(2 compartments in this instance); *C* the creel frame (6 beam-feeding), and *D* the first portion of the head stock (this being done in order to bring illustration within compass of the page) and which is identical with the one shown in connection with Fig. 1 and consequently will explain itself. *E* indicates the run of the yarn through the machine.

AN IMPROVED KETTLE FOR PREPARING SIZE AND STARCH. For this work the Textile-Finishing Machinery Co. build a size or starch kettle herewith represented in Fig. 4 that consists of an iron kettle with cover, mechanical means for boiling and stirring the size, the latter consisting of hollow stirrers with holes for delivering the steam to the size or starch and distributing it evenly through the mass. By means of such a size kettle, the boiling of the size or starch can be done in less time and at less expense than with other arrangements now in use; again, size or starch thus prepared in one of these kettles is sure to be in proper condition for perfect sizing of the warp or finishing of the fabric. Size unless well boiled, as mentioned in the first part of the article, retains a granular nature and in turn causes faulty yarn and cloth, a feature prevented by the use of one of these kettles.

Individual Take-up Mechanism for Looms for Weaving Tape, Suspender Material, and other Narrow Ware Fabrics.

The object aimed at is to provide a mechanism connected with the take-up shaft of narrow ware looms, whereby each web of the series of webs of fabrics woven simultaneously side by side on the loom, can be independently adjusted without interfering with any of the other webs on said loom.

Fig. 1 is a side elevation of one of this series of take-up mechanisms, showing also that portion of the frame of the loom to which these take-up mechanisms refer to. Fig. 2 is a transverse section through the take-up shaft with the detachable hand wheel of one of the take-up pulleys removed, showing a side view of said pulley and its spring pawl mechanism. Fig. 3 is a similar transverse section looking in the opposite direction, through the rim and hub of the take-up pulley, showing the opposite side view of said spring pawl mechanism.

Referring to our illustrations, *A* represents part of the loom frame, and *B* the take-up shaft extending longitudinally through the front side of the loom. *C* shows one of the series of individual take-up pulleys, mounted on the take-up shaft *B* about two inches apart. *D* are the knee rolls mounted in the outer ends of the swinging arms *E*, as pivoted at *E'* to a fixed bearing *F* on cross beam *A'*. Each one of these knee rolls rests on its respective web *G* over the take-up pulleys, so as to produce the required friction on said web during weaving.

Take-up pulleys *C* are fitted loose on shaft *B* and are each held in position longitudinally thereon by an outer collar (not shown) and an internal hub *H*, both secured to shaft *B*. Upon each hub *H* are mounted at opposite sides of the shaft two pawls *a*, each being pivoted at *b* and provided with a holding spring *c*, their outer ends being adapted to engage with the longitudinally corrugated inner surface C^2 of its respective pulley *C*.

The normal positions of the pawl *a* are in engagement with the thus mentioned corrugated surfaces of pulleys *C*, being held in engagement by said springs *c*, one end of which is attached to hub *H*, and the other to the pawl. The inner ends of said pawls *a* are provided with extensions to engage with the hub *H* and form a stop, so as to prevent the pawls from being drawn over too far by the spring *c*.

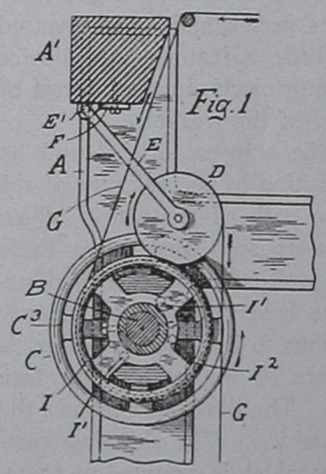


Fig. 1

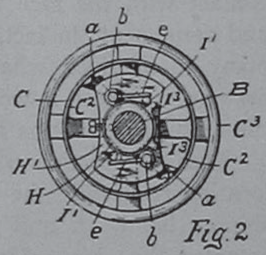


Fig. 2

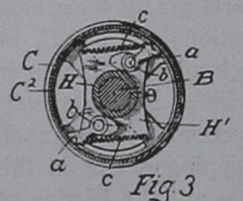


Fig. 3

Combined with each take-up pulley *C* is a detachable hand wheel *I*, loosely mounted on the hub *H*. This hand wheel has thereon two projections *I'*, adapted to come in contact with two levers *e* secured upon the pivot pins *b* of the pawls *a*.

In Fig. 2 the positions of said projections on the detachable hand wheel are shown by dotted lines against the pawl pivot levers *e*.

HOW TO ADJUST ONE WEB WITHOUT INTERFERING WITH THE OTHERS, OR STOPPING THE RUNNING OF THE LOOM.

The pawls *a*, being normally in contact with the internal corrugated surfaces of the take-up pulleys, the same are thereby normally held from turning in the direction opposite to the draft of the web *G*.

So long as no trouble occurs in the weaving, the parts remain in said locked normal positions, but if for one reason or the other it is desirable to loosen the draft upon one of the webs, its hand wheel *I* is turned to disengage the pawls *a* from said corrugated surface of the take-up pulley, by forcing its inner projection *I'* against the pawl pivot levers, as previously explained; said operation freeing said take-up pulley so that it may be turned backwards a partial revolution and thus relieve the draft upon the web so that it may be drawn longitudinally and the required repair or correction made without stopping the loom, or interfering in any way whatever with the weaving of the other webs on said loom.

This ingenious mechanism, as will be readily understood, is patented by the Crompton & Knowles Loom Works.

A PRACTICAL TREATISE ON THE KNOWLES FANCY WORSTED LOOM.

By E. P. Woodward,
Master Weaver.

(Continued from page 183.)

Setting the Shipping Device and Dragbrake.

The Knowles Loom has a very simple and satisfactory device for shipping the friction pulley into contact with the face friction. Its method of locking when it has drawn the friction pulley into driving contact with the face friction is also as satisfactory and permanent; in fact, its very simplicity has caused many to overlook what little adjustment the device may need to keep it working nicely, in the interest of the filling stop motion and of the weaver.

The construction of the shipper lock *A* and its location relative to the position of the fulcrum of the shipper handle *B* and the path of the pin *C* which actuates the shipper lock, is such that when these parts are in their locked position (as shown in illustration) the pin *C*, in the lower end of the shipper lock and through connections to the friction pulley, is holding the frictional parts of the pulley and face friction in driving contact. The illustration shows the shipping device in this position. The shipping castings and the friction pulley which is mounted on them, are left out to simplify matters in describing the setting of the shipping device and the drag brake.

To adjust the complete device, the first thing to consider would be the stud *D* which is secured to the loom side in a slot. This stud is the part on which the shipper lock *A* is fulcrumed and should be located in such a position, in relation to the fulcrum *E* of the shipper handle *B*, that when the shipper handle is allowed to swing freely, the bottom of the pin *C* will clear the bottom of the slot *D* in the shipper lock casting. In other words the distance between centres of the studs on which the shipper lock casting and the shipper handle are mounted must equal the distance from the centre of stud *F* to the point shown at the bottom of the slot at *D*, plus the distance from the centre of fulcrum *E* to the bottom of the shipper handle stud *C*. This distance must be allowed. A trifle more may be given if it is necessary in order to get the desired entering and housing of the pin *C* in its locked position.

Now, with these parts in their locked positions, draw the friction pulley into driving contact with the face friction by means of the adjusting nuts on the connecting rod *G*, and while the shipper is locked in driving contact, set the check *H* $\frac{3}{4}$ of an inch from the driving shaft frame through which it passes. This motion when transmitted to the lever which ships the friction pulley, will give to the pulley much less motion than $\frac{3}{4}$ of an inch and to the drag brake a little more than $\frac{3}{8}$ of an inch throw. This will be ample motion for the proper adjusting of the brake. The check set as described will prevent a careless or heavy handed operator damaging the castings by throwing unnecessary resistance against the friction disk when stopping the loom.

Next throw the shipper handle until the connecting rod *G* has made one-half of its motion and with the rod retained in this position, set the drag brake lever *I* in an upright position and the studs for same as nearly midway of their respective slots as the construction will admit. The shipper can now be thrown as far as the check *H* will permit, and if the brake does not engage the back of the face friction as it should do, the fulcrum stud and the adjusting bolt on the ends of the brake lever should be moved the necessary distance in the same direction as may be required to have the brake shoe engage the back of the face friction disk firmly. At the same time the check *H* should come in contact with the driving shaft stand through which the connecting rod *G* passes. *J* is a part of driving shaft stand through which connecting bar *G* passes.

It is apparent that this article, thus far, has treated of positions only, in relation to the setting of the brake. Now the question of the necessary resistance for the checking of the momentum can be taken up, and when all the resistance needed is that which the coil springs can give. This spring should be compressed by means of the adjusting collar until it will give an active release to the friction pulley when the shipper handle is released from its locked position. Spring resistance which will do this is sufficient power to apply to the drag brake to have it do what it was designed for. If one wishes to use more power on the spring, of course it can be done. This spring also keeps the shipper lock casting and the shipper handle in their locked position as well as holding them in their released position, especially when the loom is driven by a tight and loose pulley instead of a friction pulley. The block on the brake lever is placed there to support the drag brake and to prevent it from coming in wrong contact with the face friction disk. This block should not be cut away.

The fibre collar which takes the wear caused by the end thrust of the friction pulley should be renewed when badly worn, since too much play at this point will interfere with the best working of the friction pulley in starting and stopping the loom. The same can be said of a badly worn yoke where it engages the lugged collar, since an excess of lost motion is detrimental to a nice handling of the loom. To have a satisfactory locking of the shipper handle and shipper-lock and at the same time have them work easily and by so doing cause no trouble to the filling stop motion, it may be necessary to do a little filing on the curved parts of the recess in which the shipper handle pin *C* works. This slot or opening is laid out with the following details in mind:

(1) A position in which to lock.

(2) When the shipper releases a slot which will allow sufficient motion of the parts involved to let the drag brake come in contact with the friction disk.

(3) A position between these two extremes which will allow a free working of the parts by the release

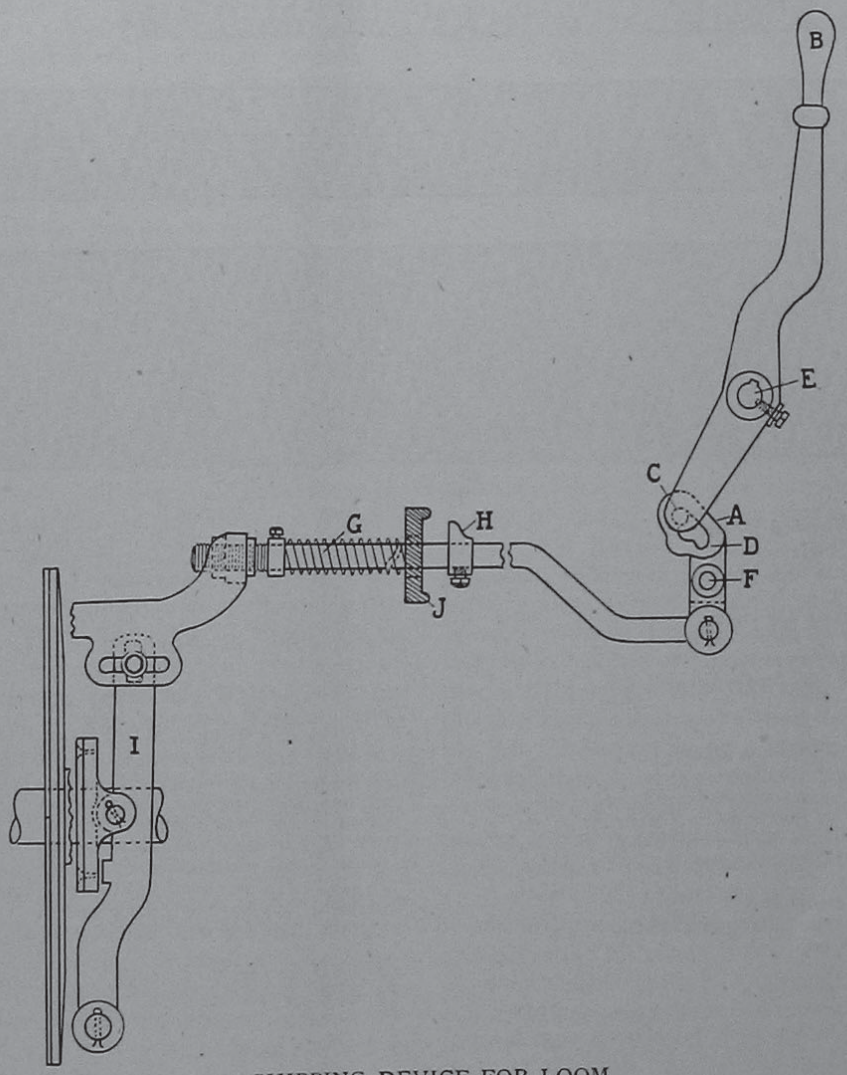
of the brake without bringing the frictional parts of the pulley together.

