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

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While President Taft was in New York, the week previous to his inauguration, according to reports, he expressed himself in favor of quick work in revising the tariff at a special session of Congress to meet March 15 and the creation of a permanent commission to guide future adjustments of duties. He was quoted as saying that "the solution of this matter at the earliest possible date means the elimination of any uncertainties which exist in the business world today."

Mr. Taft thinks the work can be done by June 1 and a new tariff by that date will be in time to promote the business activity of the year.

Mr. Taft also said he favored the idea of a permanent tariff commission, the plan for which should be worked out with deliberation, the duties of such a commission being to make a careful study of the operation of the proposed new tariff law, to the end that suggestions might be made in the future which would tend to place the whole question of the tariff on a more certain and scientific basis.

Mercantile interests are rather skeptical regarding the President's optimism in this respect. Experience of recent tariffs give slight encouragement for such speedy revision. The time during which tariff bills have been considered, matured and adopted during recent years has been strikingly inadequate, the facts being as follows:

1890, McKinley Bill, House five months, Senate two months.

1893, Wilson Bill, House four months, Senate three months.

1897, Dingley Bill, House four months, Senate one and a half months.

The action of the Southern Hard Yarn Spinners' Association, which met in Charlotte February 25, has been freely discussed among Southern mill men. Opinions vary, but the majority of the mill men realize that the situation calls for the most strenuous remedies, and curtailment seems to be generally approved. It is understood curtailment of production to the extent of 33⅓% will be recommended, lasting for three months. It is said the plan will include a forfeit from each hard yarn mill violating the curtailment agreement, and an inspector will visit all mills to see that the terms of the agreement are rigidly enforced.

Augusta, Me. A meeting of the woolen manufacturers of Maine was held here March 3, in connection with a campaign conducted by the manufacturers with a view to bringing about a revision by Congress of schedule K of the present tariff law. They claim that this schedule is unfair to the carded woolen interests since a specific duty on wool "in the grease" imposes a much greater tax on heavy shrinkage wools than it does on light shrinkage wools.

The Earnscliffe Worsted Mills, the Greenville Worsted Mills, the Paramount Worsted Mills, Walworth Bros., the Mayflower Mills, the Saugus Manufacturing Company and the Somerset Mills will form a corporation known as "The United States Worsted Company." These mills are now selling through the Earnscliffe Worsted Mills Company; probably three or four other mills will go into this combine, the Musketaquid Mills of Lowell being quoted as one of them. The Saugus Manufacturing Company is the only woolen mill thus far in the combine. The company will be capitalized for $6,000,000, of which $3,000,000 will be preferred and $3,000,000 common. Of the $6,000,000 capital stock not all will be issued, probably the $3,000,000 of common with $2,000,000 of preferred stock, it being reported, will pay for the mills.

Announcement is made by the Chicago Association of Commerce that its effort to bring the wool industry into Chicago has been realized. A warehouse is to be built at once with a guaranteed business of 25,000,000 pounds of wool annually from the Western ranches and a guaranteed profit of $250,000 a year. The National Wool Warehouse & Storage Company has been formed with a capital stock of $400,000, and will build the factory.

Silk warp Henriettas have grown steadily in favor and some importers succeeded in booking more orders for goods of this sort than at any time since Henriettas were last the vogue.

The drift toward highly finished worsted dress fabrics has militated against the sale of mohairs to such an extent that prominent Bradford houses feel somewhat disappointed with the size of the import orders in hand on goods of the finest construction.

On account of the constant demand for yarns, many a worsted spinner is unable to fill orders as fast as wanted. The men's wear manufacturers were only partially covered, and are needing more yarn from time to time, and as they do they are usually met with a higher quotation. This they are usually willing to pay on account of the difficulty in getting yarn when wanted. The yarns most largely taken by men's wear mills are 2/20's, 2/24's and 2/26's. Fine worsted mills are having an excellent season, and there is also a fair business done in the cheaper grades.

Deliveries on 2/40's, 2/50's and 2/60's are good, although dress goods mills are about between seasons.

So busy have worsted mills and spinners been that some of the latter have dropped the manufacture of knitting yarns for the time being. Both Bradford and French system spinners have plenty of orders.

The underwear and hosiery market is quiet. Most buyers have gone home and the salesmen claim they are unable to induce those who have not bought to do much of anything until after inauguration. Perhaps after inauguration it will be the tariff, then the crops, and so on.

Printers and converters are buying fine combed yarn fabrics for fall delivery. The wide goods are hard to find for any delivery before August and many mills are declining business before November. The print cloth market is quiet. Drills and sheetings for converting purposes have a limited demand, and if such, at very close figures.

In connection with men's wear worsteds, the market is higher now than it was at the opening. All of the piece dyes made by the largest corporation in the trade have been advanced 5 cents a yard and the cost of many other fabrics has also gone upward, in some instances more than this, and before many more weeks, the cost will no doubt be still further enhanced.

The reason for the rise in values is the increase of the volume of business on fall goods out of proportion to their holdings of, or contracts for, cheap raw material, which the mills have secured, and as additional supplies can only be had at much higher rates, the mills are compelled to charge more on all orders that will come forward from now on.

Marshall Field & Co., Chicago, in their weekly review of the dry goods trade, say that the feeling is that prices on all manufactured material are slow and every day adds firmness to the general outlook. The scarcity now existing in many desirable spring lines may be safely taken as a forerunner of conditions expected next fall, despite generous preparations made by manufacturers.

March 1st the new schedule of prices for skein dyeing decided upon by the National Silk Dyeing Company became operative, and the manufacturers of skein dye silk fabrics are anxious to see whether the new figures will increase the cost of manufacturing during the fall season. Conflicting views are maintained regarding the probable effect on values, the opinion prevailing that the new quotations for skein dyeing will increase the cost of manufacture somewhat, but even a fractional advance will reduce the margin of profit on goods of this sort to a level that is most unwelcome at this time.

The combine however, through one of its directors takes the other view of the situation, claiming that the producers of skein dye silk goods are disturbed without reason, there being nothing in the new price lists that can be construed as an upward flight in prices, the new figures being only the result of a revision in the discount given by the various concerns prior to their combine.

The knitting industry is bound to grow more rapidly in the South. Conditions favor its large establishment there, not the least of them being the proximity of many small yarn mills and the fact that the work is especially attractive to the workers that can be found in small communities. The knitting industry was the only textile industry that showed an increase of new mills during 1908, and while there are many who think the country's knitting industry is being overdone, there are others who foresee a still greater expansion.

The result of the late depression in business is readily seen from the report of the American Woolen Company for the year ended December 31, 1908, presented at the annual meeting of stockholders held in Jersey City March 1st. Its gross business fell off $29,986,978, while the net sales, etc., decreased $17,390,868; leaving a deficit, after dividends, of $1,169,295.

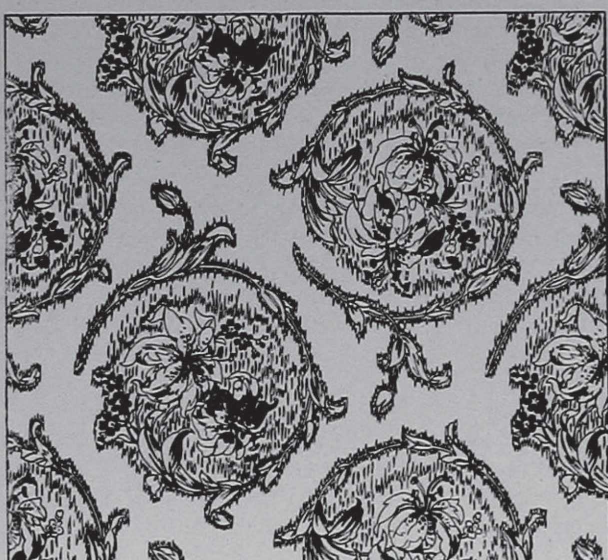
William M. Wood, President of the combine, in his report to stockholders explains the subject thus: "The depression which occurred during the latter part of 1907 continued during the past year and there was a consequent reduction of the volume of gross business to $29,986,978.50. In spite of this depression the company earned over one-half of its preferred dividend, paying the balance out of the surplus, which by such payment is reduced to $8,945,703.23. The full maintenance of plant puts the company in position to take care of the orders booked during the first two months of this year, viz., $22,000,000, which is equal to 70 per cent. of the entire production of last year, engagements of wool having been made in anticipation.

"The management is perfecting plans for still further economies in production in providing for the manufacture of all its worsted yarn requirements, a portion of which has in the past been bought in the open market.

"The number of shareholders in the company has increased during the year 10 per cent., following a 45 per cent. increase in the 1907 year."

New Designs for Textile Fabrics

Original Design by John Korzinek, Passaic, N. J. Term of patent 7 years.



Original Design by Emile Sins, Paris; Assigned to Cheney Brothers, S. Manchester, Conn. Term of patent $3\frac{1}{2}$ years.

Goods in warehouse when a new law goes into effect may be made to bear the new rates or left for withdrawal under the old ones. Generally, but not always, the statute has brought them under the new rates.

What is a Contract: This looks like an innocent question, easy to answer, however the answers that have been submitted by some high legal talent in the country have shattered the nerves of more than one textile manufacturer in the past year and the problems that have grown out of them are bound to use up many nerve cells for some time to come.

