

## PLATE 4



FINISHED APPEARANCE OF HILSCHER'S WEDGE HEEL HOSE (flat)



takes the curl out. The leg once on the transfer bar, the

(4) Running on to the Knitting machine needles will be performed by the knitter. This requires a good deal of carefulness and close watching on the part of the operator, every drop stitch will have to be picked up carefully, or the menders in the finishing department will be kept busy.

The stocking, once completed on the knitting machine, now goes into the hands of the

(5) Operator on the looping machine. She will close the toe, and stitch the open ends of the heel caps together on a regular looper or linking machine.

(6) The next operation is the seaming up of the selvages, to make a tube of the flat fabric. The curly edges are introduced in a special guide of the seamer and stitched together. The seam cannot be run all the way through, as the looping of the heel forms an interruption. The operator is thus obliged to pass the selvages twice into the guide and to draw in and cut the threads at four different places.

The running on of the leg on the transfer bar requires clever and experienced hands and the looping operation is equally expensive and slow. The frequent stopping of the knitting machines for casting off the half-finished piece and running on the leg on the footer for completing, are other factors reducing the production, taking up time and consuming power. It has therefore been the endeavor of the machine builder to find a way of knitting the hose on one machine without interruption and to improve at the same time the shape and fitting of the heel. The Hilscher factory has been most successful in solving the problem, as is shown in the following illustrations of hose and half-hose produced on their new high speed wedge heel hosiery frame.

It will be noticed that the shape of the heel has been changed to resemble partly the hose produced on the circular automatic knitter. What the latter is lacking in fullness has been improved on the full fashioned article, in a very ingenious way. The process of knitting is quickly understood when we explain that the sinkers in the middle of the section are idled and only the outside sinkers are operating with two yarn carriers. They work on to the leg and two-heel caps in idling one needle after the other and bringing them into action again. Once the heel halves completed, all sinkers go into action again, the heel thread guides are put out of action and the yarn guide that was knitting the leg will complete its work to the toe.

The practical manufacturer will soon see what operations have been eliminated on this new machine and where the saving of time and money is coming in. The several courses that are knit over the slack course on the ordinary machine and ravelled by the transfer girl and on the looper (heel caps) will not have to be worked any more. Material and time is saved. This is demonstrated in a still better way in comparing two mills of the same capacity in the same style articles and considering the difference in cost of production.

#### MILL A.

##### Ladies' Hose Department:

Capacity 600 doz. per Week.

MILL EQUIPMENT: (Knitting Room)

8 leggers of 18 sections each

3 footers of 18 " "

Total 11 knitting machines.

OPERATORS REQUIRED:

11 knitters averaging \$20 each per week

3 transfer girls averaging \$8 each per week

##### Half-Hose Department:

Capacity 900 doz. per Week.

MILL EQUIPMENT: (Knitting Room)

4 leggers, 24 sections each

3 footers, 24 " "

Total 7 knitting machines.

OPERATORS REQUIRED:

7 knitters averaging \$20 each per week

5 transfer girls averaging \$8 each per week

#### MILL B.

##### Ladies' Hose Department:

Capacity 600 doz. per Week.

MILL EQUIPMENT: (Knitting Room)

10 machines, 18 sections each.

OPERATORS REQUIRED:

10 knitters averaging \$20 per week

No transfer girls needed.

##### Half-Hose Department:

Capacity 900 doz. per Week.

MILL EQUIPMENT: (Knitting Room)

5 machines, 24 sections each.

OPERATORS REQUIRED:

5 knitters averaging \$20 each per week.

The transferring of the rib tops for half-hose is not taken into consideration, as this operation remains the same in either Mill.