Should the handle release hard it should first be seen to that the pin on the shipper handle *beds* or fits nicely in the semi-circular slot formed for holding it in its locked position. Then to get a smoothly working release of the shipper handle, the lower point of this half circle should be rounded to the extent of resembling the arc, or curve of a circle instead of a point, such as would be caused by two circles meeting. The recess which holds the brake released should be taken when adjusting the different parts of the shipping device to see that all parts work freely and leave whole shipping and brake arrangement looking trim and neatly set. Be sure to have the drag-brake engage the flat surface of the friction disk only, since, if not properly adjusted, it may ride on the rib of the casting and fail to hold properly.

With these directions followed the results are

(1) A systematic and correct adjustment of the parts, besides beginning at the beginning.

(2) A brake and shipping combination adjusted



SHIPPING DEVICE FOR LOOM,

Right hand belted. View taken from the side of shipper on which weaver stands, with right hand on shipper handle. Drawn one-sixth of original size.

should be treated the same way. With the shipper lock casting in this condition, the stop motion will have no trouble in releasing the shipper and the fixer will not be troubled by the filling stop motion tearing the cloth. A shipper handle thus set will work easily regardless of any reasonable strain which may be put upon it by a tightly locked friction pulley. At the same time, a friction pulley should not be locked so tightly as to cause undue end thrust, and with the parts in good repair it is never necessary. Care to the least possible throw commensurate with safety.

(3) A brake so set as to do its work properly and at the same time so adjusted that a careless or heavy handed operator can not damage the loom by its use.

(4) A shipping and locking device working easily and smoothly (regardless of any reasonable strain caused by the tight locking of the friction pulley)—a strong factor in keeping the filling stop motion in good working order.

(To be continued.)

FOREIGN DESIGNS IN WORSTED DRESS GOODS AND CLOAKINGS.

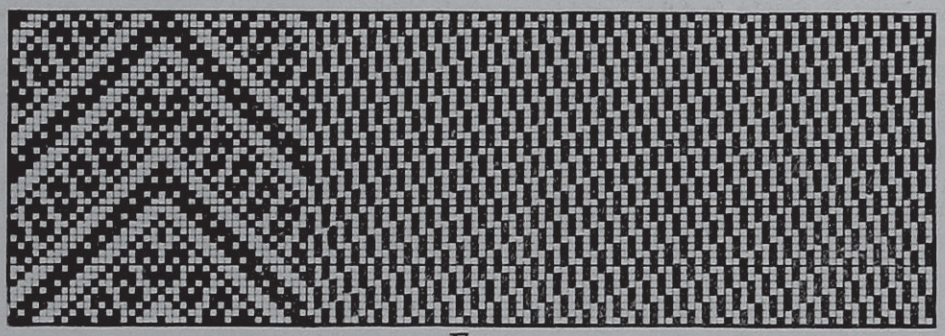


Fig. 1

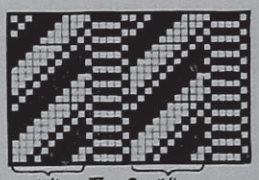


Fig. 2

Fig. 3

Fig. 4

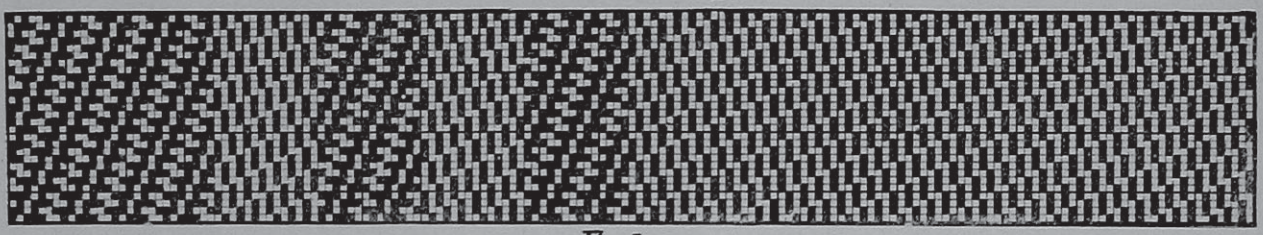


Fig. 5

Fig. 1. Gray-mix Worsted Dressgood,
with Herringbone stripes.

Warp: 6292 ends, 2/64's worsted, gray mix; 28-harness fancy draw.
Dress: 13 Sections @ 484 ends.
Reed: 19 × 6 = 56 inches wide.
Filling: 65 picks, 2/64's worsted, black.
Finish: Scour well, 52" finished width, singe, press.

Fig. 2. Home-spun Diagonal Dressgood,
with Filling rib stripe.

Warp: 1840 ends, 2/20's worsted; 12-harness fancy draw.
Dress: 5 Sections @ 368 ends = 4 patterns in section.
Reed: 15½ × 21 dents @ 2 ends, 1 dent @ 4 ends (rib effect); 56¾ inches wide.
Arrangement of Warp:
47 ends 2/20's worsted, black.
40 ends 2/20's worsted, blue green mix.
5 ends 2/20's worsted, black.

92 ends in repeat of pattern.
Filling: 35 picks, 2/20's worsted, dark gray mix.
Finish: Worsted Cheviot finish, full slightly, clear face on shear, press; 48 inches finished width.

Fig. 3. Worsted Dressgood.

Warp: 3360 ends, 2/48's worsted; 8 or 12-harness fancy draw.
Dress: 7 Sections @ 480 ends = 4 patterns in section.
Reed: 13½ × 4 = 62¼ inches wide.
Arrangement of Warp:
10 ends 2/48's worsted, dark brown
11 ends 2/48's worsted, light brown
9 ends 2/48's worsted, dark brown
10 ends 2/48's worsted, light brown
10 ends 2/48's worsted, dark brown
10 ends 2/48's worsted, light brown
1 end 2/48's worsted, dark green
8 ends 2/48's worsted, dark brown
1 end 2/48's worsted, dark green
10 ends 2/48's worsted, light brown
1 end 2/48's worsted, dark red
8 ends 2/48's worsted, dark brown
1 end 2/48's worsted, dark red
10 ends 2/48's worsted, light brown
10 ends 2/48's worsted, dark brown
10 ends 2/48's worsted, light brown

120 ends in repeat of pattern.
Filling: 57 picks, arranged thus:
11 picks 24's worsted, dark brown
1 pick 24's worsted, light brown
1 pick 24's worsted, dark brown
1 pick 24's worsted, light brown
1 pick 24's worsted, dark brown
1 pick 24's worsted, light brown
1 pick 24's worsted, dark brown
1 pick 24's worsted, light brown
1 pick 24's worsted, dark brown
1 pick 24's worsted, light brown

20 picks in repeat of pattern.
Finish: Worsted finish, full slightly, clip on shear, press. 52 inches finished width.

Fig. 4. Worsted Lightweight Cloaking.
Corkscrew stripe effect.

Warp: 7504 ends, 2/48's worsted, dark gray mix; 14-harness fancy draw.
Dress: 16 Sections @ 469 ends.
Reed: 16½ × 7 = 65 inches wide.
Filling: 75 picks, 2/48's worsted, dark gray mix.
Finish: Worsted finish, 56 inches wide.

Fig. 5. Fancy Worsted Dressgood.

Warp: 6240 ends, 2/64's worsted, dark gray mix; 14-harness fancy draw.
Dress: 13 Sections @ 480 ends.
Reed: 18½ × 6 = 56¼ inches wide.
Filling: 65 picks, 2/64's worsted, black.
Finish: Scour well, 52" finished width, singe and press.

COTTON SPINNING.

The Ring Frame.

(*Continued from page 193.*)

Quality and production in the spinning room depend in considerable measure on the condition, quality and care of the top drafting rolls, a great deal depends in turn on the way they are covered and the condition in which they are kept. Top rolls should be uniform in size and covered in the best possible manner, especially for high speed frames and fine yarns, and the materials used in covering them should be of the best quality. Rolls must be covered with a substance that will give a cushion effect, so that the surface will be slightly yielding and will take up inequalities. Woolen cloth as a first cover, and leather as a top cover, are the best materials to use, the cloth should be not less than 22 ounces to the yard and the leather should be taken from carefully selected lamb skins, selecting parts as free as possible from thin places and other defects. The covering should be done with great care, the cloth stretched evenly and uniformly and the leather put on smoothly and without thick places where the laps are made and should not be stretched too tightly.

Rolls should not be allowed to become flat, channelled or rough from use or lack of attention; if the machine is stopped for any length of time, the leather covering of the top rolls will become flat at the point of contact with the fluted rolls and when the frame is started, the bite of the drafting rolls will not be so effective at that place and unevenness in the yarn will be the result, which would have been prevented by lifting the top rolls. It is also important that the bearings of the rolls are properly adjusted and be kept well oiled and that all running parts should be smooth and kept free from dirt, dust and grit. If the roll covering is kept well varnished it will not become rough nor wear out so quickly from use. Weighting has an important effect on the wear of top rolls, the heavier they are weighted the greater and quicker will be the wear, hence over-weighting should be avoided, as with the proper weighting, power will be saved, less friction will result and a better quality of yarn will be produced. Extra top rolls should be kept in boxes made for the purpose to hold them perpendicularly, and the lid should be cushioned on the under side in such manner as to hold the rolls from damage when in transit from the roll coverer.

In setting the top rolls in the roll stand, they should be put in so that the ends project slightly above the cap bars, so that the waste, etc., can be removed without the use of a picker, as it is next to impossible to keep the ends of rolls clean if they are sunk down in the cap bars. Places should be left in the cap bars, so that the steel bottom rolls can be oiled conveniently. This oiling should always be done at regular intervals and great care be taken not to get any of the oil on the leather covering of the top rolls. Should any oil be accidentally spilled on the leather wash it off at once with dilute alcohol—one part of alcohol to two parts of water—and then dry thoroughly It will be found productive of good work and the life of the leather covering will be much increased if the top rolls are cleaned from oil and dirt with this wash, about once a week, but too much must not be applied, or the laps will be weakened or loosened, since the glue holding them will be dissolved. Care should be taken when putting in top rolls so that the lap of the leather covering will not turn up in working of the rolls, also, that roll laps are not allowed to form on one boss of the roll, or the other boss will revolve faster and become chafed by the steel roll.

When worn or when fluted or channeled they should be taken out and re-covered, or, if but slightly worn, some spinners then use front rolls up as a

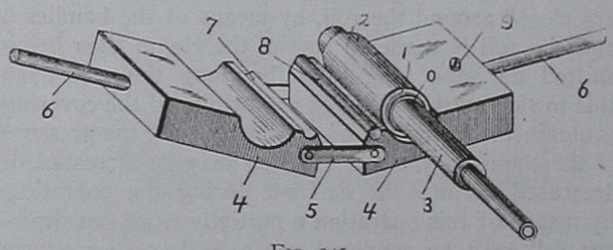


FIG. 241

middle or a back roll, as the case may require, a new roll being used in front. Most of the wear comes on the front roll and it consequently wears out quicker, besides it is the most important roll in the set. This practise of transposing and using again, used rolls, is wrong, if dealing with rolls considerably worn. The middle roll should always be kept in as near as possible good condition as the front roll. There is nothing more sure to result in poor yarn than the use of badly worn or damaged rolls, as a fluted roll is sure to produce coarser yarn from the roving in spots, as the worn corrugations pass more yarn through the bite of the rolls in a given time than does the rest of the roll. When removing a damaged roll, it is a good plan for the overseer or second hand to cut through the leather into the cloth, so that the roll coverer must put on a new cloth as well as leather cover, *i. e.*, has no chance to re-use the old cloth covering.

A good way to test the evenness of a roll is to hold a polished straight edge about the height of the eye and place the roll upon this so that its surface comes in contact with the edge its whole length, then turn the roll around, against the edge for a full revolution and observe the light that will show between them. If the roll is evenly covered, no light should show between its surface and the straight edge, whereas if there are uneven places or corrugations, more or less light will be noticed when these places come in line with the straight edge, the extent of the fault showing by the amount of light allowed to pass.