Original Design by Paul Mouton, Paris; Assigned to Cheney Brothers, S. Manchester, Conn. Term of patent $3\frac{1}{2}$ years.

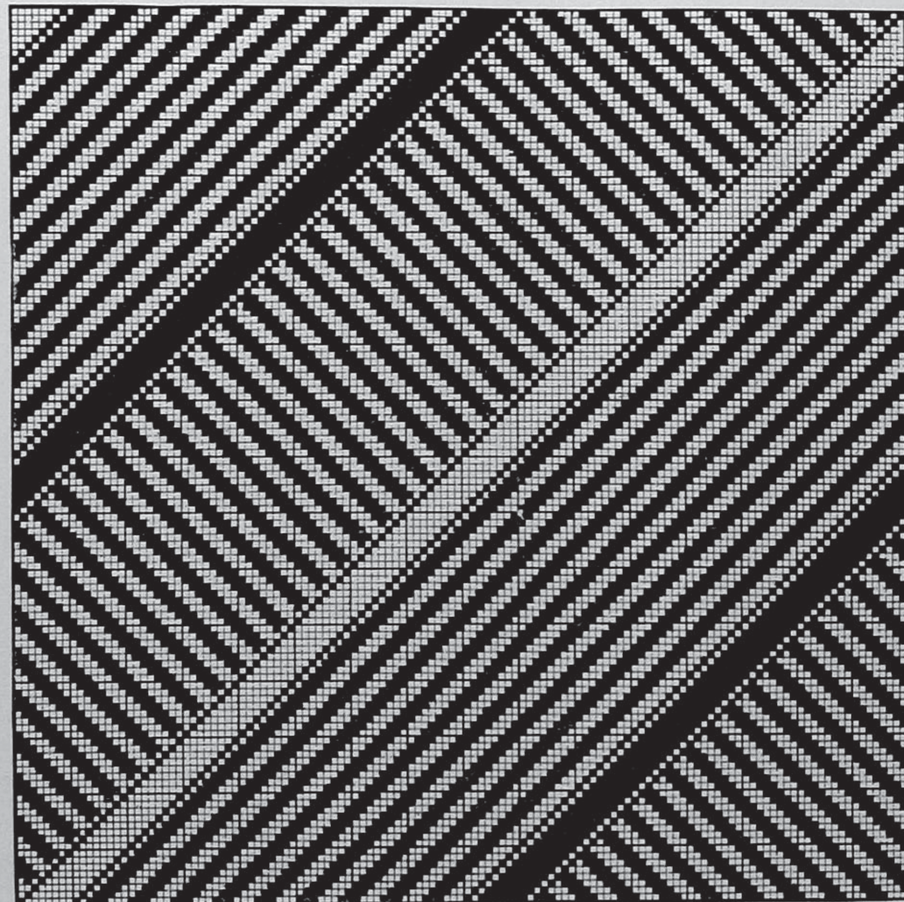
Original Design by Robert Gattiker, Paris; Assigned to Cheney Brothers, S. Manchester, Conn. Term of patent $3\frac{1}{2}$ years.

From the Genl. Supt. and Manager of one of the largest Western woolen mills:

E. A. Posselt, Publisher: Inclosed find order for Posselt's Textile Journal, have read your copy received some time ago and I must say it is *the best* of all Journals published. Yours truly, H. B. 3-3-09.

NOVELTY IN DRESS GOODS.

(From abroad.)



Diagonal Cheviot *(Piece Dyed)*

Warp: 2270 ends, 2/36's worsted, in the grey.

Reed: 16 × 3 = 48 ends per inch = 47⅓ inches wide.

Repeat of Pattern: 128 warp threads and 128 picks; cut pattern 3 times over on Piano machine for 384 needles of a 400 Jacquard machine.

Filling: 42 picks per inch, 2/36's worsted, in the grey.

Finish: Scour well, piece dye olive or any other fashionable color, shear clear on face; 44 inches finished width.

COTTON SPINNING.

The Ring Frame.

(*Continued from page 49.*)

TRAVELER CLEANERS.—The greatest evil in cotton manufacturing is uneven yarn, the removal of which has been the aim and object of inventors and mechanics from almost the very inception of cotton spinning. While the frame is running, a good deal of dirt and fine fibre is always flying about the room, which settles upon the frame and some of it naturally will deposit itself upon the ring and the traveler. Dirty travelers, *i. e.,* travelers loaded with lint, are a prolific source for uneven yarn. They render the yarn kinky and overstrained, seriously affecting the quality of the product in subsequent processes. In course of time, accumulations of these flyings would be deposited upon ring and traveler, which would interfere with the action of the latter by clogging its action, impeding the passage of the yarn, increasing the weight of the traveler, breaking ends, and adding materially to the work of the operative. Elastic yarns are the best and the elasticity is largely controlled by the traveler. Unless the traveler is kept free from accumulations of waste or lint, we cannot secure the elasticity desirable, as the finer places in the yarn are so apt to break. To overcome this trouble of loaded travelers is the object of the Traveler Cleaner, an attachment always applied to ring frames, consisting of a small projection placed in such a position that the traveler just misses touching it in its revolution around the ring, and when any fibres projecting from the traveler are caught by the projection and removed, the traveler passing on cleaned of its encumbrance.

Two prominent types of traveler cleaners are met with, both of which have been previously referred to when explaining kinds of rings and ring holders in use. In connection with Fig. 262 we had shown one kind, the traveler cleaner in this instance being formed by an upturned projection of the plate holder, clearly shown at the lower left hand side in the illustration. The position of this upturned end of the plate holder is such, that as the traveler rotates, the loose fibres and fly, which are always floating about a spinning room, and which are bound to gather on the ring and the traveler, and finally on the latter, are wiped off, and the traveler is thus kept clean and in proper working condition. This traveler cleaner is set just far enough away so that it cannot interfere with the rotation of the traveler, and as will be readily understood cannot get out of working position, the tail being always set concentric with its ring.

Another specimen of a traveler cleaner had been shown in connection with Fig. 261, it being the well-known *Knight Patent Traveller Cleaner* as made by the Draper Co.
This traveler cleaner is a most simple device, consisting of one piece of plain wire. It is made to encircle the ring, is practically a part of the ring, and whatever position the ring may be in, the finger of the traveler cleaner is always at the proper distance from the flange. It is self cleaning, because the angle given to the projecting finger prevents the accumulation of lint or dirt, and the circulation of air produced by the speed of the bobbin is sufficient to keep it clean, and most spinners will admit that travelers should be kept clean automatically, without having to resort to the use of traveler brushes or the old way of picking the lint off the travelers when doffing.

SETTING RINGS.—It is of the greatest importance for quality and production to have each spindle of the ring frame stand exactly in the centre of its mate spinning ring, since if rings and spindles are not perfectly concentric at all points, there will be unequal pulls on traveler, which will result in uneven yarn. When setting rings, first be sure that the ring rail is in proper condition, *i. e.*, see that the lifting rods are vertical, and that the ring rails fit accurately on the top of the lifting rods and be straight and level, without having to be sprung to position if readjustments required. After being sure that the ring rail is in proper position, set the spindles running and adjust rings to spindles, so that they will be perfectly concentric, whether the ring rail is at the top or at the bottom of its traverse. All adjustment between rings and spindles should be confined to the former wherever possible. Neither rings nor ring holders can be positively set to the ring rail in proper position, *i. e.*, to be concentric with spindle, for which reason the ring is made adjustable by its ring holders and can thus be accurately adjusted to the spindle. If dealing with a cast iron ring holder, the same is adjusted by its three fastening screws, of which two are in front and one in back of the ring rail. By slackening any one, and tightening the other two screws, the ring may be moved a small amount in the direction of the loosened screw. Where the plate holder is used, and where the same is fixed to the ring rail by means of screws binding in two slots, the adjustment then can only be made backwards and forwards.

Although most of the setting, *i. e.*, adjustment between ring and spindle, has to be done by moving the ring, in some instances the spindle may have to help the case. The spindle rail is bored for spindle base somewhat larger than the base, so that by loosening the nut on base, spindle and base may be adjusted through a small range. A spindle that is central at one position of the traverse and badly out at another, should be leveled by papering up between the spindle base and the rail.

There are numerous devices designed to assist in setting rings, all of which amount to the same thing, if rings can be set with them. One of them consists of a large wooden bobbin, turned true on spindle about $\frac{1}{32}$ inch smaller than ring in use. After disconnecting the mechanism which traverses the ring rail, this bobbin is put on a spindle and the ring rail raised to its highest position, and ring, or spindle if this is found necessary, adjusted so bobbins will run exactly in the centre of ring. Ring rail is then lowered to bottom of traverse, and spindle and ring again gone over. This is known as double setting, vice versa, adjusting ring or spindle only once, and this at the centre of the traverse of ring rail. This is the easier way and consequently the one most frequently employed.

(*To be continued.*)

FLY FRAMES.

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

(*Continued from page 47.*)

DESCRIPTION OF THE PROCESS. Fig. 1 is a diagram showing the principles of the working of a fly frame, *i. e.*, the run of the slubbing or the roving through the machine. With reference to the creel portion, the same is generally made up of three back rails *A*, *B* and *C* respectively, a front rail *D* and a top board *E*, all of which extend the entire length of the frame. These rails and the top board are held by the arms *F*, and which in turn are secured to the upright rods *G* (one of which only can be seen, duplicates of which are placed throughout the length of the machine) by means of screws *H*, in the arms, thus making said rails adjustable in the creel to suit different sizes of bobbins used.

