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A Monthly Journal of the Textile Industries

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Letters to receive attention must be accompanied by the signature of the sender, but this will not be published unless so requested.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

SUBSCRIPTION AGENT FOR NEW ENGLAND: Samuel Connor, 552 Manton Avenue, Providence, R. I.

At a meeting held at Manchester, Eng., August 24, the owners of two-thirds of the ring spindles in the Lancashire cotton trade have decided to form an association to fix a minimum price for yarn and prevent under-cutting.

Work on the addition to the No. 1 shop of the Whitin Machine Works, Whitinsville, Mass., is being pushed, the concern being overrun with orders for their machinery. In the foundry, an average of one hundred tons of iron is melted every day to keep the machine shop going.

Besides being filled with orders for their Carding, Combing and Spinning Machinery, well up into 1910, the Concern has great success with their looms, having orders for over ten thousand of them on their books, August 19th. They are building the first looms in this country for the weaving of Tracing cloth—a fabric until now solely imported, but hereafter to be made in New Bedford.

Semi-Annual Meeting of The National Association of Cotton Manufacturers.

The Semi-Annual Meeting of the Association will be held at the Mount Washington, Bretton Woods, N. H., September 22-23, 1909.

His Excellency, Henry B. Quimby, Governor of New Hampshire, will welcome the Association to the Granite State, at the opening session on September 22.

The full programme will not be issued until the meeting, but papers, and which are a most important feature of these Meetings, are expected on the following subjects:

Accidents to Cotton Mill Operatives; Commercial Values of Coal; Standard Specifications for Staple Grey Goods; Cork Inserts as Applied to Textile Machinery; Housing Mill Employees; Increasing the Earning Capacity of a Plant; Labor Relation Existing between Mill and Selling Agent; Limitation of American Cotton Production as effected by the Scarcity of Labor in the South; Physical and Mechanical Improvements in Sizing Methods; Pneumatic Service for Cleaning Textile Machinery; Sanitary Considerations in Ventilating and Humidifying Cotton Mills; Reinforced Concrete for Mill Construction; Secondary Textile Education; Sizing; Steam Generation.

For the convenience of members and their guests, a special train of Pullman cars will leave the North Station, Boston, at 10.30 A. M., September 21. This train will stop en route only for such passengers as have bought tickets in advance, and the schedule at the intermediate stations will be as follows:

September 21: Leave Boston, 10.30 A. M., Lowell, 11.11; Nashua Junction, 11.37; Manchester, 12.07 P. M.; Concord, 12.38; Arrive Bretton Woods, 5.15 P. M.

September 24: Leave Bretton Woods, 1.30 P. M., Arrive, Intervale Junction, 2.40; Portsmouth, 6.00; Salem, 6.45; Lynn, 6.55, and Boston, 7.15 P. M.

The price for round trip tickets from Boston to Bretton Woods and return, including Pullman car seats, lunch en route and care of baggage will be $9.07 from Boston and return; rates from other points given on application to the Raymond & Whitcomb Company at 306 Washington Street, Boston, Mass.

According to Secretary Hester, of the New Orleans Cotton Exchange, Southern Mills have for the second consecutive year consumed more cotton than Northern mills. Southern mills up to the close of the commercial year ending August 31, 1909, consumed 2,560,000 bales, against 2,500,000 bales consumed in the North.

The total consumption of American cotton by the world was put at 13,116,000 bales, the largest on record, larger by 1,004,000 bales than last year and larger by 505,000 bales than the largest consumption ever known, which was two years ago. Consumption of foreign spinners was put at 8,056,000 bales. The total consumption of America last year was 12,112,000 bales, while two years ago it was 12,611,000.

The total visible and invisible supply of cotton was put at 3,052,000 bales, against 2,412,000 a year ago and 2,932,000 two years ago. Mill stocks in the United States were estimated at 480,000 bales, against 300,000 a year ago, and foreign mill stocks were estimated at 1,100,000 bales, against 1,123,000 a year ago.

Spindles in the World.

The following figures, compiled by the International Federation of Master Cotton Spinners and Manufacturers' Association, shows the estimated number of spindles at work and in course of construction on March 1, 1909, in the various countries:

Countries.	Spindles.	
	In work.	In construction.
United Kingdom	53,471,897	1,467,388
United States	27,846,000	(*a*)
Germany	9.881,321	416,258
France	6,750,000	79,796
Russia	7,829,240	361,284
Austria	4,162,295	158,378
Italy	4,000,000	184,732
Japan	1,695,879	258,452
Switzerland	1,493,012	....
India	5,756,020	19,868
Spain	1,853,000	3,000
Belgium	1,200,000	....
Canada	855,293	....
Portugal	450,000	....
Holland	417,214	20,000
Sweden	430,000	40,792
Norway	75,000	....
Denmark	77,644	....
All other countries	2,552,142	7.544
Total	130,795.927	3,017,492

a No details.

Bibliography of the Cotton Manufacture.

By C. J. H. Woodbury, A.M., Sc.D.; Consulting Engineer, and Secretary of The National Association of Cotton Manufacturers.

In this compilation, Mr. Woodbury has had the benefit of information contained in leading libraries on both sides of the Atlantic, also, those of many cotton manufacturers, and it is believed that this list contains the titles of all works of any material value to the subject, in French and German as well as in the English language. The number of citations exceeds 5,000, and the whole has been classified into the following divisions:

I. Cotton Manufacture:—Carding, combing, cotton fibre, designing, knitting, lace manufacture, microscopy, netting, picking, singeing, slashing, spinning, static electricity, twisting, stretching, warping, weaving, yarn tables. 820 titles.

II. Finishing:—Bleaching, conditioning, drying, dyeing, mercerization, printing, receipts, water-proofing. 874 titles.

III. Engineering and Machinery:—Accidents, belts, boilers, chimneys, concrete construction, fire protection, flow of water, fuels, heating, humidification, illumination, lubrication, mill construction, preservation of timber, rope driving, specifications, steam engines, steam turbines, textile machinery, transmission of power, transportation in mill yards, ventilation, water wheels. 728 titles.

IV. History and Economics:—Administration, associations, biographies, commerce, costs of manufacture, history, labor, manufacturing accounts, patents, reports on expositions (not included elsewhere), statistics, taxation, textile education, valuation, welfare work. 1,361 title.

V. Cotton:—Bagging materials, baling, brokerage, calculators, cotton exchanges, cultivation, gathering, ginning, grading, linting, packing, pests, price tables, shipping, tare, trade, trade tables. 1,025 titles.

VI. Journals:—Technical dictionaries, textile dictionaries, textile directories, textile periodicals. 266 titles.

The Price of this Important Work of Reference to the Textile Industry is $2—and will be forwarded, post paid, by addressing A. L. A. Fox, P. O. Box 3672, Boston, Mass.

The business in general lines of raw silk continues spotty, some of the large houses having booked some good business, while other houses complain that it is very difficult to close sales. There have been more transactions of late for immediate delivery. Mills as a rule are more confident of future business, but they have not reached the stage where they care to obligate themselves, save on special qualities which they must have. There is a notable absence of speculative tendency in raw silk on the part of the mills, due in some measure to persistent reports of excellent crop prospects.

Canton silks are closely sold and reelers are quite independent for the present. Yokahoma is doing business daily, and local factors believe the advantageous values now current will continue to induce business.

Italian silks hold very steady and offerings of the higher grades are very limited.

There is an active demand for tussah silks for early and far ahead shipments. Mills making specialties have caught the fever for tussah silks which has been noted in foreign markets for some time and are preparing new fabric structures, and in turn are providing themselves with the raw material. Prices are distinctly firm and higher.

A report from Consul Carl Bailey Hurst, at Plauen, Saxony, says that the growing importance of Artificial Silk in the textile industries in Saxony has led to the formation of a Saxon artificial silk stock company, which will erect a mill in Elsterberg. The town council donated a large tract of land and the official savings bank has advanced for the enterprise considerable capital on first mortgage at a low rate of interest. The founding of this mill to furnish local industries with artificial silk is in keeping with the tendency to supply Saxon manufacturers with necessary materials without depending on outside sources.

Consul General Michael, at Calcutta, has just made a report upon the establishment of a bureau in London for the promotion of Indian trade in Europe and the United States. This bureau disseminates information concerning the products of India all over Europe, and in this country as well. The suggestion is made that similar bureaus should be established by American business men in countries where they seek the foreign market.

During August, prices on seamless hosiery have steadily advanced. On full fashioned goods, offered by domestic mills, prices remained the same as last year, but agents of foreign mills asked advances in some directions, however did little business at their higher prices. Many of the smaller mills sold cheaper than advisable, hence some buyers are becoming anxious about deliveries. The low priced business was booked early, most business taken after July 1 was accepted at slight advances. Colored seamless hosiery does not seem to show an increase in price over last season, but all the staple blacks do show the increases plainly. Full fashioned mills have not booked spring orders freely. Jobbers and importers are carrying ample stocks of foreign goods brought in at low prices because of the attractive offerings by German houses and because of the fear of a tariff increase. Duplicate orders on heavy weight underwear come forward very slowly. Wool goods show only a very moderate improvement. On spring lines of underwear radical advances are asked on light weight goods.

Knit goods manufacturers are complaining of the actions of yarn and trimming factors in not making the deliveries agreed to when market prices were much below those now current. A mill that bought 4,000 pieces of cheap torchon laces has been able to secure only 1,000 pieces of the original order and is finding it a difficult matter in securing deliveries at any figure. The reason is that prices went up rapidly after the order was placed, and the house selling the stuff is now making excuses for not sending the goods along. The same thing holds true of buttons, boxes and some other things. However the most serious drawback complained of by some manufacturers is the slow deliveries on the part of mills selling yarns. The yarns were bought at low prices measured by to-day's values, and no doubt for this reason spinners are delaying the fulfillment of their contracts, and in turn causing delay among the knitters in delivering the cheap goods they sold some time ago.

