

# Possett's Textile Journal

*A Monthly Journal of the Textile Industries*

**E. A. POSSELT, Editor and Publisher**  
2028 Berks Street, Philadelphia, Pa.

#### SUBSCRIPTION RATES

United States and Mexico, \$2.00 per year.  
Canada, \$2.50 per year.  
Other countries in the Postal Union, \$3.00 per year.  
Single Copies, 25 cents.

This Journal is published on the tenth of each month.

Postage prepaid by the Publisher.

Subscriptions begin with the number following the date on which the subscription is received at this office.

In writing about subscriptions, always give your full name and address.

When writing for changes in address, always give the old address as well as the new address to which copies are to be sent.

Money should not be paid to agents or solicitors unless they can show authority from this office. This Journal cannot be responsible for money paid to unauthorized persons.

Subscriptions are payable in advance. Money can be sent by check, draft, money order or in registered letter. Make all drafts, checks, money orders, etc., payable to E. A. POSSELT, Publisher, 2028 Berks Street, Philadelphia, Pa.

#### 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.

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

Efforts to make Philadelphia, which is the most prominent manufacturing city of this country, a great central point for the buyers who have been going to New York to make purchases of Philadelphia manufactured goods, are now being made by the merchants and manufacturers' association. Its members feel that by the establishment of great show rooms in which the goods made in Philadelphia could be exhibited, would result in bringing to this city hosts of buyers from other towns. At the present time many of the leading industries in Philadelphia maintain show rooms in New York and complete a large percentage of their sales there.

The American women are wearing more silk every year, and more than ever is she wearing American made silk in preference to that imported. During last year it is estimated by the United States Government officials, the value of silk used in the country was approximately \$165,000,000. Of this enormous sum \$132,000,000 represents the value of home-manufactured silk used in the United States, the balance, \$33,000,000, being the value of silk imported during the year.

Remarkable has been the growth of the American silk industry. Raw silk imported in 1870 amounted to 738,381 pounds. The figures for 1909 were 22,250,000 pounds. Measured by value, the growth has been from \$4,000,000 in 1870 to \$74,000,000 in 1909. In the same period the average price per pound of raw silk decreased from \$5.25 to \$3.33, or 37 per cent.

The stated annual meeting of "The National Association of Cotton Manufacturers" will be held in Boston, Wednesday and Thursday, April 27 and 28, 1910.

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

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

Members and those proposed for membership can obtain unlimited complimentary entrance to the fair on showing their membership badge, which can be obtained at the entrance, where the names will be recorded and the badge given.

His Excellency, EBEN S. DRAPER, Governor of the Commonwealth of Massachusetts, and RICHARD C. MACLAURIN, Sc.D., President of the Massachusetts Institute of Technology, are expected to welcome the Association.

As predicted abroad, woolen goods which have been more or less out of favor for some time, show at the present season a return to popularity; cotton adulterated goods being superseded by all-woolen fabrics. In connection with worsteds the demand for these fabrics continues. In other words, a return to the days when both fabrics will be wanted, may be soon expected.

#### RIBBON MANUFACTURERS ASSOCIATION.

The union of sentiment among the ribbon producers of this country has been needed for a long time.

In this direction a number of manufacturers met on March 8th at the rooms of the Association in the Silk Exchange Building, 487 Broadway, New York City.

The meeting was very well attended, a majority of the ribbon manufacturers of this country being represented.

As outlined at that time, the motive of the association would be to improve the existing conditions in the ribbon business, as well as to correct some abuses which have crept into it, such as regulating the sample card evil, more uniform discounts, arranging the limit to amount of goods that shall be sold on memorandum, as well as price cutting, a feature which it is said can be entirely eliminated.

The committee on organization consisted of Albert Tilt, of the Phoenix Silk Mfg. Co., S. L. Migel, of Migel and Blum; I. Heilman, of Smith and Kaufman, and J. Kridel, of J. Kridel, Sons and Co.

Sir George Kelly, a member of the English firm of George Hodson & Co., the prominent builders of textile machinery, and who had been here on a visit a few days ago, while in Boston made a speech relative to textile conditions. He said that it was not right for American manufacturers to have to lose their chances of gaining a goodly portion of the world market on account of the present tariff laws. He said that England could only supply at the outside 20 per cent. of the world's demands, and France and Germany less, and the United States, with its unlimited resources, was forced to remain idle and pay attention only to its own demands, while the markets of the world were virtually begging for its goods.

### Wages Paid Abroad.

The following statistics regarding wages paid to textile workers Abroad are taken from Senator Lodge's recent address relative to the cost of living, and are based on Consular Reports, the reports of Special Agents of the Treasury Department, etc.

#### COTTON MILLS.

The Augsburg Mechanische Baumwoll Spinnerei und Weberei at Augsburg, Bavaria, Ger., one of the most prominent and successfully managed cotton mills of the Empire, pays its picker room hands and carders 50 to 75 cents a day; on two 900 self actor mules, the spinner averages about 90 cents a day, the piecer 71 cents, and each of the two creelers 35 cents a day. Weavers, on an average, run three looms, earning about 80 cents a day.

The cotton mills in Bamberg, Ger., pay to overseers from \$47 to \$83 a month. Workingmen under 16 years of age receive from \$2.18 to \$2.86 a week; those over 16 years old, from \$4.28 to \$7.14 weekly. Women over 16 years old earn from \$2.15 to \$3.15, while those under this age receive from \$1.71 to \$2.15 a week. Sixty-one hours constitutes a working week.

The cotton mills of Hanover, Ger., pay spinners from \$4.76 to \$6.66 a week, and for helpers from 50 to 75 per cent of this. Operators of self acting mules and water frames, spinning 36's and 32's, have as tenders women only. The wages paid to them for ply yarn vary from \$2.38 to \$3.57 a week.

In Silesia, Ger., overseers get from \$5.36 to \$7.38 a week; male operatives average 55 cents daily, and women 48 cents.

Cotton spinners in Chemnitz, Ger., earn on an average, about \$5.88 weekly; woolen spinners, \$5.04; weavers of Nottingham net, \$6, whereas those weaving upholstery goods are only paid \$5.30.

At Elberfeld, Ger., cotton spinners earn \$8.40, while at Mulhausen they are only paid from \$6.48 to \$7.20; piecers from \$4.36 to \$4.80; carders from \$3.96 to \$5.04 and weavers from \$3.96 to \$4.68.

At Rouen, France, the highest wages are paid to mule spinners, who receive \$5.16 a week. Winders, the lowest paid, get \$2.04 a week.

At Belfort, France, spinners get on an average \$5.90 a week; weavers from \$4.04 to \$5.36.

At Lille, France, ring frame spinners earn from \$5.76 to \$7.48 a week; mule spinners from \$6.52 to \$7.48.

In Austria, 49 cents a day is the highest price paid for spinners on ring frames, while mule spinners earn from 61 cents to \$1.09 a day. Creel hands earn from 36 to 53 cents a day, doffers on ring frames, from 25 to 35 cents a day.

In the southern part of Italy, boss carders get about \$7.00 a week, second hands about \$3.50, and helpers about \$2.90; draw frame tenders about \$2.32 a week; fine-frame hands about \$2.61 a week. Boss spinners are paid \$6.95 a week and their second hands \$5.79. Mule spinners get the same. Women spinners get about \$2.50 and doffers about \$1.49 a week. Mills of Northern Italy pay somewhat better wages.

In Switzerland, wages of the four largest cotton mills showed: Boss carders from 85 cents to \$1.42 a day; ring spinners from 87 cents to \$1.16; doffers, 31 to 33 cents a day; mule spinners from 65 to 91 cents a day; piecers from 44 to 66 cents.

In Egypt, men start in at about 30 cents a day, being in turn advanced to 40 to 45 cents a day and

over. A girl running two sides of a ring frame running on warp gets about 25 cents, but on the higher counts may earn as much as 50 cents.

In India spinners get 14 to 15 cents a day; doffers 10 cents a day. For running a pair of mules of 1,872 spindles on 20's, the spinner gets about 27 cents a day.

According to figures prepared some time ago by the British Board of Trade, the average weekly wages of the spinning industry are quoted thus: Overseers, \$9.74; mixers, \$5.16; scutchers, \$6.14; grinders, \$7.02; spinners, deducting pay of minders, \$9.88; big piecers, \$4.40; sizers, tapers, slashers, \$10.24; warp dressers, \$8.44; drawers in, \$7.42; weavers, (men), \$6.06; weavers, (women), \$4.94; frame tenders, (women), \$4.64; ring spinners, \$4.04; reelers, \$3.28; winders, \$3.66 and doublers, \$3.14.

#### HOSIERY.

At Chemnitz, Ger., men operating hosiery frames are paid from \$5.28 to \$6 a week; packers, \$5.28; finishers, \$4.32.

At Stuttgart, Ger., hosiery weavers average from \$3.60 to \$4.32 a week.

At Troyes, France, power frame operators are paid as follows: Cotton's patent, \$8.64 to \$11.52 a week; Rotary, \$8.64 to \$10.56; Paget, \$7.20 to \$8.64; Circular, \$8.16 to \$8.64, and finishers from \$6.34 to \$6.92.

#### SILKS AND VELVETS.

In England, according to Board of Trade Reports, overseers receive \$6.80 a week; Men operatives, throwers, \$4.50; pickers, thrown silk, \$4.84; twisters, sewing silk, \$6.10; dresser, sponge silk, \$6.34; dyers, \$5.54; weavers, \$5.50; Women operatives, doublers on thrown silk, \$2.44; on sponge silk, \$2.58; reelers, \$2.44; winders and spoolers, \$2.70; weavers, \$3.10.

At Lyons, France, weavers average \$3.31; dyers average \$6.34; printers from \$6.92 to \$8.06; finishers from \$5.76 to \$6.34; velvet weavers \$4.90 to \$5.14.

At Crefeld, Ger., the wages to boss weavers varies from \$5.95 to \$7.14 a week, while laborers are paid from \$5.71 to \$6.18. Overseers in the winding and warping departments receive from \$5.95 to \$7.14; laborers from \$3.57 to \$4.96. Employees in these departments are generally women. In the dyeing department overseers are paid \$9.52 to \$10.71, skilled labor from \$7.14 to \$8.33, and unskilled labor from \$4.76 to \$5.95. Overseers in the finishing department receive from \$8.33 to \$9.52 and the laborers from \$4.76 to \$6.18.

In silk spinning mills of Düsseldorf, Ger., where only women are employed, the average daily wage is from 71 to 83 cents. Immediately after leaving school, usually at 14 years, the young girls enter the factories. In two years they earn from 35 to 47 cents a day, and after four or five years their wages are increased to the maximum of 83 cents. In weaving mills the salary undergoes many fluctuations, reaching as high as \$1.20 a day. Pieceworkers often make as much as \$1.50 a day.

At Barmen, Ger., a common weaver will average 60 to 80 cents a day, whereas weavers on special work get as high as \$1.50.

#### WOOLEN AND WORSTEDS.

In England, according to reports of the British Board of Trade, the wages paid are:

Men operatives—Wool sorters on piece work, \$7.71 and on weekly wage, \$7.22; picker room hands,

\$5.33; cardroom hands, \$5.45; combers, \$4.26; wool spinners, \$5.98, and \$7.93 on piecework; warpers, on time \$5.80, on piecework \$7; beamers on time, \$5.96; on piecework, \$6.59; woolen weavers, on piecework, \$6.25.

Women operatives—Cardroom hands, \$3.08; combers, \$3; finishers, \$2.66; drawers, on time, \$2.68, on piecework, \$3.41; worsted spinners, on time, \$2.29; doublers, on time, \$2.66, on piecework, \$3.53; winders, on time, \$2.66, on piecework, \$3.35; woolen weavers piecework, \$3.83; worsted weavers, piecework, \$3.59; burlers and knotters, time, \$3.20, piecework, \$3.51; menders and fine drawers, time, \$3.63, on piecework, \$4.30. The average good wool sorter makes from \$6.80 to \$8 a week. An apprentice for a two year period receives \$2.40 a week the first year. During the second year he is put on piecework at the regular rate, but he has to return to the firm one-fourth of the wages paid. In a large mill near Bradford they require a full five years of apprenticeship, the wages varying from \$1.92 a week for the first year to \$2.16 the second, \$2.40 the third, and \$2.64 the fourth. The apprentice then goes on piecework and gets three-fourths of the regular wage paid by the firm for the fifth year.