These rails are generally made of wood, having porcelain or glass cups in the upper side to carry the bottoms or lower bearings of the skewers *I*. The tops of these skewers are made to either extend into holes drilled into the bottoms of rails *B*, *C* and the top board *E*, said holes being fitted with brass rings in order to prevent wearing out of the wood; or said rails and the top board are provided with wire eyes *J* (see Fig. 2) on the edge, to carry the top bearings of the skewers. In connection with the latter arrangement a different shape of brackets or arms *F* has been shown.

When placing a bobbin in the creel, a skewer (*I*) is passed through the central hole of the bobbin and the upper tapering point of said skewer (provided arrangement shown in Fig. 1 is used) in turn entered in its respective hole in the rails *B*, *C* or the top board *E*. In connection with arrangement shown in Fig. 2, the wire eyes *J* take the place of the holes in the underside of the rails and the top board previously referred to. The lower pointed end of the skewer is then set in the porcelain or glass cup in its respective rail, and when the bobbin is then in position for feeding the roving to the drafting rolls of the frame. The top board *E* of the creel is used to hold a number of full bobbins for the convenience of the operator.

The ends of the roving on the bobbins, as placed in the creel, are then drawn from the bobbins and passed over their respective guide rods *K*, through guide eyes on the traverse rod *L* (see Fig. 1 only) as situated directly behind the rolls. This traverse rod *L* has a slow horizontal traverse motion imparted to it, to prevent the slubbing or the roving from wearing a groove in the top leather roll while the other portion of the roll would remain unused.

The slubber has no creel, the sliver then being fed from cans as are set in the rear of the machine.

The drafting rolls on any fly frame consist of three pair of rolls *M*, *N* and *O*, the bottom rolls being fluted steel rolls while the top ones are leather covered.

Metallic rolls are to advantage used on the slubber, in place of leather covered rolls.

During the passage of the sliver, slubbing or roving between the three pair of rolls *M*, *N* and *O*, as will be readily understood, the same is subjected to the required amount of drafting. From the front pair of rolls *O*, the slubbing or roving then passes to a flyer *P*, which rests securely on a revolving spindle *Q*. The flyer has a hole in its top end and in the side connecting with this one, a hole being also provided through one leg of the flyer. The slubbing or the roving passes in turn through these holes to the eye in the presser foot *R*, which is a part of the flyer, and from there onto the bobbin *S*. The presser foot *R* is shown complete in connection with the flyer nearest the frame, the one in connection with outside situated flyer being shown broken off on account of showing section of bobbin. From illustration Fig. 1, it may look to the student as if the bobbin *S* is connected with the spindle *Q*, but which is not so, it being driven separately by special mechanism.

The slubbing or roving is twisted between the bite of the rolls *O* and the top of the flyer, by the combined revolving of the flyer and bobbin. Although the flyer puts the actual twist into the slubbing or roving, the revolution of the bobbin makes the operation practicable. The bobbins are traversed vertically in the frame, while the slubbing or the roving is wound upon them, in order to lay the coils of roving side by side on the bobbin.

THE TRAVERSE for slubbers is from 9 to 12 inches, for intermediates 8 to 10 inches, for roving frames from 6 to 8 inches, and for jack roving frames from $4\frac{1}{2}$ to 7 inches. The reason of this diminishing in traverse is that as the roving becomes attenuated by the processes and consequently reduced in strength, it requires to be wound on a smaller size bobbin in order that said bobbin will not be too heavy to be afterwards pulled round by the roving without straining it when placed in the creel of the succeeding machine.

The diameter of a full bobbin made on the different process frames is proportionately small according to the length of traverse, the diameters being limited on any frame by the space of the spindles, which is arranged to correspond with the traverse so as to build a standard shaped bobbin. This shape is obtained by making the diameter of the bobbin one-half that of the length of the traverse, which will be easily seen by referring to some of the sizes, as for example a 10 inch traverse frame makes a 5 inch bobbin, usually expressed 10 x 5. Exceptions are sometimes made to this rule, as for example 7 x 3.

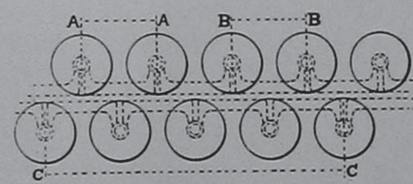


Fig. 3

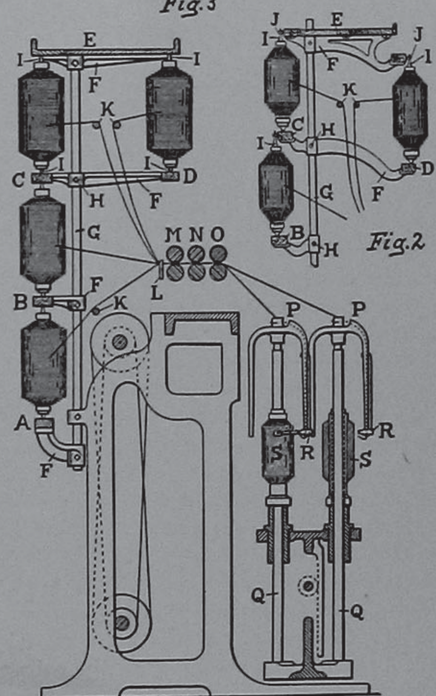


Fig. 2

Fig. 1

STANDARD SIZES OF FLY FRAMES ARE: Slubber 12 x 6, 11 x $5\frac{1}{2}$, 10 x 5, 9 x $4\frac{1}{2}$; Intermediate 10 x 5, 9 x $4\frac{1}{2}$, 8 x 4, 8 x $3\frac{1}{2}$; Roving Frame 8 x 4, 8 x $3\frac{1}{2}$, 7 x $3\frac{1}{2}$, 7 x 3, 6 x 3; Jack Frame 7 x 3, 6 x 3, 6 x $2\frac{1}{2}$, 5 x $2\frac{1}{2}$, 5 x $2\frac{1}{4}$, $4\frac{1}{2}$ x $2\frac{1}{2}$, $4\frac{1}{2}$ x $2\frac{1}{4}$.

SPACE OR GAUGE. All fly frames are made with two rows of spindles which are spaced so as to be able to use a maximum number of spindles in a given length without interfering with each other during operation. The system of placing the spindles in the frame is shown in Fig. 3, from which it will be seen that they are arranged alternately, *i. e.*, in a zig-zag order. In some machines they are placed exactly midway between each other, each row remaining distinct, while in other makes, the spindles of the back row are not placed exactly midway between the centres of those in the front row, but slightly to one side, in order to make the back row more accessible for the operator in piecing up ends or when doffing.

The distance from the centre of one spindle to the centre of the next in the same row, as from *A* to *A*, or *B* to *B*, is known as the *space* of the spindles, all of the spaces being the same between the spindles of both rows.

Another method of indicating the distances of the spindles, and one which is frequently used, is the term *gauge*, the spindles in the machine then being spoken of as having a certain gauge, *i. e.*, a certain number of spindles in a given distance, considering in this instance both rows of spindles. The gauge of the spindles is indicated in the diagram Fig. 3 by the distance *C* to *C*, in other words, we may say that in this case it is the distance which contains eight spindles, *i. e.*, four spindles in each row.

THE CONES AND THE DIFFERENTIAL MOTION.

The drafting rolls of a fly frame deliver a uniform length of slubbing or roving throughout the running of the machine, and which roving must be wound onto its bobbin.

The diameter of the bobbin, as the same builds itself up, is a constantly varying one, every layer of slubbing or roving laid on will increase the (then) working diameter of said bobbin; for which reason it will be readily seen that the speed, at which said bobbin is revolved, must be also one constantly varying, or otherwise the slubbing or roving strand would be pulled apart.

Take a simple example of winding where the circumference of the front roll and bobbin are 4 inches, then if the excess speed of the bobbin is the same as the number of revolutions of the front roll, the roving will be wound on the bobbin properly for that layer. Now say that the circumference of the bobbin is increased to $4\frac{1}{2}$ inches, while the delivery of the front roll of course remains the same, then it is clear that the same number of revolutions of the bobbin, *i. e.*, the excess speed, cannot be used, since every excess revolution of the bobbin would wind on $4\frac{1}{2}$ inches, while only 4 inches were delivered by the rolls and consequently the roving would be immediately broken by the strain put on it. It is therefore necessary to provide some means of taking care of this increased diameter of the bobbin, which is done by decreasing the excess speed of the bobbin in such a manner as to have the surface speed of the bobbin just sufficient to take up the roving as delivered from the rolls, with the *bobbin lead*. (Provided a *flyer lead* were used, it would be necessary to increase the speed of the bobbin in order not to have the roving pulled apart by the revolution of the flyer).

With reference to this decrease in the speed of the bobbin as it fills, said decrease is obtained by means of *cones* which transmit the required variation of speed to the bobbin through the medium of a special arrangement of gearing known as the *differential motion*.

In designing cones, certain data must be given, for instance, the diameters of the empty and full bobbins must be known, the speed of the top cone must be taken from some basis and the extreme diameters of the cones must be decided upon.