Partially or unevenly worn top rolls may be trued up by means of the device shown in Fig. 241, and by its use made again more or less uniform in diameter. The apparatus is practically a clamp, consisting of two grooved metallic pieces 4 connected by straps 5 (one on each side) and provided with handles 6. The clamp pieces have pivot grooves 7 which receive the pivot rod 8 to form a pivot about which the clamp

sections 4 turn when they are clamped in position on the roll to be trued up, by means of their handles 6. The diameter of the refinished rolls and the pressure applied to them is regulated by the set screw 9. If a shell roll is being trued up, it is mounted on a rotating arbor before being put into the clamp, as illustrated, the shell of the roll being shown at *O*, the cloth cover at 1, the leather covering at 2, and the rotating arbor for holding the roll at 3. If the roll to be repaired is a solid one, the clamp is fastened around the roll covering as before, the shaft of the solid roll performing the same function as the rotating arbor in connection with the shell roll and revolving the roll inside the clamp.

This device is operated thus: The clamp sections 4 are closed around the roll, by means of the handles 6 and the roll is made to rotate, the clamp then being shifted by hand longitudinally along the roll from side to side until the desired uniformity of the covering is obtained. By means of the set screw 9, the pressure of the clamp on the roll covering may be increased or decreased, as may be desired, during the operation. By means of this operation a partially worn-out drawing roll may be rendered more or less of uniform diameter throughout its length, due to a considerable extent to the longitudinal shifting and repositioning of the fibres of its inner felt layer. This procedure of truing drafting rolls, it is claimed, is superior to the process of truing these rolls by a cutting or abrading process, as such processes necessarily remove and sandpaper off the polished or finished surface of the leather coverings. Besides truing the rolls, it is claimed, the process will assert a progressive ironing or pressing upon the roll, in turn producing a redistribution of the fibres in the felt backing of the rolls, so that when the rolls are finished the materials constituting the roll coverings will not be simply compressed down at the high points thereof, so as to be liable to again swell out when exposed to moist atmosphere or when relieved from pressure, but, on the contrary, such coverings will be set by the redistribution of the fibres to the uniform diameter required.

Top rolls should not be allowed to get dry at their bearings through neglect of oiling or collection of dirt, because then their speed is reduced and yarn is produced that is coarser than should be. Not only this, but the drag from friction will cause the rolls to make rough, lumpy, fuzzy and uneven yarn, will cause frequent breakage and will greatly increase the amount of power necessary to run the machine. For similar reasons, the bottom rolls should also be kept well oiled at their bearings, clean and properly adjusted.

(To be continued.)

A Traveler Ring for Spinning Machines.

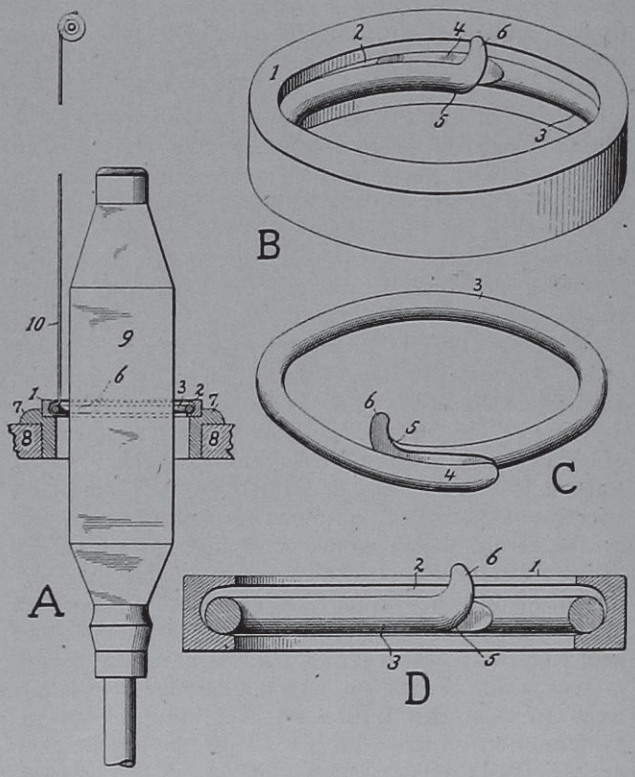
This new device with reference to ring spinning, lately patented by Messrs. Jackson & McVicker, is solely illustrated here, in order to acquaint our readers with various modifications suggested in the departure from our standard devices used for this work. Like similar new devices, constantly patented by individual parties, it takes their application to practical work and this for some time, to demonstrate whether the idea in question is of any practical value or not.

The object of the new traveler ring, as claimed by the patentees, is to provide such a device in which

(1) the thread may be combined with it without the necessity of stopping bobbin or the ring rail for this purpose,

(2) in which friction to the passage of the thread is reduced to a minimum, thereby avoiding danger of breakage, and finally

(3) provide a traveler ring adopted for either spinning or twisting purposes, as well as for permitting a considerable change of count of yarn to be spun or twisted.



To illustrate the new ring to the reader, the accompanying plate of diagrams is given, and of which *A* is a view in elevation, partly in section, exhibiting the manner in which the traveler ring is combined with the ring rail, and also its coöperative relation to the bobbin being wound. Diagram *B* is a perspective detail view (enlarged compared to diagram *A*) of the ring and traveler, and diagram *C* is a perspective detail view of the traveler. Diagram *D* is a view in longitudinal section through the ring and traveler, being shown somewhat enlarged compared to diagrams *B* and *C*.

Considering the new device more particularly with reference to diagram *B*, the same comprises a ring 1, provided on its interior with a circumferential race 2, in which loosely fits and works a metal traveler 3. The latter is made in the shape of a split ring, the overlapping ends of which are beveled with relation to each other, so as to present an open joint through which the thread will pass, the beveled terminals being provided to make the device self-threading. The outer

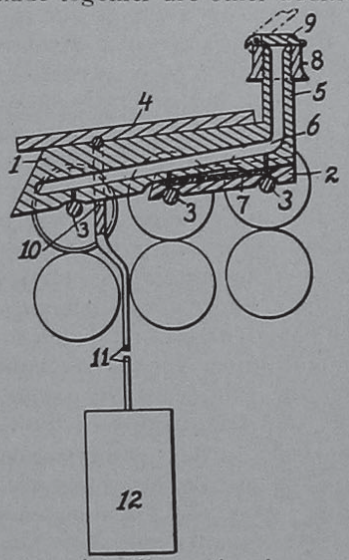
terminal 4 is partially housed within the race, and the inner terminal 5 projects beyond the inner wall of the race and is provided with an upturned hook with which the thread engages, and by which it is guided between the slit into the race, the beak constituting the self threader for the device, previously referred to in the first claim of the inventors.

The ring 1 is mounted within a holder 7 carried by ring rail 8. 9 is the bobbin upon which the yarn 10 is wound during the process of spinning or twisting. This bobbin 9, as will be readily understood, is made to rotate to the left, by which arrangement the thread is positively held from slipping out of the slit between the terminals of the traveler, which would occur if the bobbin turned to the right.

The manner in which the new device operates will be best understood by reference to diagram *A*. The thread 10, to be wound upon the bobbin, is slipped between the terminals of the traveler and bears against its outer face and the inner face of the ring opening, thereby securing sufficient friction to effect winding of the thread without breakage. Beak 6 positions the thread within the traveler without having to stop bobbin or ring rail, the thread seating itself in position, owing to its movement due to the rotation of bobbin 9.

Saddle for Spinning Frames.

In the same, the main saddle is provided with an oil conduit which is filled from behind the clearer board and from which the oil is delivered through passages over and onto the bearing surfaces. A peculiar bottom saddle, and means to lock the main saddle and blade together are other additions.



The accompanying illustration is a sectional view of the assembled parts of this saddle, and numerals of reference indicate as follows:

1 is the main saddle, 2 the bottom saddle, 3 the bearing surfaces to be lubricated, 4 a clearer board resting on saddle 1. The main saddle has an upstanding extension 5 and a conduit 6 extending throughout, from which small openings lead either direct or through holes in the under saddle onto the bearing surfaces 3. The upper surface of the bottom saddle is recessed (7) and said recess filled with absorbent material to retain the oil. Saddle 2 is made somewhat wider than saddle 1 and is provided with flanges to prevent the oil from leaking out laterally between the two saddles and so wasting and fouling rolls and roving. Extension 5 is provided with a cap 8 which has a lid 9 pivoted thereto, to keep conduit 6 free from dirt, dust and flyings.

The clearer board 4 and the main saddle are indented to receive and engage the head 10 of the blade 11 carrying the weight 12. The saddle is the invention of Mr. J. H. Turcotte.

A Novel Way of Clothing the Licker-in of the Breaker Card.

The novelty consists in leaving a portion or space of the outer face of the filleting for the licker-in blank, *i. e.*, without card teeth, so that when the clothing is wound spirally upon the roller and secured thereto,

the card teeth will not cover the entire surface of the cylinder, but only a part of it, and this arranged in a spiral direction, as readily seen from the accompanying illustration, showing a licker-in roller covered with card clothing in this manner. This bare or blank space in the filleting may be arranged longitudinally either at one or the other of the edges of the strip, or at its centre, so as to provide groups of rows of the teeth. Again, these blank spaces may be arranged in the surface of the clothing in the form of small rectangles (not shown in the illustration).

When these blank spaces extend longitudinally of the strip, it will be seen that they will form a spiral space or channel *a* around the roller when the clothing is applied thereto and that the teeth will also be arranged in spiral rows or groups *b*. This will, it is claimed by the inventor, Mr. C. A. Cobbett, cause the wool, cotton or other material to be fed most evenly into the carding engine, and will at the same time prevent any bunching of the material.

The spiral rows of teeth will draw the material in strings or strands in the carding engine and the blank spaces or portions coming successively across the material being fed by the roller, will cause the latter to release or partially release the material, to prevent large bunches of the same from being pulled into the action of the card. The provision of the blank spaces in the card clothing at the same time increases the life of the card clothing all around, since the carding engine will not become so readily choked with large bunches and hence the teeth will not be mashed down or bent, thus greatly prolonging the life of the clothing.

This open space in the clothing of the licker-in when handling cotton, may be partially filled up with a strip of leather, wound around the cylinder in said groove of the card clothing and removably secured therein, so it can be quickly taken out, when the card is to be used for handling wool, shoddy and other heavy material.

POINTS ON COTTON CARDING.

Points to be considered when altering the drafts. The following should always be borne in mind when deciding the drafts between the various points:—

The draft between the lap and the feed rollers should not be more than sufficient to keep the lap straight. If this is exceeded, irregularity in the cotton fed will result. Smooth lap rollers are liable to cause slipping of the lap, causing fluctuations, and a greater draft than that estimated. The corrugated and ribbed forms of lap roller eliminate this tendency.

The draft between the feed roller and lickerin varies considerably. It is customary to alter the speed of the former part whenever a change in the draft is necessitated. That of the latter part is rarely interfered with, being generally about one-half the rate of the cylinder. Altering the draft at this point, therefore, changes the rate at which the fibres are prescribed to the action of the lickerin, and therefore controls the duration of its combing action upon any given fibre.

The draft between the flats and the cylinder is regarded generally as fixed for different classes of cotton. Alterations in this are made by varying the speed of the flats. The rate of movement of the flats in the main governs the duration of the cylinder's action upon a given body of fibres, and also the amount of clean carding surfaces introduced, and hence it is proper to vary their speed according to the exigencies of carding. With neppy, dirty, and matted cottons a higher rate of this part is expedient. For low American, Indian, and like qualities of cotton, they are worked at about double the rate in vogue for the clean qualities of American and Egyptian.

The draft between the cylinder and doffer is also varied, probably more than is expedient. In this the speed of the doffer is often regarded as subordinate to the count of sliver. The propriety of this is discussed elsewhere. The draft between the doffer and the calender is only varied slightly. It should always be such that the sliver, or *web,* does not sag to an extent which is detrimental. On the other hand, if the draft is too much, irregularity through overstretching will result. The draft between the calender and the coiler delivery rollers should be sufficient to maintain a slight tension at all times.

Conditions Controlling the Output of a Card.

General Conditions. When circumstances demand an alteration in the quantity of the output, a knowledge of the limitations of each action are essential in deciding the best manner of procuring the same. This knowledge cannot be gained without intimate association with the work. Assistance of a general character may be afforded, and this is attempted in the following statements.

Greater the contrasting speeds of the carding parts, longer the fibres are desired to remain in the carding action; greater the length of the fibres treated, closer the carding surfaces; more numerous the fibres treated the greater the tendency to strain the fibres.

