Posselt's Textile Journal

A Monthly Journal of the Textile Industries

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Review of the Men's Wear Trade.

The men's wear trade is looking up and those thoroughly in touch with the market, are inclined to look upon the coming season as a wonderful improvement over what has been experienced for some time past.

Overcoatings have been very much in demand and the market is practically bare of anything desirable, particularly grays. Fancies are an unknown quantity and anything worth the mention may be easily disposed of, in some cases it is claimed that heavy cassimeres have been bought in place of overcoatings. The buyers who were in a position to supply the demand made the most of the opportunity and the demand is expected to continue until early in January.

The demand for suitings is shaping itself and as soon as the rush for overcoatings is over it is expected that the duplicating on the new season will be in full swing.

The majority of the fancy worsted mills, with the exception of a few, are fairly well employed on spring lines, the manufacturers of cotton worsteds and unions being in the most part operating on a very conservative basis.

In glancing over the market, it is easily seen that woolens have fallen down, and it is with few exceptions that any lines have secured any business like that which they had anticipated.

Duplicates: Although there has been considerable duplicating on spring lines, yet it is apparent that there is a large amount of business yet to be placed, and from all indications it is only a matter of a few weeks until the demand will become vigorous, inquiry among clothiers revealing the fact that they do not desire deliveries before the latter part of February.

In commenting upon this, a leading factor expressed himself as positive that unless mills start operating on stock, they would not, apparently, be able to make deliveries when goods were wanted and business would revert in another direction.

The prices on a majority of various lines of fabrics have advanced from one cent a yard on cotton worsteds to 7½ cents on low grade wool serges, but on the better grades of woolens and worsteds the average advance is about 5 cents per yard.

This, in view that many of the mills are receiving assurance of large duplicate orders, and that the supply of light weights on the market is very low, is very encouraging.

Among the orders being placed, the general demand seems to be on grays and browns, the latter being most evident, especially in those fabrics which have a variegated design of broad stripes. In the grays, considerable attention is being given to pearl-gray piece dyes with small check and hairline effects, basket weaves and herring bone effects.

The question of opening the Fall 1911 lines is one which is commanding great attention, and it is thought that little or nothing will be done in the way of placing orders to any extent until after the first of the year. Many sales agents have not as yet received their sample blankets, due to the rush in their mills to get certain work out, and this, together with certain other conditions, may retard rather than advance the opening of the season.

In connection with the openings of the heavy weight lines, there is a general tendency, among buyers, of considering a heavier weight in overcoatings; for instance, a certain buyer expressed himself as thoroughly dissatisfied with the 18 to 20 ounce fabrics, and said that he would accept nothing under 26 ounce. Manufacturers look upon this in a light way, the general opinion being that when the difference in price is taken into consideration, they will look upon it in a different light.

In connection with the Fall 1911 season, it is ventured that stripe effects will maintain their popularity, and that the range of colors will be practically the same as the past season.

Review of the Dress Goods Trade.

The quiet tone of the dress goods market is leading to a general complaint on all sides, but when it is taken into consideration that the suit and cloak trade was handicapped by labor conditions, during the past season, it seems that it is as good as can be expected.

In order that they may realize something on the season, many mills are liquidating their stocks at figures which barely cover the cost of manufacture, and in view of this, buyers are unwilling to pay the regular prices on current lines.

Many houses are booking fair sized orders on spring lines, and as one factor put it, the sales, so far, are ahead of this time last year. Some of the foreign houses are delivering their spring lines already.

A feature of the demand for spring is the preference for serges and open weaves, which developed several months ago. Storm serges are well regarded, and mills with this line, as well as fine twills, state that the former is in far better favor.

Navy blue is the popular color, with tan, a close

second. A very delicate shade of violet is also popular. Black and white effects in rough finished fabrics are well regarded.

In stock goods, an absence of 36 inch fabrics is noticed, although wide goods are being offered from stock at reduced prices.

Review of the Silk Trade.

Throughout the market, the same promising outlook which manifested itself several months ago, still holds sway.

The industry is well employed, and at the present time, there seems to be nothing in the way of a large and profitable business for 1911.

Before pushing ahead, however, manufacturers are adjusting their prices to conform with the advances made in raw silks lately, and where the lines have been advanced within reason, the buyers have met the price without any hesitation. The various lines of marquisettes seem to have had the most attention, and the prices at which they are offered show conclusively that manufacturers have studied the subject of economical production during the slack period, and are putting their knowledge to use at the present time.

The market, as regards duplicates, appears to be very active, most of the buying being confined to the same lines as original purchases, plain and fancy poplins commanding the most attention. The demand for navy blue and garnet from the retail trade, which has recently manifested itself, has caused quite a sensation in the market, as the stock on these two colors was way off, and the demand unexpected.

This condition of the market recalls the assertion made by certain factors, who are thoroughly in touch with conditions, that in their opinion it would not be long before a shortage of desirable materials would confront buyers, who depended upon stock goods for their supplies. The demand for certain lines of broad silks is of such a character that accumulations are practically unknown, and mills are in a certain sense unable to produce sufficient, to supply the demand.

The standing of the various fabrics is readily estimated, when it is taken into consideration that:—

Taffetas are on the off side of the market and the demand is at about as low a point as it has been at any time during the last three years. This condition is due to the trend towards satin faced goods, which by all appearances will maintain their popularity for some time to come. During the opening of the season, manufacturers tried to force the market by quoting prices which would permit of little or no profit, and while some did get a little business, the majority did not, and to make matters worse, raised their prices in an average, 2½ cents per yard. This increase was undoubtedly the reason why buyers, who were operating, lost all interest in the line, as they figured that 60 to 62½ cents for 36 inch goods is an impossible figure to be accepted by any manufacturer, unless warp and filling are heavily weighted, but which in most cases, especially in colored taffetas, results in a very undesirable fabric. Lately, an inclination of shirt waist manufacturers to trade on black and colors has manifested itself, but in any case, the demand will be moderate.

Foulards of all descriptions will be the great feature of the spring trade, small dotted effects seem to be most in favor. The extent of the popularity of this fabric is readily determined by the fact that the entire printing capacity of the country is inadequate to take care of the business offered in these fabrics. Printers claim that the best deliveries they can make are late in February or early in March, and unless buyers are willing to accept deliveries a month or two months late, they will have to depend on mills who were foresighted enough to take our tip several months ago, and at which time we advocated the coming popularity of foulards. It is suggested, at this time, that neat Jacquard effects will be highly regarded.

Messalines, in high pastel shades, are well in favor, and changeables are experiencing a moderate demand.

Striped messalines are looked upon as a good seller for the spring season, and it is presumed that the trend will be toward wide goods.

Peau de Cygnes maintain a similar position. Navy blue and dark red are much in demand for spot delivery.

Crepe de Chine is one of the most popular fabrics this season, and upon the authority of a well-known fashion expert, we suggest that brown will be the next fashionable color in this fabric.

Marquisettes maintain their popularity, and it is noticed that the new lines for spring include new and original ideas in figured, fancy, invisible stripes and small polka dot effects, as well as new ideas in bordered designs.

Persian Effects: The demand for this line has not fallen off as some anticipated, and in view of the present conditions, it is considered as a strong factor in the spring trade.

Poplins, of both the plain and brocaded lines, enjoy a healthy demand and the initial business placed for spring delivery is extremely satisfactory to the trade.

Satins: The spring business in this desirable class of fabrics is getting well under way. Large orders are being booked freely and advances on certain lines are frequent, but then there is no hesitation on the part of the buyers who realize that their trade demands a wide variety of these fabrics for spring.

Velvets still maintain their popularity, and manufacturers are experiencing difficulty in making deliveries. The demand is confined to the garment end, the millinery market having, as it were, abandoned it.

Plushes and Caraculs are extremely active, and cutters are using all available equipment to supply the demand.

Shantungs seem to be in for a good demand this spring, judging from the satisfactory initial business that has been booked.

Tie Silks: All-over effects, in high colors on dark grounds, in the better class of fabrics, are being demanded, which is also characteristic of foreign lines. Fancy figured effects are a strong factor and it is noticed that among the foreign lines, moiré effects, English satins in plain colors, large figured basket weaves in two tone effects, Persian stripes as well as satins with fine hairline stripes, in combination of colors, are much in evidence.

A novelty which is being shown abroad, is a printed crepé effect, in floral designs, which is very attractive.

Our foreign correspondent suggests that large designs in flowery cassimere or Persian effects in high colors, very rich colorings in two-tones and contrasting effects, and novelties favoring Jacquard effects, which are the leading lines abroad, will be in demand here for the spring season.

Knitted Ties: From present indications it appears

that the spring season will show a marked improvement in the silk knitted tie field, especially among those lines made to sell at $1.00 to $2.00. This tie is by all means the most economical and a stylish article of gent's furnishings, and it must be admitted keeps its shape and appearance much longer than ordinary silk ties.

RIBBONS.

A marked improvement has taken place in the ribbon market, and while the demand is not extremely strong, yet a healthy tone is manifesting itself and stocks are moving generally in every weave, single and double faced satins being by far the strongest.

Black and white continue to lead in colors owing to the popularity of these colors in other lines.

In the fancies, black and white stripes are featured, as are also Persian designs, especially in dark back grounds, also wide ribbons with velvet or fancy selvedges, cloth of gold ribbons, and wide black satin ribbons for millinery purposes.

PRACTICAL POINTS ON SIZING.

In considering the subject of sizing, the first question in determining the quantity and quality of the constituents is a general knowledge as to what the size is composed.

It is generally conceded that a satisfactory size should contain an *adhesive,* such as corn starch; a *softener,* to reduce the harsh feeling, such as tallow, soap or specially prepared compounds; a *deliquescent,* such as zinc, magnesium, calcium chloride or glycerine, and an *antiseptic,* such as zinc chloride, formaldehyde, carbolic acid, etc., the whole combined with sufficient water to produce a solution.

The nature of the constituents entering into the combination being known, the tests for determining the quantity and quality follow.

Using starch as an adhesive, some information, as to its nature, will be of interest.

STARCH is a naturally produced body of a granular structure, consisting of two parts: the *inner part* which forms an adhesive by boiling, and the *outer coat,* of cellulose nature, which is destroyed by boiling.

Boiling, or the use of various chemicals, is the only way of destroying this cellulose structure, the starch having no adhesive property until after it is destroyed.

Tincture of Iodine has no effect upon this cellulose matter, but as soon as the granule is changed to an adhesive, it causes the solution to assume a bluish tint.