The Italian Silk Crop.

It is reported that the estimated crop of silk cocoons in Italy in 1909 will be from 48 to 50 million kilogrammes—that is to say, a decrease of from 7 to 8 per cent on the crop for 1908. This decrease is due to a sharp decline in the crop in Piedmont, and a diminution in several districts in Lombardy, which are, however, counterbalanced by increased production in Central Italy. Altogether, the decrease in the production of Italian raw silk is estimated at 480,000 kilogrammes. This falling off is the result of the generally unfavorable season and of a blight which attacked the mulberry trees. The cultivation of mulberry trees in Italy, must it is further stated, be extended either by introducing them largely in Southern Italy, or by growing them on State and Communal lands. The result of this shortage in the crop will mean keen competition, and in spite of the efforts of the spinners to regulate purchases, the prices paid have been high, and it is expected that they will rise considerably.

Obituary.

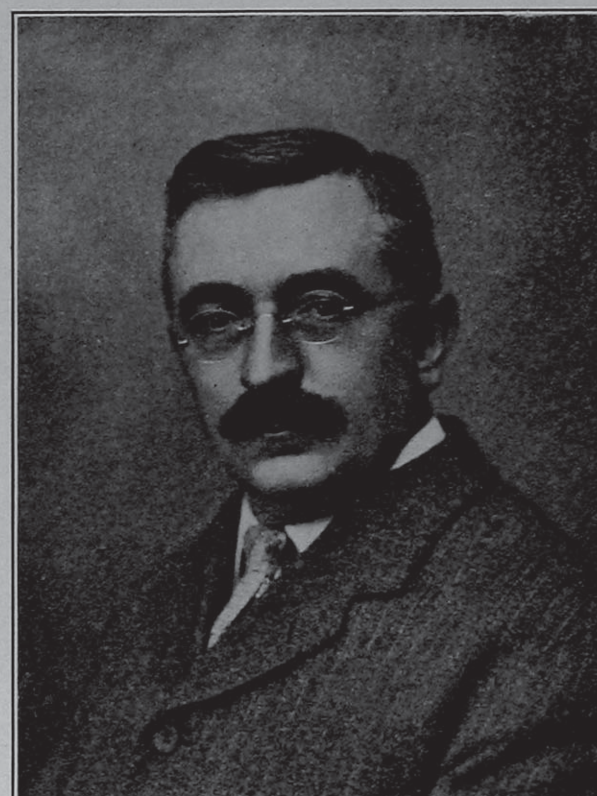
William Fehr.

Mr. William Fehr died suddenly at his residence, Friday, September 3, after an illness of only a few days.

Mr. Fehr was born in Zürich, Switzerland, in 1867 and came to this country when only eighteen years of age.

He was the Founder and Superintendent of the well known *"Steel Heddle Mfg. Co.,"* of Philadelphia, and in connection with this enterprise showed remarkable talent as a business man.

The product of this concern brought him in close contact with the managers of our most prominent



textile plants all over the country, and in connection with which, the Steel Heddle, the invention of Mr. Fehr, has become an absolute necessity.

Since the last few years, Mr. Fehr had also introduced the Steel Heddle successfully in England, Ireland, Japan, China, etc.

Not only was Mr. Fehr known all over the country in the textile line, but at the same time he was well liked on account of his social ways, and his presence will be greatly missed.

Mr. Albert Hellwig, the genial President and Treasurer of the Steel Heddle Mfg. Co., is at present taking Mr. Fehr's part of the business, additional of his own, on his shoulders.

Philadelphia manufactures each year: 45,000,000 yards of carpet; 34,000,000 yards of worsted goods; 28,000,000 yards of woolen goods; 180,000,000 yards of cotton piece goods; 12,000.000 dozen hose and half hose; 2,000,000 dozen undearwear, and 4,800,000 hats.

COTTON SPINNING.

The Ring Frame.

(Continued from page 41.)

Traveler Magazines.

Travelers are a great expense in connection with ring spinning, amounting to about $20.00 per thousand spindles the first year in connection with a new ring frame, provided the same is not fitted out with Mirror Spinning Rings, after which said expenses should not be more than $6.00 to $8.00 per thousand spindles per year. New rings will always wear out travelers quicker. One method of economizing in the amount of travelers needed by the mill is to have the speed of the spindles, and the weight of the travelers, so proportioned that the travelers will not heat up and consequently lose their temper, wearing out and flying off.

Another item to save travelers is to provide suitable magazines and have them arranged conveniently, so that the spinners will have no occasion to carry travelers around in their mouths, or pockets, or leave them loose on thread boards, to be brushed off on to the floor. These magazines have covers, which keep the travelers clean and free from flyings, and are of such a shape that they discharge a few of the travelers at a time into a shallow pan from which they are taken by the spinner as needed, in turn preventing waste in travelers by the operator.

Fig. 270 shows us a specimen of such a magazine, as built by the Draper Co., known as the *Duckworth's Patent Traveler Magazine,* and of which diagram *A* is a side elevation of said magazine, a portion of the pan being shown broken out. Diagram *B* is a right hand elevation of the device shown in diagram *A*. Diagram *C* is a top plan view of the magazine, showing the closure therefore and the outlet for the travelers when the magazine is moved to the discharging position. Diagram *D* is a cross section of the holder on the line $x - x$, diagram *C*.

With reference to these illustrations, 1 indicates the pan for holding a few travelers at one time, delivered into it from the movable magazine 2, which is filled with travelers, and has at its top a slot, widened along one edge, to leave a narrow elongated discharge opening 3.

4 indicates any convenient part of the ring frame to which pan 1 and the casing for holding the magazine 2 are secured. A longitudinal rib 5 is formed on the interior of the magazine, opposite the slot, to act as a counterbalance, that is, normally this counterweight will operate to retain the magazine in position with the discharge opening 3 uppermost and under the overhanging arm 6, and if the magazine is turned on its journals, this counterweight will retain it to normal position as soon as released. 7 is a movable cover, the magazine being filled with a quantity of travelers in bulk, after which this cover is replaced and fastened.

When during working hours, the spinner requires one or more travelers, he then grasps the nut 8 and revolves the magazine 2, to turn the discharge opening 3 downward, whereupon one or more travelers will drop out into the pan 1, but only a few of the travelers at most will be discharged, owing to the character of the opening 3.

The discharged travelers are then picked out of the pan by the operator and used as needed, the bulk of the travelers being retained in the magazine and kept thereby from scattering or spilling over the floor. This small device will repay its initial cost in a short time.

The overhanging arm 6 protects the discharge opening from the entrance of lint and fluff.

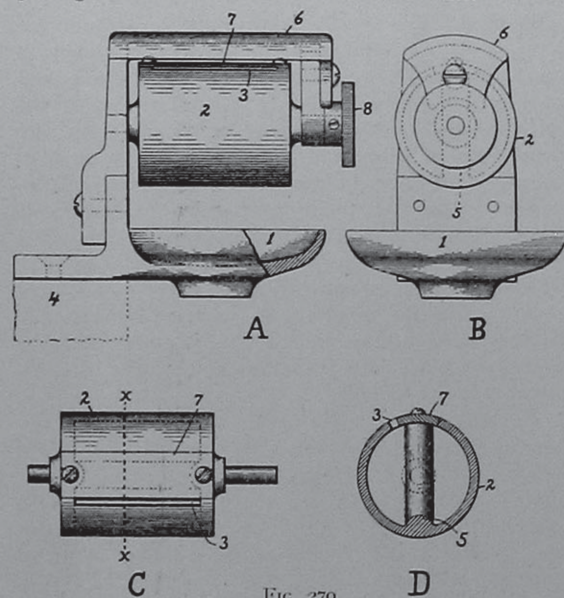


Fig. 270.

Spindle Rails.—The spindle rail, shown at *O* in Fig. 227, of the November, 1907 issue of the Journal, is a stiff metal piece extending the full length of the spinning frame and securely attached to its samsons. The spindle rail is usually fastened by bolts, so that it can be loosened sufficiently to be leveled up both lengthwise and across its width, after which it is rigidly secured in place. Holes are bored through the spindle rail at regular intervals, into which are fitted the bolster cases carrying the spindles proper, the bolster cases being threaded externally and bolted securely to the spindle rail by means of nuts. The holes are usually bored larger than the bolster case, so as to allow for adjustment, therefore the spindle should be set as nearly as possible in the center of its hole, so that all the spindles are in one line. This insures bands that are all the same length, and consequently there is a uniform tension on bands and spindles. There are two forms of construction in spindle rails; the box rails, so-called (*i. e.,* with the upper and lower fixed rails cast together), and the double rail, this having the upper and lower rails secured together by double knees or brackets. The latter arrangement permits, on account of the knees being of correct length, a finer adjustment of the rails in relation to each other, and to the roller beam, as well as adjustment of the spindle, in relation to the rollers. It also allows the maximum distance between the fixed rails, giving a steadier lifting motion to the ring rail and consequently better results, especially when dealing with high counts of yarns.

After the spindle rail has been leveled, the spindles should be set plumb and level with each other, and which ought to be possible without packing them, although in connection with old frames, it may sometimes be found necessary to do this. The object of having spindles plumb, is that they are central in the ring, through the entire traverse of ring rail, also to prevent uneven rotation and vibration of the bobbin.

Spindles.—The spindle is the most important part of the ring frame, and on its design, action, consumption of power, etc., depends the successful and economical operation of the frame. The modern spindle has been developed by long years of experimentation with a multitude of types and designs, which have been finally worked down to one common principle of construction. There are to-day practically but four varieties of spindles now in the market, but which differ from each other only in details of construction. The first radical improvement in design over the old type was in making the spindle with only one bearing, and that bearing self-contained, so that it could be easily fastened in place and the alignment of its parts be secured without trouble.