The greater the length of the fibres treated, the longer the duration of the action of carding by reason of increased difficulty involved in their separation.

The more numerous the body fibres present in the carding influences, beyond a certain limit, the greater the tendency of damage to them by rolling and excessive straining. This occurs whenever the quantity of fibres are in excess of the capacities of the available carding surfaces, and results in some portion of the weight of the flats being borne by the body of fibres instead of by the bend. This tendency increases as the crowding becomes more intense. This becomes apparent through the increased power required to drive the card. Such conditions are more likely to arise in treating long than with short, fibred cotton. Inconsistent increases in the power consumed by these machines, after alterations of this nature, may be regarded as signs of overcrowded carding surfaces and straining of the fibres.

Distinct conditions in respect of the actions of the carding parts. The functions of the lickerin are to straighten the fibres composing the fringe of the lap, eliminate foreign matter, carry forward the treated fibres to the range of the cylinder's action.

The functions of the cylinder are to take the fibres from the lickerin, to carry them into the range of action of the card flats, whereupon the latter arrest those fibres otherwise than straight. The action of the cylinder, about this latter portion of the machine, is directly upon those fibres held by the flats and partially projecting in the carding action. The gradual straightening and withdrawal of these, introduces others more or less contiguous to the carding action. In this way the super-abundance of fibres which the flats receive during the earlier period of their action are held in reserve, and gradually brought into the action. As the fibres are gradually separated and straightened, they are carried off by the cylinder.

The functions of the flats are to receive foreign bodies, fibres that are entangled as well as those that are not straight—not in line with the direction of the carding movement; to present such fibres to the range of action of the cylinder for a definite period. The facility of the flats to arrest and detain foreign bodies and to retain and present the fibres requiring carding, depends upon the efficacy of the points, composing those surfaces, and the quantity of these available.

Numerous sharp carding points accompanied with reasonable spacing are the active agents in arresting and presenting fibres for disentanglement and the retention of foreign matter and short fibres. A sufficient supply of clean wire points should be continually passing into action. Should this latter be insufficient, the imperfectly carded cotton from the lickerin would be carried forward by the action of the cylinder, and in passing the crowded surface of points of the flats, would tend to embed those fibres already engaging the wire. Those fibres, brought forward, which cannot be accommodated by reason of the crowded character of the surfaces, are subjected to the pressure previously referred to, and are thus strained, ruptured, and nepped according to the degree of overcrowding.

To guard against the fibres becoming embedded, care should be observed to ensure that the proper inclination of the bend in wire is preserved. This is often depressed through the stripping brush being used in an unclean condition, also by its being set too deep. The wire on all surfaces should have a fine keen point, and this should be maintained in as uniform a condition as possible.

The rate of Movement of the Flats. It would seem that if the wire surfaces act as heretofore described, a period very much less than forty minutes would more than suffice for the selection of all the desirable fibres from those received by the flat whilst occupying the first position on the bend. Such may be the case, but since the flats when even in their last position arrest fibres—proved by passing a little colored cotton in with the lap, this making its appearance on the next flat exposed—the best way in deciding the proper speed of flats is to recognize the strips from them as the index. The speed should be adjusted to give the lightest *strip* that will strip satisfactorily. To adjust the percentage of strip by manipulating the front stripping plate is wrong in principle. There is only one correct position for that part, and that is as near the flats and cylinder as practicable. Increasing its distance from the flats causes the detachment of portions of the entangled fibre and impurities selected in the carding action from the flats as they move out of action, and thus polluting the work otherwise accomplished.

In considering the rate of movement of the doffer, its functions as well as the length or the weight must be kept in mind.

The function of the doffer is to take the fibres from the cylinder. The more completely this is accomplished the better. Should the cylinder be only partially cleared of the fibres borne upon it, its influence in carding will be interfered with to that extent; because it reduces the extent of the surface of carding points at liberty to act upon those fibres presented by the lickerin and *flat* surfaces. The aim, therefore, in working the doffer should be to clear the cylinder as completely as possible, and to ensure this its surface rate should be as high as practicable. This rate cannot be specified only in general terms on account of the wide variations in the working conditions. Light slivers, poor staple, bad laps, poor selvedges, unsatisfactory doffing combs, badly constructed sliver casements, draughty rooms, all tend to restrict the speed at which the doffer can be run. Under favorable conditions 16 revolutions per minute can be attained.

The rate of the flats is as high as 3 per minute.

The rate of cylinders is 170-180 revolutions per minute for low American and like cottons.

The rate of cylinders is 160-175 revolutions per minute for Egyptian and American better qualities.

The rate of cylinders is 120-160 revolutions per minute for the longer stapled cotton than those enumerated above. (From Cotton Spinning Calculations and Yarn Costs by James Winterbottom, Lecturer in Cotton Spinning, Municipal School of Technology, Manchester, England—Just Published.)

COTTON FROM FIELD TO FACTORY.

(*Continued from page 192.*)

Ginning has for its object to separate the cotton fibres from the husk, berry or seeds to which the filaments most tenaciously adhere. It will be readily understood that on account of the delicate structure of the cotton fibre this process of ginning should be carried on with the greatest of care in order not to injure the staple. The fibre, after being separated from the seed by the ginning process, is then technically known as *lint*.

Cotton intended for use in the mills in the vicinity of the cotton raising districts is, in some instances, taken straight from the field to the mill and ginned there, consequently giving such mills advantages over

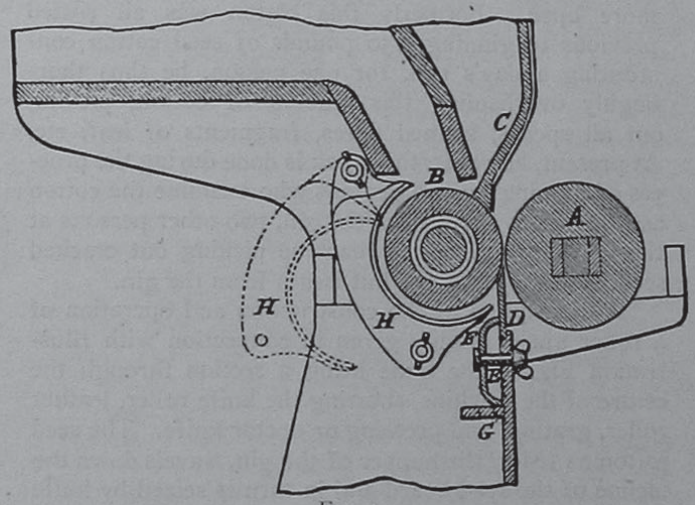


FIG. 4

others, since they will carry on ginning more carefully in their own interest, so as not to injure the staple.

Cotton ginned in a defective machine is damaged either by the fibres being broken or by their being rubbed up into little knots or *neps*, the presence of which, in large quantities, always indicates bad ginning; so do also sticks and broken leaf indicate poorly ginned cotton.

The method employed in every gin is to pull the fibre through a narrow space which is too small to permit the seed to follow. Separation is then effected either by the passive resistance offered to the passage of the seed, or to the seed being mechanically pushed in an opposite direction to that in which the fibre is being drawn.

Cotton gins are of two types, the roller and the saw gin. The roller gin is only used for long stapled cottons, while the saw gin is used in connection with the other cottons and consequently is *the* gin referred to when considering cotton ginning collectively.

The Roller Gin as mentioned, is used only in connection with long staple cottons and where it is of the greatest importance to preserve the length of the fibres. The amount of work done, in a given time, in connection with this gin is considerably less compared to the saw gin, but which feature is of minor importance as it is of course essential to deliver this finest of all cotton fibres to the markets without the slightest impairment of its quality.

Sea Island cotton is ginned altogether by the roller gin. This cotton on account of its high price is handled more carefully all around, from the field to the ginning process proper as compared to other cottons. When such cotton has been picked, weighed and housed, it is next spread out in the sun on what is called an arbor, which is a platform twenty-five feet or more square made usually of inch boards. Here the sun and air dry the cotton, preventing it from heating (which it is liable to do when stored in bulk) and, it is also thought, causes the lint to absorb some of the oil in the seed, which adds to the silky lustre of the fibre. After being thus dried, the cotton is either stored or passed at once to a cleaning machine which knocks the dust and sand out and leaves the cotton whiter and more open. Formerly this cotton was all sorted previous to ginning, 150 pounds of seed cotton constituting a day's task for one person, he thus thoroughly overhauling this amount of cotton, picking out all specks, stained fibres, fragments of leaf, etc. At present, however, this work is done during the process of ginning by two persons who examine the cotton as it passes to the feed of the gin, two other persons at the delivery end of the machine picking out cracked seed, motes, etc., as the lint issues from the gin.

A description of the construction and operation of a roller gin is readily given in connection with Illustration Fig. 4, the same being a section through the centre of the machine, showing the knife roller, leather roller, grating, and pressing or doctor knife. The seed cotton as fed to the hopper of the gin, travels down the incline of the feed board and in turn is seized by knife blades constituting the roller *B* and carried forward by said roller. *C* is a guard which prevents too much cotton at one time passing into action. The seed cotton as taken along by the knife roller *B* has its fibres in turn taken up by the roughened surface of leather roller *A*. Interposed between rollers *A* and *B* is a stationary doctor knife *D*, which by means of a spring *F* resting on cross bar *G* is kept pressed against the leather roller *A*, the amount of pressure being regulated by thumb screw *E*. The rotation of the roller *A*, to which the fibres adhere on account of its roughened surface, strips the cotton from its seeds over the edge of the doctor knife *D* since the seeds on account of their size cannot pass said knife, they being in turn engaged by the blades of the knife roller *B* which alternately rub and strike against the seeds and thus gradually loosen their hold on the fibres until they separate, when they are carried around in the grooves of the knife roller *B* and dropped out of the machine through grid *H* as situated beneath the knife roller *B*. The freed fibre (lint) in turn passes around with the roller *A* from which it is stripped, in a continuous film, by a stripping board acting on the roller on the opposite side to the doctor knife, and delivered outside the machine, being kept away from the seed by means of a dividing plate on the machine. A double action form of this machine is also built; in this instance a leather roller and doctor knife being placed on each side of the knife roller so that the seed cotton is taken up by two leather rollers and doctor knives (the knife roller acting on both sets) thus greatly increasing the production of the machine.

Another construction of a roller gin, which separates the seed by a different principle, is shown by

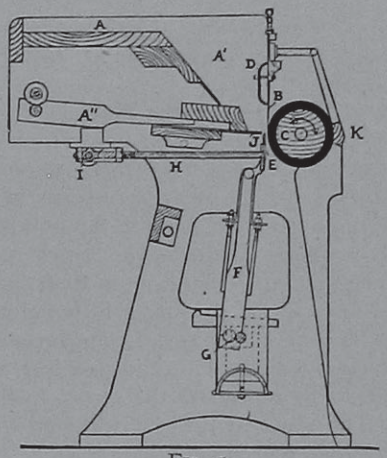


Fig. 5

Figs. 5, 6 and 7; Fig. 5 referring to a single action, Fig. 6 to a double action arrangement, while Fig. 7 shows the principle of liberating the seed from the fibres as observed in both machines. With reference to the single action machine as shown in Fig. 5, *A* is the feed table from which the cotton in turn falls in the hopper *A'* and from where it is pushed into action by means of a reciprocating feeder bar *A''*. *B* is the doc-

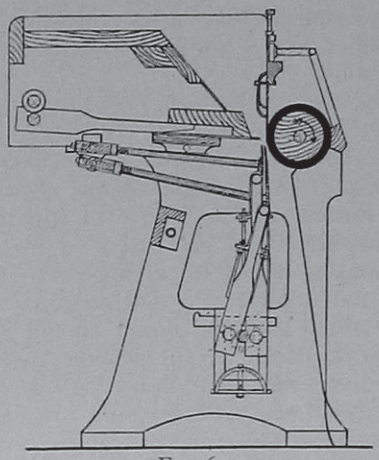


Fig. 6

tor knife, supported above the leather roller *C*, and *D* is a spring which presses the doctor knife *B* against the leather roller *C*. As this leather roller revolves in the direction shown by the arrow, its rough leather surface carries the cotton fibres past the doctor knife, but not the seeds which are arrested by the doctor knife. The quickness of this action *i. e.* the seeds following the fibre and being suddenly checked by the doctor knife will certainly cause some of the fibres to separate and follow the leather roller, however the bulk of the seeds will remain at the knife edge with the fibres still adhering to them. To liberate them from the fibre they are then struck upward by means of beater blade *E* which is connected by means of rod *F* with a crank *G* on the driving shaft and to a rod *H* which is centered at *I*; the seeds being acted upon by the rapid recipro-

cating motion given to the beater blade *E* by the crank *G*. The repeated blows the seeds receive, soon detach them from the fibres which are carried forward with the leather roller, the seeds meanwhile falling through grids *J* in the feed plate and thus out of the machine. The beater blade *E* is guided in its path, which is a portion of a circle having *I* as a centre, through its connection with the bar *H*, the latter being also the means for adjusting the distance of the blade *E* from the leather roller *C* according to the size of the seeds in the cotton under operation. To permit ready adjustment for this purpose the ends of rod *H* are screw threaded and fitted with adjusting nuts. The ginned cotton is stripped from the leather roller *C* by means of stripping boards *K* and when the lint falls to the floor in a continuous film, being kept from mixing with the seeds, as fall under the gin, by means of a sheet iron dividing plate. The double action machine, as shown in Fig. 6 has identically the same parts and the same action for separating the seed from the fibre as the single action machine thus described, the only difference being that the beater blades and its connections are duplicated, the two beater blades acting alternately on the seeds, in turn increasing production of the machine. In Fig 7 is shown the method as employed in both machines for liberating the seed. In said illustration *C* is the leather roller, *B* the doctor knife and *E* the beater blade. At *S* is shown a seed as removed by the beater blade *E* which is operated as indicated by dotted lines (rising up to about three-eighths of an inch above the edge of the doctor knife), the seed in turn falling out of the machine through apertures *J* in the feed plate.