In order to provide for the required unequal decrease in the speed of the bobbin, the outlines of the cones are not straight lines but are made curved, the top cone being made always concave, while the bottom cone is always convex, that is, the surface of the top cone curves inwardly and the bottom cone curves outwardly or bulges from an imaginary straight surface of the cone.

(To be continued.)

PERFECT ROVING FOR WOOLEN YARNS.

By J. H. Dunn.

Roving is the finished product of the card room, and the back bone of good yarn, *i. e.*, quality and quantity of the output of a mill; the quality of the roving in turn depending, (1) whether the stock used is suited to the particular kind of yarn into which it is to be spun, and (2) the condition and working of the carding engines. As will be readily understood, the conditions and working of the latter must be changed to suit different kinds of stock.

The structure of the roving depends considerably upon the stock from which it is made, there may be roving that, while considered from a technical point inferior, is the best that can be produced from a certain grade of stock.

There are two factors which good roving must possess:

(1) uniformity in size and weight throughout the whole length of each strand, and throughout all the strand as compared with each other, and

(2) a like evenness in condensation.

Aside from defective condition of the breaker card, irregularities in feeding, etc., there are many causes which may be the reason for unevenness in the final roving, and probably most all poor roving met with in woolen mills and which is not the direct results of the condition of the stock delivered to the card room, results from such causes. In working some kinds of stock we may find difficulty to get as much stock into the outer roving strands as into those proceeding from the centre of the machine. One or two may be finer than the others, again there may be a gradual increase in size from the outside strands to those in the centre, or the fine ends may only be on one side and the increase in size be gradual nearly to the other side of the machine. Such conditions may be caused by poor feeding of the stock to the card, and may result with any style of feed.

Rolls not properly set, or not adapted to the quality of the stock used, seldom wind evenly. Sometimes it is one end, but more often the middle of the roll or rolls which take up the greater quantity of stock in this way, giving in turn the coarser roving. Where rolls are constantly well cleared, fine strands are sometimes the result of worn places in the roll, caused by carelessness in handling or long use.

Sometimes the roving becomes fine at the side of the card from narrow feeding, caused by the sliver being too tightly drawn in laying, a fault which has the most injurious effect on soft, fine wool stock, the same having a pronounced tendency to contract the length of the sliver whenever released from strain. On such stock, too, if there is too great a draft between the feed rolls and the tension bands on the long side of the feed, that side of the card will yield the coarser roving, more so if the feed is heavily packed.

Make sure that your stock is going properly into the breaker card before meddling with its delivery, *i. e.*, finisher card.

In many instances variations in the size of the roving strands are caused by the action of the fancy. If the speed of that roller and that of the swift is too great, the card wire of the fancy too stiff, or not sufficiently pitched, or is too rough, or from any other cause throws back the stock, more or less of it will be thrown from one part of the carding engine to another, thus making coarse and fine roving strands. Most often the fine strands occur at the sides of the card and the heavy ones in the centre, which however, is not always the case.

The clothing of the fancy may be on somewhat harder at one end than the other. It will be found that fancies after running awhile are nearly always stiffer at that end where the filleting was started on in winding, and that from that side more stock will be thrown from the cylinder than from the other.

The position in which the carding engine sets in relation to others, or some partition or other obstruction in the room which breaks or changes the current of air created by the machines, may be the cause of changing the heavy strands from the middle to one side.

To remedy this trouble the throwing of the fancy must be lessened as much as possible. If the whole fancy is too stiff, pitch the teeth further forward by hard grinding for a few moments, but if only the first windings are in that condition, rewind the latter under a light tension, setting up the filleting close together to prevent running. Do not re-grind the fancy but set it very lightly on the swift, or it will soon be as hard as before. Whether the fancy be hard or soft, set it lightly on the swift and run it as slowly in proportion to the speed of the swift as possible, and have it raise the stock on the cylinder sufficiently to keep that from winding. If these expedients are not sufficient to produce even delivery, reduce the operation of the fancy still further by diminishing the speed of the swift. The most serious objection to this slow speed of the swift is, that the fancy is more apt to wind. Stock which plies badly has also the most marked tendency to wind.

However, if the teeth in the fancy stand true, are smooth, and are set to just brush the tops of the teeth of the swift, and, if they are occasionally oiled, provided the stock used has not been oiled to any great extent, there will be little trouble in this respect. To oil the entire surface of a fancy, take a handful of stock, well saturated with oil, and hold it against the fancy. This procedure, however, is seldom needed, as the fancy generally commences to wind in streaks, which widen gradually, if not quickly remedied. It is when this tendency to wind is first observed, that the remedy should be applied. If there are no teeth at that point which are bent, or set back, so that they catch and hold the stock, the trouble is probably caused by some depression in the surface. If this is slight, it is better not to disturb the teeth, as the remedy is sometimes worse than the fault. It is almost a certain remedy in such a case to take a little wool, saturated with oil, between the thumb and finger, and without cleaning the stock from the fancy before doing it, hold it gently on the teeth until the fancy clears itself. Repeat this as often as the winding begins, when a few applications will be sufficient to overcome the difficulty which ordinarily will not occur again soon.

(*To be continued.*)

WOOL SCOURING AND DRYING.

A Description of the Process and Machinery for it.

THE WOOL SCOURING PROCESS.

(*Continued from page 56.*)

Amount of Scouring Agents to use: With reference to amount of scouring agents to use, no fixed rules can be given, experience being the best rule. For instance, let us consider that we were scouring two varieties of wool, and one was heavier in natural yolk than the other, then, that which is heavier in the grease should not require the same amount of scouring agencies than the one having the lesser amount of yolk, as the yolk itself possesses elements in its composition which have valuable scouring properties. The finer qualities of wool usually contain the largest amount of yolk.

Closely examining an unwashed fleece from a fine grade of our domestic sheep will show it to be so full of grease that by handling it the hands become sticky and greasy, and that by twisting a lock between the fingers some grease may be squeezed out. We also find the wool divided into little bunches or locks, each being composed of a small bundle of fibres held together by a very sticky, fatty substance which contains more or less dirt adhering to it.

Examining in turn another fleece from a poorer breed, raised, for example, in a region where vegetation is scant, but where the soil contains much lime, iron and magnesia salts, said wool may scarcely feel greasy, its impurities possibly consisting largely of the salts previously referred to, and which are so detrimental to a soap solution that the attempt to scour such a wool with soap would prove a failure. If a wool scourer who had always been used to the first kind of wool was to receive a lot of the second kind mentioned, and he should not change his methods of scouring, he would find that what was good for one was not good for all, and that judgment must be exercised for each quality.

Again in the case of very greasy wools there will be found a great difference in the relative proportions of the *soluble fatty* substances and the insoluble or *wool fat*, so that the different classes of wool, each of which contains the same total amount of fatty matter, may require a considerable difference in treatment, owing to the different proportions of soluble and insoluble fatty matter being present.

For example, let us take a wool containing a large amount of soluble fat and a relatively small amount of *woot fat* and mechanical impurities, say an Ohio XX fleece, let us see how it can be scoured.

The fleece thus examined was very greasy and fairly dirty, but not excessively so.

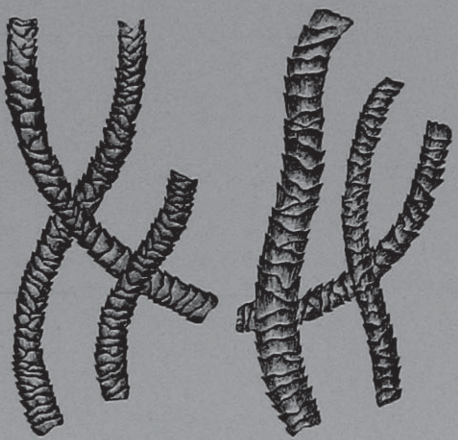


FIG. 4 FIG. 5

A test resulted in proving that in the wool there was present

8.5 per cent. of moisture,

36.7 per cent. of impurities removable by means of clear, lukewarm water and

9.3 per cent. of impurities only possible to be removed by means of scouring with pure alkali and soap; or, in other words, we found that every 100 pounds of the raw, greasy wool resulted in 45.5 pounds dry wool fibre.

A chemical test of the matter removed by water alone, in turn showed that it contained some 74 per cent. of organic matter and 26 per cent. of inorganic matter, the latter composed of 40 per cent. of sand and other impurities insoluble in water, while there was 44 per cent. of potassium carbonate in the soluble portion, besides a small amount of other salts.

With such wool, the scouring process is not a very difficult one, and the chief consideration is to scour it as cheaply as possible and turn out the best work. By the use of soap alone, if the water is soft, most excellent results can be obtained, but in case hard water must be used the same must first be softened, by adding the required amount of GRAN-CARB-SODA.

On account of the trouble with hardness and also on a score of cheapness, some mills use pure alkali for scouring, with or without the addition of soap. As has been previously stated, pure alkali has a much severer effect on the fibre than the soap, and it is a well-known fact that fine wools, when scoured with pure alkali, lose more than when scoured with soap alone, so that the saving in chemicals may be overbalanced by the greater loss in weight of the wool scoured.

In some cases, the wool may require only washing in a solution of common salt and when the soapy matter from the wool itself will remove all or nearly all the fat, the wool will furnish its own scouring agent. If all is not removed, a little soap in the second bath will remove what little is left, when then the wool is left white, soft and clean.