The older types of spindles had two bearings, fastened to two independent rails, with the result that if these two parts were not perfectly adjusted, the spindles could not run properly. The modern spindle is attached by its base to the spindle rail at one point only, and is always ready to run independent of external conditions.

Another important feature in the modern type of spindle is the flexibility of its bearings, which are made so that the spindle can shift its center of rotation under the influences of load and strain, an impossibility with the old style of rigid bearings. The spindle accurately fits the bolster, but the bolster is made about $\frac{1}{500}$ inch smaller than the base which holds it, so that the spindle, with its load of bobbin and yarn, having a certain amount of freedom, will, when running, adjust itself to a proper centre of revolution, which may or may not correspond exactly to its vertical centre of alignment. A spindle of this type resembles, in its action, that of a top, in that when caused to revolve, it will always find its centre, and revolve on its axis whether it be upright or inclined. The spindle may be removed from the bolster, the bolster and footstep being also loose in the base, so that these parts may each be removed at will, or, the entire spindle may be taken from the spindle rail at one operation.

All spindles and surrounding parts should be most carefully constructed, so that it will be possible to run the spindles, without vibration, at a high speed, between 7,000 to 10,000 revolutions per minute, according to counts and quality of yarn spun. The spindle speed should be kept rather leaning towards the lowest rate permissible with production, than overrunning the speed, since a lower speed means less breakage.

Up to a certain point, the spindle has to be run at a higher rate of speed for spinning fine counts of yarn than for low counts. After this point has been reached, the speed of the spindle is gradually diminished, as the counts become finer. For example, the speed of the spindle, for warp yarns begins at about 7000 *r. p. m.* for number 9's yarn, and gradually increases to about 9700 *r. p. m.* for number 50's yarn; then, as the yarn grows finer, the *r. p. m.* decrease from about 9600 *r. p. m.* for number 60's yarn, to about 5500 *r. p. m.* for number 170's yarn. The reason for this is easily seen, because the finer the counts, the less strain can the yarn withstand. The spindle speed for warp yarn should be higher than for filling yarn, on account of the additional amount of twist that has to be put in warp yarn, which would seriously reduce the production of the frame, if the spindle were not run at a sufficiently high speed. Another reason why the speed of spindles on the filling frame should be lower is, that filling is given less twist than warp and therefore cannot stand as much strain and tension. For this reason we find that number 9's filling yarn is spun with about 5700 *r. p. m.*, in contrast to the 7000 *r. p. m.* for the same count in warp yarn previously quoted; 50's filling yarn requires about 7900 *r. p. m.*, vice versa the 9700 *r. p. m.* for the warp yarn, etc.

A spinning frame spindle is simply a revolving upright shaft, made of steel, its prime duty being to carry a bobbin at high speed, all other parts being added merely to aid it in performing this function. The bobbin, made of wood, is usually cylindrical, and fits over the steel spindle, so shaped inside that it fits the spindle snugly at the bottom, and sufficiently tightly at the top, to revolve with it without slip. Usually the bobbin rests in a cup formed on the spindle, which gives it better support and action.

The spindle commonly used on modern ring frames, consists of the following principal parts: the base, the bolster, the step, the spindle blade, the whirl and the cup.

The whirl is driven onto the spindle, so that it will overhang in such a way that the strain from the banding is directly resisted by the bearing; the cup, which helps centre and rotate the bobbin, is forced on to the sleeve of the whirl. The lower or taper part of the spindle blade fits inside the bolster, the bolster in turn fitting into the base. The lower part of the bolster is covered with packing, tied with a fine string. This gives greater steadiness to the running of the spindle and better wearing qualities. The step is made of hardened steel, has a flat top, and is screwed into the bottom of the bolster. It is adjustable, and by screwing it up or down, the taper end of the spindle may be made to fit tighter or looser in the bolster. The base is made with an upward projecting nose, or oil tube, the cover of which forms a lock to prevent pulling the spindle out of the bolster when doffing. The oil tube communicates with the oil reservoir inside the base, which contains oil for lubricating the spindle. The stem of the bolster is threaded externally to receive a nut for securing the base to the spindle rail. In the older type of spindles, the oil tube projects more obliquely from the base and does not protect the spindle from slipping out, consequently a guard is used, made of wire, one end of which is bent at right angles to project over the whirl, the other end being screwed into the base. The cups are usually of brass and are made in several sizes to suit either warp of filling bobbins. Many prefer to have the cups all of one general type to suit combination frames.

(To be continued.)

Electric Driving of Spinning Frames.

Spinning frames have been driven from electric motors in groups by means of line shafting and belts, and also individually. This latter method may be effected in two ways—*viz:* (*a*) by coupling the shaft of a variable-speed continuous-current electric motor directly to the axle of the cylinder of the spinning frame; and (*b*) by gearing a small three-phase induction motor (which runs at a constant speed) by means of a pinion on the motor shaft with a pinion on the cylinder shaft of the frame. The high speed of this gearing, transmitting the whole power to drive the frame, rendered it very noisy and liable to wear. To obviate these defects, one or both of the spur wheels have been made of cast iron, steel, brass, raw hide, fibre, etc., and helical and double helical teeth have also been tried.

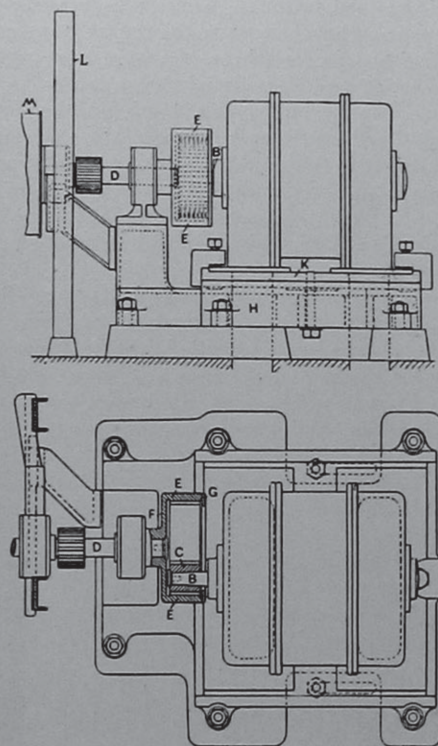
According to a late English invention, all the difficulty can be overcome, and a silent, easily running drive may be obtained, by applying a pinion to the motor shaft and an internal wheel to the cylinder axle of the spinning frame, with the motor pinion running inside it, with a suitable baseplate for adjusting the position of the motor.

Of the accompanying illustrations, Fig. 1 shows the motor in its front elevation, showing also its connection to the spinning frame. Fig. 2 is a top plan view, with parts in section.

As shown in the illustrations, a wheel *E*, with internal teeth of the desired diameter, is fitted on the cylinder shaft *D* to replace the ordinary belt pulley; this wheel, gears with the pinion *C* on the motor shaft *B*. The internal toothed wheel *E* is formed with a plate *F* at one side, and with a flange *G* extending towards the centre, at the other side. This flange will hold an amount of oil or lubricant in the teeth, so that the pinion *C* will be practically running in oil.

The teeth of both, the pinion *C* and the internal wheel *E*, are carefully cut or machined. There are more teeth in gear than with two ordinary pinions geared together, and the teeth are moving in and out of contact at a slower rate, and being always working in oil, a smoother and noiseless drive without excessive wear is said to result.

To provide for the changing of the pinion *C* on the motor shaft *B*, an auxiliary sliding baseplate *K* is mounted between flanges on the baseplate *H* to move in a direction parallel to the motor shaft. The plate *K* is provided with flanges between which the motor is placed to move in a direction at right angles to its shaft *B*, thereby enabling the motor to be moved in directions at right angles to one another to permit of the pinion *C* being moved clear of the internal toothed



wheel *E*. A scale is provided on the slides to show when a pinion of any given number of teeth is properly in gear. Pinching screws are provided for securing the sliding baseplate *K* and the motor in position. For fine adjustments a regulating screw, or its equivalent, may be used to set the pinion to its proper depth in gear. *L* indicates the framing of the spinning frame, and *M* its tin cylinder.

The Schaellibaum Grid.

The object of this attachment is to increase the cleaning action of cotton picking machinery and thus furnish a superior lap to the carding engine, at the same time save cotton from picker waste and sweepings.

The accompanying illustration is a sectional view of this grid, showing also those portions of an opener or scutcher with which the same comes more closely in contact, viz.: A the feed rolls, B a special comb to work in connection with the new grid, and of which its first and last bar are indicated by C. The bracket for holding the comb and the grid bars in place is indicated by D, the bottom plate of the machine by E, and the beater blades by F.

From this illustration it will be seen that the distinctive features of this grid, as compared with other grids, consist of a comb, and a greater number of bars of a special design.

The comb consists of a steel plate in which are inserted four rows of steel pins set at a certain angle pointing upward against the cotton, when the latter enters the machine, *i. e.,* is fed to the machine by means of the feed rolls A. These pins vary in size and distance apart from coarse, for use on openers, to medium and fine for scutchers, to insure a most thorough separating and cleaning of the cotton under the operation. The action of this comb on the cotton fibres is mild and gentle, and does not injure the staple in the least, yet it thoroughly loosens up the bunches of raw cotton and by this more thorough opening and loosening up of the fibres it allows more dirt to go out through the Grid Bars and thus away from the cotton than common grids will permit.

The bars C of the grid, of which from 15 to 18 are used on Scutchers, and on some styles of Openers a larger number, are made of rolled steel and unbreakable. Under extreme strain they will give, and then return to place instantly, thus eliminating all danger of their breaking and the fragments damaging the machine. This Grid can be easily applied to any style of opener or Scutcher except openers of the Crighton Type, and is as equally adapted to one grade of cotton as to another.