Solubility:—For determining the solubility of starch, first let us consider that starch is insoluble in cold water. This fact is readily proven by adding a small sample to a little cold water. By examining this in a test tube, it is readily seen that an emulsion is formed, and that there is no change in the nature of the starch as regards its adhesive quality. This latter fact is borne out by adding to the emulsion a drop or two of tincture of iodine which would cause the solution to assume a bluish tint if the cellulose structure had been disintegrated, and an adhesive formed.

To determine that the adhesive has been formed, and that a perfect disintegration has taken place, pour some boiling water on a sample of starch and transfer the mass to a test tube. Upon observation, it will be noticed that a sticky, jelly-like mass has been formed and that the cellulose portion has been destroyed by the boiling water.

To determine whether the disintegration is complete and that the adhesive properties are all that can be expected, take a sample of this adhesive mass in another test tube and add several drops of tincture of iodine and the darker the blue color assumed, the better the adhesive qualities of the starch.

Alkalinity:—In considering the alkalinity of the size, let us take into consideration sodium chloride, or as it is commonly known salt, which is not desirable, except in a very moderate degree, in any size constituent.

Salt is soluble in cold water but strong hydrochloric acid has practically no action upon it.

The simplest test for alkalines, in size, is by the use of litmus paper.

A more complicated test, and possibly the best, is made by pouring the size solution into a half test tube of strong hydrochloric acid. If salt is present, small white particles will be gradually separated from the solution. This peculiarity is one which no other common substance possesses and consequently a very valuable point in quickly determining all traces of salt in matter.

In connection with this, a suggestion as to how the best results may be obtained, may be of interest. It is suggested that if the substance under consideration be a solid, the same should be shaken up with cold water and the solution filtered if not clear. It will be remembered that salt being soluble in cold water, the filtration will not affect the test.

If the substance is a liquid, such as zinc chloride, it must be filtered if not clear and then a little at a time poured into the strong acid.

Another test for the alkalinity, of the size or its constituents, consist in adding nitric acid to the solution, in distilled water, and to which are added a few drops of silver nitrate, which produces a white, curdy precipitate, which upon the application of heat or exposure to light assumes a purple color.

SOFTENERS:—Softeners are added to the size to counteract the harsh feel which would be present if starch alone were present.

In determining the softeners used, we must take into consideration that tallow, soap, glycerine, waxes and chemical softeners find most general application.

Tallow is a well known natural fat, extracted from the sheep or ox and there are several points which determine its value in connection with sizing.

The hardness, which depends upon the age, breed, sex and feeding of the animal.

The acidity which is the result of the age of the tallow; mutton tallow going rancid sooner than beef tallow of equal quantity.

The water present depends entirely upon the discretion of the renderer.

The characteristic properties of tallow are:—

As to purity, it should be odorless, tasteless and colorless and should not darken when exposed to air. Taste, color and odor are due to impurities in the tallow.

It should be neutral when in solution, for instance if some tallow is dissolved in ether and the same divided into two portions and a piece of litmus paper placed in each portion, one red and the other blue, there should be no alteration in either.

Tallow should be soluble in carbon disulphide, chloroform, ether and alcohol, but insoluble in water. It is capable of absorbing or taking up water under certain conditions.

To determine the amount of water in tallow, melt a portion in a long test tube, preferably one that is graduated. When melting, place the tube in hot water rather than subjecting it to the direct application of the flame and when the tallow is entirely melted the two liquids will separate, tallow collecting at the top and the water sinking to the bottom.

Another method of determining the amount of water in tallow is to weigh a small evaporating dish, which is absolutely dry, and after determining the weight add a lump of tallow and weigh again.

After this weight has been ascertained put pan and tallow in a steam oven for several hours, or for such time as might be considered sufficient for the moisture to evaporate, when it is taken out and weighed. The difference between the weight when it was put in the oven and the weight after taken out is the amount of water that was present in the sample.

Another method suggested is that a portion of tallow be dissolved in carbon disulphide and the solution poured into a long, narrow test tube, to which is added a small crystal of iodine. After closing the top, by holding the finger over, shake the tube violently and the resulting solution will be a violet color, caused by the chemical action of the carbon disulphide in combination with the iodine, and the water will form a colorless layer on the top.

To determine the presence of free acids in tallow, dissolve a portion of the tallow in ether, and test this solution with litmus or methyl orange, which are both turned red by the presence of acids.

(*To be continued.*)

DICTIONARY OF TECHNICAL TERMS RELATING TO THE TEXTILE INDUSTRY.

(*Continued from page 140.*)

MALABAR CARPETS:—Woolen carpets made in India of pure Hindoo design. They are made of coarse wool, peculiar to the locality, and are distinguished by the large and grandly colored patterns. The texture of the wool is well suited to the designs, which are gay in tone, large patterns, but well balanced in harmonious arrangement.

MALASS:—A kind of native silk and cotton gauze made in Syria.

MALCOLM TARTAN:—A Scotch tartan having a composition of blue, black and green plaids. Blue and yellow corresponding bars run across the piece, flanked each way by two corresponding red bars.

MALIDA:—Cloth made in India, from down of the goat of Thibet and Central Asia.

MAMMODIS:—A plain variety of East-Indian muslins.

MAMUDI:—A muslin made in the Hardoi District, in Ondh, India.

MANCHESTER:—A variety of cotton velvet.

MANDICI:—A form of collar for ladies' cloaks and dresses, distinguished by being very high and stiffened, and finished with a slight roll at the top; also called Medici collar.

MANDIL:—An ornamental kerchief used by Moslems.

MANGANESE BROWN:—A hydrate of manganese peroxide, produced by precipitating managanese hydroxide on the fibre, and oxidizing it. The color is very fast to light and washing.

MANICA:—A long sleeve reaching to the wrist; worn by Eastern nations; a protection for the arm worn by gladiators and Roman Archers; a covering reaching from the elbow to the wrist.

MANILA or MANILA HEMP:—See Abaca.

MANTA:—An unbleached muslin made in Mexico and largely used for garments by the lower classes.

MANTEAU:—A cloak or mantle.

MANTILLA:—A light cloak or cape, often of silk or other costly material.

MARABOU:—A peculiar specimen of white silk that can be dyed without being boiled off.

MARANHAMA COTTON:—A rather inferior variety of Peruvian cotton. Its general appearance is of a dull, golden tint. Many deliveries are often rather dirty, containing considerable percentages of leaf seed, shell, sand, etc., the former of these impurities being the one most frequently met with. The number of yarns for which it is adapted, when spun alone, is from 40's to 50's count. The maximum length of the staple is $1\frac{3}{16}$ inches, minimum $\frac{15}{16}$ inch. This cotton can be, and is, often used with either Egyptian or American cottons when the color and length of staple is approximately similar.

MARCELLINE:—A light, thin, diaphanous fabric, used largely for millinery and other linings.

MARKING HAMMER:—A device on the slashing machine which automatically marks the cut lengths on the yarn.

MAROON:—A coal-tar dyestuff obtained from a substance formed in the manufacture of magenta.

MARSEILLES QUILT:—A double cloth cotton structure woven in patterns raised in relief in parts, from having an additional, loosely twisted stuffer filling used, to act as a wadding, resting between the two fabric structures, which are tightly stitched together.

MASALIA:—A fabric of the weight of a medium English nainsook, with a smooth nainsook finish, receiving from the weave a moiré, or watered silk effect.

MASULIPATAM CARPETS:—Carpets made in Masulipatam, India. They were formerly the finest carpets produced in India, but now are invariably deteriorated by backing them with Jute Yarns.

MAT BRAID:—A thick braid, closely woven, used for trimming, for the binding of heavy garments, etc.

MATCHING:—A quality of wool in the best part of the fleece.

MATELASSÉ:—Textile Fabrics having a raised pattern, the surface of which looks as if quilted; said of fine textiles, especially silk. Matelassé silk have

usually a rich flowered pattern, and are of one color, the pattern showing only by its slight relief and difference in texture.

MATE THREADS:—A technical term used in connection with two-ply fabric structures, meaning one ground thread and its corresponding figure thread; used more particularly with reversible fabrics, like Ingrain carpets, etc.

MATKA:—Silk Cloth made in India from pierced cocoons.

MATTÉ:—A faint, dull, peculiar greyish-green color, of that of maté, or Paraguay tea, and from which the name is derived.

MAT WEAVE:—See Basket or Hopsack weave.

MAUVANILIN:—A coal-tar dyestuff ($C_{19}H_{17}N_3$), derived from aniline oil in the arsenic acid process, for the manufacture of magenta. Silk and wool are dyed by it a fast violet.

MAUVEIN:—The first aniline dye introduced into commerce, but now seldom used. Called also aniline purple, mauve, mauvine, Perkin's violet, etc. A coal-tar dyestuff ($C_{27}H_{24}N_4$) derived by oxidizing aniline containing toluidin.

MAWATA:—The Japanese name for waste silk, the product of double and pierced cocoons boiled-off.

MCDUFF TARTAN:—A Scotch tartan, better known as *The Duke of Fife,* which shows red, blue, black and green plaids, divided by red lines.

MCKENZIE TARTAN:—A Scotch tartan, the ground work of which is formed by blue, green and black plaids, and a red bar flanked by a white one; each side forms large squares.

MCLEOD TARTAN:—A Scotch tartan which consists of black, dark blue and green plaids, alternating with red and yellow bars.

MECHLIN EMBROIDERY:—An old name for Mechlin lace, because its peculiar manufacture gives it somewhat the look of embroidery.

MECHLIN LACE:—An expensive lace made in one piece upon the pillow, the ground being formed with the pattern.

MEDRINACK:—A coarse fibre obtained from the sago-palm.

MEEN POW:—The Canton Chinese name for cotton cloth.

MEKKLA:—Cotton cloth made in India, used by Hindu women for petticoats, etc.

MEN JIES TARTAN:—A Scotch tartan, having a simple blue and white plaid. The red Men Jies tartan consists simply of black and red plaids.

MELANGE:—A fabric produced from yarn that has been either printed in the wool or dyed of different colors, and mixed together before being spun.

Fabrics woven in two or more colors in a manner to produce an irregular distribution of same.

MELTON:—A stout woolen cloth, for men's wear, that has been well fulled, but not gigged.

MERALINE:—A woolen material for women's dresses and cloaks, usually having a narrow stripe.

MERCER:—A dealer in cloth or silks.

