances of making shady pieces by mixing lots. For the overseer to look after the wage question in every department, will in a short time create habits amongst the help, more particularly when they know that they are ever under the watchful eye of their overseer.

Power Gage and Lug Strap for Looms.

The object of the device is to facilitate the transmission of power of increasing force to the picker stick during each forward movement of the same.

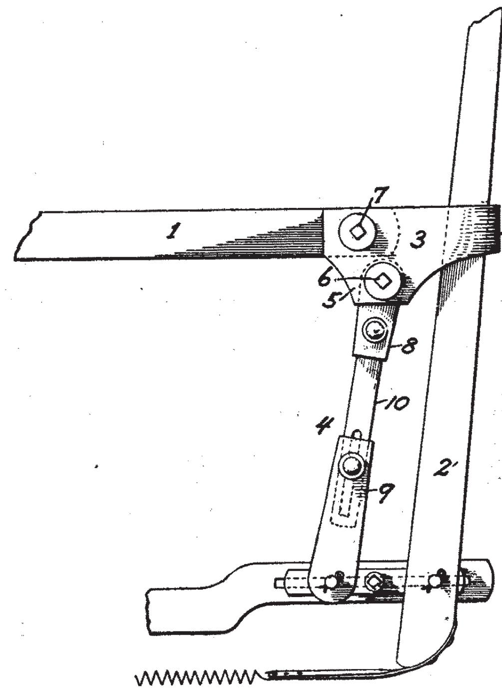
A DESCRIPTION of the construction and operation of the new device is best given by quoting numerals of reference accompanying our illustration, which shows the new device in its perspective view, also those parts to which the same more particularly refers to, and of which 1 is the sweep stick, 2 the picker stick, 3 the new lug strap and 4 the new power gage, for either raising (less power) or lowering (more power) the latter.

This lug strap is cut either from a single or a plurality of pieces of leather and folded over for placing the ends in substantially parallel position. The lug strap is provided on each one of the folded sides with depending ears 5, each ear having cut out a horizontally extending, elongated aperture for bolting (6) said lug strap to the arm of the power gage. In the same way apertures are stamped out in the upper forward part of each side of the lug strap for bolting (7) the same to the sweep stick.

By the shape and construction of the new lug strap, all tendency of cramping upward during picking is overcome, besides the tapering structure of the strap obviates the liability of the sharp corners of the picker stick cutting said strap.

THE POWER GAGE 4 comprises an upper and lower bifurcated member 8 and 9 respectively, both adjustably connected by means of the intermediate member 10. Member 8 is made of stiff leather, member 9 of wood, and member 10 is a flat bar, our illustration clearly showing their method of connection.

ADVANTAGES. The object of making the upper member of the power gage adjustable is to alter its relative position to the picker stick regardless of the position of the latter, and when the lug strap can be caused to move downward to a more or less extent during the pick of the loom, thus securing a *hard* or a *light pick*, as is desired. The alteration or adjustment of the upper end of the power gage need only be very slight to secure desired results.



The depending ears 5 of the lug strap, reinforce and strengthen the entire strap, besides constituting a brace for the rear end 11 of said strap. Furthermore, by employing these depending ears, leather may be employed in place of a metallic strap. Another advantage of these depending ears or lugs is that by means of them, the power gage is connected beneath and contiguous to the sweep stick, which leaves the rear portion of the strap free, and therefore only necessitates the strap to be of sufficient length to allow the movement of the picker stick therein and to surround said stick. The inventor of this device is Mr. C. A. Messer.

The World's Raw Silk Production.

The production of raw silk for 1906 was:

Italy	13,200,000 lbs.
Other European countries	2,200,000 lbs.
Asia Minor and Central Asia	3,080,000 lbs.
Extreme Orient	26,400,000 lbs.
Total	44,880,000 lbs.,

and which compares favorably against the average annual production of raw silk from the figures given for 1880 to 1890:

Italy	9,240,000 lbs.
Other European countries	2,200,000 lbs.
Asia Minor and Central Asia	660,000 lbs.
Extreme Orient	13,200,000 lbs.
Total	25,300,000 lbs.

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A Monthly Journal of the Textile Industries

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

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

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

Application for the entry of this Journal as SECOND-CLASS mail matter has been made.

Six Months have passed since the Journal first appeared. Although it was unexpectedly launched at possibly the most unfavorable time for such an undertaking, on account of the financial difficulties encountered by the country, particularly the textile industry, we are glad to say that the Journal stood the strain. Under prevailing conditions, the efforts of the Publisher were concentrated on giving the readers the most practical as well as educational articles run in any textile journal.

The Editor desires to extend his thanks for the hearty co-operation of the readers in their assistance along this line in acknowledging the value of the Journal by their subscriptions as well as encouraging letters received daily.

As a matter of explanation, it may be said that the success of the journal is an assured fact, as may be readily seen from the unsolicited words from practical men from all over the country, *all entire strangers* to the Editor.

"Pleased with your publication, think it meets a long felt want of the textile world" are the unsolicited words from the Boss Finisher of one of the largest woolen mills in the South.

"It is far ahead of any textile paper published in this country," are the unsolicited words from the Superintendent of one of the most prominent Cotton Mills in Fall River.

"After reading the journal for four months from cover to cover, am satisfied you have a first class textile journal on the market," are the unsolicited words of one of the practical men in one of our largest silk mills.

"Enjoy the reading and illustrations in the journal very much. Wish you much success"—the unsolicited words from a prominent superintendent of a South Carolina cotton mill.

"I enjoy your paper very much and hope you will be successful in the venture, as it is the journal that fills a long felt want in the textile industry," are the unsolicited words of the Designer and Superintendent of one of New York's largest fancy narrow-ware mills.

"Our instructors and men in our classes speak of it (the Journal) in a very favorable way," are the unsolicited words of the Secretary of one of our Textile Schools.

"I have been a subscriber to other textile papers for a long time, but find yours superior, especially your method of instruction in the various branches of the textile industry," comes unsolicited from a Pennsylvania Woolen Manufacturer.

"It is just what we have been wanting along the lines of knitting information, 'and not too technical,'" comes unsolicited from the Secretary of a prominent Western Knitting Mill.

"It seems to me the best textile journal I have ever seen, especially for beginners in textile work," are the unsolicited words from the office of a large silk mill in upper New York State.

"Find it alright," comes unsolicited from a former student in the Rhode Island Textile School.

"I wish it a permanent success," comes unsolicited from a New York City textile worker.

"I have received copies of your Journal regularly and find them very instructing and am very much pleased with them" comes unsolicited from the Designer of a prominent Rhode Island Worsted Mill.

"Like it very much," comes from a Phillipsburg silk worker.

"I am very much interested in the Journal," from an East Greenwich textile worker.

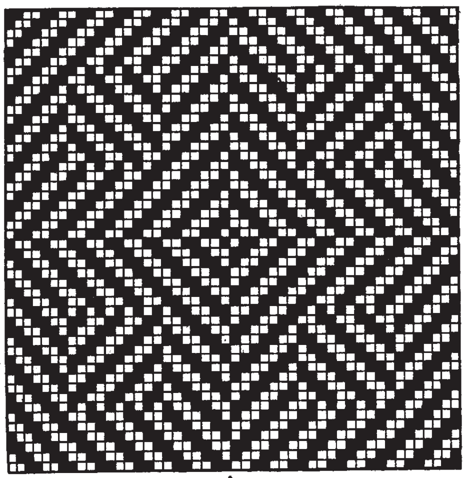
These and any number of others, of like terms, *coming unsolicited,* clearly denote the textile public's sentiments toward the Journal and its Editor, who by the way is the only Editor of a textile paper published in this country who is a practical textile man.

To prove worthy of the many friends who have spoken these words of kindness and encouragement will be the constant aim and desire of the Editor.