#### SAVINGS OF MILL B.

##### (a) In the Ladies' Hose Department:

\$20 wages of one knitter

\$24 " " three transfer girls

\$18 or 3c on each Doz. on looping

\$ 9 or 1½c " " " seaming

\$12 in ravelings or waste \$83. per week

##### (b) In the Half-Hose Department:

\$40 wages of two knitters

\$40 " " five transfer girls

\$27 or 3c per Doz. on looping

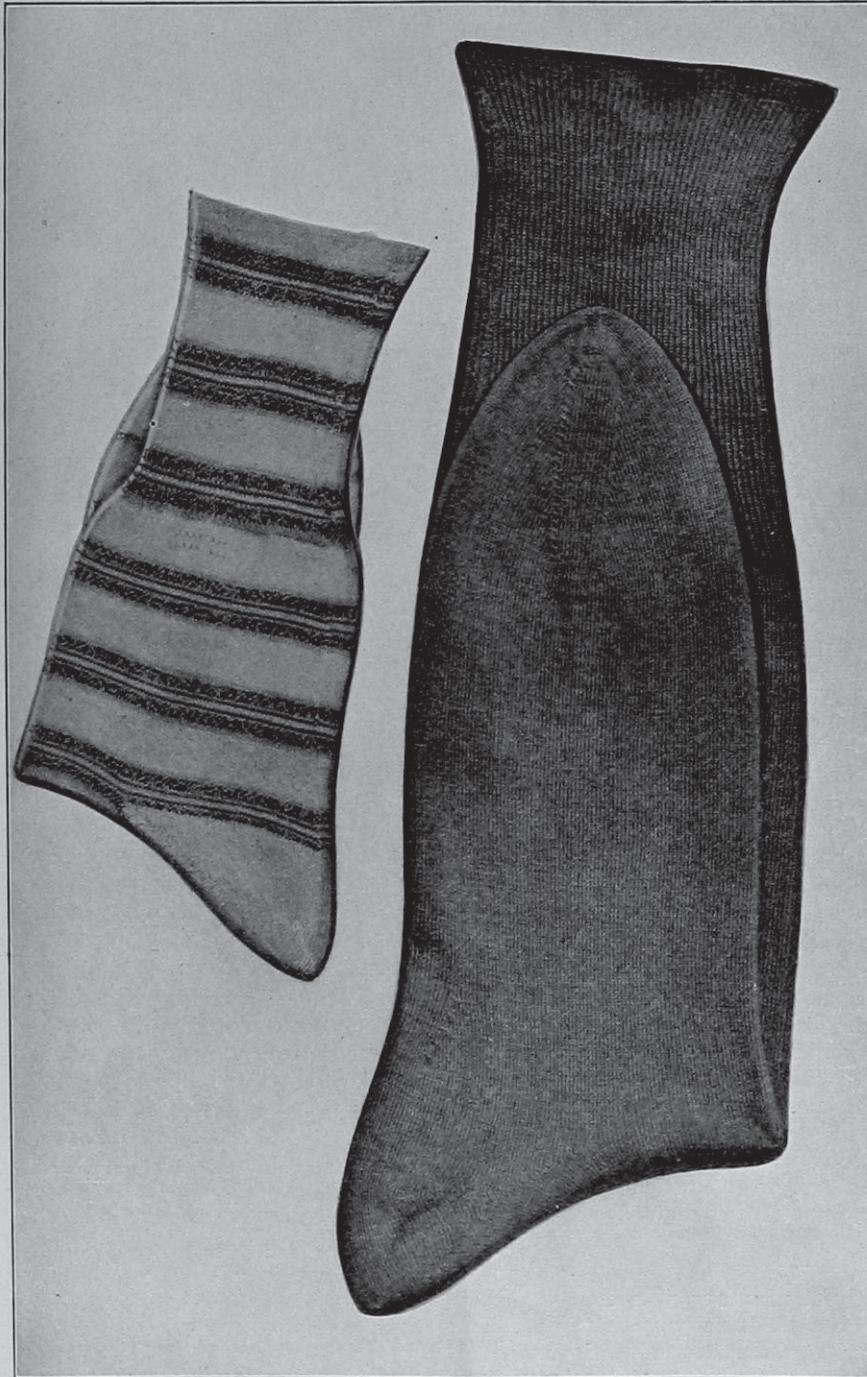
\$13.50 or 1½c per Doz. on seaming

\$16 on ravelings or waste \$136.50 per week

TOTAL SAVINGS OF PLANT B: \$219.50 per week



## PLATE 5



FINISHED APPEARANCE OF HILSCHER'S WEDGE HEEL HOSE (folded)