MERCERIZATION:—The process of subjecting cotton in the form of yarn or fabric to hydrolysis by the action of caustic soda of about 60° *Tw.* (30% NaOH). This is the invention of John Mercer, a prominent calico printer in Lancashire, England, and was patented by him in 1850; however Mercer missed to discover the proper application of the material under treatment, as practiced so extensively at the present day, and which is the invention of a firm of German dyers, who, experimenting on some half-silk and cotton goods which they desired to piece dye, found that the cotton did not take the dye with the same intensity as the silk. To help themselves over the trouble, they concluded to mercerize the fabrics, and when, to prevent the loss in the cotton by shrinkage, and which was the drawback of Mercer's invention, put it through the concentrated solution of caustic soda in a strongly stretched condition. This experiment was a perfect success. They not only found that they had achieved all they desired, but to their astonishment, also that the cotton had assumed a lustre equal to that of silk. They developed this discovery into a process to produce the silk lustre upon cotton now known as mercerized cotton, silkoline, sub-silk, silk lustre, etc., *i. e.,* the process known at present as mercerizing, was then invented. When examined under the microscope, mercerized cotton appears as a cylinder without any twist. It is this cylindrical form, very probably, to which its great lustre is due.

To test mercerized cotton proceed as follows: Prepare two solutions: (1) Five grams of potassium iodide and 0.5 grams of iodine crystals are dissolved in 16 grams of water. (2) Twenty-five grams of zinc chloride are dissolved in 12 grams of water. Mix the two solutions, allow to settle and decant. If mercerized and non-mercerized cotton is immersed in this solution for about 3 minutes, both will be colored brown. Place them in a dish filled with distilled water and wash until the brown iodine solution has been removed, leaving a dark, blue-black color. Then place them in fresh water, and when the non-mercerized cotton will lose its color in about 5 minutes, while the mercerized cotton will retain its color for about one hour. Be careful to keep the two samples immersed while testing, since otherwise they will discolor, on account of the oxidation of the iodine.

(*To be continued*)

SHORT FIBRE SPINNING.

The Woolen Mule.

By A. F. Barker, M. Sc.

Briefly, the art of short-fibre spinning consists in supporting the thread or sliver during elongation with twist instead of with rollers, as is the case with long-fibre spinning. Did spinning simply consist of twisting fibres together, then it would be impossible to differentiate between long-fibre and short-fibre spinning. Any difference would then probably lie in the preparation of the respective fibres for the spinning. But the drafting or drawing out of the sliver being necessarily implied, at once emphasizes the difference between long- and short-fibre spinning.

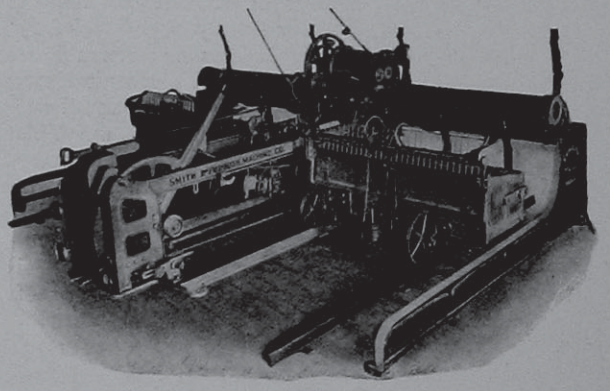
In long-fibre spinning, the fibres are of such a length and are arranged so parallel in the silver, that when the spinning twist is inserted, it is inserted into a sliver or thread already formed, and of which the thickness is already decided.

In short-fibre spinning, the commencement of the final twisting is really a putting in of drafting-twist, *i. e.,* as the twist is inserted the sliver is elongated.

But for this drafting-twist, the short-fibred slivers to be spun would break. This drafting-twist running into the thinnest sections of the slivers strengthens them, and these, becoming the strongest, in turn serve as a means to draft the sections which are now relatively weaker. Upon the drafting being completed, the elongated sliver is then converted into a true thread, by receiving its final complement of twist. So potent is the drafting-twist, that it must be exactly adjusted to the length of fibre being spun; the shorter the fibre the more drafting-twist, and conversely, the longer the fibre the less drafting-twist, until for long fibres no twist at all is possible, as they bind the sliver too much, under which circumstance roller control must be resorted to. The principle of spindle-draft is the distinguishing feature of mule spinning, especially woolen mule spinning, producing yarns of marked characteristics, which in turn have a marked influence in both the weaving and finishing operations. Again, the method of inserting twist into the slivers on a mule must have some influence upon the resultant yarn, though what it exactly is we cannot say.

The woolen mule is a perfect short-fibre spinner. In brief, a woolen mule consists of three main parts, *viz.*, the prepared or condensed sliver holder and deliverer, the carriage with its spindles, and the headstock which controls the action of the other two. The condensed sliver brought from the finisher card, on flanged, long condenser spools, are placed on a delivery drum, and being turned by surface contact with the latter, is always completely under control. The delivery drum is constructed in sections, each to accommodate one of the condenser spools. The slivers from these condenser spools are passed through a pair of stationary rollers, the revolution of which is in accord with the surface speed of the delivery drum and both are under perfect control from the headstock, intermittent delivery being varied at will. The carriage, carrying from 300 to 700 spindles, of any suitable pitch, thickness and inclination, according to the work to be done, is perfectly controlled from the headstock, by means of drawing-out and running-in scrolls. The speed of the spindles is also under perfect control so far as drafting-twist and final-twist are concerned, and something more than under perfect control when the building up of the cop is in process.

One complete cycle of operation, starting with the carriage run-in to the delivery rollers, and consequently with the spindle points close to the grip of the rollers, the condensed sliver passing direct to the spindle points, taking a few turns round the spindle, to the spun yarn forming the cop on the spindle, may be described as follows: As the delivery rollers deliver condensed sliver, the carriage with its spindles slowly retreats until it reaches about half the distance of its complete traverse, when the delivery drum suddenly stops. The carriage, however, goes on towards its full traverse, slower and slower, in the meantime, the spindles putting in just the requisite drafting or supporting twist, which, owing to the nearly upright position and thickness of the spindles, vibrates right along the slivers and ensures distribution in fair proportion to the diameter of the yarn, so that as thin places are strengthened and become strong, the thick places are drafted out, and so an equalizing action goes on right throughout the drafting operation. Upon the carriage reaching the extent of its traverse, when drafting is completed, the spindles are turned onto double speed, to effect the necessary twisting of the two yards of yarn per spindle, just twisting as quickly as possible. The insertion of so much twist, naturally causes a contraction of the thread, and to allow for this, a slight return of the carriage towards the delivery drum is arranged for. Upon the completion of the twisting, the spindles are reversed for a few turns (this is termed *backing-off*) to enable the faller guide wire to commence building up the cop from where it left off at the last run-in, a counter-faller wire, suitably weighted, rises, to maintain a perfectly even tension on the yarn, which otherwise would snarl and form kinks. The carriage is now freed and commences its



THE FURBUSH TYPE OF WOOLEN MULE.
Built by the Smith & Furbush Machine Co., Philadelphia.

run-in under the control of scrolls which, working in conjunction with a quadrant which controls the turning of the spindles, and a *copping-plate* which controls the traversing of the faller-wire, result in a firm, sound cop being built up. Upon reaching the delivery drum, the faller-wire rises; the counter-faller wire falls and the spindles are free to repeat the cycle of evolutions. Of course, a greater or less amount of condensed sliver may be delivered, according to the draft required, more or less drafting-twist may be inserted in accordance with the binding qualities of the material being treated, again, the exact turns per inch required may be inserted at double speed, and by a change of copping-plate the yarn may be spun on bobbins instead of on paper tubes.

From this description, the two main features of mule-spinning, *viz.*, the spindle-draft (properly spoken of as twisting-draft), and the twisting of unsupported threads will be fully realized. It should be noted, however, that as previously remarked, the machine just described should not be called a mule, for Crompton's *mule* received its name from being a hybrid combination of roller and spindle-drafting, while in

the woolen mule there never has been any roller-draft; it is simply an automatic *jenny* in the *billy* form. The cotton and worsted mules, however, are genuine mules, as roller-draft in these, plays almost a leading part. If, as very often happens, little or no spindle-draft is inserted by these mules, the only possible advantage would appear to be in the method of inserting the twist. Against this presumable advantage there is the intermittent character of the cycle of spinning operations and the additional floor space occupied to be placed. That there must be an advantage, is evident from the fact that mule spinning in the cotton trade abroad at least holds its own, while in the case of the worsted, it is rapidly making headway. In both these cases, it may be that it is the peculiar method of sliver preparation which makes it possible, and which is the real advantage.

It will have been noticed, that although cotton is short fibred, nevertheless it is frequently spun on the roller-draft or long-fibre spinning method. This is accounted for by the nature of the cotton fibre, which is much more docile than wool, and does not require length to control it, but may readily be controlled by the small drafting-rollers. In this connection it is interesting to note that prior to the mechanical era, cotton yarns were probably spun very largely, if not entirely, upon the short-fibre spinning system. This is borne out by a knowledge of the cotton industry in India, in which the flax wheel plays no part, all the spinning being done on the simple spindle wheel. This rendered cotton spinning a relative difficult process as compared with either linen or long wool spinning; hence the comparatively small number of people engaged in the industry prior to the mechanical era. But the introduction of the various automatic drawing and spinning machines rendered possible the drawing and spinning of cotton on the long-fibre principle; in fact, it is practically true to say that the cotton industry is a machine-created industry. It would probably always have remained small but for the introduction of mechanical methods.

It would also be interesting to investigate to what extent the short, or Botany wool industry is a machine-created industry. It is true that woolen yarns were spun from short wools prior to the mechanical era, but the short wool worsted yarn is evidently a creation of the mechanical era; and consequently to this mechanical development must the large demand for Botany wools be attributed. That this is so, is proved by the fact that the largest increases in the production of these yarns have taken place since the perfecting of the necessary preparatory machinery and the invention of the wool comb, specially adapted for short wool combing, *i. e.*, between 1840 and 1880, although short Botany wools were previously largely employed in the clothing and woolen trade.

During the past thirty years many endeavors have been made to produce a frame yielding yarn possessing the same characteristics as yarn spun upon the mule. If such a frame could be produced, a great saving in space and a markedly increased output would be effected, since such a frame would be a continuous spinner, whereas the mule is an intermittent spinner. The difficulties to be faced are principally these:—firstly, the continuous drafting of the sliver along with the insertion of the necessary drafting-twist; secondly, the insertion of the true thread twist; thirdly, the construction of a frame as easy to follow (to piece up broken ends) as a mule; and fourthly, a frame as inexpensive in initial cost and in use, as the mule. One of the first attempts was that made by Celestin Martin, of Verviers, Belgium, in which a *twizzler* to insert false drafting-twist is placed between two pairs of drafting rollers, and a ring-frame arrangement placed to receive twist and form a cop of the drafted but twistless yarn as delivered by the second pair of rollers. This machine, although employed to a considerable extent on the Continent, cannot be considered entirely satisfactory.

