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Posselt's Textile Journal

A Monthly Journal of the Textile Industries

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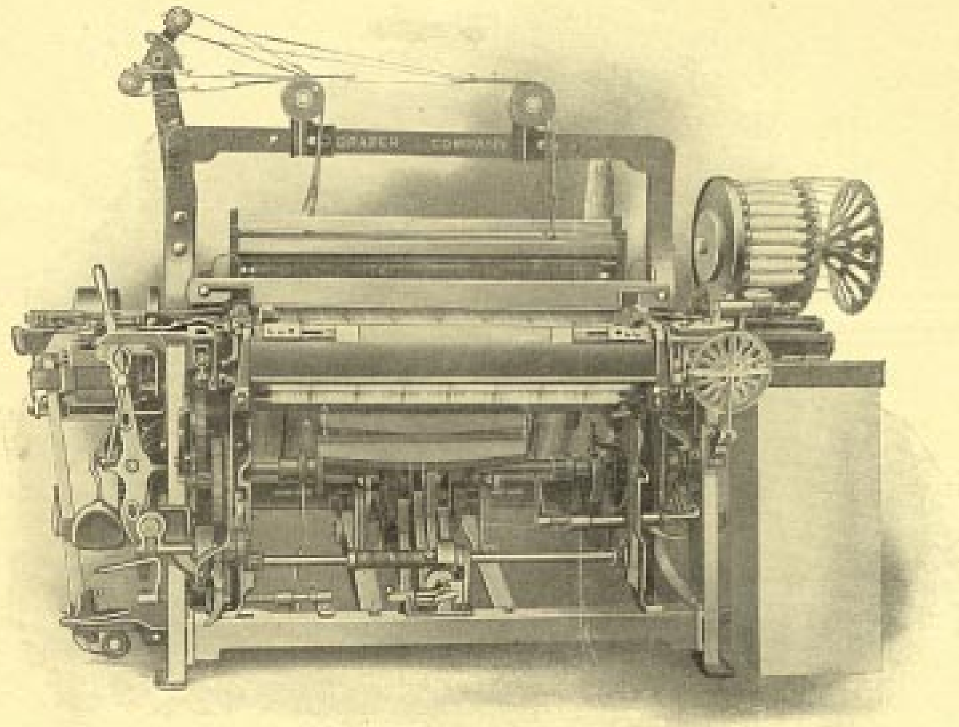
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POSSELT'S TEXTILE JOURNAL

A PRACTICAL AND
EDUCATIONAL JOURNAL
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Posselt's Textile Journal

Vol. I. **December, 1907.** **No. 3.**

A PRACTICAL TREATISE ON THE KNOWLES FANCY WORSTED LOOM.

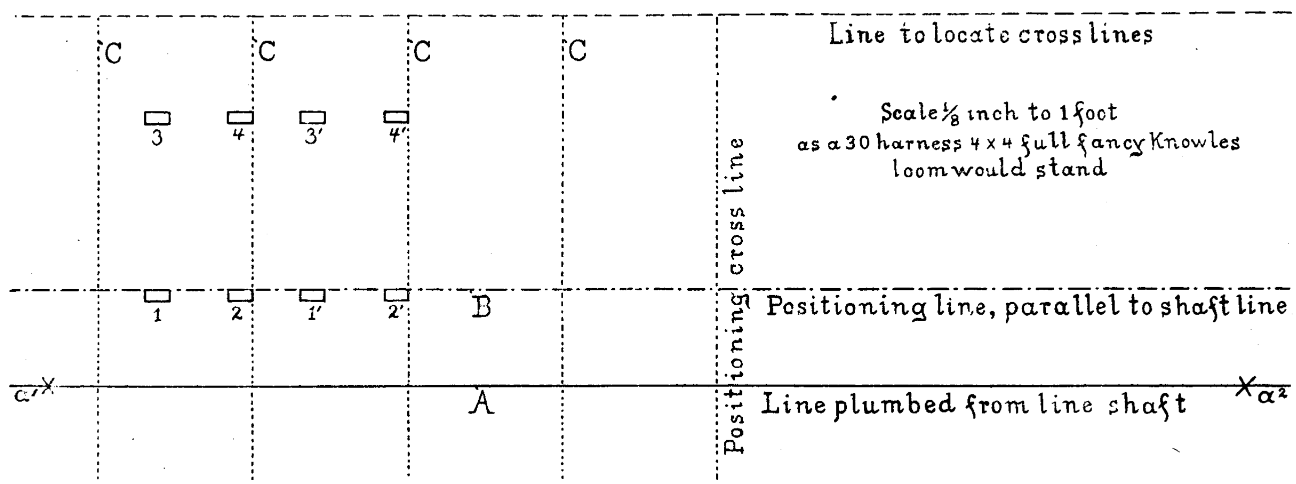
By E. P. Woodward,
Master Weaver.

The object aimed at in writing this series of articles is to give to loom fixers a "companion" to which they can refer when in trouble or in doubt of how to proceed in their routine work. However, more particular will these articles be of the greatest interest to persons learning the business of fixing looms, since no practical work of value on this subject exists. In writing this series of articles, the author has taken the position of a person who assumes that the party, in whose interest these articles are written, has all to learn, nothing is taken for granted, a feature which is absolutely necessary, so as to make this series of lessons on loom mounting thorough and at the same time plain and readily understood by the student.

The Lining of the Loom to Its Proper Position in the Weave Room.

We will take for our subject the 30 harness, equal geared, 4 x 4 box loom, since the same is the type of a woolen and worsted loom met with in most instances in the weave room of modern mills.

The first thing to be taken into consideration, after the shafting is lined, is the distance to be given between the looms. After such has been settled, the next thing to do is to ascertain the proper floor space for each loom. By this is meant that each loom must have, besides its own floor space, the proper amount of alley-way for the weavers to pass conveniently to and fro in their work. The proper way to lay out this floor space per loom is to plumb to the floor from each end of the line of shafting required to drive the looms. Between these two points found, then draw a line, *i. e.*, stretch your measuring cord tightly between these two points, this being a simple and at the same time an accurate way. Parallel to this line, at a distance which will meet the inside of the loom frame (on the pulley end) when the loom is in its desired position on the floor, then stretch or draw another line the same length as the first line. At right angles to these lines next draw lines which will extend from the line drawn under the shaft line to a point a few inches beyond the opposite end of the loom. As it is desirable to have these shorter lines for guidance in positioning the loom lengthways, they must be so placed that when the looms are in position, the line will meet either the front of the loom sides if locating from the front of the loom, or the back of the loom sides if locating from the back of the loom.



To illustrate to the student points thus far explained, the accompanying diagram of a floor plan is given with two looms shown placed in position so as to make matters as plain as possible to the student. In this diagram, letter of reference *A* is the line found by plumb line from points a^1 and a^2 located at each end of shafting. Dot and dash line *B* indicates the line to which the inside of the loom frame is lined. The eight shaded rectangles 1, 2, 3, 4 and 1′, 2′, 3′, 4′ indicate the feet of two looms to which are bolted the floor plate for fastening the looms to the floor. Line *B* is parallel to the shaft line and is of the same length as the latter.

At right angles to lines *A* and *B* we next find drawn the division lines *C* (shown in dotted lines) which mark the space allowed for each loom, including its alley-way.

It will be noticed that the looms are placed on these lines in the position previously referred to, *i. e.*, the ends of the loom sides (2 and 4 and 2′ and 4′) are on a line with line *C*.

By following directions given we accomplish the following results:

(1) All lines running lengthways of shaft will be true parallels to the shaft line.

(2) All cross lines will form right angles to shaft lines.

(3) The loom space will be equally divided.

As each loom has been given its allotted space, regardless of measuring from another loom, and is squared to lines which are true right angles, the loom in turn will stand as square as the construction of its frame will allow. These are points to be well remembered, since they influence the leveling of the loom, and the true running of the belt—a point taken up later on, in its proper place.

If when lining looms to two lines as described, the setter-up should find that the feet of the looms will not meet both lines (*C* and *B*) exactly, he need not be surprised, nor can he expect this to be the case, for he must bear in mind that he is handling looms and not, for example, constructing a watch; a loom frame will not always come up exact to delicate measurements, besides this is not absolutely necessary. Lines *B* and *C* have been solely made by him for a guidance, in placing the looms in the best possible positions. He knows that these lines are absolutely true and in turn he must strike a medium where a loom frame varies a trifle, being sure that he is working on a true principle and when any slight deviation in a loom frame will not prevent him from getting good results, *i. e.*, placing the respective loom in its best possible position. If a setter-up of looms has not the right idea of lining looms, as thus explained, he will not know where he stands, and guesswork all around in all his work will be the final result.

The student has thus far been taught to draw lines (*C*) at right angles to the shafting line. To do this he may take his choice of the following methods.

First: Take your shaft line (*A*) as one line of a square, the length of which is eight feet, to this extend a line as nearly at right angles as you can, six feet in length from shaft line. Connect this line of eight feet and the line of six feet with a line ten feet in length, and you will have formed a triangle, two sides of which form a perfect right angle. Having formed a right angle you can now take a measuring line and lay out your floor space for the looms, taking all your measurements from the tape as follows: If the floor space per loom is six feet, the second division line will be found at the 12 foot mark on the tape, the third division line at 18 foot on tape and so on. Measure line *A* this way: Draw a line parallel to shaft line at the opposite end of loom from shaft line and space this line in same manner as line *A*. Then draw your cross lines and you have your right angles and spaces.

The second method of getting right angles is thus: Should you choose to use a large square, the proportions 3-4-5 or any multiple of the same connected as a triangle will give you a true right angle.

Leveling the Loom.

In leveling the loom, it is well to remember that the builders of the loom level the frame previously to said loom leaving their erecting room, and that the person who sets up the loom in the weave room of the mill should follow the same method as practiced in the erecting room of the builders.

The loom being lined to its proper position, the holes bored for floor screws, for fastening the feet of the loom to the floor of the weave shed, the next thing to do by the erector is to put the level on each end of the back girt and see that both ends stand level and that there is no inclination to warp or twist. Next use the level on the breast beam of the loom in the same manner. These two parts of the loom frame being leveled, the next thing to do is to look after the picking shaft which should stand true to level, when back girt and breast beam are level. If the picking shaft does not stand level with the latter, it is a sign that something is wrong, look for a strain or a loose casting, or a twist somewhere due to the handling of the loom in transit, *i. e.*, since leaving the erecting room of the shop and arriving on the floor of the weave room of the mill. The trouble in most cases will be quickly located.

The loom is now level lengthways, the next thing to look after is to test the loom frame endways, or in the direction of the countershaft which carries the bevel pinion gear and drives the loom. This shaft should stand level and the loom side at the same time should be level.

The level should also be put on the heel pin cap over the vibrator ends, or the top harness cylinder, both of which should stand level. At the same time the upright shaft should be a true perpendicular, *i. e.*, no matter where you place the level on any part of the circumference of the upright shaft, it should stand plumb.

The loom now having been thoroughly tested as to its levelness on all places quoted, is then bolted by its feet to the floor of the weave shed, securing by this all necessary blocking under countershaft frame, centre girt and all other places where blocking has been done, by screwing down all floor screws, into a stationary position.

The next, and so far as the running of the shuttle is concerned the most essential part to look after, is the lay, more particularly the shuttle raceway. If the same is not as it should be, a poor loom fixer is in for much worriment why shuttles do not box evenly. He may lay the trouble to the belt and friction, in fact on most every part of the loom but the actual cause for his misery, and quite frequently he sums up all his troubles in the scapegoat word "backlash."

The lay must stand level and anything in the imperfect lining of castings or braces which support and strengthen it, must be looked for at this time.

The lay is cut out in the centre so as to allow room for the stop motion wires to drop and it is this place which in some instances will be found to be out of line in place of being level with the rest of the shuttle race.

A lay may warp a little in spite of being well braced, and the time to attend to truing it is when you are leveling the loom. These are points which the experienced fixer is on the lookout for, knowing that he cannot see them when the warp is in the loom, and the latter running. The point originally has been mentioned more particularly for the benefit of the beginner, who cannot think far enough for looking for his trouble in the right direction, in fact who will look everywhere else but the place which is at the bottom of his trouble and when the practical information thus given him will greatly lessen his labor and trouble.

The lay now being leveled, and in turn swinging freely, the reed line must be next looked after, and if it is not true, made true. It should be a perfectly straight line from lay sword to lay sword, and under no consideration let the idea get hold of you that in order to keep the shuttle in its travel during weaving on a straight course, you must "dish" the reed line a little towards the centre. This statement may be in opposition to the views of many loom fixers, but nevertheless it is the method of lining carried out in the erecting room by the loom builders and which they hold to be correct. All you need allow in lining the reed would be just enough to be on the safe side. If you can place the thickness of an ordinary sheet of writing paper between the straight edge and the reed, it is sufficient. On the other hand be sure the reed does not bulge towards the straight edge. Judgment must be used in handling a straight edge. The first thing to know is that your straight edge is true and does not deceive you. Take care to work by directions given, and other things will develop later which will keep the shuttle running straight.

When lining the reed to the box guide plates, it will be found that quite often the reed when in line with the box guide plates at the shuttle race line will not be in line with the same plates at the top of the reed near the hand rail. This should be made to line true by the loom fixer, since it cannot be fitted by the loom builders, since reed makers do not use a standard size rib.

These directions if properly adhered to, should now leave the loom well leveled and true to the shaft line for floor position. In leveling, the things to keep in mind can be summed up as follows:

First, level back girt, picking shaft and breast beam.

Second, level counter or loom pulley shaft, loom sides and head of loom at vibrator heel cap or top harness cylinder gear.

Third, try upright shaft and see that it stands perpendicular.

Do not expect all these points to come to an exact level.

Use your level faithfully just the same and remember the essentials here are to have a smooth working machine rather than one set up absolutely accurate to gauge, and when slight deviations from perpendicular and level will do little harm.

(*To be continued.*)

THE JOURNAL'S TEXTILE SCHOOL.

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

Lesson 3.

SATIN WEAVES. This is the third system of our foundation weaves. The characteristic features of fabrics interlaced with satin weaves, or as they are more frequently called *satins,* consists in that they are without the prominent line effects characteristic to twills, in turn imparting to the fabrics in connection with which they are used, a smooth face.

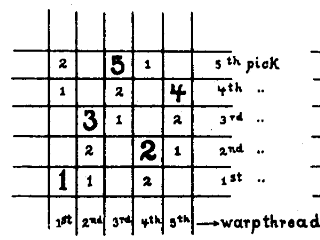


Fig. 50

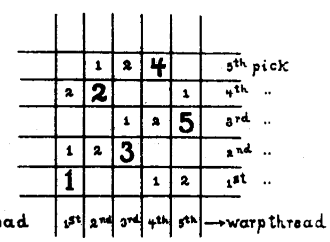


Fig. 51

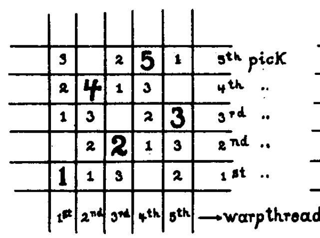


Fig. 52

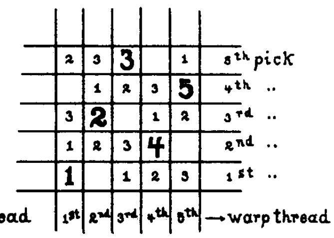


Fig. 53

Satins might also be designated as double twills, *i. e.*, two positions of one twill intertwined or mixed into one weave (for example with the 5-harness satin filling effect, the 1 up 4 down 5-harness twill) taking alternately one warp thread or one pick from one position of this mate twill and then from another position (except either one of the joining picks of the one used before) of said mate twill. This, as will be readily seen by the student, kills the prominent twill effect, the joining two floats, whether warp or filling, covering the point of interlacing of the satin, giving in turn to the fabric the characteristic smooth face.

Satin weaves are always uneven sided interlacings, *i. e.*, a satin weave is either a warp or a filling effect, the first being the most often used effect in connection with plain fabric structures; filling effect, although also in some instances used in connection with plain fabric structures, finding its most important use in connection with figured work, *i. e.*, blending it against warp effect satins or other warp effect, etc., weaves, but never against another filling effect.

As a rule, whether warp or filling effect required, for practical work in the weave room, in connection with plain fabrics, the filling effect symbol of weave is used, since it is easier constructed such a satin, and besides plainer to the eye—sinkers (□) being then considered for risers if the warp effect is required when building a harness chain. In connection with figured work, however, both symbols of weaves (warp and filling effect) however, must be used.

THE OBJECT aimed at in the construction of satin weaves is *to arrange the interlacing* of warp and filling *as much as possible distributed* and *yet at the same time as regular as possible distributed.*

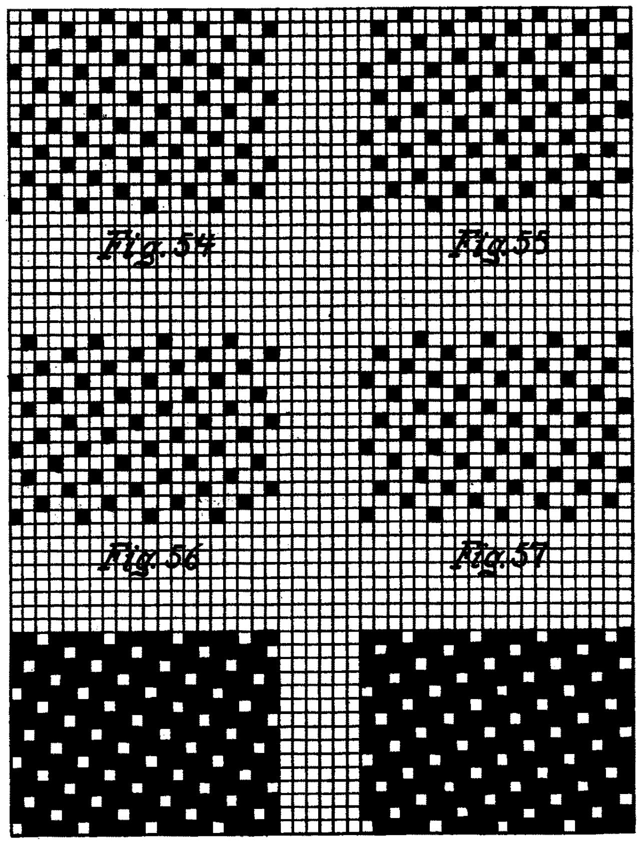


Fig. 58 *Fig. 59*

The lowest number of harnesses for constructing a satin is 5, after which, with the exception of 6, they can be constructed for any number of harnesses. Some designers consider the 4-harness broken twill, also known as the *small crow foot twill* as a satin, which however, is not the case and for the sake of system in classifying weaves, is better not done, although we must admit that in a great many instances it is hard for the designer to decide at a first glance whether we deal with this weave or a 5-harness satin in the fabric; for example, a doeskin or a beaver, and where we may come in contact with either weave, more particular in connection with the better class of these fabrics.

On 6-harness no regular satin can be constructed, for reason explained later on, we using in its place then what we technically term the 6-harness irregular satin also called the regular or *large crow foot twill* and which is a most important weave for cotton and silk manufacturers, it being a weave that is very extensively used in connection with figured stripes, checks, etc.

Rule for constructing satins: Divide the number of harnesses you are to construct the satin for into two prime numbers (neither number to be a multiple of the other, nor of the repeat of the weave). Either one of these two prime numbers we will call a *counter*. Next take either one of these counters only into consideration, and add it to 1, then add it to the sum, and keep this adding of the counter to the last sum obtained continually up, until the repeat of the weave is obtained. During this procedure of counting out our satin, take at the same time into consideration that in the construction of such a satin weave, we only deal with one repeat of it and for which reason any number of a sum, whenever coming in the second repeat of the weave, has to be transferred to its proper number in the first repeat. For example, if in connection with a 5-harness satin, the sum calls for 8, this means then (8 minus 5=) 3, for the number to be taken in place of the last sum. Or in other words, more plain to the student, the 8th warp thread in a 5-harness satin constructed with more than one repeat equals the 3rd warp thread in the first repeat or the second, etc., repeat of this weave. In the same manner, the sum of 12, in connection with a 10-harness satin (12 minus 10) equals the 2nd warp thread in either the first or any successive repeat of this weave.

What has been said thus far with reference to warp, at the same time also refers to counting-off filling ways.

Explanations thus far given are best explained with a practical example, for instance the 5-harness satin and when we will explain at the same time *all* possible chances for counting-off, in this way helping the student over any possible doubt as what to do when having to construct a satin for any required number of harnesses. In the same manner, as thus explained in the lesson, the student—for exercise—may treat any different satin weave.

5-harness satin. $5 = 2 + 3$

Taking 2 as the counter we find:

$\mathbf{1} + 2 = \mathbf{3} + 2 = \mathbf{5} + 2 = (7 - 5 =) \mathbf{2} + 2 = \mathbf{4} + 2 = (6 - 5 =) 1$ giving us 1, 3, 5, 2, 4, as the rotation of stitch for the 5-harness satin.

One system of the threads, either the warp or the filling, is now taken in consideration in regular rotation, the other system being taken as per arrangement (counting-off) thus obtained; which system to use straight, and which distributed, is immaterial with reference to constructing the satin. Explanations following later on will explain subject.

We will now take warp straight and filling distributed as counted-off and when:

the 1st	warp	thread	intersects	with	pick	1
2	"	"	"	"	"	3
3	"	"	"	"	"	5
4	"	"	"	"	"	2
5	"	"	"	"	"	4

This procedure of counting-off the 5-harness satin is shown on point paper in diagram Fig. 50.

Now let us take the filling straight and distribute the warp, and when

the 1st	warp	thread	interlaces	with	pick	1
3	"	"	"	"	"	2
5	"	"	"	"	"	3
2	"	"	"	"	"	4
4	"	"	"	"	"	5

This procedure of counting-off the 5-harness satin is shown on point paper in diagram Fig. 51. The difference between using either way of counting, will result in a different double twill effect for the satin; which to use depending on the fabric under consideration and consequently has nothing to do with the construction of the weave.

Previously we mentioned that either *counter* (2 or 3) may be used, and in order to simplify study to the student and at the same time possibly set many a practical man's mind at rest, we will next repeat the procedure as done with counter-off 2 now with counter-off 3.

$\mathbf{1} + 3 = \mathbf{4} + 3 = (7 - 5 =)\ \mathbf{2} + 3 = \mathbf{5} + 3 = (8 - 5 =)\ \mathbf{3} + 3 = (6 - 5 =)\ 1$ giving us this time 1, 4, 2, 5, 3 as the rotation of stitch for either one or the other system of threads.

Taking the warp in rotation and skipping the filling gives us:

1st	warp	thread	interlaces	with	pick	1
2	"	"	"	"	"	4
3	"	"	"	"	"	2
4	"	"	"	"	"	5
5	"	"	"	"	"	3

This procedure of counting-off the 5-harness satin is shown on point paper in diagram Fig. 52.

Taking next our last chance of a change in producing this 5-harness satin into consideration, *i. e.*, skipping warp and taking filling in rotation we find:

1st	warp	thread	interlaces	with	pick	1
4	"	"	"	"	"	2
2	"	"	"	"	"	3
5	"	"	"	"	"	4
3	"	"	"	"	"	5

This procedure of counting-off the 5-harness satin is shown on point paper in diagram Fig. 53.

In the same way as referred to, when counting-off with 2, the difference between using either way of counting-off (either the one obtained in diagrams Figs. 52 and 53) will result in a change of the double twill effect for the satin; which to use depending on the character of the fabric to be made, however, it has nothing to do from a point of constructing the weave.

We now come to a more interesting point. The student might think "we now have four 5-harness satins constructed"—nothing of the kind, since weaves Fig. 50 and 53 are identical and in the same way weaves Fig. 51 and 52, and which brings the matter in a nut shell to the fact *only one 5-harness satin* has been obtained, the only difference being either a left or right hand double twill effect.

To bring the affair more plain before the student, weaves Figs. 54, 55, 56 and 57 have been given, either one showing twelve repeats of a 5-harness satin, *i. e.*, four repeats warp ways and three repeats filling ways. Of these four weaves

Fig. 54 =	diagram	of	construction	1	
" 55 =	"	"	"	2	
" 56 =	"	"	"	3	and
" 57 =	"	"	"	4.	

We mentioned before, that satin weaves, for plain structures, are best constructed filling effect, although the warp effect is the one required for face in almost all cases.

Until now we have shown the 5-harness satin always filling up, since however, in connection with figured fabrics the warp effect must be also painted out, we have shown the latter in weaves Figs. 58 and 59, and of which

Weave Fig. 58 is the mate of Fig. 54 and
" " 59 " " " " " 55.

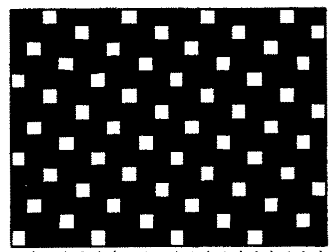


Fig. 60

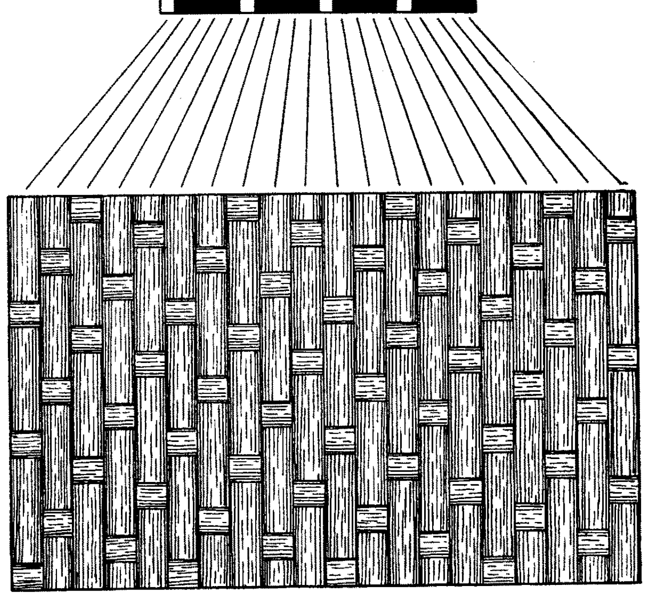


Fig. 61

In order to show the general interlacing of fabrics with satin weaves, diagrams Figs. 60 and 61 are given, and of which weave Fig. 60 corresponds to the 5-harness satin warp effect shown in connection with diagram Fig. 58, it being four repeats warp ways and three repeats filling ways of said satin. Diagram Fig. 61 shows a portion of a corresponding fabric, the lines between weave and fabric structure indicating the respective warp thread in each.

6-harness satin. For this number of harnesses, as mentioned already, no regular satin can be designed, for the fact six cannot be divided into two prime numbers. For this reason, whenever required to use a 6-harness satin we have to use an irregular satin, which however, is a weave used very extensively in connection with the cotton and silk trade, for the fact that it produces a most exquisite face on account of its broken up satin effect.

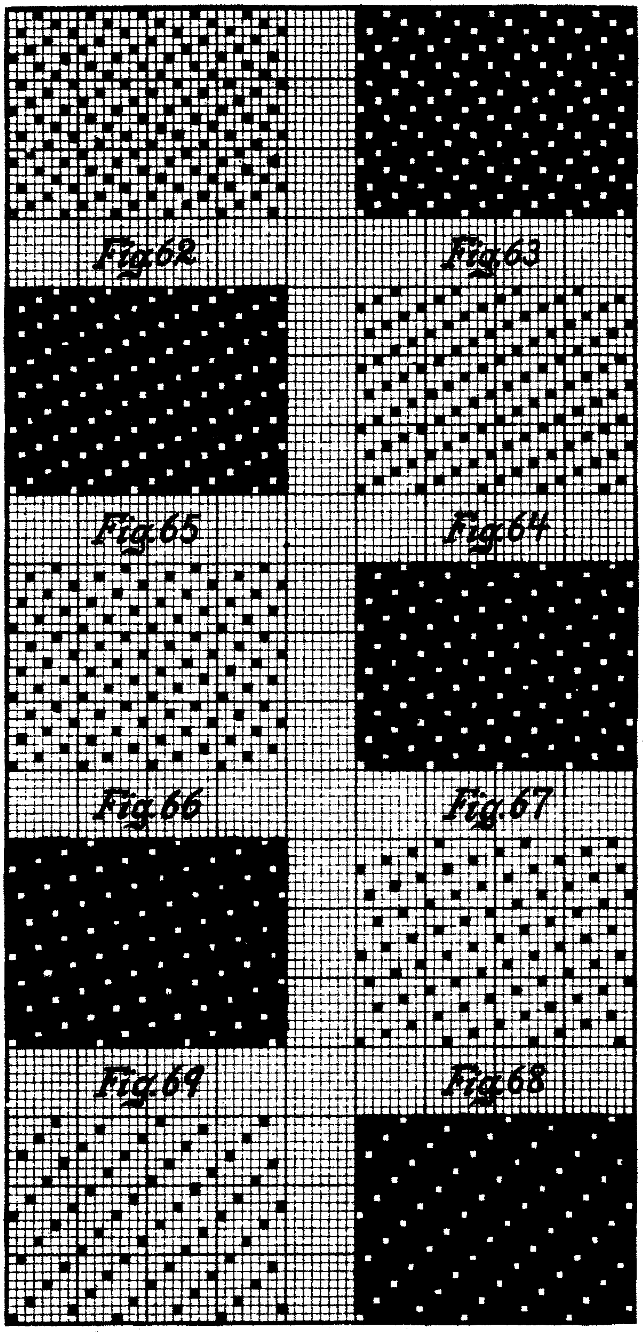


Fig.70 *Fig 71*

The drafting for this weave is thus: Drafting filling in rotation, draft alternately every other warp thread for three picks, next find the centre, which forms a new starting point and from which reverse drafting of three alternate threads, in connection with the next three picks. Finding the centre between each break or change of drafting will always place your initial starting point on the proper place in order that every warp thread throughout the repeat of the weave is taken up. With reference to our example, we will draft thus 1 — 3 — 5 (find centre =) 2 — 6 — 4. This weave on account of the breaking of the double twill effect every three picks, is called for this reason the crow foot twill, *i. e.*, the regular or large crow foot twill, in order to distinguish it from the 4-harness broken twill. To simplify matters to the student, weaves Figs. 62 and 63 are given and of which weave Fig. 62 is the 6-harness irregular satin, filling effect, and Fig. 63 its warp effect. The weave in either instance repeating on 6 warp threads $\times$ 6 picks.