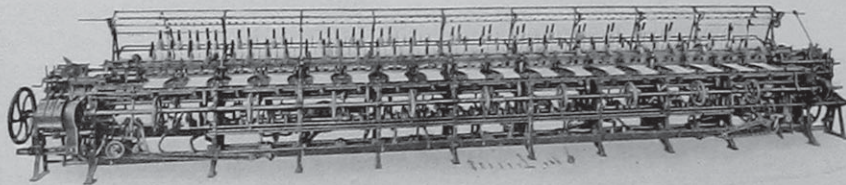
MILL A, a full fashioned hosiery mill with a weekly output of 600 dozen ladies' hose and 900 dozen half-hose in regular cotton goods. This mill is still operated on the regular Cotton Patent Machines, while MILL B, has just put in the new machines and follows the new process. The production of both Mills is exactly the same and the best machine on the market has been selected for comparison.

A saving of \$11,000 (eleven thousand dollars) a year is certainly worth while considering, even if an extra investment of about \$7,000 is required for the machinery in the knitting room. The cost of several loopers and seamers would still have to be deducted,

the simplicity of the hand motions to be performed in starting up and finishing off each article.

To avoid variations in the adjustments of the delicate narrowing and lace attachments all machines in finer gauges and above 16 sections wide, are provided with divided covering bars, operated from independent graded cams. The re-setting of those graded cams is quickly made, simply a dropping down in normal position by releasing the catch. No possibilities of wrong setting. Quick change from size to size.

The short set needle and correspondingly short sinker motion will permit to run the Hilscher machines



HILSCHER'S COTTON MACHINE. 18 SECTIONS.

as Mill B will require less finishing machines than Mill A has to run. In this figure the saving of power (about 15 per cent.) compared with Mill A and the cost of mending defective work have not been taken into consideration, but they will speak strongly in favor of the management in Mill B.

As soon as fancy goods are made, that is, striped hose, lace work, Scotch plaids, or any other combination in plaiting effects, etc., Mill B will be considerably better off than the other plant. The difference in cost of the machinery will be reduced to nothing or even go in favor of the new Mill.

Where space is limited, help difficult to obtain and keep at work, where the management wants to run a plant on the most economical basis, the Hilscher high speed wedge heel machine will give entire satisfaction and solve the problem.

German hosiery manufacturers have taken advantage of this new system of making hosiery and are able to produce, at advanced cost of cotton and paying increased wages, an article within the price limits, which could not be duplicated on the regular Cotton Patent Machines. The public here has been fairly well acquainted with the new shape of the heel and wearers have found out that it fits the foot better than any other heel hitherto produced on full fashioned or circular hosiery machines. Here then is an opportunity for enterprising manufacturers to work up a new line of business and increase the profits of the mill by reducing cost of production.

The HILSCHER FULL FASHIONED HOSERY MACHINES are built for high speed and large production. All the essential working parts are of the highest grade material, well tempered. The cam motions are very well balanced, assuring smooth and silent running. Accessibility of the working parts is another point in favor of this special make of knitting machinery and operators are very much pleased with

at very high speed (Wedge heel machines 52 Rev. p. m., regular High speed Cotton's Patent 62/64 Rev. p. m.). Further details will be cheerfully submitted by the American representative: The Grosser Knitting Machine Co., MAX NYDEGGER, 260 West Broadway, New York.