The drafting being effected or supported by false twist is very different in character from that obtained on the mule. Again, the vibration which runs along the thread in mule spinning, owing to the thickness and inclination of the spindles, is not attempted here. Again, the final twisting conditions obtained on the mule do not exist here; and finally, the difficulties of piecing-up are greater.

Accuracy in Warping.

One of the fundamental principles of economical warping is accuracy in the lengths of the warps. While the devices in use serve this purpose to a certain extent, yet the trade demanded something which would be more convincing.

To satisfy this demand, the GLOBE MACHINE & FOUNDRY CO., INC., FRANKFORD, PHILA., PA., lately designed a measuring device to their warper that is as nearly accurate as mechanical skill can make it.

It is, in a certain sense, the final development of the *"Denn Spindle Driven Ball Warper,"* and from a mechanical stand-point is absolutely accurate. The accompanying illustration is a perspective view of this measuring device. (For an illustration of the Warper, its construction and operation, see pages 67 and 68 of the September issue of the Journal.)

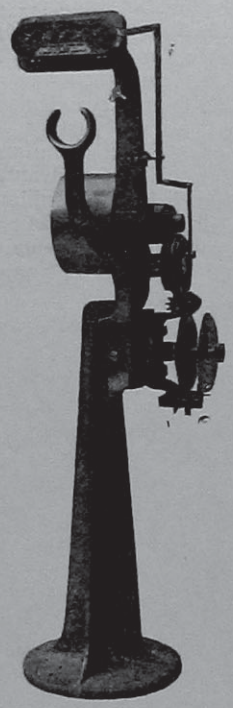
In construction, as can be seen from the illustration, the new measuring device consists of the stand, as used before, which supports the measuring roller, the circumference of which is trued exactly, by micrometer measurement, to 36 inches.

The free end of the shaft carrying this roller, is supplied with a gear which meshes with the worm-gear to which the vibrating arm, attached to the indicator, is secured.

In operation, one revolution of the measuring roller and in turn the worm-gear, causes the indicator to register one yard.

As a matter of convenience, in order that the operator may know exactly how many yards have run off from time to time, the device is further equipped with a dial, which is graduated in multiples of a thousand yards. This dial is in turn geared with the worm-gear first mentioned; in order to have the machine stop at a certain point, a trigger-pin is set by the operator at the point corresponding to the number of yards desired. When the required length of warp

has then been run off, this trigger-pin naturally comes in contact with the lug, which flies off, in turn stopping the machine. The accuracy of the setting can



always be verified by the counter; in practice it is preferable to set the dial two or three yards short, winding the last two or three yards on the beam by the operator matching the counter. This improvement is worthy of special consideration to our mills, and on account of its simplicity, and from a practical standpoint, should appeal to every cotton, woolen and worsted manufacturer, who is interested in an economical and profitable production, with reference to warping.

DYEING COTTON CHAINS.

(Continued from page 96.)

Cotton warps are dyed with several classes of colors, as manufactured respectively by the various dyestuff concerns. Among those made by the Cassella Color Company are:

Diamine Colors direct
Diamine Colors after-treated with metallic salts
Diamine Colors diazotized and developed
Diamine Colors coupled

Immedial Colors straight
Immedial Colors after-treated with metallic salts
Immedial Colors topped with Diamine Colors
Immedial Colors topped with basic colors.

As a general rule, cotton warps are dyed in the usual machine provided with two sets of guide rollers, the lower series of which are near the bottom of the kettle, the upper series either rotating just under the surface of the dye liquor, or, as is usual and better, mounted on top of the dye kettle and a few inches above the surface of the dye liquor. Two prominent makes of these chain Dyeing Machines were shown in the July issue, on pages 19 and 20, the first showing the machine as built by the Textile Finishing Machinery Co., Providence, and Fig. 28 that of the H. W. Butterworth & Sons Co., Philadelphia.

The general practice is to dye with the machine filled to about half its capacity, although some dyers operate with a strong liquor, filling the kettle to its maximum.

Dyeing with Diamine Colors.

The warps should be thoroughly wetted out previously to dyeing, more particularly if light shades are to be dyed; very pale and delicate shades should always be dyed upon warps previously bleached. Pale shades are dyed by giving the warps one or two passages through the machine, adding, according to the speed of the machine, about one-quarter of the requisite dyestuff, previously well dissolved, and the salt; the remainder of the dyestuff is added during the progress of the dyeing. Deep shades are dyed in the same manner, with the exception that about one-third to one-half of the dyestuff is added, together with the Glauber's salt, at the beginning of the operation, and the dyeing completed in four to six passages, according to the depth of shade required. The warps are then finally rinsed.

There is a growing tendency to make use of very large or so-called continuous dyeing machines; these are, of course, more economical than the small machines, on account of the smaller number of passages required; where a small machine will require six passages to produce a good shade, a large three compartment machine will produce the same result in two passages. A first class black produced in a machine as above described is obtained in the following manner:

1¼ to 1½ lbs. Oxy Diamine Black J E I Extra Conc.
½ " 3 oz. soda ash
1 " 1½ lbs. calcined Glauber's salt

to each 10 gallons liquor contained in the machine.

This bath is replenished during the dyeing, by the addition of

3 to 3½% Oxy Diamine Black J E I Extra Conc. and
3 " 4 " calcined Glauber's salt

calculated upon the weight of the warps being dyed.

It is important that the warp dyer should notice that the first quantities indicated are to make a working solution consisting of so much weight of dyestuff, etc., per each ten gallon unit; the actual dyeing quantities are in percentages of the weight of the warps being dyed. The same principle holds good for all colors of this class of dyestuffs.

Diamine Colors after-treated with metallic salts.

Where the dyer aims to produce shades of very good fastness to light, washing, etc., with the Diamine colors, recourse to the after-treating process with chrome or bluestone, or both combined, is necessary. The bath for after-treatment is charged with from 1½ to 4½ oz. bluestone or bichromate of potash and 1½ to 4½ oz. acetic acid, per ten gallons liquor. This solution is heated and the warps passed through while hot. The chemical change here taking place is the formation of oxygenated compounds of the

color base previously taken up from the dye-bath by the cotton; these metallic salts of the color base are extremely difficult of removal after having been once formed on the cotton, suffer little change on exposure to extraordinary influences, and consequently produce fast shades.

Diamine Colors diazotised and developed.

This process is an extension of the well-known Primuline process, but is now applied chiefly in warp dyeing for the production of blacks of extreme fastness. Three compartment machines are permissible for this work, provided the warps pass through intervening washing tanks; otherwise, it is best to dye them in single compartment machines and washing in similar machines.

A high grade diazotised black is produced as follows: For 100 pounds warps, a machine holding about 130 gallons dye liquor will be necessary. The quantities of ingredients are as follows:

13 pounds Oxy Diaminogene O T, dissolved in
22 gallons hot water, and, separately
35 pounds calcined Glauber's salt, dissolved in
22 gallons water.

About one-half to one-third of the quantities of dyestuff and Glauber's salt are added to the dye-bath and then the previously wetted out warps are passed once through the same. The remaining quantities of the solutions are added and the dyeing completed, by giving four to six passages. The standing bath for continuous work will be replenished by the addition of

4 to 4½% Oxy Diaminogene O T and
3 " 5 " calcined Glauber's salt,

calculated upon the weight of the warps.

The dyed warps are rinsed cold and passed through a diazotising bath containing

3 pounds nitrite of soda, dissolved in
10 gallons water and
10 pounds hydrochloric acid, diluted with
10 gallons water.

The nitrite solution should be added to the water contained in the diazotising machine before the addition of the acid.

This diazotising solution must always be cold and the whole operation must be in the cold.

After the warp has been given one passage, the remaining half of the nitrite and acid solution is then added; the warps are then squeezed off, rinsed thoroughly in cold water, and finally passed through a developing bath, which, for 100 pounds warps, is charged with

11 oz. phenylene diamine and
11 oz. soda ash, both dissolved in
12 gallons boiling water,

while for a blue, provided the warps have been previously dyed with Diaminogene Blue, the developing bath would consist of

1 lb. beta naphthol
1½ to 2 lbs. caustic soda lye 77 deg. *Tw.*, dissolved in
12 gallons boiling water.

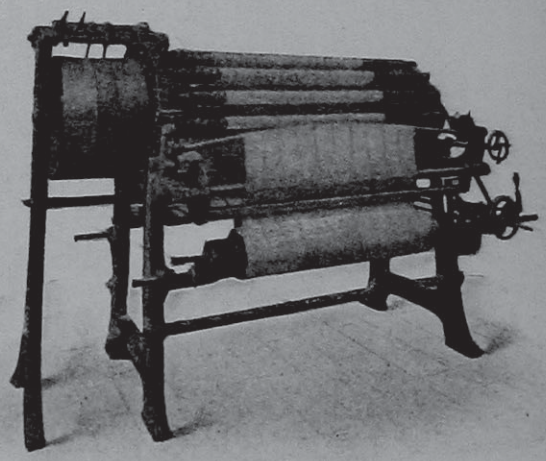
Only one-half of the developing solution is used for the first run of the warp, the balance being reserved for the second run.

(To be continued.)

The New Spiral Softener.

A. W. BUHLMANN, Textile Engineer and Importer of Textile Machinery, of 487 Broadway, New York City, who has made extensive installations of silk finishing machinery in some of our most prominent mills, has added to his line a new *Breaking Machine* of improved construction. The same is of the celebrated J. M. Clerc-Renaud make.

This acquisition, on the part of Mr. Buhlmann, will greatly interest our silk manufacturers and finishers, and it will be to their advantage to get full details in the matter from Mr. Buhlmann. The machine is what is technically known as a Spiral Softener or Knife Breaker, intended to soften and stretch cloth,



by means of spiral rollers acting reciprocally. A description of the principle of a Knife Breaker was given on pages 76 and 77 in the September, 1909, issue of the Journal, in connection with the serial article on Silk Finishing.

This new machine, with its spirally fluted rollers, treats the goods in a thoroughly practical fashion. Every inch of the yarn in the cloth is treated equally and without any undue tension; the sizing is broken up without injuring the finish of the yarn; the cloth is softened throughout and has a better feel. The machine can be used for all kinds of material, and it is claimed, has a greater production than machines built heretofore.