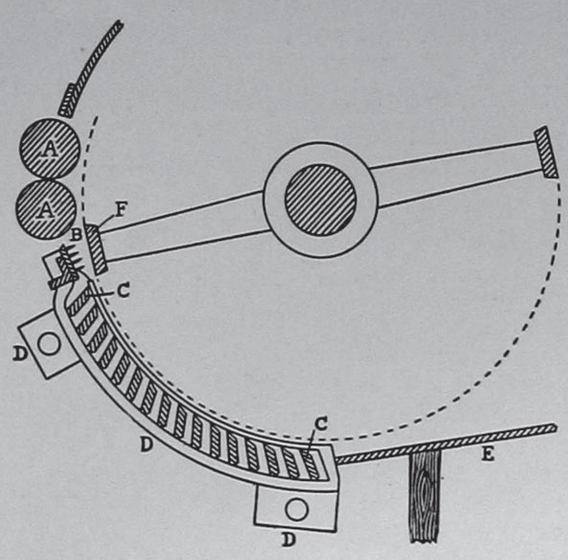
For dyed cotton the advantages of the grid are fully double as great as for white cotton.

The advantages of this grid are testified by some of our most prominent Cotton Manufacturers, for instance:

Agent *R. W. Eaton*, of the Cabot Mfg. Co., "I have learned more about pickers from Mr. Schaellibaum, when here than during my whole training, and it does a mill good if Mr. Schaellibaum only looks into a picker room."

Agent *Wm. P. McMullan*, of the Naumkeag Steam Cotton Co., "We have tried several kinds of grids and consider the Schaellibaum Grid the best in the market, it has accomplished all that was claimed for it."

Mr. *T. Ashby Blythe*, of Philadelphia, "The Schaellibaum Grids are doing splendid work in our mills and save much good cotton."

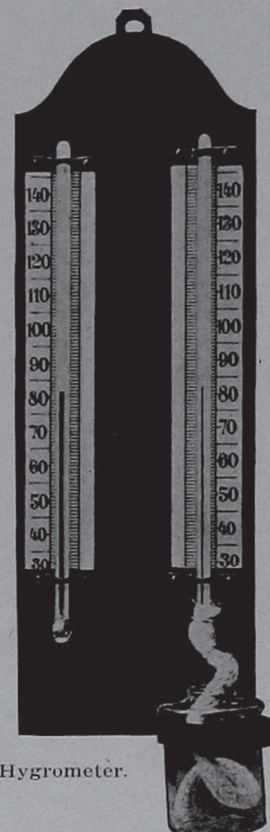


Superintendent *M. E. Stevens*, of the Columbus Mfg. Co., "I have used the Schaellibaum Grid for the last ten years and know that they exceed all claimed for them in every particular. There is no question about the Grid being far superior to anything else on the market."

AIR CONDITIONING FOR TEXTILE MILLS.

(*Continued from page 52*)

It is one of nature's laws that when anything evaporates, it absorbs heat, therefore, the water evaporating from the wick which surrounds one of the bulbs of the Hygrometer, absorbs or draws out the heat from the thermometer, thus lowering the temperature. The dryer the air, the faster the water evaporates from the bulb and the greater the difference would be between the two thermometers. If the air would be perfectly saturated with moisture, there would be no evaporation taking place from the wick, and consequently the two thermometers would read exactly alike.



Hygrometer.

After ascertaining the difference between the two thermometers, by consulting table given herewith, the relative humidity may be read off direct. As, for instance, if the temperature in the room was 100° F., according to the dry thermometer and the wet thermometer read 85° F., *i. e.,* a difference of (100 — 85

Air Temperature.	Difference Between the Dry and Wet Thermometers.																													
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
60	100	94	89	84	78	73	68	63	58	53	48	44	39	34	30	26	22	18	14	10	6	2									
65	100	95	90	85	80	75	70	65	61	56	52	48	44	39	35	31	28	24	20	17	13	10	6	3							
70	100	95	90	86	81	77	72	68	64	60	55	52	48	44	40	36	33	29	26	23	19	16	13	10	7	4	1				
75	100	95	91	87	82	78	74	70	66	62	58	55	51	47	44	40	37	34	31	27	24	21	19	16	13	10	7	5	2		
80	100	96	92	87	83	79	75	72	68	64	61	57	54	51	47	44	41	38	35	32	29	26	23	20	18	15	13	10	8	6	3
85	100	96	92	88	84	80	77	73	70	66	63	60	56	53	50	47	44	41	38	36	33	30	28	25	22	20	17	15	13	11	9
90	100	96	92	88	85	81	78	75	71	68	65	62	59	56	53	50	47	44	41	39	36	34	32	29	26	24	22	20	17	15	13
95	100	96	93	89	86	82	79	76	72	69	66	63	60	58	55	52	49	47	44	42	39	37	35	32	30	28	25	23	21	19	17
100	100	97	93	90	86	83	80	77	74	71	68	65	62	59	57	54	51	49	47	44	42	39	37	35	33	31	29	27	25	23	21

=) 15°, then follow the air temperature column down to the 100 mark, and then follow that line out to the right until the 15th space = 54% humidity.

Hygrometers, in all cases where used in a mill, should be procured, and readings taken at least three times a day and a proper record kept of the same, in order to be able to trace any possible drop in quality and quantity of production. No up-to-date mill should attempt to be without them. However, it is not only the buying of the instrument, but after installed, attention to its proper keeping must be exercised and not that the wet bulb and its well of water is left more often dry than wet, the excuse given being that the overseer and his second hands can tell by the feel, the proper conditions of the air in the room. Although experience may be in their favor, they then lose sight of the fact that keeping records requires little extra work, and at the same time is a mighty handy affair when in trouble or dispute.

In the use of hygrometers, attention must be given to:

(*a*) The muslin, covering the wet bulb, must be kept in good condition; the evaporation of the water always leaves a small residuum in the meshes, which inevitably causes stiffening of the material, preventing the proper taking up of the water. Hence, use as pure a water as possible, and renew the muslin covering from time to time.

(*b*) Have the wet bulb 4 inches or more apart from the dry bulb, and the well of water at least 5 inches, in order to prevent the dry bulb being affected by evaporation.

(*c*) Have the gradations cut on the stems of the thermometers, and have them properly tested before being put to use in the mill. A defect in many makes of hygrometers is to have the spherical bulbs of the thermometers too long to adapt themselves quickly to the changes of temperature.

Lately an improved hygrometer has been brought in the market, enabling the humidity of the air in spinning and weaving mills to be quickly and accurately ascertained. It is rightly termed a *Direct-reading Hygrometer.* By merely setting the pointers to the wet and dry bulb temperatures, the humidity of the air is obtained on the scale. The apparatus operates as follows: On setting the pointers, the difference betwen the wet and dry bulb thermometers is obtained. A slotted bar at the back of the instrument multiplies this reading by a factor which obtains the dew point. The scales are so chosen that the vapor tensions corresponding to the dry bulb temperature and dew point are found. These are divided and the result multiplied by 100, thus finding the humidity. It will, of course, be understood, that the instrument, by means of the pointers, slots, and special scale, performs all these operations at one setting.

(*To be continued.*)

Installing HYGROSSO Humidifiers.

The Banna Mfg. Co., of Goldville, S. C., which is now making improvements and additions whereby they will double their buildings and capacity at their present plant have awarded contract for a humidifying system to John W. Fries, 45 Lafayette St., New York, manufacturer of the HYGROSSO. The installation at the above concern will consist of the belt driven HYGROSSO in all its departments.

The Aberfoyle Mfg. Co., of Manayunk, Pa., have recently installed the HYGROSSO Humidifiers in their weaving department, this installation also consists of belt driven HYGROSSO.

Improved Fabric Structure for Napkins.

The above is the gist of a claim for a fabric just patented, and which is shown in the accompanying two illustrations, of which Figure 1 is a plan of a section of the fabric, and Figure 2 a completed napkin, the raw edges of which have been hemmed.

Referring to Fig. 1, numerals of reference 1, 2 and 3 designate the napkin patterns of a bolt of cloth, having selvages 4 and 5. Along such selvages there

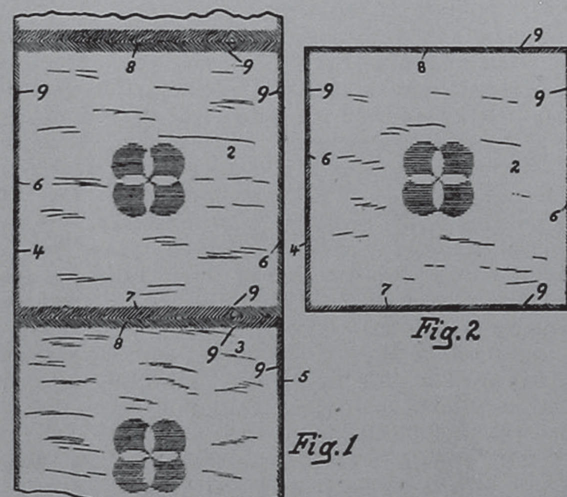


Fig. 1 Fig. 2

is produced a margin 6, interlaced with the $\frac{2}{2}$ 4-harness twill, which weave is also used for the margins across the width of the cloth, between adjacent napkins, as at 7 and 8.

The direction of the twills in these filling margins 7 and 8 is the reverse of each other where they meet, so as to produce a demarcation along which the napkins may be severed. Said margins are of a depth greater than the side margins 6, so that, when the raw edges are hemmed, a border of the same depth and design will be formed extending entirely around the napkin, as shown in Fig. 2.

According to the nature of the pattern desired, the direction of the twill is changed at a given point in each margin, as is clearly shown in Fig. 1, at 9.

Philadelphia has always been the financial rallying point of the Republic—in the War of Independence Robert Morris financed the army, in the War of 1812 Stephen Girard replenished an empty treasury, in the Mexican War E. W. Clark successfully financed the Government, and in the Civil War Jay Cooke raised the money necessary to keep the armies in the field.

COTTON FINISHING.