DESIGNS FROM ABROAD.

Designs A, B, C and D refer to Novelties in Fancy Cheviot Suitings for men's wear.

Design E refers to a Novelty in Piece Dye Cheviot Dress Goods.



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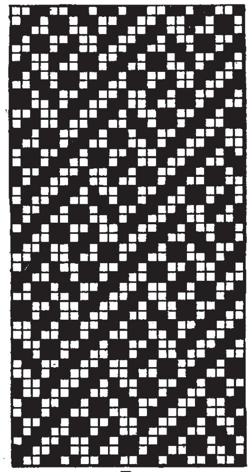

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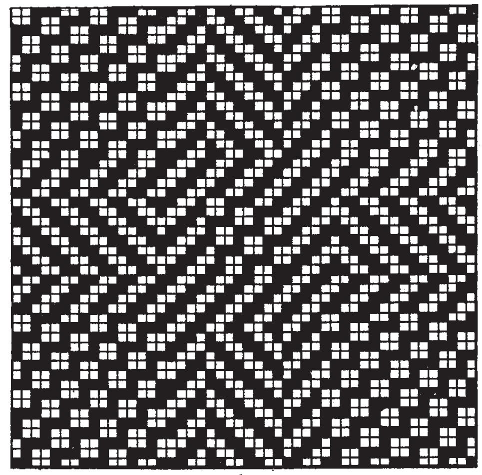

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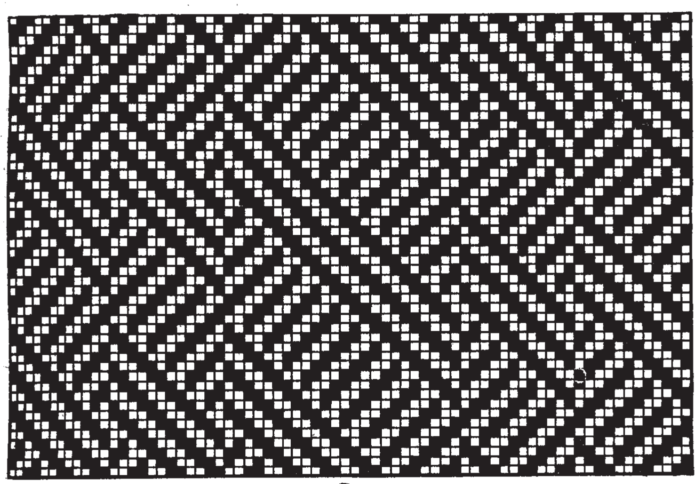

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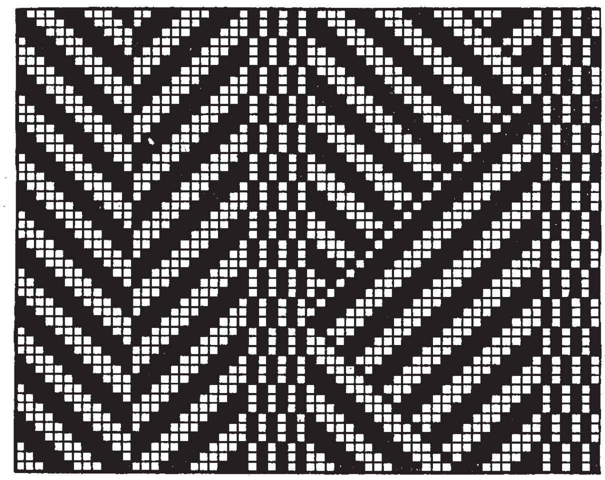


E

COTTON FROM FIELD TO FACTORY.

Of the fibres which provide us with clothing, cotton, the cheapest and most indispensable, was last to come into general use. In the fourteenth century (long after linens, woolens and silks had become articles of commerce) cotton fabrics were introduced into Europe, but necessarily they were very expensive on account of the distance they were brought (India) and the clumsy methods of their manufacture; thus giving almost a monopoly to woolens, silks and linens. However the great inventions of Hargreaves, Arkwright, Crompton, Cartwright and Whitney, late in the 18th century, changed the subject and made cotton the chief clothing for us, and thus marked an era in the industrial development of the world.

The great industry of modern times was then begun, and since then inventions have rapidly followed each other. Of importance to note are the invention of the scutcher in 1797 by Snodgrass; the invention of the lap machine by Crighton early in the 19th century; the invention of the differential motion in 1822 by Asa Arnold of Rhode Island. Ring spinning was invented in 1828 by John Thorpe of Providence, and in 1862 Lord invented the piano feed motion for feeding to pickers and scutchers, etc.

The rise of cotton manufacturing in this country was effected after a long series of experiments, for which reason no one place can claim the distinction of its birthplace. Massachusetts was the first state to give aid and thus encouragement to the cotton industry, although Philadelphia was the original centre of the manufacturing movement in this country. Tench Coxe, a prominent resident of that city, was the pioneer of this movement there, and so untiring was he in his labors that he earned for himself the title of "Father of American Manufactures." He also was prominent in urging the cultivation of cotton in the South, and this at a time when the plant was scarcely seen outside of a flower garden. Through him, also, it was that in 1775 the first spinning jenny, constructed by one Christopher Tully, after the plans of Hargreaves, was exhibited at Philadelphia. This machine was secured by the "United Company of Philadelphia for promoting American Manufactures," a company formed through the instrumentality of Mr. Coxe, for the purpose of encouraging home industries. However Tully's machine was a rude and more or less unsatisfactory affair, especially since Arkwright's water frame was then giving a decided impetus to the cotton industry in England, and which country guarded Arkwright's invention jealously, forbidding every exportation of models, some of them as made in 1786 for Mr. Coxe being seized by the English customs officials. Relief to this state of affairs to the cotton industry then in this country came through Hugh Orr, Esq., of Bridgewater, Mass., who had in his employ two Scotchmen, Robert and Alexander

Fig. 1. The Young Cotton Plant.

Barr, they being familiar with the English spinning system, besides Orr himself was something of an inventor. Orr had the Barrs build three machines, respectively for carding, roving and spinning, which when completed were probably the first stock-card in the country. A year later, Thomas Somers, an English midshipman, drifted to Bridgewater and at Orr's direction constructed an imperfect form of Arkwright's water frame. These machines were then exhibited by Mr. Orr as state's models, with the result of experiments in spinning at Beverly and Worcester, Mass., and Providence, R. I. However it was at Beverly that the first real advance was made, the Beverly Company being formed there in 1787, building a small brick factory on Bass River. The machinery used consisted of one or more spinning jennies and a carding machine, the enterprise however was not a financial success.

Daniel Anthony was the one who secured the plans from Bridgewater for Providence. He, with Andrew Dexter and Lewis Peck, had started a company in that city for the making of home spun cloth, but the new venture proved also unsuccessful and the machines passed into the hands of Almy & Brown, to be pronounced utterly worthless at the close of 1789 by Samuel Slater, who then was fresh from the centre of the cotton industry in England. He landed in New York in November 1789, and after some delay in that city, pushed on to Providence, where Almy & Brown, as mentioned before, were trying to operate the card and jennies which they had bought from the old home spun cloth company. Slater looked them over, and pronounced the whole lot utterly worthless. Moses Brown, the head of the firm, a worthy Friend, was rather astounded at this wholesale condemnation of his plant, however he recovered sufficiently to reply, "But thee hast said thee canst make the Arkwright machines; why not do it?" The result was that Slater then contracted with him to produce it. On January 18, 1790, Moses Brown drove Slater out to Pawtucket and there let him begin his work, securing for him a shop by the Blackstone River. Slater had to make all the plans from memory, having a Sylvanus Brown to do the wood-work, a David Wilkinson the metallic, and an old colored man supplying the needed power by turning a wheel. Behind closed doors and barred windows, to keep out rivals, this quartette worked until December 20, 1790, when three cards, drawing and roving frame together with seventy-two spindles, were complete for trial. The commendatory words of Moses Brown, "Samuel, thee hast done well," tell the story of the experiment and greeted the birth of a great industry in the western hemisphere.