The following figures were furnished by the central office of the trades council at Bradford, Eng.: Day sorters, \$6.72 a week; piecework sorters \$6.72 to \$7.68; wool washers, day work 55½ hours, \$3.32 to \$5.28; night work, 63¾ hours a week, \$3.32 to \$6. Women operating carding engines, \$2.88 to \$3.36; men wool dyers and card strippers, \$4.80 to \$6; women combers, day work, \$2.88 to \$3.36; men combers, night work, \$3.32 to \$5.76; draw and gill box minders, \$2.88 to \$3.36; drawers, \$2.16 to \$2.64; side spinners, 72 to 100 spindles a side, \$1.80 to \$2.04; doffers, \$1.80 to \$2.04; men warp dressers, \$7.20 to \$8.16; men warp twisters, \$7.68 and upward; women weavers on 40 inch looms, \$1.92 to \$3.84; men weavers on coatings, from \$4.86 to \$6; boss spinners, \$6.24 to \$7.20; second hands, \$4.80 and upward; dyers, 54 hours work, \$5.76 to \$6.72. Girl menders and burlers are usually paid 8 cents an hour. Fullers and cloth scourers average about 10 cents an hour. The highest paid hands in a finishing room is usually the boss fuller and the man who sets the hydraulic press and who make from \$7.44 to \$8.88 a week. Except where specially mentioned, the working hours a week are 55½, which is the legal limit for the work of women. Women are not allowed to work between 9 p.m. and 6 a.m. The maximum weekly hours for half timers between 12 and 14 years of age is 32½ hours.

Average weavers in Yorkshire make from \$3.16 to \$4.13, with a limit for the best weavers on men's fine worsted at \$7.30.

From Aix la Chapelle, Ger., the following wages are quoted: Overseer of spinning and weave rooms, from \$9 to \$14 a week. Weavers, \$7.50 to \$9. Overseer of darning department, (female), \$8 to \$10 a week, her assistants, from \$5 to \$7.

At Lille, France, sorters receive \$6.96 a week; packers, \$5.76; scourers, \$4.32; dryers, \$3.14 and combers, \$4.64.

An important feature in Southern cotton mill construction is the adoption of electricity for power; many of the new mills are thus equipped, while a number of the existing plants have changed their power equipment to the electrical drive.

#### ROUGH WOOLENS POPULAR ABROAD.

Consul Rufus Fleming, of Edinburgh, reports that in the tweed trade of south Scotland a distinct rebound from the depression which overtook the woolen industry about two years ago is now observed.

Inasmuch as this recovery seems to be more pronounced than the upward movement in Yorkshire, the Scotch manufacturers attribute it largely to a revived public preference for rough woollens; in other words, rough goods are having their turn in the popular fancy. Certain manufacturers have been obliged to start auxiliary work in mills hitherto standing idle, others running overtime. Five derelict woolen mills in Galashiels alone have been reopened. Both the spinning and the weaving departments are well employed in Galashiels and Hawick, and there are indications that this prosperous condition will continue.

The wave of prosperity in the worsted trade in the past year, has resulted in big earnings to mills. It is reported that the Arlington Mills, the largest individual consumer of wool outside the American Woolen Company, is at present earning at the rate of about 30 per cent. on its old capital of \$6,000,000. The Arlington Mills manufacture worsteds, mostly dress goods, yarns and tops. Its annual consumption of wool is in the neighborhood of 20,000,000 pounds. The only other mills which use anything near this amount of wool outside the Washington Mills, and the Wood Worsted Mills of the American Woolen Company, are the Botany Worsted Mills, of Passaic, N. J., and John & James Dobson, of Philadelphia.

With its new yarn mill, costing \$2,000,000, in full operation, the Arlington Mills will have an aggregate weekly yarn capacity of about 275,000 pounds.

For a number of years many complaints have been made by French spinners on account of the excessive degree of moisture contained in cotton imported from this country, due to the steam or water used in pressing the staple, which not only injures the cotton itself but also gives it a fictitious weight, which is lost shortly after the bale is opened and evaporation takes place.

With a view of officially determining the degree of moisture existing in cotton and establishing both the extent of the damage sustained and the depreciation in value occasioned thereby, the French mill owners recently sent a delegation, composed of prominent representatives of the spinning industry, to confer with the cotton brokers and merchants of Havre and discuss the possibility of establishing a testing bureau or laboratory. Up to the present time, the brokers and merchants of this port, which is one of the most important cotton markets of the world, have not favored such a proposition, their objection being that while the degree of moisture could, from a purely scientific point of view, be established with great precision, the method proposed would fail to be of practical value. They aver that in order to arrive at a fair estimate it would be necessary not only to test samples from every part of the bale, but to take them from each and every bale imported, so great do the hygrometrical properties of cotton vary. On the other hand, the objections raised do not appear to have in any way altered the determination of the spinners to establish such a laboratory, and it is probable that the project will be sooner or later put into execution.

The greatest interest is manifested throughout the South, particularly in Charlotte and its vicinity, in the operations of the Dukes and other interests in the Southern Power Co., of Charlotte. The Dukes are interested in about thirty cotton mills located in the Carolinas, including the new \$1,000,000 mill at Durham, and the recently organized Iverness Mfg. Co., at Winston-Salem. They are backing the cotton mill project at Great Falls, S. C., where the largest station of the Southern Power Co. is located. One mill, the \$500,000 Republic, is already under construction. As soon as this mill is completed a twin plant is projected, to be followed by others. The success of the Dukes rests in the fact that they associate with them practical mill men in their enterprises, thus not only guaranteeing the investment but also, practically doubling the capital invested.

The Secretary of State for the Colonies of the German Empire, Herr Dernburg, recently returned from a tour of the cotton-growing belt of the United States, spoke at length at a banquet of the Liverpool Chamber of Commerce on the raising of cotton in the African possessions of Great Britain and Germany. He expressed the opinion that cotton was grown too expensively in the United States; and that with the rapid increase of the population of the United States and the rest of the world, with the entering of about 50,000,000 of African negroes into the consumption of cotton goods, the growing prosperity of the world enabling the people to buy more and higher grade goods, the production of cotton in the United States had not kept pace therewith. The two facts he had mentioned were not due either to want of push or negligence—two things very difficult to impute to their friends on the other side—but were the sequel of natural conditions, of historical development, especially with the kind of labor they had to employ and its productive value in the United States.

He stated that the area in the United States capable of producing cotton was, in his opinion, far from being exhausted, but the lack of capital and competent labor made him doubtful of much increase in the output or of lower prices in the near future, and he therefore joined the movement for extension of cotton growing in Africa. He criticised it as "incomprehensible" that the make-up of the bales in the United States should be of the "poorest kind" and "leading to very great waste and loss of money both to buyer and seller."

#### WITNEY BLANKETS.

The manufacture of blankets at Witney, Oxfordshire, Eng., has been carried on from time immemorial. In the West Riding, of Yorkshire, the industry is also of long standing. Sixty years ago, up to 300 blanket manufacturers used to meet at the Blanket Hall at Heckmondwike each Monday for the sale of their goods, and there was then current in Yorkshire the term "to Witney," meaning to raise, a Witney blanket meaning one of wool raised on both sides, more so on the face.

A Witney blanket is defined in the trade, as distinguished from the Bury or cloth blanket, as having a highly raised fluffy or fleecy surface on both sides, with a brightly colored border. This bordering now common to Witney blankets was invented in Yorkshire some forty-five years ago and became very popular, being copied by the Witney manufacturers. The warp in these blankets is of the best cotton.

The Mason Machine Works are shipping to the Daniel Manufacturing Company, Lincolnton, N. C., additional cards to fill up their carding department with reference to production, as well as to enable them to do lighter carding.

Mr. Herman A. Metz, of the firm of H. A. Metz & Co., chemicals and dyestuffs, and until recently the popular comptroller of the city of New York, has been appointed by the Department of State, as one of the honorary commissioners to the American exposition to be held in Berlin from July 4 until September this year. The exhibition will be held under the patronage of Prince Henry of Prussia.

#### CONDITIONS IN THE PHILADELPHIA TEXTILE INDUSTRIES.

The textile trade has been very uncertain during the past month. There is no noticeable improvement and considerable machinery is standing idle. There has been a slight improvement in the mills manufacturing mens wear, but nothing like normal, although expectations are that they will be operating to capacity before 30 days. Dress goods mills are quiet, upholstery fair, while tapestry and brussels carpet mills are very busy. Damask, towel, lace and rug mills are slack, while hair cloth mills continue busy. The worsted spinning mills, the hosiery and knit goods mills are all busy. In general, mill conditions have been quiet and somewhat disrupted by labor troubles.

#### THE OLD COMPLAINT.

Consul Joseph I. Brittain, of Prague, recently visited one of the leading Bohemian cotton spinning mills, and while there, his attention was called to the condition in which American cotton reaches the factory, on which subject he comments:

The bales were in a miserable condition, many of them broken open, with the cotton exposed and bulging out in numerous places. The proprietor of the mills said he could not understand why Americans are so exceedingly careless in packing cotton for export. Cotton received by the same mill from India was in good enough condition to ship around the world, while the American cotton was in no manner fit for export; in fact the bales appeared more like bundles of old rags than bales of fine cotton. American cotton is popular, but if the condition in which it reaches the Bohemian spinner does not improve, the imports from India and Egypt will materially increase.

#### CANADA'S WORKMEN'S COMPENSATION LAW.

In case of absolute and permanent incapacity an income is allowed equal to 50 per cent. of the yearly wage; and in case of permanent and partial incapacity, the income is equal to half the sum by which the wages have been reduced in consequence of the accident. For temporary incapacity, the compensation is equal to one-half the daily wages received.

An act has been introduced in the General Assembly of Rhode Island, regulating the hours of labor of women and children. It provides that no women or minors shall be employed between the hours of 6 P. M. and 6 A. M. The act would particularly affect the mills where a large number of those employed are women. It promises to meet with severe opposition from the manufacturers.

**SILK FINISHING.***(Continued from page 48.)***Shearing, Sanding.**

If dealing with light, delicate shades, singeing cannot be made use of on account of the damaging influence of the heat upon these delicate colors, and for which reason we must use for such fabrics either the shear or the sanding machine.

The operation of the shear requires the most careful manipulation, any inattention on the part of the operator being liable to result in cutting the fabric, due to folds or wrinkles in the cloth, as it passes the Cloth Rest, Ledger Blade and the Revolver; again shearing may be done too low, and when we then may hurt the wearing qualities of the fabric. The shearing mechanism consists of the cloth rest, over which the fabric passes; the revolver blade, which acts as the lower part of the mechanism for the actual shearing, and the shear cylinder or revolver, which is made up of a series of spirally placed blades, with their cutting edges extending the same distance from the centre; said shear cylinder being revolved at a high rate of speed, and from which action it gets its name, *revolver*.

Figure 20 shows us such a revolver in its perspective view, taken out of the machine, clearly revealing the spiral blades as placed around its circumference, and which do the cutting, on account of the high velocity with which they are revolved.

With reference to the *Sanding Machine*, the same resembles one of our brushing machines, with the difference, that in place of the cylinder being covered with brushes, the same is covered with sanding lags, and of which there are as a rule six to a cylinder. These sanding lags are covered with the best grade of garnet paper, which is held on by adjustable clamps. Worn out paper can thus be readily and quickly replaced. However, if desired, emery, garnet, ruby or sand paper may be applied in the grain, direct to the cylinder, provided the same is used without lags; or to the lags if such are used on the cylinders. One or more (up to four) cylinders are used in a machine.