#### A Reinforced Stocking, Presenting a White Surface to the Foot, with a Colored Outside Surface.

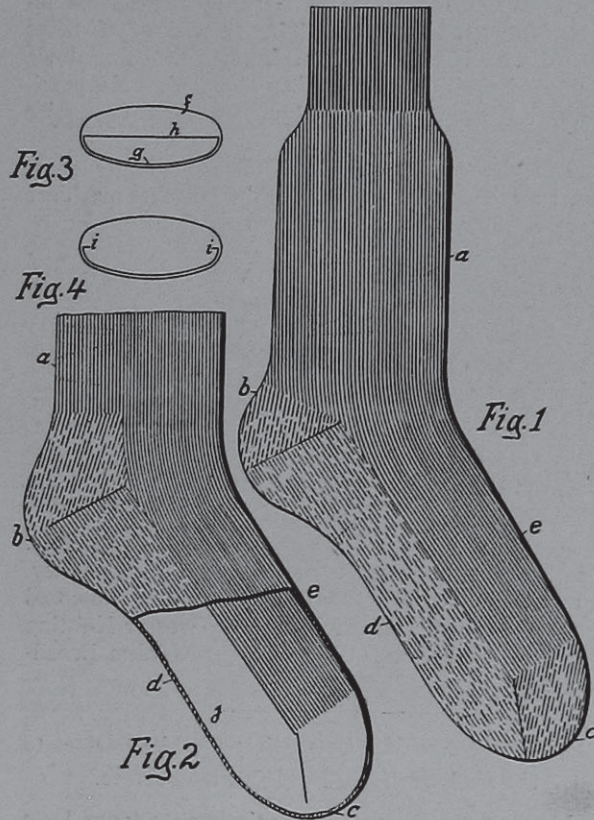
Many of the dyes used in coloring stockings have a tendency to reduce the strength of the yarn, and consequently also that of the stockings. This has been the reason for making the heel, bottom of the foot and toe of such stockings of white thread, and as these portions of the stocking are subjected to the greatest wear, the stocking is thus made more durable. Such stockings are also considered more sanitary as the part of the stocking which comes in contact with the foot with the greatest pressure is undyed.

To more clearly show the construction of the new stocking, the accompanying four illustrations are given, of which Fig. 1 is a view in elevation of the stocking. Fig. 2 is a view partly in section to show the interior of the foot of the stocking. Fig. 3 is a diagram showing the threads as they appear in the foot of the stocking after knitting, and Fig. 4 is a like view showing the float threads removed.

Examining illustrations we find knitting to be done with a thread of the desired character down to the heel, and when then an additional thread of a different character is thrown in and plaited so that the white thread appears only on the inside of the stocking. After the heel is completed, knitting with both threads is continued, the additional thread being knitted only across the portion of the web which is to be the foot of the stocking, such thread being plaited



as in the heel, and floated across the part of the web which will form the top of the foot of the stocking. When foot is completed, the toe of the stocking is knitted in the same manner as the heel, *i. e.*, entirely around that portion of the stocking.



In the illustrations *a* denotes the leg, *b* the heel and *c* the toe of the stocking; *d* is the bottom and *e* the top of the foot of the stocking. *f* is the body thread forming the leg and top of the foot of the stocking, and *g* is the additional white thread. *h* denotes that portion of the additional thread as is floated from one side of the web to the other in the centre of the foot of the stocking. *i* denotes the ends of the float thread after the main portion of the float has been cut out. *j* is the plaited inner part of the foot of the stocking, which, beginning with the heel extends along the bottom side of the foot, and throughout the whole of the toe of the stocking.

