Worsted Trousering.

Warp: 4200 ends, 2/36's and 2/40's worsted.

Weave: See Diagram **Fig. 4**; repeat 6 warp threads and 4 picks, 12 harness straight draw.

Reed: 21 @ 3 ends per dent, 63 ends per inch, 66½ inches wide in reed.

Dress:
1 end A
9 ends B
1 end A
10 ends C
2 ends B
1 end C
9 ends C
} 4 times.

42 ends in repeat of pattern.

Descriptions of Yarns to use:

A = 2/40's worsted light grey.
B = 2/36's worsted black.
C = 2/40's worsted light and medium grey twist.

10 Sections @ 420 ends; 10 patterns to each section.

Filling: 62 picks per inch, all 2/32's worsted, black.

Finish: Worsted finish; 56 inches wide.

Worsted Suiting.
(*Stripe Effect*)

Warp: 4104 ends, 2/36's worsted.

Weave: See Diagram **Fig. 5**, repeat 48 warp threads and 4 picks; 8, 12 or 16 harness fancy draw.

Reed: 15½ @ 4 ends per dent, 54 ends per inch, 66⅛ inches wide in reed.

Dress:
1 end black
1 " silver grey
2 ends black } 5 times
1 end silver grey
1 " black
1 " slate (light) } 5 times
1 " black

24 ends in pattern.

9 Sections @ 456 ends; 19 patterns to each section.

Filling: 50 picks per inch, 2/36's worsted, black.

Finish: Worsted finish, 56 inches wide.

Worsted Suiting.

Warp: 4080 ends, 2/40's worsted.

Weave: See Diagram **Fig. 6**, repeat 68 warp threads and 4 picks; 8, 12 or 16 harness fancy draw.

Reed: 15½ @ 4 ends per dent, 62 ends per inch, 66 inches wide in reed.

Dress:
1 end black and grey twist } 30 times
1 " black
2 ends black and grey twist } 4 times
2 " black

68 ends in pattern.

10 Sections @ 408 ends; 6 patterns to each section.

Filling: 60 picks per inch, arranged thus:
2 picks 2/40's worsted, black.
2 " 2/40's worsted, black and grey twist.

4 picks in repeat of pattern.

Finish: Worsted finish, 56 inches wide.

Melton Suiting.
(*Stripe Effect*)

Warp: 3072 ends, 4¾ run woolen yarn, 24 and 28 twist and 2/28's worsted.

Weave: 4-harness even sided twill, repeat 4 warp threads and 4 picks; 8 or 12 harness straight draw.

Reed: 15 @ 3 ends per dent, 45 ends per inch, 68⅛ inches wide in reed.

Dress:
2 A; 2 B; 2 A; 1 C; 1 D;
2 G, 1 H, 1 I, Four times;
2 G, 2 H, Ten times;
1 A, 1 B, Four times;
4 G; 1 E; 2 H; 1 E;
4 G, 4 H, Five times;
4 G; 3 H; 1 F.
128 ends in pattern.

Description of Yarns to use:

A = 2/28's worsted, white.
B = 24's worsted black and 28's worsted white, twist.
C = 2/28's worsted, green and blue, twist.
D = 2/28's worsted, blue.
E = 2/28's worsted, yellow and olive, twist.
F = 24's worsted black and 28's worsted yellow, twist.
G = 4¾ run, woolen yarn, white.
H = 4¾ run, woolen yarn, grey mix.
I = 4¾ run, woolen yarn, olive drab.

6 Sections @ 512 ends, 4 patterns to each section; or

8 Sections @ 384 ends, 3 patterns to each section.

Filling: 42 picks per inch, arranged thus:
1 pick 4 run woolen yarn, black.
1 " 4 run woolen yarn, dark grey.

2 picks in repeat of pattern.

Finish: Melton finish, scour well, full slightly, 56 inches wide.

Melton Suiting.
(*Check*)

Warp: 3072 ends, 4½ and 5 run woolen yarn, 2/20's and 2/24's worsted.

Weave: 4-harness even sided twill, repeat 4 warp threads and 4 picks; 8 or 12 harness straight draw.

Reed: 15 @ 3 ends per dent, 45 ends per inch, 68⅛ inches wide in reed.

Dress:
4 A, 4 B, 4 C, 4 B, Three times;
4 A; 4 B;
2 C, 2 B, 2 A, 2 B, Six times;
3 D; 1 B; 2 A; 2 B; 2 E; 2 B; 2 A; 2 B; 3 D; 1 B;
2 A, 2 B, 2 C, 2 B, Five times;

2 F; 2 D; 2 F; 2 B.
128 ends in repeat of pattern.

Description of Yarns to use:

A = $4\frac{1}{2}$ run, woolen yarn, medium grey.
B = 5 run, woolen yarn, light grey.
C = $4\frac{1}{2}$ run, woolen yarn, dark grey.
D = 2/24's worsted, black and white twist.
E = 2/24's worsted, black and red twist.
F = 2/20's worsted, black (or use $4\frac{1}{2}$ run, woolen yarn, hard twist.)

6 Sections @ 512 ends, 4 patterns to each section; or
8 Sections @ 384 ends, 3 patterns to each section.

Filling: 42 picks per inch, arranged thus:
4 G, 4 H, 4 G, 4 I, Four times;
2 G, 2 H, 2 G, 2 I, Ten times.
144 picks in repeat of pattern.

Description of Yarns to use:

G = 4 run woolen yarn, black, twisted over with single 48's worsted, light grey.
H = $4\frac{1}{2}$ run, woolen yarn, dark grey.
I = $4\frac{1}{2}$ run, woolen yarn, black.

Finish: Melton finish, scour well, full slightly, clip on shear, 56 inches finished width.

A PRACTICAL TREATISE ON THE KNOWLES FANCY WORSTED LOOM.

By E. P. Woodward, *Master Weaver.*

(*Continued from page 69.*)

Advantages of Eccentric Gears and Hints about Timing them.

The Knowles head can be driven by means of eccentric gearings when desired or necessary. These gears are constructed to fit on the same shafts and the same centres as the concentric gears whose places they may take.

By means of the eccentric gears, results can be obtained which in many cases will help to make warps weave better and with less breaking, and also be the means of causing the head motion to run steadier than it otherwise would, thereby causing the harnesses and shuttle boxes to change with a slower and easier motion than can be obtained from the head when driven by concentric gears.

Since the gears are eccentric, they must give a varying or differential speed to anything which they drive as there are no two points on the gear which will give the same conditions of speed. Yet in spite of this fact, the gear has much to show in its favor and much can be done with a loom equipped with these gears which cannot be accomplished without them. It is well within the range of the eccentric gears to give four conditions of speed to the head for approximately $\frac{1}{2}$ of its revolution as follows:

A speed of the head faster than the speed of the loom;

A speed slower than the speed of the loom;

A speed partly slow and partly fast; and,

A speed partly fast and partly slow.

Any of the different speeds are obtained by timing the eccentric gears so that the part desired will be driving the head during the shedding and box changing time.

To demonstrate the utility of the eccentric gearing and at the same time making the timing clear to the learner, it may be well to consider: First, a warp which would be benefited by this gearing; second, the timing of the eccentric gearing to a certain method, to improve the running of such a warp.

The warp in the case could be one in which some of the yarn would weave much tighter than the rest of the warp. In such a case the tightly stretched threads would be sure to get a strain on the beat and the finish of the shedding which would be very apt to snap them before it would affect the slacker weaving ends which comprise the body of the warp; or it might be a case of a very hard tight weaving fabric straining the warp to its limit. In either case, the yarn would be quite sure to break where the strain would be the greatest. This would come when the lay was on the front centre and also when the harnesses were finishing their change before the throwing of the shuttle.

Since the cloth will take the picks easier on an early changing harness time than a later one, the first thing to do would be to see that the cylinders were set as far forward as the chain time will allow. This done, the box motion can also be timed as early as it can safely be done. With this accomplished and the loom starting to pick on the top centre, the timing of the eccentric gears can now be attended to as follows:

With the head coupled and loom ready to run, turn everything forward until the harness vibrator gears are within about four cogs of finishing their change. This will give the finish of motion so far as the harnesses are concerned, the remaining teeth of the gears serving to carry the vibrator levers past the dead centre line. With the loom left in this position, bring the eccentric gears to a position where the shortest radial line of the driving eccentric and the longest radial line of the driven eccentric meet and at the same time stand in line with the centres of the shafts with which they turn. These radial lines are marked on the gears by a hole drilled in the driving eccentric and a pin set in the driven eccentric. This completes the timing of the eccentric gears.

As this timing of the eccentric gears has disturbed the timing of the head motion, it will be necessary to time the head motion with the picking motion. This can be done by breaking the connection between the bevel gear on the lower end of the upright shaft and its driver, and turning the head to the desired position.

It will be found better when using the slow side of the eccentric gears as here described to time the head motion to finish changing the boxes a little later than when running concentric gears. This will give more time for the boxing of the shuttles before the boxes begin to change. If the boxes were timed to finish their movement as early with the eccentric gears as they are when driven by concentric gearing, it would be found that they would not allow the shuttle to reach the picker before they started, thus endangering the safe boxing of the shuttles and the *protection*.