Having now given a thorough explanation of the construction of satins and which refers to any satin to be constructed any time by the student, *i. e.*, explanations which must guide him to construct any satin he ever will come in contact with, we will now simply elaborate the subject somewhat by guiding him in constructing the satin weave for four more additional repeats of harnesses, (7, 8, 10 and 12-harness) and for which reason diagram Figs. 64 to 71 are given.

7-harness satins. For this number of harnesses there are eight different ways of constructing a satin possible, for the fact that 7 can be divided into 2 + 5 and 3 + 4, and that either warp or filling can be taken in rotation, the other system being counted for.

Weave Fig. 64 shows the 7-harness satin obtained by using 2 as a counter, taking the filling in rotation and counting off or skipping the warp thus:

1 + 2 = **3** + 2 = **5** + 2 = **7** + 2 = (9 — 7 =) **2** + 2 = **4** + 2 = **6** + 2 = (8 — 7 =) 1, or repeat. Using any other number for a counter-off will give us the same satin weave, only that the double twill effects run in a different direction, which matter is immaterial to us with reference to construction of weave, but will come into consideration when dealing with the laying out of fabric structures, *i. e.*, their face effect required, etc. Diagram Fig. 65 shows us the 7-harness satin warp effect taken from the preceding weave.

Weave Figs. 66 and 67, show us the 8-harness satin, filling and warp effect, respectively.

Weave Figs. 68 and 69, show us the 10-harness satin, filling and warp effect respectively, and finally

Weave Figs. 70 and 71, the 12-harness satin, filling and warp effect respectively.

By studying diagrams, weaves and explanations thus given, the student cannot help but master the construction of any satin weave he ever will come in contact with.

Questions:

(1) What is the difference in constructing satins from that of twill weaves.

(2) Which is the lowest number of harnesses you can design a regular satin for.

(3) Quote reason why no regular satin can be constructed on six harnesses.

(4) Count out the 8-harness satin, using 3 as a counter.

(5) Count out the 10-harness satin, using 7 as a counter.

(6) Count out and construct the 9-harness, 11-harness and 16-harness satin.

In either instance when painting a weave for your exercise, always be sure to paint two repeats each way, in order to convince yourself that your answer is correct.

(7) Which fabric will permit you to use a higher texture warp and filling ways, in connection with a given count of yarn: (*A*) the 4-harness even sided twill, or (*B*) the 7-harness satin; giving at the same time the reason for it.

An Improved Picker Stick Attachment.

The new attachment comprises a combination of parts to replace the sweep strap, and power strap, now commonly used in connection with looms.

THE OBJECTS aimed at in connection with the new attachment are to provide a positive connection between the picker staff and the sweep stick so that there will be no lost motion on the forward stroke of the picker, and to provide a cushion for the back stroke of the picker staff, sweep stick and connections.

ILLUSTRATIONS. In order to explain the construction, application and working of the new attachment, the accompanying two illustrations are given and of which Fig. *A* is a detail view of the new attachment, in place on its picker stick *P*, only the upper portion of said stick being shown, since it is this part to which the new attachment refers to, the connection to the lower portion of the stick being of usual construction, *i. e.*, the stick is pivoted to the rocker iron of the loom frame and has attached to its lower back a foot strap, which in turn is connected in the usual way to what is known as the power spring, by which the picker stick is brought back after delivering its blow to the shuttle or picker. Fig. *B* is a detail view of the adjustment band and picker stick, taken on line *X-X* of Fig. *A*.

THE NEW ATTACHMENT SUBSTANTIALLY CONSISTS of the adjustment band 1, the back piece 2, the head 3 and the two straps 4 (one on each side of head 3).

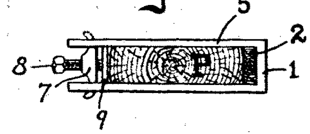
Considering adjustment band 1, the same consists (see detail illustration Fig. *B*, drawn somewhat enlarged to Fig. *A;* in order to show the details of said band more clearly) of the U shaped strap 5, which is of a width equal to the width of an ordinary picker stick and somewhat longer than the depth of the picker stick. Near the open end are square openings 6 through which pass the curved shoulders of brace 7. A bolt 8 passes through brace 7 and against a bearing plate 9 interposed between it and picker stick *P*. By this construction the bolt 8 can be loosened and the whole device can be slid up or down upon picker stick, and it may be clamped in any position by tightening bolt 8. In so shifting the positions of the parts, the band 1 may be moved up or down, the back piece 2 may be moved up, or down or both may be moved together as desired. In this way more or less power is given to the blows of the picker stick and picker, and the elasticity of back piece 2 may be increased or diminished.

The advantage of the construction shown is, that by loosening bolt 8 and separating the legs of strap 5, brace 7 may be withdrawn and strap 5 may be readily removed and attached to a new picker stick.

The back piece 2 consists of a strip of springy wood of a size at the bottom to slide through band 1, when bolt 8 is loosened. The top of back piece 2 is extended into a tongue 10 which fits into a suitable mortise in head 3. The latter, and tongue 10, are held together by a pin 11. A shoulder 12 on back piece 2 helps to make the union firm.

The head 3 is of fibre, and is pivoted by a metal stud 13, to the metal straps 4, which are pivoted at their other end to the sweep stick *S* by a stud 14. On the face of head 3, which is next to the picker stick is fastened a sheet of leather 15, as that is the part which receives the weight of the blow. Since head 3 is made of fibre, and stud 13 of metal, no oil is needed to lubricate the bearing and the wear is reduced to a minimum.

Fig. B



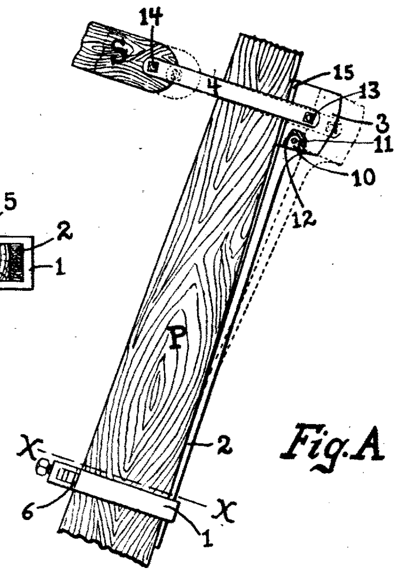


Fig. A

THE OPERATION OF THE NEW ATTACHMENT IS AS FOLLOWS:—Starting with the picker stick at rest, at the required time, the picker stick is driven forward by the action of sweep arm and sweep stick *S*, acting through straps 4 and head 3. The action of the spring in back piece 2, keeps head 3 pressed close against picker stick, so that there is no lost motion. After the blow is delivered, the foot strap throws picker stick back, carrying with it in close contact the head 3 and thereby sweep stick and sweep arm. When the top of the picker stick strikes its buffer or check, the momentum acquired carries along the sweep arm and sweep stick, thereby forcing back, head 3 and back piece 2, as shown by the dotted lines in Fig. *A*. When the momentum of these parts is exhausted, by working against the spring of back piece 2, the spring of said back piece brings head 3 back into contact with the picker stick and keeps it there so that there will be no lost motion upon the next forward stroke. The action between picker stick and back piece 2 is such that as picker stick is held firmly in one place by its pivot, foot strap and its puffer, all three not shown, but of usual construction, the back piece 2 will always bring head 3 up to the picker stick, which brings sweep stick *S* and its sweep arm back to just the same place, for every stroke. At the same time spring 2 will take up the force of the blow, which is usually given to the picker stick by the end of sweep stick *S* on the back stroke.

CLAIM. The inventor of the new attachment, Mr. H. E. Taplin, claims that the action of the picker stick is smooth and positive, which saves much wear on the parts, more especially on the picker and the free end of the picker stick which strikes the picker. Again, that since the position of head 3 can be adjusted on the picker stick to a small fraction of an inch, it is not necessary to weaken the picker stick by adjustment holes for the power strap. Another claim is that since none of the parts are of leather or other pliant material, they cannot stretch or get out of place.

THE TESTING OF TEXTILE FIBRES, YARNS AND FABRICS.

(Continued from page 65)

SEA ISLAND COTTON is the best grade of cotton grown, being raised on the islands off the coast of South Carolina and Georgia, or directly on the coast, and has a staple of from $1\frac{3}{4}$ to $2\frac{1}{2}$ inches in length. Such of the cotton as is grown further inland has a staple of from $1\frac{1}{2}$ to 2 inches only. This cotton is used only in the manufacture of the finest of yarns and thread.

THE MAINLAND COTTON is the typical cotton of the world, and, as will be readily understood, varies with reference to fineness and length of staple according to the topographical condition of that part of the cotton belt where grown. Of this species of cotton, the Gulf or New Orleans, Bender's or Bottom Land varieties are the most important, varying as to length of staple of from 1 to $1\frac{3}{8}$ inches and running in special instances up to $1\frac{5}{8}$ inches in length. Mobile, Peelers and Allan Seed belong to the same variety and are next in importance, while Mississippi, Louisiana, Selma, Arkansas and Memphis cottons are slightly inferior. Texas cotton produces a fibre of from $\frac{7}{8}$ to 1 inch staple. Georgia, Boweds, Norfolk and Savannah cottons belong to the variety comprising what is known as Uplands cotton, having a length of staple from $\frac{3}{4}$ to 1 inch.

With reference to the EGYPTIAN COTTON, the variety known as brown Egyptian Cotton is the one extensively imported to this country. The color of this cotton itself varies from a dark cream to a brown tint, with a length of staple of from $1\frac{1}{8}$ to $1\frac{1}{2}$ inches, and is well suited for yarns for fabrics requiring a smooth finish and high lustre, *i. e.,* giving to fabrics produced from it a soft silk like finish.

Of the PERUVIAN COTTONS, the "Rough Peruvian" is the variety imported, on account of its strong, rough, wooly, crinky staple, about $1\frac{1}{4}$ to $1\frac{1}{2}$ inches long. This cotton is usually very clean and well handled, its chief use being for mixing with wool in the manufacture of merino yarns, for which reason, it is also called "vegetable wool" and when carded, its resemblance is so close and its characteristics so strikingly similar to wool that it would pass off as the latter. When woven into goods, along with wool, the cotton fibres cannot be determined with any certainty, except by using chemical tests. When mixed with wool, it reduces the tendency of the goods, in which it is used, to shrink, makes them more durable, lessens their cost of production, besides giving them a superior lustre and finish; hence it is also frequently used in the manufacture of underwear and hosiery. For dyed goods it is equally suitable. Wild silks, when viewed under the microscope, may often present a flattened and twisted fibre, closely resembling cotton, hence the chance of a mistake, unless chemical tests are resorted to. Mercerised cotton closely resembles silk.

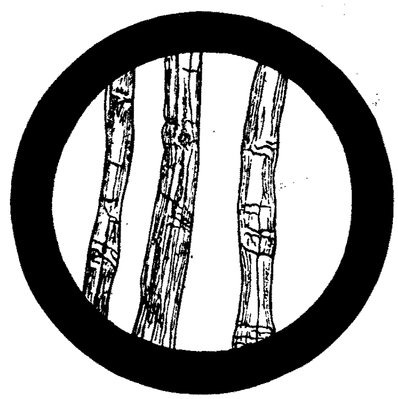


FIG. 6.

Flax, when viewed under the microscope, see Fig. 6, has the appearance of long grasses or reeds, with bamboo-like joints or nodes, arranged at regular intervals. The cell wall is regular in thickness and leaves a narrow internal channel, which, if visible, appears as a fine dark line. When bleached, the flax, *i. e.,* linen fibre, becomes snowy white and lustrous.

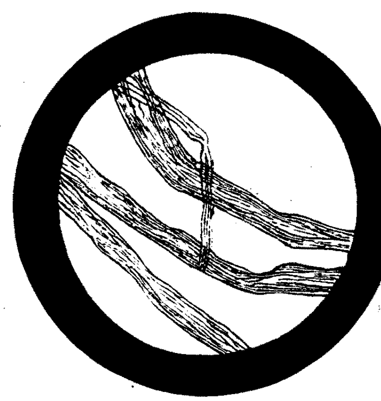


FIG. 7.

Jute, if viewed under the microscope, is shown to consist of stiff lustrous and cylindrical fibrils, the walls being irregular in thickness, with a comparatively large central opening. Fig. 7 shows specimens of jute fibres magnified.

Ramie closely resembles in its appearance, under the microscope, flax, in fact both being in many cases at a first glance, rather hard to distinguish, however, a more careful examination will show that the ramie fibre is generally coarser, the bamboo-like joints being larger and more marked, and of a rather different appearance to those of flax.

(To be continued.)

THE JOURNAL'S TEXTILE SCHOOL.

JACQUARD DESIGNING.

Lesson 3.

We now come to consider the principles employed for the setting of textile designs and which are: the *"plain setting"* in all its varieties, comprising setting on the *"square,"* the *"diamond,"* the *"rectangle,"* the *"drop"* as they are variously named; the *"turn-over"* or *"point setting,"* and the various *"satin settings."* **Plain setting:** In some instances, in connection with plain setting, we meet with designs worked out on the full repeat, *i e.,* one figure with its details covering one repeat of the pattern, and what is known as "setting on the square;" such arrangement, however, as a rule, giving unsatisfactory results, as compared to the other plans of plain or the satin settings; this more particularly being the case, when one part of the figure is more conspicuous than other portions and when then in turn, the repeat of the pattern, on the loom, causes these prominent figures to form lines, either horizontally or vertically or both ways, or in an oblique direction in the fabric.

Fig. 8 shows us a figure set on the "plain setting principle," set on "the diamond" plan, *i. e.,* using two figures in one repeat of the pattern. The figure, being set in both instances (in the repeat of the pattern) in the same position, in turn has a tendency, in this instance, to show stripes in a diagonal *i. e.* oblique direction, a feature readily overcome by means of reversing the position of the two figures as forming the repeat of the pattern.

This has been done in connection with design Fig. 9, and where one of the figures (see the one in the left hand lower corner) is shown in the same position as in the previous design, the other figure, in the repeat of the pattern, having been reversed, *i. e.,* turned over, a feature which in turn cannot help but result in a better design all around; this reversing of one of the figures in connection with the plain setting (neither after the diamond or rectangle plan) always resulting in a better effect in the fabric, a feature readily grasped by the student by comparing illustrations Figs. 8 and 9 ("plain setting—diamond plan") with each other.

Fig. 10 shows the same figure as shown in connection with design Fig. 8 produced under the same conditions, *i. e.,* both figures in one repeat of the pattern being set in the same position, which setting however, in the present instance, is different from the one shown in connection with Fig. 8, the figure itself being placed in a different (a more verticle) position, overcoming in this instance considerably the disadvantage of showing oblique, *i e.,* diagonal lines in the woven fabric. Still, considered all around, the reversing of figures, as has been shown in connection with Fig. 9, will always produce the best effects in fabrics, and consequently is the one most generally employed for that purpose, however, the arrangement given in connection in Fig. 10 shows a well repeating pattern, with little, if any, tendency for striping; again, the arrangement shown in connection with Fig. 8, in some instances, may refer to a special effect, more particular aimed at by the designer.

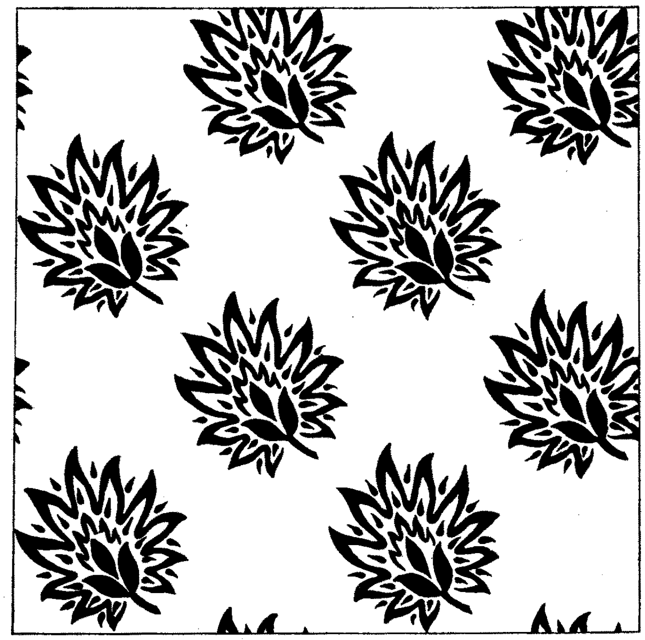


FIG. 8.

Previously we mentioned, that the repeat of the design, width ways in the fabric, is always regulated by means of the texture of the fabric as well as the

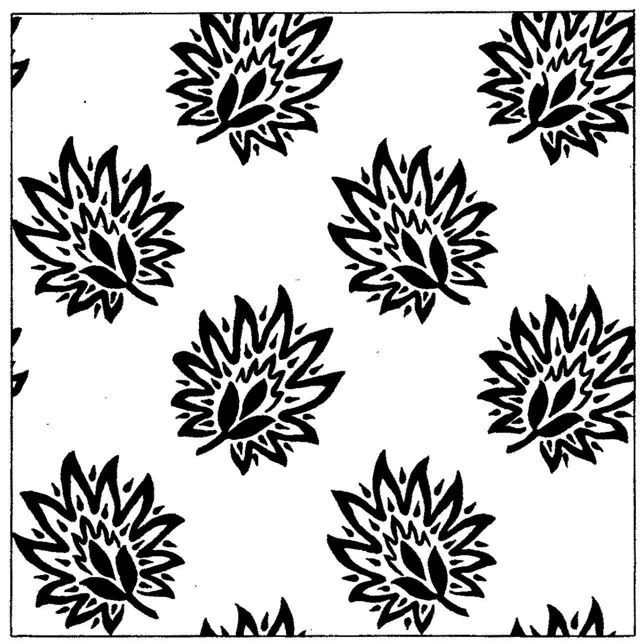


FIG. 9.

compass of the jacquard machine, whereas, in connection with the same fabric, the repeat of the design length ways, is unlimited, a feature which without question is the cause why a great many of our designs set on the plain setting, have a longer repeat filling ways than warp ways, (a stretched diamond, *i. e.,* the rectangle plan) giving in turn the designer a chance to bring up more elaborate designs.

To illustrate the subject, Fig. 11 is given, and which in its main effect contains the same figure as well as the same setting of it (plain setting reversed) as had

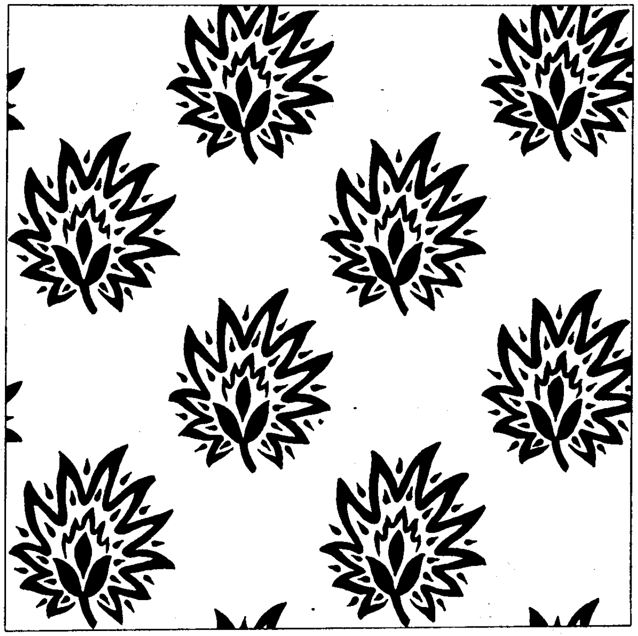


FIG. 10.

been given in connection with Fig. 9, the difference however being, that in the present instance, the figures have been dropped further apart from each

FIG. 11.

other than in the previously given example, giving us in turn more ground at our disposal, which in turn, with fabric sketch Fig. 11, we have then worked up in connection with a special design shown in a shaded effect.

Having referred to the square, the diamond as well as the rectangle plan of the plain setting, it will be well to refer also to what is called the "drop plan," in connection with plain setting; for the fact that it is a term frequently met with, more particularly in connection with carpets and similar fabrics.

The subject will be best explained with an illustration, and for which reason Fig. 12 is given, and in which *a-b* is to represent one breadth of the fabric on the loom, the rectangle *a b c d,* representing one repeat of the pattern as then woven on the loom.

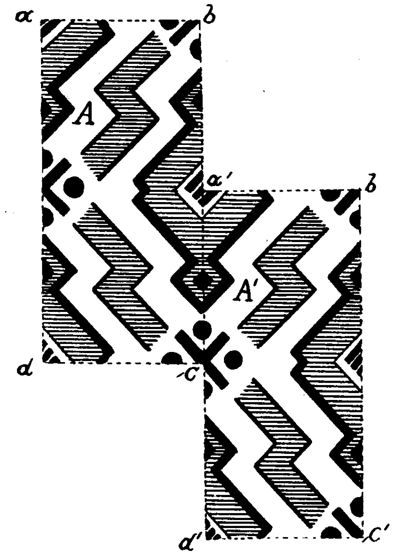


FIG. 12.

To get the repeat of the pattern on the floor, for example in connection with a carpet, is then accomplished by means of matching every other width to the one joining it, *i e.,* every other width has to be dropped before it properly will join, (see rectangle $a\ b\ c\ d$ compared to rectangle $a^1\ b^1\ c^1\ d^1$), and which consequently has been the origin of the name, drop pattern given to such designs (A dropped to A^1); however, considered as a whole, on the floor, they will be simply nothing else but a plain setting of a pattern.

The characteristics of these designs are that the squares, or rectangles, as the case may be, in opposite corners of the complete design on the floor must contain exactly similar parts of the figure, *i. e.,* must correspond, in order to permit the characteristic drop, previously referred to—see A and A^1.

As mentioned before, the most advantageous use of the drop pattern is in connection with carpets, more particularly brussels and tapestry carpets, and which are manufactured in what is known "by the roll," their standard, width in connection with both makes being 27 inches, and when by using the "drop" arrangement, in connection with the plain setting, it then is possible to make the full width of the repeat equal to twice the width of the carpet in the roll, *i. e.*, the repeat of the pattern to be ($27 \times 2 =$) 54 inches wide on the floor.

It will be readily understood, that these patterns, when viewed on the roll, *i. e.*, single breadth, do not show the repeat width ways, although they show it length ways in one roll. To see the full repeat, it then is required that two breadths of the carpets are laid side by side on the floor and properly matched, or what is better yet, put four breadths side by side on the floor and you will then have two repeats of the pattern before you. As will be readily understood, this drop plan of the plain setting only refers to carpet designing, *i. e.*, fabrics with one repeat to the width of the fabric in the loom, and where then, by means of the drop pattern, the repeat is extended to twice the dimension, width ways; it has nothing whatever to do with jacquard designing for dress goods, cloakings, table covers, etc., etc., and where more than one repeat of the pattern, side by side, is produced on the loom.

(*To be continued.*)

A Novel Under-screen for Carding Engines.

The new device has for its object to provide means for extracting any foreign substances still adhering to the wool or cotton fibres during the carding process.

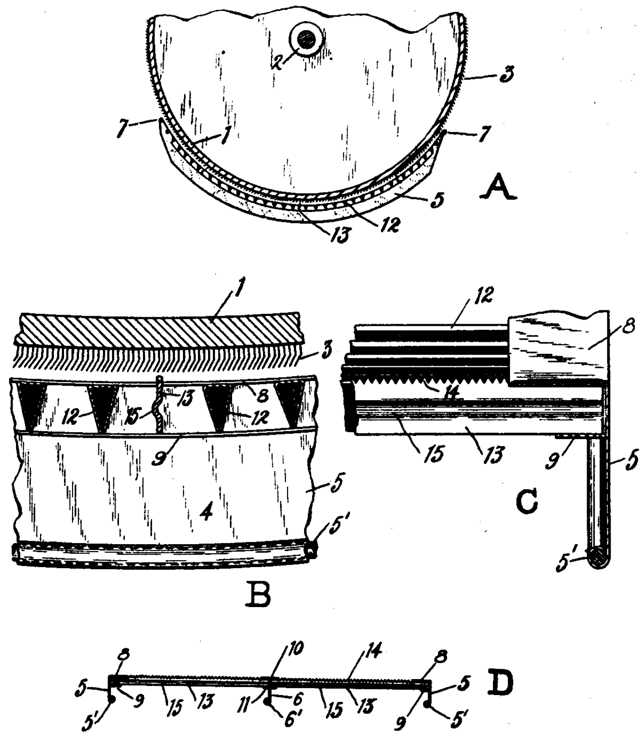
Illustrations: Diagram *A* is a longitudinal section of the new screen showing its relative position beneath the main cylinder of the carding engine. Diagram *B* is an enlarged (compared to diagram *A*) longitudinal sectional view of a portion of the screen and card-cylinder. Diagram *C* is an enlarged (compared to diagram *A*) perspective view of a portion of the screen, and diagram *D* a transverse section of the screen showing the manner of securing the bars in place.

Description of the Construction: Numerals of reference accompanying the illustrations indicate thus: 1 a portion of the main cylinder, revolving on axis 2 and being provided with card-clothing 3. Located beneath cylinder 1 is the under-screen 4, made of tinned sheet-iron and having the side walls 5 and the central partition 6, the edges of which are spun over the stiffening wires 5^1 and 6^1 and joined at each end by wire rods 7. The side walls 5 are provided with inwardly extending brackets 8 and 9, and the central partition 6 is provided with similar brackets 10 and 11, extending laterally from each side thereof and in line with the brackets 8 and 9 respectively, as shown in diagram *D*. Extending transversely across from each side of the central partition 6 to the side walls 5, are a series of triangular bars 12, having their end portions mounted and soldered thereto between the brackets 8 and 9, and 10 and 11, respectively.

The triangular bars 12 are arranged in the arc of a circle, parallel with the periphery of the card-cylinder, with their base portions uppermost and their apexes extending downward, as shown in diagram *B*. Such of the bars 12 as located in the central portion of the screen, are constructed in cross section in the form of isosceles triangles, as shown in diagram *B*, while as said bars approach the end portions of the screen, the form of the triangle is gradually changed to a right angle triangle, as shown in diagram *A*. These bars in the end portions of the screen are arranged with their right angular sides facing the central portion of the screen, the other side being inclined toward said central portion.

With this construction and arrangement of the bars, the dirt and foreign substances which are removed from the fibres, will fall through the openings between the bars and will engage the inclined sides of the bars and be directed downward away from said bars, thereby obviating the liability of the openings between said bars becoming choked or clogged.

Extending transversely across the screen 4, between the triangular bars 12, are three flat bars 13, one in the



centre and one adjacent each end of said screen, as shown in diagram *A*. Bars 13 are mounted upon their edges in line with the radius of the main cylinder of the carding engine, and are secured at their ends between the brackets 8 and 9 and 10 and 11, in the same manner as the triangular bars 12. Said bars 13 are constructed and arranged so that their upper edges extend above the bars 12 and in close proximity to the periphery of the card-cylinder, as shown in diagram *B*, the upper edges being provided with a series of teeth 14, as shown in diagram *C*. To strengthen the bars 13, they are provided with a corrugation 15 extending the entire length thereof, as shown in diagrams *B* and *C*.

With this construction a very efficient screen is produced, the triangular bars 12 serving to shake out the dirt and the flat bars 13 extracting any foreign substances from the fibres which will not be shaken out by the bars 12.

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

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

NOTICE: Payment for subscriptions must be made only direct to this office.

The Aim of the Journal.

From the outset the aim of THE JOURNAL has been to produce nothing but interesting, educational as well as practical articles.

"Nothing is good enough for our subscribers" has been our motto from the start, and to it we will adhere—whatever the consequence. To produce a journal that will be read and preserved for future reference, when in need of information, will be our continual aim.

To New Subscribers.

In presenting the December issue of THE JOURNAL, we are compelled to announce that no back numbers of the October or the November issue can be furnished, the demand for them having been far in excess of what we expected it to be.—*H. Nelson Craig,* Circulation Manager.

Loom Fixing.

Special attention is called to the series of articles on this subject written for the journal by Mr. E. P. Woodward, Master Weaver, a well known authority on this subject on account of his former connection with the Crompton & Knowles Loom Works.

Silk Weaving and Manufacturing

will form the basis of a series of articles beginning with the January number. The same is written by a practical man—Mr. Frank S. Hemingway—now connected with one of our most prominent silk mills in Pennsylvania.

Dictionary of Textile Terms.

Beginning with this number we start the regular serial issue of this important work of the textile industry, beginning with letter A. We have tried to quote every word of importance, still one or more may have escaped our notice, for which reason we will be pleased to have our readers co-operate with us in compiling the first authentic and most complete Dictionary of Textile Terms ever issued, by calling our attention to any word omitted by us.

Dictionary of Weaves.

With this issue we close our collection of 8-harness weaves with 20 specimens. In our October issue we quoted 56 and in our November issue 184 specimens of these 8-harness weaves or a grand total of 260 weaves designed for 8-harness. As will be readily understood, a great many more could have been given, but the collection would have lost its value to the reader, since weaves would have been produced of no value. The collection given will answer any practical purpose, whether needed for cotton, wool, worsted or silk work; for harness or jacquard fabrics.

Advantages of Concrete Construction for Textile Mills.

We call our readers' attention to the article by our Mr. L. Feldstein, B. S., in the present issue. The same will, without doubt, meet with the approval of our readers, being written to the point; *"highly interesting,"* as the local manager of the largest concrete construction concern, who read the article previous to its publication, expressed himself.

Questions and Answers.

As will be readily understood, during the past three months of our existence, we have been more or less overrun with technical questions. These questions until now have been all answered by personal letters, no matter what trouble or expenses to us.

Beginning with the new year, all such questions, provided of any merit or value to our subscribers, will only be answered through the columns of THE JOURNAL.