**ADVANTAGES.** It will thus be seen that the main portion of the stocking, the leg and top of the foot of the stocking are made of one character of yarn and that the heel, bottom of the foot and the toe of the stocking are made of the same yarn, strengthened by the addition of another thread, which addition increases the wearing capacity of those parts. It will also be seen that these strengthened portions of the stocking are white, and that this surface is the surface that comes in contact with the foot of the wearer with the greatest pressure, thus giving the stocking all the advantages of a white solid or a *split-foot stocking*, while at the same time the objectionable feature of discoloration of a white or a *split-foot*

stocking is removed, the new make of a stocking at the same time possessing all the advantages of such goods, together with the advantages of a reinforced or *spliced* stocking.

#### An Improvement to Knitting Needles.

In this needle, the remaining portion of the wire, after forming the butt of the needle, extends downwardly, then laterally and upwardly, the terminal of said upward extension being provided with an off-set.

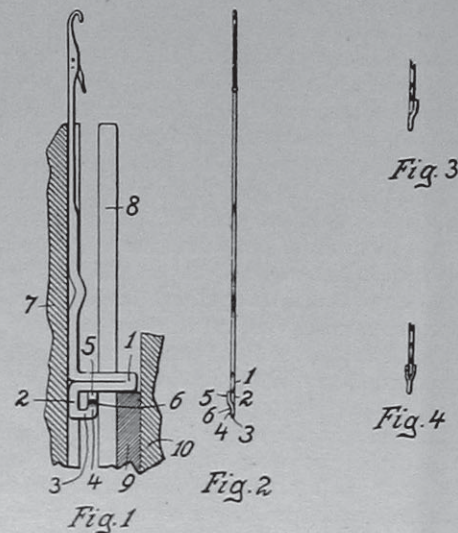
Of the accompanying illustrations, Fig. 1 represents a side elevation of this needle, showing also the needle cylinder and skeleton cylinder (of usual construction) employed in conjunction therewith. Fig. 2 represents an end elevation of the needle shown in Fig. 1. Figs. 3 and 4 show different positionings of the off-set of the needle.

Numerals of reference in illustrations indicate thus: 1 is the butt of the needle, the latter having depending therefrom the extension 2, which is continued laterally at 3 and upwardly at 4, the terminal 5 of said upward extension being provided with an off-set, which begins at the point 6.

7 designates the needle cylinder and 8 the skeleton cylinder of the head of the machine. 9 shows the needle rest as is attached to the cam cylinder 10.

From illustration Fig. 1 it will be seen that by reason of the extensions 2, each needle is held in proper relation with respect to the regular needle cylinder 7 and the skeleton cylinder 8, while by reason of the employment of the terminals or the off-sets 5, it will be seen that each needle is spaced in proper relation with respect to its adjacent needle. The needles thus being spaced from each other to the desired extent, at the same time can be set somewhat closer together, whereby it is claimed, a greater number of needles can be employed in a given space and consequently finer work can be done on the machine.

Off-set 5 of the needle, can be deflected to either the right (see Fig. 3) or left (see Fig. 2) of the butt



1, or if need be, it can be split, having the members deflected to both sides of the butt (see Fig. 4).



### A NEW QUICK MOTION FLAT RIB TOP MACHINE.

E. O. Spindler, 350 Broadway, New York City, is introducing into this country a new Type of *Flat Rib Top Machines, improved Cotton System*, which attracts the attention of our leading manufacturers of Hosiery and Underwear.

Originally built in France, this machine has been perfected and patented by the builder, Karl Lieberknecht, Oberlungwitz, Saxony.

The machine is used for making Rib Tops on Full Fashioned Hosiery, for Full Fashioned Sleeves on Ribbed Underwear, and for Cuffs and Drawer bottoms.

The remarkable feature about the machine is its enormous production and unapproached elasticity of the fabric it produces. The machine runs fully 30 to 35% faster than any other machine now on the market for the manufacture of Flat Rib Work. The machine is constructed on a new principle of dividing and pressing off, whereby the movements of the parts forming the loops are considerably shortened, resulting in increased output and a very elastic fabric, which is far superior to that of ordinary style machines.

On account of the principle, on which it is constructed, the machine knits a very wide range of numbers of yarns, without injuring the elasticity of the fabric.