From this statement about timing the boxes to finish moving later when eccentric gears are used than one would when using concentric gearing, it would appear that the harness-section cylinder gears would also be changing much later upon the fillings. This is not so. It will be found that the harnesses will begin changing as early when the boxes are timed to finish late (when the head is driven by eccentric gears) as they would if they were finishing their change earlier and the head were driven by concentric gearing.

In both cases, the timing of the shuttle boxes will show them to be about the same distance from the race plate when the lay is at the protection.

This article has been written with the idea of showing the setting or timing of the head motion and the eccentric gearing to what is known as the *slow* side of the drive, *i. e.,* using the parts of the eccentric gears during the harness and box changing time which will drive the head during most of this part of its revolution slower than the speed of the loom.

The slow motion of the head during the harness changing time is generally used and while it may not be, nor necessarily should be, set to the exact directions here given, this setting demonstrates, and shows plainly, the object desired, *i. e.,* to apply to the part of the revolution desired, the speed which a certain part of the eccentric gears will give. It also shows a simple and direct method for making this change.

Why this timing of the eccentric gearing will do that which is claimed, will be seen from the following conditions with which the loom and the warp had to contend.

First, the warp weaving very tightly on account of the kind of fabric being made.

Second, the harness changing at the same speed as the loom throughout their entire movement. By this is meant that with the loom running 100 picks per minute the head would be traveling steadily at the same speed of 100 revolutions of the cylinders per minute. This motion of the head would cause the harnesses to travel at the same speed throughout their complete change so far as the speed of the cylinders actuating them was concerned.

With the head driven by eccentric gearing, the finishing effect of the motion given the harnesses would be far different, the harnesses would be found to move much slower at their finish.

The difference would be about 20 per cent. slower. This would mean an approximate harness speed of 80 cylinder turns per minute, with a loom running 100 picks per minute. This would at once make for a better running warp.

It should be borne in mind in connection with this timing that starting to change harnesses quickly would have no tendency to break the weakest warp since the starting to change the harnesses is always a motion which releases the threads from the strain. The speed of the harnesses when finishing their change is where the threads are gradually tightening and it is at this point where the slow motion of the eccentric gears proves its value in improving the running of the warp.

Thus far this article has not treated on any timing of the eccentric gearing for particularly saving the wear of the cylinders and vibrator gears when they start to lift the harness.

The setting of the head here described would not be apt to cause as much breakage of head supplies and strapping harness, etc., as concentric gearing would cause, and, would move the harnesses all things considered about as easily as any part of the eccentric gearing which might be used.

To get the slowest engaging speed of the harness cylinders with the vibrator gears, is what many desire of the eccentric drive and when one wishes this it can be readily done by turning the loom to the engaging position of the cylinder gears with the vibrator gears and with the loom thus held, turn the eccentrics to a position where they are giving the desired speed (as previously described). They can be set-screwed to position and the upright shaft uncoupled and the head brought to the desired time. The *fast* side of the eccentric gearing is not as much used as the *slow,* but it is very desirable on certain weaves and yarns. For instance many weaves are of such a nature as to cause the threads to cling together and undue tension of the yarn to keep the shed clear, is not so essential or advisable to use, as a quick snappy finish of the harnesses.

Fabrics also which call for yarns of a coarse and clinging make up, such as coarse long-fibred wool and certain coarse grades of worsted yarns, will in many cases be found to weave far better and cleaner by using the *fast* side of the eccentric gears.

In conclusion, it should be kept in mind that the right timing of the eccentric gears is to first *know* what you desire to accomplish and then set the gears to do it.

It will not always be found advisable to bring the gears to a certain fixed position or set them by any hard and fast rules.

The gearing is there and the thing to do is get results by the use of it which could not be obtained without it.

This article has not been written to lay down any set rule or rules, but to show the possibilities of the eccentric gears and give a few examples of timing them (not to any exact positions) but to help to overcome certain conditions of warps and weaving for which they are a decided help. When in doubt try them and prove their merits.

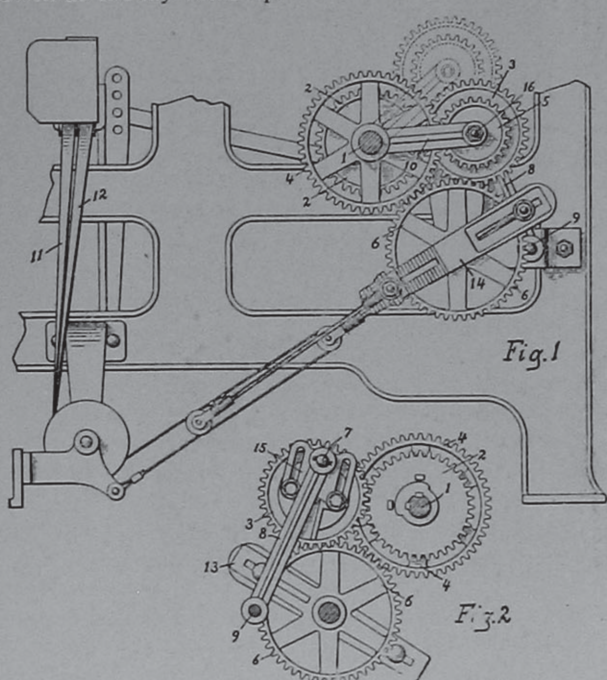
Briefly summed up, the eccentric gears will do all that can be done with concentric gearing—and more. They will help the fixer out of many troubles with the head motion, such as saving head supplies, preventing harness miss picks on old heads and light weaving fabrics, helping to keep shuttle boxes changing steadily, and making many a poorly weaving warp the better because of their use.

They were designed from necessity, and practical tests and usage have proven their utility.

(To be continued.)

Shuttle-Operating Mechanism
For Narrow-Ware Crompton & Knowles Looms.

In these Looms as used for weaving ribbon, tape, etc., a series of shuttles are used, arranged in a single row, and adapted to have a reciprocating movement, first in one direction, and then in the other, by a reciprocating rack and a series of pinions, and at the end of each movement of the shuttles to have a dwell as the lay beats up.



The object of the improvement is to provide a shuttle operating mechanism of simple construction and operation, and located at one end of the loom, outside of the loom frame, and connected, through straps to the racks for operating the swivel shuttles; said straps being located on the same side of the loom as the operating mechanism.

A system of spur gears is employed, which has an intermediate spur gear with two toothed surfaces, or two gears mounted on a swinging arm, and carrying a crank pin, adjustable on said gear, and is connected with a second swinging arm, so that the axis of said gear or gears will be moved, relative to the driven gear for operating the swivel shuttle racks through a crank mechanism connected with said driven gear, and thus cause a dwell of said driven gear.

In order to illustrate the new mechanism the three accompanying illustrations are given, and of which Figure 1 is an end view of the lay, and a detached portion of a loom side, showing also the improvements in the shuttle operating mechanism. Fig. 2 is a detail view showing the gearing.

The operation of the improved mechanism is thus: The rotation of the driven crank shaft 1 rotates gear 2, and through said gear, the gears 3, 5, 4, and 6 will be rotated, and the double crank mechanism connected with the gear 6 will be operated, and through connections to the shuttle racks (not shown) said racks will be operated.

The system of spur gears quoted, are so arranged, that a complete rotation of the crank shaft 1, during the forward and backward movement of the lay, will communicate a half rotation to the gears 4 and 6, so that the double crank mechanism connected with gear 6, will be carried from one extreme position, shown in Fig. 1, to its opposite extreme position, and through the connections and straps to the shuttle racks and shuttles, move them, to communicate to said racks and shuttles a complete movement in one direction. At the end of the latter, the continued rotation of the crank shaft 1, through gear 2 and gear 3 carrying the crank pin 7, connected by the arm 8 to the stationary stud 9, will communicate a swinging movement to the arm 10 loosely mounted on the crank shaft 1, and cause the gears 3 and 5 to move from the position shown by full lines in Fig. 1, to the position shown by broken lines in said figure, and leave the gears 4 and 6 substantially at rest and thus cause a dwell after each half rotation of the gear 6, at the end of each movement of the shuttles and shuttle racks, as the lay beats up.

With one end of the belts 11, and 12 attached to a fixed point, and the belts passing around a pulley on the crank arm connector rods, the amount of movement communicated to the shuttle operating racks is twice the movement of the crank arms 13 and 14.

By means of the plate 15, adjustable on the driven gear 3, and connected with the arm 8 pivoted on the stationary stud 9, the throw or movement of said gear 3 and the gear 5, through the movement of the arm 10 carrying the stud 16 on which the gear 3 is mounted, may be varied as desired, and the amount of dwell of the gear 4, and the gear 6 driven by the gear 4, may be varied as desired, said gears being stationary during the throw or movement of the gears 3 and 5, and consequently the amount of dwell at each end of the movement of the shuttles may be varied as desired.

FROM A LOOMFIXER FROM TRENTON, N. J.