DICTIONARY OF TECHNICAL TERMS RELATING TO THE TEXTILE INDUSTRY.

A

AAL:—The name of an East Indian shrub, of the madder family from which a red dye, of the same name is obtained.

ABA or ABBA:—A coarse fabric, woven in Syria from hair or wool. As a rule, stripe effects in black and white or blue and white are produced,. again more elaborate patterns are met with.

ABACA or ABAKA, also known as Manila Hemp:—The fibres of the leaf stalks of a plantain or banana, a native plant of the Indian Archipelago, and extensively cultivated in the Philippine Islands. In India the inner fibres of the leaf stalks are used in the manufacture of delicate fabrics, whereas the outer fibres are used in the manufacture of hats, hammocks, matting, cordage and canvas, the well known Manila hats being one of the better class of these products.

ABB:—A former English term for warp yarn; also an English term used in wool sorting, denoting the eighth quality, between seconds and livery.

ACCORDION PLAITING:—Fine single plaits done on a machine and steamed and dried into shape. Used on fine soft silk and woolen goods for vests, waists, sleeves and skirts.

ACETIC ACID:—A clear colorless liquid, with a strong odor of vinegar. Its salts are known as acetates and are used to a large extent as mordants.

ACID:—A liquid with a sour taste. Acids turn blue litmus paper red, and neutralize alkalis.

ADRAS:—A lustrous, usually striped, fabric made in central Asia, of silk and cotton. The gloss of the fabric is heightened by beating it with a broad, flat wooden instrument.

AEROPHANE:—A name given to a thin, more or less transparent fabric, made in imitation of lace fabrics.

AFGAN STITCH:—A stitch made by hand with a long needle of uniform diameter. All the stitches of a row are taken up in turn and held by the needle until crocheting them off again. Generally two at a time are taken off so as to keep the same side of the fabric up.

ALKALI:—A liquid with a caustic taste; its presence can be ascertained by means of red litmus paper, which it turns blue. An alkali is a combination of a metal with oxygen and hydrogen, which is soluble in water.

ALADJA:—The name applied to a blue and white striped cotton fabric made in Greece and Turkey.

ALAGAI:—The name of a fabric made of silk and cotton in Russia and Turkey.

ALAMODE:—A thin, light, glossy black silk fabric, made first in the 17th century in France and England; then used chiefly for women's hoods and men's mourning scarfs.

ALATCHA:—A cotton fabric made in central Asia, being similar in construction to Aladja.

ALBERT CLOTH:—A double-face fabric, both sides of which are of a different color and each finished so that no lining is necessary, also called reversible; used chiefly for overcoats.

ALIZARIN or ALIZARINE:—The red coloring matter formerly extracted from the root of the madder plant, now manufactured from coal-tar products, being an orange-red crystalline coloring compound, used for dyeing cotton, wool and silk in different shades of red.

ALIZARIN BLUE or ANTHRACENE BLUE:—A coal-tar color, appearing in commerce as a dark violet paste, used in wool dyeing and calico printing in place of indigo.

ALKALI BLUE:—A coal-tar product used for dyeing wool and silk bright blue shades. It cannot be used for dyeing cotton, since it does not combine with acid mordants.

ALKALI-STIFF:—A stiffening compound employed in the manufacture of the cheaper grades of hats. It is made of three pounds of shellac, dissolved with six ounces of sal soda in one gallon of water.

ALLEJA:—A silken fabric made in Turkestan, being interlaced with weaves producing wavy lines in the cloth.

ALPACO or PACO or ALPACA:—One of the four species of Llama or Peruvian sheep. Its color is generally black, though frequently variegated with brown and white. The wool is long, soft, silky, and extremely valuable. The hair of the Alpaca, if shorn each year, is about eight inches long, but if allowed to grow will attain a length of from twenty to thirty inches. It is less curly than sheep's wool, but fine and strong in proportion to its diameter, and is used either wholly or in part for producing the yarn for some of the finest dress goods (Alpacas), coatings, coat linings, umbrella coverings, as well as the face of overcoatings (Montagnacs, etc.). The commonly met with alpaca cloth is made of cotton warp and either alpaca or alpaca and wool mixed filling.

ALUM:—A compound salt of aluminum sulphate with a sulphate either of soda, potash or ammonia. It is used to a large extent as a mordant.

AMAN:—A blue cotton cloth made in the Levant, chiefly at Aleppo.

AMERICAN CLOTH:—The English term for enameled cloth; a cotton cloth prepared with a glazed or varnished surface in imitation of morocco leather.

AMMONIA:—A volatile alkali, one of the best cleansing agents for wool fibres and fabrics. Its use for this purpose would be more extensive if it was not for its expensiveness.

ANABASSE:—A coarse blanketing used in African trade.

ANDAZE:—A Turkish cloth measure, equal to 27 inches.

ANGORA:—The hair or wool of the Angora goat, an animal somewhat smaller than the common goat. It is a native to the district surrounding Angora in Asia Minor, but now raised extensively in the Cape Colony, also to some extent in this country. Angora in the fleece is of remarkable fineness and of a very pure white, and hangs on the animal in long spiral curls. The average length of the hair is from six to eight inches, but even if called hair it is actually wool, possessing a curly structure with a fine development of the epidermal scales and a bright, metallic lustre. From five to seven pounds of wool is yielded by each fleece. It is manufactured by the inhabitants of Asia Minor into shawls and other fabrics, which are greatly esteemed in Turkey, the shawls particularly equalling those of cashmere. Angora is made up into plushes, imitations of silk velvet, dressgoods, trimmings, etc.

ANGLOA CLOTH:—A figured cotton cloth having a fine rough surface resembling somewhat momie cloth. It is generally of a cream color and is principally used for embroidery.

ANTHRACAEMIA:—Is better known as Wool Sorters' disease.

ANILINE:—A colorless oily compound, the base from which many coal-tar dyes are made. Aniline originally was obtained in the distillation of indigo, but is now chiefly made from nitrobenzene or oil of myrbane.

ANTICHLOR:—Any agent for removing the last traces of chlorine from goods after bleaching.

ANTIMONIUM:—A modern antimony mordant, which can be used in place of tartar emetic.

ANTI-SNARLING MOTION, or HASTENING MOTION:—A device of the mule; the same is actuated from the copping motion, and slightly increases the speed of the spindles at the end of the draw. If a snarl is formed, this motion will throw the snarl onto the spindle point, when it will be taken off by the drag.

APPLIQUE:—Applied or laid on, as for example, lace applique upon a ground fabric, as made of other material.

Arbaccio:—A coarse fabric made in southern Italy from the wool of the Nuoro sheep.

Ardash:—The European or Leventine name for a lower grade of Persian raw silk, called shirwan in Persia.

Ardassine:—The finer grade of Persian silk, also called ablaque.

Argentan:—A type of a French point-lace.

Argentilla:—A Genoese type of a lace.

Argol:—A white, purple or reddish powder, which deposits out upon the sides of the barrel when fresh grape juice is allowed to ferment. When purified it is known as *cream of tartar*, which is used in connection with bichromate of potash or soda as a mordant in wool and skin dyeing.

Armiak:—A garment made of camel's hair and worn by the Tartars.

Armure-laine:—A heavy ribbed or corded silk face fabric, interlaced with a warp rib weave, the filling resting in the interior of the structure.

Army Cloth:—Cloth of any description used in the manufacture of soldiers' uniforms.

Army Worm:—An enemy to the cotton plant; its name is derived from the feature that it comes with its companions as an invading host, marching from field to field, and devouring every leaf of the cotton plant, and even attacking the bolls.

Arras:—A tapestry fabric originally made in Arras, France; usually woven with colored figures or scenes and used for draping the walls of rooms.

Arrasene:—A cord or thread made of wool or silk, closely resembling chenille, used for embroidery.

Arsenate of Soda:—Is used in calico printing as a dung substitute, in clearing the cloth after mordanting, so as to remove any excess of unfixed mordant.

Artificial Silk:—is made by dissolving nitrocellulose in a mixture of acetic acid, acetone and amyl alcohol. This solution is forced through capillary tubes. When the solution evaporates a thin silky thread is left, known as artificial silk.

Astrachan:—A rough fabric with a long and closely curled pile, in imitation of the fur as obtained from the pelts of young lambs in Astrakhan in European Russia.

Atlas:—The German word for satin. A silk fabric interlaced with (Atlas) satin weaves.

Aubusson Tapestry:—Tapestry made originally at the former royal factory at Aubusson, France; now made extensively in the city of Aubusson for draperies.

Auramin or Auramine:—A coal-tar dye used for dyeing wool, cotton and silk in yellow shades.

Aurantia:—A coal-tar product used in dyeing wool and silk in orange shades.

Aureosin:—A coal-tar product used for dyeing cotton, wool and silk a light rose with greenish-yellow reflection.

Aurin or Aurine:—A coal-tar product used for printing cotton and woolens in orange-red shades. Owing to its fugitiveness it is seldom used in dyeing.

Axminster Carpet:—A variety of Turkish carpet made with a flax or jute warp and a woolen or worsted filling formed into a pile. It derives its name from the town of Axminster in England, where it was first manufactured.

Azarin:—A coal-tar product of the azo-group used in dyeing cotton a brilliant red, inclining to a crimson.

Azo-Blue:—A dark blue powder, soluble in water; used for dyeing cotton. It is a coal-tar product, and fast to soaps and acids.

Azo-Dyes:—A group of the coal-tar colors, which contain nitrogen as a necessary constituent.

Azulin:—A coloring matter produced by heating aniline with corallin, formerly a blue dye.

Azurin:—A blue-black color, produced on fabrics printed with aniline black, by the application of ammonia.

B

Back Cloth:—A reinforcing cloth used in calico printing, to support a fabric while it is being printed.

Backed Cloth:—This name applies to fabrics which in addition to the face fabric, bears bound underneath a layer either of extra filling, extra warp, or another cloth.

Backing:—The filling, which produces by interlacing with warp threads the lower or back structure in a heavy weight woolen or worsted fabric.

Backing-off Chain:—The same is provided to a mule for the purpose of pulling the winding-faller wire down to its proper place during the backing-off of the carriage.

Backing-off Friction:—A device of a mule provided for the purpose of revolving the rim shaft, and thereby the tin rollers and spindles the reverse way, during the backing-off of the carriage.

Backstitch:—A name given to a stitch which is made by carrying the thread half way back the length of the preceding stitch.

Backwashing and Gilling:—Two operations practiced in connection with worsted spinning, which free the wool (which enters the machine in the shape of a sliver) from oil (as previously added to facilitate carding) and discoloration, and dampens, draws, and straightens the fibres in the sliver previous to combing.

Backwind:—To unravel a knitted fabric and wind up the resulting yarn into convenient form for re-using.

Bactrian or Asiatic Camel:—The long hair of this animal, mixed with wool, or wool and cotton, is spun into the yarn used for the long, hairy backs in cloakings, overcoatings, etc.

Baft or Bafta:—A coarse cheap cotton fabric, originally made in the East, but now made in England for the African trade.

Bagging:—A coarse fabric of hemp or jute, out of which bags are made; also used for covering bales and for similar purposes.

Baize:—A coarse colored napped woolen lining, most frequently met with in scarlet or green colors, also used for table covers, draperies, etc.; formerly made in finer texture for clothing.

Balastre:—A fine gold cloth made in Vienna.

Balayense:—The inside protection strip at the bottom of a dress.

Balbriggan:—A term now used as applying to all classes of light-weight, flat underwear made of Egyptian cotton or yarn dyed to resemble its color. Originally, the term was first applied to a style of full-fashioned hose made in Balbriggan, Ireland; later, it was also used in connection with knit underwear, both being made from unbleached cotton yarn.

Baline:—A coarse canvas made for packing purposes.

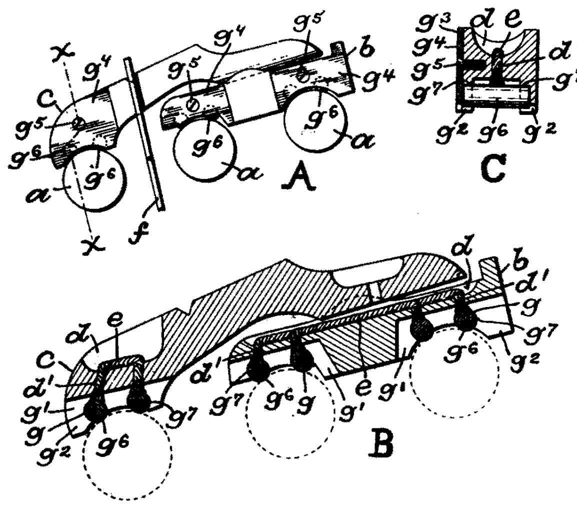
Baling Press:—A power press, screw or hydraulic, employed for compressing raw cotton, as well as yarns and fabrics in all their varieties into bales handy for transportation.

Balling or Top Making:—The slivers produced by combing are put up at the back of a can finisher to further straighten out its fibres. The slivers when leaving the machine collect together again in sliver cans, which are then put up at the back of a balling finisher, a common gill-box, in which the sliver, after its passage through the machine, is wound on a ball by a suitable attachment in front. In some mills the combed sliver is wound directly upon large bobbins in place of these balls, which process results in keeping them smoother.

(*To be continued.*)

An Improvement in the Bearings of Top Roll Saddles for Ring Frames.

It is well known that top roll saddles of ring frames, constructed with straight or parallel bearings, create considerable friction on the journals of the top rolls and consequently are the cause for an excess waste of power required to run the top rolls of a ring frame, besides requiring the use of more oil in lubricating the bearings of the top roll saddles than would be necessary



if this excess in friction is overcome. To do this, *i. e.*, to eliminate friction as near as possible, between the journals on the top rolls and the bearings of the top roll saddles, and thereby increasing the life of the saddles, is the object of a new top roll saddle of the Dixon Lubricating Saddle Co., of Bristol, R. I. The new construction at the same time will also reduce the amount of oil required to lubricate the bearings of top roll saddles, thereby reducing the cost of lubricating the same.

The Gist of the Improvement: The new saddle has roller bearings bearing on the journal of the top roll, thus practically eliminating friction between the journal of the top roll and the bearing of the top roll saddle.

Illustrations: In order to be able to more thoroughly explain to the reader the construction and operation of the new saddle, the accompanying three illustrations are given, and of which diagram *A* is a side view of the front and back top roll saddles provided with improved anti-friction or roller-bearings and showing the same in their operative position on the journals of the top rolls of a ring frame. Diagram *B* is a somewhat enlarged sectional view, if compared to diagram *A*, taken lengthwise through the front and back top roll saddles, showing the means for oiling the roller bearings. Diagram *C* is a transverse sectional view through the front top roll saddle, taken on line *X-X* of diagram *A* (shown for sake of clearness enlarged), showing the construction of the roller bearing in the same.

Description of the Construction: Letters of reference accompanying the illustrations indicate thus: *a* the journals of the top rolls, *b* the back saddle, *c* the front saddle, *d* oil grooves in the front and back saddles, *e* oil wicks in the oil grooves, *f* the stirrup strap and *g* the roller bearings of front and back top roll saddles.

The back and front saddles *b* and *c* each have holes d^1 for the wicks *e*, leading from the grooves *d* to the cavities g^1 formed in the underside of the saddles, as shown in diagram *B*. The lower edges of the side walls g^2 of both saddles conform in their shape to the journals *a* of the top rolls. The saddles have the outer countersunk portions g^3 for the plates g^4, which conform in their shape to the contour of the saddles and are secured to the saddles in the countersunk portions g^3 by the screws g^5, as shown in diagrams *A* and *C*. Rolls g^6 are rotatably secured in the bearings g^7 formed in the side walls g^2, by boring two holes through the countersunk side wall g^2 and partly through the opposite side wall g^2. The bearings g^7 thus formed, intersect the lower edge of the side walls g^2, allowing the rolls g^6 when secured in the bearings g^7 by the plate g^4 to project slightly through the lower edge of the side walls g^2, as shown in diagram *C*. The ends of the wicks *e* project through the holes d^1 onto the rolls g^6 for lubricating the same.

On the ring frame, these wicks *e* are oiled by the operator in the usual way, and when the wicks leading to the roller bearings *g* lubricate the bearings for a longer period with one oiling than has heretofore been done, the roller bearings *g* at the same time eliminating friction between the journals of the top rolls and the bearing of the top roll saddles, with the consequence of reducing the power required to run the top rolls.

Silk Substitutes.

Mr. Edward Lodge in a very interesting paper read before the Huddersfield Technical College Textile Society divides these substitutes into two main groups, viz:

(1.) Attempt to improve the lustre of natural fibres.

(2.) To build up or synthesise an entirely new artificial fibre.

(1.) To improve the lustre of natural fibres. Amongst these may be cited the suggestions of Hoseman (1881), who proposed to take advantage of the well-known property possessed by silk of dissolving in caustic alkalies and forming a solution from which the silk substance is precipitated by the addition of an acid. Hoseman's plan was to cause cotton threads to pass through a caustic—silk—solution in such a manner that they became thoroughly saturated. After wringing out excess of liquor, he passes the cotton through a diluted solution of sulphuric or phosphoric acid, which causes a precipitation of the silk substance, and thus coats the fibre with a film of silk.

Brodbeck (1890) reverses Hoseman's process by passing the cotton through diluted sulphuric or phosphoric acid, and then through a caustic-soda solution of silk. Brodbeck patented an alternative process, in which he first treats the cotton with an ammoniacal solution of copper or nickel oxide, squeezes out excess, then enters the cotton into a bath containing a solution of silk dissolved in hydrochloric, sulphuric, or phosphoric acids.

Unguad (1898) proposes to saturate the cotton fibre with a caustic-soda solution of silk waste, and to precipitate the silk substance in an insoluble form by means of carbonic-acid gas or a solution of bicarbonate of soda.

Lewis Aubert (1883) attempts the lustring of cotton (1) by a treatment with caustic soda at 18.2° Tw., from which solution the cotton is squeezed, and then (2) treated with hydrochloric acid, 9° Tw., washing, and (3) bleaching the cotton with sodium hydrochlorite; (4) treating with a bath of glucose standing at 12° Tw., and drying; (5) working the cotton in a concentrated mixture of nitric and sulphuric acids, which is said to convert the glucose into nitro-saccharose and the cotton into bi-nitro-cellulose; after rinsing, the cotton is then (6) treated with a soap solution, and finally (7) worked in a solution of tannic acid.

Later (1896) Dr. Knecht proposes to dissolve wool or silk by means of barium hydrate, precipitating the barium by means of carbon-dioxide, adding to the silk solution so obtained 10 per cent. of formaldehyde, padding the cotton goods in this material, and steaming under pressure (15 lb.) for half-an-hour, and lastly, washing.

None of these methods has received industrial application, as the degree of lustre obtained does not warrant the expense of the process. It is interesting to note that the processes of Hoseman, Brodbeck, Unguad, and Knecht result in the "animalising" of the vegetable fibres. It was hoped that these processes of depositing a coating of animal matter (wool may be used in place of silk) on the vegetable fibres would sufficiently change their nature in the direction of animal fibre as to enable the "animalised" fibre and wool or silk to be dyed and worked up together in the same way as all-wool or all-silk goods. These hopes have not been industrially realized.

The one successful method which has accomplished the modification of the cotton fibre, so as to increase lustre, is that due in the first instance to John Mercer, and perfected chiefly by Lowe, and Thomas, and Prevost. I allude to the process known as mercerising. This process is based upon the fact that when cotton is steeped in cold concentrated caustic soda the cotton fibre loses its twisted tape-like structure, becoming rounded and semi-transparent, and when immersed whilst under tension a high degree of lustre is developed, especially in the case of the long-staple Sea Island and Egyptian cottons. This process is now very largely practised, although the lustre is not equal to the lustre of the finest silk, or of some of the so-called artificial silks.

(2) Artificial silk. It is under the second class that success has been achieved in the manufacture of a fibre having lustre equal to and even surpassing the beautiful lustre of natural silk. The idea of producing an artificial fibre appears to be due to Reaumur, so far back as 1734, and to have lain forgotten for over 100 years, when Andemars, of Lausanne, in 1855 obtained letters patent for the production of artificial silk. According to Andemars' patent, he reduces the young branches of the mulberry tree to a paste, bleaches and purifies the paste, and finally transforms it into an explosive substance (probably nitro-cellulose), which he dissolves in a mixture of alcohol and ether, and to which he adds some rubber solution. The thread was then spun from the viscous fluid by means of a simple point of steel, which was dipped into the mixture and then drawn out. The point drew the viscous thread, which rapidly dried, and was at once wound on to a bobbin. The idea did not prove practicable on any scale. The search for a suitable filament for the electric incandescent lamp led Sir William Crooks, Weston, Swan, Swinburne, and Wynne and Powell to experiment on lines laid down by Andemars. They conceived the possibility of manufacturing an artificial filament for incandescent lamps from a body known as cellulose-nitrate impregnated with rare earths. The researches of these investigators prepared the way for the more successful work of Count H. de Chardonnet (1885).

According to published accounts, Chardonnet finds the most suitable strength of acid to be a mixture of 15 parts of nitric acid 1.52 sp. gr., and 85 parts of sulphuric acid 1.84 sp. gr. He steeps one part of cellulose in nine parts of this mixture for about six hours; the cotton is then freed from excess of acid, thoroughly washed with water, and finally subjected to hydraulic pressure. The pyroxyline so formed is pressed to such a degree that 36 per cent. of moisture is left in the mass. At this stage it is introduced into a slowly revolving horizontal tin-lined drum, in which it is treated with a mixture of equal parts of 95 per cent. alcohol and ether, 100 parts of this mixture to 22 parts of cellulose nitrate. The solution is complete in 15 to 20 hours. The liquid so obtained is filtered through cotton wool, a pressure of 30 to 60 atmospheres being necessary for this purpose. Lehner has since shown that the addition of a small per cent. of H_2SO_4 causes the viscous fluid to flow under much less pressure. After storing for some time it is introduced into the spinning apparatus, which consists of a stout reservoir, from which the viscous fluid is forced, by continuous air pressure, through a vertical tube, terminating in a glass or platinum nozzle with an opening 0.1 to 0.2mm. in diameter, and an edge not thicker than 0.1mm. The viscous thread produced is immediately dried in a current of air at a temperature of 45° C., or coagulated by water or a 0.5 per cent. solution of nitric acid. The artificial fibre is then successively treated with solutions of Na_2CO_3, bisulphite of soda, albumen, phenol, or a salt of alumina or mercury. Dry spinning is now said to be the rule, the solvent rapidly evaporating as soon as the fibre reaches the air. Several fibres are spun together to form a thread. At this stage the threads are very inflammable, and even explosive; they have therefore to be denitrated. This is accomplished by passing through ammonium sulphide or some other reducing agent, which removes the nitric oxide radicles and substitutes hydrogen, thus regenerating the original cellulose, which is not more inflammable than ordinary cotton.

The cost of this product is said to be not more than 50 per cent. that of natural silk. Its tensile strength is variously stated at from 50 to 80 per cent. of boiled china-silk. It absorbs about 16 per cent. of moisture as compared with natural silk 11 per cent. Chardonnet silk is grey-white, possesses a high degree of lustre, is less soft to the handle than silk, and is without "scroop."

The diameter of thread varies from 0.001 to 0.04mm. Under the microscope it appears as a thread of irregular thickness, generally a little flattened, and resembles Tussah silk in the presence of longitudinal striation.

Lehner's Silk (1900) is manufactured by a process similar to Chardonnet's. He, however, uses as his solvent for the cellulose nitrate a mixture of methyl alcohol, ether and ethyl sulphate; the strength of the solution being equal to 8 per cent. of cellulose nitrate. In one of his patents he claims the use of a mixture of five parts of cellulose nitrate and one part of silk substance, which he obtains from silk waste by dissolving in ammonium copper oxide, and afterwards neutralises and precipitates with acids, washing with water and re-dissolving in concentrated acetic acid. The spinning is carried out by causing the fluid to flow through fine orifices into water, turpentine, petroleum, carbon, disulphide, or chloroform, which cause the fibre substance to congeal to an insoluble fibre. Denitration of the fibre is carried out by treatment with a diluted solution of nitrate of soda. In lustre it is equal to Chardonnet's. In strength, elasticity, and color it closely approximates to Chardonnet silk.

Du Viviers Silk (1888) claims the use of three solutions:—(1.) 7 per cent. solution of tri-cellulose nitrate dissolved in glacial acetic acid (eight parts). (2.) 12.5 per cent. solution of gutta-percha dissolved in carbon di-sulphide (one part). (3.) 5 per cent. solution of isinglass in glacial acetic acid (two parts). These bodies are well kneaded together with the further addition of small quantities of glycerine and castor oil. The spinning is carried out in an apparatus similar to that employed by other makers, being delivered into a solution of caustic soda, and after washing in water, passed through dilute acetic acid. The threads are then successively treated with albumen, mercury chloride, and CO_2 gas. The fibre is brittle, but beautifully white.

Many years ago John Mercer discovered that cellulose would dissolve in a strong solution of copper oxide in ammonia (cuprammonium), forming an extremely viscous fluid, which, when allowed to dry in thin layers, produced an insoluble film of considerable tenacity. It is colored green owing to the presence of copper. This observation has proved to be of great technical importance, notably in the production of the "Willesden paper," and for waterproofing canvas for tents and sails, pickling cordage, etc.

When this substance is treated with an acid, the cellulose is set free in a pure white condition, the acid binding the copper. After many attempts by several investigators, Pauly (1897) and others have succeeded in producing one of the most perfect of artificial fibres, which has been put on the market under the name of "Glanzstoff."

The solution of copper can be prepared in several ways. For example: Copper turnings are treated with ammonia in presence of lactic acid at a temperature of 4 to 6° C. At the end of about ten days the intense blue solution of copper oxide is sufficiently concentrated for use.

Preparation of the cellulose solution: 100 parts of cellulose are mixed with 1000 parts of a solution containing 30 parts of sodium carbonate and 50 parts of caustic soda, and warmed in a closed vessel for 3½ hours under a pressure of about 2½ atmospheres. The mercerised cellulose thus obtained is washed, dried, and bleached by chloride of lime, and again washed and dried. Seven to eight parts are now mixed in a machine with the copper solution. The cellulose slowly dissolves, the end reaction being determined when 4 to 5cc. run from a flask form a continuous thread. The spinning is done through capillary tubes, 0.2mm. in diameter, a pressure of 2 to 4 atmospheres being required to force it through the orifices. The viscous fluid is coagulated by passing through a bath containing 30 to 65 per cent. of sulphuric acid. The threads are then well washed and soaped.

As regards lustre, tenacity, and elasticity, this fibre is equal to Chardonnet's fibre; it also possesses the lustre of genuine silk. This process would indicate that the silk would be cheaper than Chardonnet or Lehner's silk. Pauly's silk is more uniform in structure than Chardonnet silk. As compared with genuine silk, the strength is: Silk, 100; Pauly silk, 56.

Viscose (1892); *Stearn Fibre* (1898).—These splendid examples of artificial fibre owe their origin to a most important and interesting discovery by Messrs. Cross, Bevan and Beadle. They found that when cellulose is treated with (1) a concentrated solution of caustic soda, and whilst still saturated with the soda (2) treated with carbon disulphide, and after some time with (3) water, a compound is formed soluble in water to an extremely viscous fluid, a substance which has received many technical applications, under the name of "Viscose." Messrs. Cross, Bevan and Beadle and Dr. Stearn have succeeded in producing from "Viscose" one of the best and cheapest synthetic fibres. Viscose is of an unstable character, decomposing either spontaneously on standing or heating, or on treatment with ammonia salts, acids, or metallic salts. The decomposition results in the regeneration of the original constituents—that is, carbon disulphide, caustic soda, and cellulose, the latter when in the form of film or filament being left in a highly lustrous condition.

Cross, Bevan and Beadle obtained their alkali-cellulose by impregnating cotton with 15 per cent. of caustic soda containing 12 per cent. Na_2O, and pressing until it contains 40 to 50 per cent. of its weight of soda. This is then treated with 30 to 40 per cent. of carbon disulphide in a closed vessel and with constant stirring for five or six hours, and finally adding water. The "Viscose" is purified to free it from brown substances, which would, if allowed to remain, spoil the color of the fibres manufactured from it. After a purification, the "Viscose" is forced by air pressure through fine capillary orifices into solutions of ammonium chloride or dilute sulphuric acid to coagulate the fibre.

Cellestron Silk.—Artificial fibre from cellulose-acetate. If cellulose be treated for 24 hours with sulphuric acid at 103° Tw. strength, then freed from acid by thorough washing, it is found to be very tender, and breaks on rubbing. This modification of cellulose is called hydrocellulose. When this product is treated with a mixture of acetic anhydride and conc. H_2SO_4, and at a temperature between 45° and 70° C., some of the hydrogens of the cellulose are replaced by the acetyl group. This compound is very viscous, and when spun in a similar manner to that adopted for other artificial fibres, a fibre of remarkable brilliancy is obtained. The threads obtained in this way have this advantage over the other fibre, that they are not inflammable. The silk cannot be readily dyed, but can be colored by adding the color to the pulp before spinning. This silk is much used in America for covering electric wires, and is known as cellestron silk.

Fibres can be obtained by dissolving cellulose in zinc chloride. The threads are, however, weak. This fibre is principally employed for the manufacture of filaments for electric lamps.

Silk-like fibres have been obtained by the Vereinigte Kunstseid-fabriken, of Frankfurt, by spinning a solution of acid cellulose in caustic soda, and precipitating the thread as it comes from the capillaries by means of an acid. The cellulose is first treated with sulphuric acid, sp. gr. 1.55 (10 cellulose, 100 acid), thrown into water, well washed to free it from acid, and then dissolved in caustic soda (100 parts) density 11.2.