Another important feature is the draw thread attachment, whereby the cuffs or sleeves can be separated by pulling out a dividing thread, thus making cutting unnecessary. Not taking into consideration the attractive appearance of the cuff, thus separated without cutting, this feature will save the manufacturer a considerable percentage of cuffs, which are ordinarily spoiled by cutting. The machine is strong and simple in construction and easy to operate.

The illustration shows a ribbed sleeve for children's vests made on this machine. The sleeve is widened in two places, the widening is done fully automatically, making it unnecessary to stop the machine every time the widening process begins.

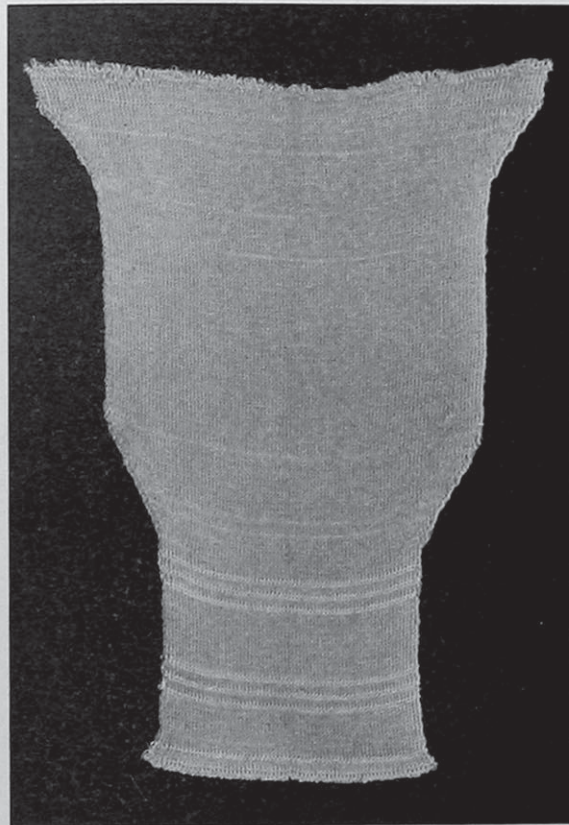
Machines fitted out with this widening attachment for making Full Fashioned sleeves run fully 40 courses a minute on 27 gauge, on work as shown by illustration.

The selvage produced is perfect, and the machine makes a Welt of any desired length automatically, a feature, which appeals to every underwear manufacturer.

For Hosiery Purposes the machine can be fitted up with six thread carriers, of which each one, through a simple and ingenious arrangement, places itself automatically in position between needles and sinkers, so the distance of the latter from the needles never varies, but is always the same. Ordinarily the machines are built with attachments for six color striping, tuck stitch, plating, plated tuck stitch, loose course, draw thread separating cuffs, but they can also be built with widening attachment as shown in illustration, narrowing, or with apparatus for Jacquard patterns.

The usual length of the machine is from 4 to 16 sections, and it is built in any gauge.

SUMMING UP, this new Type Machine, of which several are running in this country already to the



highest satisfaction of the purchasers, has so many striking points of merit, notably high speed, and turning out a fabric of unexcelled elasticity, that it is to-day the foremost and ideal Type of machinery for making staple and fancy rib work. This concern also builds Full Fashioned Hosiery and Underwear machinery, Cotton System, which enjoy a high reputation here and abroad.

**GREAT GROWTH OF PHILADELPHIA'S COMMERCE:** In spite of the adverse conditions under which it is conducted, the commerce of this port is increasing continually. From the report presented at the thirty-third annual meeting of the Maritime Exchange it is seen that merchandise was exported from here last year to the value of \$107,000,000. Ten years ago the figures covering the same business were \$51,000,000. This shows a very important and encouraging development. It is also to be noted that the value of the imports had risen from \$43,000,000 in 1897 to \$80,000,000 last year, which shows a somewhat similar ratio of growth. There were 302 sailings of transatlantic cargo steamers last year as compared with 254 the year before.