Mr. Buhlmann, at the same time, has acquired the sole representation of a new *Boiling-off Machine*, for silk piece dyes, especially crapés, voiles and cachemires, as well as complete sets of finishing machinery for mousseline, crapé Anglais and tulle. Mr. Buhlmann also handles the Schroer's velvet and plush loom, reporting that he has about two hundred of these looms in order now, for American silk mills. He reports business very satisfactory and has several large installations of silk machinery on hand.

Experiments have been made at Ciudad Porfirio Diaz, Mexico, in the breeding of Karakule sheep, imported from Bokhara in the Far East. A flock of 40 full-blooded animals has been imported. These sheep are famed for fine wool, which is in reality fur, and they are doing well in Mexico. The ranch on which they are grazing is ideal, as its hills are covered with never-failing grass in summer and its valleys are warm and have succulent growth in winter.

DIRECTORY OF TRADE MARKS RELATING TO THE TEXTILE INDUSTRY.

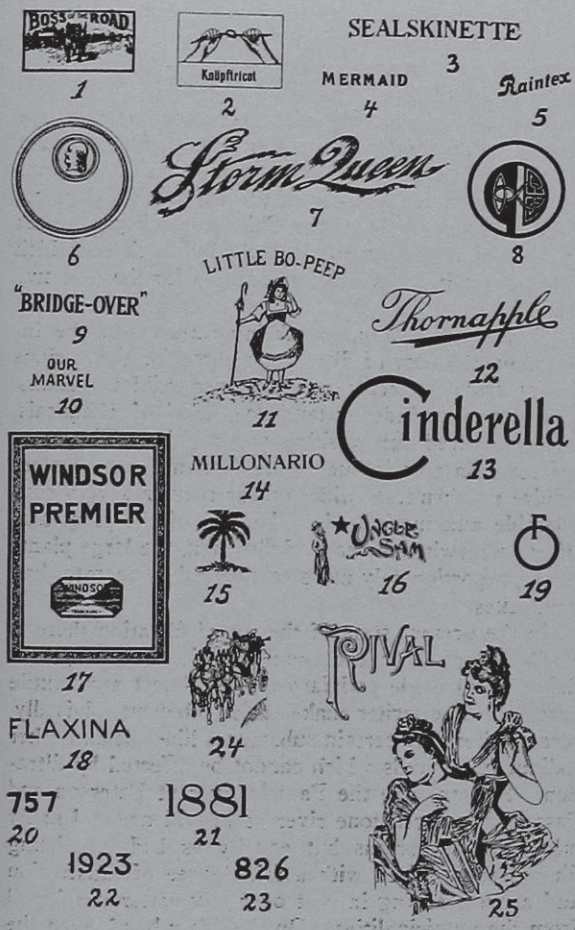
Registered November, 1910.

1. Wearing Apparel.—Neustadter Bros., San Francisco, Cal.

2. Underwear.—Jacques Schiesser, Radolfzell, Baden, Germany.

3. Velvets and Plushes.—The Salt's Textile Mfg. Co., Bridgeport, Conn.

4. Chiffons and Malines.—Stern & Stern, New York.



5. Cotton Shirts.—Oppenheim, Oberndorf & Co., Baltimore, Md.

6. Cotton Piece Goods.—Franklin Mfg. Co., Baltimore, Md.

7. Veilings, Nettings and Malines.—Hydeman & Lassner, New York.

8. Wearing Apparel.—Dennis D. Barrett, Terre Haute, Ind.

9. Wearing Apparel.—Brill Brothers, New York.

10. Hosiery.—Rice-Stix Dry Goods Co., St. Louis, Mo.

11. Hosiery.—C. H. Yates & Co., Utica, N. Y.

12. Knitted Underwear.—Globe Knitting Works, Grand Rapids, Mich.

13. Cotton Flannels.—Whittenton Mfg. Co., Taunton, Mass.

14. and 15. Cotton Piece Goods.—Otis Co., Ware, Mass.

16. Negligée and Work Shirts.—Salant & Salant, New York.

17. Plain White, Printed, or Mercerized Cotton Piece Goods, and Plain White, Dyed, or Printed Cotton and Silk or All-Silk Piece Goods.—The Windsor Print Works, North Adams, Mass.

18. Cotton Canvas.—Levy & Meyrich, New York.

19, 20, 21, 22 and 23. Dress, Negligée and Work Shirts.—E. Rosenfeld & Co., Baltimore, Md.

24. Hosiery.—Brown Durrell Co., Boston.

25. Sheetings.—The New York Mills, New York Mills, N. Y.

WATER FILTRATION.

By Churchill Hungerford, Filtration Engineer.

(*Continued from page 105.*)

A filter plant is operated in the following manner: At the entrance to the sedimentation basin, the water receives its dose of sulphate of alumina. If algae are very troublesome, copper sulphate or calcium hypochlorite may be used as an algacide. The water then flows slowly on through the sedimentation basin, eventually reaching the filter. The process is continuous; that is, as water is drawn from the basin a corresponding amount is always flowing in. In its passage through the chamber, which occupies from two to four hours, the alum has entrapped the very fine particles of matter which might be difficult to hold in the filter and has gathered them into comparatively large masses which are quite visible to the naked eye and which have a tendency to settle with considerable rapidity. In addition, the alum has also attacked the coloring matter derived from peat, leaves and other vegetation along the path of the stream. Moreover, nearly all of the waste dye liquors that may be present in the water will respond to the action of the alum and will be converted from the soluble to the insoluble form.

To compare the action of alum with some of the processes in textile manufacturing it might be likened to a mordant in the dyeing process; that is, the alum tends to precipitate and form lakes of the various coloring matters which are found within the water, and the sand of the filter bed corresponds to the fabric which is being dyed, so that in the chemical treatment of water we really anticipate the dyeing process and exhaust all of the dyes by merely dyeing the filter bed.

The next question which naturally arises is: what becomes of the alum and why will it not interfere with subsequent dyeing and bleaching processes? Previously we have discussed the necessity of an accurate chemical feed. The necessity of this accuracy now becomes apparent. When alum or sulphate of alumina, which is a very similar substance and more generally used, is applied to the water in solution, it combines with the alkaline carbonates (which naturally exist in all streams) to form an

insoluble earthy substance known as hydrate of alumina. The latter is somewhat gelatinous and can be readily retained by the filter. So long as the amount of alum fed to the water does not exceed the amount of carbonate of lime, just so long will every trace of alum be decomposed and rendered insoluble so that it can readily be removed in the subsequent filtration process.

In certain exceptional instances where the normal alkalinity of the steam is very low, the deficiency is made up by applying small quantities of soda or lime through the chemical feed to produce an artificial alkalinity, which gives the same result in the end. It is apparent, of course, that should alum be fed in excess of the alkalinity of the water, there would be free alum, and it has been inattention to this particular feature in times past that has led to the disfavor with which alum as an aid to filtration is unjustly viewed in a great many establishments.

This interesting and really simple reactions take place largely in the sedimentation basin, and a very considerable percentage of the coagulated matter falls to the bottom of this part of the plant,—where it is afterwards disposed of by means of drain valves,—and the water flows on by gravity to the filters, through which it passes merely by its own weight, and is discharged at the bottom bright and clear and in condition for use. This ends the filtration process.

Only the large filter plants are so completely equipped as thus described, which might be considered an ideal plant. In the majority of instances the requirements are satisfactorily met by a comparatively small rough-and-ready apparatus that can be attended by the ordinary laborer and will give fine results. There are twenty such filters installed to one complete plant, and practically the only difference in results is an economic one; that is, the ideal plant will filter the water with less attention and less coagulant than the small service plant, but the small plant will give equally as good water as the larger one.

The small service plant usually consists of a pressure filter only, with a pressure chemical feed which applies the alum at a sufficiently accurate rate to avoid the danger of overdosage, yet supplies enough to give the desired reaction. It is connected directly to a pressure main, either from the city supply or from a pump, and the water is forced through it, the chemical reactions taking place in the upper body of water overlying the filter bed itself. When this filter gets dirty, the back pressure may run up to five, ten, twenty, or even more pounds with a corresponding reduction of the flow through it. These features are really advantageous, as the filter, by becoming nearly water tight, makes attention compulsory. These filters are washed by reversing the current, and in from five to ten minutes are perfectly clean, either raw or filtered water being suitable for this purpose. From one to three times daily is required, depending upon the condition of the raw water.

With some waters the contamination is of such a nature that it does not need chemical treatment, and in those cases simply passing the water through the filter for the straining effect gives satisfactory results. Such cases as this, however, are uncommon and unfortunately are getting rarer every year.

With reference to drinking water it is customary to guarantee a removal of at least 97 per cent. of the bacteria. This bacterial guarantee is dependent, of course, upon the use of a coagulant, usually sulphate of alumina, but within the last two years it has been found that chloride of lime or bleaching powder, can be used with great advantage as an adjunct to filtration. This substance is applied in quantities ranging from 8 to 16 pounds per 1,000,000 gallons of water, and in even this infinitesimal quantity it destroys all of the bacteria except one or two highly resistant and perfectly harmless species.

The applied chloride of lime is converted in the process to an inert, harmless substance, quite similar in its characteristics to common table salt. Perhaps the most notable instances of the use of this chemical are the water supply of the Chicago stock yards, and the municipal supply of Jersey City, both of which have been using it with great success for the past two years.

Cost of Filtration. Omitting interest on the investment, the cost of filtration ranges for the various waters from 30 cents to $2.50 per million gallons. This figure includes attendance, cost of chemicals, power required for washing and repairs. The great difference in cost is due to the fact that some waters require no chemicals while others require a very considerable amount indeed. The size of the plant also affects somewhat the cost of filtration, the large plants being proportionately more economical to operate than small ones.

In the present state of the art of filtration there is hardly a stream in the country which cannot be reclaimed and made satisfactory for almost any textile purpose. The writer makes this statement advisedly, because there are certain substances like salt and other sodium compounds which cannot be affected by filtration. Streams like the Passaic river at Paterson and Passaic, the Blackstone river at Providence and many others less notorious but equally as bad, are being filtered and utilized with a fair degree of satisfaction and a great saving in cost over city water purchased from the municipalities. On the other hand, even the best of streams are greatly improved by filtration because they usually carry more or less suspended matter, and in the summer contain large quantities of algae which sometimes produce very much trouble.

Taken altogether, every dye house and bleachery, as well as the wet finishing department of woolen and worsted mills, should be provided with filtered water.

Improvements in Machinery Abroad.

Improvements to Apparatus for Dyeing Wool Stock.

In dyeing wool, there are certain conditions that manifest themselves, especially when dyeing with mechanical power.