**BRUSHING.** Previous to measuring, folding and packing the fabric for the market, or for goods requiring to be pressed on a hydraulic or a screw press, it may be found advisable to run certain goods through a brushing machine in order to remove any dust, loose pieces of threads, etc., adhering to the goods. Such brushing machines may have their cylinder covered with soft bristle brushes, or with slats covered with plush; again both arrangements may be combined in one machine.

**Pressing**

is generally, and most satisfactorily done on the Hydraulic Press, although some mills may use a Screw Press for this work, but which is not as powerful, hence not as effective.

For the Hydraulic Press, the goods are put up in flat folds with a thin, but excessively hard, glazed, sheet of pasteboard, known as *press board*, between each fold of the cloth. Between the pieces of cloth

as thus folded, and when placed in the machine, (one piece above the other, until the press is filled) come hollow metal plates, well braced inside, to stand the immense pressure exerted by the press. These plates are in turn connected with each other by flexible pipes, through which steam is passed. Thus the goods can be given either a hot or a cold pressing, again they may be pressed hot, and cooled while in the press, by

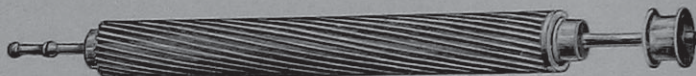


FIG. 20.

passing cold water into and through the hollow metal plates. Goods are left in the press, as a rule, either all day or all night, the press being changed first thing when starting work, and just previously to closing.

There is a margin of the fabric, where it bends itself around the press boards, which receives no pressure, for which reason the position of the layers of the fabric has to be changed once, in order to subject the whole length of the fabric to pressing. The

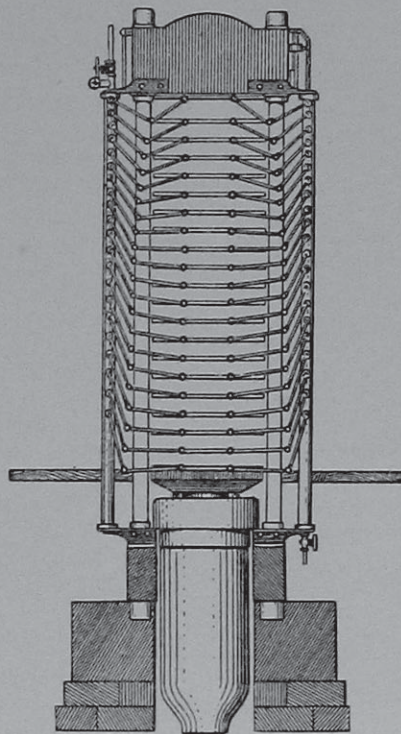


FIG. 21.

fabric is for this purpose taken out of the press papers and refolded, with the fold moved some five or more inches apart from the first one and in turn put back in the press. This will press the fabric uniformly in its entire length, after which the latter is taken out of the press papers for good, to be in turn finally inspected, measured, laid in folds of a half yard or a yard, rolled, and packed for shipment to the market. In connection with the better class of silks, tissue paper is placed between the individual layers.

Fig. 21 shows us the Hydraulic Press as built by The Textile Finishing Machinery Company of Providence, R. I.

### FINISHING FACE FABRICS.

For producing a boiled lustre on the face, it is a question whether the old system of open boiling is not more economical than the newer methods of treating the rolled piece in a covered cylinder, *i. e.*, decatizing. When a large number of pieces require to be boiled for five to six hours these can all be done together on the old system, as a cistern eight feet by six will accommodate over twenty pieces when piled up on end. Formerly wood rollers were used to wind the cloth on previous to boiling, but these are difficult to keep under the surface of the water when covered with cloth, and old copper or galvanized iron blowing rollers answer the purpose better. Naturally, these must be quite smooth and clean and the perforations allow the water to gain access to the inner end much more readily than those of solid wood.

Following boiling, it is advisable to allow the cloth to cool overnight on the roller before pulling off, the rollers containing the cloth being leaned upright against a wall with only the ends of the roller in contact with floor and wall. During half the time of cooling it is better to reverse them with the other end uppermost, so as to obviate any danger of list-ness from the liquor draining into the bottom list, the greatest care being taken not to bump the rolled fabric against either the cistern edge or the floor. Should such a thing as a bump take place, the cloth will invariably show a glazed mark just at the spot, and which mark repeats itself in every lapping.

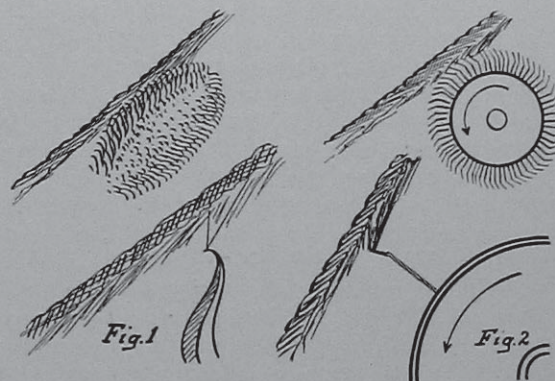
Dirty water and soiled wrappers must, of course, be avoided, especially when dealing with light and bright shades; special rollers and wrappers are kept for the various colors, whenever this is possible. Green shades are more likely to give rise to trouble than blues, particularly in the giggering process, and where dirty water, given during this process, may cause a cloudy appearance even if it does not form long dark streaks lengthways of the cloth. Boiling or pressing cloth in this condition only aggravates the fault and renders it more difficult to remove, the safest method if streaks show being to give the fabric a rinsing in the washing machine with clean aired water only.

Following this washing, the nap will require laying straight again by a round or two on the gig, using for this purpose old or worn teazles, before either tentering or winding on for boiling. After the first boiling, a round or two should be given with damp teazles but no water. After these two rounds the spray pipe may be turned on and a full supply given, some finishers however preferring to throw the water on by hand at the front of the gig, using for this purpose a hand handle with a bucket of water. Certainly more discrimination may be exercised by hand spraying, as the driest parts of the cloth show up whiter, and these would of course raise faster and with a longer nap than the wetter portions.

Green carriage cloths are more liable to show a white milky bottom than blues and also come up very

unsatisfactory if glazed too highly in the rotary pressing, as this only accentuates any streaks. Re-finishing goods of this class is very risky as they lose weight and substance, and raising should have the utmost care devoted to it so that further treatment is not required. In light-weight carriage cloths, and also with all low qualities of faced material, the object must be to get a uniform level cover on the cloth with a minimum of flocks, since whatever is carried away by the teazles is so much dead loss to the fabric.

It appears to be a common notion that teazles are altogether out of date, their use being supposed to be taken by napping machines. This, to a certain



degree, is true, but the reason why teazles are not used to such a great extent as formerly is the great decline in the faced cloth trade, not that any superior instrument for raising nap has been found.

Figs. 1 and 2 show respectively the action of teazle hooks as compared with the wire clothing of a napper, the difference consisting in the more elastic nature of the teazle when wet, and the holding power of the small hook at the tip of each spine. The lower portion of diagram Fig. 1 illustrates a feature peculiar to the teazle, which card clothing of any description does not possess; the diagram shows how the small hook on the teazle's spine will hold a single fibre and draw it out until one end is free after releasing its hold on the thread. In this particular, the actions of teazles differs from that of wire clothing, not only in their elasticity, which is increased by water, but also in the ability of the sharp hook not to draw out bunches of fibres, but single ones only. Card wire, on the other hand, no matter how sharp and elastic, digs out bunches of fibres and in drawing them out they either slip off the wire when a certain angle is reached, or they are torn out bodily.

The present rotary napping machines have a releasing action to imitate the teazle's spring; this is obtained by giving the small card rollers a reverse action to that of the cylinder on which they are mounted. Although this is a great improvement on fixed card clothing, still it does not by any means come up to the property which the teazle has of taking hold of individual fibres.

Fig. 2 in the lower diagram shows this lifting of a mass of fibre by a card tooth, which after attaining

a certain angle slips the wool off. In addition to bending and releasing the wool after reaching a given angle, the teazle still clings to a few single fibres and draws these out as shown.

#### STREAKY PIECES.

After facing the cloth, streaks and other marks are particularly noticeable when the fabric is being pulled off the roller, as at this stage the boiling has made them easier to see, and the heat will have caused the faults to rise to the surface. To cure these marks, a few rounds on the gig, carrying an old set of teazles, may be given, traversing the cloth each round and using the teazles without water; should any signs of dirt or cloudiness appear, a wash in the machine should be given, but only just sufficient to get the face clear.

Olive greens require even more care than the foregoing, since it is an important item to obtain a good lustre together with no loss of strength and a perfectly level and even color. Dirty cloth is a prolific cause of flecked places and shortness of lustre, as heat given to such a piece either in pressing or boiling, causes it to rise and also fastens it, while in boiling it would naturally sink to the end next the roller and also the bottom list causing dark end and list. For straightening, a side of fours may be given, traversing the cloth well and evening up with plenty of water. The last round of all may be given dry and this will be found very useful in removing any scum dirt which would become permanent on boiling.

Brown shades are somewhat difficult to handle unless great care is observed during every process, the chocolate shades requiring most care of any and being usually wanted with the most lustrous finish. While it is imperative that the cloth must be clean previous to finishing out, much running in the washing machine helps to lose weight and also to impoverish the cloth; this again may cause the fabric to come up tender after the action of boiling. An open washing machine is safer to use for cleansing at this stage, while plenty of aired water should be given and the piece taken out after as little running as possible.

Following this, it is best to wind tightly on to a roller to take out all creases, while the revolving brush straightens out the nap and lays all smooth, ready for the next stage of tentering. In the raising of faced cloth, an item which requires watching is the sorting as far as possible of old sets of teazles, according to the color of the cloth they have been used upon. It would never do, for instance, to use a set of teazles containing dark brown or blue flocks upon a light green cloth. Under the action of moisture and friction it is almost a certainty that some of the dye would bleed and give rise to long dark streaks. Seak marks are also a frequent cause of stains arising, and as they are seldom noticed until the last stages of finishing, by this time they have become fixed by the pressing and boiling. Anyone used to the working of a gig, especially where wet raising is done, will have noticed how the seak collects on the under side of tension bars, etc.; this is

often transferred to the cloth in the act of running off, the last lap of material, now free from tension, curling round the bar and absorbing the accumulation of dirty liquor. Of course, this is easily guarded against, it only requires forethought enough to wipe down the bars from time to time; but yet this small detail may by its omission cause no end of trouble with stained ends. The composition of seak, of course, varies according to both cloth and dye; it is usually loose dye along with dirt size, etc., or it may contain soapy matter, scum from the boiling pans, and in some cases even grease.—*The Dyer and Calico Printer.*

#### PREPARATION, DYEING AND FINISHING OF LADIES' CLOTH.

By Dr. Louis J. Matos, *Textile Chemist.*

(Continued from page 24.)

#### CARBONIZING.

This is the next operation, and is necessary to remove the small particles of vegetable matter, chiefly cotton fibres, that will always find their way into the cloth. There are many methods for cloth carbonizing, but the one here described is about as perfect in its results as it is possible to have it. The cloth is passed through a weak acid sour, at  $5\frac{1}{2}^{\circ}$  Tw., contained in a wooden vat, lined with lead. The cloth is given two or three runs and then allowed to remain immersed for 2 to  $2\frac{1}{2}$  hours, then rolled and whizzed to remove the excess of acid solution, taking every precaution to avoid spotting from any source, specially lime or iron. The writer has observed provoking spots on cloth which were ultimately traced to fine particles of dry whitewash, from the walls of an adjacent room, which, quite accidentally, were blown through an open door into the room where the acid soaked pieces were being handled. The fine particles of whitewash consisting of lime deposited on the acid were immediately changed to sulphate of lime, and which could then be no longer removed from the cloth without possibility of injury. From the whizzer, the cloth is slowly dried in a ventilated dry-room, heated to about  $120^{\circ}$  F., and then forwarded to the carbonizing stone, heated to  $200^{\circ}$  F., where it remains for 30 minutes to ensure the complete destruction of the vegetable matter; to effect the final removal of which, the cloth passes through a washing or dry fulling machine and then is neutralized with weak alkali (soda) standing at  $4^{\circ}$  Tw. The several pieces are stitched together and run for about one hour in a washing machine with rather a liberal supply of water continually flowing, afterwards adding about 2 to  $2\frac{1}{2}$  gallons of the soda solution per piece. Continue running for  $\frac{3}{4}$  hour, run off, and refill with plain water and run for  $\frac{3}{4}$  hour or longer, testing with blue litmus paper to be sure that every trace of acid is washed out, for otherwise any acid allowed to remain in the pieces will decompose a corresponding amount of the soap used in the fulling process, thereby producing results almost identical with those referred to above when discussing the evils of hard water, and further, traces of acid remaining in the goods tend to prevent proper fulling.