# Posselt's Textile Journal

*A Monthly Journal of the Textile Industries*

PUBLISHED MONTHLY BY

E. A. POSSELT, 2028 BERKS STREET,  
PHILADELPHIA, PA.

#### SUBSCRIPTION RATES:

United States and Mexico, \$3.00 per year.

Other Countries in the Postal Union, \$4.00 per year.

Single Copies, 25 cents.

This Journal is published on the tenth of each month.

Postage prepaid by the Publisher.

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

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

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

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

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

#### ADVERTISING RATES:

WANTS, FOR SALE, ETC. If set solid under Classified Advertisements, Special Notices, Help Wanted, Situations Wanted, Machinery for Sale, Etc., will be inserted at the rate of 25 cents per line, for each issue, if the answers are to come in care of this office to be forwarded; 20 cents per line, if replies are directed to advertiser. Count 10 words to one line.

• Payment must be made in advance for all transient advertisements.

Rates for Regular Advertisements will be furnished on application.

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

ALL COMMUNICATIONS WILL BE CONSIDERED AS CONFIDENTIAL.

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

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

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

The joint convention of the *National Association of Hosiery Manufacturers* and the *American Knit Goods Manufacturers' Association*, held in Philadelphia on May 11th to 16th inclusive will prove very interesting as well as profitable to those who are interested.

The sessions of the respective Associations will be held in the Convention Hall of the Continental Hotel. The first session will be held on Monday morning, May 11th, at 10 A. M., when the various committees of the National Association of Hosiery Manufacturers will deliver their reports.

The morning and afternoon sessions on Monday, Tuesday and Wednesday will be in the interest of the National Association of Hosiery Manufacturers. Part of the time will be given over to addresses and discussions of various topics that are of vital interest to any Hosiery Manufacturer, such as: "Trade Associa-

tions, a World Power; Unjust Cancellations; Advantage of Uniform Terms; Interchange of Credit Information; Net Weight Yarns; German Reciprocity Agreement; The Tariff; Ways and Means to Eliminate Trade Abuses," etc.

The various divisions of the Hosiery Manufacturers' Association will hold sub-meetings before and after the regular afternoon sessions, viz: on Monday at 1.30 P. M. in Parlor C, the Manufacturers of Children's Ribbed Hosiery, and at 5.30 P. M., the Manufacturers of Men's Half Hose; on Tuesday at 1.30 P. M., same place, the Manufacturers of Women's Flat Seamless Hose and at 5.30 P. M. Manufacturers of 200 needle and over Seamless Half-Hose and Full Fashioned Hosiery of all kinds.

The American Knit Goods Manufacturers' Association will begin their sessions on Thursday morning at 10 A. M. The routine will be along the same lines as the Hosiery Manufacturers' Association. The topics for discussion will be the same as the Hosiery Manufacturers' together with "Advantages to be derived through the adoption of a Uniform Order Blank; Possible benefits through the adoption of Uniform Terms; Elimination of Freight and Cartage Allowances (Would it prove beneficial or otherwise?); Special Packing (Can this abuse be corrected?);" as well as a number of other topics of interest to any progressive manufacturer of to-day.

In bringing The Journal before the Hosiery and Knit Goods Manufacturers' Association, a few Abstracts from Letters received from Subscribers interested more particularly in this industry, will be in place: "I appreciate the great value of your magazine;" "We will certainly be pleased to say a good word for your publication, and trust that it will meet with the success that it deserves;" "I would like to have a complete set of journals, as I think it is the best ever;" "In better shape than any we have heretofore seen;" "I receive your publication regularly and it not only interests me very much, but I get a lot of practical information from it;" "I think your journal will be of immense benefit to me," etc.