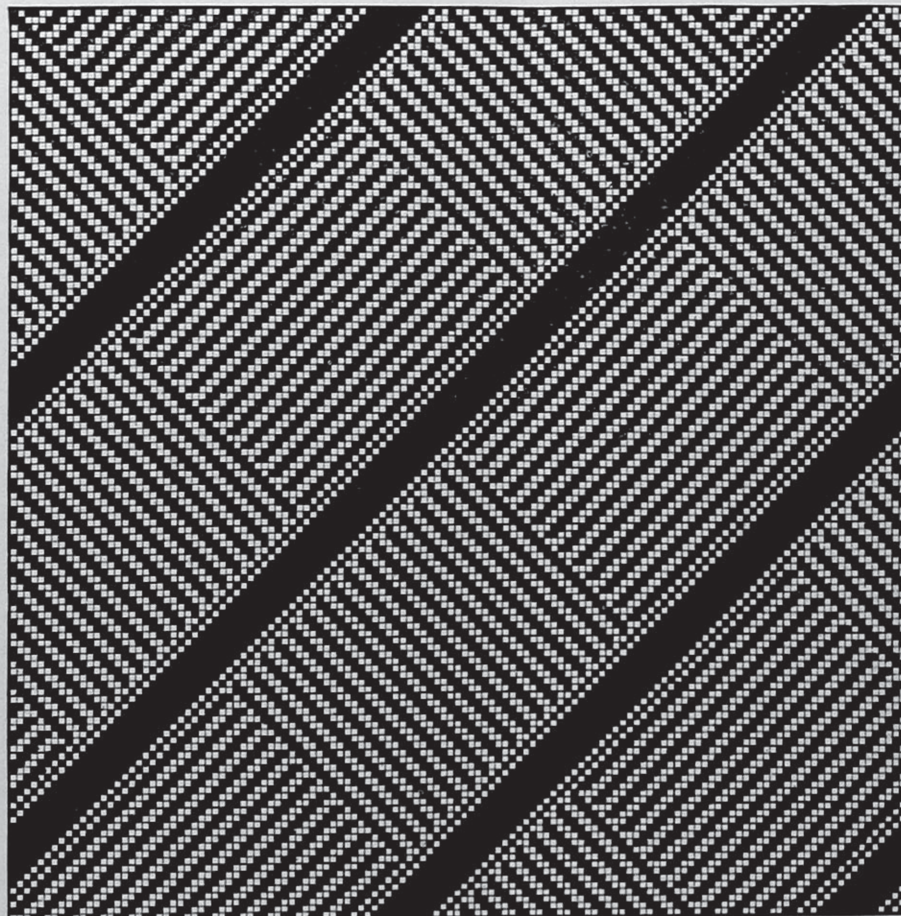
Mr. Posselt:—I have been reading Mr. Woodward's writings in your paper and am very much interested in them. H. J. H. 3-17-09.

FROM A NEW YORK COMMISSION MERCHANT.

E. A. Posselt:— . . . . There is another matter which I would like taken care of and that is I wish another copy of the January number of your Journal as the one I have, was badly torn through my clumsiness in removing the wrapper, and as I wish to have them bound I would like to have my copies in perfect shape. E. F. 3-8-09.

NOVELTY IN DRESS GOODS.

(From abroad)



Figured Diagonal Cheviot *(Piece Dyed)*

Warp: 2162 ends, 2/36's worsted, in the grey.

Reed: $15\frac{1}{2} \times 3 = 46\frac{1}{2}$ ends per inch = $46\frac{1}{2}$ inches wide.

Repeat of Pattern: 130 warp threads and 130 picks; cut pattern 3 times over on Piano machine for 390 needles of a 400 Jacquard machine.

Filling: 40 picks per inch, 2/36's worsted in the grey.

Finish: Scour well, singe, piece dye navy blue, shear clear on face; 44 inches finished width.

PERFECT ROVING FOR WOOLEN YARNS.

By J. H. Dunn.

(*Continued from page 83.*)

Unevenness in any one roving strand varies in character according to the causes from which it arises. Short thick bunches or nubs come from imperfectly carded stock. They may be large or small, but generally have equal diameters in all directions. Larger, and at the same time longer enlargements of the roving strand are almost always due to bunches taken into the card by the licker-in, either from imperfect feeding, badly set rolls, or because of an overloaded licker-in.

To make the drawing from the second breaker finer and softer, slow the feed on the finisher card, to get more doublings; give a more acute angle to the feed by slowing the tension bands on the long side of the table, or giving a flatter lay to the strands by lowering the presser bar.

With reference to the licker-in, the same may become dulled by accident or long use, or become too full of waste stock or dirt, or if the work is very heavy, may have too slow a speed for the amount of stock it is obliged to carry. If clothed with diamond wire, do not grind until necessity compels it, the original cut point being far the best, although a ground point is better than no point. It is very much the same in regard to cleaning. For such wire, the less done, the better for the wire, its point and the work. But when long stock is so wound into the teeth that the fed stock must press itself to the points in order to have them take hold of it, or when the teeth are so filled with dirt that the gum rounds up their front edge clear to their point, it is then time to clean the fancy, partially at least. When compelled to resort to higher speed, do not increase it more than needed; since too high a speed will wear both, wire and stock.

Unevenness as previously referred to occurs most often in the more outside situated roving strands, from automatic feeds, and when any of the causes quoted exist their effects are aggravated on account of the doubling of the web on the feed table at that point. Very bad bunches may result when the doublings are laid too far in from the edges of the carding engine, or provided insufficient space has been allowed for the waste end ring on the doffer, a feature, which not only results in an uneven roving strand, but at the same time a coarser one, while from the other causes mentioned, the extra stock in the bunches is taken from the other portions of the strand and is consequently followed by places in the strand lacking this stock, and consequently is much finer than the required size of the roving, as the bunches are coarser. Bunches resulting from these causes are seldom uniform in size, but come in series, gradually diminishing from large to small.

An unevenness very much like the one just referred to is sometimes caused by workers out of trueness; however, in this case there will be a gradual alternate swelling and diminishing from fine to coarse and from coarse to fine, not always of uniform length for either the coarse or fine, but quite uniform length for as to the amount of stock which either kind contains. Carders may think that such effects could only be produced when the workers are very much out of true, caused by the high side taking up more stock than the other, and which will be the case as long as both sides are equally sharp. However, when a worker is only slightly out of true, if it then is so closely set that the point is cut from the tooth while the lower side remains sharp, the latter will then be the one that will take up the most stock. In either case the roving strands in the centre of the delivery will show the greatest unevenness.

Provided all the workers are perfectly true and this unevenness is noticed with somewhat longer distances, it is then caused by an uneven surface of the swift, the same being either out of true or portions of its card clothing without teeth. Provided the swift is out of true, the greatest unevenness, like that from the workers, will arise in the centre of the card, while if teeth are out, it comes from where the most of these teeth are lacking.

It will be readily understood that untrue ring doffers will make coarse and fine places in the roving, however this should not occur since it is such an easy matter for the carder to keep these rings true.

However, with the best of care, doffers will get sprung, or, at least, their shafts will, journals will become worn, and then results similar to those previously explained in connection with untrue workers will appear, coarse and fine places being then of equal length to that of the circumference of the doffer. They will all be of nearly the same length with each other, provided the points of the rings are equally sharp all the way around; otherwise, if the point is worn from the high side, there will be finer places coming from those portions of the ring immediately adjacent to its dullest part.

It will be readily understood that all of this imperfect work is avoided by the experienced carder keeping his machines in perfect condition, true, well clothed and well ground.

COTTON SPINNING.

The Ring Frame.

(*Continued from page 80.*)

Care of rings.—When setting the rings, it is good practice to examine every one of them and replace such as are worn with new ones. A practical overseer will quickly discover, by the feel of the yarn and the distribution of tension, whether the rings are in proper set and otherwise in order or not. Poor rings, or rings badly set, are of great annoyance to the spinner, besides they are a loss to the mill on account of work running bad, waste, poor yarn, etc. Substituting perfect rings for poor ones and seeing to it that all rings are set proper, will result in a complete change in the work. The difference in the amount of waste made, the cost per pound for spinning, the better quality of the yarn and the increase in quantity, will in a short time explain that poor rings or rings badly set are a great loss to the mill. A poor ring will destroy enough travelers every six months to pay for a new ring, to say nothing of the extra amount of waste that will be made, and poor yarn besides, since every time a traveler breaks, waste is made and at the same time a weak place in the yarn on account of piecing, the result. When new spinning frames are sent from the shops, experienced men are sent along, who at the mill adjust rings and spindles, as well as other parts, and start the machine up in perfect order. The machine must then not be neglected for years, but the various mechanisms and parts must be examined from time to time and not allowed to become deranged. A good plan is that whenever ring rails, etc., are scoured, the rings are thoroughly wiped out and examined and poor ones discarded. For a thorough scouring of the ring rails, have a trough made to fit the rails to be cleaned, fill it with concentrated lye and place rails in it, and if convenient let them remain in the bath all night. They should then be rinsed in hot water, after which they will dry in a few minutes. All rings should be readjusted at least once in two or three years.

A mechanical device for cleaning spinning rings consists of three fibre discs set in suitable grooves cut in an ordinary ring frame bobbin. To clean the rings, a whole set of these bobbins are placed upon the spindles of the ring frame as for the operation of spinning. The frame is then started. The discs press against the ring and traveler and while revolving rapidly with the bobbin, thoroughly remove all grease and dirt from them, besides imparting a polish. As the ring rail rises, the discs press against the inside of the lower flange, and as it falls, the traveler is pressed upwards and the inside and upper flange is cleaned. Both the upper and lower surfaces of the ring are cleaned and polished, and besides them, the lower part of the ring rail below the ring is also cleaned. The time required to thus properly clean the rings is five minutes, and that to place the cleaning bobbins on the spindles and afterwards to remove them, is very little.