(*Continued from page 43.*)

FOREIGN IMPURITIES IN COTTON. In addition to these natural impurities the cotton contains, there are foreign impurities present in the cloth and which have been added to the raw material during its manufacture into yarn and cloth. Chief amongst these foreign impurities met with are, a varying amount of sizing materials, composed largely of organic matter, added to the warp previous to weaving, for which reason the cloth, when arriving at the bleachery, presents a greyish, dirty appearance. There may be up to 30 per cent. of impurities present, in proportion to the weight of the cloth.

To completely remove these natural and foreign impurities in the cloth, is the object of bleaching; producing in turn a fabric that may be sold either in a pure white state, or prepared for the dyeing of delicate, light colors, or furnish the clear white ground for calico printing.

Besides the regular goods to be bleached, there is a fabric known as *Back Cloth,* and which forms a considerable portion of cotton cloth requiring bleaching. Said back cloth is the result of calico printing, and where it is customary, when printing bleached cloth, to keep between it and the padding blanket, a piece of unbleached, *i. e.,* grey cotton cloth. The latter, owing to the shrinkage of the bleached cloth, is somewhat wider than the (bleached) piece that is being printed; and in this way serves to protect the padding blanket from any color striking through or lapping over the printed cloth. This back cloth consequently will be more or less daubed with the various colors used in print works, and for which reason it has to be more thoroughly bleached, so as to free it from these additional color impurities.

THE PROCESS: The ancient method of bleaching was to expose the materials to the action of the sun's rays, while frequently wetting them. Now, bleaching is carried on by means of either chloride of lime or peroxide of sodium. Although the bulk of grey cotton cloth is yet treated by the first mentioned process, the peroxide of sodium process is more and more becoming the bleaching process, particularly in connection with our better grades of cotton cloth, for the fact that the process closely imitates the action of the sun; it is non-injurious to the cotton fibre.

Chlorine was first proposed as a bleaching agent by a French chemist, Berthollet, in 1786. In 1798, a Scotchman by the name of Tennant, patented and first produced the bleaching powder known as chloride of lime.

Peroxide of sodium was first made commercially available under the process of Hamilton Y. Castner, and is now produced on a large scale at Niagara Falls. Other peroxides, such as hydrogen peroxide, have largely gone into disuse on account of their cost and instability.

Both systems of bleaching will be dealt with, since both are in commercial use.

WATER: The most desirable water for bleaching purposes is an upland surface water, because it has not drained through any limestone, hence contains a small amount of impurities. Hard water, *i. e.,* water which contains lime and magnesium salts in solution, if used in that state, will form insoluble compounds in conjunction with soap. These insoluble compounds in turn will remain in the fabric, and not only spoil the appearance of the bleach, but at the same time will render the goods harsh to the touch of the hand. Iron, if present in the water, makes the same totally unfit for use in bleaching, on account of the red-brown color of iron compounds.

Chlorine Bleach.

The same is commonly liberated from bleaching powder, chloride of lime or chemic. To ascertain the commercial value of bleaching powder, determine calcium chloride, calcium oxide, calcium carbonate, and available chlorine. The chief constituent of bleaching powder is calcium hypochlorite ($CaCl_2O_2$). The amount of chlorine present is determined by titration with arsenious acid, and when the best commercial grade of bleaching powder will show to contain about 40 per cent of chlorine present.

Bleaching proper, as a rule, is preceded by boiling the cloth in one or more alkaline baths so as to facilitate the removal of such impurities as are not destroyed by chlorine. Besides this treatment with dilute acid, several thorough washings are necessary.

Consistent with the variety of cotton fabrics bleached, some requiring a more thorough bleaching than others, different treatments of bleaching are practised; a common grading being thus:

(1) Madder Bleach, and which means the most thorough process.

(2) Collectively—Less strong bleaching processes, sub-divided again into, (a) Turkey Red Bleach, (b) Market Bleach and (c) Half Bleach, the last being the weakest bleach.

Which bleach to apply in any particular case, depends upon the finish of the cloth, and its final use.

Madder Bleach. This is the most thorough kind of chlorine bleaching. Its name is derived, when in days gone by, madder was extensively used, and when it was necessary then to give those goods which had to be printed and subsequently dyed with madder, an extremely thorough bleach.

The object aimed at by this bleach is to effect a most complete removal of every impurity which can attract coloring matter in the dye bath, so that in connection with prints the pattern will stand out clear and bold. This bleach is also used when having to dye light and delicate colors. Although other dyestuffs, more particularly alazarines, have taken the place of madder, the name Madder Bleach still adheres to the process, it representing the most thorough form of bleaching in use to-day for cotton piece goods.

The following is an outline of the process, after the goods have been stamped (Printer's Ink is very good for this work), burled, stitched, singed or sheared:

(1) Lime Boil.

(2) Acid Treatment, also called Brown Sour, or Lime Sour.

(3) Lye Boils; Rosin and Alkali.
(4) Chemciking or Bleaching proper.
(5) Acid Treatment, also called White Sour.

Preceding and following each of these five processes, there is a wash (six in all); the one preceding the Lime Boil being termed the *Grey wash* or *Singeing wash,* that following the White Sour being termed the *Final wash.* After the latter, the goods undergo the processes required for Printing, Dyeing or for White Goods, as the case may be.

THE GREY OR SINGEING WASH. Upon leaving the Singeing (or Shearing) room, the cloth is ready for the grey wash, the same being the first step in the actual bleaching process. The object of this operation is to remove, by water, as much of the loose, charred fibres as possible, also to wet out the cloth and make it more absorbent, as well as to remove some of the weaver's dressing.

It is at this process, that the pieces under treatment pass from their open width to the rope, chain, or string form, as it is variously termed, and which form they retain until the bleaching process is completed. This is accomplished by drawing the cloth either directly from the adjacent singe house, or from the roll, through a smooth porcelain or hard rubber ring, about 6 inches in diameter, and which is called a *pot eye.*

As a rule, the cloth is run into an ordinary washing machine, and in turn allowed to lie *in pile,* in a wet or at least moist condition, for some hours, if possible over night, in order to soften.

An illustration of a Bleach House Washer is given in Fig. 13, the same being a transverse section of the machine, showing the routine of the cloth through the latter, explaining the principle of saturation with water and alternate squeezing by the upper rollers.

The cloth is drawn (see arrow 1) from the singe house, or roll, as the case may be, through a pot eye (not shown), by the nip of a pair of large wooden rollers 2 and 3, and from there passes in a downward course (4) underneath roller 5, which is deeply immersed in the trough 6, containing the water 7. The cloth is then drawn upwards, and guided to its proper position on roller 3 by wooden pegs 8, a series of which is pitched out, side by side, from peg rail 9, so as to allow a free passage for the cloth. This operation of running the cloth around rollers 3 and 5 is repeated, up and down, first in water and then squeezed, until the whole width of the machine has thus been taken up by the cloth, and when, after passing upwards between the last two pegs 8 of the series, the cloth is then carried away by reel 10, see dotted line 11, and conveyed to squeezers, from which it is laid *in pile;* whereas if crowded for room, or pushed for time, the cloth may be passed directly from the squeezer into the liming machine, and in turn into the kier, in which the next step of the operation is performed. However, it must be remembered, that leaving the string of cloth lie in a pile, in a moist condition, for at least a few hours, will render the remaining impurities in the cloth, more easily removed in the subsequent operations, due to a mild fermentation of the sizing materials and some of the natural impurities present in the cloth.

Numerals of reference 12, in Fig. 13, indicates the floor line; 13 and 14 the foundation beams.

The altitude at which the upper rollers are placed, allows a downward current of the water coming from the nip of rollers to add materially to a thorough wash.

LIME BOIL. The same follows the grey wash, and consists in running the string of cloth through a solution of milk of lime, *i. e., calcium hydroxide* $Ca(OH)_2$ a portion of which the cloth absorbs, after which it is passed by overhead winches into a specially constructed boiler, known as a *kier.*

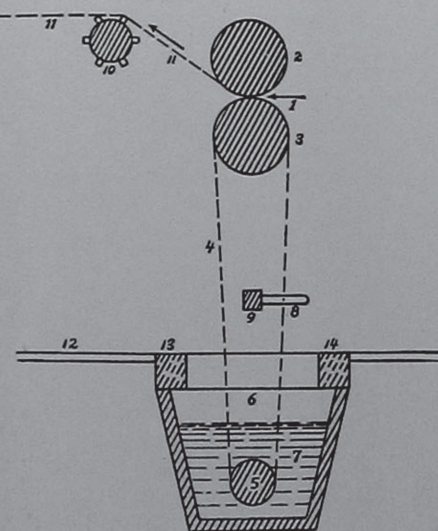


FIG. 13.

The essential action of boiling with lime, is to decompose the fatty, resinous, and waxy impurities present in the fabric. They are not removed, but remain attached to the fibre as insoluble lime soaps, which are, however, readily removed by the subsequent processes.

The coloring matter of the fibre is modified, and any alumina present is also attacked.

A good quality of lime, known as *fat lime,* should contain only small amounts of magnesia and alumina, and be free from iron. If the lime has to be stored before using, be careful not to expose the same to the air, thus preventing it from becoming carbonated, *i. e.,* air slacked—useless for liming cloth.

The milk of lime is run directly into the box or pit of the liming machine, the cloth passing through this lime pit, where it is saturated with the milk of lime, and when after the excess of liquor has been removed by the squeeze rollers, the cloth then passes directly into the kier.

The quantity of lime used, varies according to the material being bleached; about 5 to 7 lbs. of dry lime to 100 lbs. of cloth, may be taken as a fair average. Some bleachers add a very small quantity of caustic soda solution to the kier, after the same has been filled with cloth, claiming that the same helps the process.

(*To be continued*)

SILK FINISHING.

(*Continued from page 45.*)

Sizing, Drying and Tentering.