Vanduara Silk (Millar, 1899).—This fibre was introduced by A. Millar, of Glasgow, and is produced from gelatine. He describes his process as follows: 4 lb. of the best gelatine is broken up into granular pieces, such as will pass through a riddle, 16 meshes to the square inch. This is added to the melting pot with 2 lb. of pure cold water, well stirred, covered over, and allowed to stand one hour. The vessel is next placed in hot water, temperature 120° F., for another hour, stirring once or twice. At the end of the second hour a solution of gelatine of uniform consistency, and containing 66 per cent. of gelatine, is obtained. The solution is now drawn into fine filaments. The apparatus consists of a brass cylinder enclosed by a hot-water jacket. The cylinder is furnished with a series of nipples or nozzles. The upper end of the cylinder is closed with an air-tight cover. After the solution has been poured into it, the gelatine exudes from the nipples of thin thread-like streams, and these are received on traveling bands of considerable length. The filaments are very thin, and dry in less than 30 seconds. They are taken off the bands and reeled on to a bobbin before the band has made its complete circuit. The group of filaments are next twisted together and spread out in a thin layer on an open reel, about one foot in diameter. These are now placed in a chamber in which a small quantity of formaldehyde has been poured, and is therefore filled with formaldehyde vapor. An exposure to the vapor, at the ordinary temperature, completely changes the character of the gelatine. It is no longer soluble in water nor any ordinary solvent. The fibre so prepared has a splendid lustre. To obtain colored yarn, the color is mixed with the water before adding to the gelatine.

The nozzles have a bore of $\frac{1}{100}$ in., but the filament drawn from these can be $\frac{1}{100}$ in., the thickness being determined by the speed of the traveling band. Air pressure is used to force the liquid out of the nozzles. This silk is very lustrous, but of low tensile strength.

Attempts have been made to produce silk by using bichromate to render insoluble gelatine in place of formaldehyde.

Up to about a year ago artificial silks were not of sufficient strength and elasticity to stand weaving in the warp form. Dr. Thiele (Belgium) has, however, succeeded in producing a fibre which is said to be of equal elasticity to natural silk, and a strength equal to 80 per cent. that of the natural fibre, also of equal softness and covering power.

Artificial silks dye more readily than ordinary cellulose fibres; the temperature of the dye-bath should not be higher than 140° F.; for Chardonnet silks not higher than 90 to 100° F.

COTTON SPINNING.

RING SPINNING:—A General Description of the Modern Ring Frame—The Creel—Roll Stands—Weighting Rolls—Top Rolls—Bottom Rolls—Clearers—Care of Rolls and Roll Stands—Faulty Work of Rolls—Thread Boards—Rings—Ring Holders—Size of Ring to Use—Traveler Clearers—Setting Rings—Care of Rings—Finishing of Rings—Ring Travelers—The Action of the Traveler—How Travelers are Made—Weight of Travelers—Spindle Rails—Spindles—Setting Spindles—Lubrication of Spindles—Bobbins—Bobbin Clutches—Banding—Banding Machines—Band Tension Scale—Tin Cylinders—Ballooning and Separators—Winding—Builder Motions—The Warp Builder—How to Set the Builder Motion—The Filling Builder—Spinning Filling on Paper Tubes—The Combination Builder—The Care of Ring Rails and Lifter Rods—Some Causes for Badly Shaped Bobbins—Doffing.

NOTES:—Management of the Spinning Room—Data on Ring Frames—A new Spindle Drive Device—Care of Machines—Oiling—Leveling Frames—Power Tests—Power Consumption—Arrangement of Machinery.

FAULTY YARNS:—Knots and Bunches—Variations in Counts—Uneven Yarn—Thick and Thin Places—Weak Yarn—Kinky Yarn—Dirty Yarn—Kockled, Curled or Knotty Yarn—Slack Twisted Yarn—Hard Twisted Roving—Cut Yarn—Harsh or Wiry Yarn—Badly Wound Yarn—Bobbins Wound too Low—Soft Wound Bobbins—How to Prevent "Double"—Colored Work—Waste—Breaking Strength of Yarn.

CALCULATIONS:—A general Description on the Subject of Draft, Twist, Production and Gearing—Calculating the Draft from the Gearing—To find the Draft—To find a Constant—To ascertain Draft Change Gear—To Ascertain Hank Roving—To Ascertain Draft—Twist—Standard Twists—Contraction Due to Twist—Notes on Twist—Calculating Twist—To Ascertain Speed of Spindles—Calculating Twist from Gearing—Traverse Gear—Taper—Sizing the Counts—The Grading of Cotton Yarns, Single, Two or More Ply—Production—Programs for Spinning Yarns of Various Counts, from Bale to Spun Thread—Illustrations with Descriptive Matter of the Different Makes of Ring Frames.

The Ring Frame.

(*Continued from page 71.*)

Roll Stands. The drafting rolls and the roll stands of all the various styles of ring frames are pretty much alike, even when the frames are made by different builders, and where marked differences or variations exist these are mainly due to the peculiar specifications required by the mill ordering the machines. The principles, construction, etc., of the drafting rolls, stand, etc., of the ring frame are the same as the drafting rolls, etc., of the fly frame, and the reader is referred to the chapter on fly frames in Part 2 of this work, only that the mechanism in connection with the ring frame is constructed on a more delicate scale.

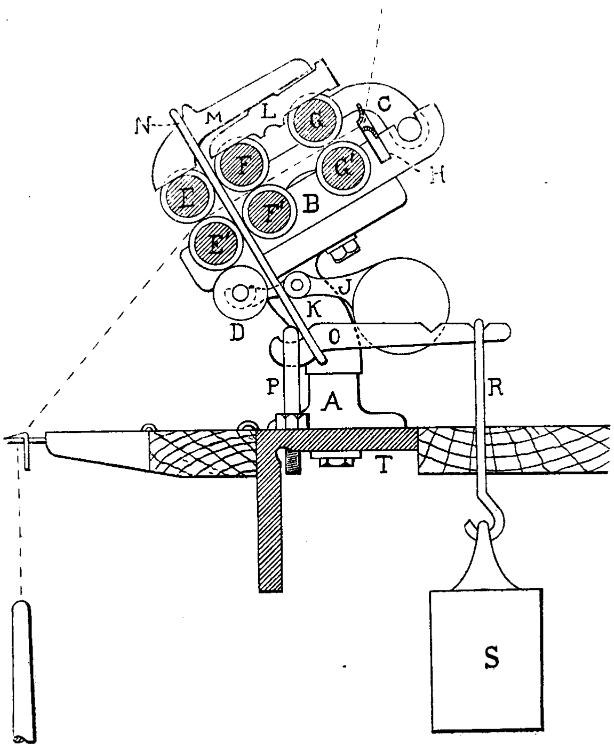


FIG. 230.

A sectional view of the side elevation of a roll stand and its system of weighting the top rolls is given in Fig. 230, where the various parts are shown lettered to correspond with the following description: The roll stand proper consists of the front stand *A* which is bolted to the thread board *T*, the slide *B* and the cap bars *C*. The front stand *A* carries the lower front roll *E'*, the slide *B* carries the lower middle roll *F'* and the lower back roll *G'*, whereas the cap bars *C* hold the three upper rolls *E, F* and *G* in place. The lower rolls are of steel, fluted and are carried in bearings set into the front stand and slide. The lower rolls alone receive power. The slide for the back rolls is made in one piece, and is generally made adjustable on the front roll stand by means of a nut. The distance between the back and middle rolls is not changed, but the middle roll may be set at any desired distance from the front roll, this setting of the rolls depending upon the principles set forth in connection with the drawing frame in Part 2 of this work, the distance between the two rolls being regulated by the length of the staple of the cotton used. The importance of properly setting the rolls on these machines cannot be too often, nor too strongly, emphasized. Scarcely any draft is put in between the middle and back rolls, the total draft on the machine being usually between 8 and 13.

The top rolls are always leather covered and are either solid or shell. They are supported at their ends by cap bars *C*, in the same way as explained in connection with the drawing frame. The front neb is adjustable by means of a screw. These cap bars hold the top rolls in their proper position. They are constructed so as to prevent the rolls from sliding backwards or forwards or endways, and are adjustable for different lengths of staples, and will also turn backwards out of the way when cleaning the rolls. Beneath the front bottom roll *E'* is a clearer roll or scavenger *D*, supported at each end by the weighted lever *J* pivoted at *K*. When the lever weighting system is used, the top rolls are held in contact with the bottom rolls by levers and weights, as shown here. The two back rolls *F* and *G* are surmounted by the back saddle *L* resting on the bearings of the rolls. Over said saddle is placed the front saddle *M*, resting on it and on the bearings of the front roll *E*. Over this saddle *M* fits a downward hanging stirrup *N*, connected with the lever *O*, at the end of which is suspended the weight *S* by means of the weight hook *R*. This lever *O* is usually notched, so that by suspending the weight from one or another of the notches, the desired weighting may be obtained. The fulcrum of this lever is at the lever screw *P*, which is fastened to the thread board *T*. The system of self-weighted top rolls will be explained later.

The scavenger or clearer roll *D*, upon which the yarn collects when an end breaks, preventing a roller lap, is a wooden roll covered with denim or light weight flannel. In each end of the scavenger are wire gudgeons which rest in open bearings in the scavenger self-weighted lever *J*, the scavenger roll being held lightly against the lower front drafting roll *E'* by means of this lever. Sometimes a spring is used for holding the scavenger roll in place, but this is not so satisfactory as the former method, because springs are apt to weaken or break.

In addition to the scavenger roll, top roll clearers are employed, the same being held in place by a metal clip. These clearers are placed between the saddles at each side of the rolls and therefore are not shown in the illustration.

At *H* is shown the traverse guide rod which conducts the roving from the bobbins on the creel, to the drafting rolls, the guide rod carrying trumpets *I*, of brass, usually made with as small a hole as is possible to use, and through which the roving strands are drawn by the action of the rolls. This guide rod rests in a ¼ inch slot, cut into the slide *B*, just behind the back rolls. It is traversed a distance a little short of the length of the fluted portion of the steel lower rolls, this motion being given by the guide rod to the roving, so that wear from friction will not come at the same part of the drafting rolls all the time. The roving traverse should have careful attention. It should travel a little quicker at the ends when changing direction; it should lap in the center on long boss rolls, to avoid a shoulder forming on the top roll.

Figs. 231 and 232 give an illustration of an improved type of traverse motion, as brought out by the Whitin Machine Works and as applied to the roll stand, showing its parts and operation. Fig. 231 is a transverse sectional view of this traverse motion, showing the relation of the parts to the drawing rolls. Fig. 232 is a view, partly in section, of the forked lever, the actuating arm, the eccentric actuation, the lever and the cam operating the arm.

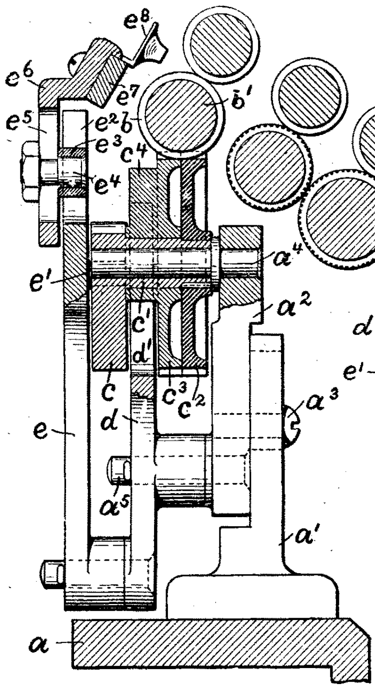


FIG. 231.

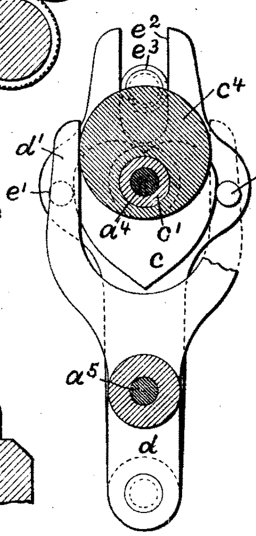


FIG. 232.

a indicates the top rail of the ring frame on which the stands supporting the drawing rolls are mounted. The vertical distance between the rail a, and the back drawing roll b', differs in ring frames made by different makers, for which reason the stand a^1 is provided with a vertical slot for adjustably securing the post a^2 by means of the screw a^3 to the standard a^1. In the post a^2, stud a^4 is secured near the upper end, and the fulcrum pin a^5 near the lower end; the stud a^4 having journaled on it a heart shaped cam c. The worm gear c^2 is secured to the sleeve c^1, and engages with the worm b on the back drawing roll b^1. The worm gear c^3, which has one tooth more or less than the worm gear c^2, is provided with an eccentric cam c^4 and is journaled on the sleeve c^1, said eccentric cam c^4 acting on the two arms of fork d^1 of the lever d as supported on the fulcrum pin a^5, being pivotally connected at its lower end with the lower end of the arm e, carrying the pins e^1 which engage with the cam c. The upper end of the arm e has the slot e^2 in which a slide e^3 is adjustably secured by screw stud e^4 in the slot e^5 of the bracket e^6, secured to the traverse rod e^7 on which the roving guides e^8 are supported.

When the traverse motion is in use, the rotation of the back drawing roll b^1 and the worm b imparts rotary motion to the worm gears c^2 and c^3, and through the same to the eccentric cam c^4 and the cam c, the relative position of the two cams changing gradually by the difference in the number of teeth in the two gears. The eccentric cam c^4 swings the lever d on the fulcrum pin a^5, the lower end of the lever moving the pivot supporting the arm e from side to side, while the heart shaped cam c swings the arm e and by the same imparts reciprocating motion to the traverse rod e^7. The continuous change of the position of the pivotal support of the arm e causes the arm to rock on the cam c and to move the upper end of the lever with the bracket e^6 and the traverse rod, independent of the action of the cam. This extra throw can be increased by adjusting the screw stud e^4 higher on the bracket e^6.

Thus it will be seen that by the continuous changes in the length of the traverse as well as the speed, an even wearing of the leather covered top and fluted bottom drawing rolls is secured, thus increasing their durability. It may be mentioned here, that the drafting rolls are set on the roll stand and spaced apart according to the same principles as apply to drafting rolls used in previous operations on fly frames, etc.

In Fig. 233 is shown the sectional view of a new style of roll stand, in which ready adjustment of the rolls between each other can be made while the frame is in operation, without liability of breaking or damaging the roving or having to stop the machine. This device is somewhat interesting as in the type of roll stand previously described, it is necessary to stop the spinning when readjusting the drafting rolls between each other.

In this roll stand the distance of the rear roll bearing 1 and the front roll 2 is adjusted by means of a screw 3, extending from the forward end of the head 4 and engaging with a nut 5 as situated on the underside of the rear roll bearing 1, said nut sliding in a longitudinal groove or slot 6. 7 and 8 are the carrier and the back rolls respectively and which are set in unison with reference to distance from front roll 2. 9 is the flange upon which the rear roll bearing 1 slides during adjustment of the latter. 10 indicates the cap bar for the top rolls 11, and 12 one of the clearer roll weights.

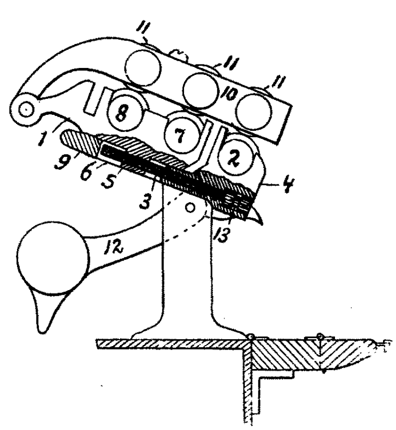


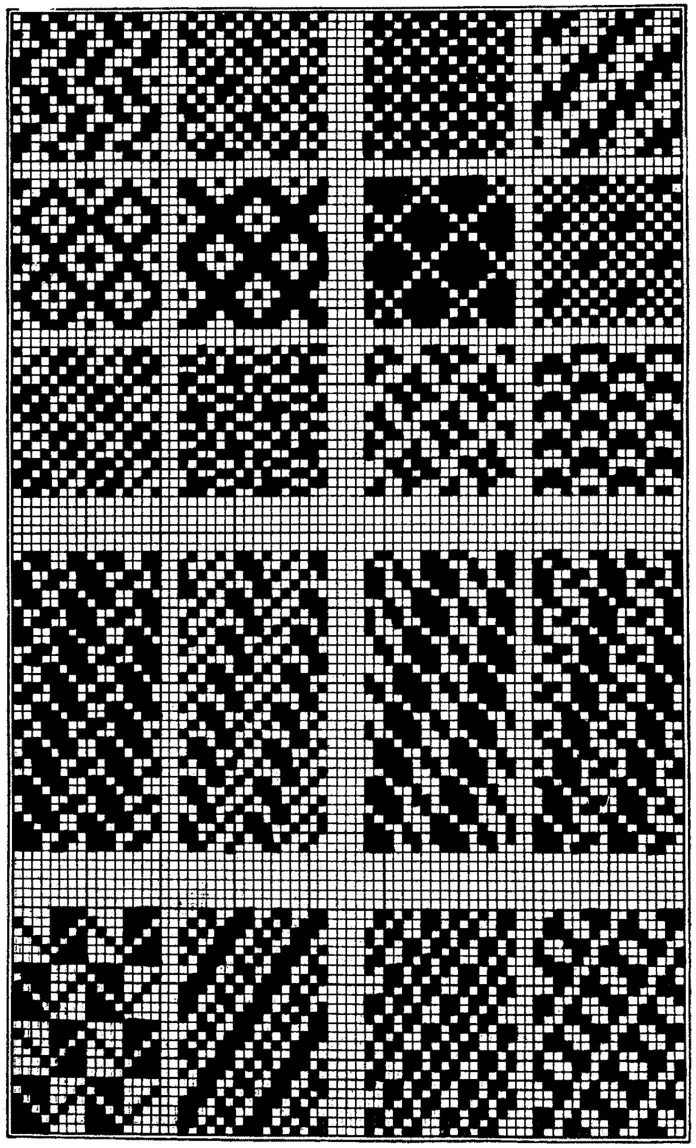
FIG. 233.

By means of arrangement thus described, the rear roll bearing 1 can be quickly adjusted when so required, from the front, by means of a screw-driver, while the machine is running. The screw 3, after proper adjustment has been made, in turn is held against any possible movement by means of a set screw (not shown in illustration) which extends laterally through the head 4 and enters an annular groove 13 formed in the head of screw 3.

(*To be continued.*)

DICTIONARY OF WEAVES.

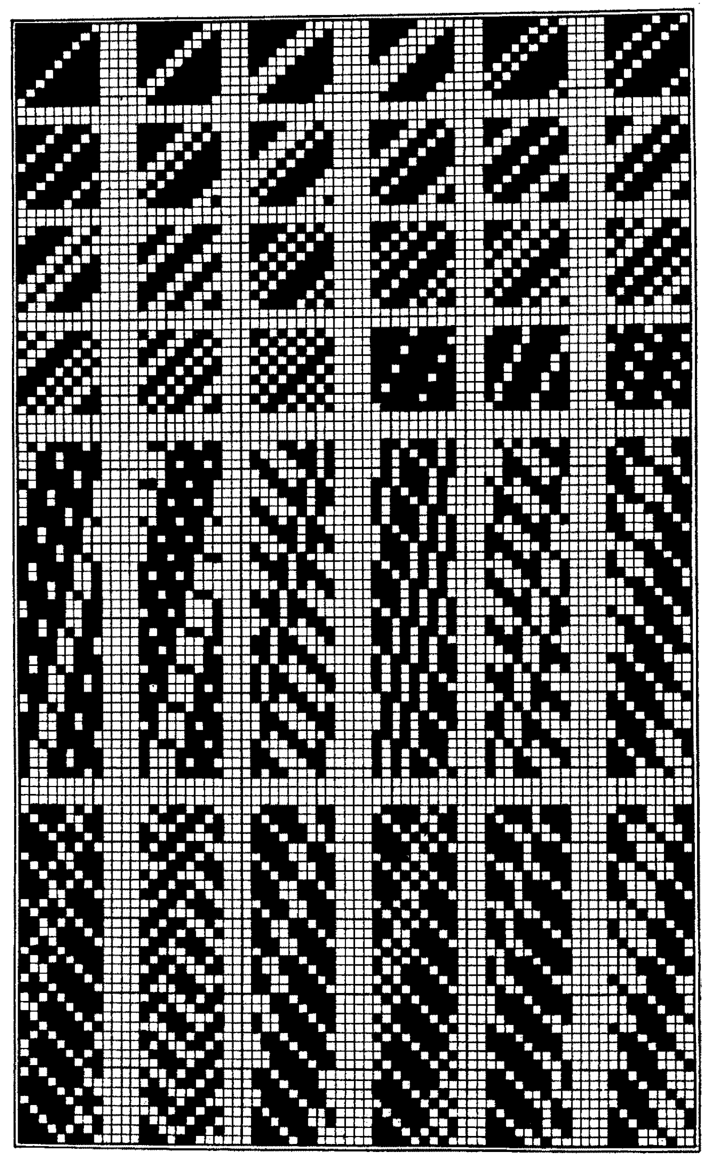
EIGHT HARNESS



8 × 8, 8 × 32 and 8 × 12

This completes our collection of Eight Harness Weaves, 260 of them having been given.

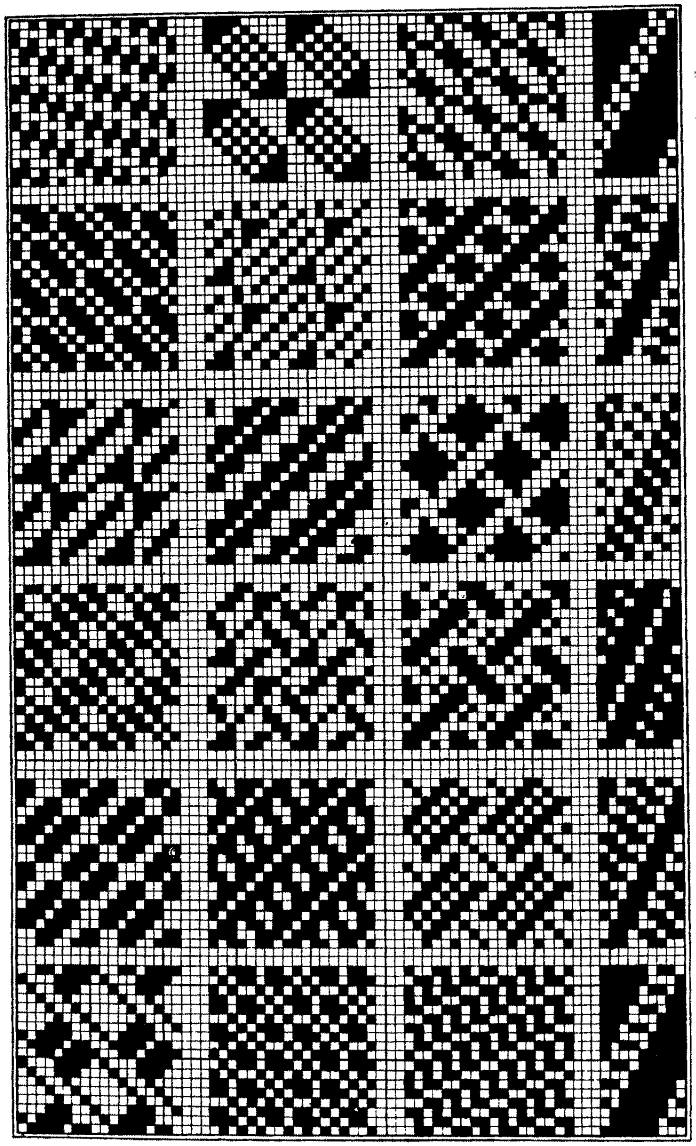
NINE HARNESS



9 × 9 and 9 × 36

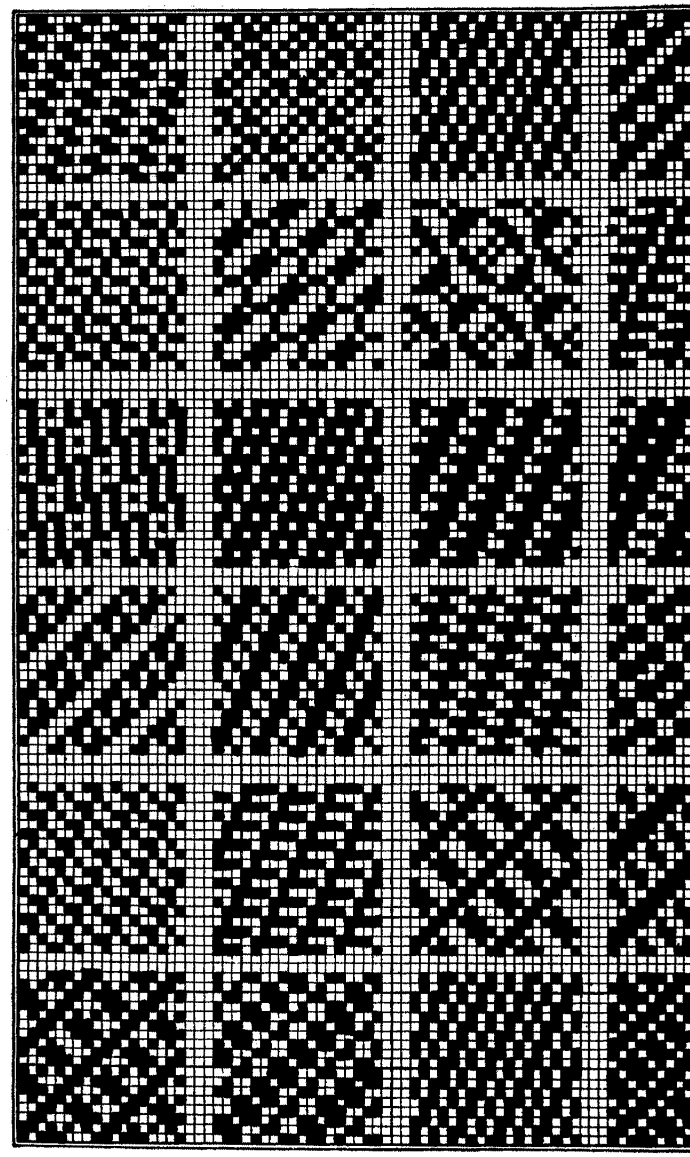
DICTIONARY OF WEAVES.

NINE HARNESS



9 × 9 and 9 × 18

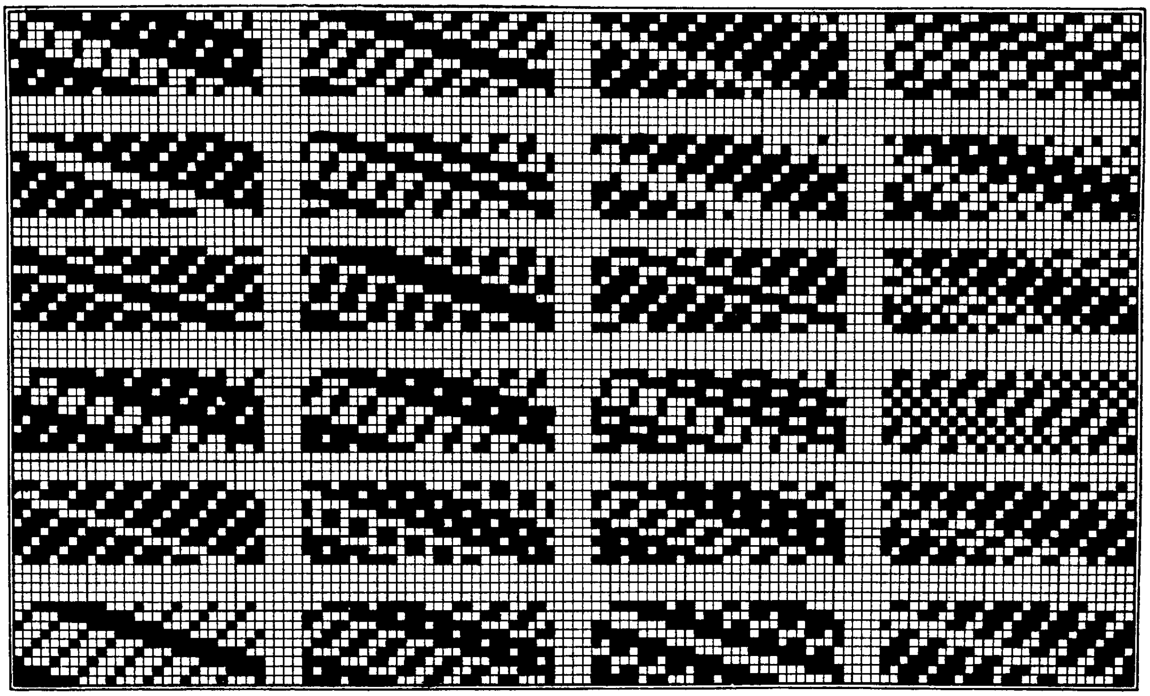
NINE HARNESS



9 × 9 and 9 × 18

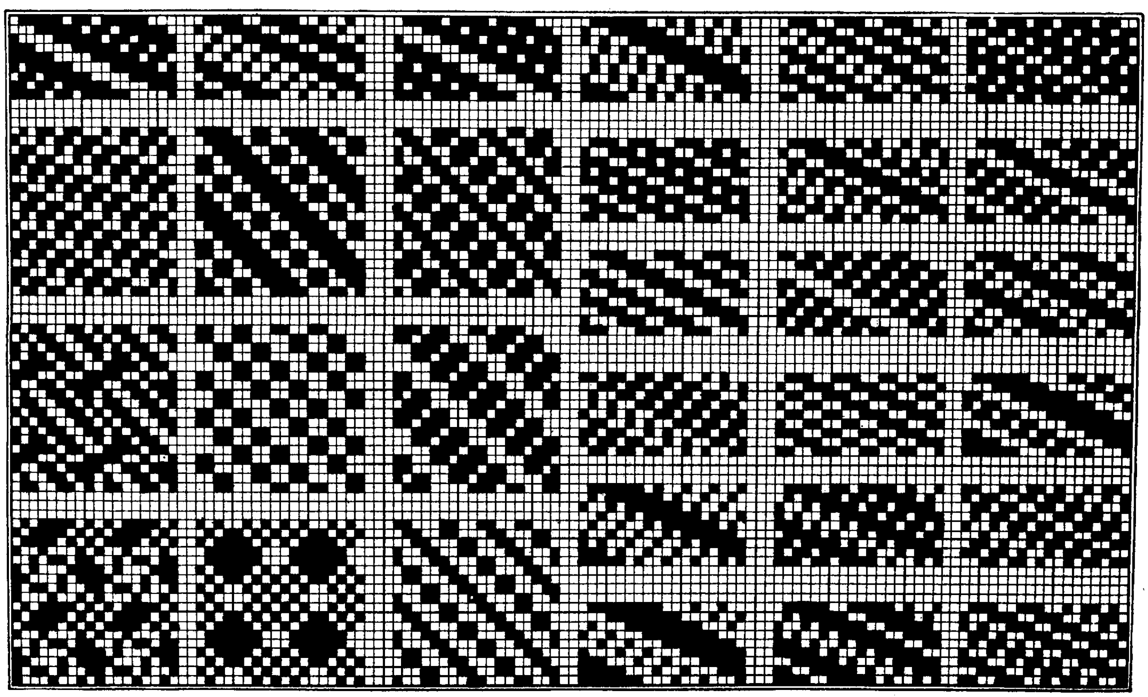
DICTIONARY OF WEAVES.