History of Cotton Growing. The actual beginning of the culture of cotton in our country occurred about one hundred and seventy-five years before the industry became at all important. According to Bancroft, the first experiment in cotton culture in the colonies was made in 1621 in Virginia during Wyatt's administration of the Government, but it was not until after the invention of Eli Whitney's saw gin in 1793 that the United States became the principal source of cotton supply for the world, and this at a period when

Fig. 2 Plant at Full Maturity.
Showing Bolls open or ready to open, more particular at the bottom and middle portion of the plant.

spinning machinery was a recent invention and the modern factory system in its infancy. Since then American cotton, such as is grown in the fertile regions forming the south portion of our country has remained the typical cotton fibre—*King Cotton.* Its general uniformity, the skill with which it is cultivated, gathered, and ginned, and the excellence of its spinning qualities, within the range of counts where by far the largest quantity of yarn is required, render it pre-eminently "the cotton fibre."

To give an idea how indispensable American cotton is to the mills of the world, we only have to remember the cotton famine resulting from the civil war. In the absence of the accustomed staples, certain cottons of India, Italy and other southern parts of Europe, etc., had to be substituted, which proved a sore trial to the patience of spinners and weavers, who, in one notable instance (in England), when the first wagon load of our cotton arrived after the war, gave expression to their joy by singing "Praise God, from whom all blessings flow." The experimenting with cotton raising in southern parts of Europe stopped at once after the war.

Fig. 3. Cotton Picking.

Our cotton is of two types. One, the Sea Island or black seed cotton is confined to islands and shores of South Carolina and Georgia, to Florida, and to an extremely limited distribution along the Gulf coast. It has the longest and finest staple and commands the highest price of any commercial cotton, being spun in the finest yarns and used very largely for thread laces, and fine cambrics. The bulk of our crop, however, is known as American Upland, varying from the fine Mississippi cottons, Peelers, Benders, to the short clean Uplands cotton, having a green seed to which the filaments closely adhere. The greatest advantage to raising a superior cotton in this country is due to the advantage of climate in the production of the distinctive type of cotton of the United States, the varieties of green seed Upland.

What Is Cotton? The cotton fibre is the hair which grows around the seeds of the various species of the cotton plant, which varies in height according to the climate and soil. The leaves of the cotton plant grow upon stalks placed alternately upon the branches, most frequently being formed in the shape of a heart, and generally either three or five lobed, with the lobes sharp or rounded. The flowers are usually large and showy, and grow singly upon stalks in the axils of the leaves.

The fruits of the cotton plant known as "bolls" (of about 1 inch diameter) are divided by membranous walls into three or five cells containing three or four seeds each, covered with the thin transparent cylindrical filaments known as Cotton and which by one end are attached to the seed. Towards maturity of the fruit these filaments exchange their cylindrical form to a compressed or ribbon shape, by means of the collapse of their walls; simultaneously each fibre twisting on its axis, causing in turn a sufficient pressure on the inside of the boll to burst the latter at the junctions of the compartments in the outer casing, which by this time has become dried up. After being left on the plant for a few days, so as to properly ripen the fibres, the cotton is picked.

Picking. Cotton is picked by hand, notwithstanding that considerable skill and capital have been expended in the efforts to produce a machine cotton picker. It cannot be said that any of these machines have been successful, as they gather limbs, leaves, and hulls, necessitating the passing of the whole through a separator. As high as 333 pounds of cotton it is claimed have been picked per day by one man, though it is probable that 100 pounds is nearer the day's work of the average plantation laborer. As a rule, the cotton plants have their bottom, or first crop gathered during the time that the leaves of the plant are green; but the second crop, from the upper part of the plant, is liable to attacks of frost, which interferes with the picking harvest. Cotton picking is the most tedious and expensive operation in cotton growing, the most of the picking being paid for at the rate of from 40 to 50 cents per hundredweight, expert pickers in this way earning from $1.— to $1.50 per day. It is very light work, at the most pleasant season of the year and it is effectively performed by women and even by small children, as well as by men. The thus picked seed cotton in turn is loaded in box wagons and brought to the Ginnery, where the wagon, loaded with cotton, is driven under a flexible slip joint pipe and the cotton drawn from the wagon by suction created by an exhaust fan, which is connected to the back part of a vacuum separator and cleaner. In this cleaner is placed a wire screen and a revolving spiked drum. The dirty seed cotton first comes in contact with the spiked beater in the vacuum box, which revolving rapidly, throws it upward and backward against the wire screen. Rushing against the Revolving Spiked Beating Cleaner it is separated, lock from lock, and thrown back against the wire screen, giving opportunity for the dust, sand and leaf trash to be sifted and drawn through by the suction. The cotton, freed from impurities, then drops down upon a Distributor, which conveys and drops it into the first Gin Feeder of the battery of gins until that is exactly level full, then on to the feeder of the next gin, which is treated and kept likewise, and so for any number of feeders of gins in the battery.

After filling all the Feeders of the battery of gins in the ginnery, the surplus is allowed to fall out, dropping either upon the floor or into a bin. After the cotton is all out of the wagon, or bin of the store house provided it was first stored and drawn from the store house, the ginner turns a simple valve, by a lever, causing the suction to change from the direction of the wagon to that of the overflow. The ginner then proceeds to feed the cotton which has accumulated upon the floor or a bin, into the flexible slip joint pipe, and thus picks up all the overflown cotton, and when by the time he is done with it, the next wagon will be driven up, or the next bin open and ready, so that the gins need not lose one minute of time waiting for cotton.

(*To be continued.*)

COTTON SPINNING.

The Ring Frame.

(*Continued from page 163.*)

Sometimes it is desired to run the frame without any weight upon the middle roll, and then the saddle is pushed back until the curved part comes over the neck of the back roll arbor. This will remove the bearing part of the saddle from the middle roll and then the entire weight will be borne by the front and back rolls.

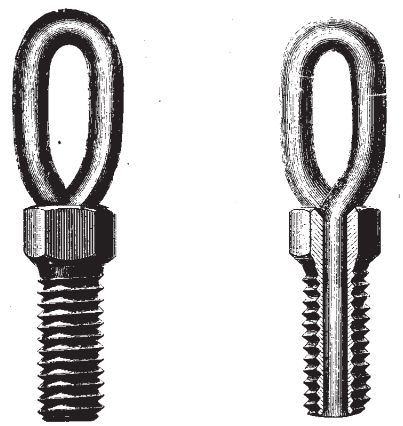


FIG. 239 FIG 240

Another system of weighting met with, more particularly in connection with fine yarns, is the single saddle system. In this arrangement only one saddle is used, the same resting on the front and back rolls only, the middle roll having no weight on it whatever. Opinions vary as to which is the better method, even on the same class of work, some spinners having been successful with the single, while others have been equally successful with the double saddle system, even going to the extreme of using it on combed sea island stock and spreading the rolls fully 1⅝ inches apart.

Another system of weighting the drafting rolls differing from those previously mentioned has been used with success in England, and devices of that type, for fine counts of yarn have been introduced here. In this system, weight is applied to front roll by means of stirrup, saddle, lever, and weight, the middle and back rolls being self-weighted. A revolving clearer roll, covered with flannel, rests on the top of the middle and front rolls. The back and middle rolls are carried by the same slide and are set about one and three-fourths inches between centers, the adjustment being between the front rolls and the middle rolls.