## FULLING

of ladies' cloth is not difficult if clean material is to be treated. The pieces are sewn end and end, put into the machine and gradually impregnated with the soap solution, and here again the advantages of the soft, or *potash soaps* is of interest, for the reason that such soaps when well made are nearly neutral, and contain all the natural glycerine of the oils or fats used in their preparation, which has a tendency to preserve the lustre and softness of the wool. Such a soap should be strengthened if necessary for fulling, by the addition of pearl ash (potash carbonate). After fulling, the cloth is washed in running warm water to remove all soap, and afterwards rinsed with cold water running off slowly at first but more rapidly later. Complete removal of all soap must be ensured at this stage of the process to prevent the possibility of *shades* or *clouds* appearing after finishing.

## GIGGING

follows, and being essentially a mechanical operation will only be touched on. Natural teazels always have the advantage over wires, producing a lustre and handle not possible on fine cloth with the latter. From the gigs, the cloth is dried on either a wooden tenter frame or on a hot air tenter.

## BRUSHING AND SHEARING

of ladies' cloth should preferably be done, the former on a machine so constructed as to permit the use of wet steam, which aids in keeping the fibres soft and pliable, while the latter on a cylinder shear. A second brushing should always follow the shearing.

## PRESSING.

Two pressings are necessary, once on a cylinder machine or continuous pressing machine, and twice on a hydraulic or similar machine to remove the folds resulting from the first pressing. Following the pressing, the goods are decatized for 5 minutes at 20 lbs. pressure, and in connection therewith, if the previous gigging or napping and other operations have been done well, the decatizing cannot fail to give a first class lustre, fast to water.

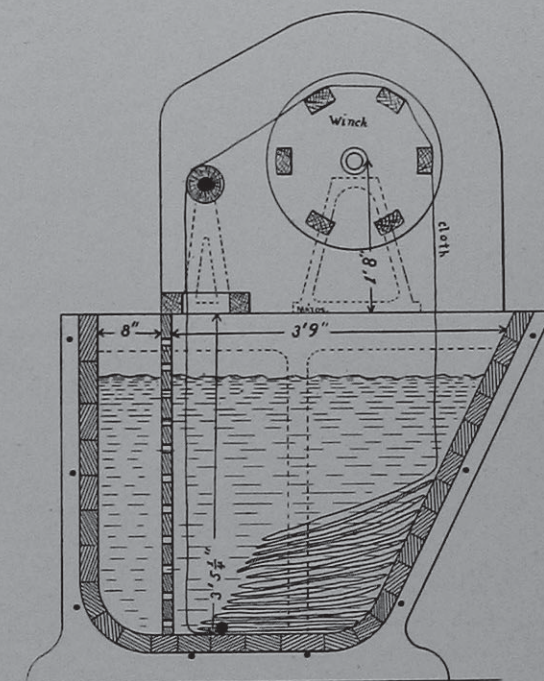
## Dyeing.

After all, it is in the dyehouse that the cloth can be made or unmade; it is during and immediately after the dyeing that the thoroughness of the scouring and cleansing of the wool and cloth can be ascertained. It is here that the presence of impurities in the cloth are first noticed, and while it frequently occurs that uneven results in dyed cloth are laid at the door of the dyehouse, yet the facts brought out by thorough investigation more often point to a lack of care given to the preliminary operations. It often happens, too, that the defects in cloth brought to light in the dyehouse are the direct result of hurrying the goods through the scouring, specially when hard water is used. In such cases, the dye will not go on evenly, and no expedient which the dyer will adopt will overcome the difficulty. Where perfectly clean goods are given to the dyer, there is every probability that he will deliver evenly dyed goods.

Dyeing of ladies' cloth calls for the use of very soluble and easily levelling dyestuffs, and these, owing to their simple method of application, take first place for this class of work, particularly for fashionable shades. For the so-called standard shades, and for shades required to stand prolonged exposure to light, perspiration, etc., then the dyer must use those colors requiring a fixation with chrome, such as the anthracene chromates.

The proper dyehouse equipment for handling ladies' cloth does not differ materially from any other piece goods dyehouse, but everything should, if possible, be so arranged as to promote easy handling of the cloth, and specially should the water supply be good and ample.

The dye kettles require some attention, and while any form of tub may be used, yet to secure uniform results, it will be found advisable to have dyeing apparatus constructed for the purpose. The accompany-



ing illustration is of a cloth dyeing machine in actual use in France and Germany, with excellent success, and while it does not differ materially from similar machines here, still it is so well proportioned and cheap to erect that it is deemed of interest to show it.

The following recipes are for fashionable shades, and are produced with easily levelling colors in the following manner: The dyebath is charged with 10 per cent of crystal Glaubers salt and 5 to 10 per cent of bisulphate of soda and the requisite dyestuff. The cloth is entered hot; if the goods are light weight, the bath may be boiling. Boiling is continued for 1 to 1½ hours, turning over the haspel or winch slowly but regularly. In case of medium weight or heavy goods, where penetration is likely to be difficult, the proper thing to do is to enter the cloth at about 140° F., and bring gradually to the boil. The quantities of dyes indicated in the following recipes are for 100 pounds of cloth.



## LIGHT PEARL.

$\frac{1}{2}$  oz. Cyanol FF  
 $\frac{1}{2}$  oz. Azo Orseille BB

## PEARL.

1 oz. Cyanol FF  
 $\frac{7}{8}$  oz. Azo Orseille BB

## LIGHT LAVENDER.

$\frac{7}{8}$  oz. Cyanol FF  
 $1\frac{1}{8}$  oz. Azo Wool Violet 7R

## HELIOTROPE.

$1\frac{1}{8}$  oz. Cyanol FF  
 $4\frac{1}{4}$  oz. Azo Wool Violet 7R

## ASH GREY.

$1\frac{1}{4}$  oz. Cyanol Fast Green G  
 $\frac{3}{4}$  oz. Indian Yellow G  
 $1\frac{3}{8}$  oz. Azo Orseille B

## MEDIUM GREY-GREEN.

14 oz. Cyanol Fast Green G  
 $6\frac{3}{8}$  oz. Lanafuchsine SG

## PUMPKIN YELLOW.

$1\frac{3}{8}$  oz. Cyanol Green B  
 $3\frac{3}{8}$  oz. Acid Yellow AT  
 $2\frac{7}{8}$  oz. Azo Orseille BB

## SMOKE GREY.

2 oz. Cyanol Fast Green G  
 1 oz. Acid Yellow AT  
 $2\frac{1}{2}$  oz. Lanafuchsine SG

## ROSE.

$2\frac{7}{8}$  oz. Cyanol Green B  
 $2\frac{1}{2}$  oz. Lanafuchsine SG

## STEEL GREY.

$4\frac{1}{2}$  oz. Cyanol Green B  
 2 oz. Azo Orseille BB

## TOBACCO BROWN.

12 oz. Cyanol Green B  
 $2\frac{1}{4}$  lbs. Acid Yellow AT  
 $1\frac{1}{2}$  lbs. Lanafuchsine SG

## BRONZE.

12 oz. Cyanol Fast Green G  
 1 lb.  $1\frac{1}{2}$  oz. Acid Yellow AT  
 $1\frac{1}{4}$  lb. Lanafuchsine SG

## RED-BROWN.

12 oz. Cyanol Green B  
 2 lbs.  $3\frac{1}{2}$  oz. Lanafuchsine SG  
 $2\frac{1}{4}$  lbs. Orange Extra Con.

## LIGHT GREYISH-BROWN.

$3\frac{1}{2}$  oz. Cyanol Fast Green G  
 $6\frac{1}{8}$  oz. Acid Yellow AT  
 $10\frac{3}{8}$  oz. Lanafuchsine SG

## CLARET.

$4\frac{1}{2}$  lbs. Naphtol Red C  
 $1\frac{1}{2}$  lbs. Azo Wool Violet 7R  
 $4\frac{3}{4}$  oz. Cyanol Extra

## GENDARME BLUE.

$2\frac{1}{2}$  lbs. Cyanol Green B  
 $1\frac{1}{2}$  lbs. Tetracyanol V  
 $\frac{1}{2}$  lb. Azo Wool Blue 6B

## TURQUOISE BLUE.

$3\frac{1}{4}$  lbs. Cyanol Green B  
 $\frac{3}{4}$  lb. Tetracyanol V

## CRIMSON.

4 lbs. Naphtol Red C  
 1 lb. Azo Wool Violet 7R

## LEAF GREEN.

1 lb. Cyanol Fast Green G  
 $1\frac{3}{4}$  oz. Acid Yellow AT  
 $5\frac{1}{2}$  oz. Lanafuchsine SG

## MOSS GREEN.

2 lbs. Cyanol Green B  
 $\frac{3}{4}$  lb. Acid Yellow AT  
 $\frac{1}{2}$  lb. Lanafuchsine SG

## DARK BLUE.

5 lbs. Azo Wool Blue 6B

## MARINE BLUE.

1 lb. Cyanol Extra  
 4 lbs. Brilliant Naphtol Blue 4B

This entire range of fashionable shades is produced with only fourteen types, and by means of judicious intermixes, every possible combination is readily obtained. Shading is done by making direct additions to the dyebath. Instead of using bisulphate of soda as suggested, the use of 20 per cent of Glaubers' salt and from 2 to 4 per cent of sulphuric acid is suggested. The use of bisulphate is free from the objections attendant upon the employment of vitriol.

After dyeing, the cloth is washed well on a machine with plenty of cold water and then *wet-gigged*. It will be sufficient to give 2 to 4 passages for light shades, while heavy shades may require as many as 6 to 8. For the wet gigging, it is necessary to acidulate the cloth with a small amount of either formic or acetic acid added to the last wash water. Formic acid has the advantage over acetic acid by not imparting to the goods any odor. Run the pieces on rollers and allow them to remain some time in a wet and cold state, whiz shear again to match the original sample, and, if necessary, brush. Pass twice through the hydraulic press and again decatize to prevent further *roughing-up* and also to give good wearing qualities to the cloth, and specially making it proof to rain drops. If spots show at this stage, it is proof that the soap was not completely removed after the fulling. Final pressing imparts increased smoothness and lustre to the fabric.

The annual convention of the American Cotton Manufacturers' Association will be held in Charlotte, N. C., on May 17 and 18.

## CAUSES OF IMPERFECTIONS IN WOOLENS.

By J. H. Dunn.

Stains, blotches, mildew, streaks, etc., are defects inherent to the manufacture of woolens, which it will be impossible to eradicate entirely; the success with a Superintendent of a woolen mill resting in the fact that he must keep these imperfections down to a minimum. This is demonstrated by the varied condition of goods met with in the market and coming from different mills.

Mildew stains are the result of heat and moisture, causing *fungi*, resulting in a destruction, or part destruction of the color, or the fibre itself, in the goods. If the Dyer or Finisher will permit a piece of goods to lie wet, in a warm place, for any length of time, fermentation soon takes place, causing mildew to make its appearance.

This mildew proposition is most likely to appear in a mill where one department is ahead of the other, and this to such an extent that the goods begin to pile up in the washing, fulling, dyeing or drying departments of the mill, and when, as a rule, the pieces at the bottom of the pile frequently reach that stage of fermentation, where, even if the dyes are not affected, the fibre is touched and weakened, resulting in tender goods. For this reason, one of the best preventatives for mildew, is not to pile up any wet goods for any length of time, but to get them in a dry condition at the earliest possible moment; otherwise the trouble may not be detected until too late.