NINE HARNESS



9 × 27

NINE HARNESS



9 × 9 and 9 × 18

This completes our collection of Nine Harness Weaves, 138 of them having been given.

SILK FROM FIBRE TO FABRIC.

True Silk—Silk Throwing—Splitting and Sorting—Soaking—Winding—Cleaning—Doubling—Tram—Organzine—A Typical Silk Spinner—A Silk Doubler and Twister—Defects met with in Thrown Silk—Singles—Reeling—Numbering the Silk—The Denier System of Numbering Silk—Dram System of Numbering Silk—The Ounce System of Numbering Silk—Comparison of Denier and Dram—Denier Constant—Testing Silk as to Counts—Conditioning—Scouring—Boiled-off Silk—Tinting—Souple Silk—Ecru Silk—Bleaching Silk—Soap—Testing Soap—Soap Economy—Water—Weighting—Dyeing—Washing—Lustering—Wild Silk—Spun Silk—Waste Silk—Statistics — Winding — Warping — Drawing-in — Quilling — Weaving—Finishing.

(*Continued from page 74.*)

A Silk Doubler and Twister.—The purpose of this machine, as previously mentioned in this article, is the doubling and twisting together of several single silk threads (after the latter have been previously cleaned, or cleaned and twisted as the case may have required) into one thread. The amount of twist to be put into the yarn is regulated by the fabric the yarn is intended for, some fabrics requiring more, some less, again, some hardly any twist.

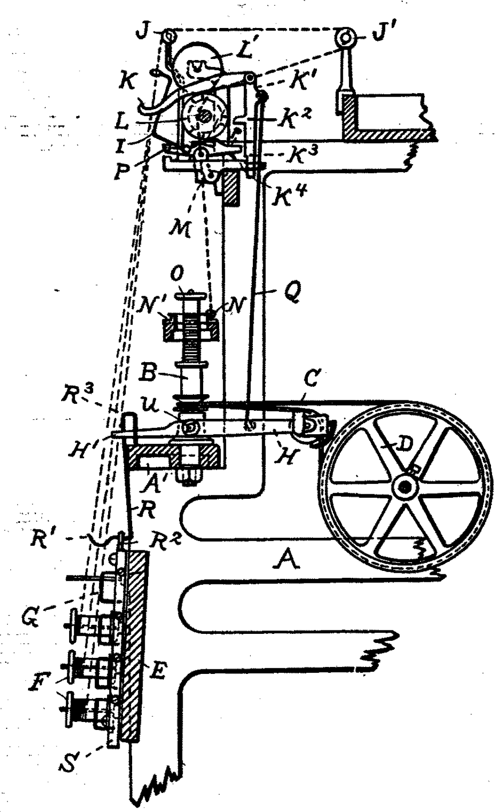


FIG. 4.

A uniform count (*i. e.,* size) of the yarn with an equal amount of twist (turns per inch) throughout said yarn, and this without any imperfections (technically known as "kinks," caused by loose-running supply ends) in the yarn, are items of the greatest importance to the manufacturer, since only then can he produce perfect fabrics. To accomplish these results, is the object of the doubler and twister shown in diagrams Figs. 4, 5 and 6, the machine being provided with a stop motion, which stops the revolution of the spools from which the several supply threads as to be twisted are drawn, simultaneously with the stopping of the rotation of the spindle of the machine, caused either by the breaking or running out of one of the supply threads, doffing, etc. In other words, the motion of every part of the machine is arrested at the same moment. Illustrations given refer to the machine patented by Mr. Joseph E. Tynan of Paterson.

Of the three illustrations given Fig. 4 is a vertical cross section of the machine, showing the threads being drawn from spools placed upon a creel, said threads, after passing over guides and feed rolls, being twisted and laid upon the spool on the twister spindle. Fig. 5 is a front elevation, enlarged compared to Fig. 4, of the creel with the supply spools, the brake-bar and the spool brakes. Fig. 6 is a plan view, slightly enlarged compared to Fig. 5, showing the action of the brake mechanism upon a supply spool.

Examining illustration Fig. 4, we find on the frame *A* of the machine the spindle rail A^1, in which the spindles *B* are mounted, said spindles being driven by means of driving band *C* from driving pulley *D*. On the frame *A* is also mounted the creel board *E*, upon which are mounted, as required, one, two, three, or more banks of supply spools *F*, said spools being acted upon by brakes *G*.

Each thread, as to be in turn doubled with one or more similar threads, after leaving the spools *F*, passes up and through a faller *I*, from which they pass as single threads over and partly around guide rollers *J*, J^1 and feed rolls *L*, L^1, and thence through a guide eye *M* to the traveler *N* (as adjusted to ring rail N^1), and in turn onto the spool *O* as carried on spindle *B*. The rolls *L* L^1 revolve, and feed the threads to the traveler *N*, which puts the required amount of twist into the yarn. The roller *L* is provided with mortices adapted to be engaged by a claw formed on the rock lever *P* whenever said lever is rocked by the dropping of a faller *I* on account of its supply thread breaking.

Above this rock lever *P* is situated a lever *K*, having a latch K^1, which is supported by a shoulder K^3 resting on the back end K^4 of the faller stand, a lug K^2, limiting the drop of said latch K^1. To this latch K^1 is pivoted one end of a wire link *Q*, the other end of it being connected to the movable lever *H*, over which the driving band *C* passes.

When a faller *I* drops, the lever *P* is rocked, causing the claw as formed on the rock lever *P* to engage one of the mortices on roller *L*, thereby causing the lever *P* to be moved back so that it engages the latch K^1 and causes the shoulders K^3 to be pushed from its support. This causes said latch K^1 to drop and the lever *H* to be tilted, in turn slackening the driving band *C* and stopping the rotation of the spindles *B*.

For applying the brake to the spools simultaneously with the stopping of the spindles, the outer end of the lever *H* is provided with a fork H^1, which passes through a hook R^3 of a support *R*, connecting the end of lever *H* with the brake bar *S* (see Fig. 5). To this brake bar *S* are secured the brake wires *G*, which are bent at right angles at their end, as shown at *T*, in Fig. 6, for conveniently engaging the head of the spools.

The brake bar *S* is slidably mounted in slots S^1 on the creel *E;* thus it will be seen that when the lever

H is tipped on account of the stopping of the machine, the front end H^1 of said lever H, as it raises (on account of the rear end of said lever dropping—see fulcrum U), will also raise the brake bar S (through support R), thus bringing the brake wires G into engagement with the heads of the spools, and at once stop the rotation of the same.

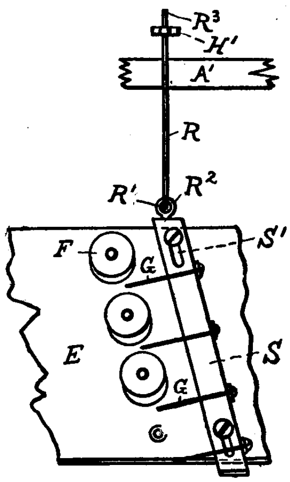


FIG. 5.

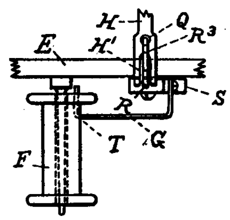


FIG. 6.

When the stop motion has thus operated, and the operator has to piece broken ends, he simply presses the support R inward, allowing the eye R^2 of the brake bar S to drop into the hook R^1 of the support R, thus removing the brake wires G from engagement with the heads of the spools F, permitting the operator to piece any broken end.

When the machine has to be started, the operator presses down the lever K, thus raising the lever H, which in turn tightens the driving band C and starts the machine running, the hook R^1 at the same time springs automatically back into place and allows the brake bar S to assume its normal position.

Defects met with in thrown silk. With reference to the first twist, *i. e.*, the twist imparted to the minor thread, defects met with are: soft twisted ends, and kinks or snarls. The first may be the result of slack spindle bands, sticky spindle bolsters or spindles out of true. Such a soft twisted thread can be readily detected by the attendant, since the spools containing such silk will handle soft. Such yarn should not be used in this state in connection with perfectly spun yarn, since if used, it will clearly reveal the defect after passing through the boiling-off process, and finally may be the cause of spoiling the face of the fabric. Kinks or snarls in the first twisting process can be generally traced back to improper working of the stop motion, *i. e.*, when the latter fails to operate when the spindle stops. Kinks should either be stretched, rubbed or pieced out, previously to again starting up the machine.

In connection with thrown silk, *i. e.*, no-throw, tram or organzine, defects we may come across are: (1) Minor ends running out or breaking, caused by the stop motion being out of order and this trouble not noticed at once by the attendant; (2) Uneven tension given to some of the minor threads as fed to the twisting machine, which will give to the twisted thread a spiral effect, technically known as corkscrew; (3) Uneven counts or sizes of minor threads put up for twisting into one end, may also be at the bottom of corkscrew, and so also (4) the union of minor threads containing a different percentage of moisture, which in turn will cause an uneven contraction of the thread when dry.

Corkscrew of the thread will cause trouble at the weaving, the short minor thread of the organzine, not being able to stand the strain of weaving, will break, and when the loose end will form itself into a bunch, which will catch either in the mail of the harness or in the dents of the reed, and thus be the cause of the end breaking during weaving.

Singles. These consist of the single threads of the raw silk, as received by the mill, and in which state—single ends—they are used in the production of cloth. Silk, after being rewound from its skein and cleaned, as previously fully explained, is then known as single, and in this state is still covered with the saliva of the silk worm. This gum adds strength and elasticity to the yarn, but hides its luster, for which reason said gum or saliva must be removed, before the full brilliancy of the silk is brought out. On account of the greater strength of silk in this single state, after first adding some slight twist, if so required, to such thread as will be used for filling, more twist to such as is destined for warp, the yarn in some instances, is then woven into plain and figured pongees, some kinds of satins, etc., and the gum boiled off afterwards from the woven fabric.

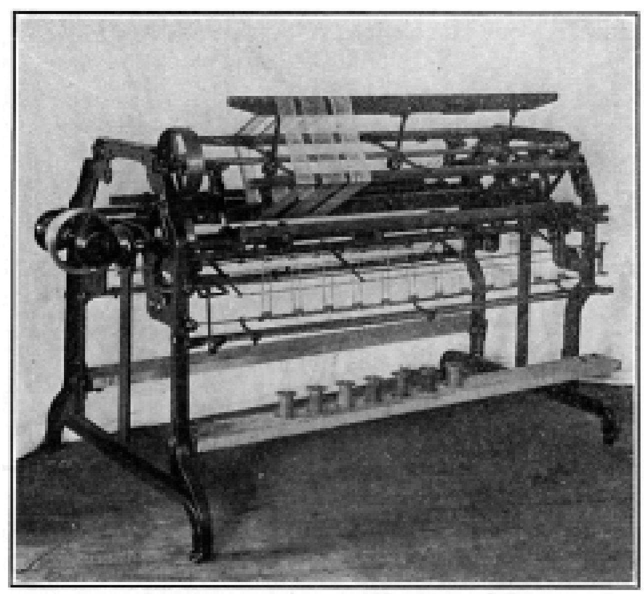


FIG. 7.

In some instances, such single silk is also dyed without boiling-off the gum, which, however, is done at the sacrifice of some of its luster, but the additional strength left to the yarn will not only result in better weaving, *i. e.*, in more production to the mill, but at the same time the woven cloth will gain both in strength and weight.

With reference to silk throwing, as practiced in connection with no-throw, tram or organzine, we now come to the process of

Reeling. The spools of doubled, or doubled and twisted silk are then taken to the reeling frame, also called the reel, to be rewound in skeins so that the silk can be handled in the processes of scouring or boiling-off, dyeing, bleaching, weighting, shaking, glossing and lustering. This reeling process is simply the reverse from that of the winding process previously explained, *i. e.,* the silk on the spools being, in this instance, rewound on skeins.

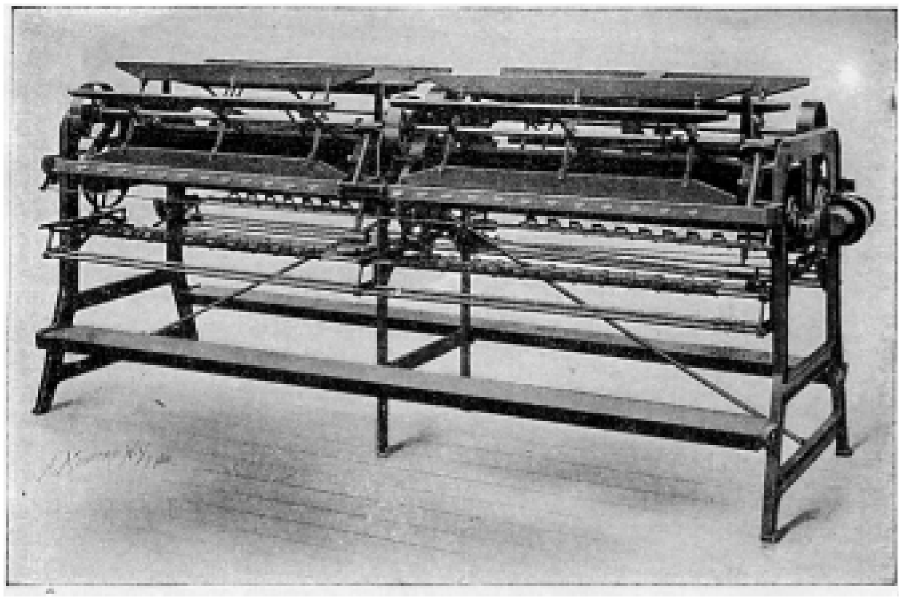


FIG. 8.

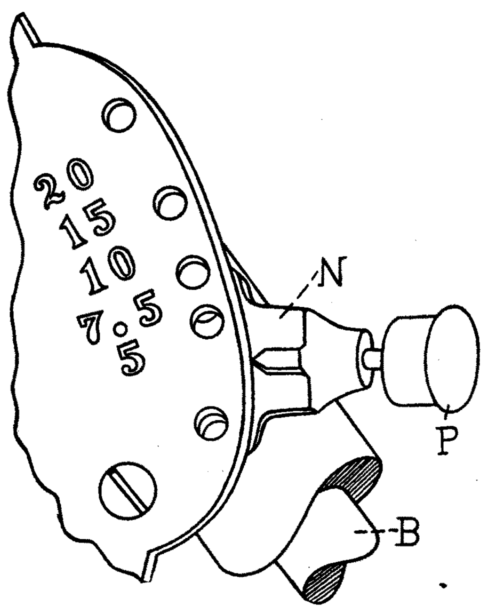


FIG. 11.

Fig. 7 shows a single fly reeling frame for accomplishing the foregoing purpose, with spools in position, also showing silk wound on the reel. This machine is built with the reel bearings detachable; stop motion for each end, operating instantly, the action of starting the reel lifting the drop wires of the stop motion into position. It is provided with a quick or slow traverse motion, to produce any style of skein crossing desired. As will be seen from the illustration, the bottom shelf holding the feeding spools is adjustable in the head framings. The reel-flies are strongly built and well balanced, thus allowing a high speed; as a rule, the dimensions of the reel-fly and the machine being such that the skeins wound are spaced four inches apart from centre to centre. The counting or registering device is of two styles, quickly adjusted; one style can be set each 50 yards up to 25,000 yards by an indexed register; the other style is locked for the required length of skein and the reel cannot be removed, or the counter changed in any way until the skein is completed, thus preventing any tampering with length of skein by the operative.

Fig. 8 shows a specimen of a four-fly reeling frame, as built by the Sipp Electric and Machine Co. This machine, if required, is also built three flies long, and is the outcome of careful study of the necessities of this very important branch of silk throwing.

Amongst the improvements characteristic to this reel is a lock joint for the fly arm, which acts automatically after the reel is stripped, and is readily unlocked when required. The fallers are substantially mounted on a heavy steel rod and accurate alignment and ample stiffness is therefore attained. Wear of the fallers is avoided by a proper arrangement of the parts traversed by the silk. The stop motion is quick and by test, a fly has been known to stop in less than three turns after the breaking of an end.

One of the most important features of this power reel is its measuring clock, by means of which the most accurate length of skeins are obtained. All the vital parts of the clock are enclosed in a dust proof case, and a knob and dial on the outside enables the length of the skein to be varied, as follows: 5,000, 7,500, 10,000, 15,000 and 20,000 yards. No changing of gears, no loose pins, no calculations are required, all the operator has to do is simply to move the knob, (which is not loose but fastened) to the length of skein desired and as per the figures provided. The clock may be locked if desired. Resetting the clock for each skein is not necessary and the skein is made with any cross (traverse) desired and any width. On account of the importance of this clock to the silk industry, a special description of it is herewith given.

Registering Clock. The counting or measuring device referred to in the preceding paragraph is used in order to regulate the action of the reeling frame, so that a desired length of silk may be wound on the skein. This secures skeins of uniform length and consequently is a step toward securing more uniform results in the scouring and dyeing process. The object knock-off cam in position. Fig. 11 is a detail illustration of the setting knob, by which the clock is set for the required length of skein.

The clock is bolted by its three feet directly to the frame of the machine, and is driven by means of a bevel gear *A*, which is in turn driven by a pinion on the fly shaft. Motion is given to the mechanism of the clock by a worm gear B^1 on the driving shaft *B* to a gear wheel *C*. The cylindrical cam *D* and which is an integral part of the gear wheel *C*, is eccentrically mounted on the centre clock-shaft *F*. This cylindrical cam *D* moves in the cam lever *G* which moves on its fulcrum *H*.

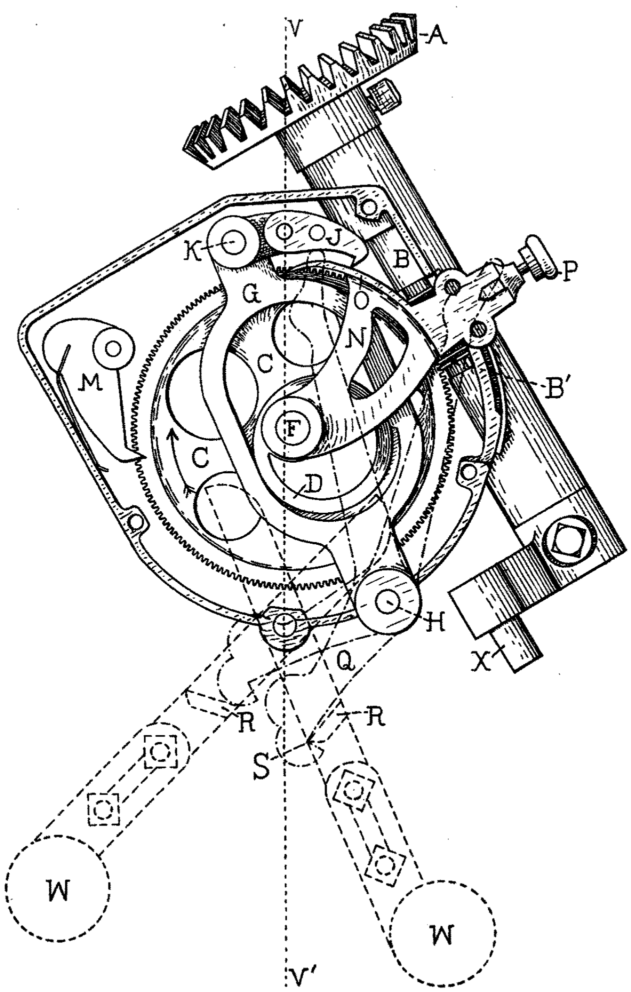


Fig. 9.

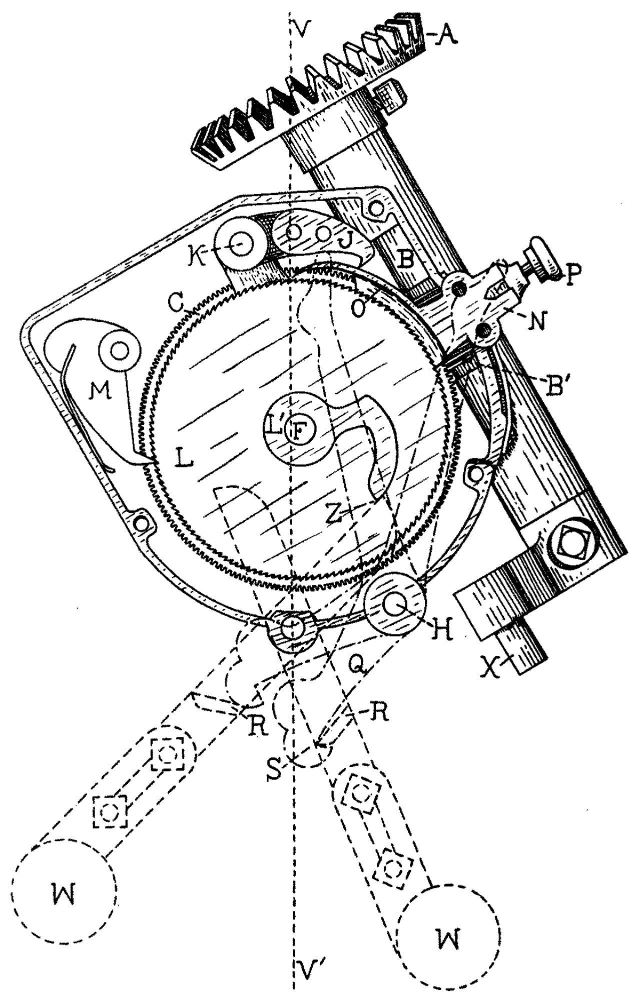


Fig. 10.

of the clock is accomplished by an automatic knock-off motion which stops the winding, *i. e.*, the revolving of the flies of the machine when the desired length of silk has been taken up by the flies of the reel. In order to give a thorough understanding of the construction and operation of this clock, the accompanying three illustrations Figs. 9, 10 and 11 are given; of which Fig. 9 shows the interior parts of the clock, minus the ratchet wheel with its knock-off cam which is a part of the ratchet wheel, and which could not be shown. For this reason Fig. 10 has been given, showing this ratchet wheel with its

The pawl *J* slips on the pin *K*, which is a part of the cam lever *G*, the latter providing nothing more than a slot for the motion of the cylindrical cam *D*. It is evident that by the turning of the cylindrical cam *D*, a to and fro motion of the pawl *J* will be the result; this motion being in an arc of a circle with *H* as the centre. The cam lever *G* of course comes to rest at some part of its journey, and which occurs when the common diameter of the cylindrical cam *D* and the centre clock-shaft *F* become parallel to the side pieces of the cam lever *G*.

(To be continued.)

A Novel Way of Changing the Texture in Rib-Knitted Fabrics.

THE OBJECT is to produce a seamless, tubular, machine-knit ribbed fabric comprising two webs, one having wales in excess of those in the other, some of the wales of each face extending throughout both webs, and other wales of either face having stitches drawn only through wales of the other face where the change of web is effected.

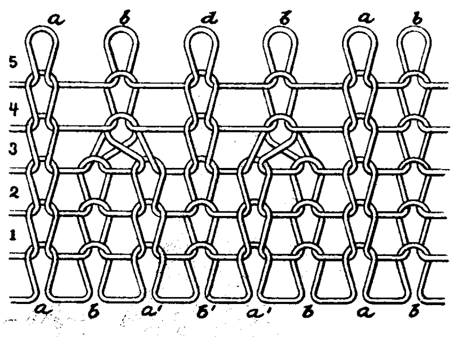


Fig. 1

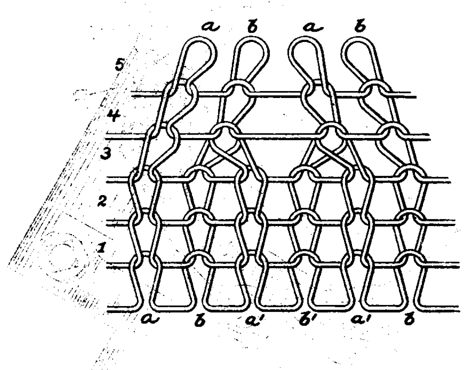


Fig. 2

For example, the fabric may be a tube having in one portion 160 or 180 wales and in the other portion only 120 wales, or again the fabric may have in the portion containing the greater number of wales a two-and-one rib or a two-and-two rib, and in the portion having the lesser number of wales a one-and-one rib.

Change in the character of the web is effected by manipulation of the needles of the machine and without stopping said machine or requiring the intervention of an attendant, the new process, the invention of Messrs. Scott and Williams, being therefore well adapted for use in the manufacture of hosiery fabrics upon automatic knitting machinery.

ILLUSTRATIONS.—Fig. 1 represents (enlarged) a fabric in which the change is from a web having the greater number of wales to a web having less wales. Fig. 2 is a similar view illustrating a web in which the disparity between the number of wales in the two webs is still greater. Fig. 3 is a view illustrating a fabric in which the web having the greater number of wales is a two-and-one rib, and the web having the lesser number of wales is a one-and-one rib. Fig. 4 is a view representing a fabric in which the web having the greater number of wales is a two-and-two rib and that having the lesser number of wales is a one-and-one rib. Figs. 5 and 6 represent webs in which the change is effect from web having the lesser number of wales to web having the greater number of wales. Figs. 7 and 8 are sectional views illustrating sufficient portions of a knitting machine to show the method of transfer when a stitch is changed from a dial needle to a cylinder needle, and Figs. 9 and 10 are similar views, illustrating the method of transferring from a cylinder needle to a dial needle.

A DESCRIPTION OF THE NEW FABRICS.—In Fig. 1 *a* represents plain stitch wales or those formed upon the cylinder needles of the machine, and *b* represents rib stitch wales or those formed upon the dial needles of the machine, the web in courses 1 and 2 representing a one-and-one rib having a certain number of wales, say 160, in a tube of given diameter, and the web in courses 4 and 5 representing a one-and-one rib having a lesser number of wales, say 120, the change being effected by interknitting in course 3, stitches of certain plain stitch wales *a′* with adjoining rib wales *b*, and in course 2 by transforming the rib wale *b′* into a plain stitch wale *d*.

The fabric has what is termed a thirty-three-and-one-third ($33\frac{1}{3}$) per cent. doubling, that is to say, the web having the greater number of wales has thirty-three-and-one-third ($33\frac{1}{3}$) per cent. more wales than the web having the lesser number of wales.

Fig. 2 shows a fabric in which a fifty per cent. doubling has been effected; *a* and *b* in this case rep-

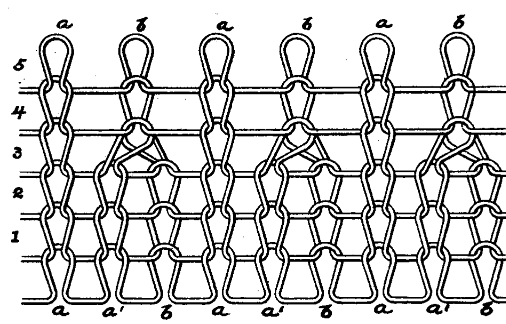


Fig. 3

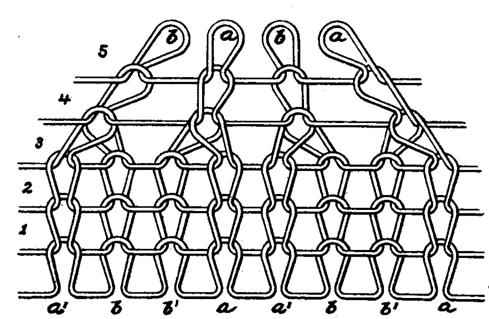


Fig. 4

resenting respectively plain wales and rib wales which continue as such throughout the fabric, *a′* representing a plain wale which is interknitted with an adjoining rib wale at course 3 and *b′* representing a rib wale which is interknitted with the adjoining plain wale also at course 3.

Fabric sketch Fig. 3 illustrates a structure which has in courses 1 and 2 a web consisting of a two-and-

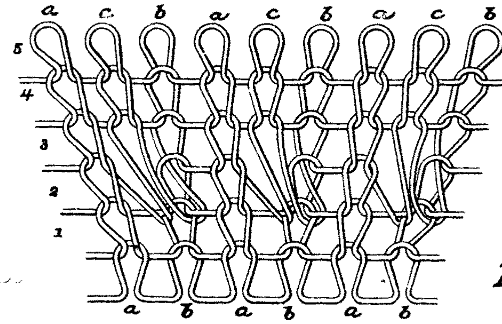


Fig. 5

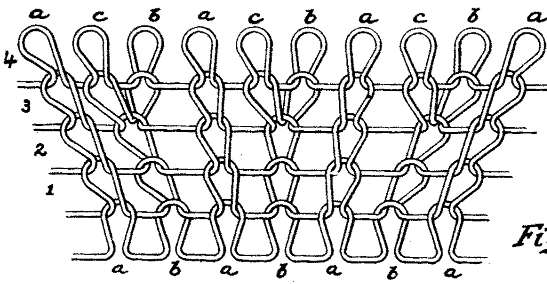


Fig. 6

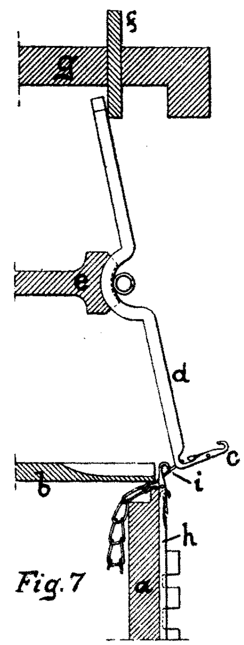
one rib, that is to say, one having pairs of plain wales alternating with single rib wales, while the web shown in courses 4 and 5 is a one-and-one rib; change being effected in course 3 by transferring stitches of plain wales *a'* to adjoining rib wales *b*.