In using a machine of the Klauder-Weldon type,

and where the stock is rotated in the liquor, attention must be directed to the stock, and when by keeping

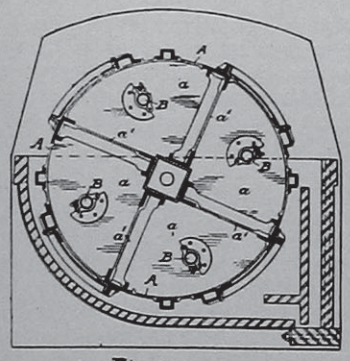


Fig. 1

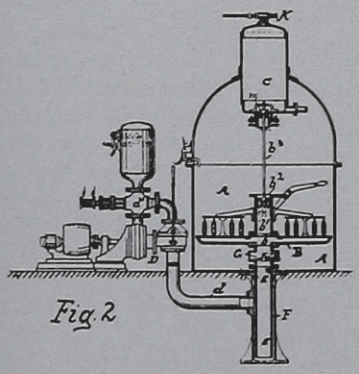


Fig. 2

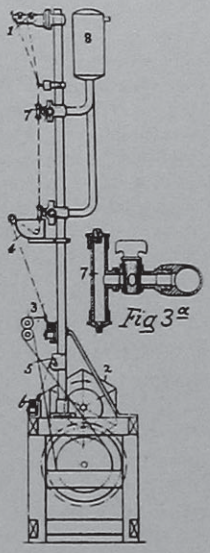


Fig. 3

it thoroughly mixed, an equal circulation of the dye liquor and in turn an even shade to the wool is obtained, without a tendency to felting, a feature that is frequently met with, if this care is not properly exercised.

Fig. 1 shows us a dyeing machine of the Klauder-Weldon type, having an improvement, lately patented by T. H. Daniels, applied thereto.

According to this invention, the rotary drum *A* is divided into compartments by partitions a^1, and is provided with a hollow perforated structure *B* in each of the compartments *a*, so as to prevent movement of the material.

Another Improvement in Dyeing Machinery.

This improvement relates to cop and cheese dyeing machines and is particularly designed for Indigo dyeing.

Fig. 2 shows us a sectional view of the apparatus; a description of its construction and operation is best given by means of quoting letters of reference, accompanying the illustration.

The vat *A*, exhaust chamber *C*, and pump *D* are of the usual construction. The cop carrier *B* is constructed with a hollow ram *E*, working in a hydraulic cylinder *F*, with which the pipe *d* of the pump is connected. The hollow ram opens into the chamber *b* below the cops, the passage being controlled by the valve *G*.

When it is desired to raise the cop carrier in the vat, the valve *G* is closed, and the dye liquor, on being pumped, raises the ram *E* and with it the cop carrier *B*. The latter may be lowered by reversing the pump or opening the valve *G*.

The carrier *B* is fitted with an exhaust pipe b^1 and valve b^2 for closing it. A rod b^3 passes from the valve b^2 through the valve *m* and into the exhaust chamber *C*. On raising the carrier *B*, the rod b^3 engages the valve of the ejector *K*, opens it and creates a partial vacuum in the chamber *C*, opening the valves *m* and b^2, exhausting the moisture in the cops and drawing air through them to oxidise the Indigo.

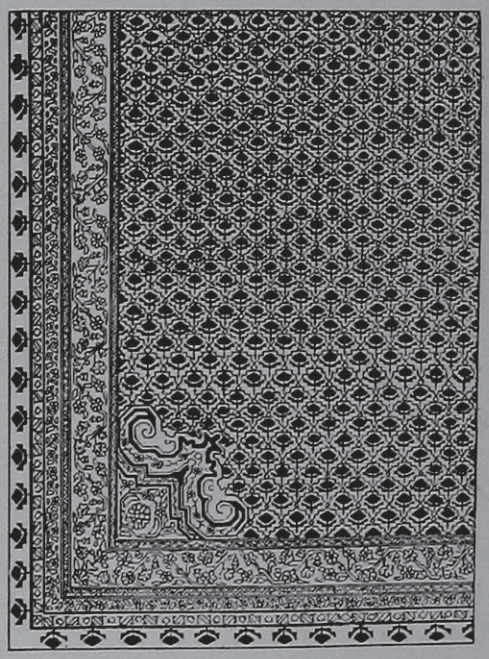
Improvements in Apparatus for the Manufacture of Artificial Silk or for Coating or Glossing Textile Threads.

Fig. 3 shows a sectional elevation of this apparatus, which is designed for coating natural silk or other textile threads with artificial silk. In the procedure, the threads of silk unwind from the bobbin 1, and in turn, pass through the upper dies 7, in which they are treated with a dressing supplied to the dies from the vessel 8. The threads then pass through the lower dies, in which they are covered with a suitable layer of artificial silk, and forward through the water in the tanks 4 and are wound on the frictionally driven bobbins 3. When sufficient thread has been wound, the bobbins are placed in the notches 5, the end threaded through the eye 6, and the yarn reeled upon the reel 2.

Fig 3^a shows in detail a section of one of the dies 7, previously referred to.

Design for a Rug.

The illustration shows one quarter of a Rug, the



design of which has just been patented by E. G. Sauer, Richmond Hill, N. Y.

HOSIERY AND KNIT GOODS.

Review of the Hosiery and Knit Goods Trade.

The demand for hosiery, from all quarters, seems to be improving, and leading mills are getting better prices for their lines than they have for some time.

The supply of cheaply made, low grade hosiery far exceeds the demand, and is a drug on the market.

Woolen and worsted lines are enjoying a healthy demand, and there seems to be little or no comment from this trade.

Throughout the market, the greatest attention seems to be directed towards the opening of the next fall season, and a number of lines are already in action and orders being placed.

The silk end of the market is extremely brisk, the demand for this class of goods being so great that mills are having difficulty in making deliveries at specified dates, and the majority of the lines are sold ahead, until late in the spring. In commenting upon the popularity of this line of goods, a prominent factor, in the fine cotton yarn market, stated that the demand for lisle hosiery had decreased about 50 per cent, since medium price hosiery entered the field, and that there will be a difference of about ten million pounds in the consumption of fine cotton yarns, as far as the manufacture of lisle hosiery is concerned, and should the demand for silk hosiery decrease in favor of lisle, it will only be on account of the difference in serviceability.

Throughout the underwear section of the trade, great stress is being laid upon the next fall season, and the high class lines seem to be booking considerable business.

The price of the various lines for the Fall 1911 season seems to again be the contention of this season's opening.

It appears that certain factors, who handle large lines of men's cotton ribbed fabrics, are naming prices, which in view of 14½ cent cotton, offer little or no profit to the mill.

In analyzing the situation, it is found that the large mills, whose lines are handled by these factors, have covered their yarn requirements until July or August of 1911, on a basis of 21 cents of 10's hosiery cone yarns, one order alone, on this basis, having amounted to one million pounds. Again, the mills are large producers, and in order to relieve themselves of the uncertainty of full distribution of their output at the high prices, discounted the situation, and named low prices in anticipation of booking their output entirely, in a very short time.

A majority of the houses have advanced their lines from 5 to 10 per cent. Where prices have not been advanced, a change has been made in the weights, and in numerous instances the trimming has been altered. While this applies to many of the staple lines, yet it cannot be said of certain lines of finer quality, where the margin of profit is wider.

In connection with the revision of prices, it is noticed that a number of mills are offering their staple lines at staple prices, and to satisfy the jobbers, are making supplemental lines to fit the established prices: the only trouble will be in having the quality of goods delivered, equal to samples.

The demand for heavy weight garments for spot delivery is good, but mills are not inclined to accept orders at prevailing prices, the mills being inclined to accept cancellation of some of the business under order, rather than accept new business at prices buyers are inclined to pay.

Deliveries of spring goods on the low end seem to be causing a great deal of speculations on the part of the buyers. It is quite certain that there will be a general delay on deliveries, as it stands to reason that the low priced cotton, on which they based the quotations, will not be a reality, and they will not be inclined to hurry on business that shows no profit.

Taken as a whole, we agree with the more conservative manufacturers that the market will eventually demand and pay for well made goods, and that although orders may come in slow, it is far better to operate at a profit than at a loss.

About Flat Knitting Machines.

Flat knitting machines include all those machines having one or more flat or inclined needle beds, in which are cut tricks or grooves for the reception of the needles. In all cases the knitting movement is given by traveling cams. In nearly all cases the needles are latch needles and draw and knock over their own loop.

They may be classified as follows:—

(1.) Those with a single bed, which are used chiefly for making so-called *press-off* work.

(2.) Those with two parallel flat needle beds which are placed at right angles to each other, the needles of each bed being fed from the same yarn guides.

(3.) Those with two parallel flat needle beds which are so placed that a needle may be operated by cams on either bed, for which purpose double ended needles are used in conjunction with sinkers or jacks.

(4.) Those with four needle beds, used only for the making of circular rib work.

Of the above, class No. 2 are by far the most numerous and important and may be taken as the standard type of flat knitting machines, and it is this type that takes the name of the inventor of flat knitting —Lamb—although the first idea of it was that of ordinary latch needles, working in two parallel needle beds.

Technically speaking, the position of the needle beds is not of primary importance, and it is not of this that we wish to treat, as we shall assume that the machine is of the ordinary type, with two inclined needle beds, the latter possessing springs to keep the needles in knitting position, or, if necessary, to allow the needles to be withdrawn out of action.

Where the chief differences lie with regard to these machines is in the styles of cams used, and these vary greatly, owing to the diversity of fabrics that can be made upon these machines.

Upon these flat knitting machines may be made ordinary rib work, circular plain work, plain work on one bed only; "openside" or flat selvedged work on two beds, plain fabrics joined on the one side or the other only; tuck rib work, *i. e.*, royal or half cardi-

gan, polka or cardigan and the various "twills"; shogged rib work, and, by the addition of a jacquard, nop or raised designs and any kind of fancy or printed design that can be put onto designing paper. It is upon these machines only that properly fashioned circular work, say, for hose or pants, can be made, while the ranges of fancy raised designs they can produce, are almost unlimited.

Now, while the whole of these fabrics may be made on certain hand knitting machines, it will be understood that for different classes of work, different movements must be given to the needle, hence the necessity for the different styles of cams.