In connection with double flange rings, see to it that they are turned over when one side of them becomes worn, cleaning the rings previously.

Some spinners may have wondered why the modern ring in place of wearing longer, does not wear as long as those made many years ago. The explanation is stated by the Draper Co., to the point: "The wear of a ring depends on the speed at which the traveler rubs over it, also on the size and hardness of the traveler. The speed of the traveler has been increased by the higher speed of the modern spindle as well as the increase in the size of ring used to produce the same number of yarns. In certain instances, the actual wearing friction of the traveler is thus multiplied one hundred per cent. This increased speed of the traveler on the surface of the ring, tends to extract the temper of the stock, soften the flange and produce wear in this manner. Stock that would have served perfectly under the old conditions will now not do at all. Much greater care has to be taken in the selection of the stock, and at times when the steel industry is embarrassed by excess of orders, it is often extremely difficult to maintain a proper standard. The average number of yarn spun again is also higher than formerly, resulting correspondingly in a lightening of the traveler sizes, the larger rings used at the same time having a tendency to also reduce the size of the traveler used, and when it must be remembered that a small traveler wears the ring more rapidly than a heavy one."

Finishing of rings.—Until a few years ago, it was impossible, by any method of polishing, to produce a new spinning ring that ran as light as one that had been in use several months. Until new rings then had become burnished by the action of the travelers, they always caused an excessive breakage of ends, waste of travelers, falling off in quantity and quality of production, to say nothing of the vexation among the operatives arising from the badly running work, the dissatisfaction among them caused by the increased labor they are called upon to perform, the consequent neglect of their regular work, and the serious effects of these evils upon all succeeding operations. These drawbacks grow in seriousness as the speed of the spindles is increased. Some years ago, burnished rings were introduced, with the object to overcome this trouble, in turn reducing the consumption of travelers, causing less waste, minimizing the breaking of ends when new rings are started, and materially improving the quality and increasing the quantity of yarn spun.

Lately the Draper Co., patented a new finish in connection with their rings, known as their *mirror finish*, an illustration of which is given in Fig. 265 in connection with one of their double flange rings. The new ring has an inside surface polish that reduces traveler friction so that it starts like an old ring. It therefore not only saves time, labor and expense while breaking in new frames or new rings, but it also allows a higher speed of frame if purchasers take advantage of the conditions presented, since the speed of new frames is always more or less influenced by the difficulties attending the first few months' operation of the frame, *i. e.*, until rings were polished by the action of the traveler. The usual mill is built to furnish yarn for a certain number of looms, and sufficient spindles are bought to furnish that yarn on the speed under which they can be started. If frames can be started at a higher speed, less spindles will be needed to give the necessary output, and considerable first cost in

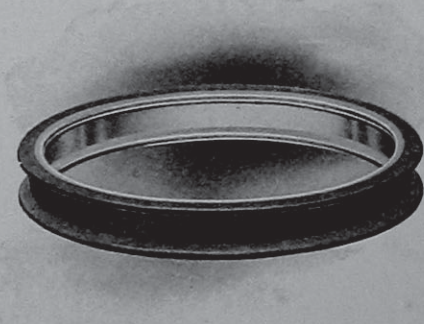


Fig. 265.

machinery and floor space can be saved. Spinning rings before they leave their shop, until now, received their surface finish by the hand application of oil and emery on a stick, or by automatic metal contact of burnishing devices. The new mirror process of polishing stretches the process over hours, and thus reduces any chance of overheating or taking the temper out of the stock. The system used is entirely new, and covered by patents, both for method and apparatus. It is a continuous machine application of polishing material under natural forces, the extent of treatment depending on the time the machine is run and not on the whim of the individual. Fig. 265 shows the ring as polished by the new machinery before the rest of the ring, as shown by the black surface, is finished. The rings are finished all over, but the comparison of the polished surface with the black surface, gives chance to see the perfection of the process.

(To be continued.)

Egyptian Cotton Crop. The same is reported at less by about a million hundredweight than the yield of last season. Frequently occurring heavy fogs lasting well into the late morning hours are held responsible for the damage to the plant, and opinion is unanimous that the shortage is due to this cause more than to any other agency. The crop was three weeks later than usual. Cool weather in October, unfavorable to cotton, ruled throughout lower Egypt where 75 per cent. of the cotton is grown. This caused delay in the normal development of the plant and in the opening of some of the bolls of the second picking. Both the first and second pickings were below early-season anticipations. The size of the crop, because of these conditions, was foreshadowed and is now confirmed by the known returns.

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ADVERTISING RATES ON APPLICATION.

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

ALL COMMUNICATIONS WILL BE CONSIDERED AS CONFIDENTIAL.

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

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

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

Members of the New York Cotton Exchange have approved the addition of five quarter grades to the official New York contract, but refused to approve the addition of two more grades that had been added to the committee's recommendation of the Board of Managers. The managers proposed to include "Barely Low Middling" and "Fully Good Ordinary."

The five quarter (Intermediate) grades added are: "Fully Good Middling," "Barely Good Middling," "Fully Middling," "Barely Middling" and "Fully Low Middling."

The new grades will go into effect on contracts for delivery in March next year, after which in classing white cotton, the following grades are to be used:

FULL GRADES: Fair, Middling Fair, Good Middling, Middling, Low Middling and Good Ordinary.

HALF GRADES: Strict Middling Fair, Strict Good Middling, Strict Middling, Strict Low Middling and Strict Good Ordinary.

INTERMEDIARY GRADES: Fully Good Middling, Barely Good Middling, Fully Middling, Barely Middling and Fully Low Middling.

THE NATIONAL ASSOCIATION OF COTTON MANUFACTURERS.

The stated Annual Meeting of this Association will be held at Boston, Mass., Wednesday and Thursday, April 28 and 29, 1909.

The sessions will be held in the Mechanics Fair Buildings (Talbot Hall), Huntington Avenue, in an acceptance of the invitation of the Textile Exhibitors' Association, which is to hold an exhibition of textile machinery during the last week of April.

The sessions will be called to order on Wednesday, at 11 o'clock, A. M., and 2 o'clock, P. M., and on Thursday at 10 o'clock, A. M. and 2 o'clock, P. M.

His *Excellency*, EBEN S. DRAPER, Governor of the Commonwealth of Massachusetts and a member of this Association for many years, will give an address of welcome.

The full program will not be issued until the meeting, but papers are expected on the following subjects: Additional Top Strippers on Revolving Flat Cards, Advantage of Variable Speeds for Ring Spinning, Bibliography of Cotton Manufacturing, Commutator Grinding, Cotton Fibre Substances and Its Properties, Cotton Futures on New York and New Orleans Cotton Exchanges, Economy in Steam Generation, Improvements in Lighting Large Textile Areas with High Efficiency Lamps, Proper Care of Machinery, Scientific Methods in Warp Sizing, Standard Specifications for Staple Gray Goods, The Textile School, Transportation for Mill Yards.

Hotel Brunswick, opposite the Institute of Technology, will serve a special lunch on Wednesday and Thursday, in a dining room reserved from 12.30 until 2.30 for those attending the meetings. Tickets to be obtained at the hotel desk.

$20,000 DAMAGE SUIT FOR "STRETCH" OF COTTON GOODS.

The Kursheedt Manufacturing Company, of New York, is suing the Standard Bleachery Company, of New Jersey, to recover $20,000 damages for alleged wrongful conversion of 60,000 yards of cotton goods, stated to be the "stretch" resulting from the bleaching of 3,000,000 yards of the plaintiff's property by the Standard Company.

John W. Griggs, formerly Attorney General of the United States, is chief counsel for the plaintiff company. "The Kursheedts will make out the strongest case possible," he said (March 30), not only for their own benefit but for that of other manufacturers and the dry goods trade at large as well.

The Society of Chemical Industry in Basle, Switzerland (A. Klipstein & Co., U. S. A.), has absorbed the Basle Chemical Works. Dr. A. Bischler and Dr. E. Ziegler, directors of the Basle Chemical Works, become directors of the amalgamated company, and Dr. F. Meier and Dr. C. Staehling, vice directors; Dr. T. Kröber and Dr. H. Rey, chemists of the Society of Chemical Industry, have also become vice directors, and Mr. E. Haas and Dr. K. Jedlicka will sign procuration. Mr. W. Huth has retired on account of ill health.

A very interesting statement as to the difference in wages and cost of operation of Textile Plants, here and abroad, has been given by Mr. Julius Forstmann of the Forstmann & Huffmann Company, Passaic, N. J.

Mr. Forstmann has had valuable practical experience as a woolen manufacturer in both Germany and the United States, and is, therefore, qualified to speak with unusual authority. He was a member of the recent German Tariff Commission. Mr. Forstmann states:

"As to the *difference in the scale of wages,* I find that for the same work done here in Passaic we have to pay 125 to 150 per cent. higher than in Germany, or in other words—for the same work for which a German mill hand received $1.00 we have to pay here $2.25 to $2.50.

"Furthermore the mill people of Europe have for the most part inherited and acquired a certain proficiency in their respective line of work, having been employed through several generations in the same capacities, whereas the American manufacturer has no such advantages and is obliged to educate almost all of his working people.

"The *cost of erecting and installing* a mill in the United States is 50 per cent. higher than the same can be done for in Europe.