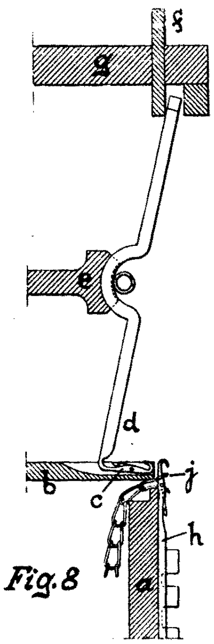
Fabric sketch Fig. 4 shows a structure in which there is a two-and-two rib in one portion and a one-and-one rib in the other portion, courses 1 and 2 showing the two-and-two rib, courses 4 and 5 showing the one-and-one rib, and course 3 representing the change course, the change in this case being effected by interknitting stitches of plain wales *a'* with adjoining rib wales *b*, and stitches of rib wales *b'* with adjoining plain wales *a*.

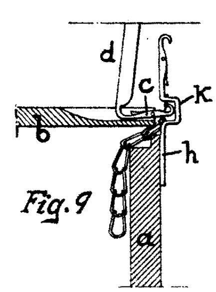
In the fabrics thus far described, the change is effected from a web having the greater number of wales to a web having the lesser number of wales. A reverse operation is shown in connection with diagrams Figs. 5 and 6, and of which fabric sketch Fig. 5 shows a structure in which a one-and-one rib web is changed to a two-and-one-rib web, *a* representing the continuous plain wales and *b* the continuous rib wales, while *c* represent plain wales which in course 3 are introduced between the adjoining plain and rib wales, the first stitches of each of said introduced plain wales engaging with a stitch in course 1 of the adjoining rib wale.

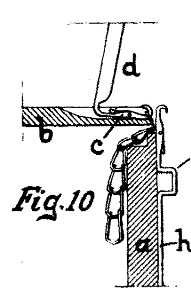
Fabric sketch Fig. 6 illustrates a structure in which the first stitch of each plain wale introduced in course 3 is caused to engage with a stitch in course 2 of the adjoining rib wale, this effect being produced by causing the cylinder needle to engage with the stitch on the dial needle instead of with a precedently formed stitch.

The process for producing the change on the machine is shown in connection with diagrams 7 to 10, of which Figs. 7 and 8 show sufficient of the elements of a knitting machine to impart a proper understanding of the manner of manipulating the needles to effect the transfer of stitches from one to another. In these views *a* represents part of a needle cylinder, *b* part of the dial, as located on the inside of the cylinder. Dial needles *c* are carried by the lower ends of jacks *d*, as pivotally mounted upon a fixed ring *e*, and having their upper ends acted upon by cams *f* upon a cam plate *g*. This plate has two sets of cams, one for acting upon the jacks *d*, so as to cause operation of the dial needles *c* for ordinary knitting, and another set for causing an abnormal projection of said dial needles *c*, so as to carry them outwardly beyond the cylinder needles *h*, as shown in diagram Fig. 7. This has the effect of drawing or stretching the webs so as to dispose the stitches of the same over the needle cylinder *a*, as shown in Fig. 7; hence cylinder needles may be projected and caused to enter said stitches, as also shown in said Fig. 7, the dial needles *c* from which stitches are to be transferred directly to the naked cylinder needles









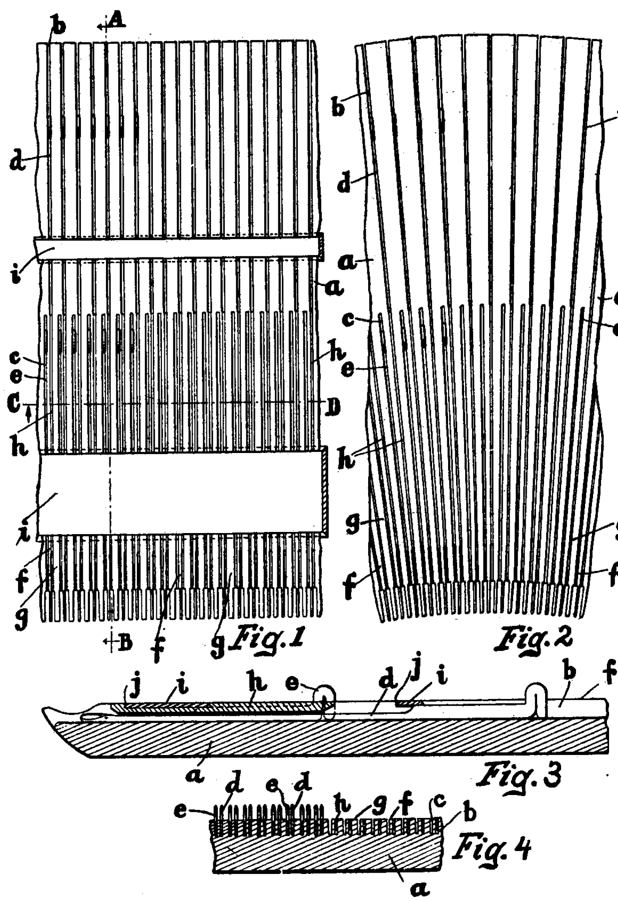
h, preserving their normal position above said needles, while being thus projected. The dial needles, which have to double their stitches with those of the cylinder needles, are moved laterally into line with the cylinder needles which are to receive such stitches, the projection of the dial needles being such as either to bring the stitches upon them, or precedently formed stitches, above the cylinder needles which are to engage the same.

When the cylinder needles *h* are projected so as to enter the stitches upon the dial needles *c*, either of said needles may be moved laterally to the extent necessary to cause engagement of the cylinder needles with the dial stitches (see *i* in Fig. 7) and the dial needles can then be withdrawn so as to cast their stitches onto the cylinder needles, as shown at *j* in Fig. 8, but when the cylinder needles engage stitches other than those upon the dial needles, the lateral movement referred to is not necessary.

When a transfer is to be effected from a cylinder needle *h* to a dial needle *c*, said cylinder needles are in like manner abnormally projected, so that their lugs *k* may stretch the cylinder stitches of the web, so as to draw them, or precedently formed cylinder stitches, into line with the dial needles, the latter being, if necessary, moved laterally into line with the cylinder needles from which the transfer is to be effected. This operation of transferring from a cylinder needle to a dial needle is represented in Figs. 9 and 10.

Improvements in Needle-Beds for Straight-Frame and Circular-Knitting Machines.

The object is to provide a needle-bed for independently reciprocating needles—either spring or latch—in which a higher gauge than heretofore can be used. Until now the gauge, *i. e.*, the number of needle grooves in a given space has been limited by the thickness of walls required to resist lateral strains imposed by the operating cams upon the butt ends of the needles. The inventor of the new needle-bed, Mr. H. A. Klemm of New York, uses long and short grooves, to receive long and short needles, the same being arranged alternately, wall strengthening filling pieces being inserted over the needles in the front parts of the long grooves opposite those parts of the short grooves traversed by the butts of the short needles.



Illustrations. Fig. 1 represents a plan view of a portion of a needle-bed with some of the needles therein, adapted for use in connection with the straight-frame knitting machine and adapted for the production of so-called Swiss-rib underwear. Fig. 2 is a view similar to Fig. 1, showing a dial needle-bed adapted for use in connection with a circular knitting machine. Figs. 3 and 4 are sectional views taken respectively on the lines *A*, *B* and *C*, *D*, of Fig. 1.

Description of the construction of the new needle-bed. With reference to illustrations, *a* designates a needle-bed of a shape as the particular case may require, *i. e.*, either cylindrical, straight or circular dial in form. *b* and *c* show grooves therein, provided for the purpose of receiving or holding needles *d* and *f*. Examining our illustrations, it will be readily noticed, that the needle grooves *b* and *c* are arranged in pairs, each comprising a short groove *c* and a long groove *b*. *f* shows us the division wall between each pair of grooves *b* and *c*, said walls being thin or narrow, while the walls *g* as located between the pairs of grooves are relatively thick or wide.

To strengthen the thin dividing walls *f*, in order to resist the lateral strains imposed by the operating cams upon the butt-end portions of the short needles, filling pieces *h* are fitted between the walls of the grooves *c* over the front portions of the long needles. These filling pieces *h* are approximately the length of the short grooves, as shown in Fig. 3, but however that may be, they must be opposite those parts of the short grooves traversed by the butts of the short needles.

The filling pieces *h* are so fitted as to provide a space between them and the lower surface of the needle grooves *c*, to admit of the free and ready insertion or withdrawal of the long needles from the rear, and in order that both the long and short needles shall be securely held against displacement, during the operation of knitting, keepers *i*, in the form of bars (adapted to rest over and upon the needle shanks) are provided. These keepers *i* fit in guides *j*, formed at intervals across the upper face of the needle-bed.

THE PRINTING OF SILK WARPS FOR THE MANUFACTURE OF CHINÉ SILK.

Translated for Posselt's Textile Journal from "Osterreich's Woolen and Leinen Industry."

Chiné silk, which is produced principally as piece goods in Lyons and Zürich and as ribbons in St. Etienne, Basel and Krefeld, is a most elaborate branch of the silk industry. At regular intervals, fashion demands for the manufacture of ladies' trimmings and dress goods, as well as for men's neckwear, the pretty patterns which chiné silk offers us.

The characteristic feature in design of chiné silk consists in the veiled, vague prints, as they appear to the eye, caused by the silk warp having been first printed in selected, harmonic colors, previously to warping and weaving. A thus printed silk warp may be woven either with white or colored filling, again two or more colors may be used for the filling. Besides these different combinations in color, as will be readily understood, the use of different weaves will also result in novelties. This all explains why chiné silk is meeting with such universal favor with the public, *i. e.*, is used in connection with such a great variety of articles.

As mentioned before, the important part of this industry lays in the printing of the silk warp, which enters the printing establishments wound on rolls. In order to obtain even, smooth rolls, strips of paper are rolled in between the layers of the warp, said strips of paper being somewhat wider than the width of the silk warp as wound on the roll, spool or bobbin, as the case may be. The warp to be printed is first interlaced at regular distances of about 40 inches apart, with filling threads, which on said places fill out a space of about one-quarter of an inch in width. This is necessary in order to give the warp a good hold for the operation of printing it. Some manufacturers interlace the warp loosely throughout its entire length to give it the resemblance of a loose net work.

"Boiled-off" silk is used as the raw material for these warps, for which reason no further treatment before printing them is necessary, except a very light moistening, which, however, is scarcely noticeable. When the printer has the length of the printing table covered with the warp, this slight dampness is then given with the help of a water spraying apparatus. This apparatus is held by the operator in his hand, in a suitable position above the outspread warp, and when he blows into the mouth-piece of the apparatus, the water is blown out in a fine spray onto the warp, which imparts to the latter the necessary dampness. Some silk printers do not use this apparatus, they place the water in their mouth and blow it direct onto the warp in the same way that the Chinamen moisten shirts for ironing.

After then printing the length of the warp stretched on the table, in its required colors, the operator waits until the last printed colors are completely dry. The drying is hastened by airing the thus printed length of warp yarn, which is done by placing smooth pieces of wood, or glass rods at different places under the warp. This raising of the warp, for the purpose of airing, on the printing table has to be done with great care, in order to avoid tearing of warp threads, which may adhere to the printing table. More particular care must be taken when dealing with warps where the greatest part of its surface has been printed, and when the threads therefore more readily adhere to the table.

The thus printed part of the warp is then rolled up on a roll, bobbin or spool, with a strip of paper from a roll of paper run between the individual layers of the warp, in a similar manner as was done with the warp previously to printing it.

All the colors, as used in printing this class of fabrics, are thickened with Senegal or Gum Arabic. Black and other very dark colors can be thickened with burnt starch or dextrin, provided cheapness of cost is an item.

For fixing the color, the printed warps are steamed at least one hour, with dry steam under pressure, which pressure, however, should not amount to more than 1.5 atmospheres. For this purpose the warps are rolled up in woolen cloths (which have the appearance of ordinary packing cloth) on perforated reels of a diameter of from 10 to 12 inches. In order to obtain a thorough steaming, two, or at most three of the warps, depending on the length of the warp, are placed upon one reel. The reels are provided at one end with hooks by means of which they are hung in the steam chest. In order that the warps and the woolen cloths do not change their relative position in this vertical hanging position, or in other words, in order that the rolls remain unchanged during this process of steaming, the winding up on the reel must be carefully carried out, *i. e.*, the rolls must be wound fairly tight, and there should be no folds or wrinkles.

After the steaming, the warps are unrolled from the reels, separated from the wrapping cloths, and a hank of from 40 to 60 inches is made from each warp. The warps with simliar printed patterns are then laid in large sacks of clean linen and carefully washed in large tanks in which there is a continual flow of fresh water in order to dissolve and separate the thickening material, previously added when printing the warp. The sacks with these steamed warps, are then moved by hand to and fro in the tank with the utmost care, in order to avoid tangling of the warps in the sacks, thus guarding against tearing of the threads. The method of moving about of these sacks, which contain this valuable material in the washing tank with thick clumsy sticks, as was practiced in former times has been discarded, since tearing of the warp was frequently the result of this procedure. After agitating the warps in the tank for at least a quarter of an hour, all the gum should be dissolved, when the sacks with their contents are then taken from the tank, left to drain, and finally freed from most of their water in a hydro-extractor.

The warps are then taken from the sacks, loosened and hung in a drying room until completely dry. After drying, each warp is rolled up into a nice, broad roll, on a table, in a similar manner as they are delivered by the silk manufacturers to the printer. In this rolling up process, the warp threads are slightly stretched, at each table length, and are smoothened out by means of a fine brush. In all the operations, which these warps pass through at the printers, care must be taken that no threads are torn, which could easily occur on account of the tenderness of the thread. It may be well to state here that the excessive breaking of the threads during the printing process will result in a warp more or less unfit for weaving, or anyway result in a poor quality of woven fabric.

The dyes for the printing of the silk warps are delivered to the printing room from the color preparing department of the establishment, in earthen vessels, already prepared, each vessel containing a special stirrer.

A view into the mystery of the color preparing department will be of the greatest interest, for which reason we will now take up this subject. The colors for printing consist of the thickening material already referred to, also of a small amount of glycerin and acetic acid as well as the dye. The addition of glycerin raises the smoothness of the color. Gum is a necessary thickening substance for these colors for printing silk warps, and is prepared into two fluid grades:

(1) a viscous gum solution for the preparation of the chief color,

(2) a limpid gum solution, used for thinning the thick viscous gum preparation.

The preparation of the thickening material is very simple. The proportion of gum is 2 pounds of gum to 1 quart of water. Ordinarily 100 pounds of gum and 50 quarts of water are heated in a copper kettle with a double bottom, which is heated by steam, and is fitted with a stirring device. It is heated gradually to the boiling point and at the end of an hour all the gum is dissolved to a thick fluid which is allowed to cool. In cooling, it forms on the surface a thick scum of albuminous matter, pieces of wood, dirt, etc., which scum is carefully removed and thrown away. The boiled gum is now pressed through a sieve supplied with a brush-like stirring device, and caught in a vessel. In passing through the sieve, the gum solution is freed of all foreign impurities, like sand, etc. To the liquid is then added about a teaspoonful of ordinary acetic acid and a teaspoonful of glycerin for every quart of the gum solution.

The thin gum solution is made up in the proportion of 1 : 1, *i. e.,* one pound of gum to one quart of water, or 1 : 2 according to the quality of the gum. A test shows immediately the boss printer what proportion is required. A large supply of this thick gum fluid, and thinning fluid, can be prepared ahead, because it resists the influence of the air for months and does not become sour like cooked starch and other material. For the preparation of the color, the aniline dye is dissolved in hot water, filtered and mixed with the thick gum solution. The print colors are prepared in different strengh, $\frac{2}{3}$, $1\frac{1}{3}$, 2 or $2\frac{2}{3}$ ounces of aniline dye may be contained in one quart of the dye solution; as a rule $\frac{2}{3}$ to $1\frac{1}{3}$ ounces being used in connection with basic dyes, acid and azo dyes generally containing from 2 to $2\frac{2}{3}$ ounces to the quart.

In the selection of the aniline dyes, which are required for the printing, care must be taken that they will resist the action of water and steam. Neither in the steaming after the printing, nor in the washing that follows the steaming, dare these colors run or fade. Not all the aniline dyes are suitable for this kind of printing, but all classes of aniline dyes offer good representatives.

The author of the article in turn quotes a list of dyes that he recommends for silk warp printing, basing his list upon the well-known products of Cassella; S. C. I. Basel, Geigy, Bayer, etc. Since products used here and abroad differ as to name, etc., we addressed their offices here for full particulars, in this way making the article of more interest to our silk manufacturers.

With reference to *Cassella Color Company,* they informed us that the colors most suitable for silk warp printing are their Diamine colors, without exception, as well as most of their Acid colors, such as Lanafuchsines, Brilliant Scarlets, Brilliant Cochineal, Croceines, Naphtol Red, Orange G G, Orange E N L, Indian Yellow, Acid Yellow A T, Fast Yellow S, Brilliant Milling Green, Cyanole Fast Green, Acid Green Extra Conc., Brilliant Milling Blue, Cyanole and Tetra Cyanole, Indigo Blue S G N, Formyl Violets, Alizarine Black 4 B, Anthracite Black. In a further correspondence on the subject Naphtol Black B D is added to the list given, the same being the identical of Brill. Black B D as quoted by the German authority, the former being the correct American designation.

With reference to the products of The Society of Chemical Industry in Basle, their American agents, Messrs. *A. Klipstein & Co.,* quote that all their dyestuffs (acid, basic and direct dyestuffs) listed as suitable for wool printing in the hand book of their correspondents (on pages 326-327) are equally suitable for printing silk warps.

They further want it to be known that the composition of the printing pastes of their products, in connection with silk printing, is to be similar to that of the pastes used in wool printing, with the exception that the addition of glycerin or other hydroscopic bodies is omitted, as this is not necessary in silk printing.

The preliminary treatment of the goods to be printed, which is required for wool goods, is usually unnecessary for silk; however, in some cases, a treatment with stannate of soda and sulphuric acid greatly increases the brilliancy of the printed color.

As thickening agents, gum arabic, tragacanth paste and dextrine are principally employed; for dark shades also British gum is used. These possess the important advantage of being easily removed from the fabric by a simple washing; as fixing agents for acid and basic dyestuffs, acetic acid or oxalic acid are used; for direct dyestuffs, acetic acid, and for direct dyestuffs sensitive to acids, sodium phosphate. If the prints with basic dyestuffs are required to be particularly fast to water and washing, they are frequently printed, as on cotton, with addition of 2-3 times the quantity of dyestuff of tannin, and passed, after steaming, through a bath containing tartar emetic.

The Usual Printing Recipe for Acid, Basic and Direct Dyestuffs is given by the S. C. I. thus:

$1\frac{1}{2}$ — 3 ozs. Dyestuff; dissolve in
$2\frac{1}{2}$ — $2\frac{3}{4}$ pints water, and add
$6\frac{1}{2}$ lbs. Gum Solution 1/1,
$\frac{1}{2}$ pint Acetic Acid 12° Tw.

10 lbs.

Dyestuffs soluble with difficulty, particularly direct dyestuffs, are boiled with the thickening (British gum, dextrine); with Alkali Blue, Pure Blue, Orange II and IV, Ponceau, Rocceline, Cochineal Substitute, Acid Black and Acid Rhodamine, an addition of $2\frac{1}{2}$-3 ozs. tartaric acid per 10 lbs. printing paste is very beneficial. The printed goods are steamed one hour without pressure, and washed well. To obtain prints fast to washing with basic dyestuffs, 2-3 times the weight of dye stuffs of tannic acid, dissolved in acetic acid, is added to the printing paste. The goods, after steaming are passed through a bath containing 2-3 lbs. tartar emetic per 100 gallons at 86 to 104° F.

Bleu d'Alsace is also suitable for silk printing. For black, Acid Black D and D K may be used; but the amount of dyestuff required is considerably greater than that required to produce a black on wool. For small patterns Jute Black has been successfully employed.

With reference to the products of the *Berlin Analine Works,* the following colors are suitable for Chiné prints: Methylene Blue 2 B D, Guinea Violet 6 B, Guinea Violet S 4 B, Wool Black G R, Naphtol Yellow L, Guinea Fast Green B, Ponceau 2 R, Mandarine G Extra, Chinoline Yellow, Indocyanine B, Resorcine Brown, Ponceau 4 R B.

With reference to the products of the *Badische Company* in the interest of our readers they call our attention to their Black for printing silk warps, *i. e.,* Naphthomelan S B & S R, suggesting the following formula:

250 grams Naphtomelan S B or S R
50 c. c. m. Acetic Acid 6° Bé (30%)
80 c. c. m. Acetate of Chrome 24° Bé
550 grams Starch—Tragacanth Thickening
70 c. c. m. Water.

1000 Grams.

With reference to the products of Kalle & Co., they call attention to the following colors as suitable for printing silk warps:

Yellow, Orange & Brown dyestuffs: Orange II, 4 and R; Phosphine, Bismarckbrown R Conc.

Red dyestuffs: Eosine J, Rhodamine G, B and 6 G; Silk Ponceau, Croceine Scarlets, Safranines.

Blue dyestuffs: Biebrich Acid Blue B and G G, Alkaline Blue.

Green dyestuffs: Brilliant, Malachite and Acid Greens.

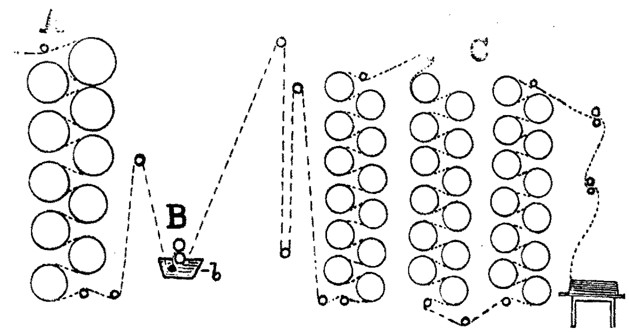
Violet dyestuffs: Methyl and Acid Violets.

Black dyestuffs: Biebrich Patent and Alizarine Blacks, Wool Black D G.

(*To be continued.*)

A New German Process for Preparing Cotton Fabrics for Printing During the Drying Process.

The Gist of the New Process consists in printing the fabrics between two series of drying cylinders, in this way doing away with the rolling up of the fabrics after the first drying process, *i. e.,* previously to



printing. The new process at the same time has the advantage that the fabrics have not to be completely dried, the printing solution simply being made somewhat stronger, in order to compensate for the moist condition of the fabrics.

A description of the new machine and process. In order to explain the subject to the reader, the accompanying diagram is given. The wet fabrics, as coming from the bleachery, are guided over the drying cylinders of the upright dryer *A*. As a rule twenty cylinders, *i. e.,* a double column upright dryer of ten cylinders each is used, only half of it being shown in the illustration. The arrangement of the dryer is such, that after the fabric leaves the latter, about two-thirds of its moisture is removed, and when then the fabric enters at once the preparing machine *B,* which contains a solution of 30 grams of the acid sodium salt of elaidic acid in one liter of water. The fabric then is guided to the upright three column dryer *C*. Ten drying cylinders are shown in each column of the dryer, *i. e.,* 30 cylinders in the complete machine, although more or less may be used. The average speed of the fabric in traveling through the machine is given at thirty to forty yards per minute.

Provided fabrics have to be dried by this process, requiring no printing, the trough *b*, containing the preparing liquid, is simply lowered on the preparing machine and thus brought out of reach of the immersing rolls, *i. e*, out of reach of the fabric.

Natural vs. Synthetic Indigo.

Much publicity has recently been given in the Indian and English papers to an announcement that a discovery had been made whereby the process of extracting natural indigo from the plant and preparing it for the market would be cheapened to such an extent that it would compete with synthetic indigo in price. There is some reasonable show of earnestness and sincerity behind the statement, but a lack of tangible proofs of its entire truthfulness. The latter are promised.

In the absence of these, says "The Textile Recorder," it serves to show that the fight between natural indigo and the synthetic product is by no means at an end, as some would have us believe. We may leave out of consideration the respective and contradictory statements advanced during the last ten years by the partisans of both products, and there still remains very little doubt in the minds of indigo users that of both coloring matters each possesses its particular and peculiar merits for specific purposes; synthetic indigo may give decided advantages in some circumstances, while others cannot be satisfied but by natural indigo. This expresses the state of opinion up to April of this year, when new possibilities came into sight.

Mr. Cyril Bergtheil, the Indian Imperial bacteriologist, had occasion to make an official pronouncement to the effect that from comparative trials made on a large scale on woolen pieces at the Cawnpore Woolen Mills most unexpected, though satisfactory, results had been obtained in favor of natural indigo. These trials were conducted in vats made up according to the ordinary routine method, and the conditions were said to be identical in the two vats. For the one series natural indigo of a standard and known quality was used, and for the other indigo pure B.A.S.F., 20 per cent. paste.

In each case the indigo was reduced, and the vats made up, with hydrosulphite and lime. Comparison showed that natural indigo gave not only a darker shade, but also a richer one. This result was regarded as sufficiently encouraging to warrant the carrying out of more extensive experiments, and these were promised. The question remained at this point until September, when it was again brought in the same quarters to public notice by a communication from the Badische's representatives at Bombay, Messrs. Ostermayer and Co. This communication pointed out that the particular brand of synthetic indigo supplied by them and used for Bergtheil's tests was not the ordinary "B.A.S.F. 20 per cent.," but a special brand known as "B.A.S.F. 20 per cent. E." This also contains 20 per cent. of indigotin and additional bodies, beside water, which are not in any way adulterants, but simply fermentable substances, and preservative alkali added for the specific object of producing a brand of indigo suitable for use in the cold fermentation vat, frequently used by the natives in such countries as India and China. The commercial E brand contains caustic lime to the extent of about 25 per cent. of the amount of indigotin contained in the paste, consequently the vat of synthetic indigo at the Cawnpore Woolen Mills contained, besides indigo, a considerable quantity of caustic lime, and as both the plant and the synthetic indigo were reduced by treatment with exactly similar quantities of hydrosulphite and lime, it follows that the comparative dyeings did not take place under identical conditions in both vats, but, on the contrary, the vat containing the synthetic indigo was essentially more alkaline than the other vat.

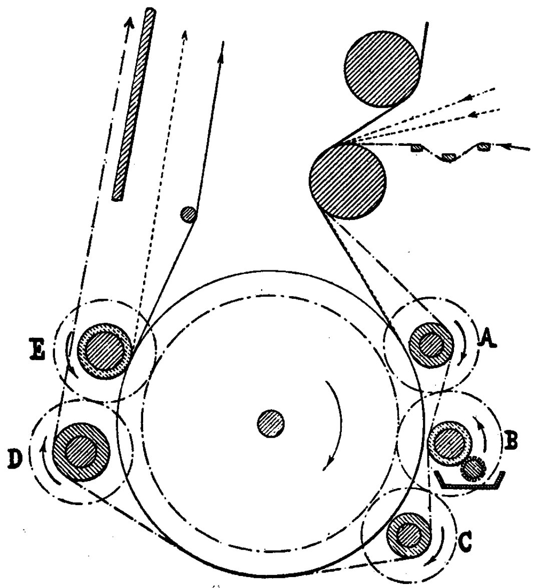
This in itself would, it is claimed, account for the difference in shade obtained by Mr. Bergtheil. A neutral vat yields the indigo up to the fibre most readily, and by making the vat acid in character it is possible to drive the indigo white completely from its solution on to the fibre. On the other hand, a small excess of alkali is sufficient to hinder materially the exhaustion of the indigo white. A difference in shade corresponding nearly to that obtained by Mr. Bergtheil in his experiments when comparing plant and synthetic indigo has been obtained, and is illustrated by patterns from specially prepared vats, the one normal, the other containing a known excess of lime. Replying to this criticism, Mr. Bergtheil says that he cannot at present express agreement or disagreement with the conclusions drawn, and that he proposes to carry out further tests, and until these are made he cannot form an opinion.

This uncertainty, however, is followed by a further development. This time Mr. E. C. Schrotty, writing to the Indian papers on the research work in connection with indigo carried out by him during the present year, claims to have proved that by a second steeping process, and with the established merits and greater yield per acre of the Java-Natal indigo, natural indigo can now be produced and sold at a good profit at a figure which is considerably below the manufacturing cost of synthetic indigo.

A Novel Process of Producing Changeable and Silk Effects Upon Fabrics.

THE CHARACTERISTIC FEATURE of the process consists in imprinting upon the extreme points of the fibres as protruding from the fabric, a fine smooth layer of a dye, by means of engraved rollers; the fabric during the process being kept at an equal tension by means of a proper arrangement of a series of drafting and delivery rolls, in order that the color is most evenly applied. These delivery and drafting rolls, or as we might call them, guide rolls, are covered rolls, in order to present a rough surface to the fabric and thus accomplish the proper friction with the latter, *i. e.*, produce an even smooth running of the fabric to be treated, through the machine.

As will be readily understood, the process refers more particularly to fabrics having a napped face, the layer of the dye being of a color differing from that of the fabric. The same procedure can be used provided it is desired to make use of "discharging the color." In either instance, whether adding or discharging color, only a small amount of the face of the fabric is treated, the original color of the fabric remaining in excess, and not treated.



The design or effect desired for the printing, *i. e.*, the coloring of, or the discharging of color from the ends of the protruding fibres, is regulated by means of an engraved roller, and consequently differs from the older process, where a similar result was obtained by means of a brushing process, which however, does not produce the nice smooth even result as the new process does.