The front top roll, which is usually a shell roll, is weighted by means of a weight which extends from side to side of the frame and which is connected to the top roll by means of hooks and stirrups, holes being drilled in the roller beams to allow the hooks to connect with the stirrups. There is a hook shaped projection on the top of the stirrups so that the weight can be lifted clear of the top roll when necessary, and a round eye is formed on top of the hook to prevent the weight from dropping down upon the cylinder when the top roll is removed. The top back roll is usually about one and three-fourths inches in diameter and the middle top roll is about three quarters of an inch in diameter. These rolls are made of cast iron and are not covered with leather.

In setting a frame, with self weighted rolls, it is the practice to set by staple, which means that the distance between the front and the middle rolls is from one-sixteenth to one-eighth of an inch less than the length of the cotton staple. This is just the opposite to the setting of lever weighted drafting rolls, in which the rolls are set one-sixteenth to one-eighth of an inch more on centers than the length of the cotton staple.

A very ingenious device forming a prominent part in connection with lever weighting systems is the Speakman lever screw, as manufactured by the Draper Co. This screw is shown in Fig. 239 in its perspective view and in Fig. 240 in its elevation with a sectional view of the screw part. This lever screw is constructed of two parts, a wire hook and a screw which rotates around the hook. The wire is headed so that the upward or downward movement of the screw carries the hook up or down the same vertical distance, without, however causing it to rotate.

On ordinary spinning frames when the weight levers get out of position an endless source of annoyance is occasioned, since the only way to adjust with ordinary lever screws is to stop two to four ends, take off the lever weight, remove the lever from the stirrup and screw and turn the screw up or down until it is proper adjusted. The ends have to be pieced again and production is stopped from three rolls during the operation, again the lever weights are liable to be dropped on to the tin cylinder or bands, incurring a waste of time and perhaps damage. The lever is apt to become bent provided it has been used for the turning of the screw. The stirrup may also fall between the bottom drafting rolls and thereby make repairs necessary.

This all is obviated by the use of the Speakman Lever Screw, when all that is needed is to turn the screw slightly by means of a wrench, and this without the necessity of stopping an end or moving a part of the roll stand. With the old screw, half a turn is the least you can get, while with the Speakman screw as much or as little rotations as is necessary may be obtained.

NOTES:—The proper weighting of the top roll is very important and the levers must be kept as nearly horizontal as possible, or they will be dropping down and in turn relieve the rolls of the necessary amount of pressure. This is a matter often neglected and then bad work is sure to follow. Stirrups should not be allowed to get out of place and rub on either side of the steel rolls. The saddles should rest on the bearings so as not to crowd the rolls with undue grip and friction. When the saddles are set on the top rolls the wrong way, additional weight is put on the wrong roll and when saddles are worn they have too much bearing surface on the rolls and retard their movement, causing an irregularly drawn thread to be made. The weights should always be put on in the right notch and not one in one notch and another in a different notch on different levers. The cap nebs must be securely fastened in their proper positions, so as not to bind the ends of the roll. No two top rolls should be set so close as to come in contact with one another. All rolls with their bearings and working parts should be kept perfectly clean and well oiled, otherwise bad spinning will result. System, intelligence and close attention to duty on the part of everybody concerned are required in the spinning room to keep these things as they should be. The weight required on rolls will depend on circumstances, coarse work requiring more than fine, double roving and long draft requiring more than single roving and short draft. On ordinary counts of yarns, from 60's down to 20's, with double roving and medium draft from 25 to 30 lbs. weight is sufficient, on yarns coarser than this, down to 10's, more weight would be needed, while from 60's finer, from 20 to 25 pounds will be found ample. In practice, however, circumstances are found that will alter these figures and no precise rule can be given to govern this matter.

Top Rolls. Top rolls may be either solid rolls or shell rolls, with short boss or with long boss. All rolls have two bosses. If shell rolls are used, they are only employed for the front roll, solid rolls being then used as middle and back rolls, because the front roll, as a rule, receives the heavier weighting and therefore solid rolls for middle and back, will to some extent, give the effect of self weighting. If shell rolls are used for the front roll, they should be carefully matched in pairs before being set on their respective roll stands, to insure even work. For medium and fine work, the solid front roll is considered to be the best, in fact a great many spinners prefer them all around for all counts of yarn spun.

There are various opinions as to the advantages of the long boss and the short boss roll. On medium and fine work the short boss is commonly used. Short boss rolls, or single boss rolls, are those from which one end of roving (yarn) is delivered from each boss, making two ends from the roll. Long boss rolls, or double boss rolls, are those from which two ends are delivered from each boss, making four ends from the roll, or sometimes, three ends are delivered, making in this instance six in all from the roll.

The advantages of the short boss rolls are: The boss being shorter, there is less chance of imperfection in its covering; there being only one end on a boss, there is less likelihood of getting *double* yarn; again, when a thread breaks and the roving winds up around the top or bottom roll, raising the top roll, if it be a long boss roll, the other end on this boss would either slip under the roll and make poor yarn, or would else keep catching in the broken roving with the result of bunches on the yarn; whereas on a short boss this could not happen, because the other end, or thread, would be on the other side of the roll and could not be affected thus.

It is claimed for the long boss roll that it is easier to keep clean than the short boss roll, that there is less cleaning by half as many rolls and saddles and that less oiling is required. There are also less saddles to be kept in place and levers and weights to be adjusted, it reducing also the chance for saddles, etc., to be wrongly placed after cleaning. Some spinners prefer the long boss roll when spinning high counts, then taking all weight from the middle rolls, claiming that the long boss roll, on account of being heavier, does not retard the delivery of the roving to the front roll and that it is not necessary to spread the rolls for long staple cotton, as is necessary with frames equipped with short boss rolls.

In general, it may be said that the difference in the quality of the work produced is in favor of the short boss roll, although for yarn of 20's and counts below, it may be advisable to use a long boss roll, because such yarns do not require such perfect rolls as the higher counts do, and as more dirt and flyings are made with low counts than with fine counts, the rolls are more likely to clog.

(To be continued.)

Points on Twisting and Doubling Cotton Yarns.

The Effects of Twisting Two or More Single Threads Together. When the twist inserted is in the reverse direction to that contained in the singles, it displaces an equal amount from each of them. When the twisting proceeds in the same direction as that contained in the singles, that in the singles is supplemented to the extent of the doubling twist. Thus, the former procedure removes the twist in the singles, the fibres being simply rearranged convolutely, or in what may be termed a spiro-corrugate order. When tension is applied to bodies of fibres so arranged they are pressed towards a common centre, and this force bonds them, preventing the fibres from sliding.

It is this change in the arrangement of the fibres, without necessarily changing their compactness, that is responsible for the greatly increased strength of doubled yarn, as compared with that of single yarn of a similar weight.

The conditions that would have to obtain in order to utilize to the fullest extent the available strength of the body of fibres contained in a doubled yarn, are—

That all fibres be equally outstretched and in alignment, so that they mutually share the tension applied. That they are bonded sufficiently to prevent their slippage upon each other and devoid of individual twist.

This latter state, in so far as twist is concerned, can readily be obtained. It is in the laying of the fibres equally outstretched that difficulty arises, that state being only partially possible. The formation of the fibres about a common centre, twisted, renders their alignment impossible.

The aims of doubling may be stated as follows:—

(1) To permanently utilize the available strength of the fibres by preventing their axial movement after the thread is completed.

(2) To obtain the desired compactness, lustre and freedom from ooze, with the fibres bonded in the most suitable manner for the required size of thread.

(3) To insure definite elastic properties in the yarn when under tension.

(4) To obtain the desired character of surface, such as cylindrical, spiral, corkscrew, pearly, crepe, or other effects.

In order to secure the utmost strength, and at the same time prevent axial movement, the twists in the successive stages should be arranged so that they balance in the completed yarn.