There is a machine built, which attends to the sizing or gumming, drying and tentering of silk, or half-silk goods, in one process, the same being so constructed that it can be easily and quickly changed to take in different widths of goods to be operated upon. The principle of construction of this machine is the same as the celebrated French machines of this character, although the improvements added to this machine have greatly increased its working qualities.

The roll of goods to be treated, is first placed on slotted pieces attached to rods, directly in front of machine, and which are adjustable for different widths of goods to be treated. The goods, thus placed, then pass over a wood roller, around a lower brass roller and between upper and lower brass rollers, the lower one of which runs in the sizing liquid contained in a copper tank, which tank can be raised and lowered and thus bring the sizing liquid up around the lower roller and take it away when required. The liquid can be heated by means of a coil of copper piping in the bottom of the tank.

After passing between these two brass rollers, the goods pass over a table, covered with oil cloth, and a brass knife edge scrapes off the surplus size from the goods, which then pass under a small wooden roller and over a roller which is movable up and down in slots of two upright frames, placed opposite to each other on the two sides of the machine.

From this tension roller, the cloth passes under another wooden roller to the point where it is fed onto the clamp chain by the operator. Weights are connected to this roller by means of a wire rope, on each side and thus tension can be given to the goods at this point by the tendency of the roller to move upwardly due to the pull by the weights. The tension of course can be varied by varying the amount of weights used.

The goods are thus held by the clamp chain, which tenters them, and at the same time passes them over a charcoal or gas fire which dries them. If charcoal is used to generate the heat, it is done by igniting the same in a large iron pan which travels in and out on a track under the machine. The amount of fire exposed to the goods can be regulated by means of a lid which slides over the pan in the direction of the motion of the goods, thus exposing as little or as much of the fire as is wanted. If the cloth or machine stops, there is a mechanism by means of which the pan can be quickly thrown out of the machine, thus preventing the burning of the goods. It is claimed that charcoal fire gives a lustre and finish to silk goods that cannot be equalled by steam, gas or any other known process of producing heat. A hood is provided over the fire, with an exhaust fan to carry off any fumes.

After being dried by the charcoal, the goods pass around a steam drum which dries the edges as were held by the clamps. After leaving the steam drum, the goods pass under another wooden roller and then to the winding attachment which rolls them up.

Breaking the Finish.

The silk fabric, somewhat stiff according to the amount of sizing imparted, has now to be softened to the touch of the hand, and which has to be done without robbing the fabric of its Size. The process has to remove the Size from the interstices between the individual threads, a feature not aimed at in the process of sizing but which it was impossible to prevent. This is accomplished by running the fabric either through a *Button Breaker*, or a *Knife Breaker*.

For light and medium weight fabrics, the first mentioned machine is the one used; the knife breaker being used more particularly in connection with heavy weight fabrics.

A Button Breaker, by preference, in order to save space in the room, is an upright frame, holding from 12 to 25 rollers, about $3\frac{1}{2}''$ in diameter. Into these rollers are driven nails, with about $\frac{1}{2}''$ to $\frac{5}{8}''$ heads, resembling the large round headed brass nails used by upholsterers in their work. Arrangements for varying position of rollers and tension on the goods are provided. In running the goods through the machine, the rollers *revolve with* the *goods*, each nail head imparting to the cloth a slight pinch, *i. e.*, separating the individual threads of the fabric from each other, and which threads in the process of sizing have become glued more or less together. The procedure does not intend or mean the liberating of Size from the fabric. If one run through the machine is not sufficient, the operation is repeated. In order to avoid any chance for streaks in the fabric see to it that the rollers are properly aligned; buttons in good shape, evenly spaced and of a uniform height and size.

A Knife Breaker, is a machine carrying in its frame one, two, or more cylinders about 10" in diameter, having secured to its circumference, a series of spiral shaped knives, about $1\frac{1}{4}''$ high, set at right

Fig. 8.

angles to the surface of the cylinder, arranged about three inches apart, somewhat like the blades of the revolver in a shear. Fig. 8 shows one of these cylinders. The sized goods are in turn run over these cylinders, and which revolve against the run of the goods through the machine. While a knife breaker will certainly soften and polish the goods treated by it, at the same time it will loosen, and consequently waste much of the Size given to the goods by the spraying, *i. e.*, the sizing process.

All silk goods constructed with a sufficiently high warp and filling texture, seldom require stiffening, and this only if some extra stiffening should be desired, or the weave demands it so as to prevent the threads from slipping upon each other, while it may be necessary to add body to some loosely textured, or cheaper grades of all silks, or half-silks or silk mixtures, as also called, by means of sizing them, in order to produce a salable article at a low price. It must, however, be remembered that sizing will influence the lustre and touch to the hand of any fabric, whether all silk or half-silk, thus treated.

Silk goods, whether sized or not sized, weighted or pure dye, whenever of sufficient texture to stand it, in order to make them softer and at the same time more lustrous, are in turn subjected to heat and pressure, *i. e.*, hot calendering and pressing. This process, however, will decrease the fullness of the fabric to the touch of the hand, for which reason, only better textured fabrics will stand the process; light textured fabrics would come out too flimsy for commercial sale.

(*To be continued.*)

BURLING, PERCHING AND FINE-SEWING WOOLENS AND WORSTEDS.

By J. Morrow.

The fabric after coming from the loom, receives a perching and measuring at the weave room before leaving for the finishing room. This examination, however, is not thorough enough to have the finisher shoulder responsibilities, said examination being then only performed to keep the wage list of the weavers correct, or detect quickly imperfections, wrong draws, or ends out, etc., in the fabric, requiring at once prompt attention at the loom.

Burling. Frequently the poorest class of employees are placed at the burling table, since it is supposed that most any girl can burl a piece of cloth. Many persons also have an idea that whatever is left undone in the burling and sewing can easily be remedied after the fabric is finished; this, however, is a big mistake.

The burlers, who are girls, and who usually work in connection with 6/4 goods, in pairs, together on a table, take the piece from the supply, and carrying it to their table, there unroll it and commence to examine the fabric, with its back up, for such imperfections as knots, bunches, runners, etc., using for this purpose their eyes as well as their fingers, and in fact the latter more deftly.

The tables used for burling must be smooth, if you prefer, have them covered with zinc so that a perfectly smooth surface is obtained, in order that the burlers, when feeling for the knots or bunches, etc., will not come in contact with obstructions on the surface of a common table, a feature which in turn would only create a loss of time, and in turn give rise to carelessness on the part of the girls, by getting fooled. The burling table has its top fastened by hinges on one side to the framing, thus permitting the tipping of the top to any angle, for convenient work; the top being held in its proper angle by movable braces, placed on both sides of the table. This also permits the top to be let down level when the piece is finished, the girls then folding the fabric on the top of the table before taking it away.

The tools used by the burler are the burling iron and a fine pair of scissors. The burling iron, in order to produce the best results, should be ground flat on the sides and come to a sharp point, since if the sides are ground flat, the edges thus given the iron will cut the threads easily, and this with as little strain as possible on the threads; hence these irons should never be allowed to become worn on their edges, and neither as to point.

Every knot, slug, bunch, or runner should be removed, care being taken not to injure the regular threads, as this only makes extra work for the fine sewers, who will usually find plenty of unavoidable imperfections from the looms to sew in.

There are several ways of removing the knots from the goods in vogue, depending upon the class of weave, length of time they full, or if they are to be shrunk lengthwise, or not, in order to prevent the making of imperfections that will show after the goods are finished. Care and attention will soon teach which way is best to produce satisfactory results.

The fabric is first burled on the back and afterwards on its face, and where the removal of knots is attended to with more danger than on the back.

All the knots which have been tied in the threads, during winding, dressing, beaming, weaving, must be looked and felt for during burling, and carefully drawn by the girls to the surface and then clipped off with the scissors, leaving the ends long enough so that no space without a thread will occur. Threads which are found loose on the face or back, caused by the weaver having tied in a broken end, should be cut off and not pulled off, especially so if the thread in question has been interlacing tightly; however, threads interlacing loosely should be pulled to their proper position first.

A bunch must be drawn out a little at a time so as not to disturb or strain the thread to which it adhered, neither the surrounding threads. The same care must be exercised with runners, as caused by the filling having been drawn, for more or less space at the selvage, into the fabric. All places where runners have been taken out should be marked so that the sewing-in girl, later on, can examine such places to see if it has been done in such a manner as to cause no damage to the joining picks.

On fancy cassimeres that full a considerable length of time, the knot may be removed on either side by pulling up the ends and breaking off with the burling irons. But just as much care and attention should be given in this case, as in others, especially on hair lines, which are sure to show every little imperfection of the threads. The knots on these should be pulled up and left on for the shears to cut off. If this is not done, they are liable to pull apart. If a piece of goods is to be shrunk lengthways, say, from two to three inches to the yard, it will help greatly to make them perfect. But on any class of goods the burlers should not be allowed to pull off the knots with a dull pair of burling irons, and on most classes of fabrics, it is better to use the scissors in connection with the irons.

In small mills, it is practical to teach the burlers to remove the filling drawn in on the sides, and also the bunches or soft filling or pieces of waste that may have been left in. But, in large mills, where from ten to thirty girls have to be employed, it is almost impossible to do this and have it done properly. It is no small affair to pull out filling that is drawn in for five or six inches, and none but those that have had experience can do it without making the place imperfect. The soft bunches should be picked out, a small piece at a time, so as not to injure the regular threads.

In regard to a system of payment for this work, a fair and practical plan should be adopted, so that the employees will take an interest in their work.

To each burler is given a number, which when done, she places in chalk upon the piece; which then is put on a pile of similar burled pieces.