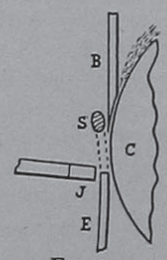


FIG. 7

(To be continued.)

DICTIONARY OF TECHNICAL TERMS RELATING TO THE TEXTILE INDUSTRY.

(Continued from page 196.)

BRANN OR BRANNING:—The process of steeping cloth in a bran bath previous to dyeing, in order to produce lighter and clearer shades. It was formerly used extensively in calico printing and dyeing.

BRAY:—An instrument for breaking hemp.

BRAZIL WOOD OR PERNAMBUCO-WOOD OR RED-DYE-WOOD:—This is a red wood, and as its name indicates, comes from Brazil. It is distinguished from barwood in that it gives up its color (a bright red) to water; sandal-wood and barwood on the other hand do not color water. It is nearly identical with peachwood, lima-wood, and sapan-wood.

BREAKER CARD:—The first carding engine of a set of woolen cards, and to which the fibre is first submitted. It consists of the characteristic main cylinder or swift, several workers and strippers, doffer cylinder and comb. Its clothing must be strong by the reason of the coarseness of the fibre to be worked upon.

BREARDS:—The flax saved from the tow by a second hackling process.

BREAST BEAM:—The bar or beam of a loom over which the woven cloth passes in its travel from the fell of the cloth onto the cloth beam, on which it is wound automatically.

BRIGHTEN:—In calico printing, to brighten, *i. e.*, make the color more brilliant by boiling the fabric in a solution of soda.

BRILLIANTE:—A light weight cotton fabric with raised brocade figures woven in.

BRILLIANTINE:—A rich dress goods, somewhat resembling alpaca, but of superior quality and finish. The goods may be either of harness or Jacquard patterns, and are finished on both sides.

BRIN:—The two strands emitted by the silkworm when spinning its cocoon.

BRITCH:—The extremity of the fleece at the tail end of the sheep or goat.

BROACH:—The commercial name of the cotton raised to a considerable extent in the Bombay Presidency; considered the second best grade of India cotton.

BROADCLOTH:—A fine woolen cloth, commonly black, made from a rather soft twisted yarn (more particular the filling), in a plain or 3-harness twill weave, finished with a high lustre, in which the threads cannot be distinguished. During the finishing process, the cloth is much shrunk and the fibres felted together, giving it a soft, glossy appearance, the so-called *face finish*. Until 40 years ago it was the material in common use for gentlemen's dress suits; made now also in a less dense structure for ladies' dressgoods.

BROAD SILKS:—Silk fabrics above 18 inches in width; distinguishing it from narrow-ware fabrics, such as ribbons, tapes, etc.

BROCADE:—A fabric in which the design is raised and appears on its surface as though it were embossed. Made on a Jacquard loom, so as to produce the characteristic elaborate designs. Sometimes gold or silver threads are interwoven.

BROCATEL OR BROCATELLE:—A coarse brocade of silk, wool or cotton used for tapestry and upholstery fabrics, also occasionally for dresses.

BROCHÉ:—An effect produced by means of swivel weaving. The effect produced resembles embroidery work.

BRODÉ:—A French word used, equivalent to embroidered.

BROKEN TWILLS:—Twill weaves in which the direction of the characteristic twill line is arranged to run part way of the repeat in the weave from left to right, and part way from right to left. They are met with either broken only warp ways and when they are known as *herring bone* effects, or broken warp and filling ways, when a checked effect is produced.

BROKES:—Short locks of wool found on the edge of the fleece in the region of the neck and belly.

BROWN SHEETING:—All weights of cotton goods in the gray, *i. e.*, unfinished condition; 40 inches or less wide, they are known as brown shirtings.

BRUISING:—The softening of the flax fibre by means of passing it between heavy, fluted iron rollers.

BRUNSWICK:—The name given to a coat for women, made with a collar and with open lapels.

BRUSHING MACHINE:—A machine having one, two or four cylindrical brush cylinders, used to lay the nap on the cloth during the finishing process.

BRUSSELS CARPET:—Pile carpets in which the pile is not cut, to distinguish it from *Wilton Carpets* in which the pile is cut. Brussel carpets have a heavy linen, cotton or jute body, warp and filling, and a pile warp of colored worsted yarn raised during weaving into loops to form the pattern. Each color requires its own thread, which dis-

tinguishes it from *tapestry* carpets, where one printed pile warp thread is used in place of the three, four, five or six pile threads used in a row of loops (lengthwise) in a brussels carpet. From the number of different colored pile threads used, they are known as 3, 4, 5 or 6-frame brussels carpet. Fractions of frames are also used, then the carpet is known as a *planted* design.

BUCKING OR BOWKING:—The act or process of steeping, soaking or boiling articles in solutions of lye or caustic soda.

BUCKRAM:—A fine material formerly used for personal wear; now a coarse fabric stiffened with sizing, used for book bindings.

BUFFING:—The beating process employed in removing the boon from the flax fibre.

BULLION:—A fringe of thick twisted cords; bullion made of silk cords covered with fine gold or silver thread are used for epaulets.

BUNCH:—A measure used in flax manufacturing, consisting of three bundles of 18,000 yards of linen yarn.

BUNDLE:—A term used in spinning linen yarn, consisting of 20 hanks or 6,000 yards.

BUNTING:—A light worsted fabric; the material out of which flags are generally made.

BURBON COTTON:—is grown on the French Islands off the coast of Africa; its staple being from $\frac{3}{4}$ to $1\frac{1}{8}$ inch in length, weak in character, and commercially of little importance.

BURKA:—A short round heavy woolen cloak worn in Russia.

BURL:—A small knot or lump in thread or cloth.

BURL OR BURLING:—To remove burrs, knots, etc. (by hand) from cloth previous to finishing.

BURLAP:—A coarse heavy material of jute, flax or hemp, used for wrappings, in upholstering, etc.

BURLER:—The person who burls cloth.

BURLING IRON:—A kind of pincers or tweezers used in burling.

BURNOSE:—A hooded woolen cloak worn by Arabs and Moors. Also the name given to a loose sleeveless cloak having a hood, worn by women.

BURR:—A rough or prickly seed vessel of the burdock, or other plant that bears burrs. They are frequently found intermingled with the fleece of the sheep.

BURRING:—The process of cleaning or removing burrs and other foreign impurities from the wool previous to carding. Two methods of doing this work are in use; either the wool is carbonized, *i. e.*, the burrs, shives, etc., are chemically extracted, or the scoured wool, after drying, is passed through a burr-picker. The chemical process is preferred, if dealing with screw burrs, etc., whereas the burr-picker is generally brought into use where larger burrs are to be contended with.

BURR PICKER:—A machine for cleaning the wool from any burrs, shives, etc., without injuring the staple by cutting or rolling.

BUTTONHOLE STITCH:—A stitch used in needlework, consisting of close upright stitches, each fastened with a loop at the top so as to form a ridge.

(*To be continued.*)

POINTS ON LOOM FIXING.

By William Secor.

Fixing and setting a loom so the same will run to the best advantage certainly requires not only mechanical skill, but at the same time experience, more particularly when we have to take into consideration that in many cases the loom fixer has to favor a certain weave. Certainly if the designer would carefully investigate the advantages and disadvantages of a new weave before the warp is made, a great deal of the latter trouble would not occur. In plain words, he should know whether a certain weave will run well in the loom or make trouble by poor weaving, and when in the latter case he should never use such a weave (or a weave where he is not positive that good work in the weave room will be the result), since poor work in the weave room is a financial loss to the mill. The same holds true to texture, both for warp and filling, more particularly the first; he should know whether he uses too many ends of a certain count of yarn, and when a great deal of poor work would never enter the weave room. He should consider whether the stock and twist used in the manufacture of the yarn will stand the strain the thread is subjected to during weaving, etc. However, in many cases, yarn, texture and weave will be all right and the trouble of poor work found in the setting of the loom.

When poor running work is the cause of a wrong weave, texture or yarn, one or all, it requires skill and experience on the part of the fixer to make a poor warp, as we may call it, run well or at least fairly well in the loom. Some thinking on the part of the fixer and adjusting of different parts of the loom will often do wonders with such a poor warp; however, as a rule, fixers will consider this not in their line of business and naturally will not go at it, except forced to do so by the overseer. They should not act that way, they should take pride in exercising their skill and experience and have every loom in their section running to its best advantage, whatever the condition of work.

Every weave has its peculiarities and consequently the loom must be more or less adjusted to favor it. The variety of these peculiarities in weaves is considerable; while one weave, in order to produce production and perfect cloth may demand that the head motion be set as late as possible, another weave may run far better if adjusted so that the shed almost closes on the shuttle before it leaves it. One weave may require that the shed is still open when the reed passes the pick against the fell of the cloth, whereas another weave may run better if having the shed closed before that time, in order to hold the pick where it is placed by the reed. Such characteristics of the different weaves should form a close study for the fixer, he should take an interest in it, and the one who will do it cannot help but reap the harvest, by promotion; the overseer will notice it, the superintendent will notice it, and whenever a vacancy for a better position, it will always be in the interest of the mill to give it to that fixer who shows up the best production, the best woven cloth from a section, and finally the one who under trying circumstances (accidents will happen in the best managed mill) will do his best, by some extra work on his part, to get rid in the best way possible of any bad warps, if such, by somebody's carelessness have reached the weave room and naturally must be woven into cloth. To handle a tender warp successfully on the loom, is always a delicate affair, still it is an affair frequently met with in a weave room.

Previously we referred to the difference in weaving, considering various weaves, and for which reason it will be readily understood that it is impossible to have exact rules for how to set the head motion, hence if a new weave comes under the observation of a fixer, it must be tested and the result remembered, and when then, if a similar case should come up, a like treatment by him of such a weave can be used. In most instances it is a good plan to have the harness meet at the same time that the reed strikes the fell of the cloth, since this eases the strain on the warp and at the same time does away with the necessity of pushing the filling through a closed shed, which always must be a wear on the warp, no matter how little the amount of pushing. The head motion of the loom may have to be set late, in order to be able to introduce a certain number of picks, by what we mean, that more picks per inch can be put in with the same tension on the warp with the head motion set late than when the latter is set early. This, however, will call for more or less readjusting of the loom, since if the head motion has to be late the picking motion must also be late, since otherwise the shuttle will fly out. This again brings up the fact that to run a loom smoothly with the picking motion set late is quite a difference in placing it where it will work the best. Fixers will set both, the picking as well as the head motion, where they will work nicely, and think they have done their work, still at the same time the warp may be running bad.