"The *money rates* are generally much lower in Europe than in the United States, which is also an important factor in the cost of production to the advantage of the European manufacturer.

"I have no hesitation in stating my conviction that, were it not for the great distance of European manufacturers from this market and the loss of time involved in transportation, which prevents a quick delivery of merchandise, the present tariff would prove insufficient for the protection of the woolen industry; and it must not be overlooked that this disadvantage to the importer is being gradually reduced by the increased efficiency of means of transportation.

"One very important reason why the American woolen manufacturer requires protection is the fact that he depends *entirely* upon the home market, whereas to the European manufacturer the whole world is open and in the event of business depression in one market, he can send his wares to any other, while the American has no alternative but to reduce production or perhaps close down his mill entirely.

"In proportion to the general expenses of living, the cost of woolen clothing worn by the great majority of the American people is lower than in Europe. My explanation of this is that the American manufacturers have been able to reduce the cost of the cloth, by producing in large quantities, and the same methods are followed in the manufacture of ready-made garments, which has reached a position far ahead of the same kind of business in Europe."

Another important statement regarding wages, etc., paid here and abroad, based upon data procured from both sides of the ocean, is that of Mr. Walter Erben, President of the Erben-Harding Company of Philadelphia. Mr. Erben states that the wages paid in making worsted yarns on the Bradford system in this country are more than twice as high as the wages paid for similar work in Bradford, England; that the wages in France, Germany and Belgium, are far lower, even, than British wages.

A permanent tariff commission constantly active would be a plague to the country's business. President Taft was right in urging that there could be no full prosperity until the present tariff revision was completed, and after that *the country wanted a ten years' rest from tariff agitation.* A tariff commission, through the unrest which it would cause, might do millions of dollars of damage to the country's business interests.

Unfinished Worsteds to be Popular for Spring, 1910. There is a strong sentiment in favor of unfinished worsteds, although fabrics of this character are not the most desirable as a rule for spring wear owing to their warm appearance. However close observers state that more unfinished worsted piece dyes will be shown when the next season will open than during any recent period. Investigation shows that a large number of mill men concur in this opinion. Black and blue fancy stripes and gray mixtures will be favorites.

Fall River, Mass. The members of the Cotton Manufacturers' Association have signed the agreement providing that all weighing and sampling of cotton be done at the mill premises. The abuses resulting from the practice of having most of the cotton weighed and sampled at the wharves and railroad yards had become serious and the losses on cotton so heavy that decisive action was necessary. The chief cause of the losses was held to be the over-large samples drawn, owing to the carelessness in oversight of the cotton. The mills stand to lose three pounds per bale under the established rule of sales, but it is anticipated that under the new system they will save a good proportion of this allowance. They will save the trimmings of samples, which now go to the samplers as an allowed perquisite.

Shrinkage of Foreign Wools. The larger proportion of the foreign wools, grown of Merino blood, will shrink on the average over 56 per cent. To be more specific, Australian fine wools as a class will shrink all the way from 45 per cent. to 65 per cent. Wools from the Cape of Good Hope will shrink from 55 to 75 per cent., from South America from 50 to 72 per cent. Spanish wools will average about 64 per cent.; French and German wools around 65 per cent.

The Cassella Color Company begs to inform their friends that they now occupy their new offices and warehouse at *39 Oliver Street*, Boston. These new quarters provide more than double the floor space heretofore occupied, which additional room has been found necessary to accommodate the ever increasing needs of their customers. The location is convenient to both North and South Stations.

FLY FRAMES.

The Process—The "Daly" Differential. The Woonsocket Frame.

(*Continued from page 82.*)

THE WOONSOCKET FLY FRAME.

The method of applying the change of speed to the bobbins from the cones is shown by referring to illustrations Figs. 4, 5 and 6. Of these, Figs. 4 and 5 show the ingenious *Daly Differential Motion,* as used by the Woonsocket Machine and Press Co., in the construction of their well-known Fly Frame, and of which Fig. 6 shows a diagram of its gearing, etc., given more particularly for the purpose of calculations.

From this diagram Fig. 6, it will be seen that the bobbins are driven by two trains of gearing, one from the main shaft and the other from the cones, and it is to effect the combination of these two drives into a single drive and at the same time allow of the variation in the speed of the cone drive, that the differential motion is used.

Previously to explaining the working of the *Daly Differential Motion,* it may be well to define what constitutes a differential motion, and when the answer is: "A differential motion, or epicyclic train of gearing, consists in introducing gears on movable centres into a regular train of gears."

DALY'S DIFFERENTIAL.—All the gears and collars of this differential revolve in the same direction, thus reducing the amount of friction between the collars and the main shaft to a minimum, and consequently if compared to other differentials, requiring less power from the cones and decreasing the strain on that part of the mechanism. Two views of the motion, separated from the frame, are given, Fig. 4 being a perspective view of the motion with the internal gears in position in the casing, while Fig. 5 is a view, showing the sleeve pulled out on the shaft, in order to see the arrangement of the internal gears. Referring to the illustrations, *A* indicates the main shaft of the machine, to which is secured the internal gear *B*, said gear being made on the inside of a casing as used to enclose the mechanism when in working position (see Fig. 4). The gear *C* is fixed on a collar which is loose on the shaft *A*, the other end of said collar carrying a gear *D* which is driven through gearing from the bottom cone of the machine. A second collar *E* fits over the first collar (not to be seen) and carries a disk *F*, in which two studs *G* and *G'* are fastened on opposite sides from each other, each stud carrying a gear, *H* and *H'* respectively, which mesh with the internal gear *B* and also with the gear *C*. The other end of the collar carries a bevel gear *I*, which, through proper gearing drives the bobbins. The main driving power comes through the internal gear *B*, on the main shaft, and the excess speed is gotten through the gear *C* on the same collar with the gear *D*, as is driven from the bottom cone.

CALCULATING THE SPEED OF GEARS.—The speed of the internal gear *B* = "**n**" revolutions; the speed of the disk *F* carrying the gears *H* and *H'* = "**a**" revolutions; and the speed of gear *C* = "**m**" revolutions. The gear *C* to contain 28 teeth, the gears *H* and *H'* 25 teeth each, being intermediates, and the internal gear *B* 80 teeth.

The value of the train of gears "**e**" will be negative or minus, since considering the three gears *C*, *H* (or *H'*) and *B* as a simple train, the gear *B* will revolve in

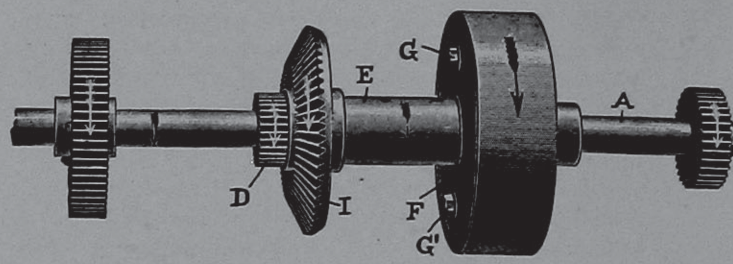

FIG. 4

the opposite direction from the gear *C*, as will be plainly seen by following out the gearing thus: The gear *C* drives the gear *H* in an opposite direction and said gear *H* drives the internal gear *B* in the same direction as itself, and hence it is opposite also to the first gear *C*. There is scarcely a limit to the number of combinations of the two drives, but only those concerned in a thorough understanding of the motion will be given, since more would only tend to confuse the problem.

We will first consider that the gear *B* makes 400 revolutions in the positive direction, while the gear *C* remains stationary or "**n**" = 400, "**m**" = 0, and we wish to find the number of revolutions "**a**" of the disk *F* carrying the gears *H* and *H'*. Since the first gear *C* contains 28 teeth, and the last gear *B* contains 80 teeth, the value "**e**" of the train will be $28 \div 80 = \frac{28}{80}$, and as the two gears revolve in opposite directions, this quantity becomes $-\frac{28}{80}$.

We have the formula:

$$\mathbf{a} = \frac{\mathbf{n} - \mathbf{e}\,\mathbf{m}}{1 - \mathbf{e}}$$

and substituting the known values, we have:

$$\mathbf{a} = \frac{400 - \left(-\frac{28}{80} \times 0\right)}{1 - \left(-\frac{28}{80}\right)}$$

$$= \frac{400 + 0}{1 + \frac{28}{80}} = \frac{400}{1\frac{28}{80}} = 296.29 + \text{ revolutions.}$$

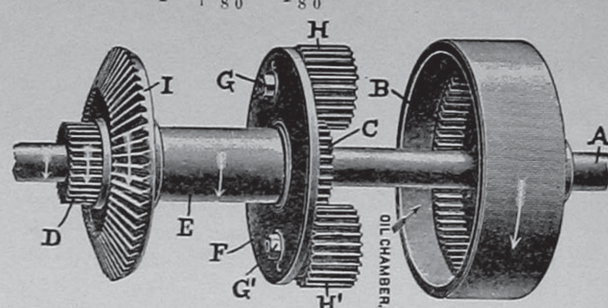

FIG. 5

Say that the gear *C* makes the same number of revolutions as the internal gear *B* and in the same direction,

$$a = \frac{n - e\,m}{1 - e}$$ and substituting, we have:

$$a = \frac{400 - (-\frac{28}{80} \times 400)}{1 - (-\frac{28}{80})}$$

$$= \frac{400 - (-140)}{1\frac{28}{80}} = \frac{540}{\frac{108}{80}} = 400 \text{ revolutions,}$$

or the whole train revolves together as if the gears were locked.