Perching. The next operation the fabric is subjected to is perching or inspecting. A good northeast light, in connection with large clean windows, is a most important requisite for this work, another being, a perch similar to the one used in the weave room, and over which the percher then examines the fabrics. In connection with 6/4 goods, as a rule, two persons attend to this perching, the inspector standing on one side and his assistant on the other side, in front of the fabric to be examined, pulling the latter slowly over the perch, both persons at the same time examining the fabric carefully as to imperfections, caused either by carelessness of the weaver, imperfect running of the loom, poor yarn, etc.; however, no matter what was the cause, it is the work of the percher to detect these mistakes, and when found, mark such as can be rectified with chalk, to call the attention of the sewing-in girls to such places, whose work it is later on to darn and fix up such places.

When the face of a fabric has been examined, the same is then done with its back. In some instances, in connection with light weight fabrics, the latter are examined from behind the goods, the inspector or more often his assistant, for this purpose changing his position by stepping in between the two runs of the cloth, which thus brings one of the runs of the fabric between him and the light, in turn enabling him to look through the fabric, and consequently readily detect any imperfections. After this is carefully done, and all imperfections properly marked, make a memorandum of each piece, and pass it to the sewers.

Fine-sewing, Darning or Mending. This work, as a rule, is done by experienced girls or women, in fact the person must be an expert with the needle, to do perfect work. The object of darning is to bring the goods up to perfection before they are allowed to undergo fulling or scouring. It is a good plan, where sufficient room is at disposal, to give each sewer-in the use of a perch for her work, this will facilitate perfect work, again if the person knows weaving, such knowledge will also benefit her in her labor.

On *fancy* work it is essential that the sewer-in should know the colors as used for producing the various effects and have a good eye for imitating the latter, taking adjoining patterns for reference, both as to the interlacing of the threads as well as the coloring, thereby making a nearly perfect affair of some of the most imperfect places, certainly work which requires experience as well as attention. On plain or mixes, the weave alone will only come under consideration, the sewing-in being then regulated by the final finish of the fabric; thus indicating that more exact work is required for a threadbare fancy fabric, requiring little, if any, finishing afterwards, than if dealing with a face finish fabric and where gigging, *i. e.*, the nap thus raised on the face of the fabric, will cover many imperfections, never to be noticed in the finished cloth.

The work is tedious and trying to the eyes, however experience comes to the aid of the person and after awhile imperfections are corrected to a nicety which formerly appeared hard or impossible to be remedied. It will be also a good plan for the overseer to regulate the work, giving the hardest styles to be mended to the most experienced hands.

In connection with double cloth fabrics, or such as have either a back warp or a back filling, a backing thread out is apt to show on the face when finished, hence must be attended to. Hairline effects must be sewed in carefully, leaving the ends out, say, a quarter of an inch, so that they will not draw apart, and have a space at each end of the thread sewed in blank or imperfect. The greatest of care must be exercised in connection with worsteds; everything that can possibly be fixed or mended should be done there.

With reference to some kinds of face finished fabrics, the cutting out of good picks, in place of sewing-in a missed pick, is frequently resorted to, for the fact that the sewing-in of mispicks is very tedious. To do this cutting out of a good pick, in order to remedy a mispick, requires a good knowledge of cloth construction (weave formation) in order to know which picks have to be cut and which not, and unless this is well understood by the sewer-in, it is best not to attempt it, in fact it is no use for the sewer-in to attempt anything in the line of darning unless it can be made to look, in the finished fabric, sufficiently perfect that no allowance has to be made, otherwise the labor spent in mending the imperfection has been time lost and consequent waste in money to the mill. Never attempt to do the impossible.

After the fabric is mended, *i. e.* all mistakes possible to be corrected attended to, the same is folded and put on a pile with other fabrics previously darned, to lie until needed for the fulling mill or washer.

Lustring without Mercerisation.

One of these methods can be combined with mercerisation. If before the cotton is acted upon by the caustic alkali, it is chlorinated with a strong solution of chlorine, it acquires a lustre which stands dyeing in a boiling bath, whether alkaline or acid, and also soaping.

Another lustring method is to convert the surface of the cotton into viscose with caustic soda and bisulphide of carbon, or to treat the fibre with a mixture of 84 parts of acetic anhydride, 23 of acetyl chloride, 100 of glacial acetic acid, and 13 of zinc oxide. In both these processes quick working is essential to avoid tendering of the fibre.

Yet another method is to varnish the fibre with solutions of collodion, viscose, or gelatine. If gelatine is used it must be fixed with formaldehyde. Collodion solutions have the advantage that they can be applied colored, the collodion acting as a mordant. (The Dyer and Calico Printer.)

NOVELTIES IN KNITTED FABRICS.

Knitted Bandage.

The purpose aimed at is to provide an abdominal or other bandage (for various parts of the body or limbs) consisting of a knitted fabric having constant numbers of wales and courses and formed with its stitches gradually decreased in length from its middle towards its end portions, with rubber weft threads extending longitudinally through the bandage and forming a substantially straight selvage at each end thereof.

To show the formation of the new fabric structure, illustrations Figs. 1 and 2 are given, of which Fig. 1 is a plan, illustrating the construction of an abdominal or knee cap bandage. Fig. 2 is an enlarged diagrammatic view, illustrating one of the stitches which may be used in knitting this particular fabric.

Consulting Fig. 1, it will be noted that the end portions *a* of the bandage are narrower than the middle portion a^1 and that while there are constant numbers of wales and courses throughout the fabric comprising the bandage, the loops are larger at the middle portion thereof, becoming gradually smaller as they approach the end sections of the bandage. In order to accomplish this end, the central stitches of each course are made larger than those of the ends, employing for this purpose a specially constructed knitting machine, in the manufacture of these fabrics.

In order that the bandage may be more or less elastic, there are knitted into it rubber weft threads a^2 extending longitudinally of the bandage, being held to or made part of the fabric by tying-in loops a^3.

Any of a number of stitches may be employed in making this improved bandage, it being, however, essential that while the number of its wales and courses remains constant, the relative looseness or tightness of the stitches, and therefore their size, is varied to secure variations in the dimensions of the fabric. In some cases the rubber threads may be omitted without departing from the main features of the invention, although the use of such threads in a bandage is advisable.

The shape, as well as the relative placing of loose and tightly knitted portions, may be varied to suit the shape of a bandage desired.

Ribbed Knitted Fabric Having Eyelet Holes.

Figure 3 is a somewhat exaggerated view of a piece of ribbed knitted web produced in accordance with this new fabric structure. Figs. 4 and 5 are diagrams illustrating the arrangement and operation of instrumentalities whereby the new ribbed knitted webs are produced.

In Fig. 3, *a* represents the needle wales, produced by the needles of the cylinder of an ordinary circular rib knitting machine, and a^1 the wales produced by the dial needles. *b* represents the sinker wales or portions of the knitting yarn passing from one needle wale to the other of the ribs of either face of the web. b^1 represents the sinker wales passing from needle wales of the ribs of one face of the web to needle wales of the ribs of the other face of the same.

In order to better distinguish the wales from each other, the stitches of one face of the web are shown in heavier lines than those of the other face.

It will be observed that the needle wales *a* constituting the ribs of one face, approach and recede from each other so that the rib is alternately distended and contracted, the ribs of the other face being of uniform width but pursuing a waved or undulating course corresponding to the expansion and contraction of said ribs of the first face.

The distention and contraction of the ribs are effected by the formation of eyelet holes between the needle wales of the rib at definite intervals, such eyelet holes being produced by transfer of sinker wale loops into adjoining needle wales, the eyelet holes being formed in the ribs of but one face of the web, the ribs on the other face of the web being normal.

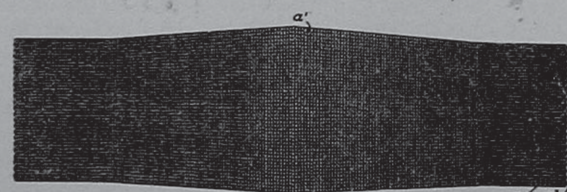


Fig. 1

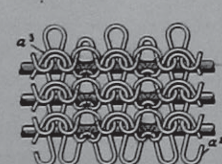


Fig. 2

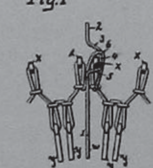


Fig. 4

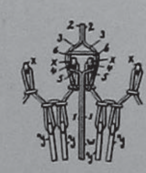


Fig. 5

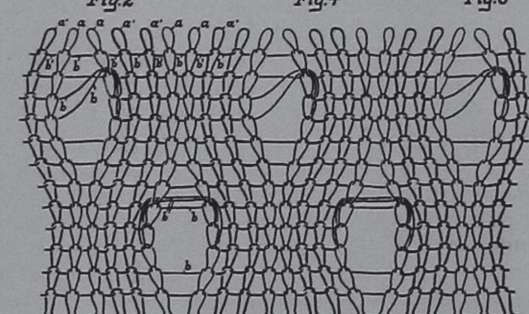


Fig. 3

The manipulation for effecting the production of the eyelet holes will be understood on referring to Figs. 4 and 5, in which *x* represents cylinder needles for producing the wales *a* of the fabric, *y* represents dial needles for producing the wales a^1 of the fabric; *w* in Fig. 4 represents a transfer point for producing elongated sinker wales and transferring the same to adjoining standing wales.

The transfer point consists of a stem 1 having an outer end 2 in the same plane as the stem; a diagonally inclined portion 3 and a short sub-stem 4 connected to the stem 1 by a neck 5 substantially at right angles to said stems 1 and 4, the diagonal member having, near its inner end, a shoulder 6.

The stems of these transfer points are guided in grooves in the dial midway between the needle grooves of the same. In order to effect transfer of a sinker wale between adjoining needle wales *a* to one of said needle wales, the transfer point is first projected until its outer end 2 occupies a position between the adjoining cylinder needles, either before or after the projection of the needles, to receive the yarn from the yarn guide. When the needles are retracted in order to engage and draw stitches of the knitting yarn, the sinker wale yarn is engaged and held by the outer end 2 of the transfer point, and the latter may retain this position for one or more courses of the knitting, until as many sinker wale loops as may be desired have been deposited upon the end 2 of the point, the fabric shown in Fig. 3 having loops of two successive courses thus caught and retained.