The strength of the solutions used depends on several things, the same being also true of the temperature to be employed. The longer the wool remains in the bath, the weaker the solutions that can be used, and for a machine that required but four minutes for a passage of the wool through the bowl, a stronger solution would have to be used than if eight minutes were required. For very dirty wool stronger solutions have to be used than for fairly clean wool.

The temperature for the scouring liquor depends on the quality of the wool under operation and also on the scouring agents used. Many mills do not take this into account. A pretty safe rule is to not exceed 110° F. for fine wools, nor 125° F. for coarse wools.

The tendency of the times is to dispense with soap as much as possible, with the claim that it is too expensive, using in connection with good wool either pure alkali only or the same in connection with a small amount of soap for scouring. Such mills will readily learn from manufacturers who use soap alone, or with just enough GRAN-CARB-SODA to soften the water, that the results are enough better to more than counterbalance any increase in the expense of scouring, since if using pure alkali alone, and especially in the case of using soda ash, there is a loss of wool fibre, and taking into consideration the price of wool and that of the chemicals used, it is easily seen that a small loss in wool fibre will more than overbalance any saving in chemicals.

Greasy wools, *i. e.*, such in which there is a large amount of *wool fat* and a small amount of soluble fatty matter, if washed in water alone, there will be but a very small amount of matter removed. The wool fat retains even the mechanical impurities, and prevents their removal. Pure alkali, salt nor even soap itself will hardly remove all the fat, unless very large quantities are used, and which of course makes it very expensive. In case such wool is encountered it is necessary to use some oil that is easily saponified, and especially an oil like *red oil*. By the use of this oil and pure alkali even the greasiest wool can be cleaned.

Wools deficient in fatty matter of any kind, but which contain a large amount of salts of iron, calcium and magnesium, like for instance *lime pulled* wool, if such are met with, require again a different treatment. If the attempt was made to scour such wool direct with soap, not only would there be an enormous amount of soap destroyed, but what would be even worse, the insoluble soaps of lime and magnesia, when once fixed on the fibre, would be very hard to remove by any subsequent process. But by the use of GRAN-CARB-SODA, the lime and magnesia salts are changed to insoluble carbonates, which are precipitated in the form of a white powder, and are quite readily removed. In some cases there is not enough soluble fat to assist the agent in removing all the wool fat, and in such a case a little soap should be added to the second bath in connection with the GRAN-CARB-SODA. In this way the small amount of wool fat remaining is removed without danger of the formation of insoluble soaps, as the lime and magnesia salts have been removed, or rendered inert by the first bath. However, the trouble thus mentioned can be greatly overcome by soaking such wool in water previous to scouring and when the larger portion of these troublesome salts are removed, and the wool then can be scoured in a more normal way.

To illustrate the external change the fibres undergo during scouring, Figs. 4 and 5 are given, and of which Fig. 4 shows wool fibres, highly magnified, before being scoured, Fig. 5 showing fibres from this wool, magnified similarly, as they appear after having been scoured.

(To be continued.)

DECATIZING WOOLENS.

(Continued from page 58.)

WET DECATIZING. While by *dry decatizing* the fabric is exclusively treated by steam, with *wet decatizing*, the fabric in wet condition is treated either with hot water, steam or both. Wet (hot water) decatizing was first practised in England. According to this process, the cylinders, or rolls containing the fabric wound on it, are subjected for from 4 to 6 hours to the influence of hot water of from 120 to 190° F. This procedure imparts to the fabric only a slight lustre.

For fabrics requiring a very high lustre, wet decatizing by the use of steam is the process par excellence. The cylinder carrying the wound on fabric, in this instance always rests in a horizontal position in the machine, and receives a slight rotation during the process.

Fig. 3 shows us what is known as, the *"S & S Combined Steamer, Wet-and Damp Steam-Dry Decatizing Machine,"* which is brought in the market by Messrs. Schuchardt & Schütte, West Street Building, New York. The improvements of this machine consist in a specially constructed friction winding apparatus, the proper handling of which forms a most important item for the proper final finish as well as the height of the lustre obtained, it being a device to wind the fabric, face upon face; a changing device which is a necessity for all kinds of fabrics having thick, long, curly selvages; the decatizing compartment with cover; a suitable windlass for the change of the loaded decatizing cylinders, *i. e.,* for conveniently lifting the latter into and out of the decatizing compartment; a device for the automatic delivery of the decatized fabric from the machine, with folder attachment so as to lay the cloth in folds on a movable table; a strong pump working in either direction and handling about 400 *l.p.m.* 2 large three-way-cocks and necessary

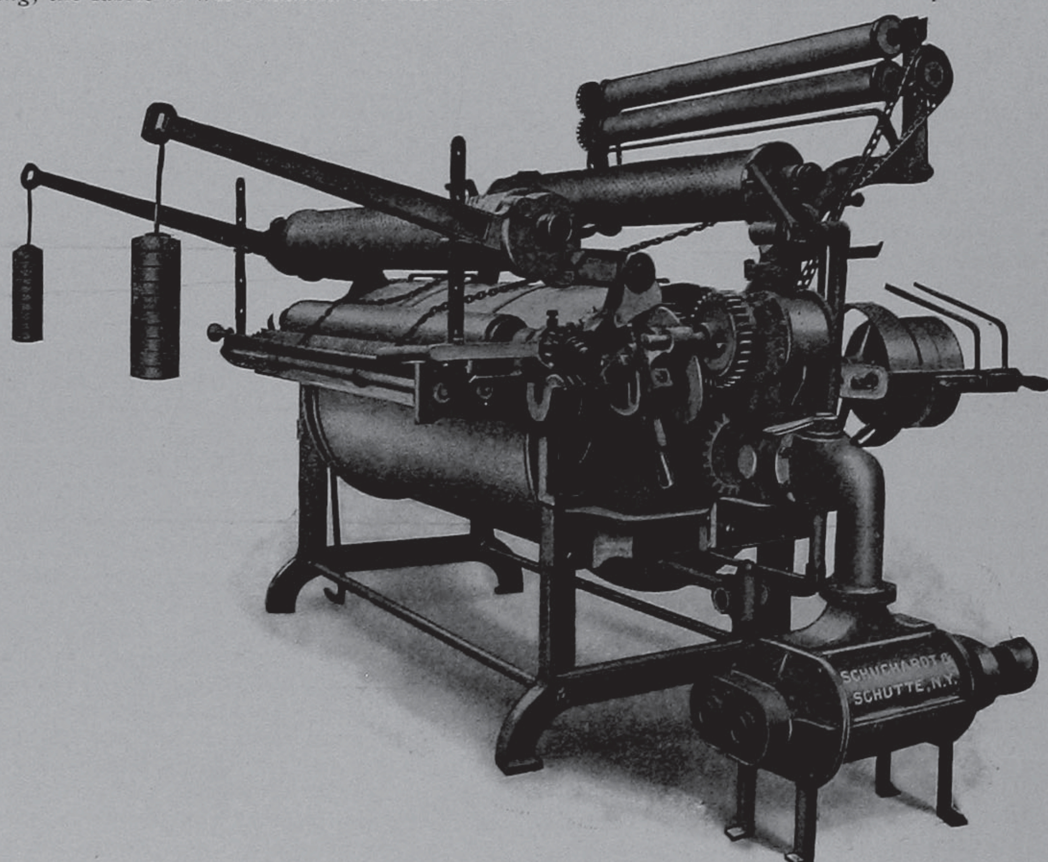


FIG. 3

piping inside of the machine for the supply of cold and warm water and the circulation of boiling water; steam three-way-cock; steam condensing apparatus with spigot and valve; 2 decatizing cylinders, made either out of iron, heavily tinned, or copper cylinders if so desired; a strong blowing device with connection and a disconnecting cock.

It will be found unnecessary to use in connection with this machine a runner with the goods, on account of the special winding apparatus which is mounted on the machine, there being no printing on the left side. The decatizing cylinders of this make of machine are of such a solid, heavy construction, that they remain absolutely true, even after years of continuous service, hence there is no cockling of the goods in the centre possible.

It will be interesting here to refer to this combination decatizing machine with reference to its action as a Moist Steam-Dry Decatizing Machine. The grand effect, wet decatizing with this machine produced upon piece dyes, soon brought up the question among manufacturers of fancy, woolen fabrics "Can a similar beautiful and lasting lustre be produced on such fabrics by means of the Schuchardt & Schütte machine?" Originally the question had to be answered with no, since the colors *run*, they could not stand boiling, neither the action of hot steam in a wet condition. Experiments then convinced the builders of this machine that these colors only *bled* or *run* when water was used in the process, or had a chance to form itself in the fabric by compression of the steam used in the process. Since decatizing is the result of pressure, heat and moisture, which consists of water, and since a fixing of the lustre minus these three items is impossible, the question resolved itself "How can the water which is the cause of the colors bleeding be substituted by moisture with a steady pressure and a powerful warming of the fabric?"

Water changes at 100° C. into steam.

Steam changes at 97° C. again into water.