Compactness is the result of tension and compression applied during doubling. In order to obtain the smallest thread from a number of others, as for example, in sewings and kindred yarns, the following procedure is most effective:—

In doubling the singles the fibres should be compressed to their limit, by twisting in the same direction as the singles, and to the extent necessary to obtain a balanced state when the final twisting is completed. Thus, when the final twist is great, that in the folded singles must also correspond. In the substitution of the preparing by the final twist the consequent extending and expanding tendencies are fully absorbed, or counteracted by their greater radius about a common centre.

Lustre is affected by the angle which the fibres make with the completed thread. It is greatest when they are in line with the axis of the individual singles, and vice versa. Thus, lustre indicates the extent of the twist in the singles and in the fibres.

Freedom from Ooze. This is in the main the result of the rolling action of the yarns against each other in the course of twisting.

The Tendency to Stretch, under tension, is regulated by the angle of the singles or strands comprised in the final thread. The more numerous these are the less their stretching tendency. Thus, highly elastic doubled yarns are composed of the fewest singles and strands. The number of strands that can be satisfactorily bound in this way are limited, and hence they seldom exceed four. Above this number the singles or strands have insufficient adherence, and hence plaiting is resorted to.

Cylindricity is developed most effectively when the singles are only slightly twisted and of the best quality.

Pearly Effects are developed by employing highly twisted singles.

Crepe by twisting in the same direction as the singles, also by inserting considerable twist in the reverse direction to that in the singles; but the effect is not the same in both cases.

Spiral Effects are obtained by slight folding twist.

Where a small yarn with hard effects are required, highly twisted singles are necessary. For soft effects similar to those required in yarns for mercerizing, the singles should be softly twisted.

Corkscrew Effects are obtained by doubling—

(a) Yarns in unequal tension.

(b) Yarns unequal in size.

(c) Yarns containing unequal twist.

(d) Yarns twisted in opposite direction. (From Cotton Spinning Calculations and Yarn Costs by James Winterbottom, Lecturer in Cotton Spinning, Municipal School of Technology, Manchester, England—Just Published.)

Rotating Spinning Rings.

The same refers to that class of spinning rings in which the rings are rotatively mounted upon the ring

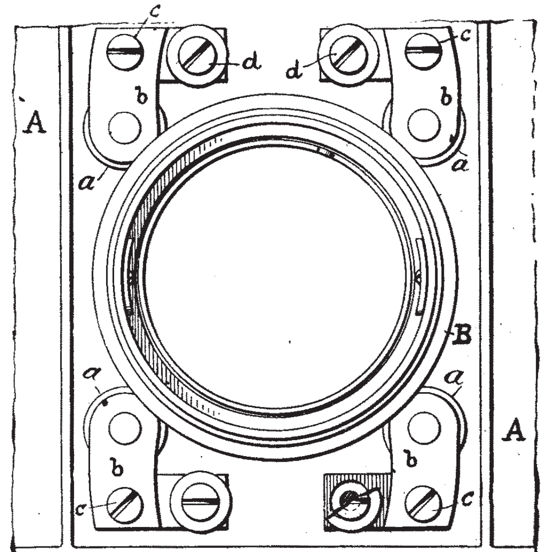


Fig. 1

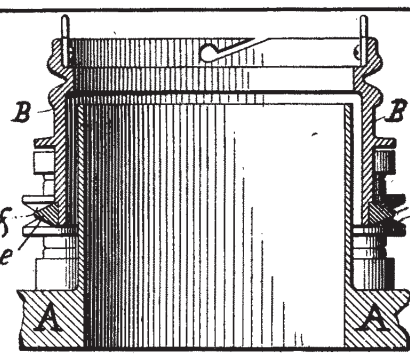


Fig. 2

rails, and effect the twisting of the yarn and its winding upon the bobbins by their rotation.

ILLUSTRATIONS. Fig. 1 is a plan view of a portion of the ring rail, showing one of the rings applied therewith. Fig. 2 is a vertical section of such parts, taken in the plane x-x of Fig. 1.

A indicates a portion of the ring rail and *B* a ring rotatively mounted thereon by means of rolls *a*, journaled in stands *b* adjustably secured to the ring rail by screws *c* and *d*. The ring *B* is constructed in a cylindro-tubular form, and provided with a thread guide or guides (formed by either slitting the upper edge of the ring, as shown in Fig. 2 or by securing hooks thereto) at its upper end, with a circumferential groove below, for receiving the driving band (not shown) by which its rotation is effected and upon its depending annular portion with a supporting track *e* secured to its lower end. This track *e* may be constructed as an outwardly extending *V* surface for engagement with appropriately shaped grooves *f* formed in the rolls *a*, while in others (not shown) it may be formed in the shape of a groove and the peripheries of the rolls so shaped as to engage with it. As thus formed in either of the ways specified, the track is constructed of steel, while the body or remaining portion of the ring is made of either wrought iron or cast iron, the track being secured thereon, after the latter has been hardened and ground, in order to bring it into symmetry. The means by which this securement of the track to the body, or to the remaining portion of the ring is effected, may be of various forms. In Fig. 2 it is shown accomplished by forcing the track upon the ring, and holding it thereon by friction; another plan being to secure it in place by screw threads, with which its interior and the exterior of the body of the ring are provided.

With the ring constructed as explained, its body may be made of the same or of a different material from that of which the track is formed, but left unhardened, with the result that no subsequent grinding of the same is necessary, while the track, which is really the only part that is subjected to wear, will be hardened either on the surface or throughout, and only the grinding of this portion of the ring required to properly bring it and the other parts of the ring into balance and concentricity with its axis of rotation. This improved construction of a spinning ring is patented by the Atherton Spinning Ring Co.

DICTIONARY OF TECHNICAL TERMS RELATING TO THE TEXTILE INDUSTRY.

(*Continued from page 151*)

Bisulphite of Soda:—A white solid used together with some acid for bleaching purposes, and when sulphurous acid is set free, and does the bleaching.

Bitting:—The process of drawing-in additional warp threads in the harness and reed, at the side of the fabric, provided its width on the loom has to be increased.

Bivoltin:—A silkworm that yields two cocoons a year.

Bixin:—A red coloring matter contained in arnotto seeds.

Black Seed:—A name applied both to Sea Island varieties and to Upland varieties of cotton having a smooth seed.

Blancard:—A linen fabric made in the Normandy of half bleached linen yarn.

Blanc Fixe:—Trade names for barium sulphate or heavy spar, used in sizings for the purpose of weighting as well as filling the goods.

Blanket:—A large oblong piece of soft, loosely woven, heavy woolen cloth, usually having a nap, used for a bed covering, to cover a horse, etc. The lower grades of blankets contain cotton, either as a solid cotton warp and a wool, or wool and cotton mix filling; or wool and cotton mix are used for both the warp and the filling.

Any piece of cloth used as a sample by which to sell goods. Selling blanket.

The word *blanket* is derived from Thomas Blanket, an Englishman, who in 1342, under the reign of Edward III, was permitted to carry on that manufacture in Bristol, England, against the wishes of the mayor of that town.

Blazer:—A bright colored, light weight jacket of cotton, wool or silk and worn by men or women in outdoor sports.

Bleachery:—An establishment for the bleaching of textile fabrics.

Bleaching:—The process of freeing textile fibres and fabrics of their natural color, in turn whitening them. The ancient method of bleaching was to expose the materials to the action of the sun's rays while frequently wetting them. Now bleaching is carried on by means of either chloride of lime or sulphurous acid, or peroxide of sodium. The sulphurous acid is employed more specially in the case of animal fibres (silk and wool), while cotton, flax and other vegetable fibres are still largely treated with the chloride, the bleaching in both cases being preceded by the proper cleansing processes. Peroxide of sodium, however, is the bleaching agent par excellence, as it closely imitates the action of the sun, being non-injurious to any textile fibre. Chlorine was first proposed as a bleaching agent by a French chemist, Berthollet, in 1786. In 1798 a Scotchman by the name of Tennant patented and first produced the bleaching powder, known as chloride of lime. The sulphurous acid is employed either in the form of the fumes of burning sulphur, or in the form of the liquid bisulphite of soda. The peroxide of sodium was first made commercially available under the process of Hamilton Y. Castner and is now produced on a large scale at Niagara Falls. Other peroxides, such as hydrogen peroxide, have largely gone into disuse on account of their cost and instability.