There are two stages of the mildew:

In connection with the first stage, the goods are only lightly touched, and when then a good soaping and washing will remove the stuff, leaving the thus affected goods in apparently as good a condition as before.

When, however, the last stage of mildew is reached, a complete fungus growth is then produced, and for which there is no process known for removing it. Washing goods thus affected, or re-dyeing them, to thus cover up the stained portions, may partly hide the trouble, in fact in some instances temporarily hiding the imperfections, but no matter how well this is done, the goods are not perfect. There is, however, a final stage of mildew, and where there is no remedy possible, the cloth after scouring having the appearance of scorched and affected places, which are so tender that one can push his finger through the texture, and when such fabrics have to be used as seconds, being careful in the cutting of the garments only to use such portions of the cloth as are not affected by this mildew.

Bunching, twisting or knotting, of a fine piece of material, in the washing, fulling or dyeing processes, may often be the cause of blotches and streaks appearing in the goods. Some Fullers put their goods into the fulling mill, expecting them to run for hours without attention, for which reason one side of the piece or pieces under operation has been known to keep in touch with the framing of the fulling mill for the whole period of the fulling process, the other side and the centre of the piece or pieces never coming into contact with the wood of the crimping box, the friction rollers, etc., receiving of course a different treatment, with the result of chances for streaks running from end to end in the goods. This difficulty may be overcome by occasionally reversing, *i. e.*, turning the goods, under operation, in the fulling mill, opening them out occasionally and seeing to it that all portions of the fabric are being equally treated.

If dealing with white, or solid colored fabrics, they can be handled more easily in the fulling mill, but if we deal with fancies, then the greatest care is required on the part of the Fuller; he must closely watch them from start to finish. Some fancy colored pieces are so delicate that the tints are altered, or dulled, by simply stopping the washing or fulling process just long enough to change the run of the goods in the mill, for the reason that the liquor has a chance to cool and change. In such a case put the goods back without renewing the liquor.

Bad odors adhering to the goods, may have their cause in the goods having been stored in a damp place, again the trouble may rest with the oil, grease or dye used in the manufacturing process.

Streaks, caused from imperfect flocking may be prevented by tacking the goods for the process of fulling, thus keeping the flocks from the face of the goods.

Sizing stains may be caused by using ingredients of improper strength, the flour in the sizing being usually allowed to ferment for some time before it is in-

roduced. It is then mixed and applied. The mixture should be tested before using.

Streaks may also be caused by poor carding or spinning; some Carders depending too much upon the spinning process to remove lumps left by them in the roving. If a roving, upon examination, is found to be irregular, broken, twitty, full of specks and shives, the conclusion which may be drawn is, that the cards are not kept up to their proper condition. Examining the carding engines, we then may notice that the card clothing is bent and dull, and besides clogged with dirt; that journals are gummed with dried oil; that rollers not set right, and besides belts possibly running loose. The cause of neps, if found in the roving, rests with the process of carding as carried on through careless setting and grinding of the cards, or neglecting to strip regularly. To avoid this trouble, use a good card clothing, well ground; one of the principal advantages of hardened and tempered cast-steel wire being its durability. On account of its stiffness, resulting from its treatment during its process of tempering, the wire does not get out of place. This, as will be seen, secures a positive carding surface, enabling the card wire to hold well to the fibres during the process of carding.

The proper amount of twist in the yarn is a most important item. The aim of the Spinner must be to produce a yarn that will weave well, but at the same time present a fine, soft finish in the finished fabric. To accomplish the latter result, *i. e.*, to avoid any harshness to the touch of the hand in the finished fabric, it is often necessary to reduce the twist in the yarn. In connection with this change in turns per inch of the twist, the Spinner is however liable to go to the other extreme, making the yarn in turn too soft, resulting in a consequent trouble in the weave room, since soft yarns, *i. e.*, yarns with not enough twist in them may not weave well, again if making no trouble there they may result in baggy goods. To introduce the correct amount of twist in a yarn is a point that requires skill and lots of experience on the part of the Superintendent.

#### AIR CONDITIONING FOR TEXTILE MILLS.

##### HUMIDIFIERS.

(Continued from page 42.)

That the Hygrosso has proven an eminent success is shown by the excellent business reported by the manufacturers since its introduction, the latter part of the year 1908—The Hygrosso has taken its place among the leading apparatus of this character because it fills an important requirement of the textile manufacturers and because it has been demonstrated that its simple and durable construction, satisfactory service and economical operating cost is appreciated by a class of mills that are competent to judge.

The main argument set forth to recommend the Hygrosso Humidifiers include simple and durable construction, low cost of operation and upkeep, minimum attention for satisfactory operation and excellent service.

It is pointed out that simple and well built machin-

ery always lasts longest and gives the least trouble.

Realizing these important points, the manufacturers are giving particular attention to constructing these humidifiers to meet the hard service to which they will be subjected in practice. Some improvements have been made in certain lines to obtain stronger construction and guard against the possibility of any trouble with the apparatus itself.

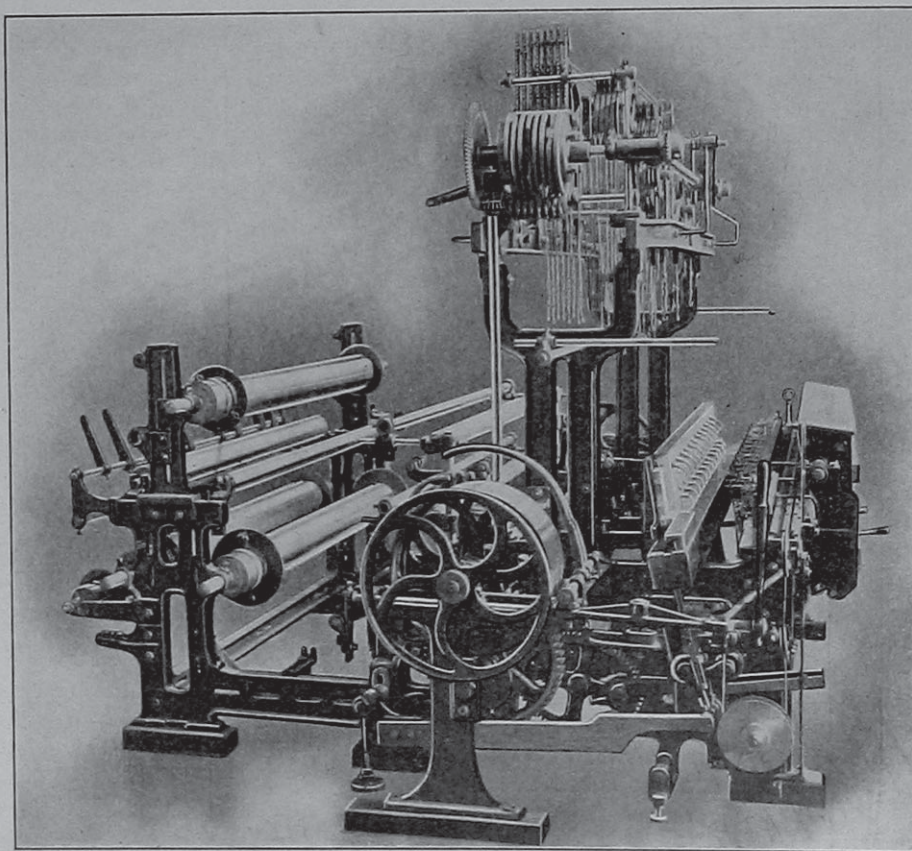
A simple arrangement of piping the water feed to humidifiers has also been devised to insure a constant and even feed to the heads. This arrangement overcomes very satisfactorily any troubles which may develop where water is used from a supply which varies in pressure. It also prevents flooding the humidifiers to cause wetting or depositing spray on floor or machinery.

While the Hygrosso stands alone as the only humidifier with all working parts exposed to view, requiring no opening for cleaning, a special construction for operating in carding rooms containing large

midifier. The New Berlin Silk Mfg. Co., New Berlin, N. Y. have installed the Hygrosso Humidifiers. The Lowell Textile School, Lowell, Mass. have installed Hygrosso Humidifiers for demonstration. The Colonial Mfg. Co., Phila., Pa. have installed the Hygrosso Humidifier in their weaving department. Nims Mfg. Co., Mt. Holly, N. C. have placed an order for humidifying equipment consisting of motor driven Hygrosso. The W. A. Lush Silk Co., Scranton, Pa. have placed an order for the Hygrosso Humidifiers. The Albion Cotton Mills, Mount Holly, N. C., The Mount Holly Cotton Mills, Mount Holly, N. C. and The Stanley Creek Cotton Mills, Stanley Creek, N. C. have also installed the Hygrosso Humidifiers.

#### THE VELVET RIBBON LOOM.

There is hardly another textile being so much subject to the fancy of fashion as the velvet ribbon. There are seasons when the demand is considerable in excess of the output, and again sometimes the opposite



quantities of fly has been developed, which prevents, to a great extent, the accumulation of fly on the working parts. This construction is only found necessary however in rooms containing an excessive amount of fly.

The Banna Mfg. Co., Goldville, S. C. are equipping their entire mill with Hygrosso Humidifiers. The Buffalo Weaving & Belting Co., Buffalo, N. Y. have installed the Hygrosso Humidifier. John S. Boyd & Co., Williamstown, Mass. have made an installation of the Hygrosso Humidifiers. The Fort Mill Mfg. Co., Fort Mill, S. C. have installed the Hygrosso Hu-

midifiers.

conditions exist. Manufacturing of velvet ribbons in this country is practically in its infancy. The manufacturer here is very cautious in installing machinery on account of the risk of having looms standing idle in dull seasons, for which reason the bulk of velvet ribbons consumed in this country are imported from Europe.

Attempts have been made therefore to construct a loom adapted for the weaving of velvet ribbons as well as wide velvet piece goods, many a French and German mill being now equipped with this combination loom, the pioneer builder of which is the *Herm.*

*Schroers Maschinenfabrik of Krefeld*, represented in this country by *A. W. Buhlmann, 487 Broadway, New York*.

The Schroers loom is built on the same principles as the well known Schroers Velvet piece loom, with the exception of the batten. The Schroers velvet piece loom is well known in this country, some mills having over 100 of them in successful operation.

On the velvet ribbon loom, there are two warps, one for the ground and one for the pile, the selvages being placed on an individual warp-beam for each ribbon. The beams are placed in a cast-iron frame containing supports and are provided with the necessary weights and tension. The shafts for the two warps are connected with treadles, on the top and at the bottom of the loom, and are lifted and lowered positively by means of a dobbie, with cams. The selvage shafts which are placed behind the dobbies are worked negatively by cams of lighter construction, placed on top of the loom frame. The take up motion is a positive one.

In changing the loom from velvet to velvet ribbons, the batten is taken off and replaced by a ribbon batten, provided with a number of shuttles varying in accordance to the width of the ribbons to be woven. A toothed rod, extending all across the batten, moves the shuttles. A simple arrangement consisting of two large excentrics, one on each side of the loom, acts upon the treadles which are connected by means of adjustable straps with the toothed rods mentioned before and move to and fro transmitting this motion to the shuttles.

For cutting the pile, the Schroers firm employs the same arrangement that has been such a success in their piece loom. It consists of a sledge, carrying an adjustable small steel knife, precisely planed, a strong cast-iron rail extending across the loom and the necessary parts to move the sledge. Two parallel steel rulers, one below and one above the velvet ribbons, serve as guides and are provided with a most accurate adjusting arrangement. The motion of the steel knife as is cutting the pile between the ribbons woven face to face, is carried out in a most accurate manner and is the result of many years experimenting, yet it is simple and dependable. The movement of the sledge on the start and towards the end is slower on account of the knife passing between the grind stones and then reversing the direction of its course. On the other hand, the knife has to travel swiftly before coming in contact with the first ribbon and must necessarily continue so until the last ribbon has been cut, as otherwise the cutting would be imperfect.