Since boiling water is the main factor for fixing the lustre, the inventor of the process conceived the idea, to handle fancy woolens after winding them in their dry state under pressure on the decatizing cylinder, with watery (cooled down to 98 to 99° C.) steam. The experiment was a success from the start, and moist-steam decatizing with the Schuchardt & Schütte Decatizing Machine is the process par excellence for decatizing fancy colored woolens; in fact, the success of this process is of such magnitude that it has been found advisable in connection with, for example, ladies piece dye dress goods and where an extra high lustre is desired, after a wet and boiling decatizing, to use this Moist-steam decatizing process, running the fabric in turn then once, twice or three times through what is known as the S. & S. High Polish or Lustering machine. Another Moist-steam decatizing of from 20 to 30 minutes duration may then follow, provided you want to be sure that the extra high lustre thus obtained is positively fixed to the fabric.

Some Causes for Streaks in Woolen Goods.

By S. H. Midgley.

Where such streaks are not due to a difference in color, the cause may be found in a difference in twist or tension on the warp threads, again the material used may be the cause. Irregularities in tension at the dresser or warping mill may be the cause of a variation in the face of the cloth, and when in turn the fulling process may produce streaks; however, this sort of streakiness will not appear prominently unless we deal with a double and twist yarn, when light and dark colors are twisted together, and when a variation in tension of the warp threads will be apt to cause a change in the shade of fabric, whereas in connection with a solid color or ordinary yarn, no variation would be noticed. Unevenly spun or twisted yarn also has a liability to streakiness, provided such a yarn gets into the warp.

The most important moment for ascertaining the cause of streaks in woolen cloths, is, when the latter reaches the fulling mill. In connection with this machine, the warp, the flocks, or the operation itself may be the cause of the streaks.

For instance, if during the process of fulling, more particularly if dealing with fabrics requiring only a slight fulling, the soap is poured out of a spout on the goods, this method of applying soap may have a tendency to result in streaks during the felting of the fabric.

If the goods are allowed to run in folds and remain so during the fulling operation, and more particularly if the fabric fulls quickly, everything is favorable towards the production of streaks, especially if we deal with fabrics requiring flocking and where a streaky appearance may result in the cloth, for the fact that the flocks will act mainly along the line of soaping; and when said soaping is done in the shape of streaks to the cloth, naturally the flocks, thus following said line, are apt to cause trouble. With fabrics requiring little fulling, alter the position of the cloth in the fulling mills, from time to time, so as to avoid all chances for streaks.

A frequent cause for streaks is also the bunching of the goods lengthwise in set folds or creases, and when these creases are not moved or straightened out until it is too late to do away with them. In this way those parts of the cloth which are in constant contact with the friction pulleys and sides of the fulling mill, and which are most exposed to the felting influences, are in turn liable to show up in different shades from the other parts of the cloth, and the appearance will be in the shape of streaks or uneven fulling.

To remedy any tendency towards streaks, soap must be applied uniformly, and flocks in the same way put on over the whole fabric evenly, and whenever possible the cloth should be frequently opened and stretched out in its width by the fuller and his assistant, so it has no tendency to run in continual folds.

The next machine the fabric is subjected to is the washer. Here a defect in the operation will be frequently at the bottom of streaks showing in the cloth.

Worn out guide eyes in the washer, for the cloth to travel through, worn out rollers, etc., will have a tendency to be at the bottom of streaks, and are items which must be carefully watched, and worn out parts of the machine replaced with new ones.

Standing in front of a cloth washer, you will notice how the dirty soap suds roll back upon the goods as they pass between the nip of the rollers. These long streaks of dirty water and suds are apt to leave an appearance of streakiness to the fabric if the whole is not thoroughly removed in the final rinsing process.

Defective seams, at the sewing together of the ends of the pieces, may also be the cause for streaks. A bunchy seam will always tend to form streaks, not only at the ends of the piece, but even, at times, far into the goods, for which reason such poor seams must be avoided at all stages.

At gigging and steaming, the tension on the fabric under operation calls for care, since if the fabric is not uniformly stretched, if the fabric is not handled with a uniform tension, or if the rollers are worn, etc., streaks are apt to be found.

The brushes on the shear and the rotary press may also be at the bottom of forming streaks to the fabrics, for which reason an economy in using them as long as they resemble a brush, instead of replacing them in time by new ones, is an expensive economy.

A STUDY OF KNITTING.

(Continued from page 54.)

Knee and Ankle Splice.

Another construction of a splicer then the one shown and explained in the February issue of the Journal, also to be used with the Brinton machine is given in connection with Fig. 28, the same, although very similar in construction to the one previously explained, however is at the same time more positive in its action. The illustration is a side view of the device which is also secured to the cam cylinder and thus revolves with it. The device consists of an upright post A, having a flange B at the bottom, which is attached to the side of the cam cylinder by passing screws through the holes C into the cam cylinder. The flange B is also provided with a projection D which is used as a pivot at E for the lever F. About half way up the length of this lever F is a pin G, which comes under one end of the lever H as centred at I, when the lever is moved in, and consequently causes the projecting screw J on the other end of the lever H to move down and press against the inclined surface plate (G in Fig. 25,—see page 154 of the November issue for it) thus lowering the movable cam J in said Fig. 25, in order to make the long stitch for the splice, this portion being identical with that previously explained in connection with the other splicer.

Situated on top of the post A (see again Fig. 28 of this article) is the yarn feeding arrangement for the extra yarn and which consists of a specially shaped piece K, the outer end of which is made with an upwardly projecting arm L for holding one end of the yarn guide M as pivoted at N. This yarn guide M is made with a slanting hole O through which the extra yarn passes from the guide eye P in the lever F to the guide Q as situated on the piece K. Resting on the top side of the piece K and just under the yarn guide M is a slide R, the outer end of which is made to fit over the lever F and hence it receives a forward and backward movement to correspond to the movement of the lever F.

A forward movement of the slide R will put said slide in the position shown in the illustration, that is, it comes under the yarn guide M and raises it slightly,

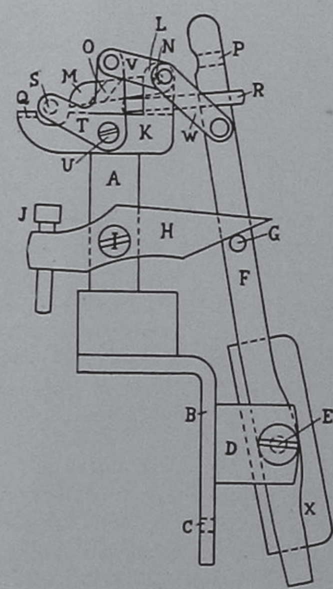


FIG. 28

against the pressure of a spring which tends to hold one end of the guide M in contact with the top surface of the piece K. It is this motion which produces the feed of the extra yarn, for in this case the extra yarn which is resting in the guides P, O and Q was gripped by having the yarn guide M pressing against the top surface of the piece K with the yarn between them, and when the yarn guide M is raised by the slide R, the yarn is released and free to be carried along by the regular yarn in the yarn carrier to the needles. In order to insure enough friction between the regular yarn and the extra yarn, to be able to carry it forward to the needles, when said extra yarn is free to move, a pin S is provided, which is secured in one arm of the elbow lever T as centred at U.

The regular thread is passed behind and under this pin S in its passage to the yarn carrier, and by depressing the pin S said thread is brought down into contact with the extra thread, this contact being sufficient to cause the extra thread to travel along with the regular thread and be fed with it. The downward movement of the pin S is obtained by having the other arm of the elbow lever T connected to the lever F through two links V and W, so that as said lever F moves in, the vertical arm of the elbow lever T is moved in and consequently the other arm carrying the pin S is moved down.

It will be seen from the foregoing explanation, that when the top part of the lever F is moved in, the extra yarn is fed to the needles, thus producing the splice, and when it is moved outward, the slide R is withdrawn from under the yarn guide M which then falls under the action of a spring and grips the yarn, thus causing it to break out at the needles and cease to be fed. At the same time the pin S is raised, bringing the regular yarn out of contact with the extra yarn, also the lever H is released, thus allowing the movable cylinder cam to rise again to its original position for the plain rib stitch. The inward and outward motions of the lever F are controlled by the pattern wheel, in the same manner as explained in connection with the previous splicer.

CIBA DYES.

The Ciba dyes, which have recently come into prominence through the efforts of *Messrs. A. Klipstein & Co.*, were discovered by Dr. G. Engi in the course of research work in the laboratory of the *Society of Chemical Industry in Basle.*

They belong to the latest class of dyestuffs, the highly interesting group of vat dyes that approach the basics in brightness and are at least as fast as, if not actually faster than, indigo and alizarines.

A great point in this Ciba group is, that they are easily reduced and the printing pastes are only slightly alkaline, which removes the only objection to the vat dyes from the calico printer's point of view.

All the methods of application depend upon the reduction of the dyestuffs with Hydrosulphite to the corresponding leuco derivatives soluble in alkali. These are easily absorbed by the fibre and fixed in the usual way by ageing or steaming.

After printing, the goods should be allowed to hang for a short time, or if desired, passed through bichrome, in which case however, somewhat flatter shades are produced. To develop the color, it is only necessary to soap at the boil after rinsing.

Ciba dyes may be printed together with alizarine and steam colors, aniline black and azo dyes. In this case the goods undergo the ordinary process for these styles, as neither long steaming nor treatment with acid, bichrome or tartar emetic have any harmful influence upon the Ciba dyes. Finally the goods are soaped as usual. The printing pastes are very stable and print well; they do not attack the rollers or doctors in the slightest. They can be used for discharges over para red and napthylamine claret as well as for the resist styles under Paramine Brown or aniline black.