The ordinary type of cams or "locks" as they are sometimes called are shown in Diags. 1 and 2. *A* and A^1 are the knitting or stitch cams, while *B* is the centre or raising cam. The needles, when not knitting, occupy a low position, the butts being below the knitting cams *A* and A^1. For ordinary rib work the cams are in the position, as shown in Diag. 1, and retain this position throughout. Diag. 2 shows the non-knitting position of the centre cam *B*, which position is necessary if plain work is being made. How the position of this centre cam is altered will be seen from Diag. 3, for when the bracket *P* is in position shown, the centre cam *B* is in its low or knitting position, but when the bracket *P* is moved in the direction of the arrow, the screw *d*, which is attached to *B*, rides up the slot *D* and causes the centre cam *B* to assume a high or non-knitting position, as shown in Diag. 2.

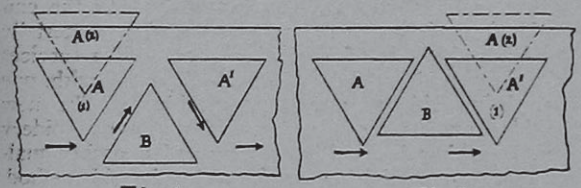


Fig. 1 Fig. 2

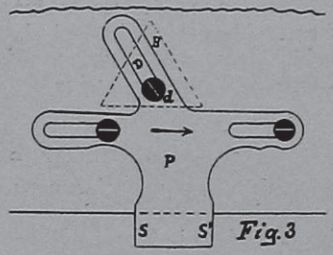


Fig. 3

Now, in making circular work, the cam *B* must be alternately in and out of position, the same thing occurring upon the other bed only *vice-versa*, to do which the bracket *P* comes in contact with stops, which consequently change the position of *B* on both beds at each half round, these stops acting on the extending part at *S* and S^1.

For working on one bed only, *B* must be down on the one side and up on the other, while for openside work, *B* must be up for two half rounds first on the one side and then on the other, which arrangement requires different movements to *P* than the ordinary machine is capable of giving, but which may readily be made by other combinations of cams.

If tuck work is required, the knitting cams must be so raised as to prevent knocking over, in which case—for royal rib—the cam *A* would be raised to position (2), and for cardigan the cam A^1 upon the opposite bed would be raised to position (2) as well, while the centre cam *B* would be in action throughout. (The Hosiery Trade Journal.)

German Embroidery, Lace Machinery, and Their Products.

The only machines now constructed in Chemnitz, Germany, for the manufacture of embroideries and laces, and which are exported to the United States, are the so-called shuttle embroidery machines. Their leading product is known as embroidery or etched lace. The essential feature upon which its manufacture is based is the production of embroidered designs with cotton yarn upon a light woolen cloth, which by subsequent treatment in an alkaline bath can be dissolved out. The design is thus left in a free state, and bears a close resemblance to handmade lace. The method is also varied by employing as foundation a light cotton cloth, impregnated with dilute sulphuric acid. After the embroidering process is completed the product is heated and as the temperature rises the acid present carbonizes the fibres of the foundation cloth, which can then be readily removed by beating, leaving the lace pattern free.

These machines are likewise used extensively to produce lace effects on tulle. The ground material is made expressly for the purpose and forms a very light fabric of hexagonal mesh work, which serves as a framework for the embroidery. It is practically concealed by the stitches of the latter.

Another important use is for white embroidery on cambric, muslin, and nainsook.

To a limited extent, the machines are also employed for producing silk embroideries, which involve effects with thread of but one color.

As is evident, this class of machines produce embroideries, properly so called, with the various intermediary articles. The chief establishment at Chemnitz, engaged in building such machinery, has supplied over 11,000 machines during the past fifty years.

The standard type of machine is 30 feet long. It requires a motive power of from one-half to three-fourths of a horsepower. Machines are arranged to run by ordinary transmission, or by individual electric motors. The price of such a machine, with automatic borer and 200 reserve shuttles, without packing, is $1,250 at Chemnitz. The extra rounding device is attached at an additional cost of from $75 to $100. The attachment of a festooning apparatus costs from $200 to $300.

ARRANGEMENT AND WORKING OF MACHINES.

The machine is arranged to embroider two strips of cloth or tulle at a time. Each strip is attached to two horizontal rollers in the vertical framework of the machine and stretched tightly. A sliding bar in front of each strip is provided with a row of needles, similar to those used for embroidery work on ordinary sewing machines, and pointing at a right angle to the surface of the cloth. Each needle does the same work as its neighbors. The needles are fastened to the bar at uniform distances, these distances corresponding to the length of the pattern to be repeated on the cloth. The sliding bar on a machine 30 feet long, producing

a continuous succession of designs five inches in length, would be mounted with a row of 72 needles. Cones of embroidery yarn are placed behind each needle.

Back of the cloth is another sliding bar, controlling the movement in grooves of a row of steel shuttles, equal in number to the needles on the front bar. Each shuttle is provided with a bobbin of yarn. When the machine is in operation, each shuttle darts with its yarn under the yarn carried by the needle, producing a lock stitch, essentially the same as on an ordinary sewing machine.

As the movement of the needles is simply forward and backward, their working position with regard to the cloth can be altered only by the movement of the latter. This is effected by a pantograph, located at the end of the machine, causing the entire framework to move vertically or horizontally. An operative directs the stylus of the pantograph over a design to be reproduced, tacked upon a vertical board. The regulating movement of the pantograph is as 6 to 1, and the patterns followed are, hence, six times larger than the design to be reproduced.

The manufacture of these machines is quite extensive. Not only is the demand in Germany considerable, especially from the lace-producing region in the southwest section of Saxony, but there is a considerable export to other countries. The number of such embroidery lace machines exported to the United States during 1909 was 20.

There are several establishments in Chemnitz engaged in the manufacture of machinery for the production of tulle, which serves so largely as a foundation for embroidery laces. Tulle machinery was formerly exported to the United States, but none was shipped during 1909.

There is a limited export to the United States from Chemnitz of machines designed to produce a coarse netting, used for making shopping bags and the like. During 1909 five of these machines were exported to the United States, at a cost of $714 each. Every machine is accompanied by a riveting attachment, which costs $131, and by a stock reserve of needles, guides, and other parts, costing $74.

Machines similar to those built at Chemnitz, with an improvement, are manufactured by a firm at Plauen, with an automatic device for controlling the movements of the pantograph, thus dispensing with the need of a specific operative for the purpose. The device is protected by patents, and its attachment costs about $960. An important element in the construction of the machine is the adjustment of the movable framework so as to rise or fall and move sidewise in either direction with the greatest ease and exactness. The horizontal movement is limited to a distance of 9¾ inches, so the patterns to be reproduced must be limited to this length.

The machines are provided with arrangements similar to the needle bars, each of which carries a set of so-called borers, designed to produce perforations of various sizes in the cloth. Frequently the borers are accompanied by a set of rounders, or punches, which shape the perforations into uniform circles. Both parts are located under the needle bars. Their action is ordinarily automatic, but can be changed instantaneously to a motion controlled by the hand. The rounders are absolutely necessary for white embroidery and the finer work on cloth foundation. Borers accompany every machine. The rounder attachments are furnished only upon special order.

Another device, frequently attached beneath the needle bars, is the festooning apparatus. This is a bar carrying a series of long, flat hooks. Their purpose is to catch the thread of each needle, at the will of the operative, and twist it so as to produce a loose border about the design. It is, likewise, furnished only upon special order.

Machines of the kind described require three operatives. A stitcher stationed at the pantograph, controls the entire movement; another operative walks up and down in front of the frame, keeps the needles threaded, sees that they stitch correctly, and remedies minor defects; a third keeps the shuttles supplied with small bobbins of yarn, one inch in length. Female operatives usually occupy the last two posts.

A new machine known as the *"Automat,"* the invention of Director Zahn, of the Vogtländische Maschinenfabrik of Plauen, Germany, it is reported, will revolutionize the embroidery industry. Like the old machine, it is on the Jacquard principle. The stenciling of the cartons is most ingeniously executed by a punching machine simultaneously with the embroidering of the first sample strip, thus materially lessening the cost of preparing them. The services of the embroiderer or stitcher are dispensed with, one man being able to attend 25 machines. The new machine produces one and a fifth more embroidery every working day and of a better and smoother quality than can possibly be produced by the old method. Probably one of the most decided advantages will be to the manufacturer who desires to turn out large quantities of embroidery of a single design, that with the new machine, the great expense of frequently changing the Jacquard cards is avoided.

Hungerford & Terry, Inc., 1414 Pennsylvania Bldg., Philadelphia, Pa., manufacturers of Water Filters, have appointed Mr. H. G. Mayer Southern Agent for the sale of their Water Filters and Water Softeners.

Mr. Mayer, who is also the agent for a number of textile machinery firms in the South, is located at Charlotte, N. C., with offices in the Realty Bldg.

Hungerford & Terry, Inc., report a number of recent installations in the South among which are plants at the Camperdown Mills, Greenville, S. C.; Bedford Pulp & Paper Co., Lynchburg, Va.; DeWitt-Wharton Mfg. Co., Lynchburg, Va.; Dan River Power & Mfg. Co., Danville, Va.; Revolution Cotton Mills, Greensboro, N. C.; Durham Hosiery Mills, Durham, N. C.; Cliffside Mills, Cliffside, N. C., and the Cedartown Knitting Co., Cedartown, Ga.

The preliminary condition for the satisfactory operation of ball bearings is precision in dimensions. The allowable differences for the bores are fixed consequently at +0.005 millimeter and the external diameter at —0.01 millimeter. Owing to the trifling amount of friction, the heating of ball bearings is practically impossible and the consumption of lubricating oil small; transmission bearings, for example, require to be oiled only every 6 to 10 months.

BUYERS' INDEX

MILL NEWS

Philadelphia. The Lowry Knitting Works, 5120 Wakefield St., suffered a loss of $2,000 by fire, the damage being to stock and equipment.

Philadelphia. The United States Knitting Mills Co., 243 Market St., which are operated by Haber and Auerbach, suffered a loss of $75,000, to stock and equipment, by fire.

Philadelphia. The Shetland Worsted Mills, owing to the increased demand for their fabrics, are operating on a day and night basis.

Philadelphia. A. J. Cameron & Co. report an increased demand for their worsted yarns and that they are operating their plant on a day and night basis.

Philadelphia. Ward-Meehan Co., manufacturers of Turkish towels, Hancock and Lehigh Ave., report that they have lately received considerable business which has necessitated their starting additional looms.

Philadelphia. John Graf, manufacturer of embroideries, has leased the sixth floor of the building at 1001 Hamilton St.

Philadelphia. Andrew Alexander & Co., manufacturers of carpets, suffered a loss of $500 by fire.

Philadelphia. The Star & Crescent Co., manufacturers of Turkish towels, reports a decided improvement in business, they have started up additional looms and are now operating 200 narrow and 35 broad looms.