Production and speed of the velvet ribbon loom is equal to the production of a two-shuttle piece loom; the batten is built with a certain amount of space according to the width of the ribbon desired. Velvet piece looms are built up to 4 wide, permitting to weave 8 pieces with two shuttles running at a time. In this country mostly double width looms are used, whilst in German mills, the 3 and even 4 width loom is in operation. These wide looms naturally require skillful operators and the best material can be used only.

For velvet ribbons, the single and double width loom is preferable, as the mechanism for triple width looms becomes too intricate.

#### NEW DYESTUFFS.

Our Editorial Department desires to acknowledge receipts of the Wool Dyeing Supplement II from the *Farbenfabriken of Elberfeld Co.* and compliment them on the attractiveness of the Binder which we think will prove very valuable in keeping intact the various Color-Cards as issued from time to time by them.

The cards furnished with Supplement II give receipts as well as valuable information regarding samples of Stock, Yarn and Fabrics dyed with their:

Brilliant Alizarine Blue 3R pat.; Diamond Green 3G; Cashmere Green B pat.; Indian Yellow GR; Acid Chrome Black TC, RH, RHN; Naphtylamine Black 4AN, 4BN, 6BN, 10B; Diamond Blue Black G, R, T; Acid Chrome Blue B, BR, 2R; Alizarine Rubinole R; Sulphon Cyanine Black 4B, BR, pat.; Brilliant Acid Blue A, FF, V; Fast Green bluish GS (pat. applied for); Azo Acid Violet A2B; Quinoline Yellow N extra, N extra conc. (pat. applied for).

Boss Dyers and Mills who are interested in these Color Cards and who have not received them, will do well to either address the company at their New York office or their nearest branch office.

#### A NEW SILK REEL.

On page 54 of the February issue, we illustrated and described a new silk reel. This reel is handled by Mr. Alfred Suter, the prominent Textile Engineer of 487 Broadway, New York, and to whom all inquiries regarding the same should be addressed.

#### TESTING OF CHEMICALS AND SUPPLIES IN TEXTILE MILLS AND DYE WORKS.

(Continued from page 62.)

**ALUMINIUM SULPHATE:** A white crystalline substance, soluble in water. Impurities and the amount of aluminium present is determined as in alum. The percentage of aluminium present should be 15 per cent of the amount of aluminium sulphate used. With an excess of caustic soda a clear solution should be obtained. The amount of water permissible is 48.6 per cent. Calcined aluminium sulphate should contain no water.

**AMMONIUM OXALATE:** A white crystalline compound which should dissolve to a clear solution in water. On igniting it strongly, no residue should remain. To determine if there is any residue, place a weighed amount of the ammonium oxalate in a weighed porcelain crucible. Heat gently at first, then strongly. White fumes will be given off. Continue heating ten minutes after the fumes cease to come off. Then weigh crucible to see if the crucible weighs the same as it did when empty. The difference in weight between the two weighings is the weight of the impurities present. Ammonium oxalate solution, when

(Continued on page xii.)

## HOSIERY AND KNIT GOODS.

### An Improvement on the Hepworth Looper.

During the process of looping with this machine the operator has sometimes experienced difficulty in having the cast-off threads pass under the looper points instead of over the same, as is necessary in order that the stitches may be properly made.

To overcome this difficulty, an attachment has recently been patented which it is claimed will obviate this trouble and at the same time increase the output.

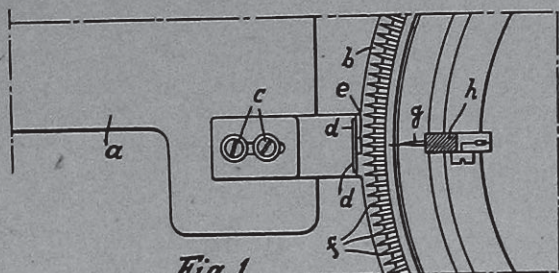


Fig. 1

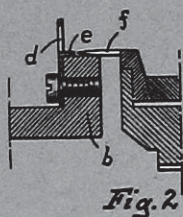


Fig. 2

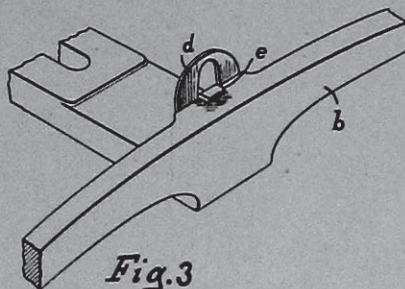


Fig. 3

In order to more clearly show the attachment, we have resorted to the following illustrations.

Fig. 1 shows that portion of the looper more closely associated with the improvement.

Fig. 2 shows a sectional view of the dial plate, carrying points and the guide in position.

Fig. 3 shows the adjustment of the guide upon the fabric guard.

In order to explain the mechanism, the following letters of reference have been used: *a* indicates the bed plate, having attached to it the fabric guard *b*, which prevents the fabric being pushed off the looper points during the process of looping. A more decided idea of this part may be had from the sectional view as shown in Fig. 2.

The fabric guard is adjustable by means of set screws *c*, so that it may be more readily adapted to the weight or thickness of the fabric under operation.

The throat plate *d*, which is attached to the fabric guard *b*, has a guide or deflector *e* which rests upon the fabric guard *b*, keeping the loops or free ends of the fabric upon the looper points. This is the base of the improvement in question, and a more decided idea of the same may be had from Fig. 3.

The looper points, or referred to as *f*, are set upon the ordinary dial in the usual manner, while *g* indicates the thread carrying needle, secured in the oscillating arm *h* in the usual way.

Now, in order to make the operation plain, a description of the process will be of material benefit.

In looping, the free ends of the fabric are placed over the looper points following the course of the stitches. When the dial carrying the same comes to such a point where the thread carrying needle comes into action, the guide then pushes against the fabric, causing the free ends to retain their position on the looper points. When the needle recedes from these ends, forming the stitches which unite the two fabrics, instead of the end having a tendency to work off it is held in place by the guide, thus making it impossible for the needle to miss a stitch.

### A Novel Way of Producing Fleecing Loops on the Reverse Side of Ribbed Fabrics.

In order to explain the working of the new mechanism, the accompanying plate of diagrams is given, and of which Fig. 1 shows a central, vertical section of one-half of the head of the machine, showing also a part of the mechanism. Fig. 2 is a side elevation in flat condition, illustrating the positions of the cylinder needles, prior to forming the loop and after such has been formed. Fig. 3 is a diagrammatic view, illustrating the formation of the loops. Fig. 4 is a detail of the web-depressing wheel.

Numerals of reference indicate thus: 1 designates the cylinder, 2 the dial, 4 the cylinder needles operated by the cam 5. The dial, rotably supported on shaft 6, is provided with slots 7, in its upper face. Slidably mounted in each groove is a looper 8 and the dial needle 9. To operate the loopers at the proper time is the work of the inner cam 10, carried by the upper circular disk 11, while carried by said disk 11, and concentric exteriorly of the cam 10, is the dial needles' operating cam 12.

As usually done, two web-forming yarns, to one loop forming yarn are used. The looper has a butt 13, adapted to enter the groove of its cam, whereby the looper is projected and withdrawn, the looper hook 14 operating at all times to engage or release the yarn below and within the cylinder and dial needles, the yarn being drawn or pulled in by this hook.

In order that the yarn for forming the web may be properly fed to the needles, lug 15 is provided the same being secured to the disk 11 at its periphery so that its reduced end 16 depends below the disk to present its yarn guiding eye 17, so that the cylinder needles and the dial needles can engage the yarn without catching the end 16.

To feed the loop yarn to the looper, frame 18 is secured to the periphery of disk 11, so that the upper outwardly projecting yarn guide 19 will feed

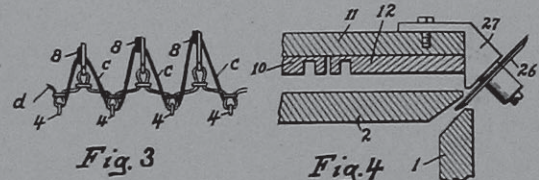
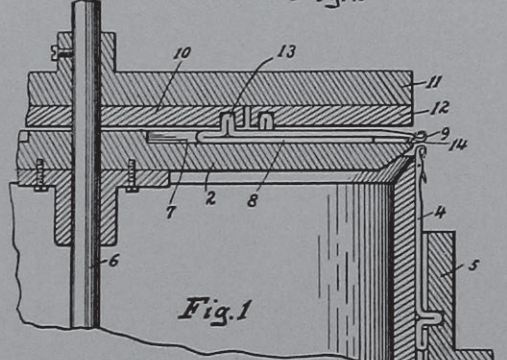
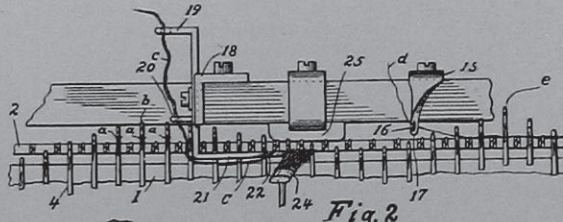
the yarn through the eye 20, to the lower guide arm 21, having eye 22, over which the extreme end of the loopers or jacks pass, engaging the yarn fed through said eye 22. As the yarn is thus engaged by the looper's hook, a stationary brush 24 prevents the yarn from moving outwardly, so that as the looper is withdrawn, the yarn is carried with it, and the loop is formed in connection with the cylinder needles, the yarn being alternately engaged with the looper hooks and cylinder needles and held until same has passed the body wales or web-forming point.

Opposed to the brush 24, and carried removably upon the periphery of the disk 11, is the looper re-

tainer 25, the purpose of which is to prevent any upward movement of the loopers as they are projected to engage the yarn and return with the same.

After the web has been formed, and to properly feed the same within the cylinder and not injure or break the web, the rotary depressor 26 is employed (see Fig. 4), the same being journaled upon the angular frame 27, carried upon the periphery of the disk 11.

Fig. 3 shows the operation of the needles and loopers, with the looper yarn.



tainer 25, the purpose of which is to prevent any upward movement of the loopers as they are projected to engage the yarn and return with the same.

After the web has been formed, and to properly feed the same within the cylinder and not injure or break the web, the rotary depressor 26 is employed (see Fig. 4), the same being journaled upon the angular frame 27, carried upon the periphery of the disk 11.

THE OPERATION OF THE MACHINE.

Referring to Fig. 2, and to the left hand side thereof, the cylinder needles have and retain the web yarn *a*, and are gradually rising as at *b*, to insure the latches falling, but not high enough to cause the yarn *a*, to fall below the latches. The loopers as they pass the yarn guide, hook the yarn *c* and as the cylinder needles pass this point they catch the yarn *c*, the loopers receding to form the loop, while the

THE KNIT GOODS TRADE.

Considerable discontent has manifested itself among the trade on account of the lack of interest in placing orders in quantities usually placed at this time of the year.

Novelties seem to be in demand and an unusual pressure is brought to bear on cheap silk and cotton hosiery. Indications lead to the belief that domestic full fashioned goods will have popular favor.

The Underwear trade is quiet; the large buyers have completed their initial wants. Due to the decline of cotton, many mills found themselves without business because they were unwilling to accept orders as the jobbers and commission men desired to place them. The larger manufacturers have discontinued these lines and refused to consider any proposition to make up similar goods to sell at their prices. Scarcity in this line of goods is apparent and this it is thought, may cause manufacturers to look upon this line in a different light. High priced underwear and union suits continue strong. Low prices were the prime factor in the volume of business booked by leading producers of fall goods and although orders were taken at these prices for early delivery, the mills are asking an extension of time in order that a drop in yarn may show a small profit.

Fleeced underwear of the best known and choicest grades, it is said, will be very scarce a little later on, as jobbers at the present time have booked orders ahead and refuse to accept anything further.

Fancy knit goods and union suits are very scarce for the quantities that certain Western houses are asking for.

A falling off in the sweater coat production is noticed while the sweater itself continues popular.

HOSIERY MANUFACTURERS MEET.

The 136 to 144 needle division of the Hosiery and Underwear Association came together in Reading, Pa. on Saturday afternoon February 26th, at which time discussion were made on the question of the cost of production, present prices of raw materials and the demands of the market. About 20 members were present and the meeting was presided over by S. H. Weihenmayer of Hagerstown, Md.