The gearing to the bobbins will afterwards be shown to be such that the disk, which is on the same collar with the bobbin driving gear, does not require to be driven as fast as the speed of the main shaft, and hence the required speed of the gear C will lie between the two examples given.

This differential motion is shown in diagram Fig. 6 in its proper position in the frame, in connection with gearing, given for the purpose of explaining the principles of calculating only. The gearing to the bobbins and spindles are not shown in the positions they would occupy in the frame, but instead are placed toward the top of the diagram in order to avoid confusion with the other gearing.

Referring to the diagram, we see that the spindles are driven from the main shaft A through a 35 gear on said shaft, which through an intermediate, drives a 35 gear on the end of the spindle shaft B. On the spindle shaft are 46 tooth bevel gears which drive the spindles through 24 tooth bevel gears secured on said spindles.

The bobbins are driven both from the main shaft and from the cones. The top cone C is driven from the main shaft through the twist gear, which we will consider as 31, said gear through an intermediate, driving a 56 gear on the top cone shaft D. On the bottom cone shaft E is the cone gear (*) which will be calculated, and this gear drives a 70 gear on the same stud with another 70 gear, which in turn drives the spider shaft F through an 80 gear. Secured also on the spider shaft is a 23 gear, which through an intermediate drives the 30 gear corresponding (see Fig. 5) to the gear D on the same collar with the gear C. This gear C, as mentioned before, has 28 teeth and gears into the two 25 gears H and H', which are in mesh with the internal 80 tooth gear B as fast on the main shaft A. The sleeve E, carrying the disk F on which the two gears H and H' are pivoted, as mentioned before, also has the bevel gear I secured to it, and which bevel gear in connection with diagram Fig. 6 is shown as a 57 bevel gear, driving in turn a 32 bevel on one end of an angle stud G; the other end carrying another 32 bevel, which in turn drives a 32 bevel on a vertical shaft H. On this shaft is a 32 bevel, driving a 42 bevel on the end of the bobbin shaft I. The bobbin shaft has the series of 51 tooth gears secured to it, which drive 25 tooth gears on which the bobbins rest.

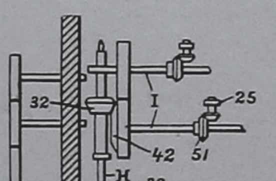
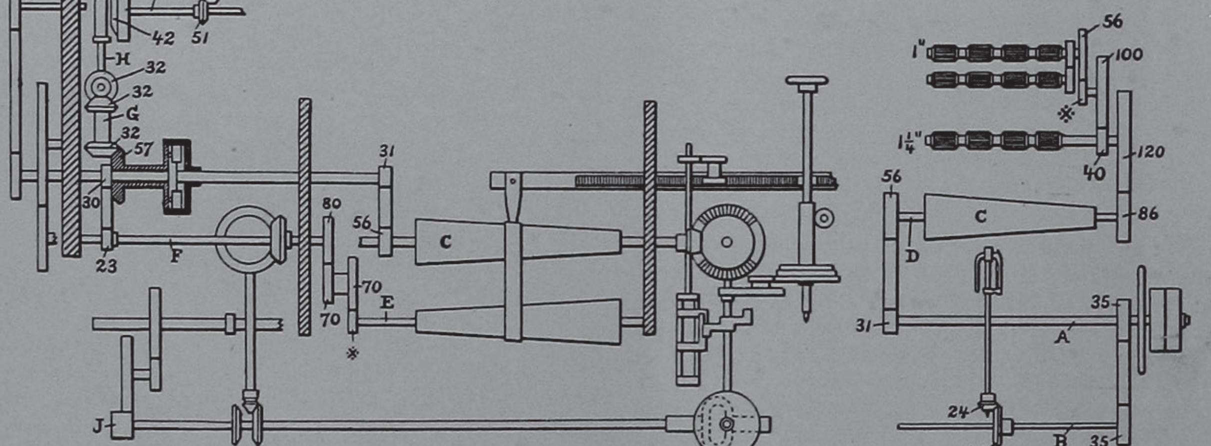

FIG. 6

The diameter of the front roll $= 1\frac{1}{4}$ inches.
Diameter of empty bobbin $= 1\frac{5}{8}$ inches.
Diameter of top cone (at start) $= 6\frac{1}{2}$ inches.
Diameter of bottom cone (at start) $= 3\frac{1}{4}$ inches.
Speed of main shaft = 450 revolutions.

The length of roving delivered per minute by the front roll is

$$\frac{450 \times 31 \times 86 \times 1\frac{1}{4} \times 3.1416}{56 \times 120} = 701.1 \text{ inches.}$$

The number of coils this length will produce on an empty bobbin is

$$\frac{701.1}{1\frac{5}{8} \times 3.1416} = 137.33$$ coils, excess revolutions of empty bobbin.

The speed of the spindles is ascertained as follows:

$$\frac{450 \times 35 \times 46}{35 \times 24} = 862.5$$ revolutions, and

$862.5 + 137.33 = 999.83$ revolutions of the bobbin per minute.

The speed of the sleeve (E in Fig. 5) necessary to produce this speed to the bobbin is:

$$\frac{999.83 \times 25 \times 42 \times 32 \times 32}{51 \times 32 \times 32 \times 57} = 361.13 \text{ revolutions, speed}$$

of the sleeve and disk.

This speed is the value for "**a**", and as the value for "**n**" is 450, the problem now is to find the speed of the gear C in Fig. 5, or the value for "**m**" which is given to it by the cones. For this purpose, we will use the formula:

$$\mathbf{m} = \frac{\mathbf{e\ a + n - a}}{\mathbf{e}}$$

The value of "e" is $-\frac{28}{80}$, for the reason already given. Substituting the proper numbers, we have:

$$\mathbf{m} = \frac{(-\frac{28}{80} \times 361.13) + 450 - 361.13}{-\frac{28}{80}}$$

$$= \frac{-126.4 + 450 - 361.13}{-\frac{28}{80}}$$

$$= \frac{-37.53}{-\frac{28}{80}} = 107.23 \text{ revolutions of gear } C.$$

We may find the speed of the bottom cone shaft or simply continue the train of gears to the 30 gear on the inside sleeve, which revolves at 106.2 revolutions per minute, and then solve for the cone gear:

$$\frac{450 \times 31 \times 6\tfrac{1}{2} \times \text{cone gear} \times 70 \times 23}{56 \times 3\tfrac{1}{4} \times \quad 70 \quad \times 80 \times 30} = 107.23$$

Cone gear =

$$\frac{107.23 \times 56 \times 3\tfrac{1}{4} \times 70 \times 80 \times 30}{450 \quad \times 31 \times 6\tfrac{1}{2} \times 70 \times 23} = 22.45 = 22 \text{ gear.}$$

Warp Sizing.

The importance of sizing warps as a branch of the cotton trade is now generally recognized, and in this, as in the allied branches of the cotton trade, regularity and uniformity are the main objects to be achieved. At the outset, a sizer is largely dependent on the quality of the work turned out in the warping process, as, if the back beams are not warped well and evenly, the result in the sizing is deplorable. The warper should see that the edges of the warp at the flanges are level. *Walled-up* or high edges, as well as *sunk* or soft edges, are a fruitful source of trouble and annoyance in the sizing machine. Another feature is, that the warper should not have any lost ends on the beam, as these cause laps in the sizing frame which are liable to break down the adjacent ends, if not observed immediately by the sizer, and this often causes a big breakage of ends in the slay at the front of the machine. In this connection it is important also that all the back beams should be of the same width between the flanges, so that the sizer, in *setting* the back beams, can make even edges, without any beam edges overlapping the others during the time the warp is running through the size-box and the drying portion of the machine. It might be added here, that the hot-air system of drying warps is the best for all-round work, both in cotton and worsted sizing. It is of great importance, in sizing, that the warps should have as nearly as possible the same percentage of size placed on them, this percentage to be kept up all the time the *sett* is running.

Say, for example, that 14% of size is required on the warps.

The first warp sized can be calculated for percentage as follows:

Example: 2935 ends, 1/40's cotton, 166 cuts, 60 yds. per cut.

Calculation weight unsized, 873 lbs. Then
$873 \div 166 = 5.26$ lbs. per cut unsized.

Say the sized warp is 14 cuts, and the net weight of yarn in the sized warp is 83 lbs.

$83 \div 14 = 5.99$ lbs. per cut sized.

Then 5.99 lbs. per cut sized,
5.26 " " " not sized,

$.73 \times 100 = 73 \div 5.26 = 13.87$

Or 13.87 per cent. of size required on the warp

The sizer should be provided with a book ruled as below, in which the particulars of the *setts* sized should be entered:

Particulars: 2935 ends, 1/40, 166 cuts, 60 yds. per cut.

Date.	Back Beams.				Warp No.	Sized Warps.			% of Size and Remarks.
	Gross.	Tare.	Net.	Remarks.		Gross.	Tare.	Net.	
					1				
					2				
					3				
					4				
					5				

The weights of the back beams should be entered on the left-hand side of the page, and the weights of the sized warps on the right-hand side. By this method the sizer can, by entering the weights of each sized warp, easily find out whether he is gaining or losing the percentage of size.