Philadelphia. The Leicester and Continental Mills, manufacturers of sweaters and athletic goods, report that they are operating their plant overtime.

Philadelphia. It is reported that Joseph Ridley has secured the plant of David Greer Orme, located at 4317 Franklin street, equipped for the manufacture of men's wear and dress goods.

Philadelphia. The James Doak Jr. Co. has been incorporated by James Doak, Jr. and others to take over the business now conducted by James Doak, Jr. & Co., manufacturers of yarn.

Philadelphia. The plant of the E. G. Chester Hosiery Co. is again in operation, after having been idle a short time, and will continue under the management of Joseph H. Lorimer and Frank T. Somers, receivers.

Philadelphia. The American Cloth Mfg. Co. has been incorporated with a capital of $100,000, by D. H. Barr, G. F. McRae and James McBlaine, and will engage in the manufacture of textile fabrics.

Philadelphia. The Diamond Knitting Mills have installed the celebrated *Brinton* machines, for the manufacture of reversible knit accordion ties. These ties retail at $1 each. This machine was considered one of the *Sensations of the Paterson Exposition.*

Philadelphia. The Atco Knitting Co. has moved their plant to 3941 Ashmead street, Germantown, which will enable them to increase their capacity by the installation of 10 additional machines.

Philadelphia. The Puritan Knitting Mills, manufacturers of sweaters at 36 S. 5th St., are preparing to remove their plant to 61 N. 2nd St., where they will install a number of flat machines as well as loopers.

Philadelphia. The Quaker City Knitting Mills, manufacturers of sweaters, 435 North Broad street, are installing 10 additional circular knitting machines.

Philadelphia. The Riehms Knitting Mills, manufacturers of sweaters, will increase the capacity of their plant, and are planning to add additional equipment after the first of the year.

Philadelphia. Morris Starrels, 2126 East Dakota street, manufacturer of sweaters, bathing suits, and fancy knit goods, is increasing his equipment of knitting and finishing machinery.

Philadelphia. The World Knitting Co., a new concern, located at 26 N. Third street, will triple the size of its plant.

Bangor, Pa. It is reported that Alexander Bruenn of Hazleton, Pa., is interested in securing a half interest in the Bangor Silk Co.

Chester, Pa. The Chester Spinning Mills, who operate the Old Lincoln Mills, have completely overhauled the plant, and expect to have the same running in all departments in a short time.

Chester, Pa. Plans are under way for the re-organization of the Chester Worsted Co., manufacturers of worsted yarns. It is understood that B. F. Dewees, a large dry goods merchant of Philadelphia and a relative of Seymour Runk, the treas. of the company, is interested.

Coplay, Pa. The Coplay Knitting Mills, which have been idle for some

(*Continued on page xi*)

BUYERS' INDEX—Continued

Dyeing, Drying, Bleaching and Finishing Machinery.
Allen, William, Sons Co.
Buhlmann, A. W.
Butterworth, H. W., & Sons Co.
Curtis & Marble Machine Co.
Hall, Amos H., Son & Co.
Hunter, James, Machine Co.
Johnson, Van Vlaanderen Machine Co., The.
Parks & Woolson Machine Co.
Philadelphia Textile Machinery Co
Suter, Alfred.
Textile-Finishing Machinery Co., The
Tolhurst Machine Works.
Woolford, G., Wood Tank Mfg. Co.
Woonsocket Machine & Press Co.

Dye Sticks.
Haedrich, E. M.

Electrical Warp Stop Motion.
Mossberg Wrench Co.

Engineers.
Helick, Dr. Chauncey G.

Feeding Machinery.
Harwood, Geo. S. & Son.

Filters
Hungerford & Terry.

Finishers.
Firth & Foster Co.

Flyers, Caps and Tubes.
Calder Machine Works.

Fulling Mills.
Hunter, James, Machine Co.

Harness Builders.
Crompton & Knowles Loom Works.
Halton's, Thomas, Sons.
Lentz, F. G & Co.
Ulrich Company.

Harness Makers.
Gowdey, The J. A., Reed & Harness Mfg. Co.

Heddles.
Steel Heddle Mfg. Co.
Suter, A.
Ulrich Company.

Hydro Extractors.
Dienelt & Eisenhardt, Inc.
Tolhurst Machine Works.

Jacquards.
Crompton & Knowles Loom Works.
Halton's, Thomas, Sons.
Suter, Alfred.

Jacquard Card Stamping, Lacing and Repeating Machinery.
Royle, John & Sons.
Suter, Alfred.

Knitting Machinery.
Brinton, H., Co.
Ludwig, H. Alban.
Wilcomb Machine Co., Inc.

Logwood.
American Dyewood Co.

Looms.
Crompton & Knowles Loom Works.
Draper Co.
Hindley, E. B.
Kilburn, Lincoln & Co.
Mason Machine Works.
Suter, A.
Whitin Machine Works.
Widmer Bros.

Measuring Devices.
Draper Co.
Sipp Machine Co.

Mercerizing Machinery.
Buhlmann, A. W.
Butterworth, H. W., & Sons Co.
Klauder-Weldon Dyeing Machine Co.
Textile-Finishing Machinery Co., The

Mill Supplies.
American Textile Specialty Mach'y Co.
Bond, Chas., Co.
Hindley, E. B.
Pavia Shuttle Co., The.
Suter, Alfred.
Ulrich Company.
United States Truck & Supply Co.

Mohair.
Littauer, Ludwig.

Napping Machinery.
Buhlmann, A. W.
Curtis & Marble Machine Co.
Parks & Woolson Machine Co.

Oils.
Borne, Scrymser Co.
Harding & Fancourt, Inc.
Scholler Bros. Co.

Patent Attorneys.
Crosby & Gregory.
Howson & Howson.

Pneumatic Conveyors.
Philadelphia Textile Machinery Co.
Schnitzler, Chas. H.

Presses.
Buhlmann, A. W.
Textile-Finishing Machinery Co., The.
Woonsocket Machine & Press Co.

Printing Machinery.
Textile-Finishing Machinery Co., The

Quillers.
Buhlmann, A. W.
Lever, Oswald Co., Inc.
Royle, John & Sons.
Sipp Machine Co.
Whitin Machine Works.

Quills.
Pavia Shuttle Co., The.
Pratt, Robert G.
Suter, Alfred.
Ulrich Company.

Reeds.
Gowdey, The J. A., Reed & Harness Mfg. Co.
Pavia Shuttle Co., The.
Ulrich Company.
Whitaker Reed Co., The.

Reels.
Draper Co.
Scott, Henry L. & Co.
Sipp Machine Co.
United States Truck & Supply Co.
Whitin Machine Works.

Revolving Flat Cards.
Mason Machine Works.
Whitin Machine Works.

Ribbons and Piece Silks for Trimming Knit Goods.
Cheney Bros.
Sauquoit Silk Mfg. Co.

Scales and Weights.
Suter, A.
Troemner, Henry.
United States Truck & Supply Co.

Sheet Metal Work.
Bonner, A. J.

Shuttles.
American Textile Specialty Mach'y Co.
Pavia Shuttle Co., The.
Pratt, Robert G.
Ulrich Company.

Silk Dyers.
Scheu, Ernest.

Silk Machinery.
Altemus, Jacob K.
Buhlmann, A. W.
Butterworth, H. W., & Sons Co.
Crompton & Knowles Loom Works.
Halton's, Thomas, Sons.
Hindley, E. B.
Johnson, Van Vlaanderen Machine Co.
Mason Machine Works.
Parks & Woolson Machine Co.
Sipp Machine Co.
Suter, A.
Textile-Finishing Machinery Co., The.

Silk Yarns.
American Silk Spinning Co.
Champlain Silk Mills.
Cheney Bros.
Littauer, Ludwig.
Ryle, William, & Co.
Sauquoit Silk Mfg. Co.
Suter, A.
Villa, Stearns Co.

Size.
Corn Products Refining Co.

Soap.
Harding & Fancourt, Inc.
Holbrook Mfg. Co., The.
Scholler Bros. Co.

Spindles.
Draper Co.
Calder Machine Works.

Spinning Frames.
Mason Machine Works.
Whitin Machine Works.

Spinning Rings.
Draper Co.

Spools.
Marshall Bros., Agts.
Ulrich Company.
United States Truck & Supply Co.

Starch.
Corn Products Refining Co.

Stop Motions for Looms.
Crompton & Knowles Loom Works.
Draper Co.
Mossberg Wrench Co.

Tanks, Vats and Dye Tubs.
Hall, Amos H., Son & Co.
Woolford, G., Wood Tank Mfg. Co.

Tapes, Braids and Edgings.
Chapin, George W.
Weimar Brothers.

Temples.
Crompton & Knowles Loom Works.
Draper Co.

Thread Guides.
Palmer, The I. E. Co.
Whitin Machine Works.

Threads.
Chapin, George W.
Littauer, Ludwig.

Tinsel.
Littauer, Ludwig.

Trade Mark Stamps.
Kaumagraph Co.
Parks & Woolson Machine Co.

Twisters.
Draper Co.
Mason Machine Works.
Whitin Machine Works.

Twist Counters.
Buhlmann, A. W.
Scott, Henry L. & Co.
Sipp Machine Co.
Suter, A.

Ventilating Fans.
Philadelphia Textile Machinery Co.

Winding, Beaming and Warping Machinery.
Altemus, Jacob K.
Draper Co.
Globe Mach. & Fdy. Co., Inc.
Hindley, E. B.
Lever, Oswald Co., Inc.
Sipp Machine Co.
Whitin Machine Works.

Wiping Cloths.
Crowther, Harry.

Wool Combers.
Crompton & Knowles Loom Works.

Wool Oils.
Borne, Scrymser Co.
Harding & Fancourt, Inc.

Woolen and Worsted Machinery.
Altemus, Jacob K.
Buhlmann, A. W.
Crompton & Knowles Loom Works.
Curtis & Marble Machine Co.
Harwood, Geo. S. & Son.
Hunter, James, Machine Co.
Lever, Oswald Co., Inc.
Parks & Woolson Machine Co.
Philadelphia Textile Machinery Co
Speed & Stephenson.
Textile-Finishing Machinery Co., The.
Woonsocket Machine & Press Co.

Woolen Yarns.
Littauer, Ludwig.

Wool Washing Machinery.
Hunter, James, Machine Co.

Yarn Testing Machinery.
Buhlmann, A. W.
Scott, Henry L. & Co.
Sipp Machine Co.
Suter, Alfred.
United States Truck & Supply Co.