A Description of the New Machine and Process: In order to explain the process, *i. e.*, the machine used for it to the reader, the accompanying illustration is given, representing a diagram of the new printing machine. In the same *A, B, C, D,* and *E* are five rollers arranged on the two sides of the main cylinder of a printing machine, and of which roller *B* is the actual printing roller, *i. e.*, and engraved copper roll, and which is driven direct from the main shaft of the machine, driving in turn through suitable gearing rollers *A* and *C* in opposite direction from it.

E is a copper roller, driven direct, and which in turn drives the draft roller *D* and thus revolves the main cylinder of the machine by friction of the fabric. *A, C* and *D* are wooden rollers turned smooth and perfectly true and are covered with strips of sheet iron, into which fine holes have been drilled (in a spiral direction), the indentations of the rolls having been made so as to protrude outside when on the roll, in order to present the required rough surface to the fabric, so that the latter will adhere closely to the rolls and travel evenly and under a proper uniform tension throughout the process through the machine. Rollers *A* and *C* are feed rolls, and are of equal diameter and have the same surface speed, and since the fabric closely follows the surface speed of these rolls, an even tension of the fabric during the printing process will be the result, *i. e.*, an even, uniform printing of the fabric is accomplished. After leaving roller *C* the fabric structure is taken along by draft roll *D* and from there enters direct to drying room, a feature which is of the greatest importance in connection with these printed fabrics.

Any change of design or effect required, is produced by means of using different engraved rolls *B*.

The machine also may be supplied with two or more printing rollers *B*, provided two or more different colored effects are required in the fabric.

The process is of Russian origin and is claimed is meeting with practical success, not only in that country, but also in France and Germany.

TESTING OF CHEMICALS AND SUPPLIES IN TEXTILE MILLS AND DYEWORKS.

(*Continued from page 92.*)

LIST OF APPARATUS REQUIRED FOR LABORATORY.

Glassware.	Quantity.
Beakers, 60 c.c., 120 c.c., 250 c.c., *Griffin form, with lip*	6 each.
Beakers, 350 c.c., 700 c.c., *Griffin form, with lip*	4 each.
Burettes, 50 c.c., *graduated in 0.2 c.c.*	4
Crucibles, porcelain, *with cover, 15 gram*	3
Dishes, evaporating, *porcelain,* 120 c.c., 300 c.c.	3 each.
Dishes, evaporating, *porcelain,* 30 c.c., 60 c.c.	6 each.
Dishes, evaporating, *porcelain,* 600 c.c., 1000 c.c.	1 each.
Flasks, *glass, Ehrlenmayer,* 500 c.c.	4
Flasks, *glass, Ehrlenmayer,* 120 c.c., 250 c.c.	6 each.
Flasks, *glass, Florence,* 500 c.c., 1000 c.c.	2 each.
Flasks, *graduated,* 1 litre, 500 c.c.	2 each.
Flasks, *graduated,* 250 c.c., 100 c.c.	2 each.
Funnels, *glass,* 60 c.c., 250 c.c.	4 each.
Glass rods, *¼ inch and ⅛ inch*	½ lb.
Glass tubing, *¼, ⅛ and ½ inch sizes*	1 lb.
Measuring Jars, *graduated,* 250 c.c., 500 c.c.	1 each.
Measuring Jars, *graduated,* 100 c.c., 50 c.c., 25 c.c.	2 each.
Mortar and Pestle, *glass, small*	1
Pipettes, *graduated in 1 c.c., 5 c.c., 10 c.c.*	2 each.
Specific Gravity Bottle, 10 gram	1
Watch Glasses, 2 in., 3 in.	6 each.
Test Tubes, 6 in., 8 in., 4 in.	12 each.
Test Tubes, *with foot,* 6 in.	12
Bottles for Reagents, 4 oz. (*40 bottles in set, labelled as per catalogue.*)	Set 1.
Bottles, *glass stoppered,* 1000 c.c.	10
Bottles, *amber, round,* 500 c.c.	10
Bottles, *clear, cork stoppered,* 1 quart and 1 pint, about	12 each size.
Bottles, *cork stopper,* 2 oz., 4 oz. and 8 oz. and 1 pint	12 each.
Bottles, *glass stoppers,* 4 oz. and 8 oz.	12 each.
Other bottles as needed.	

Miscellaneous.	Quantity.
Alcohol lamp, *4 oz. size*	1
Bunsen burner, *gas, with rose top*	1 or 2.
Cork stoppers, *assorted for pints, quarts, etc.,* about	4 doz. each size.
Cork borer, *3 in set*	Set 1.
Apparatus stand, *3 rings*	1
Burette stand, *for 4 burettes*	1

MISCELLANEOUS.	QUANTITY.
Stop-cocks, *for burettes, wire*	6
Scales, *analytical, to weigh 1 mgm. to 10 gm.*	1
Set of Weights, *metric*, 1 cgm. to 10 gm.	1
Platinum Crucible, *15 gm. size*	1
Nickel Evaporating Dish, 30 c.c., 60 c.c.	1 each.
Rubber Tubing, ⅛ in., ¼ in.	6 ft. each.
Rubber Stoppers, *for pint bottles*	36
Thermometer, *chemical, Centigrade Scale*	1
Test-tube Rack, *for 18*	1
Test-tube Holders	2
Drying Oven, *for gas or alcohol*	1
Sand Bath, *6 in. diameter*	1
Water Bath, *8 in., assorted lids*	1
Funnel Rack, *small size*	1
Retort Stand, *12 in. high*	1
Filter Paper, *3 in., 4 in., 6 in., best white*	1 pack, each.
Sieve, *6 inch, No. 80*	1
Clay-pipe Triangles, *4 inch size*	3
Copper Wire-gauze, *heavy*	1 sq. foot.
Sheet Iron or Copper, *4 in. sq., ⅛ in. thick.*	3 pieces.
Copper Wire, *light*	3 feet.
Copper Foil, *thin*	6 sq. inches.
Magnifying Glass	1
Sheet Asbestos, *¼ in. thick*	1 sq. foot.
Scissors, File, Pinchers, Labels, etc.	

The foregoing list of glassware and apparatus may be taken as furnishing practically all the articles that will be needed under ordinary circumstances. As the work to be done will be confined to what are known as analytical operations, the only things required are those necessary for measuring and weighing and the operations involved in testing. If desired, more of any of the items of "Glassware" may be ordered, as the list given is a minimum one, making allowance for breakage and for the requirements of several operations carried on at one time.

The number of burettes, measuring flasks and jars, and pipettes will not be found excessive, in fact more burettes may be needed if much work is done, and the other articles will be constantly used in volumetric analysis. A burette stand, or holder, is necessary. If expense is not a consideration, burettes with glass stopcocks are preferable to the plain style, as rubber tubing, which is affected by some test-solutions, is necessary with plain burettes.

A good set of scales is an absolute requirement, for on accurate weighing depends the accuracy of the test-solutions and all operations where the purity, strength, quantity, etc., of any article is being estimated. The scales must be capable of weighing one milligram with accuracy, in quantities weighed on it up to 10 grams. Such a "balance" as a set of scales for laboratory work is called, will be the most expensive part of the outfit, but the finer and more costly kind of balances is not required, and a good one can be bought for about $35 to $50. A set of weights in the metric system should be bought with the scales, a set containing weights from 1 centigram to 10 grams being most suitable. Small avoirdupois weights may also be bought if desired, but it will be found that the work can be done much easier if the metric system alone be used. Scales should be kept in a glass-enclosed case, which is supplied with them.

The best place for the balance is in the office, where neither fumes nor gases can reach it and destroy its sensitiveness and accuracy.

All apparatus used for measuring, *i. e.*, burettes, measuring jars and flasks, etc., must be accurate or they are worthless. Only those whose accuracy is guaranteed should be purchased, and it is best to test them before use.

Much of the expense of running a laboratory depends on the care taken in handling the apparatus, as the glass vessels used are necessarily very thin and break easily. Every article should be washed clean and carefully put away after it is used, and thin glassware should be kept on a shelf or in a cupboard out of the way. The following precautions are suggested for the care of glass apparatus and vessels, and in using chemicals.

Never set a hot beaker or flask on a cold surface.

Never expose a vessel containing a cold liquid to a direct flame; put the flask, dish or beaker on a piece of wire gauze or on a metal plate when heating it.

Never pour a boiling liquid into a cold vessel without setting this on a cloth or asbestos pad.

Never use the measuring flasks for boiling or heating liquids; make all solutions in common flasks or beakers and let them cool before pouring them into the graduated jars or flasks for measuring their volume.

Never expose crucibles or porcelain dishes to direct heat at first; heat them up gradually before applying the final intense heating.

Never use a large vessel when a smaller one would answer the purpose; large glass vessels break easier than small ones and cost more.

Never use large quantities of test-solutions when a little will be all that is necessary to make the test; don't waste chemicals needlessly.

Never make up larger quantities of test-solutions than will be required for the near future; many test-solutions lose strength when kept a long time.

If these rules are followed and if common sense and care be used, the running expenses of the laboratory will be found very small.

Bottles. Bottles of various sizes are a necessary part of the laboratory outfit, for keeping the test-solutions, etc. The chemicals, acids, etc., can be kept in the bottles they come in when bought from the dealer. Round bottles are the best, and bottles with glass stoppers must be used for all strong test-solutions, acids, etc. Cork stoppered bottles can be used for liquids that will not affect the cork, such as alcohol, glycerin, weak test-solutions, etc., but they must never be used for the strong test-solutions, acids or alkalies. The trouble with cork stoppers is that they absorb considerable liquid at times, and therefore an old cork may contain enough of a chemical in its pores to spoil a test-solution if this cork be used in a new bottle holding it. Corks can be improved by boiling them in melted paraffin; acids and alkalies do not then affect them easily. Glass stoppers must fit snugly and accurately, but not too tight, else they will stick. If they be lightly covered with pure vaseline, rubbed over the ground part that fits in the bottle neck, before being put into the bottle, they will not stick or jam.

All bottles used must be clearly and plainly labelled to indicate exactly what they contain, never trust to memory or half-written labels. It is a good plan to keep a stock bottle for each solution and use it only for this particular one. Wash bottles well before using them. A neat way of rendering a paper label waterproof is to coat it thoroughly with hot melted paraffin, put on with a small brush after ink and paste are perfectly dry and wiping off the excess of paraffin with a cloth. A supply of gummed labels should be kept on hand.

There are a number of solutions of chemicals that will constantly be used in testing various substances, which are called reagents, and these are most conveniently kept in the so-called reagent bottles, which have glass stoppers and are lettered with raised glass letters on one side, giving the name and formula of the chemical solution in the bottle. A set of these comprises about forty bottles, each labelled separately, and may be procured by simply ordering thus: "1 set of reagent bottles." The set comprises the names of all the chemicals that will be ordinarily used. Solutions of other chemicals needed may be made and kept in suitably labelled glass stoppered bottles.

The standard volumetric test solutions are best kept in pint or quart amber, glass-stoppered bottles, using quart size only for solutions used in quantities. Many of the weaker solutions may be kept in cork-stoppered amber bottles, but good corks only can be used, and these should be first boiled in paraffin to fill up their pores and to prevent the liquids from affecting them.

Chemicals Required. To assist the student in fitting up his laboratory with the least expense for supplies, a list of the chemicals that will be required for the work later described is here given, with the approximate quantities of each article sufficient to begin with. While this list may not include everything that might be needed in the course of work, after this has been carried on for a while the student will be able himself to see if he needs other things. The purpose of this series of articles is to instruct the reader in the practical work of testing chemicals, dyes, mill supplies, etc., by giving only practical methods and their application, no instruction in general chemistry will be given except in so far as may be necessary to explain the theory and practice of chemical analysis applied to the purpose named, therefore, only the apparatus and chemicals needed for this work will be mentioned. However, much experimental work and general chemical analysis could be done with the outfit named, if so desired.

A few words before quoting the list of supplies are required. When ordering chemicals, specify only one quality, *i. e.*, "chemical reagents of guaranteed quality," and insist on getting it. It will not pay to buy the cheap chemicals ordinarily used in industrial processes nor those found in the average drug store, they are too uncertain in strength and purity to be fit to use for analytical work, without being themselves tested, and this would be a long and tiresome job. The only chemicals fit for use in testing are those of the highest purity, so that solutions made from them can be depended on, as being exactly what they should be. This is especially true as to acids, which are hard to get strictly pure. If cheap chemicals are bought, they must first be tested and then purified before they can be used, and this will cost far more in time, labor and materials than will reagents of the highest quality.

The various chemicals bought should be ordered in glass bottles, holding the quantities mentioned in the list, acids and strong alkalies in glass stoppered bottles, chemicals affected by light in amber glass bottles. When a portion of the contents is taken from any bottle, always cork it tightly afterwards. The laboratory supply of chemicals can be kept in the original bottles as a rule, it will seldom be necessary to transfer anything to another bottle.

(*To be continued.*)

New Dyes.

A folder showing various shades obtained from two new brands of Diamine colors, viz.: *Diamine Fast Brown G and R Pat.* has been issued by the Cassella Color Company. The card shows five samples of each color; one sample on loose cotton, two samples on cotton yarn and two samples on piece goods. The cotton yarn shows two different shades of each dye, one produced by 1½% of the dye and the other by 3% of the dye. The loose cotton and fabrics are all dyed with 3%.

These colors are remarkable for their particularly bright shades combined with excellent fastness to washing and light, and good fastness to chloring. They level exceedingly well, and are thus eminently adapted for the direct dyeing of bright shades of brown as well as for fashionable shades. They may be employed to advantage in every branch of the cotton dyeing industry, particularly also for machine-dyeing.

These dyestuffs are likewise of importance for half-wool and half-silk dyeing; they dye the cotton part principally, and go only to a small degree on to the animal fibre.

DIRECTIONS FOR DYEING:

Cotton. Dye at the boil in the manner customary for Diamine Colors with the addition of 1-2% soda ash, and of 10-20% desiccated Glauber's salt or common salt, according to the depth of shade required.

Half-wool. Dye boiling hot in a neutral Glauber's salt bath (2 lbs. per 10 gallons liquor).

Half-silk. Dye boiling hot with the addition of ½-1 lb. Glauber's salt and 3-4½ oz. soap per 10 gallons liquor.

REINFORCED CONCRETE CONSTRUCTION FOR TEXTILE MILLS.

The textile manufacturer who intends to build a new mill or make an addition to his mill, had better look into the merits of a reinforced concrete building, since there are several points which are in favor of the concrete building.

WHAT IS REINFORCED CONCRETE?

Reinforced concrete is a technical name for a method of fireproof construction in which the only materials used are cement, sand, broken stone and steel. Concrete is a combination in proper proportions of the first three, forming a hard and permanent substance similar in texture and hardness to granite. Any good building material must resist the pressure and pull of weights and stresses. The concrete resists the pressure and the steel the pull. The proper combination of these two gives any structure capacity to carry weights. Steel is added to the concrete to produce elasticity, which is essential to any good building material. This addition of steel is called reinforcement—*hence the name reinforced concrete.*

THE COST OF CONSTRUCTION of a concrete reinforced building is less than that of a building of brick or stone. This is becoming more noticeable daily, because the price of wood, brick, and building stones is becoming higher and higher, while the price of cement, which is the costliest constituent of concrete, is growing less and less due to the enormous demand for it. Moreover, in concrete construction very few skilled laborers are required, most of the work can be done by unskilled laborers, under proper supervision, so that there will be a great saving in wages. Another source of economy in reinforced concrete construction lies in the comparative lightness of structures erected according to this method, thus effecting a considerable saving in very many instances in foundation work. Thinness of the walls, floors, etc., more than compensates for the extra cost of the concrete required in the mixing and depositing of concrete and in the placing of the reinforcement. A seven or eight-inch reinforced concrete wall will replace one of brick twenty-five inches thick. This difference in the thickness of the walls gives therefore an increased floor space which is a very desirable item in connection with the construction of textile plants.

Concrete buildings can be erected much quicker than buildings of any other material. Walls can be moulded a great deal quicker than they can be built of stones or brick; and floors and roofs can be moulded at the same time as their supporting beams.

It can be readily seen of what importance this saving of time is to the mill owner; he can install machinery and start operations that much sooner.

Although the concrete buildings can be erected faster than stone or brick buildings, they are stronger than stone or brick buildings. *Concrete is indestructible,* it resists the action of water, moisture and steam, and resists the action of salt water better than any other material used for building, an item which will be of special interest to our mills located near the coast. Some of the most ancient structures in the world had been built of this material and are to-day apparently in as sound a condition as they were when they were first completed; in fact they are sounder, because concrete becomes harder and more resistant as it grows older. This may seem absurd but it has been proven by experience. Tunnels and roads built of concrete by the Romans, are still in a good condition.

FIREPROOF. Another thing to be considered is that reinforced concrete buildings are fireproof. A mill with floors, walls and roof of concrete has practically nothing which can take fire, and if there are any fires in the neighborhood, the heat from these fires does not affect the concrete walls, they do not crack or bend. If any material in a concrete building should take fire, there are no wooden floors to help feed the fire and it can be kept under control.

Illustrations of the fire resisting qualities of reinforced concrete are numerous. The Pacific Coast Borax Company had a building of reinforced concrete; one day the materials which were stored in it took fire and a large conflagration resulted. The heat resulting from this conflagration was so great that brass and iron fittings were melted to a shapeless mass. The building itself was unhurt, except where an 18 ton tank had fallen through the roof and struck the concrete floor. The floor was cracked by this mass falling on it, but the injury was repaired.

In the fire which destroyed a large portion of the business section of Baltimore, a concrete building which was surrounded by buildings which were not fireproof, resisted the tremendous heat resulting from these buildings when they burned, a slight scaling of the exterior surface and a few cracks which were easily repaired was the only injury resulting from this fire.

The insurance writers recognize the fire resisting qualities of reinforced concrete and give lower rates for insurance.

TANKS. A fact that will be of interest to Dyers, Bleachers, Finishers, etc., is that tanks, reservoirs, and tubs can be constructed of reinforced concrete and that they have been found superior to those made of wood, which rots, or iron which rusts. The concrete tank withstands the action of acid and alkalis better than iron and wood. Wooden tanks when not in use become dry and warp so that when a solution is put into the tanks they leak. On the other hand, concrete tanks can remain empty a long time and will not leak when they are again used.

HEAT. Concrete is a very poor conductor of heat. For this reason a concrete structure is cooler in summer and warmer in winter than other structures, which absorb and conduct the heat and cold. This is especially true on the top floor of the mill or any other building; every one has noticed in commonly constructed mills, how hot the top floor is in summer, and how cold in winter; whereas concrete roofs keep out the heat and the cold.

STRENGTH. Another very important point in favor of a concrete mill structure, etc., is its monolithic nature and rigidity. A concrete building is a unit; it may be considered as a big stone, out of which has been cut cavities for rooms; every particle in it is firmly connected with other particles, therefore the concrete building resists vibrations to a great extent. This resistance to vibration is noticeable in buildings containing machinery, *i. e.*, our textile mills, and where the absence of vibration is not only beneficial to the mill structure itself, but to the machinery. The latter runs more smoothly, and not being subject to external vibration enjoys a longer life. The machinery does not break down so often, nor does it require so many repairs. Repairs to machinery is a large item to the expense account of mill owners, and anything that reduces this expense is desired.

SWAMPY GROUND. For buildings which are to be erected on bad and swampy ground, reinforced concrete can be used to great advantage. A reinforced platform under the mill building, supported if necessary on reinforced concrete piles, makes a good foundation; one that is able to resist the stress of unequal settlement. Moreover, since a concrete building is lighter than a brick or stone building there will not be so great a tendency for settling or sinking as there would be in a heavier building.

SANITARY. Concrete buildings are more sanitary than the ordinary brick or stone buildings. The latter have wooden floors which decay and warp, forming cracks where dust can settle and where bugs such as roaches, ants, etc., can find lodgment. In a concrete building, where the floors are of concrete, there are no places where the dust can settle; the floors can be easily cleaned and there are no cracks where bugs can penetrate. Rats and mice find it almost impossible to bore through the concrete floors, so that they are kept away and the premises kept cleaner.

In the recent earthquake and fire in San Francisco, buildings made of concrete resisted the action of the earthquake to a greater degree than buildings built of any other material. In fact, they were scarcely injured by the earthquake, and the fire which followed did very little damage to them.

The mixing of concrete is interesting, the proportion of material being, one part cement, two parts sand, and three parts of crushed stone. The proportions are often changed, depending on the character of building to be constructed and upon the judgment of the engineer in charge. One method is to mix the sand and cement while still dry. Then to this mixture add the crushed stone which is crushed into pieces the size of a walnut. The crushed stone should be clean and should be of some hard stone, *e. g.*, trap rock. Water is added at the same time that the stone is. The amount of water added is not measured, the man in charge of the mixing knows by the appearance of the mixture when sufficient water has been added.

Great care must be taken in the selection of materials. The cement must be a high grade Portland cement. The sand must be clean sand, (if necessary washed sand) it may be coarse or it may be fine, but a mixture of coarse sand and fine sand has proven most satisfactory, because the fine sand fills in small holes which coarse sand would not. Clay and loam are injurious in sand because they do not enter into combination as well as the sand. The stone also must be clean and should not contain much dust.

A MECHANICAL MIXER is now frequently used. This does the work much quicker than a laborer and does it equally as good. The mixer consists of an iron tank in which there is a stirring device, which is run by steam or electricity. The cement, sand and stone are emptied into a hopper in the right proportions, the sand and cement are emptied directly from their sacks without previous mixing, and the crushed stone added. Water is continually fed into the mixer by means of a hose and the materials are thoroughly mixed. An opening at the lower end, which can be opened or closed, permits the mixture to be taken out as required. This is a continuous mixer.

Some mechanical mixers known as batch mixers receive one charge at a time, mix it thoroughly and then empty the whole charge. These batch mixers mix the concrete better than the continuous mixer previously explained, because the whole charge is put in at one time and thoroughly mixed. The continuous mixture has to be fed uniformly or else the concrete will not be mixed thoroughly.

THE CONCRETE IS NOW READY FOR USE. Concrete is rarely used alone, it is generally used with steel, the steel adds a property which the plain concrete does not possess; this property is elasticity. Plain concrete will stand great pressure or weight, but it cannot resist so well a tension or pulling strain. Since steel can resist the pulling strain, the addition of the steel to the concrete adds this property to it. There are many methods of reinforcing concrete. A description of these methods would be of a too technical character for any but a civil engineer. It is sufficient to say that steel in the form of twisted bars, corrugated bars, or in the form of a wire is usually used. This steel is in general used as a skeleton, about which the concrete is poured. The concrete protects the steel from water and air, and the steel therefore lasts as long as the concrete. The steel adds to the tensile or pulling strength, and is therefore useful for floors which must sustain great weights; the steel also strengthens the walls and supports, but is not so necessary in foundations of buildings.

Illustrations Fig. 1 to Fig. 9 will show how steel may be used for reinforcing concrete. These illustrations show how means are provided for tying the metallic frame members together, so that they will be held in proper relation to each other until the concrete has been placed about them. These illustrations show how, according to a recent patent, the steel is kept in place before being surrounded and imbedded with concrete.

Fig. 1 shows a reinforced girder. Fig. 2 is a sectional view of this girder taken along the line $A-A$ of Fig. 1. Fig. 3 is a sectional view of the girder taken along the line $B-B$ of Fig. 1. Fig. 4 illustrates the method of tying the metallic frame members together in the case of a column, the limits of the surrounding concrete being shown by dotted lines. Fig. 5 is a cross sectional view of Fig. 4, executed on a somewhat smaller scale, the cutting plane being horizontal and passing just above the uppermost clamps. Fig. 6 is an edge view of a straight clamp. Fig. 7 is a similar view of a diagonal clamp. Fig. 8 is a plan view of the clamps shown in Figs. 6 and 7; and Fig. 9 shows a modified form of a clamp used where the frame-members are of circular cross-section.

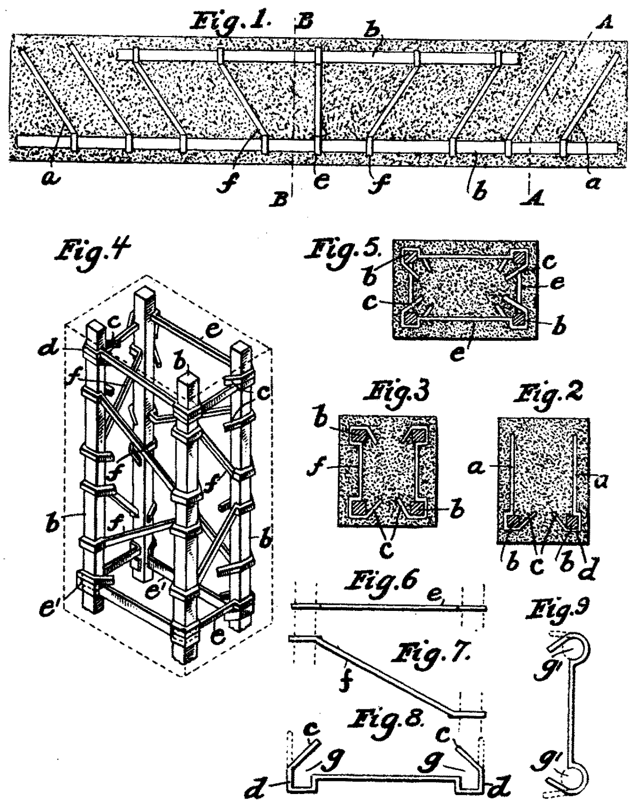


Fig. 1 shows a girder in which the anchor-member *a* is formed at one end, so as to fit snugly around the main reinforcing bar *b*, on three sides; and this end terminates in a finger *c* which lies in prolongation of the side *d* when the anchor-bar is placed upon the reinforcing bar *b* and before the concrete is placed.

Before the concrete is placed around the reinforcing bars *b*, the finger *c* is bent inwardly and thereby it serves to anchor the bar *a* and to secure it in position on the reinforcing bar *b*. The free part of the bar *a* extends diagonally outwardly from the reinforcing bar *b* and serves to give stiffness to the structure. Figs. 2 and 3 show the prolongation of the side *d* and the finger *c* which cannot be seen in Fig. 1.

In order to secure a pair of the reinforcing bars *b* together, the clamp-bars *e*, *f* are provided. These clamp-bars are formed at each end with recesses *g* in all respects similar to the recess formed upon one end of the anchor-bar *a*. The walls of the recess *g* closely engage the frame-member or reinforcing bar *b* upon three sides and both ends of the clamp-bars *e*, *f* terminate in a finger *c* identical with the finger *c* upon one end of the anchor-bar *a* and used in a like manner for a like purpose. The central clamp-bar *e* is straight, while the clamp-bars *f* on each side of it have their central portion inclined to the plane of their ends, so that they form practically diagonal braces.

In Fig. 4 the application of the system of bracing to the frame-members or reinforcing bars *b* of a column is illustrated. At the top and bottom of the column clamp-bars *e* are placed so as to prevent the frame-member *b* from spreading apart or from becoming otherwise displaced. Between the upper and lower sets of clamp-bars *e*, diagonal clamp-bars or braces *f* are placed which connect frame-members upon the same side of the column. Thus, the frame-members *b* are held rigidly in place and great stiffness and structural strength is given to the column with the addition of very little weight and at a very low cost. It will be understood that all the clamp-bars and braces are provided with fingers *c* which are bent inwardly before the concrete is placed and serve to anchor the clamp-bars and braces in place.

In case the length of the frame is to be increased by placing one reinforcing bar in prolongation of another, broad clamp-bars *e′* are used which are of sufficient width to cover the abutting ends of both bars to some distance on both sides of the joint. (See the lower part of Fig. 4.)

In the modified form of a clamp as shown in Fig. 9, the recess *g′* is shaped to receive a reinforcing-bar of circular cross-section; and in any case, the recess will be of a form complementary to that of the cross-section of the bar which is to fit into it.

The consistency and wetness of the concrete mixture is a disputed point. There are three mixtures which are distinctly recognized; these are the *dry* mixture, the *medium* or *quaking* mixture, and the *wet* or *mush* mixture. It is now being recognized that each kind of mixture is particularly suited for some special kind of work.

THE DRY MIXTURE (just enough water is added to it to give it the consistency of damp earth) is used for mass foundations which must stand great compressing a short time after being placed; because, as can be readily seen, a mixture of this sort will dry quicker and become hard quicker than a mixture containing more water. Its final state of hardness is not any harder than that which the other mixtures furnish.

THE MEDIUM or quaking jelly like mixture is one to which just enough water is added to give the mixture a tenacious, jelly like character, it sticks to the shovel; this is used for foundations, arches, and heavy walls.

THE WET or mushy mixture is thinner and runs easily and quickly off the shovel; this mixture is used for thin building walls, for floors and for tanks.