It is well known in the trade that each and every sizing firm has its own pet formula of ingredients for it, and how much of this and how little of that is to be employed. Some firms there are that use differently made sizes for the different classes of yarns. Be that as it may, *one* kind of size can be made to cover the whole ground, the only difference being in the strength of the size for different yarns, or the percentage of size required on the warps. As an instance of this I have had one sizing machine running on carded Peeler, another running on Egyptian, and another on

Mercerized cotton yarn, and all three machines received their size from the same pan. If it was desired to add a smaller percentage to one than to the others, hot water was added to the size to let it down to the required standard of strength. The experience of the writer is that farina is the best medium for size-making, in conjunction with wheat flour of a good quality. Here let me warn users of flours against buying the cheaper brands, as I have found out, to my cost, that the natural result is a lowering of the standard of work done, and may, and does, result in trouble quite out of proportion to the money saved (?) in the first instance. A good farina will make a better *body* of size, and will stand more boiling than sago flour, both in the size-pan and in the size-box of the machine. In preparing the size it is necessary to have two flour-mixing pans for the wheat flour, to be used alternately, each measuring 40 by 40″, with stirring apparatus driven by power, and with water tap attached to each pan. Run about 1′ of water before adding any flour. Then take a sack (of 20 stone), and add part of it; let the water tap run again, and then empty the bag gradually as the water in the pan rises. Let the water run to within an inch of the top of the pan, so as not to wash over the sides. Any lumps of flour that may be floating on the top must be broken up. This mixing must be stirred up for not more than four days before being used for size, as there is a rapid deterioration if allowed to ferment for a longer period. A pump, driven by power, is attached to the flour-mixing pans, and connected by pipes to each of the size-making pans.

In size-making, to attain the best results, regularity and system must be employed, *Rule-of-thumb* methods will not suffice. The size must be made exactly the same each time, with no variation whatever, and this is the most important feature of any in sizing. Regular size means regular work turned out by the machines, and it needs no arguments to impress this fact upon a manufacturer or his superintendent's mind. In conclusion, says "Textile Manufacturer," let me urge upon sizers that no size be wasted, as carelessness, long-continued, can add a great deal to the cost of sizing, from which there is no corresponding benefit.

Silk Manufacturing and Atmospheric Moisture.

By James Chittick.

No textile fibre seems to be so susceptible to the humidity of the air as silk. In this respect it is much like the hair of the human head.

The normal amount of moisture that silk should contain is about ten per cent (eleven per cent more than its absolute dry weight). At the same time it responds readily to dryer or damper surroundings and will easily lose moisture or take it up to the extent of as much as three per cent, and, under exceptional conditions, very much more, in fact, as much as thirty per cent of water can be held by silk without its feeling especially damp.

We thus see, that under conditions of ordinary use, silk will have, say, from seven to thirteen per cent of water in it.

Silk when very dry loses, in a great measure, its elasticity and becomes harsh and brittle, while the moister it is the more elastic it gets, and, when quite wet, a good silk can be stretched almost like a piece of india rubber.

The experience of any one who runs a silk mill will be that on cool, or cold, dry, brisk days, the ends of silk will be breaking and flying in all directions, cutting down the production ten or twenty per cent, while on warm and damp days a minimum of breakages occur.

The difficulty in dry weather is intensified by the static electricity developed by the silk, when dry, and which makes the thread fly about in a very wild manner, while on moist days the water in the air conducts this electricity away and there is little trouble.

On dry and cold days, the atmosphere can carry but little moisture, while on hot days it will readily carry a great deal. Thus the percentage of moisture, with reference to the point of saturation, that the air carries bears a direct relationship to the temperature.

Seventy per cent of moisture is pretty close to the normal moisture for silk, and this moisture would coincide with a temperature of about 70° F.

The more the air dries out, the less elastic will be the silk, and, on the other hand, with extremely humid days trouble will be experienced in the loom, when thread heddles are used, from the thread sticking together. This is one of the reasons why the Flat Steel Heddles and Heddle Frames of the Steel Heddle Mfg. Co., find such an extensive use in silk mills.

The only way to overcome the dry conditions is to artificially moisten the air. There are some good systems in general use and their employment is strongly to be recommended as they materially increase the output of a plant.

If the mill is heated by hot air, blown through large pipes from the basement, an exhaust steam pipe may be allowed to discharge steam into the duct and a certain degree of moisture obtained that way. Blowing steam directly into the work rooms themselves is not to be recommended. The windows, of course, should be closed at such times.

When a mill gets too damp, as it may in the hottest weather, it may be necessary to turn on the steam in the heating coils, in spite of the summer heat, to dry out the mill, but, as the heat makes the air dryer, it becomes less uncomfortable.

It is injudicious to allow the temperature to fall in a silk mill below 65° F. and between that and 75° F. best results will be obtained, allowing that the air is kept reasonably moist.

From Slatington, Pa.

E. A. Posselt:—Enclosed find two dollars for a year's subscription to "Posselt's Textile Journal." I have received the January and February, 1909, numbers, they are excellent. G. A. H. 3-13-09.

SUPPLIES USED IN SILK FINISHING.

James Chittick.

It is well understood that, in the finishing of silk piece goods, by far the largest element of cost is that of the labor. This, of course, includes the help necessary to run the spraying machines, paper dryers, button and knife breakers, calenders, presses, cylindering machines, singeing machines, brushing, measuring and folding machines, etc., etc., as well as the superintendence, putting up of the pieces and what not.

There is also the general expense of the department to be accounted for, such as value of space occupied, lighting, heating, power, gas and water, depreciation, interest, etc., etc.

These charges are easily figured, and from the fact that none of them are inconsiderable they are not likely to be overlooked or misjudged.

The supplies that are used in silk finishing are not expensive, nor are they very numerous.

There are the materials used in making the size or preparation used for spraying the goods, such as wax, glue, gelatine, Iceland moss, gums of different kinds, soaps, oils, etc., etc. (each finisher having his own mixture which he considers superior to all others), papers of different widths for rolling up with the goods during the various processes; papers for the outside and inside wrappings of the pieces, cut to various widths; tapes, stitching cotton, etc., etc.

Being of such a minor character, very little account is usually kept as to just what supplies are used per piece.

It may be interesting therefore to note the following list of the supplies used in finishing one hundred pieces, of sixty yards each, of nineteen inch colored taffeta, for which the price charged for finishing by commission finishers was fifty cents a piece.

The goods had an outside wrapper of first rate quality of buff and white paper, an inside wrapper of good white book paper, red tapes $\frac{3}{8}$ inch wide, of best quality. Soft twisted and dyed mercerized cotton was used for the stitching. The items are as follows:

$13\frac{3}{4}$ lbs. White inside paper, $18\frac{1}{2}$x36, @ $5\frac{3}{4}$c.=	$0.7906
$25\frac{7}{16}$ lbs. Buff & White outside paper, $19\frac{1}{4}$x24, @ $4\frac{1}{2}$c.=	1.1460
$16\frac{4}{5}$ lbs. Glue @ 10c.=	1.6800
8 lbs. Glycerine @ 16c.=	1.2800
$2\frac{2}{5}$ pts. best Olive Oil @ 25c.=	.6000
150 yds. Tape @ $2.50 per 1000 yd. roll =	.3750
$22\frac{2}{9}$ yds. 2/4 Stitching Cotton @ 80c. a lb. =	.0106
195 yds. of 7200 yd. Spool Cotton @ 1.00 a lb.=	.0270
	$5.9092

In addition to the foregoing items, there was some small expense in the wear and tear of finishing paper, cotton lap cloths, and wooden rollers, as well as the cost of the water and steam for cooking the size and for the spraying machine, water for clearing the spray room, steam for heating the cylinders, paper dryers, etc., as well as for the gas for heating calender rolls, for singeing machines, and for use in the torch for singeing the ends of the pieces.

These amounts are all small per piece and probably would not bring the total of the expenses, for the one hundred pieces, above the figure of six dollars; or six cents a piece, equal to twelve per cent. of the total cost of the finishing.

When it is observed what a trifling amount each of these charges amounts to in itself, it will be realized how foolish it is to buy any papers, tapes, etc., that are mean and cheap looking simply for some slight advantage in the price. The *toilette* of goods is always important, and it may be much injured by such a policy, with no commensurate saving in cost.

Soaps for the Scouring and Dyeing of Silk.

The Superintendent of a prominent silk mill requested us to quote a few facts on "Soaps for silk mills." We herewith quote Dr. Matthews, one of the foremost American authorities on chemicals and dyes, relating to the Textile Industry, on the subject:

"Soaps to be used for the soupling or boiling-off of raw silk, *i. e.*, for the removal of the silk-gum, must be the very best obtainable. It is most essential that they be perfectly neutral; for in the degumming of silk, rather concentrated solutions of soap have to be used, and a boiling temperature for a considerable period of time is required. A very small quantity of caustic alkali present in such a scouring bath, which will cause a rapid deterioration in the luster, color and strength of the hard soda soap which has been carefully made and salted out to obtain good neutrality, is the best to use for silk. Olive oil appears to be the most suitable stock for such a soap. In silk-dyeing, soap is also used to a considerable extent as an assistant to the dyebath when sufficient boiled-off liquor (the residue of old scouring baths) is not available. A soap of the same quality as that used in boiling-off should also be employed in this connection, and the same conditions hold as to the effect of traces of caustic alkali on the good qualities of the fibre."