The Carders' Union of Fall River, Mass., has gone on record as favoring shorter hours for women and minors and a 54-hour working week.

## News of the Hosiery and Knit Goods Trade.

**Philadelphia.** It is reported that the Crown Knitting Co., manufacturers of hosiery, located at Hancock & Turner streets, will be operated under a different management after the first of March and it is said will add additional machinery to their present equipment.

**Philadelphia.** Bower & Kaufmann, manufacturers of hosiery, located at Front & Columbia ave., have added a number of new leggers and footers.

**Philadelphia.** It is reported that Wm. Bennett, who has been identified with the hosiery business of this city for a number of years, will retire from active business and that the well equipped plant located at American & Diamond streets will pass into other hands.

**Philadelphia.** Boulevard Hosiery Co. is the name of a new company which will occupy the mill of the Robert Meyer Co. Richard Meyer, brother of Robert Meyer, is at the head of the company.

**Philadelphia.** Miller & Sons Co., otherwise known as the Knotair Hosiery Co., 5301 Westminster avenue, are installing twenty additional 240-needle seamless hosiery machines.

**Philadelphia.** A. Bechtold, for a number of years identified with the hosiery trade at Front & Oxford streets, has decided to give up this line and will move to the centre of the city and engage in a different line.

**Philadelphia.** Barger, Bains and Munn, manufacturers of hosiery, located at Turner and Mascher Streets, are installing new machinery to take the place of that destroyed by fire on the night of February 16th, causing a damage of \$25,000. Up to the present time two new driers have been installed and it is expected to have the department running again in a short time.

**Philadelphia.** The Diamond Knitting Mills, 327 North Eighth street, manufacturers of knit neckwear, are installing ten extra machines and state that they will add 25 more machines later.

**Blandon, Pa.** Seidel Bros., of Temple, will engage in the manufacture of hosiery, giving employment to 30 hands.

**Easton, Pa.** The Easton Knitting Mills Co., whose plant will be located on Packer street, South Side, will incorporate with a capital stock of \$10,000. A brick building 40 by 100 feet and two stories high is to be erected, to cost about \$7,000. The company will manufacture hose for women and children, and half-hose for men, giving employment to about 50 hands.

**Reading, Pa.** S. S. Miller is installing additional machinery, bringing the capacity up to 600 dozen per day. He manufactures the "Rellim-made" half hose.

**Scranton, Pa.** The Groat Knitting Co., recently reorganized, has changed its name to the Scranton Textile Co. It is making sweater coats and fleeced-lined underwear under W. H. Logan, the new secretary-treasurer and general manager, who succeeded Mr. Groat.

**Brooklyn, N. Y.** The Fashionable Knitting Co., has been incorporated with \$2,000 by Oscar and Zena Oshman, 65 Gouverneur street; Solomon Belock, 845 Flushing avenue, all of Brooklyn.

**New York.** Hugo Peiser, 815 Park avenue; Emanuel M. and Millie E. Cohen, 932 Lincoln place, Brooklyn, have incorporated the Luxe Fashion Knitting Works, with a capital of \$10,000.

**Utica, N. Y.** The Fort Schuyler Knitting Co. has purchased a plot of ground on Kemble street, on which it contemplates erecting a plant of its own. Ezra R. Pugh is the president of the company and Charles P. Clarke, secretary and treasurer.

**Utica, N. Y.** Charles A. Byington, secretary of the Kendall Knitting Co., is erecting two new mills here for the manufacture of knit underwear.

**Watertown, N. Y.** Plans have been completed for the new building for the Shaughnessy Knitting Co., to be erected on Moulton street. The building will be a three-story brick structure, 50 by 150 feet, with a basement in the rear.

**Taunton, Mass.** Arthur G. Marsh, superintendent of the Taunton Knitting Co., has been fined \$70 for two violations of the child labor law.

**Manchester, Conn.** The Glastonbury Knitting Co., has decided to enlarge its local plant to be able to double its present capacity.

**Winsted, Conn.** The Winsted Hosiery Co. has awarded the contract for a four-story addition to its plant; a brick structure, 40 by 90 feet.

**Brunswick, Me.** Turner C. Hunton, John P. Winchell and Mary B. Cobb have incorporated the Brunswick Knitting Mills with a capital stock of \$20,000.

**Burlington, N. C.** The Whitehead Hosiery Mills will double its capacity. The erection of an addition to the present building has been started.

**Flat Rock, N. C.** The Skyland Hosiery Co. have installed fifty new knitting machines and is about to begin the construction of its new finishing plant which will have a daily capacity of 1,500 dozen pairs of hose.

**Robersonville, N. C.** The Robersonville Hosiery Mfg. Co., to which we referred in the February issue, has been incorporated with a capital stock of \$100,000 by J. H.; A. S.; J. C. Roberson and others.

**Dallas, Ga.** The Euharlee Hosiery Mill has been incorporated by W. A. Foster and W. E. Spinks. Capital \$10,000.

**Rome, Ga.** The Rome Hosiery Mills, which have been in operation at this place for the past ten years, bear the distinction of being the only hosiery mills in the South that operated during the night as well as day through the recent panic.

All the other textile plants in this vicinity are making excellent reports. There is not an idle wheel in the district. The Massachusetts Cotton Mills, at Lindale, a suburb of Rome, the Anchor Duck Mills, Floyd Cotton Mills, Rome Pants Mfg. Co., and the Sanders-Glover Pants and Tent Co., of this city, are working full time and report an excellent run of orders.

**Rome, Ga.** Announcement has just been made of the organization of the Cherokee Hosiery Mills under the general management of E. F. Shropshire, and with a paid in capital of \$30,000. They have already purchased a site in the suburbs and will begin work at once on the

erection of buildings to accommodate 150 hosiery machines to be put in operation as soon as the buildings can be completed.

**Durham, Texas.** The Durham Textile Mills have elected A. M. Moore, pres., E. R. Merrick, vice pres., C. C. Spaulding, treas., and Chas. C. Amey, sec.—gen. mgr. and will install 10 knitting machines, two loopers, two ribbers, etc., with an output of 70 doz. pairs, in the white, daily.

**Wichita Falls, Tex.** The Chamber of Commerce announces that a \$100,000 hosiery mill may locate here.

**Piqua, O.** The Stuart-Brown Underwear Co. has changed its name to the Stuart-Hance Underwear Co., and increased the capital stock by \$50,000.

**Ravenna, O.** The Standard Knitting Co., of Cleveland, has secured a lease on a mill building here and will install machinery for spinning its own yarns. If business warrants it, they may add a branch knitting plant.

**Bay City, Mich.** The World's Star Knitting Co. will soon begin the construction of its new plant, thus more than doubling its capacity. To meet the expenses of this expansion, the company has decided to increase its capital stock from \$200,000 to \$250,000. The new manufacturing building will extend from Water to Saginaw street, 190 feet, and will be 50 feet wide. It will be five stories high and have a basement with outside lighting, making six working floors. The dye house, one-story, with an arched glass roof, will be 20 feet wide, and extend back 80 feet to connect with the present dye house.

**Chesaning, Mich.** The Big Rock Knitting Factory is the name of a new company which will manufacture men's and women's sweaters, shirts, gloves, etc. W. F. Hall, of Lansing, will be manager.

**Grand Rapids, Mich.** The Globe Knitting Works have bought the property adjoining them and will erect an addition to their plant which will practically double their output.

**Grand Rapids, Mich.** The Clarke Knitting Co. will move to their new building (5 story reinforced brick) in about 4 weeks.

**Appleton, Wisc.** The Saxony Knitting Co. has been incorporated with a capital of \$15,000, by Emil Zwicker, Otto Schultz and A. E. Zwicker.

**Depere, Wis.** The Oneida Knitting Co. will erect an addition, 45 by 55 feet, to its plant.

**Des Moines, Ia.** The Guaranty Hosiery Mills which were destroyed by fire on Christmas day, have contracted with a large hosiery mill to manufacture their goods until next fall. It is probable that before fall the company will have erected a new factory.

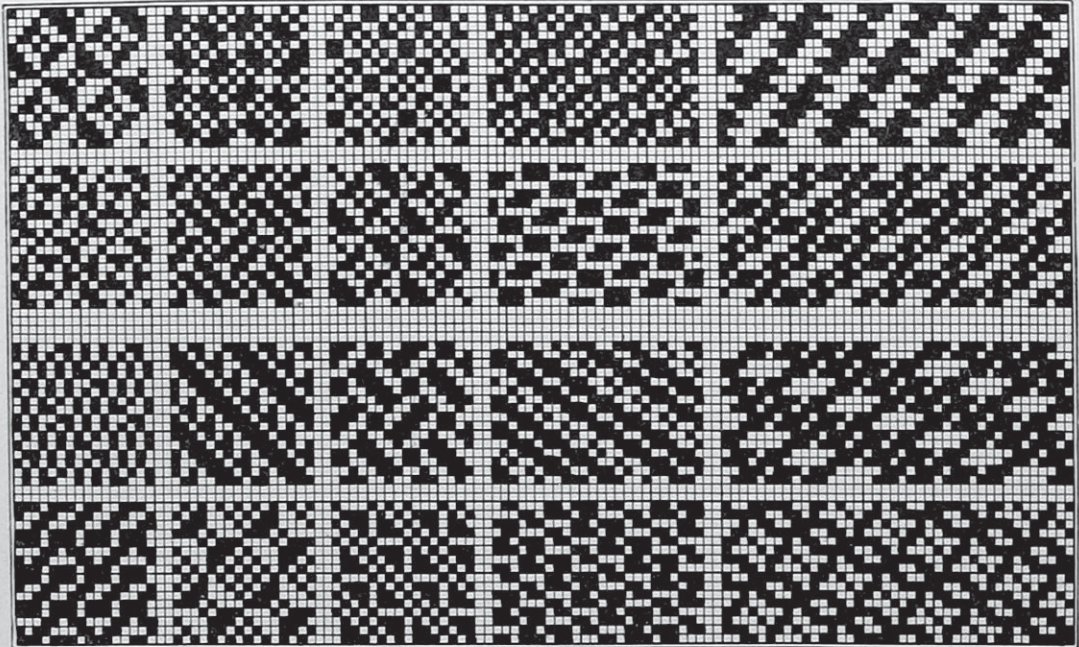
**Ephraim, Utah.** The Sanpete Knitting Works will increase the capacity of the plant and erect a new building.

**Spring City, Utah.** The Sanpete Knitting Works, manufacturers of hosiery, underwear and union suits, will erect a new building and increase the capacity of their plant. Carl Hanson is president and manager of the company.

**Los Angeles, Cal.** The Pioneer Hosiery Mills have installed twenty machines for the manufacture of seamless hosiery in both cotton and silk.