With these colors, vats of great stability are very easily formed, and in consequence of the ready and uniform absorption, very good whites or colored effects are produced by resist pastes, equally as well in the continuous machine as in the padding machine or dipping vat. The vats may be prepared like indigo vats with hydrosulphite zinc lime or ferrous sulphate and lime.

All Ciba dyes are very fast to washing, but to obtain bright shades and to improve the fastness to chlorine and light, soaping at the boil is indispensable. The new dyes are fast to acids and alkalies and are not sensitive to metals, nor are they affected in any way by hot calendering. As regards chlorine Ciba Blue becomes somewhat lighter by strong chemicking but does not change in shade, Ciba Violet B and R becomes slightly redder, but do not lose in intensity; and Ciba Red G, without losing in strength becomes somwhat brighter and bluer.

With regard to fastness to light these dyestuffs fulfill the highest requirements. Ciba Violet and Ciba Red especially are perfect in this respect.

Printing with Sulphur Dyestuffs.

A process patented by the *Farbenfabriken of Elberfeld Co.*, claims that prints of extraordinary beauty and cheapness can be obtained by means of sulphur colors by using starch broken up by alkali as a thickener.

For instance, mix together 80 parts Katigen Black T extra (free from sodium sulphide), 200 parts hot water, 40 to 50 parts glucose, 150 parts caustic soda lye, 40 deg. B. Keep this mixture from one to two hours at from 55 to 75 deg. C., until the reduction of the dyestuff is completed and a solution results. Allow to stand for 24 hours. Mix 40 parts of wheat starch in the cold with 600 parts of water and 10 parts of caustic soda lye 40 deg. B. Then heat until all is entered into solution. Stir while cooling. Four hundred to five hundred parts of this thickening agent are then stirred into the dye solution at 50 to 55 deg. C., stirred at this temperature for from one to two hours, and allowed to stand for 24 hours. Fifty to one hundred parts of caustic soda lye, 40 deg. B., and 20 to 30 parts glucose are added. The paste is printed on cotton, and the goods are steamed from four to five minutes with steam free from air, and finished in the usual way.

Resist Printing.

A late English patented process on this subject is based upon the result that certain acids and acid salts can be added to the usual diazo printing colors in an amount sufficient to resist other colors without interfering with the fixation of the corresponding azo colors by the coupling of the diazo compound with the naphthol of the prepare.

In this instance, the fabric is first prepared by padding with an alkaline naphthol solution, then printed with an admixture of the required diazo color and a suitable acid or acid salt, after which the fabric is printed or padded with a suitable mordant, or with any color or preparation which will be resisted by the addition to the diazo color, and subsequently treated in the usual manner.

Only citric and phosphoric acid, as commonly used for resist purposes, and only acid citrates of the acid salts, it is claimed, are capable of use in connection with this patented process, all other acids and acid salts, if used in any appreciable quantity, having a decomposing action on the diazo compounds, that do not give satisfactory results.

The following examples are given as suitable compositions for resist printing colors, and their method of application for the production of fast azo color resists, under suitable mordants, which are subsequently dyed in various shades, and also for the production of fast azo color resists under indigo. These examples are given to illustrate the general method of carrying on the procedure.

Fast Azo Color Resists.

Acid Paste: A solution is made of 12 parts, by weight, of citric acid in 27 parts water, suitably thickened with starch, to which 8 parts of a 33 per cent caustic-soda solution are afterwards added.

Diazo Solution: A solution is made of paranitrodiazobenzol hydrochloride in which the free mineral acid has been eliminated by the addition of a suitable proportion of acetate of soda, and of such concentration as to correspond to 20 oz. of paranitraniline per gallon.

Resist Printing Color: 4 parts by volume of the above acid paste; 1 part by volume of the diazo solution. The fabric is first prepared in the usual way by padding with an alkaline solution of beta-naphthol containing 4 oz. acetate of soda per gallon, and after drying printed with the resist printing color, and dried. The printed fabric is then padded or cover-printed with a mordant consisting of acetate of iron, acetate of alumina, or a mixture of the two, dried, aged, or steamed and afterwards fixed and dyed in the ordinary manner.

Fast Azo Resist Under Indigo.

Acid Paste: Dissolve 2 parts by weight of citric acid in a mixture of 5 parts by weight of phosphoric acid, 100° Tw., and 2 parts by weight of water, then thicken the whole with starch.

Resist Printing Color: 4 parts by volume of the above acid paste; 1 part by volume of the above diazo solution, as used in the previous example. The fabric is first prepared in the usual way by padding with an alkaline solution of beta-naphthol, containing 4 oz. acetate of soda per gallon, to which the proportion of glucose customary for indigo printing has been added, and after drying, printed with the resist printing color and dried. Then pad or cover-print the printed goods with the customary indigo printing color, dry and afterwards submit to the usual after-treatment for indigo prints.

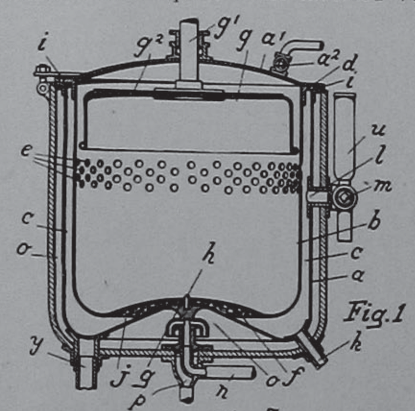
Sulphur Blues and Indigo Blue Dyeing.

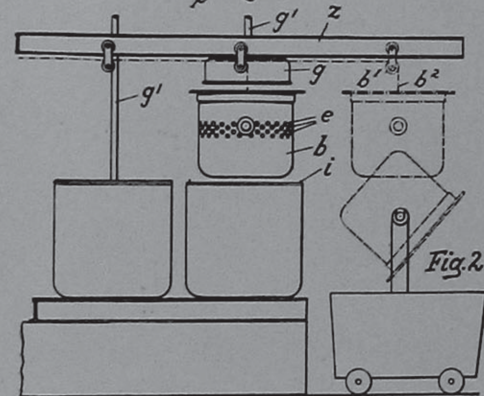
To distinguish between these the fabric is treated, if of vegetable fibre, with sulphuric acid, dilute enough to prevent it injuring the goods. This treatment will strip indigo blue, but not sulphur blues. If it is a woolen or silk fabric, it must be spotted here and there with nitric acid, when the stains on indigo blue dyeings will be yellow in the centre with a greenish border. In the case of a sulphur blue, the stains are reddish all over.

A German Dyeing Apparatus.

The construction and operation of this Dyeing Apparatus is shown in connection with the accompanying three illustrations, and of which Fig. 1 shows a vertical central section of it; Fig. 2 a diagrammatic view of it, showing a number of these dyeing apparatuses with their parts in different positions, and Fig. 3 a similar view, illustrating the means for operating the vessels and bells.

In the form of the apparatus as shown, a second vessel *b*, is inserted in a vessel *a*, somewhat larger in its diameter, the space *c*, thereby created between the sides of the two vessels, serving as a passage for the circulation of the liquid. The inserted vessel *b*,





is supported through a flanged ring *d*, on the upper edge of the vessel *a*; which ring, likewise closes the passage *c*, and thus prevents the liquid from spurting out while the machine is in operation.

Vessel *b*, is provided at the height of the normal level of the liquid with several rows of holes *e*, through which the liquid flows during its circulation, which occurs through the passage *c*, and the perforated bottom *f*, of the inserted vessel *b*. The bottom *f*, is curved from the sides inwards, and in the middle is arched upwards, the middle of the bottom *f*, resting on the support *g*.

Vessel *b*, can be taken out and attached to vessel *a*, by means of clamps.

By means of a pin *h*, fixed to the support *g*, and engaging in a hole situated in the middle of the bottom, and pins *i*, provided above in the casing *a*, and engaging in openings in the angular ring *d*, the vessel *b*, is held perfectly concentric in the vessel *a*, so that the passage *c*, is of the same width throughout. The vessel *b*, is put in and taken out of the principal vessel *a*, by means of chains b^2, engaging rollers b^1.