Bleaching Powder:—Chlorinated lime. The active principle of this bleaching material is the chlorine.

Bleed:—Said of a color of a dyed fabric when it stains water in which it is immersed. The running of a color in a fabric during scouring or fulling, or yarn during scouring.

Blending:—The mixing of different qualities or kinds of fibres in the manufacture of yarn.

Block System:—By this term is meant those means which are adopted in each headstock of a mule for preventing two contrary motions being at work at the same time. For instance, the drawing-up friction and holding-out catch must never be engaged at the same time. Also called the safety locking arrangement.

Blood Albumen:—has much the same properties as egg-albumen, and is used in printing and fixing colors, also as a mordant. It occurs in blood-serum. Care must be taken in its manufacture, otherwise the red corpuscles will break and spoil the color of the product, which would injuriously effect the colors in printing.

Bloomer:—A woman's costume consisting of loose trousers drawn close at the knee under a short petticoat. Originated by a Mrs. Bloomer of New York in 1849. Now used by women in gymnasiums, out door sports, etc.

Blooming:—The addition of an agent, usually stannous chloride, to the dye bath towards the end of the dyeing process, having for its object the rendering of the color lighter and brighter.

BLOUSE:—A garment for either sex, which fits the body loosely, and as a rule is belted.

BLUE STONE:—See Copper Sulphate.

BOA:—A long cylindrical wrap worn by women for protecting their neck, usually made of fur or feathers.

BOBBIN:—A slender spool, used to carry the filling in a loom shuttle. A flanged wooden cylinder for holding yarn or thread.

BOBBINET:—A perforated fabric produced by a series of threads crossing and partially twisting around each other in the shape of hexagonal meshes in imitation of pillow lace.

BOBBIN WINDER:—A machine for winding thread or yarn upon a bobbin.

BOCASIN:—A cotton cloth used in the Levant.

BOCKING:—A coarse woolen drugget first made in Bocking, England.

BODICE:—A tight fitting waist of a woman's dress.

BODKIN:—A pointed instrument for piercing holes in cloth, etc., for lacing ribbons or tapes.

BOILED-OFF SILK:—Boiling silk repeatedly in soap baths deprives the silk of its gum or saliva, and imparts to it the softness and lustre so highly prized in silk fabrics. In the process, the silk may lose up to 30 per cent., according to the class of raw silk used as well as amount of boiling-off required. China silk loses more than either European or Japanese silks.

BOLETTE CONDENSER:—The machine used as an adjunct at the head or end of the finisher of a set of woolen cards, for dividing the film or roving strands, as taken from the doffer by means of the doffer comb, into fine ribbons or roving strands, a number of which in turn are automatically wound on long spools. These roving strands are in the next process transformed into yarn by means of drawing out and twisting. This machine is used more on the continent than anywhere else.

The actual inventor of the Bolette condenser is a Mr. Schellenberg of Chemnitz, Germany, who in 1860 took out a patent to divide the film as leaving the doffer of the finisher card by means of dividing disks. A second inventor was Mr. Ernst Gessner of Aue, Germany, his first patent dating 1861. The third inventor was a Mr. Celestin Martin of Verviers, Belgium, who greatly improved Gessner's invention, his first patent dating from 1868. Next J. S. Bolette of Verviers, Belgium, produced the work by means of toothed discs, which produced the fine films (roving) by means of tearing and not cutting. Following him, Emil Bède, of Verviers, in 1873 invented the condenser with stationary steel ribbons. J. S. Bolette finally in 1879 constructed a condenser with a single ribbon for producing all the divisions of the films and in 1882 made the steel ribbons of Bède's patent movable.

BOLL:—The fruit of the cotton plant, which contains the seed and fibre, also called pod.

BOLL-STAINED:—Cotton which has become discolored owing to the capsules becoming saturated with moisture by heavy rains.

BOLL WORM:—An enemy to the cotton plant; the same confines its attention to the boll, and works its way to the interior of the boll to the destruction of the cotton fibre.

BOMBAZINE:—A fine fabric with silk warp and worsted filling, formerly extensively used in mourning garments.

BOMBYX-MORI:—Its caterpillar is known by the name of the silkworm, which feeds on the leaves of the mulberry tree and spins an oval cocoon about the size of a pigeon's egg, of a close tissue, with very fine silk of a yellow or white color.

BOOK-FOLD:—A piece of muslin 24 yards long.

BOOK-MUSLIN:—A plain, very light weight muslin.

BOOKS:—A certain number of heads or hanks of raw silk bound together by bands in the form of an oblong book. Twelve books make a bale of raw silk.

BOON:—The inner pulpy or woody tubular substance of which the stalk of the flax plant is composed; also called harle or haum.

BORATTO:—A silk and wool fabric similar to bombazine.

BORAX OR BORATE OF SODA:—Is a mordant, only little used in dyeing. Its chief use to woolen mills is in connection with oil, to make the emulsion for oiling the wool previous to picking and carding.

BORDERS:—The stripe running along the side of a piece of cloth formed either by a difference in color or count of yarn, or weave, from that of the main fabric.

BOROPOOLOO:—A large silkworm, a native of Bengal, which yields a soft, flossy cocoon.

BOSS OF A ROLLER:—The body of a roller in spinning machinery, to distinguish it from the axle on which it turns.

BOTT:—A pillow or cushion used by lace makers.

BOTTOMING:—A color applied during dyeing, in order to give a peculiar shade to the dye subsequently applied.

BOUCLE:—A fabric made from two ply yarn having a prominent curl or lock effect, produced by one of the threads of the two ply yarn being wound round the other and partly drawn out so as to produce a loop.

BOUILLONNE:—A weave with crinkled effect.

BOULINIKON:—Oilcloth made from a pulp consisting of rawhide, cotton or linen rags, and coarse hair.

BOURBON COTTON:—Cotton grown in India from the seed of the *G.* Barbadense.

BOURETTE:—An effect produced by introducing lumps during carding, in the yarn. These lumps may be either of the same or a different material than the foundation of the thread. Also known as knickerbocker effects.

BOWED:—A term still given to some kinds of American cotton, which cotton, however, never came in contact with a bow, being a curious survival of a term applied to a process long since obsolete; referring originally to a process practiced years ago in India for cleaning, *i. e.*, freeing the cotton by hand from dirt and knots but now entirely done away with.

BOWLING:—A washing process, after dyeing, in which the fabric is passed over rollers (bowls) in water.

BOX-BALE:—The bale, in which cotton is packed when leaving the gin-house; being over five feet long and about three feet wide, and girded with iron bands. This bale is much larger than the bale for export and for which purpose said box-bales are reduced in bulk to less one-half their original size by being subjected to steam pressure in a compress.

BOX MOTION:—The mechanism on looms which raises and lowers the shuttle boxes.

BRACK:—A defect in woven cloth.

BRAID:—A narrow flat woven strip, band or tape of silk, cotton, wool, or other material; used as trimming for garments, binding the edges of fabrics, etc.