This will readily demonstrate to us that the work of a fixer is not only to set a loom, but that at the same time he must take into consideration the warp in the loom, the weave, and that *both warp and loom must run smoothly*. This again may bring up two different items to be considered by the fixer, for instance, the loom may run much better and easier when head motion is adjusted to act rather early, whereas the warp may run better when the same is set late, and when then a compromise between both must be struck, *i. e.*, judgment and skill on the part of the fixer is necessary. Setting the head motion early and permitting the shed to close quickly on the pick may often prevent kinks, otherwise noticed on the face of the fabric, and which, provided a loom was set different, could not be easily avoided. This, running the head motion rather early, while being in favor to the fixer in adjusting loom and preventing kinks, at the same time may put extra wear on the warp threads and in turn make the warp run bad, and when again experience and skill on the part of the fixer must be exercised to compromise the affair.

I found that to handle tender yarn caused either by slackness of twist, poor stock or being weakened in the dyeing, to the best advantage, is to run your shed as close as possible, although not close enough for the shuttle to chafe. Remember that any unnecessary height of shed will cause extra strain and friction on the yarn, for which reason have it just high enough to allow a free passage of the shuttle and no more. When then the lay is pushed back have bottom of your shed just above the race plate line. Don't be misled by your temples, as it may show all right on the sides, on account of the temples being set too high, but examine the shed all the way over to see if temples are not set too high. If you find this to be the case, raise the shed and lower your temples. If you find your warp going bad, more particularly in the centre part of the cloth, look for these conditions, and if your loom is not throwing a crooked shuttle you will find that adjustment suggested will very often help you. Run the shed as late as possible, when you can do it without filling the cloth with kinks, but as I said before, you may have to strike a medium, since what will be suitable for some line of weaves and yarn, will not hold good on another.

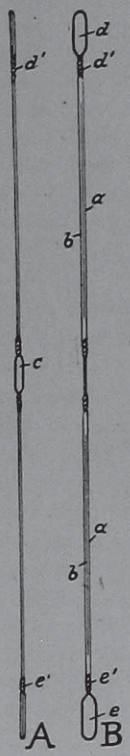
Have your whip roll and harnesses also your breast beam in a direct line, also see that the stirrups are set on the proper lifting point of your jacks, so that you will get an even lift above and below the shed line; if you do not see to this, one side of your shed will be tight on the lift and slack on the depression, or vice versa. It is a good plan to look over the connectors, especially if dealing with a heavy warp texture, since connectors will get worn, and when they will allow your harnesses to be lifted an inch or more from the highest point, and in turn on the downward pull will be inclined to bottom late and high.

Another help for the fixer on tender warps, and other troubles like shuttles flying out, boxes jumping, pickers catching, are for him to see that the eccentric gears, on tender warps, should always be run on the slow side, as then the harnesses and boxes work more steadily; it does away with that quick jerk, characteristic to the high side of your eccentric gear. Sometimes we start them fast and end them slow, again start them slow and end them fast, the latter will often help you to get over kinks and floats, especially on a coarse low grade stock, with plenty of loose fibres, which cause the threads to cling together, often causing kinks and floats.

See that your division hooks are properly divided with the warp line; look for rough shuttles and blunt tips. Make your shuttle hole properly in the picker all the time, see that your boxes are not low on the back, causing the shuttle to be thrown up against the top of the shed. The shuttle should always hug the reed, all the way across; if it does not, either a bad picker, a bent spindle, or the lathe end out of line may be at the bottom of the trouble. In the latter case put the straight edge on it, which will show it up. In lining a lathe end, I always throw it slightly towards the reed.

I think the conditions previously mentioned as to lateness of shed will hold good on high texture work, but I always give a loom as much warp as possible, setting the whip roll back and the beam low if possible, which will often remedy a bad case of filling cutting. I think if designers would be more careful as to how many ends and picks will lay side by side in a fabric structure, without crowding them on top of each other, a great deal of trouble and bad warps met with in the weave room would never have appeared.

Features quoted will readily explain that the whole gist of running a weave room successfully under all conditions, rest with having fixers who understand their business, fixers who have sufficient judgment to adjust a loom to suit production, the smooth running of the loom, the least strain on the yarn and produce a perfectly woven fabric. One of the greatest troubles met with is the fact that although our looms are continually improved with reference to their construction, still at the same time not all the fixers keep up to the times; they seem to take no interest in their work, to put in a day's work is the height of their ambition, and when certainly such a fixer will be frequently at the bottom of many a poor running warp, which if handled by an experienced fixer who takes an interest in his work, can be made to run fairly well. A good plan to keep poor work out of the weave room is to never send a new construction of fabrics (new weave, new textures, new yarn used) into the market, except a full length sample piece has been satisfactorily woven in the mill.



Another item which will greatly assist in the proper running of the loom is careful oiling. Weavers will neglect to oil their looms and a fixer may not discover it until parts are worn out. A loom should be thoroughly cleaned and regularly oiled, taking into consideration that there are parts in looms which when oil is left on will stick, whereas others will stick provided oil is not regularly used, for which reason the fixer should off and on examine the looms in his sections, more particularly in connection with new weavers, and see that all parts are properly oiled and cleaned, and when in turn he will save himself any amount of trouble and labor in his daily work.

Another very essential supply to a weave room for handling tender yarn successfully in the loom are good heddles. I think, and all will have to admit, that the best and cheapest heddle, barring its first cost, are the german steel wire heddles (and to which I will refer to later on more in detail) since they are always straight and not all bent and twisted out of shape like the ordinary iron wire heddles, however, I think if heddle manufacturers would work more towards a perfect round eye, doing away with the V-shape, we would have much better results with tender yarn. Knots in passing the V-point are, in my idea, subjected to more friction than if a round eye was used, besides the V-point must cause more friction on bad yarn than a round point, *i. e.*, heddle eye would cause.

One of the best heddles in the market for a weave room is the *Howard Twin Steel Wire Heddle,* more particularly designed for use in connection with fine high textured fabrics. They are also known as the German heddles, referred to before, for the fact that originally they were introduced in this country from Germany, the home of high textured fabrics. These German heddles at once met with such favor in this country, in place of the domestic heddles, that the *Howard Bros. Mfg. Co.,* at once grasped the idea not only to improve upon their construction, but at the same time manufacture them on a more economical basis, by machinery complete, as compared to the German method of partial hand work, in turn producing a more uniform and reliable article.

The accompanying illustration shows this German or Twin tempered steel wire heddle in two positions, Diagram *A* showing the heddle in its position when on the Harness frame, *i. e.*, with its open thread eye towards the fell of the cloth. Diagram *B* shows this heddle turned 45°, and being more particularly given to assist in describing the construction of this heddle, which is made of two parallel wires *a, b,* tinned or soldered together. The thread eye *c* is formed by then separating said wires, the end eyes *d* and *e,* as required for the heddle bar or rod (not shown) to pass through, being formed by throwing the ends of the wire back on the main wires, and twisting, as at *d'* and *e'*. After thus producing the heddle on one machine, they in turn are taken to another machine for soldering the eyes after they are twisted, in order that the heddle presents a perfectly smooth surface throughout, without any possible chance for catching knots, or chafing the warp threads; permitting their use in connection with the most delicate, high textured fabrics.

WORKERS, STRIPPERS, FANCY AND SWIFT.

By J. H. Dunn.

In giving first a brief description of the process of woolen carding, it will be noticed that most every part of the carding engine has been named by the work which it has to perform in transforming the loose wool, etc., as fed to the first breaker, when leaving the finisher, into the fine strand of roving required for transforming it in the succeeding process, by means of draft and twist, into yarn. In this manner, the work of the carding engine, or as more frequently called, the card, consists in carding or to card or prepare the stock for the spinning process.

A set of cards consists of three machines, *i. e.*, the *first breaker,* the *second breaker* and the *finisher* carding engine; the loose wool being weighed in the scales of the self-feed, as connected to the first breaker, in order to give evenness to the feeding, impossible to be obtained by hand feeding as done in years gone by, and thus lay the foundation for an even and uniform count of yarn. The scales of the self feed deliver upon an endless feed apron, which carries the stock along to

the feed rolls of the carding engine, from where it is taken up by the licker-in, whence it is conveyed to the tumbler, which practically tumbles it upon the quickly revolving main cylinder, also called the swift, a name derived from its comparative swift surface speed. This main cylinder carries the material rapidly forward to the successive pairs of workers and strippers, returning such of the stock as is not properly carded again to the main cylinder, until the stock under operation is brought to as fine a state of smoothness and uniformity as the nature of the stock, the condition of the card, and the time allotted to the operation, will permit. Considering the principle of woolen carding, the same is a continual repetition of two alternating motions, *working* and *stripping*, said motions being carried on, over and over again, until the stock has become thoroughly opened, by being caught and impaled upon some one or the other of the thousands of points of the card clothing, with which every roller and cylinder of the carding engine is covered, and with which the stock to be carded comes in contact with, is covered.

After the stock under operation has passed the last pair of workers and strippers, the same is then, with the aid of the fancy, delivered onto the doffer cylinder, from which it is stripped on the first and second breaker by means of a quickly oscilating comb (the doffer comb), the film thus combed off being guided to the balling head and there automatically wound on spools of an even size, and of which a number, corresponding to the width of the card, in turn are set up in the bank creel of the second breaker and fed to the latter, and when the process thus far explained is repeated, with the exception of that the connection between second breaker and finisher card is done by means of a direct feeding—the Apperly Feed, the Kemp feed, etc. From the doffer cylinder of the finisher card, the stock is then stripped by means of the rings of the condenser in minute small films, to which then, by means of rubbing, sufficient strength is imparted to permit the winding of these roving strands, as they are now termed, side by side, on large spools, and in which condition the roving then reaches the spinning room.

From description thus far given of the process of carding, it will be noticed that the fancy is the only part of the carding engine where its name does not correspond with the work it has to perform. It is said that the word *fancy* has its origin in that in years gone by and when machine carding was in its infancy, that one of the first experimenters in this field met with difficulty in stripping the stock from the cylinder. Some one, it is claimed, suggested that he *fancied* that if the wool was brushed up on the main cylinder, it then would be easier delivered onto the doffer cylinder. Trials in this line soon showed that the party's *fancy* idea had solved the problem to perfection, hence the name; the work of the fancy consisting in raising all the material up out of the wires of the swift, into which it has been forced by its velocity in passing the different strippers. To accomplish this task, the clothing of the fancy consists of long, fine steel wires, which during carding are set a little way into the clothing of the swift; besides the surface velocity of the fancy is greater than such of the swift, and by means of which the same will brush up, raise, the stock sufficiently; *i. e.*, prepare it for the doffer, which revolves slowly and in an opposite direction from that of the swift; thus the latter will deposit the material upon the surface of the doffer cylinder, which carries the same about half way around on its clothing, and from whence it is stripped off by the doffer comb, or the rings of the condenser, as previously referred to.

Certainly the name brush or brushing-up roller would have been a better, *i. e.*, more appropriate definition than fancy, and such a definition might have assisted many a person, who has been obliged to work out his knowledge of the business by experience, to sooner realize the nature and function of the fancy, and not to consider it as a carding roller.

Workers and Strippers. The workers are intended to work the fibres free from bunches, knots and snarls, to secure evenness, straightness, and a somewhat parallel position of the individual fibres. To accomplish this, five or more of these workers are supplied to each carding engine, or in an average from seventeen to twenty workers to the set. Placed into contact with each of these workers is a stripper and which returns the stock from the worker back to the swift, which will return it to the same or some other worker to be further worked, or to the doffer cylinder to be released from further carding on this particular engine. The point at which the latter is the case, depends largely upon the condition to which the fibres have been reduced by the previous working. The card teeth in the swift and the workers are set in their foundation, so that, at their point of contact, they incline in opposite directions, in order to card the stock, *i. e.*, open bunches, etc., and at the same time mix the fibres. With reference to speed, the workers run at a less surface speed as compared to that of the swift and although their teeth point in the direction facing the teeth of the latter at their point of contact, they move in the opposite direction to it. It is this face to face to each other (teeth in workers against teeth in swift) at their point of contact what constitutes the carding action of the card clothing on the stock, the passing each other of teeth, face to back at their point of contact (teeth in workers against teeth in strippers) constituting stripping, and finally the passing of teeth back to back at their point of contact constituting the brushing action of the fancy upon the stock in the swift. The surface speed of the stripper is greater than that of its worker, otherwise no stripping of the worker could take place.

The wool is taken from the swift by one of the workers on account of its less surface speed. When said worker then comes around, he in turn has the stock stripped from it by the action of the stripper, the teeth of which rub against the back portion of the teeth of the worker, and as its surface speed is more than that of the worker, the stock is consequently unhooked, *i. e.*, stripped from the latter by its stripper, from which in turn it then is taken up again by the

swift on account of the greater surface speed of the latter, as well as the favorable inclination of the teeth of swift and stripper at their point of contact.