FROM ALLEGHENY CITY, PA.

E. A. Posselt:—I received Journal to-day and I find it will be of very much interest to me, it is just what I have been looking for, for a long time. I find more in your Journal that you have sent me than all the — — — put together that I got for the last three years, but I had no light of anything better at the time. T. J. B. 3-15-09.

FROM A PROMINENT N. E. SUPT.

E. A. Posselt:—Enclosed please find $2.00 in payment of my subscription to your Journal. I am of opinion that it is a very helpful publication to anyone engaged in the textile trade. J. B. 3-24-09.

FROM THE PRESIDENT OF A LARGE WESTERN WOOLEN MILL.

E. A. Posselt:—Received the sample copy of your Textile Journal and it looks good to us. We enclose you herewith our check. F. M. W. 3-24-09.

ARTIFICIAL WOOLS.

Their Importance to Woolen Manufacturers; Shoddy; Mungo; The Manufacture of Shoddy; Carbonizing of Rags; The Wet Process; The Dry Process; Extract; Conditioning Rags for Picking; A Rag or Shoddy Picker; Points on the Dyeing of Shoddy; Testing for Cotton Present in Shoddy; Testing for the Presence of Shoddy in a Lot of Wool.

Artificial wools form a most important by-product in the manufacture of the bulk of our woolen goods, in fact with a great many of them, artificial wools form the basis of their construction. We will meet them as the only *all wool in all wool goods*, being

FIG. 1

used in this case mixed with wool carded cotton, like for example in the manufacture of the bulk of our cheaper grades of fancy cassimeres; again in connection with some of our best grades of heavy weight fabrics, artificial wool may be the staple used more particularly for the back filling. Narrow ($\frac{3}{4}$ wide) fabrics, like Satinets, Cotton Warp Cassimeres, mean in most cases artificial wool filling used in connection with a cotton warp, plus off and on a fancy woolen warp thread, if dealing with Cotton Warp Cassimeres.

The successful working up of artificial wools depends to a great extent upon the skill and ability of the superintendent of the mill making such goods. Some Woolen Mills manufacture their own artificial wools, whereas others buy the product in the open market.

Artificial wools are re-manufactured products from old or new wool wastes, or recovered from rags, and are divided into Shoddy and Mungo.

Shoddy is the best, being the wool fibre recovered from long staple materials, which had been fulled only slightly or not at all. Amongst these materials, we find, knit goods, shawls, flannels and similar fabrics, also the yarn and fabric waste made in the mill. The fact that these materials (known in the market as *softs*) are readily disintegrated, causes the resulting fibres to be comparatively long and sound, they varying in length on an average of from $\frac{2}{8}$ to $1\frac{1}{2}$ inches, according to the original length of the staple in the fabric from which the shoddy is made.

Shoddy is in some instances worked up alone into heavy counts of yarn, but the bulk of it is used, mixed with wool, in the manufacture of a great quantity of good average grades of yarns for all classes of all-wool fabrics.

Shoddy fibres are sometimes found to be spoiled by scales being worn off, or the ends of the fibres broken, and which may be caused during the process of rag picking or garnetting (coarse carding). Dyed shoddy can be detected from similarly dyed wool, for the reason that the color of the former will betray the inferior article compared to wool, since the rags or waste, previous to the re-dyeing, had been dyed different colors, and which will consequently influence the final shade of color obtained from re-dyeing accordingly. Fig. 1 is a specimen of a coarse wool shoddy, magnified; Fig. 2 a specimen of a fine wool shoddy, and Fig. 3, for comparison, a wool fibre, magnified.

Mungo is obtained by reducing to fibre pure woolen rags, from cloth originally heavily fulled, and when the natural consequence of the strong resistance to disintegration offered by felted fabrics, results in that short fibres, about $\frac{1}{8}$ to $\frac{4}{8}$ of an inch in length, are obtained. Mungo, for this reason, is never worked up again alone into yarn, but is generally mixed with wool or cotton and generally made up into low counts of filling yarn. On account of mungo referring to a fibre once before having been heavily felted, the same has lost its capability for further felting. Fig. 4 is a typical illustration of Mungo fibres, magnified, showing also the presence of a foreign fibre.

The Manufacture of Shoddy and Mungo. The woolen rags, as received by the shoddy manufacturer or the woolen mill, from all quarters of the globe, are first dusted thoroughly in what is known as a rag duster, after which they are sorted, *i. e.,* whether

FIG. 2

FIG. 3

destined for shoddy or mungo, or whatever sub-division or grading of the product desired. (We will hereafter refer to them all collectively only as "shoddy.")

See to it that the rags are free from grease and oil, otherwise they will not carbonize thoroughly. A small amount of greasy rags will do no harm in the wet process, but in large quantities will leave cotton threads undisturbed, with the result of them showing afterwards in the finished fabric. When carbonizing by the dry or gas process, great care must be taken in this respect, since the heat of the process would cause the greasy rags to ignite.

Carbonizing of Rags is done either by the wet, (sulphuric acid) process or by the dry (muriatic acid) process. The first takes a longer time to accomplish corresponding results.

The Wet Process, *i. e.*, the sulphuric acid process consists in steeping the rags in a bath of the acid with the strength of from 6 to 9 deg. B., until saturated, then hydro-extracting and drying the rags. During the drying, the acid on the fibres becomes more concentrated, and the vegetable matter present is disintegrated or practically burned up, and is afterwards removed in the form of dust by shaking or beating.

Fig. 4

The machinery used for the process consists in a kettle (for example) 7 feet long, 4½ feet wide and 6 feet deep, lined with lead. Into this kettle is placed a basket made with a perforated wooden bottom, solidly built and held in place by four joists of four-inch timber, one joist for each corner. The basket has no sides, and is made to fit snugly in the kettle, so it can be lifted out as required, what is done best by arranging a hoist over the kettle so as to permit the liquor to drain back, after raising the rags from the liquor. The rags are then taken to a conveniently located hydro-extractor, and thoroughly extracted. The hydro-extractor should be provided with a small receptacle in the floor, lined also with lead, to receive the overflow from the hydro-extractor, and which liquor is thus saved and returned to the carbonizing kettle.

The rags are then sent to the dryer and dried at a temperature of not less than 250 deg. F.; then, if they are to be neutralized, they are transferred to a washer and rinsed in a slightly alkaline bath, produced by adding a small quantity of soda ash to cold water in the machine, or the soda ash and water are boiled together and part of the solution added to the liquor in the machine. After the rags are thus neutralized, they are then again hydro-extracted and dried. The receptacle is then filled about three-fourths full of cold water and sulphuric acid then added, until the liquor registers 7 deg. B. Enter the rags and let them soak from five to seven hours, according to the grade of rags being carbonized. Good judgement is necessary here, as the quantity of acid used depends upon the amount of cotton in the rags, the usual strength required being from 6 to 9 deg. B.

To carbonize by the dry process, the rags are first thoroughly dusted and dried, and for which a machine of special construction is required. The same consists of an outer oven of brick, enclosing a revolving cast iron oven into which the rags are placed; a retort (for the muriatic acid) bricked and provided with two fire holes, one under the retort, the other at the side to heat the machine. Flues arranged under the machine evenly distribute the heat, and which must be kept at about 130 deg. F., in order to do its work properly. The retort fire cannot be too hot while the acid is running into the retort, as that is when the work is done. The muriatic acid (22%) is placed in a three gallon crock and suspended on a shelf above the retort. The crock has an opening on the side near the bottom, to permit the driving in of a spigot, the acid running slowly into the retort, through a small granite pipe made for the purpose. The heat in the retort forms the acid into a gas before it strikes the machine, and it is *this gas* which does the carbonizing. Be careful that the acid does not run too fast into the retort, or a moisture will be formed in the machine, in turn compelling you to re-dry the rags under operation. The length of time required to carbonize by this process is from one to two hours.

To ascertain whether or not the process is completed, take a small swatch of goods from the machine and rub it between the fingers; if the cotton in the rags crumbles to dust, the process of carbonizing is finished, and the lot of rags under operation, should then be drawn from the machine and the latter quickly re-loaded, so it will not become cooled. Another batch can be carbonized while the first is being dusted and washed.

(To be continued.)

WOOL SCOURING AND DRYING.

(Continued from page 85.)

Preparing Hard Water for Scouring Purposes: Provided hard water is the only one at our disposal, it must be first softened, and that is best done by using GRAN-CARB-SODA, and thereby made fit for scouring purposes. The use of a soda containing bicarbonate is worse than useless for softening hard water, because the half-bound carbonic acid in the water will not combine with it, nor will it precipitate the sulphate of lime found in the water.

Mills which require a large quantity of soft water will find a regular water softening apparatus desirable. Have a large tank of known capacity provided with a steam-pipe to bring the water to a boil, add the proper amount of GRAN-CARB-SODA necessary to precipitate the lime and magnesia, and allow to settle. Draw from the tank several inches above the bottom, for the supply, to make up the soap-liquor, and for washing and rinsing.

Defects to the Fibre by Poor Treatment.

Amongst such results we may find discoloration of the fibre; matting or felting of the stock; loss of the natural elasticity of the fibre, *i.e.*, loss of its spinning properties, etc.

Discoloration of the fibre is mainly caused by using