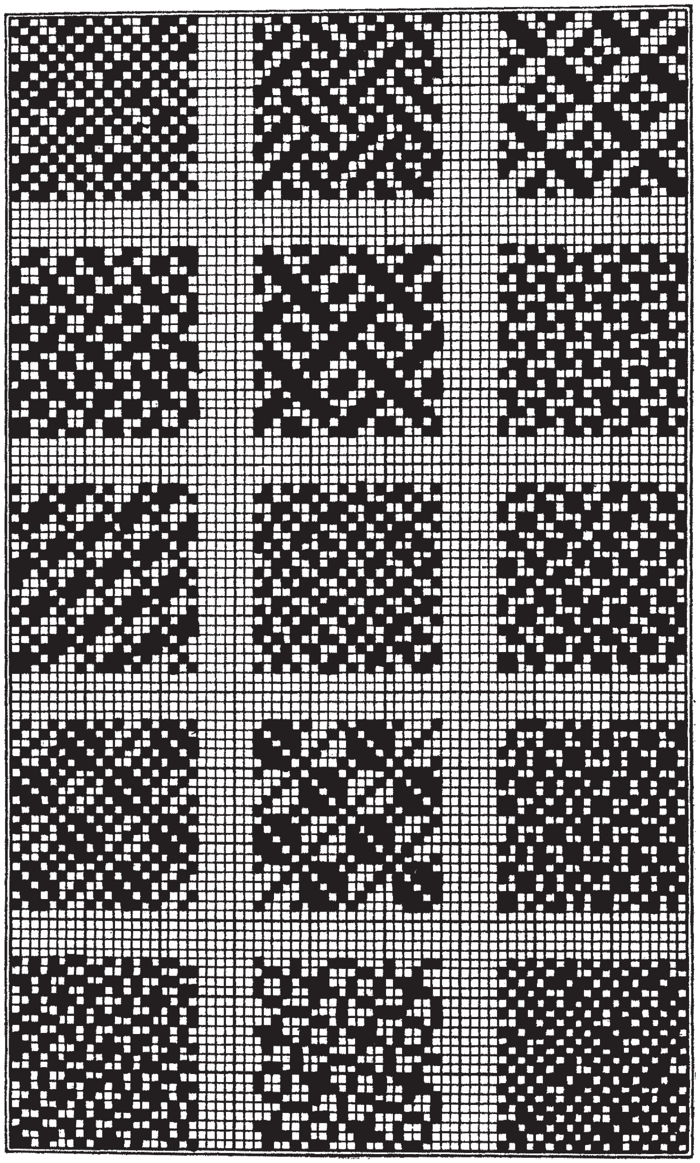
BRAMWELL FEED:—A feeding machine used in connection with woolen machinery in the preparing or the carding department, for automatically feeding a regular supply of wool (or wool mixed material) to a machine; for example, the wool scouring machine, the picker, the breaker card, or the worsted card. The machine is named after its inventor, W. C. Bramwell, and was first brought out in 1876. In cotton spinning a somewhat similar machine is used in connection with the picker.

(*To be continued*)

DICTIONARY OF WEAVES.

(Continued from page 159)

TEN HARNESS



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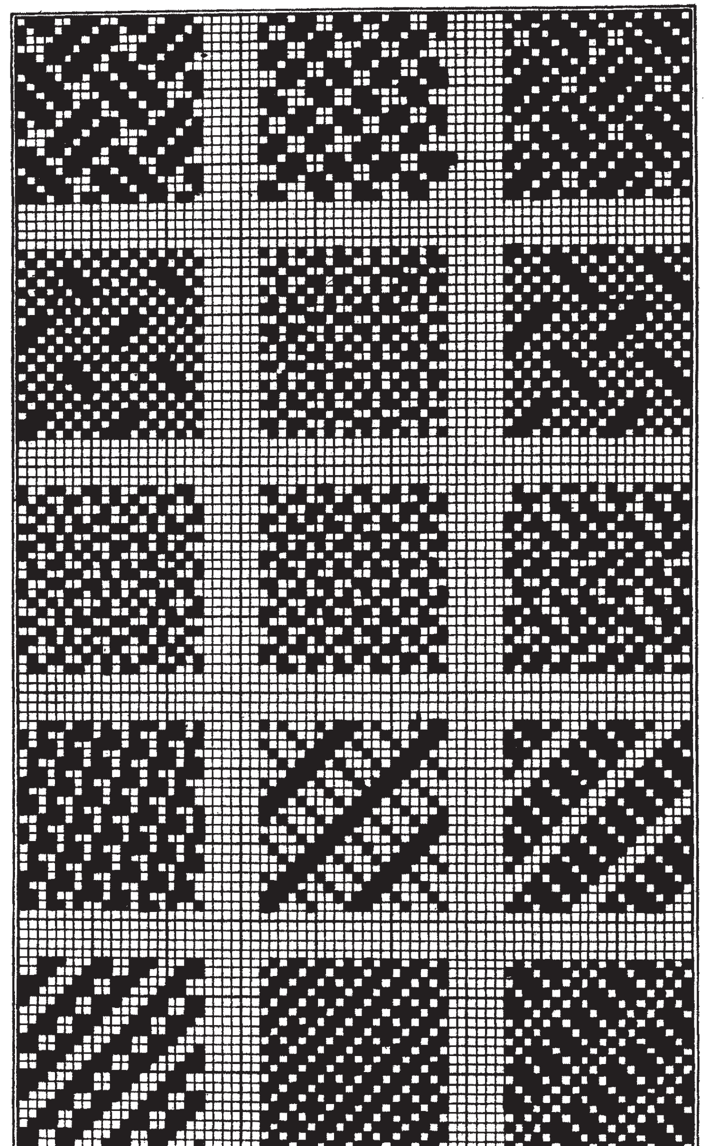
TEN HARNESS



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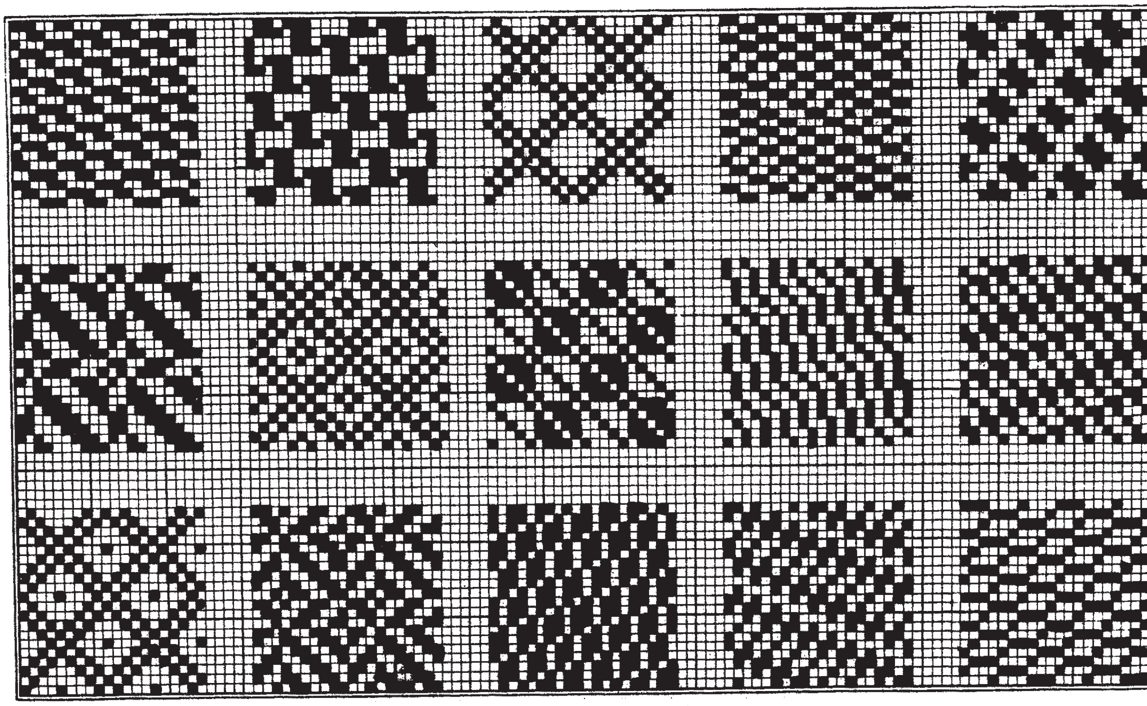
DICTIONARY OF WEAVES.