NOTES. In the erecting of the mill building, the mixed concrete is poured into molds or frames. These molds or frames are made of planks one or two inches thick and of various widths. White pine is the best lumber to use, but hemlock, fir and spruce are also used. Green wood is better than dry wood, because the dry wood absorbs the water in the concrete. The

(*Continued on page viii.*)

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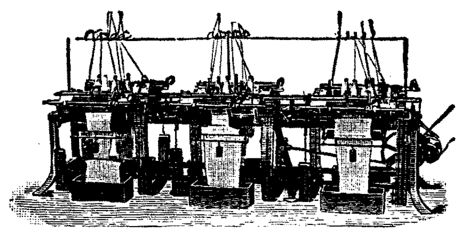

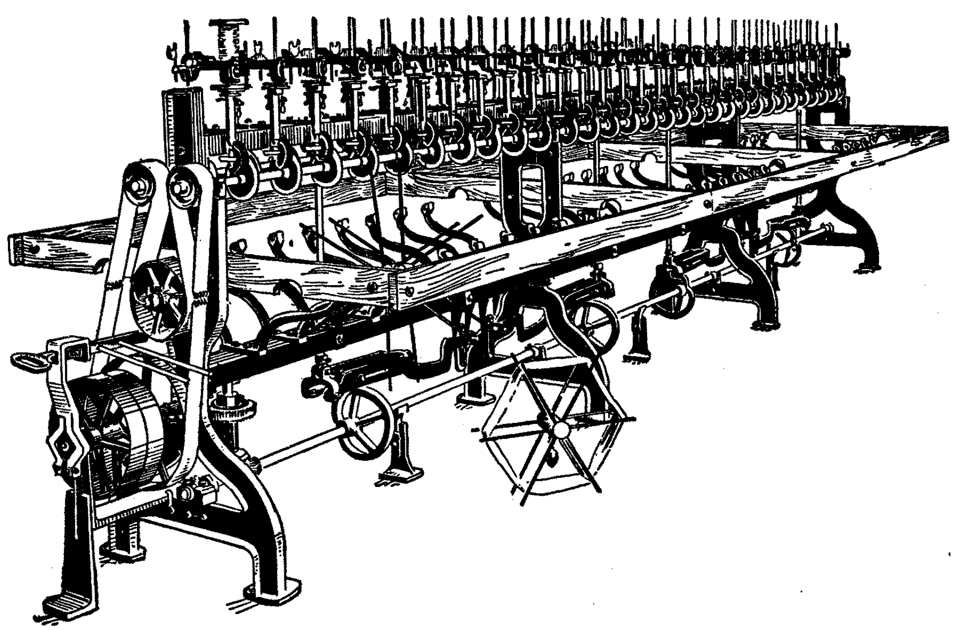

BUYERS' INDEX—Continued

CONCRETE.

(*Continued from page 136.*)

wood is usually planed so that the concrete does not stick to it. After the concrete is poured into the molds, it is rammed with special instruments to drive out the air and make it more compact. This ramming must be done every six or eight inches so that the concrete is compact. The concrete is now allowed to harden and the boards removed. These boards can be used again. In building a wall of concrete, after the concrete has attained a height of eight or ten feet, the lower part of the frame is raised (since the lower part of the concrete is dry and hard) and the fresh concrete poured on top of the old concrete. In this way the walls are kept at an even thickness and in one straight line.

Several things must be carefully considered in erecting a concrete building, the material used must be of the finest and they must be thoroughly mixed. The molds must not be removed until the concrete is strong enough to support itself; from six to twenty-one days must elapse before the boards and their supports can be removed. The only fault that was claimed to be found in concrete construction was that no addition could be made in the form of partitions in an old building, since new concrete does not adhere to old concrete. However, this difficulty has been overcome. New concrete does not adhere to old concrete, *but new concrete does adhere to steel or iron.* By fastening thin bars of iron, which have a thin projecting edge, onto the floor, walls and ceiling at the place where the new partition is to be built, and then pouring the fresh concrete into the moulds which will enclose these bars, a new wall can be constructed which will adhere firmly to the iron, which in turn is riveted to the walls of the building. In this manner a new partition as strong as the old partitions can be built.

THE LIGHTING OF TEXTILE MILLS.

(*Continued from page 94.*)

Lighting Supply. The practice of installing dynamos, etc., at mills run by water-power or at mills having a large steam plant, is now so common that it does not call for an extended reference. The purchase of electric current from other mills or from public supply companies is also a common practice; gas is almost always bought from a public supply company. The question as to whether to generate the current at the mill or to buy it depends largely on the amount of lighting required and on the cost of power. For large mills using a great number of lights and requiring considerable current, it is usually cheaper and more satisfactory to install dynamos, etc., and for them to generate their own electric supply; small mills with few lights can buy current at better terms than they can make it, considering the cost, running expenses, repairs, etc., of a plant, unless a gas or gasoline engine be used for generating the current. Even then, buying current is the least troublesome. Gas, in towns and cities, can be bought cheaper than it can be made.

There are instances where the cost of a plant for furnishing light to a mill is not the question, the mill must install its own plant as no public or other supply is available. In such cases, there are two alternatives, to equip an electric light plant or to equip a gas plant. Either can be done on a large or a small scale, but for general interest, we will describe and figure on the cost of a plant suitable for the average mill where water-power is not available and where the cheapest plant is desired. No attempt will be made to estimate the cost of building the plants, as this will vary according to local conditions, the average cost of the equipment needed and the cost of the lighting being

(*Continued on page x.*)

the only data that can be given accurately. Two types of lighting plants will be described—an *electric lighting* system, from a dynamo run by a gas or a gasoline engine, and *gas lighting*, by acetylene or by carburetted gas, the two being similar in installation and operation.

Gasoline Engine Plant. The modern gas or gasoline engine of the internal combustion type has been brought to a high state of perfection, and it is now a serious competitor of the steam engine even for high horse-power. Where only a few horse-power are required, the gas or gasoline engine is far superior to the steam engine in economy of fuel, instant availability and cost of power. These engines consume fuel and require attention only when generating power, when the power is not wanted the engine is stoppd at once and no fuel is used until it starts again, and it can be started and run up to its full capacity in a moment's time. Therefore, either a gas or a gasoline engine is ideally suited for the mill that is to furnish its own electric current for lighting, it costs money only when working.

A suitable plant for the mill consists of a dynamo and the gas or gasoline engine, with switchboard, controllers, rheostat, etc., and the usual lamps and wiring. The dynamo is run by the gasoline engine and should be of the type to furnish the kind of current required for the type of lamp used; the best results will be obtained by using incandescent or enclosed arc lamps, which are operated with a current of low voltage, usually 110 to 115 volts.

An engine of 10 horse-power will run a dynamo that will supply current for from 100 to 120 incandescent lamps of 16 candle-power, or an equivalent number of lamps of higher candle-power. The plant, consisting of engine, dynamo, switchboard with necessary appliances, and the wiring will cost about $1300, set up and in running order. A 250 lamp plant costs about $2000. The cost of the lamps is not included in this estimate, nor the work of installing the plant.

With gasoline at 16 cents per gallon, light can be generated and supplied at a cost of only 3 cents a kilowatt hour, or 0.17 cents per hour for each 16 candle-power lamp. The usual charge for current, 15 cents per kilowatt hour, would make the cost of a 16 c. p. lamp 0.79 cents an hour, or nearly five times as much. A gas engine, with gas at $1.00 per thousand, would furnish light for 2.8 cents per kilowatt hour.

Acetylene or Gas Generators. The system of individual lighting by gas generated on the premises has also been highly perfected, either acetylene gas or gasoline vapor gas ("carburetted gas") apparatus can be installed with no more risk from fire than from the ordinary system of gas lighting. The outfit consists of a generator, washer, storage tank and the usual gas pipes. A special burner is required when using acetylene gas, gas mantels and burners are used with carburetted gas.

An acetylene generator and plan capable of supplying 50 lights of 50 candle-power each, will cost about $800, not including pipes, etc., inside the mill. These lights will cost about 1 cent per hour for each 50 candle-power burner.

A gasoline gas generator and plant capable of supplying the same amount of light, 50 burners and mantles of 50 c. p. each, costs about $600. The cost of maintenance for each light with gasoline at 16 cents a gallon would be about 1 cent per hour for each 50 candle-power burner.

One advantage of having a gas plant connected with the mill is that gas can be used for power as well as light, if carburetted gas be the kind made. With modifications in the plant, it could also be used for heating. Acetylene gas can be used for heating, cooking, etc., special burners being used. Gasoline gas cannot be piped far nor stored long, as the gasoline will condense, acetylene gas can be piped, stored, etc., the same as ordinary gas.

Summary. From the brief data given, it will be seen that it is entirely practical for a mill to install its own lighting plant, and that electric lighting by gas or gasoline engines and dynamos is very cheap in operating expenses. The plant required does not cost much, the larger the plant, the cheaper it is.

With any system of lighting, due care must be taken; have everything of the best. Every precaution must be taken to safeguard against fires, accidents and stoppages, and all work must conform to the underwriters' standard requirements.

Electric Lighting. There are two types of electric lamps commonly in use, the arc lamp and the incandescent lamp. A third type, the "vapor lamp," of which the Cooper-Hewitt mercury-vapor lamp is an example, has not come into general use as yet, on account of its cost and the mechanical difficulties of its installation on a large scale. Comparing the three types, there is no doubt but that the illumination from the improved vapor lamp (the Moore type) is far superior to that from either arc or incandescent lamps, because its light is diffused, not concentrated, and is more like natural light in its effect.

The choice between arc lamps and incandescent lamps should be governed largely by a consideration of the peculiar lighting effect of each and their suitability for the situation, work to be performed, etc. The arc lamp gives a very bright bluish-white light that is concentrated in its field, casts sharp shadows and has not much penetrative effect; the incandescent lamp gives a mellow, yellower light, that is diffused, unless concentrated by reflectors, etc., and the contrast between light and shadow is not so marked as with the arc lamp. Of course, lamp for lamp, an arc lamp gives more light than an incandescent, hence its use seems more economical, but it must be remembered that the open arc lamp requires several times as much current as does the incandescent. For a general illumination, as of the entire spinning room, enclosed arc lamps will probably be the most satisfactory, while incandescent lamps will be better if the plan be to illuminate the machines themselves by individual lighting. There is greater danger from electric shock from wires if arc lamps be used, on account of the heavier current carried by the wires, and there is also more

(*Continued on page xii.*)

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Value cotton goods	450,000,000
Value hosiery and knit goods	137,000,000
Value silk manufactures	133,000,000
Value Flax, hemp and jute manufactures	63,000,000
Dyeing and Finishing textiles	51,000,000
Total value textile manufactures	$1,215,000,000

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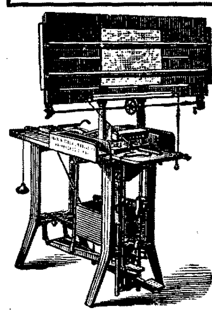

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danger of fires being caused from defective insulation of the wiring.

While on this point, attention is called to the absolute necessity of having everything connected with electric lighting of the best and that only first-class skilled men be employed to install the system.

Particular care must be given to securing perfect insulation of all wires, especially those for arc lamps, which carry a heavier current than wires for incandescent lamps; all wires should be run in suitable conduits except for very short lengths and these should be protected. All wires passing through partitions or in contact with wood must be heavily insulated, also at all switchboards, transformers, etc. Protection against lightning is very necessary, especially when the wiring is run for some distance outside. Lightning arresters should be provided at suitable locations and in number to correspond with the length of wire, voltage, etc. A lightning arrester for every 1000 feet of outside wire is recommended for voltages under 2500.

The types of various electric lamps will be briefly described, with comment on the advantages and disadvantages of each. The type of lamp to be used will depend largely on the special illumination required, in some cases the lighting will be general, in other cases localized for machines, etc.

Arc Lamps. There are two styles of arc lamps commonly used, the open arc or old style lamp, and the enclosed arc, a later style. The enclosed arc lamp is now rapidly replacing the old style because of its greater economy, steadier light, less attention required, lower voltage, etc., and for textile mills, the enclosed arc lamp is recommended as being the most suitable of the two. The enclosed arc lamp is made of less lighting power than the open arc lamp, which is an advantage, although more lamps must be employed, since the source of light is not concentrated at few points and a more general illumination is obtained. The illumination by arc lamps can be greatly improved by the judicious use of reflectors, the action, effects, etc., of which will be discussed later. The enclosed arc light operates on a much lower voltage than the open arc lamp, in fact, some types can be operated on the same circuit with incandescents.

A brief description of the enclosed arc lamp may be of interest, the old form of arc lamp is familiar to all. In the new style lamp, in addition to the large outside glass globe, there is a smaller inner globe, which completely encloses and protects the carbon rods which form the arc, this globe being perforated to allow circulation of air. The protection given the carbons from air currents, water, etc., gives them a longer life, *i. e.*, they are not consumed as fast as in the open arc lamp, the light is steadier and is less likely to be put out by outside causes. A shorter, and cheaper, carbon rod is used.

Incandescent Lamps. The incandescent lamp is too familiar to need description. They are supplied of various "candle-power," from 8 up to 128, the 32 or 64 c. p. lamps being most suitable for mills.

(*To be continued.*)

Foreign Novelties for Dress Goods.

The same are reproduced in the interest of our readers from "Muster Zeitung der Leipziger Monatschrift für Textile Industrie," and refer to designs re-

Fig. 1

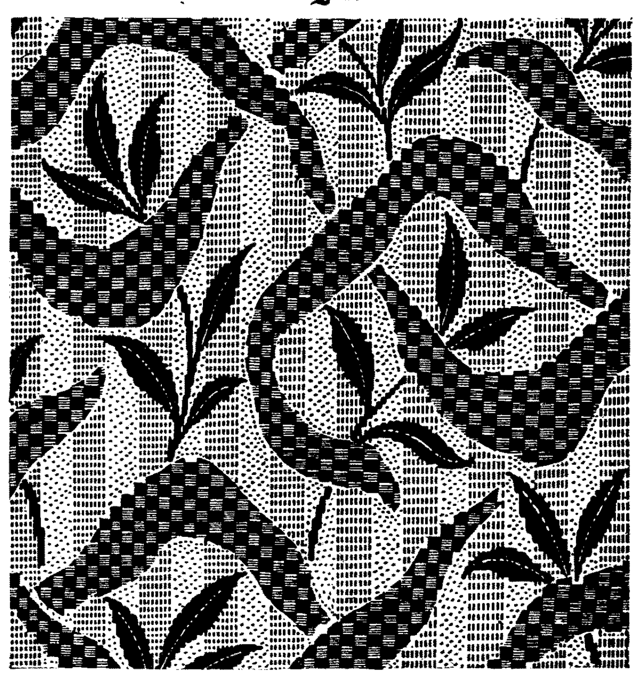

Fig. 2

quiring for their execution in the fabric silk twist—one end light to alternate with one end dark. Effects shown in black (dark) in Fig. 1 refer to filling effect, and those in Fig. 2 to warp effect.

MILL NEWS

Middle States

New York. Being hampered by a lack of ready funds with which to continue its business, the American Silk Company, which has a capital stock of $11,000,000 and operates mills in several cities, was placed in the hands of receivers to-day by Judge Ward, of the United States Circuit Court.

The application for the receivership was made by L. J. Hunt, a lawyer representing Lotte Brothers Company and Samuel Ruhy, both of York, Pa., who in the complaint stated that the American Silk Company operates a large plant in Weehawken, N. J., and owns or controls the stock of the York Silk Manufacturing Company, of York, Pa., the Monarch Silk Company, also of York, and the American Silk Company, a New Jersey corporation, with a plant at Reynoldsville, N. J. The main offices of the company are in this city.

Judge Ward appointed Bernard Shelbley, of York, Pa., and Charles W. Gould, of this city, the receivers for the company and gave them authority to continue the operations of the company and take any steps necessary to keep the business going. It is unofficially said that the assets are sufficient to pay all creditors in full.

Middleton, N. Y. The installation of new machinery and the opening of a new silk mill by The Joseph Mack Silk Company of Allentown, Pa., will add another industry to this section.

Philadelphia. Additional employment to Philadelphians will be afforded by the removal of the woolen and cotton mills of the John Williams Manufacturing Company from Trenton to Twelfth and Carpenter streets, this city. The establishment employs 150 operatives and will be put into operation in the Spring, when it is stated, the management may pass into the hands of New York textile interests.

Philadelphia. It is reported that the Overbrook Carpet Company, operating the West Philadelphia Dunlap Carpet Mills, will be incorporated shortly. It is mentioned that Axminster carpets will be the output.

Hazleton, Pa. W. B. Lovatt, who for the past twenty years was manager of the Read-Lovatt Silk Mill at Weatherly, will erect a silk mill at Nesquehoning.

Harrisburg, Pa. The Hanover underwear manufacturing enterprise is assured, provided the lease for the Blough Building at Third and Hamilton streets is closed.

Wilmington, Del. The Glenn Hosiery Company are making preparations for erecting their mill at the northeast corner of Thirteenth and Poplar streets. It is estimated that 200 persons will find employment.

New England States

Facts worth while knowing regarding the use of the Northrop loom for cop spun yarns and for yarns finer than 50's: The Grosvenor Dale Company, one of the first to run fine counts on Northrop looms, filled their entire plant, after trial, now having 3,617 Northrop looms running. The Whitman Mills, of New Bedford, have 829 Northrop looms, all of which are running on cop yarn counts finer than 50's. The Burgess Mills, of Pawtucket, just starting, have 1,294 Northrop looms running on fine counts, cop yarns, etc.

New England Mills Open. Thirty-five mills and factories in New England, which have been curtailing production or shut down for repairs recently, are expected to resume operations this week. The Cocheco Cotton Mills, of Dover, N. H.; Nashua and Jackson Cotton Mills, of Nashua, N. H.; the cotton mills of New Bedford, Biddeford, Me.; North Adams, Anthony, R. I., and Manville, R. I., will start to-morrow. Others will follow.

Some mills announce a curtailment of production, and it seems probable that many concerns will continue on a short-time basis until the close of the year.

Talcottville, Conn. The Talcott Brothers Company are making extensive changes in their plant, enlarging it and installing much new machinery in the various departments of the mill.

Nashua, N. H. The McLane Manufacturing plant will soon add to the capacity of the plant. It is proposed to unite the four-story hosiery building with the main factory.

Danielson, Conn. The building formerly occupied by the Pequot Worsted Co. will in a short time be occupied by C. J. Dandilen, of Fall River, Mass., as a cotton cloth mill.

Montville, Conn. The Alpha Mills Company, manufacturers of cotton yarn, of this place, have filed a certificate of incorporation. Capital stock, $80,000.

Woonsocket, R. I. The Lawton Spinning Company of this city have let the contract for their new mill. It is expected to have same completed by the middle of March, 1908, at an expense of $450,000.

Bellows Falls, Vt. What is claimed to be the first plant in the country to make linen from strictly American yarn will begin operations in this town early in March. The Oxford Linen Company when running to its full capacity will employ about 600 people. Besides linen, crash and oxilate will be manufactured.

Fall River, Mass. George E. Priest, of Lowell, has been appointed superintendent of the Bourne Mills to succeed George Delano, who was promoted to treasurer to fill the vacancy caused by the death of George A. Chace.

Worcester, Mass. The action of several large Worcester concerns in retrenching, various industries in central Massachusetts will be placed on a short time basis this week and next. Beginning next week the S. Slater & Sons' mills in Webster, employing 2,000 operatives, will run five days a week. The order affects the corporations' cotton mills in North Webster, its woolen mills in South Webster and the cambric works in the east village.

Willimantic, Conn. The Willimantic Cotton Mills Corporation has filed a certificate of its action in increasing its capital stock from $120,000 to $500,000 and changing its name to the Windham Manufacturing Company. The Cotton Mills Corporation recently took over the Windham Manufacturing Company, and the increase in capitalization is designed to finance the merger and to provide funds for enlargements.

Southern States

Greensboro, N. C. A movement is on foot to call a meeting at once of the cotton manufacturers of the South to devise proper methods for a system of general curtailment of yarn and cloth mill products. Already 50 per cent. of the yarn mills making weaving and knitting yarns in the Carolinas and Georgia have begun running half time, and this movement is rapidly spreading over the South. All mill men interviewed seem to agree that an immediate curtailment is imperative. No stocks of manufactured products have accumulated and the mills are determined to prevent this.

Jefferson, Ga. Fire destroyed the waste and supply rooms of the Jefferson Cotton Mills, the loss being about $1,000. No insurance.

Waycross, Ga. The Ensign Manufacturing Company resumed work on their mills and will rush them to an early completion. When completed the Ensign Mills will be among the largest in the South.

Huntsville, Ala. Arrangements have been made for the organization of the Huntsville Bagging Company of Huntsville. The capital stock will be $150,000.

Americus, Ga. Sparks from a passing locomotive set fire and burned the Central of Georgia warehouse and the Merchants' warehouse at Cobb Station, near Americus. 175 bales of cotton were burned. Estimated loss $20,000.

Dallas, Ga. The Paulding County Cotton Manufacturing Company are making an addition to their plant at an expenditure of $300,000. It is expected that the addition will be finished this year and thus doubling the capacity of the plant.

Waycross, Ga. It is reported that Waycross is to have two knitting mills, each to employ about 100 persons.

(*Continued on page xvi.*)

Producing Colored Effects in Piece-Dyed Fabrics.

According to a recent invention, the effects in question are successfully obtained by providing a part of the undyed thread, before being woven, with a suitable metallic powder or dust—for example, zinc powder, aluminium powder, or the like, which, with the aid of a suitable binding substance, such as albumen or collodion, is fixed insolubly on the thread. The fabric is then dyed with a dye which is reducible by means of hydrosulphite, but which is stable with regard to sulphurous acid, and thereupon it is passed through a warm bath of sulphurous acid, whereby the color of the impregnated thread is reduced very energetically by the hydrosulphite which is formed during this operation.

Variegated effects can, for example, be obtained by coloring the thread before impregnation with a dye not reducible by hydrosulphite, and then proceeding as described. An advantage of this process is that the result is in no manner influenced by the necessary operations to which the material is subjected while being preliminarily dressed, such as singeing, crabbing, steaming, boiling, and so on.

The new process may, moreover, be modified in many respects, for example, very beautiful effects can be obtained in half-woollen fabrics by dyeing the cotton warp with a black azo-dye reducible by hydrosulphite, by then locally removing or eating away the dye in the manner described from the prepared cotton thread of the warp, so that it is locally left white, and by finally dyeing the wool with any black acid dyes which do not affect the whiteness of the cotton.

Savannah, Ga. A knitting department is to be added by the Savannah Cotton Mills. It is expected that between 150 and 200 machines will be in position by the first of the year.

Augusta, Ga. The Elk Spinning Mill Company, of Dalton, has decided to double its capacity. An addition is to be erected which will give the concern 600 employes. This mill began operations October 15.

Winona, Miss. The Winona Cotton Mills, operating 5,000 spindles and 200 looms, will spend about $12,000 in increasing the present equipment.

Magnolia, Miss. The Magnolia Cotton Mills since it began operations in the fall of 1903 has been increased from 5,000 spindles and 150 looms to nearly 12,000 spindles and 300 looms, while the engine room proper has been doubled. The mill now has a daily output of approximately 12,000 yards of cloth per day.

Charlotte, N. C. The Skyland Hosiery Company of Flat Rock has been started. Other structures to provide for a mill village will also be built. Operations will begin about January with 200 knitting machines.

Cumberland, N. C. Erection of a new 5,000-spindle yarn mill is now progressing for J. Fred. Houston & Co. The building will be 371x71 feet, with basement. The addition will about double the output of the plant, which now operates 5,000 spindles.

High Point, N. C. A new mill will be erected by the High Point Hosiery Mills. The present mill operates seventy-five knitting machines, with facilities for dyeing and finishing misses' ribbed hose.

Gaffney, S. C. The new Merrimac Mills, now in course of construction, will have for its motive power electricity. The capacity of the mill when completed will be about ten thousand spindles and three hundred looms.

Hillsboro, N. C. Enlargement has been decided upon by the Eno Cotton Mills, consisting of an addition to the present weave shed and the erection of a dyehouse. The weave shed will be increased by a 100x125-foot extension, which will allow an installation of 200 more looms. Building has been already started on the dyehouse. The present capacity of the mill is 20,000 spindles and 400 looms, producing yarns and colored cloths.

Davidson, N. C. Electric motors are to be installed in the plant of the Linden Manufacturing Company. This concern makes 2 and 3 ply cotton yarn, 24's to 30's, on skeins or cones, and has 7,072 ring and 2,520 twisting spindles.

Bessemer City, N. C. The Whitestone Cotton Mills were sold to Captain Judson Huss, of Gastonia, recently for $19-000, at a receiver's sale. They are reputed to be the best equipped mills in the city.

Tarboro, N. C. It is reported that the Wah Ree Hosiery Mills, C. W. Jeffreys, manager, will install additional machinery, in order to be able to double the present daily capacity of the mill of 500 dozen pairs of hose.

Denton, N. C. The Denton Cotton Mills Company have incorporated with a capital stock of $50,000. The new mill is to have 5,000 spindles and will manufacture yarns.

Belmont, N. C. A charter for a new cotton mill has been granted. The authorized capital of the new mill is $250,000 and of which amount nearly one-half has been subscribed. The name of the new mill is "The Majestic" and the same will be erected near the Chronicle Mills.

Kinston, N. C. The Caswell Cotton Mills have been incorporated with a capital of $200,000. They will engage in spinning and weaving.

Cross Hill, S. C. The Cross Hill Knitting Mills have been purchased by M. S. Bailey & Son, who will continue operations in the plant.

Laurens, S. C. The ginnery of J. Y. Pitts, located in Sullivan's Township, burned, together with some cotton. This is third ginnery burned in same township this fall, the other two ginneries previously destroyed by fire being Allen Sullivan's, of Princeton, and W. L. Gray's, near Mount Bethel.

Columbia, S. C. $50,000 have been already subscribed towards the new $200,000 cotton mill, to be erected at Simpsonville. Edward F. Woodside of the Pelzer Mfg. Co., will be the manager of the new mill.

Augusta, Ga. The erection of a mill of 6,000 spindles and 200 looms is planned by the John E. Smith Cotton Mfg. Co., in the near future. This will double their present capacity. It is estimated that about $100,000 will be spent.

Cheraw, S. C. The Cheraw Cotton Mills have been incorporated by A. G. Kollock, H. D. Malloy and R. T. Gaston. Capital stock is $150,000. It is intended to build a plant of 10,000 spindles and 300 looms, and electricity will probably be the motive power.

Columbia, S. C. The Gaffney Mfg. Co. will, it is said, rebuild an entirely new mill instead of making additions to their equipment as was reported. At present they operate 61,648 spindles and 1,566 looms, and will increase the number of spindles by 20,000.

Blacksburg, S. C. It is understood that the Whittaker Cotton Mills have ordered new machinery to double their present output. The mill now operates 5,000 spindles, manufacturing cotton yarns.

Newberry, S. C. The Highland Cotton Mills has been incorporated with a capital stock of $300,000. The site for the plant was recently purchased for $16,000.

Salisbury, N. C. A new cotton mill to be known as the "Grace Cotton Mills," is to be established here. Frank L. Robbins, J. P. Gibson and Grace C. Robbins are the incorporators. The capital stock is $50,000.

EXPLANATIONS FOR THE CHART OF WEAVES ON

"Textile Designing Simplified."

The object of this chart is to show how easy weaves for all classes of Textile Fabrics can be constructed; it will be a search light in the misty matters in the field of designing Textile Fabrics. Keep this chart of weaves for reference. Millions of new weaves can be obtained by it.

All weaves for Textile Fabrics have their foundation in Plain Twills and Satins.

PLAIN.—This weave and its sub divisions are explained on the chart in the top row by 16 weaves, the sub-divisions covering common, fancy and figured Rib and Basket weaves.

TWILLS.—The foundation of constructing regular (45°) twills is shown by rows 2 and 3 with twenty six weaves, covering twill weaves all the way from 3 harness up to 13-harness. The sub divisions of twills are quoted next on the chart, being Broken twills, Skip twills, Corkscrews, Double twills, Drafting twills, Curved twills, Combination twills warp drafting Combination twills filling drafting, 63° twills, 70° twills, Wide wale twills, Entwining twills, Checker-board twills, Pointed twills, Fancy twills, thus covering every sub division of twill weaves possible to be made.

SATINS are next shown, giving also their sub divisions, viz: Double satins and Granites.

HOW TO PUT A BACK FILLING ON single cloth is shown below the satins by two examples, and at its right hand is quoted the principle of

HOW TO PUT A BACK WARP ON single cloth.

On the bottom line are given the four steps for:—

THE CONSTRUCTION OF DOUBLE CLOTH, 2 @ 1; and above the same one example, with the arrangement 1 @ 1.

THREE PLY CLOTH is shown by one example.

HOW TO BACK SINGLE CLOTH WITH ITS OWN WARP is shown by two examples.

WEAVES FOR SPECIAL FABRICS are quoted: Tricots (warp, filling and Jersey effects), Rib fabrics, Honeycombs, Imitation Gauze, Velveteen, Corduroy, Chinchillas, Quilts, Plush, Double-plush, Tapestry, Crape, Terry, Worsted coating stitching, Hucks, and Bedford cords.

HOW TO WORK THIS CHART OF WEAVES.

CAPITAL LETTERS of references refer to the plain weave and its sub-divisions.

SMALL LETTERS of references refer to twills and their sub-divisions.

NUMERALS of references refer to satins and their sub-divisions.

Example.—How to ascertain the construction of the weave at the right hand top corner of the chart; being the figured rib weave marked C C'? These two letters of reference mean that said figured rib weave is nothing else but the combination of the 2-harness 6 picks common rib weave warp effect C, and the 6 harness 2 picks common rib weave filling effect C'.

Example.—The letter of reference *c*, underneath the first broken twill indicates that the same is obtained from the $\frac{1}{3}$ 4 harness twill *c*, (third weave on the second row); in other words letter of references below each weave of any of the various sub divisions refer always to the corresponding foundation weave.

Example.—Twills *q*. and *o*, are the foundation for the eight combination twills filling drafting, said common twills are drafted 1 @ 1, the different designs being obtained by means of different starting.

Example.—The wide wale twill *t' w'*, has for its foundation the 63° twills, marked also respectively *t'* and *w'*, the latter two weaves have again for their foundation respectively the common twills marked *t* and *w*.

Example.—Granites marked 8 have for their foundation the 8-leaf satin, such as marked 12 the 12-leaf satin.

Example.—Backed by filling *e* 8, means the common $\frac{2}{2}$ 4-harness twill *e*, (fifth weave on second row) and the 8-leaf satin is used in the construction of this weave.

Example.—The complete design of double cloth, marked *e* 8 A, means that the common $\frac{2}{2}$ 4-harness twill (*e*), the common plain (A) and the 8-leaf satin (8) are used in the construction.

Example.—Rib fabric A, indicates that the plain weave forms the foundation.

It will be easy to substitute different foundations in constructing weaves for heavy weights.

In reference to single cloth weaves we only want to indicate that by following rules shown in the chart, millions of new weaves can be made up from it.

"TEXTILE DESIGNING SIMPLIFIED."

Keep this chart on hand for reference. Only 144 weaves are given, yet they will guide you to make millions of new weaves.