The material to be treated is put into the vessel *b*, and placed therewith in vessel *a*, after the bath has been prepared in the latter in the following manner:

Water under pressure is run into the vessel *a*, through the pipe *k*, and flows upwards through the perforated bottom *f*, of the vessel *b*, and the annular passage *c*, until it reaches the overflow pipe *l*. This pipe is then closed by the cock *m*, and the supply of water stopped. The raising of the temperature of the liquid to boiling heat is affected by steam, which is conveyed through the pipe *n*, into the steam chamber

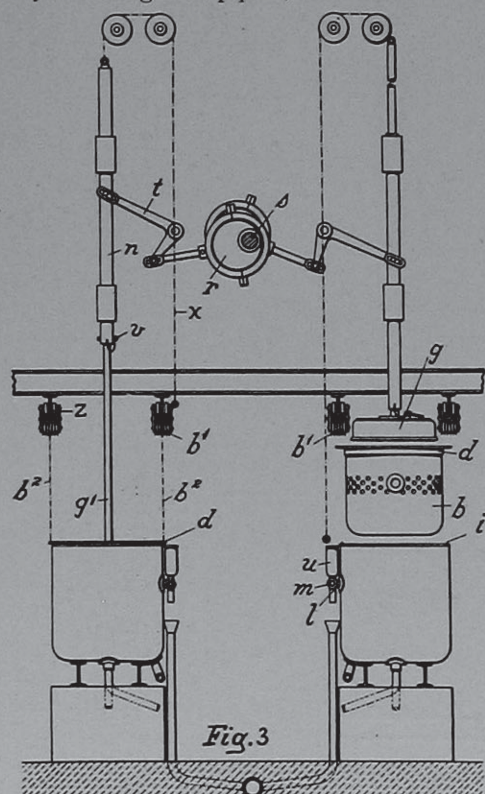


Fig. 3

o, from which the water of condensation that is formed, is carried off through the pipe *p*. When the bath has been prepared, the suction bell *q*, held in the raised position until the vessel *b*, is introduced, is lowered into the working position and the machine started. By means of the lever device *t*, connected with the eccentric disk *r*, on the shaft *s*, the suction bell is lowered and raised. When the bell is in its highest position, the lower edge thereof is always above the level of the liquid. The top of the bell is provided with openings which are covered by a flap q^2, made of felt, asbestos, or the like. When the bell is immersed in the liquid, the flap is raised by the air escaping out of the bell and by a part of the liquid, while the liquid pressed by and forced out of the material being treated flows through the bottom of the vessel *b*, into the vessel *a*, from there around the circular edge of the bottom into the annular passage *c*, and through the rows of holes *e*, again over the bell which is now in its lowest position, in which it is retained for a short time. The material being treated is thus compressed more or less through the bell accordingly as the stroke of the bell is regulated. When the bell rises again the flap lies firmly against and closes the openings in the top. The material is thereby subjected to suction through the bell and is raised, thus being loosened and a rarefication of air is produced in the material, which thereby takes up the liquid again. The part of the liquid which is above the bell when the latter is in the lowest position, is almost instantaneously drawn downwards and into the vessel *a*, concentrically through the perforation *e*, in the side of the inserted vessel and the passage *c*, and flows upwards in an exceedingly powerful stream over a smooth path on the conical bottom *f*, and passes through its perforations towards the middle of the material contained in the vessel *b*. When the bottom of the bell emerges from the liquid it allows what is contained in it to fall, in consequence of the destruction of the vacuum then taking place. This effect of the circulation is solely due to the trough-shaped construction of the bottom *j*, of the vessel *a*, in conjunction with the form of the bottom *f*, of the vessel *b*, adapted thereto, whereby any resistance to the circulation of the liquid is obviated.

As there are no dead corners the force of the stream is quite uniform throughout the liquid, so that all parts are equally well served with liquid. In this way a cycle like flow is insured and thereby, as distinguished from the case in which the bottoms of the receptacle for the liquid are of usual flat horizontal kind, any retention of the liquid and consequent impediment in the circulation are avoided.

The apparatus is also adapted for making additions of chemicals and dyestuffs for the different processes of treatment, without interrupting these processes. The chemicals and dyestuffs to be added, are for this purpose placed in a state of solution in the hopper *u*, which is firmly connected with the pipe *l*. This pipe runs into the passage *c*, and can be closed by the three-way cock *m*. The cock is closed when the hopper is filled, and is opened when the bell reaches the lowest point of immersion. The contents of the hopper are then drawn under the middle of the receptacle *b*, for the materials to be dyed when the bell ascends and just so quickly distributed uniformly throughout the liquid and brought ultimately into contact in the same degree with every fiber of the material. Before the bell is immersed again, the cock is re-closed, in order that when the liquid rises in the passage it may not spurt out through the hopper.

The pipe *l*, acts as an inlet for the chemicals, dye liquor, etc., and as an overflow pipe for the liquid in the rinsing process.

If the effect of the treatment of the work is to be tested during the process, then the block *v*, is released and the rod q^1, which can then be moved in the sleeve *w*, is raised by pulling the cord *x*, and fixed so that the examination may be effected and, if necessary, the vessel *b*, for the material treated with its contents can be easily lifted out of the liquid. In the same manner the vessel and the bell are returned to the working position without its being necessary to stop the machine.

CLOSING THE VESSEL. Generally the vessel *a*, is open at the top or only closed lightly with a cover. If it is desired to close the vessel *a*, tightly, as is necessary with the employment of many kinds of dyestuffs and those processes in which exclusion of air is indispensable, the cover a^1, lying above the bell and provided with a stuffing box for the passage of the guide-rod, is attached air tight to the casing *a*. The cover which is provided with a valve a^2, for air and steam, is raised with the bell when the latter is raised for inspection.

IF IT IS DESIRED NOT TO ACTUATE THE LIQUID AND THE MATERIAL to be treated at all, or only slightly periodically, a suitable continuous or intermittent movement can at any time be produced by loosening the block *v*, in the sleeve *w*, and then lowering and raising the bell by hand by means of the cord *x*. Thereby it is possible even with the air excluded to let the liquid and the material to be dyed rest, or to actuate both more or less vigorously, the latter in the employment of sulfur dies and the like. The shaft *s*, is intended to make from 15 to 18 revolutions per minute.

IF THE RINSING PROCESS IS TO BE BEGUN the feed water pipe *k*, is opened, as likewise the cock *m*, of the overflow pipe *l*. The dirt residues of dyeing material, chemicals and the like to be removed from the material being treated, are washed away upwards and carried off through the overflow opening *l*, into the outlet.

IF THE VESSEL IS TO BE EMPTIED, the discharge pipe *y*, is opened, whereby the liquid is likewise conveyed through the outlet or may be intercepted for the purpose of being employed again.

DYEING DIFFERENT LOTS OF MATERIAL AT ONE TIME. In the form of the machine illustrated in Figs. 2 and 3, two series of apparatus of the kind are arranged opposite one another with a space between for the workman. In any apparatus a different material can be dyed.

As a matter of course the same kind of material can be treated in the same manner and by the same processes in all the apparatus, in which case a series of apparatus are connected by pipes, so that the liquid in all the vessels is thoroughly and permanently uniform in concentration, mixture and temperature. By closing the cocks arranged in these connecting pipes, two or more compartments for the purpose of the same treatment can be connected with one another.

If a larger number of compartments for the purpose of the same treatment be connected, the chemicals, dye liquors, etc., can be conveyed into the different compartments simultaneously by putting the whole quantity of the added liquid into one vessel, in which thorough mixing is effected by the action of a suction bell, whereupon by opening a cock, the liquid is conducted through pipes into the different apparatus.

IN THE WASHING AND BLEACHING OPERATIONS which frequently precede the dyeing process, this connection of a number of compartments insures a continuous process which can be applied in the same manner to all other operations. For this purpose a number of interchangeable inserted vessels *b*, are necessary.

An inserted vessel *b*, is filled with the allowable quantity of material to be treated and is placed in the principal vessel of the first compartment. While in this the material is being well preliminarily softened and washed by the action of the bell, a second vessel *b*, is filled with material to be treated and after a certain time is put in the first compartment after the inserted vessel which is therein has been removed, and conveyed on the rollers which run on the rails *z*, to the second compartment in which the first soap bath is prepared. The first inserted vessel is then put in the third apparatus or compartment which contains a warm rinsing bath. The material is then treated in the fourth compartment with the second soap bath, in the fifth compartment with the bleaching material, and in the sixth compartment is thoroughly rinsed. The inserted vessel is removed from the sixth compartment and is put into a tilting device which empties the material into a carriage by which it is conveyed to the hydro extractor. The empty inserted vessel is then filled with fresh material to be treated and is carried back therewith the same way.

In the process described, the treatment of the material is effected without the material being put in and taken out in the different operations, and without its being touched by hand, with levers, rods or the like.

ADVANTAGE OF THE PROCESS. By the continuous introduction of filled inserted vessels *b*, into the vessel *a*, of the second compartment, a continuous working is effected, insuring a constantly uniform working result with uninterrupted use of the apparatus. The consequence of this is that when large quantities of material are treated the work effected is more uniform and always equal, whereby on the one hand excessive labor and on the other hand intervals during which the machinery and the workmen are idle are avoided.

DICTIONARY OF TECHNICAL TERMS RELATING TO THE TEXTILE INDUSTRY.

(*Continued from page 62.*)

FRENCH DRAWING:—The principle of French drawing in worsted spinning is to put no twist into the slubbing or roving, thus keeping the fibres as straight and parallel to each other as possible. This procedure requires different machinery from that used for the English drawing system (open and cone drawing). In the French system of drawing a round sliver is produced, compared to the flat or open sliver produced by the English system.

FRENCH FOOT AND POCKET HEEL:—A style of split foot, has only one seam down the middle of the bottom of the foot and no seam at the back of the heel.

FRENCH-INDEX:—One of the modes of constructing jacquard machines and card stamping machinery, *vice versa* what is termed, *American* index and *Fine* index.

FRENCH PERCALE:—A fine percale of good body, from 30 to 36 inches wide.

FRENCH-TUB:—A mixture of logwood and stannous chloride, used in dyeing.

FRIEZE:—A coarse woolen cloth with a shaggy nap on its face, used mainly for outer garments.