The swift in turn carries the stock forward with it, and when some of it is in turn again caught by the identical worker it was treated before whereas other parts of it will pass said worker to be in turn taken up by the next worker, and when the process explained before is repeated; the affair as thus explained being repeated over and over until the stock finally passes the last worker, after which it is brushed out of the clothing of the swift by the fancy and deposited by the swift upon the doffer cylinder, as explained before. Some of the stock, deeper imbedded into the clothing of the swift, will pass the doffer cylinder, it may be liberated on the second turn either by being taken up by the workers, or brushed up by the fancy, so that the doffer cylinder receives it; again, some of it may never reach the doffer cylinder, and which then, as waste, is stripped by hand from the swift, when the latter is cleaned by the operator and which waste then is known as card waste. The same in turn is cleaned by means of dusting, etc., and either reworked when new lots are mixed and picked; or as mostly will be the case, reworked in lower grades of yarn, or in some few instances may be sold by mills as waste, this being the case when better classes of yarns only are made by the mill, or when the same is under contract, for example government contracts, not to use any more than a stipulated amount of waste, etc.; it having to be taken into consideration that this waste, although good fibre, still always gets lower and lower in its quality when transformed into waste.

Mixing. This action of working and stripping the stock during carding, will separate each fibre as originally formed the lock of wool from its companion fibres, the fibres of the various locks will be well intermixed with each other, a feature which certainly is of the greatest of importance in the production of a uniform, even yarn, for the fact that no matter how well wool has been sorted, it must be remembered, that wool grown upon different parts of the sheep's body will vary; again that the sheep in a flock will vary as to their age and consequently as to fineness of fibre, features which must be taken into consideration, on account of such fibres possessing different spinning as well as felting qualities.

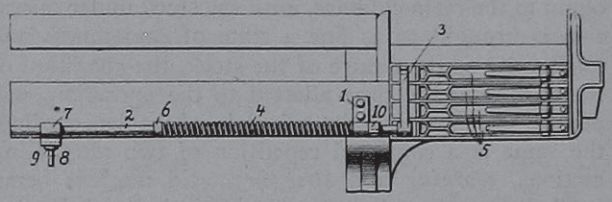
(*To be continued.*)

Shuttle Checking and Releasing Mechanism.

The object of this device is to provide means for relieving the strain on the binder of a shuttle box and thus remove the pressure from the shuttle as it is about to be picked, in turn preventing any chance of the shuttle sticking in its box, a feature which more particularly may be the case in damp weather.

The mechanism comprises an arm connected to the protector rod on the front of the lay, said arm being engaged by a pivoted lever and tilted thereby when the lay is in its backward position and the shuttle is about to be picked.

The accompanying illustration is a front elevation of the mechanism, showing mounted upon the front of the lay in bearings 1 the protector rod 2. At the end of this rod, opposite the shuttle box, is a protector finger 3, securely fastened to said protector rod 2, so that it will be tilted whenever the rod is rotated. About this protector rod is wound a spiral spring 4, which normally tends to keep the protector finger 3 pressed against the binder 5 of the shuttle box containing the



shuttle to be picked. This spring 4 is secured at one end to the bearing 1 and at the other end to a collar 6, fastened to the protector rod 2. An arm 7 is secured to the protector rod at a point beyond the collar 6, said arm extending below the lay and being provided at its free end with a hole to permit free motion of a pivoted rod 8, through the same. This rod 8 is rotatably mounted upon a rod extending across the loom, near the bottom (not shown). The rod 8 is also provided with an adjustable collar 9 for engaging the under side of the arm 7. The protector rod 2 is also provided with a short finger 10, which engages the knock off arm, as secured to the breast beam of the loom, and which acts on the shipper arm (not shown) in the common way and stops the running of the loom anytime a shuttle should fail to box for one reason or the other.

When the lay is in its backward position, *i. e.*, the picking mechanism about ready for action on the shuttle, the collar 9 of the rod 8 bears against the under side of the arm 7, thus oscillating the protector rod 2, and relieving the binder 5 from the pressure of the finger 3. At this time the shuttle is shot across the raceway of the lay, and as the pressure of the protector finger against the binder has been released, the liability of the shuttle to stick in the shuttle box is reduced. The mechanism is the invention of Mr. F. Ott.

An Improvement for Taking Lease on Slashers.

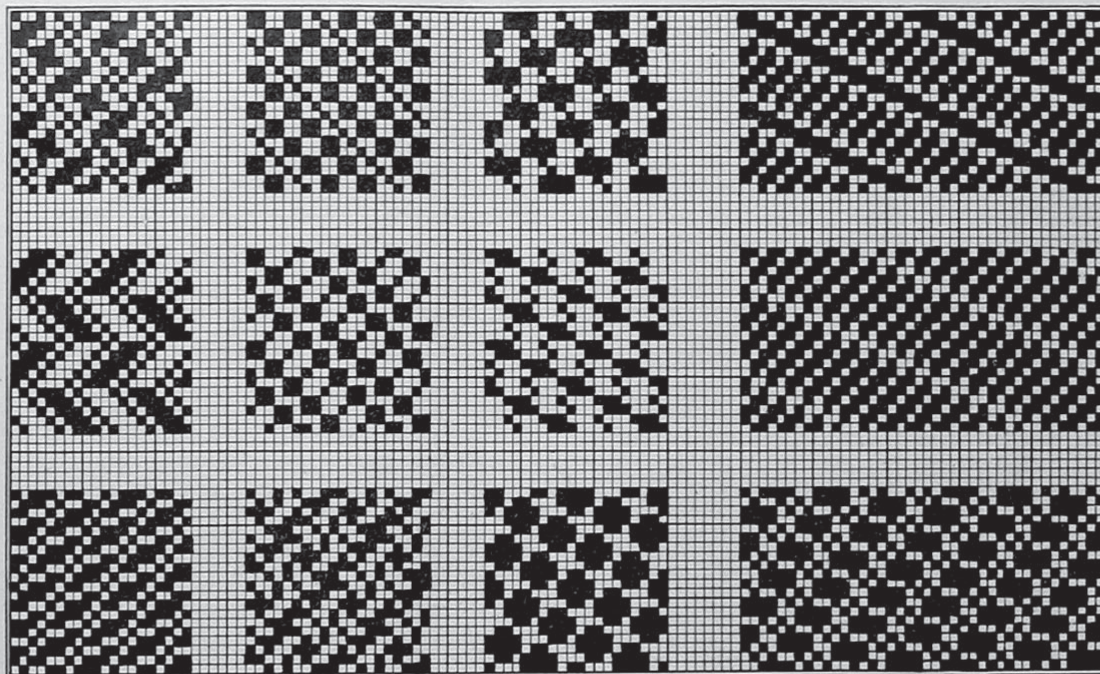
Mr. Jacob K. Altemus, one of our most progressive builders of winding machinery, has lately brought into the market a new device whereby the lease can be obtained in the warp beam and in the slasher, ready for the loom on all the section beams that may be used. The new device will take a lease in a very short time, and if we consider that a saving in time in taking a lease avoids stopping of the loom, with its consequent increase in production, the new device certainly will be a money saver to any mill.

The new device is now ready for inspection and demonstration at any time at the machine shop 2816 to 2824 North Fourth street, and should be examined by any progressive manufacturer, on account of its importance to the textile industry.

DICTIONARY OF WEAVES.

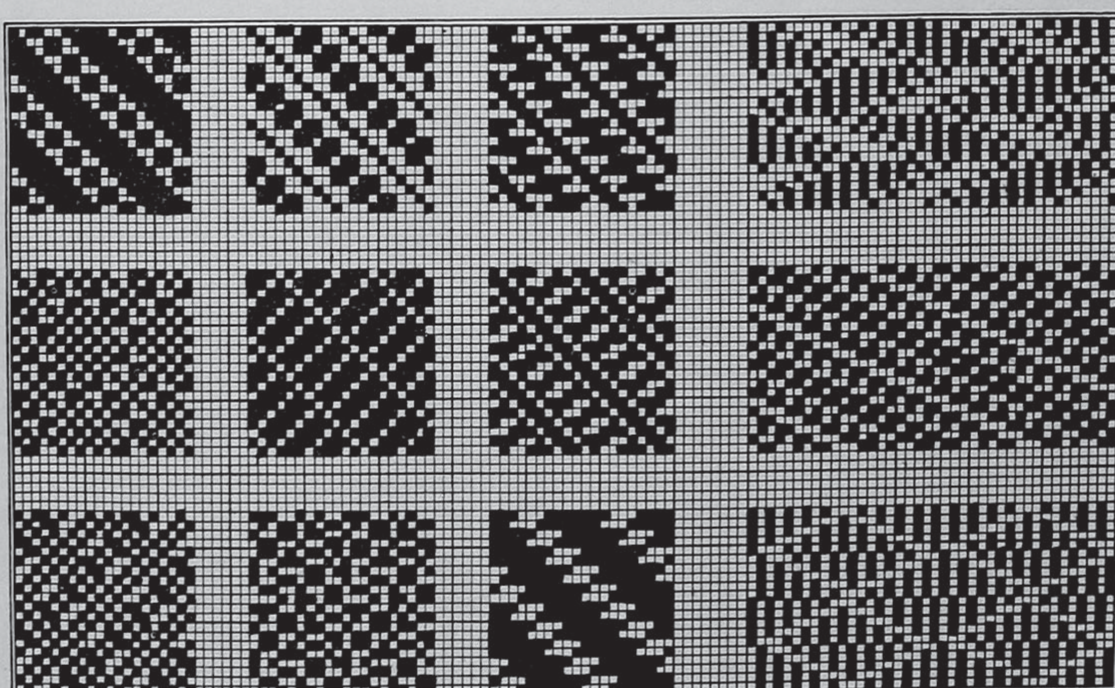
(*Continued from page 198*)

TEN HARNESS



10 × 10 and 10 × 20

TEN HARNESS

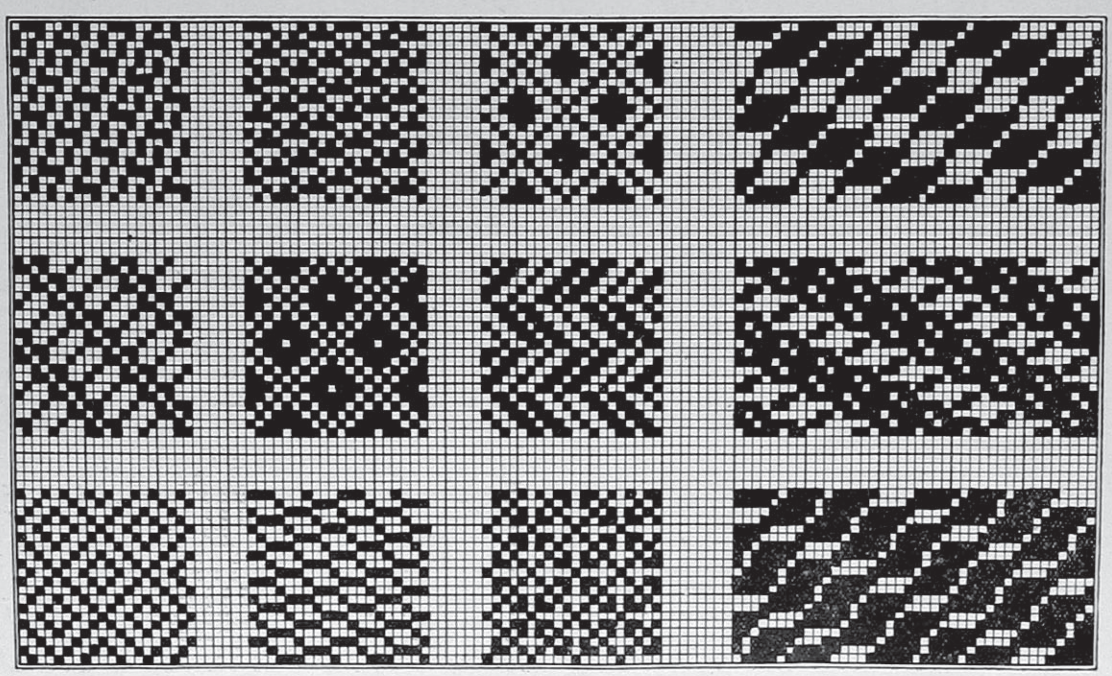


10 × 10 and 10 × 20

(One hundred and sixty-five (165) different 10-harness weaves appeared in the previous issues)