# DICTIONARY OF WEAVES

EIGHT HARNESSES



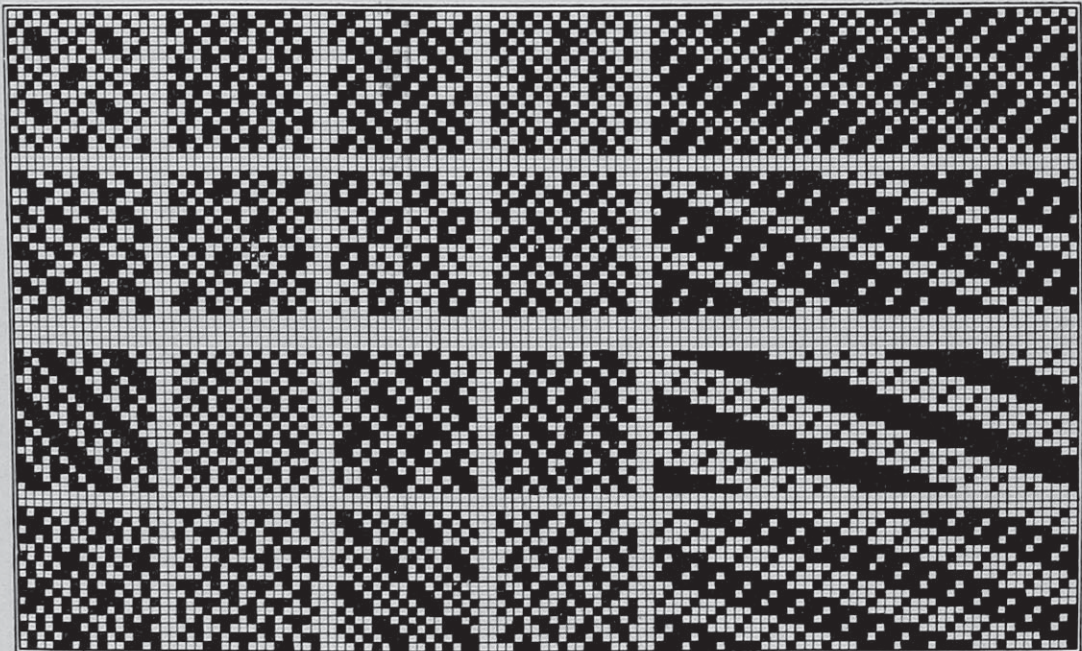
8 X 24

8 X 20

8 X 12

8 X 8

EIGHT HARNESSES



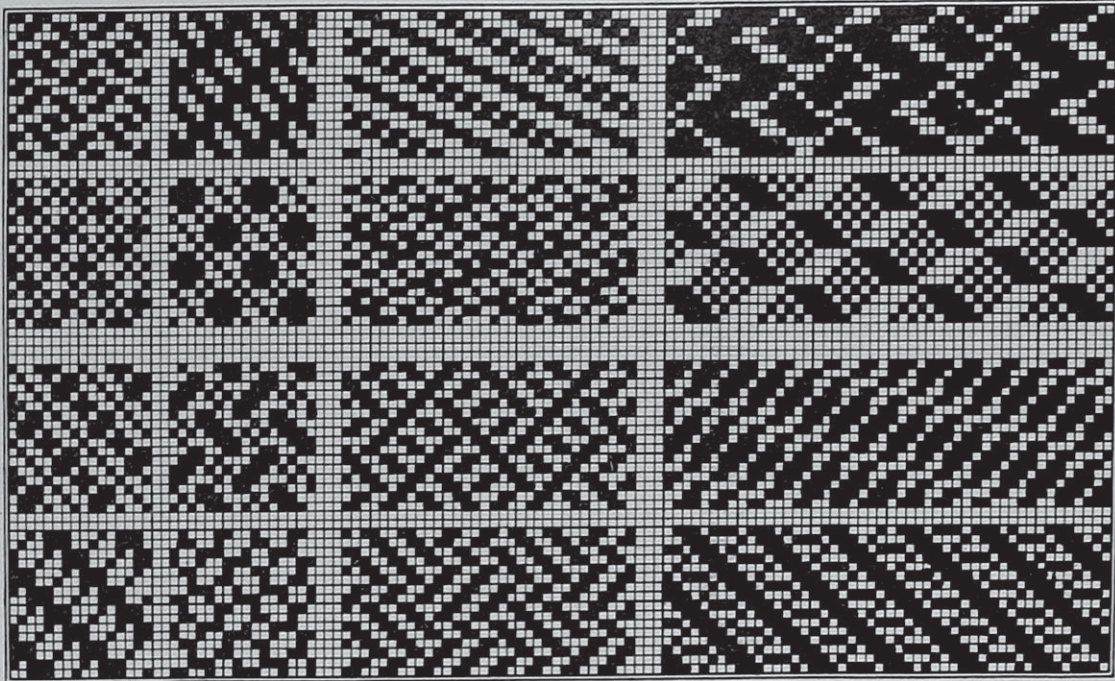
8 X 24

8 X 8



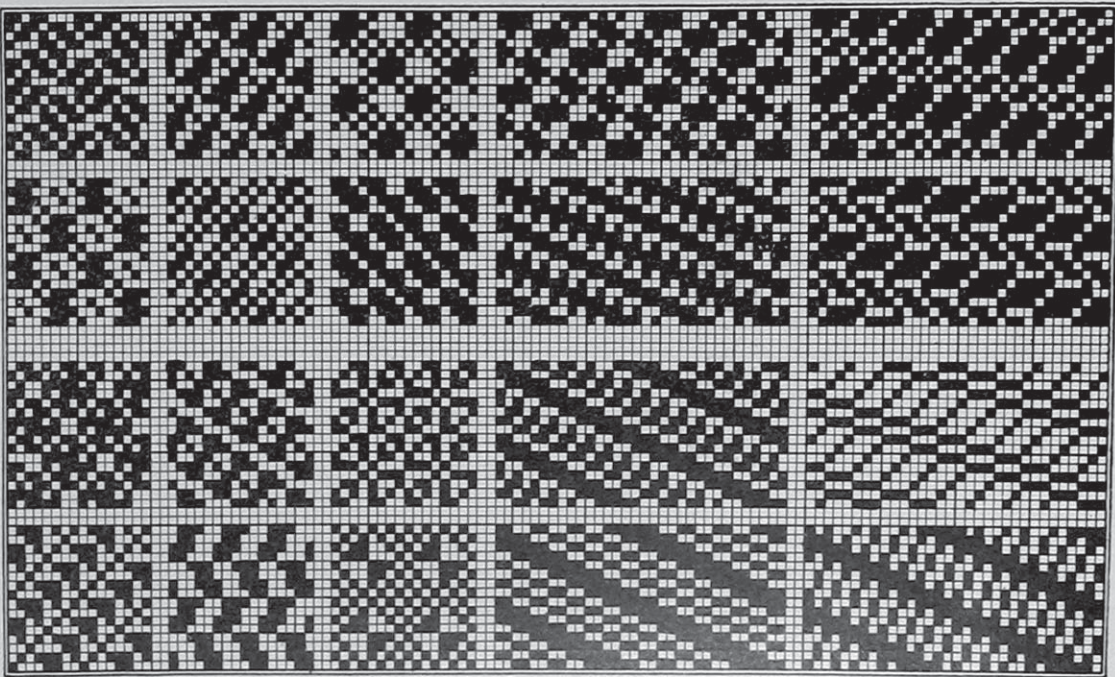
# DICTIONARY OF WEAVES

EIGHT HARNESSES



8 X 8  
8 X 14  
8 X 16  
8 X 17  
8 X 24

EIGHT HARNESSES



8 X 5  
8 X 8  
8 X 12  
8 X 16  
8 X 18  
8 X 24  
8 X 32

Complete, this Dictionary will contain over TWENTY THOUSAND PRACTICAL WEAVES, taken from woven Fabrics. Over two thousand of them have thus far appeared, and can be obtained by ordering back numbers.

Allen, William, Sons Co., Worcester, Mass.....	XII
Altemus, Jacob K., Philadelphia.....	V
Berge, J. & H., New York.....	XV
Bond, Chas., Co., Philadelphia.....	XIX
Borne, Scrymser Co., New York.....	XVIII
Brinton, H., Co., Philadelphia.....	IX
Buhlmann, A. W., New York.....	XIII
Calder Machine Works, Philadelphia.....	XIX
Cassella Color Co., New York.....	XIII
Chapin, Geo. W., Philadelphia.....	IX
Chemische Aniline Works, New York.....	XVIII
Cheney Brothers, South Manchester, Conn.....	VII
Climax Machine Co., Philadelphia.....	XI
Commercial Photo-Engraving Co., Philadelphia.....	XVII
Crompton & Knowles Loom Works, Worcester, Mass.....	Outside back cover
Crosby & Gregory, Boston.....	XV
Curtis & Marble Machine Co., Worcester, Mass.....	XIV
Draper Company, Hopedale, Mass.....	Inside front cover
Epplers, John, Machine Works, Philadelphia.....	XIV
Fagan Brothers, Philadelphia.....	XIX
Farbenfabriken of Elberfeld Co., New York.....	XXIV
Fernbach, R. Livingston, New York.....	XI
Firth & Foster Co., Philadelphia.....	IX
Fries, John W., New York.....	XI
Globe Machine and Foundry Co., Inc.....	X
Governor Works, The, Quincy, Ill.....	XI
Haedrich, E. M., Philadelphia.....	XV
Halton's, Thomas, Sons, Philadelphia.....	III
Helick, Dr. Chauncey G., Philadelphia.....	XIV
Holbrook Mfg. Co., The, New York.....	XXIV
Hotel Cumberland, New York.....	XIV
Howson and Howson, Philadelphia.....	XV
Hungerford & Terry, Philadelphia.....	XII
Hunter, James, Machine Co., North Adams, Mass.....	V
Keystone Law and Patent Co., Philadelphia.....	XIV
Kilburn, Lincoln & Co., Fall River, Mass.....	XV
Klauder-Weldon Dyeing Machine Co., Amsterdam, N. Y.....	XII
Klipstein, A. & Co., New York.....	XVI
Knapp, Chas H., Paterson, N. J.....	X
Lentz, F. G., & Co., Philadelphia.....	X
Lever, Oswald Co., Inc., Philadelphia.....	XV
Littauer, Ludwig, New York.....	IX
Marshall Bros., Agts., Philadelphia.....	XV
Mason Machine Works, Taunton, Mass.....	IV
Maywald, Frederick J., New York.....	XVI
Metallic Drawing Roll Co., Indian Orchard, Mass.....	III
Metz, H. A. & Co., New York.....	XXIV
Mossberg Wrench Co., Central Falls, R. I.....	XVII
New England Butt Co., Providence, R. I.....	XXIV
Palmer, The I. E. Co., Middletown, Conn.....	V
Philadelphia Textile Machinery Co., The, Philadelphia.....	XIV
Pratt, Robert G., Worcester, Mass.....	XVII
Royle, John, & Sons, Paterson, N. J.....	III
Ryle, William, & Co., New York.....	IX
Sauquoit Silk Mfg. Co., Philadelphia.....	IX
Schaellibaum, Rob., Co., The, Providence, R. I.....	XV
Scholler Bros. Co., Philadelphia.....	XIV
Schwarzwaelder Co., The, Philadelphia.....	XIII
Singer Sewing Machine Co., New York.....	XX
Sipp Electric & Machine Co., Paterson, N. J.....	VII
Speed & Stephenson, Boston, Mass.....	XIV
Steel Heddle Mfg. Co., Philadelphia.....	IV
Suter, A., New York.....	XXI
Textile Publishing Co., Philadelphia.....	XVII
Troemner, Henry, Philadelphia.....	X
Weber, F., & Co., Philadelphia.....	XX
Weimar Bros., Philadelphia.....	XVII
Whitaker Reed Co., Worcester, Mass.....	XVII
Whitin Machine Works, The, Whitinsville, Mass.....	II
Widmer Bros., Paterson, N. J.....	XVII
Woolford, G., Wood Tank Mfg. Co., Philadelphia.....	XIX
Woonsocket Machine & Press Co., Woonsocket, R. I.....	XXIV

## BUYERS' INDEX

**Air Compressors.**

Governor Works, The.

**Architects.**

Helick, Dr. Chauncey G.

**Attorneys at Law.**Howson & Howson.  
Keystone Law & Patent Co.**Battons.**Crompton & Knowles Loom Works.  
Widmer Bros.**Belting.**Bond, Chas., Co.  
Fagan Brothers.**Bleachers.**

Firth &amp; Foster Co.

**Bleaching Kiers.**Allen, William, Sons Co.  
Buhlmann, A. W.**Bobbins.**Buhlmann, A. W.  
Draper Co.  
Marshall Bros. Agts.**Boilers.**

Allen, William, Sons Co.

**Books on Textile Subjects.**Textile Publishing Co.  
Weber, F., & Co.**Braiding Machinery.**

New England Butt Co.

**Calico Printers' Machinery and Supplies.**

Buhlmann, A. W.

**Card Clothing.**

Buhlmann, A. W.

**Carbonizing Machinery.**Hunter, James, Machine Co.  
Philadelphia Textile Machinery Co.**Card Stampers.**

Lentz, F. G. &amp; Co.

**Chemical Manager.**

Maywald, Frederick J.