TEN HARNESS



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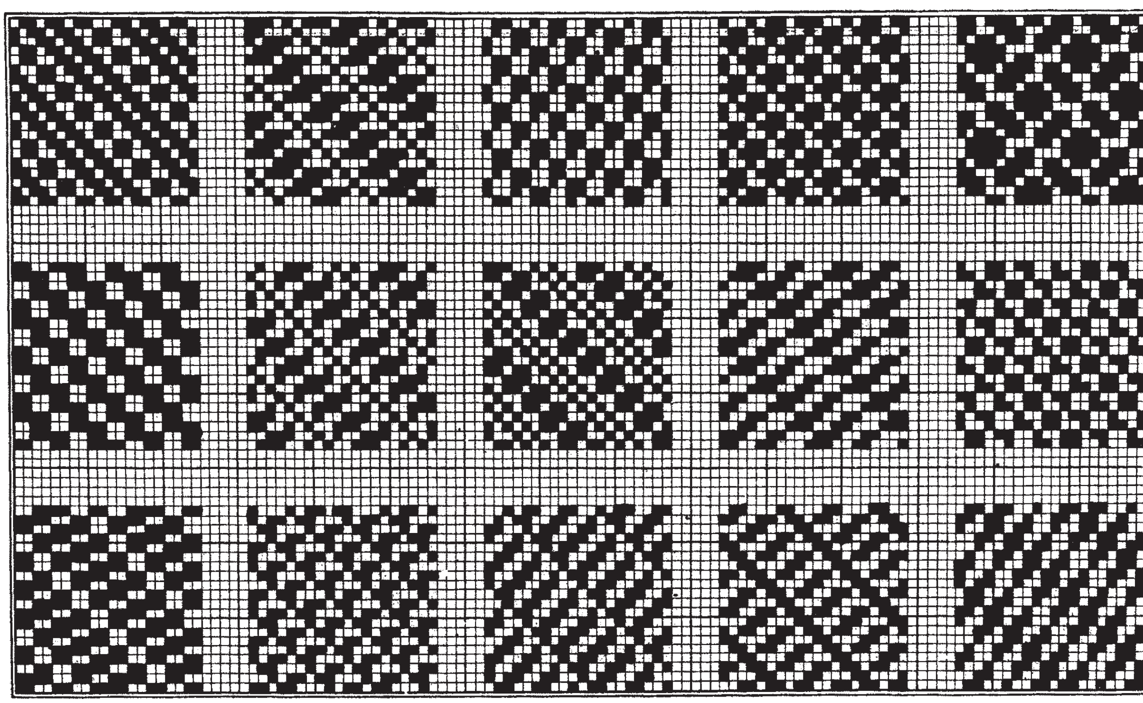
TEN HARNESS



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SILK FROM FIBRE TO FABRIC.

(Continued from page 155.)

Conditioning. Silk, like all other textile fibres, in its normal condition contains a certain amount of moisture. Since the moisture in silk can be artificially increased up to twice the amount normally present, with a consequent loss to the buyer of such silk, an international congress met in 1875 at Turin, Italy, to decide on certain allowances for moisture, or *reprises*, in the various textile fibres, and standards of allowable moisture were fixed for them. The standard allowance for silk was made 11%, that is, that silk would be considered as being in standard condition if it contained an amount of water equal to 11% of its dry weight. The skeins of thrown silk, after having been reeled and weighed, at first together and then separately, are for the purpose of conditioning, then dried in ovens, and when perfectly dry, a certain amount of water is added to the silk so as to make it contain a percentage of moisture equal to 12 parts of water to each 100 parts of dry silk, approximately 11%. The count of the silk thus treated is called its *conditioned count.*

It is not always necessary, however, to artificially condition silk unless it happens to be very coarse or hard twisted, since a fine silk will either gain or lose enough moisture from the air during reeling to restore it to a proper condition, if this operation be performed in an atmosphere of normal temperature and humidity. Coarse or hard twisted silks must usually be conditioned, because silk in these circumstances will not be sufficiently affected by atmospheric moisture to bring them to the proper condition for determining the *conditioned count* of the yarn.

Scouring. Raw silk, or hard silk, as it is called by the trade, contains considerable foreign matter which must be more or less removed from its fibres before it can be satisfactorily bleached and dyed, these impurities consisting chiefly of the gum, or saliva, used by the silk worm in spinning its cocoon, amounting to as much as 28% of the weight of the silk in some varieties. Silk which has been weighted in its raw state will also have more or less mineral matter adhering to the silk fibres, which also must be taken off. The process by which the natural impurities, and much of the coloring matter, are removed from raw silk is variously known as *scouring, boiling-off* or *degumming*, its utility depending on the fact that the natural gum from the saliva of the silkworm, *sericin*, is soluble in a hot solution of soap in water, and that it can be partially or completely removed from the silk fibre, which it coats, without affecting this, unless the treatment is continued too long. The coloring matter is chiefly contained in the sericin which coats the fibre, and is combined with it. It is also soluble in hot water. The impurities can be wholly or only partly removed from the silk, according to the future uses of the silk in question; in some cases it is desirable to remove all the gum, etc., where in others, as much as possible is left on the fibres, since the gum increases both the weight and the size of the fibre.

Scoured silk is divided into three classes, distinguished by the trade-names *boiled-off silk, souple silk* and *ecru silk,* accordingly as all of its gum or a greater or less part of it only has been removed by the process.

Boiled-off silk, has had all its gum, etc., removed by repeated treatment in soap solutions heated to about 195° to 205° F. In this process, the silk loses from 24% to 28% of its weight in the raw state, China silks losing the most weight, European and Japanese silks losing the least. Boiled-off silk is distinguished by its softness and lustre, its greater capacity for taking dyes, and a lighter color, it having lost practically all its coloring matter.

Souple Silk, is silk that has been deprived of only a part of its gum, etc., its loss in weight during the scouring process being about 5% to 8%, its treatment being especially directed towards leaving it soft and pliable.

Ecru Silk, is silk that has been treated so as to remove only the most soluble part of the gum, but most of its coloring matter, the loss in weight amount to only 2% to 5%. Ecru silk is usually very light in color.

Naturally, there is a difference in the treatment of the silk, according to the variety or quality that is to be produced. Boiled-off silk is put through several baths of strong soap solution at about 200° F., and is left in each bath for some time, being frequently worked to hasten solution of its gum. Souple silk is put through fewer baths, at a lower temperature, of less strength and kept in them a shorter time, while for ecru silk, the baths are kept at the lowest strength and temperature consistent with removal of gum, in fact one treatment with weak soap suds is all that is generally required.

A newly patented process, having for its object the increasing of the strength and lustre of silk by reducing to a minimum the amount of gum, or sericin, removed from the fibre in the scouring operations, has recently been tried it is claimed with some success. The principle on which it is based is a treatment of the raw silk with formaldehyde, which renders the sericin more or less insoluble in soap solutions according to the duration of the treatment. The process may be applied either before the raw silk is scoured, or after a slight scouring.

The raw silk, in the first method, is treated with formaldehyde by immersing it in a solution of this gas, the formaldehyde rendering the gum more or less insoluble according to the length of time the silk is left in the solution and also, according to its strength. The silk is taken out, rinsed in clear water and then boiled-off with care, so as to remove only the outer layers of the hardened gum or the part not rendered insoluble. In the second method, the silk is put through only a partial washing, then hardened with formaldehyde, again soaped and the treatment finished.

Thus treated, the fibre is sufficiently soft to replace the entirely degummed silk and is much heavier and stronger, both on account of the greater amount of