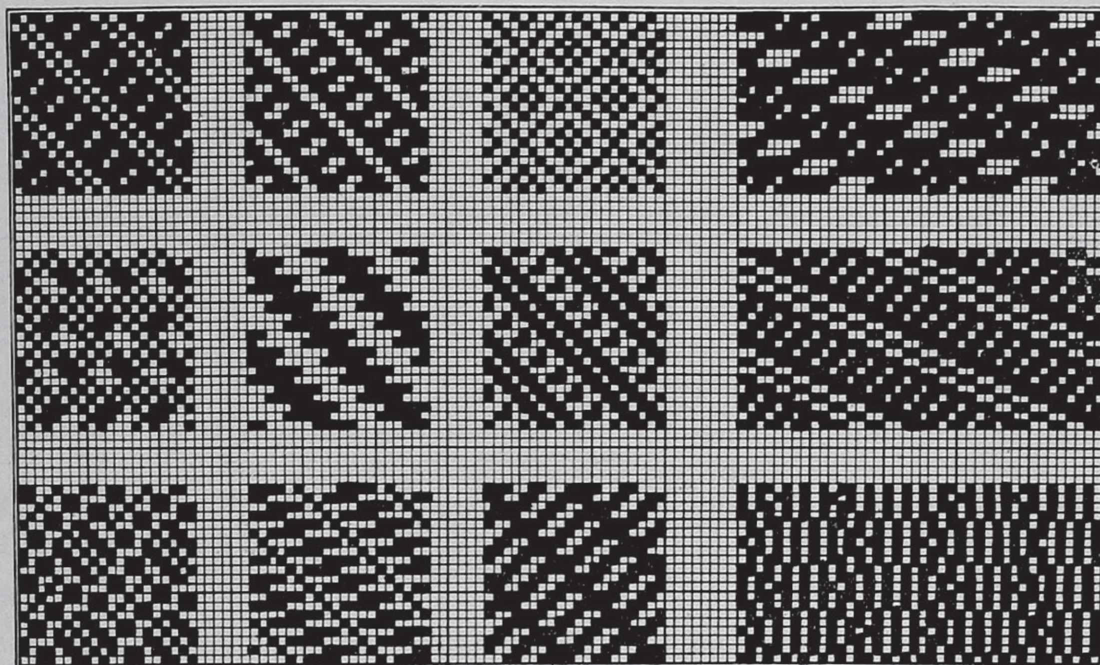
DICTIONARY OF WEAVES.

TEN HARNESS



10 × 10 and 10 × 20

TEN HARNESS



10 × 10 and 10 × 20

A STUDY OF KNITTING.

(*Continued from page 204.*)

Ordinary stockings are most commonly made on the plain stitch, circular knitting machine, with either latch needles or with spring needles, the leg, foot, heel, etc. being knit in one continuous piece or web. The operation is performed by feeding yarn or thread to the needles which repeat the plain stitch to form circular courses until the leg is made; then, by certain action of the cams, the machine is changed to a reciprocating motion to knit the heel, then back to plain circular courses for the foot and finally reciprocating motion again to knit the toe. The plain stitch can be varied by introducing tuck and drop stitches according to any desired pattern, the foot usually being made plain on the sole. Stockings are also knit on the rib stitch type of machine and on the so called flat-bed or straight type knitting machines, the latter being used for making full-fashioned fancy hosiery, as will be explained later.

Men's socks require two separate machines for completion if made on circular machines, one machine knitting the ribbed tops, the rib stitch machine, and another, the plain stitch machine, finishing the leg and foot. The ribbed tops are first knit and are then transferred to the plain stitch machine, by hand or by a transferring device, the loops of the last course being slipped over the needles, so that when the machine is started, the yarn fed in, will be taken up by the needles and interlooped with them to form a continuous web, the machine then completing the leg and foot in the usual manner. The ribbed tops may also be joined to the leg by hand knitting, or, as in old style work, by a seam made with a sewing machine or by hand.

Stockings or socks made on the circular type machine are seamless, except at the toe, which cannot be knit closed on any machine at present. The two edges of the toe part are commonly joined together by a machine called a *looper,* which catches up the loops at the opposite edges and joins them together with a thread so as to form a flat, even, seam. The toe seams are also sometimes joined together by hand knitting, which forms a seam almost exactly like the rest of the web, but this method is too expensive for any but the finest grades of hosiery. Stockings are knit on modern types of the circular machine in continuous lengths, which are cut apart just above the toe to form the separate pieces, the machines knitting in a selvedge or wale at this point to allow the stockings to be cut apart without ravelling out at the cut places. Socks are knit in single pieces on account of the necessity of transferring the ribbed tops to the machines for each piece, at which time they must be stopped to permit the loops of the top to be placed on the needles properly. Socks or stockings made on flat-bed machines are made separately, although some of these machines can knit several pieces at the same time, the blanks being formed side by side but not joined together.

Latch needle knitting machines of the circular type are most commonly used in this country for making hosiery, the spring needle circular machine being less used, probably because its construction and operation are more complicated, although finer work can be done on the spring needle machine than on the latch needle machine, because the needles of the former type can be made in finer gauges than the needles of the latter type, and there is also less strain on the yarn in knitting with spring needles. Circular knitting machines, in which the needles are arranged in a circular row on a cylinder, or on both a cylinder and a dial, are more generally used than machines with the needles in a straight row, the flat-bed or straight rotary knitting machine, because the web of the sock or stocking is knit with them in a closed tubular form and does not require another operation for closing it, as is necessary with the latter type, this lessening the cost of production. However, the finest grades of hosiery—that is, finest in smallness of mesh and of yarn used and in the perfection of their conformity to the shape of the leg and foot—can best be made upon flat-bed machines, the *Cotton System,* the extra cost of sewing up the flat blanks into completed hosiery being repaid by the higher prices that can be obtained for this class of goods.

The so-called circular knitting machines are made in two styles; in one the cylinders and dials carrying the needles revolve, in the other, the cam cylinders revolve, the needle cylinders and dials remaining stationary. Both types will be considered later.

Accordingly as they are knitted on a circular machine or on a flat-bed machine, hosiery will be seamless or seamed. With the former type, the stocking or sock is knit in a closed tubular web, in the latter type, the web forming the stocking or sock is knit in a flat piece, whose opposite edges are joined together by a seam to form the completed stocking. The piece is called a blank, and its shape is what a stocking would have if split down the back and flattened out. The finest grades of full-fashioned hosiery are made on the flat-bed machine, as the garment can be shaped with greater ease and completeness on this type of knitting machine. The cheaper grades of hosiery, ordinary as well as so-called full-fashioned, are made on the circular type of machine, as the production is greater and the cost of manufacture is less. While the products of the flat-bed machine are superior to those of the circular machine, a good grade of full-fashioned hosiery can be made on the latter by using special devices which modify its action.

Full-fashioned: The term *full-fashioned* as applied to hosiery means a sock or stocking which has been knit so that its shape conforms to the shape of the leg, and sometimes also to the shape of the foot as well, *i. e.,* it is narrower at the ankle and instep than at the upper part of the leg and the front part of the foot. This effect is imitated in plain knit hosiery by placing the stockings while wet on flat boards called *shapes,* which are made narrower at the ankle than at the calf of the leg, and giving the stocking this shape by subjecting them to heat and pressure before drying. The shape thus given to the stocking is not permanent, however, and it soon disappears after wear or washing.

Full-fashioned Hosiery may be either seamed or seamless, accordingly as it is made on a circular or on

a flat-bed knitting machine. In the former variety the sock or stocking is knit with plain or tuck stitch as usual, until the ankle part is reached, and from thence the web is narrowed to conform to the shape of the leg, either by dropping a certain number of stitches or by knitting the stitches narrower and closer together. Strictly speaking, such hosiery cannot be called full-fashioned, but the term is applied, rather loosely, to it by the trade. Seamed full-fashioned hosiery, the genuine kind, is made on the flat-bed, straight knitting machine, the so-called Cotton system, being widely employed because of the ease and certainty of properly shaping the goods possible with it..

(*To be continued.*)

An Ingenious Method of Producing a Nap on Knit Goods.

The improvement consists in adding a fleecing yarn to ribbed fabrics, which will project beyond the wales so that it can be brushed to form a fleece without tendering the goods. To interknit this fleecing yarn with the fabric, fixed sinkers are made to co-operate with the needles, so as to receive this fleecing yarn and draw loops of the same over or around said sinkers.

Fig. 1 is a flat plane of the inner face of the new cam cylinder, and Fig. 2, 3, 4 and 5 views illustrative of the operation of the machine. The improvement is applicable to machines having rotating needle cylinder and dial and fixed cam carrier, or to machines having fixed needle cylinder and dial and rotating cam carriers, the latter class is shown; the invention being by Messrs. Scott & Williams.

In our illustrations numerals of reference 1 represents the needle cylinder and 2 the needle dial. The new cam cylinder, as shown in Fig. 1, has an addition to the ordinary cams 3 and 4, a lower set of cams 5, for only partially projecting the needles, so that they may receive fleecing yarn from a guide (not shown) mounted upon the rotating cam cylinder of the machine, this partial projection of said needles not being sufficient to clear the stitches upon them, so that the needles, on their descent, after having received the fleecing yarn, will simply draw loops of said yarn, which will be cast off upon the next operation of the needles necessary to form stitches of the knitting yarn in the production of the regular fabric. The length of the loops depends upon the relation of the hooks of the retracted needles to the sinkers interposed between the needle grooves, needle cylinder 1 being provided with sinker bits 6, the tops of which are beveled on the inner side, so as to throw the loop of fleecing yarn inwardly as it is drawn down over the bits by the descending needles. The sinker bits are notched, as shown at 7, for engaging with the fleecing yarn and retaining it on the desired side when the cylinder needles rise to receive fresh knitting yarn. The notched sinker bits also keep the knitted fabric down.

The operation of the machine is shown in Figs. 2 to 5. Fig. 2 shows the position of the parts after the cylinder and dial needles have drawn their loops of yarn. Fig. 3 shows the cylinder needle partially raised so as to engage with the fleecing yarn 8. Fig. 4 shows said cylinder needle retracted so as to draw a loop of fleecing yarn over the sinker; and Fig. 5 shows the cylinder needle again raised through the loops of fleecing yarn 8 and knitting yarn 9, to engage a fresh supply of yarn, the dial needles being also projected so as to engage said yarn.

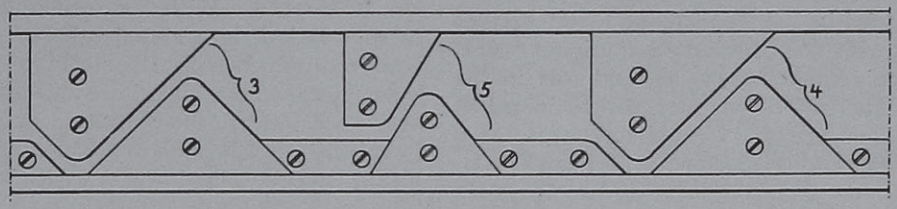


Fig. 1

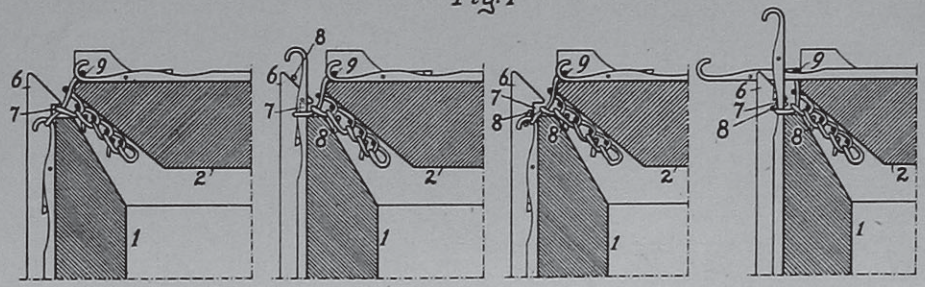


Fig. 2 Fig. 3 Fig. 4 Fig. 5

During the second rise of the cylinder needle, the loop of the fleecing yarn as well as the previously formed stitch of the knitted web, is engaged by the notched portion 7 of the sinker, and the fleecing loop is retained behind both sets of needles so that when cast off by the cylinder needles on the descent of the latter, after engaging the fresh knitting yarn, the loop will be delivered into the space between the cylinder and dial stitches; the surplus portion of the fleecing loop projecting on one side of the fabric between the wales of the same, as shown in the finished portion of the fabric represented in the different view and where it can be acted upon by napping or brushing without tendering the fabric.