When it is desired to transfer the sinker wale loops, the transfer point is projected so as to bring the inclined member 3 of the same into action upon said loops, thus causing the lateral displacement of the same as well as a slight outward displacement due to the action of the shoulder 6 thereon, the parts being now in the relation to each other shown in Fig. 4. The transfer point remains in its projected position until the receiving needle has been projected to such an extent as to enter the sinker wale loop or loops which have been deflected into the path of said needle, whereupon the full withdrawal of the transfer point releases the loop or loops and causes the same to engage the needle so that in the next course of the knitting the new stitch will be drawn not only through the stitch already upon the needle but also through the sinker wale loop or loops previously deposited upon said needle.

STANDARDS FOR FASTNESS OF COLORS.

(Specially written for Posselt's Textile Journal.)

(Continued from page 55)

Fulling Test. This test is made with plaits of cotton or wool, to determine the resisting action of dyed colors to the combined action of soap and soda, under the influence of friction with its consequent rise in temperature. It should always be made in the presence of two other different fibres, that is, if the dye is upon wool, cotton and silk should be plaited with it; if on cotton, wool and silk should then be used. The solution is composed of 1 per cent of tallow (mill) soap and 1 per cent soda ash (ordinary 58% ash), that is 150 grains of each, per quart. The plait is worked in this for a few minutes, to thoroughly soak it with the liquor, and then work it for 5 minutes under medium pressure of a wringer, then allow to soak for 30 minutes in the same solution, wash in clear water, and dry.

Acid Test. This test is applied equally to both wool and cotton dyeings, to determine the acid resisting qualities of the color, and when applied to cotton dyeings, to ascertain the value of the color tested for cross-dyeing. A solution containing 60 grains of bisulphate of soda to the quart is generally used, and the sample to be tested is boiled for 15 minutes in a sufficient quantity to cover it, usually in the proportion of 1 to 25.

Decatizing Test. This is a most important test and is applied to dyeings upon wool only. To carry it out properly requires that a small steam chest be at hand, capable of sustaining a pressure of 45 pounds per square inch for 10 minutes. The dyed material to be tested should be wound with some undyed yarn or cloth. As this test cannot be properly made without steam pressure, it is frequently omitted, but it is not difficult to obtain the friendly aid of some wet finisher who will take care of all such tests in a practical manner.

Carbonizing Test. This test should always be made upon cloth, and with a few threads stitched into the sample, to serve as a guide to the completeness of the trial. The swatch is soaked in a solution of oil of vitriol at 2° Tw., soak for 10 minutes, squeeze out well, and dry in the oven for 2 hours, wash well in water, again dry, and compare with the type of reserved sample. This constitutes the most satisfactory of all laboratory carbonizing tests, and its results are beyond comparison with those obtained by other processes for carbonizing, no matter how carefully made.

Potting Test. This test is applied exclusively to woolen goods, but the sample to be tested should always contain a few strands of undyed cotton and wool. The test is made by boiling the sample for half an hour in spring water, where possible, or in distilled water. The latter is always preferable, on account of its uniformity, while the natural impurities of spring water varies greatly with the locality whence obtained.

Cold Water Test. This is a simple, though very severe test for some colors to stand. It is applied only to wool goods, and is best carried out by suspending equal sized swatches of cloth in equal volumes (1 to 50) of distilled water for 12 hours, at the end of which period note the degree of discoloration of the water, and also the influence of the immersion on the shade.

Chlorine Test. In connection with the previously mentioned Exposure, Soap, Soda, Acid, Sulphur and Fulling tests as being applied equally to wool as to cotton, there is one known as the Chlorine Test, which is applied only to cotton, which is of the greatest importance not only on account of the results obtained, but for the fact that unless the test is carried out exactly, no proper comparison can be made. As a rule, this test is made by simply immersing swatches of dyed cloth, or dyed skeins, in a solution of Bleaching Powder of 1° Bé or Tw., for varying lengths of time, then lifting out, passing through a weak sour, finally washing and drying. While this is in the main correct, it is overlooked that the strength of the Bleaching Powder solution is not likely to be made up twice alike, even if the powder is taken from the same package, unless accurately standardized by volumetric solutions of Arsenious Acid instead of the hydrometer.

A most satisfactory strength of the solution for chlorine tests is to adjust it by titration to contain 5.58 grammes of chlorine, per liter, or 390.6 grains per gallon, corresponding to a hydrometer test of 2°

Tw., if made from pure bleaching powder containing by assay, 35 per cent of available chlorine. A solution so made, other conditions being equal, *i. e.*, temperature and duration of immersion, will always give results that are strictly comparable. During the treatment in the test solution, the dyeing should be completely immersed for 5 minutes, while a second portion should remain 10 minutes. Lift, squeeze, pass through a weak bath of sulphuric acid—1° Tw.; wash well in several changes of water and dry.

Laundry Test. This test is generally applied to cotton fabrics, plain dyed, woven effects, or prints, and consists of subjecting the swatches to the action of a strong solution of soap (2 ounces per quart) for 5 minutes with constant kneading in the hand, then wash well and dry, repeating the entire operation three successive times. A *fast* color should show practically no change after the third drying.

It is an error to confound the above designated laundry test with the usual treatment given garments in the commercial laundries, where constant use is made of variously compounded bleaching solutions.

Perspiration Test. This test is of great importance in determining the values of any color for linings, etc., but unfortunately, colorists are not agreed upon any test applicable in the laboratory that will take the place of an individual wearing a swatch of dyed cloth for a definite period, and noting any changes that may take place, due to sweat. The best arrangement is to sew a swatch of the sample to a dress shield and wear it under the armpit.

Great stress has frequently been laid upon the Lactic and Citric Acid tests of the army, as being of value, but it is a fact that there are a number of colors which do not respond to these tests, but which break down when acted upon by freshly exuding perspiration at body temperature.

A very close approximation to natural perspiration at normal (body) temperature is to saturate the dyed sample with a solution of 10 grammes Concentd. Lactic Acid, 10 gr. Glacial Acetic Acid, and 20 gr. common salt, per liter. Wring out, and place between clean cotton cloth, and keep heated at 100° F. for one hour, then dry without washing, and repeat three times.

Embroidery Silk Test. Colors intended for such work are usually tested by stitching a few threads on a piece of cotton cloth, and soaking for 10 minutes in a 1 per cent solution of a neutral soap at 150° F., then wash in clean water, squeeze and dry. A very severe addition to this test is drying by pressing with a hot iron between two folds of white muslin.

With this outline of the most important tests, dyers and colorists may have some common ground to meet upon and eliminate those tests deemed to be of little or no value, substituting others of greater practical value, or add new tests.

The entire subject of the fastness of dyes, and the methods of determining it, is very broad and fruitful, and every opportunity should be taken to reach a better understanding of just what constitutes a *fast dye.*

DICTIONARY OF TECHNICAL TERMS RELATING TO THE TEXTILE INDUSTRY.

(*Continued from page XIV, August issue.*)

HEDDLE EYE:—The opening (eye) in the centre of the heddle, through which the warp threads are passed.

HEDDLE HOOK:—See Drawing-in-hook.

HEER:—The length of two leas of thread.

HEMLOCK BARK:—The bark of the hemlock spruce, a tree very plentiful in the northeastern States. It is like sumac, an astringent, and has not been used for dyeing purposes with satisfactory results, as it gives a rusty surface reflection to the goods.

HEMP:—The fibre of the plant of this name, obtained from the skin or rind, by rotting the stalks under moisture, and prepared by various processes for manufacturing purposes. The hemp plant is supposed to be a native of India, but has long been naturalized in Europe and America. Climate has much to do with the successful cultivation of this plant, as it makes the best length of stalks, and therefore gives a greater yield of fibre in countries where the climate is mild and the atmosphere humid. The best hemp comes from Piedmont, Italy. Hemp is stronger and coarser in the fibre than flax, equally susceptible of bleaching, and possesses more of the property of improving in color by wear. The uses, culture, and management of hemp and flax are much the same. The finer grades of the fibre are spun in yarn, and used extensively in the manufacture of sail cloth, carpets of all descriptions, ropes, etc.

HEMP BRAKE:—A machine or tool for beating out the fibre of hemp stalks after they have been rotted and dried; a hackle.

HEMSTITCH:—The ornamental finishing of the inner edge of a hem, done by pulling out several threads adjoining it and drawing together in groups the cross threads by successive stitches; as to hemstitch a handkerchief.

HENEQUEN OR HENEQUIN:—A fibre known as Sisal Hemp, mainly obtained from *Agave Ixtli*, of Yucatan; also, the name of the plant. The fibre is exceedingly valuable for ships' cables, on account of it resisting dampness better than hemp.

HENRIETTA:—A term originally used to designate a fabric of the cashmere variety, having a silk warp and a wool filling. Later, it was used to distinguish German cashmere from French cashmere; now generally applied to a fabric made with a twilled face and a smooth back, produced by the 3-harness twill weave, from various fibres, alone or combined. When silk is used for a warp, it is spun silk.

HESSIAN CLOTH:—A kind of bagging made of hemp, or of jute and hemp.

HERDIWICK SHEEP:—This sheep is found only in the mountains of Cumberland and Westmoreland, England.

HEREFORD SHEEP:—A race of English sheep peculiar to Herefordshire.

HERRING BONE:—A fabric interlaced with broken twill weaves, broken warpways only, the weave showing plainly on the face of the fabric; the effect resembling the spine or bone of a herring, hence the name given to such fabrics. The name of a binding often used in facing the neck and front openings of undershirts, so called because of its resemblance to the spine or bone of a herring. Applied to hosiery, it refers to the stitching which is made to cover the edge of the split sole.

HERRINGBONE STITCH:—A zigzag embroidery stitch, crossed at the corners.