A SURE SIGN OF RETURNING ACTIVITY OF BUSINESS makes itself manifest by the Pennsylvania R. R. sending out a committee of its officials to ascertain from manufacturers the amount they expect their business to be increased during the month of May. On account of the mills resuming operations, the railroad fears that it will be unable to handle the increased traffic. The company wants to know how many additional cars to place in running order to meet the increased volume of business.

The United States furnishes about one-third of the machinery used in Mexico in the manufacture of cotton goods, the remaining two-thirds, as now employed, coming from England and Germany. The bleaching, dyeing, and printing establishments are usually of modern construction and equipped with all up-to-date appliances.



At the annual meeting of the *National Association of Cotton Manufacturers* held in Boston on April 16th and 17th, very interesting addresses were made by Charles H. Fish, Esq., Chairman; Arthur A. Noyes, Ph.D., President Massachusetts Institute of Technology; His Honor, Eben S. Draper, Lieutenant-Governor, *Acting Governor*, and William D. Hartshorne, Esq.

A special feature of these conventions is always the reading of interesting papers pertaining to the textile industry; this session bringing up discussions of the following subjects: "The Steadying Power of Consolidation; The Arts of Weaving and Spinning; Cotton Mill Stocks as Investments; The Need and Advantages of a Cotton Exchange in New England; Improvements in the Cotton Fibre from Storage of Seed Cotton; Egyptian Cotton; Sea Island Cotton; Cotton Cultivation in West Africa; Conditioning Cotton Yarns; Yarn Testing; Combing Short Staple Cotton; Economic Possibilities of Good Lubrication; The Construction and Ventilation of a Weave Shed; Belts and Belt Transmission; Steam Turbines; What a Manufacturer Should Know About Coal; Heating Systems for Mills."

The Association dinner was held on Thursday evening at Hotel Brunswick; music was furnished by Keene's Orchestra, and the addresses of the evening were delivered by His Honor George A. Hibbard, Mayor of Boston; Henry Clews, LL.D., N. Y.; Rev. Frederick W. Hamilton, D.D., LL.D., President Tufts College; Hon. Harvey N. Shepard, Boston, and William Whitman, Esq., Boston, Mass.

The members of the Association and their guests were entertained by the Boston Museum of Fine Arts, who gave them the opportunity of visiting their galleries and inspecting their Collection of Textiles, and by the Boston Art Club, who were holding their sixty-eighth Exhibition of Paintings.

---

WHEN VISITING the Betsy Ross House—the Birthplace of Old Glory (see page 97 of your program) don't miss to visit 213 Race street (only one square away) the Birthplace of the most Modern American Knitting Machinery.

---

#### Ribbon and Narrow Ware Manufacture.

This is a new work by Professor O. Both of the Imperial Weaving School of Barmen, Germany, just published on the Continent. Barmen is one, if not the most important city on the Continent with reference to the manufacture of ribbons and other narrow ware goods; the textile school of that city laying special importance on that subject; besides this, the treatise is the first one published specially on this subject of the textile industry. For this reason, in the interest of our readers, we give them a translation of the work in the columns of this journal. This month's installment treats the rudiments of the manufacture of these fabrics, and which wherever necessary we rearranged, so as to present the affair as concise as possible.

#### A STUDY OF KNITTING.

(Continued from page 281.)

**Split-foot hosiery** is a term applied to socks or stockings which have the bottom part of the foot, the sole, made from a different color yarn than the top part of the foot, or simply with the sole of the foot a different color from the top. Split-foot hosiery was originally made on the circular independent needle type of knitting machine, but it can be made on the ordinary circular machine as well, also on the flat-bed machines. With the circular, independent needle machine, the cam cylinder is given a reciprocating motion (from side to side) so that the cams operate half the needles alternately, first on one side and then on the other. Yarns of different colors are fed to each set of needles by separate feeds, feeding both yarns to the same two or three needles at each end so that the two halves from different threads will be fastened together by interlooping stitches. This operation causes each yarn to form courses halfway around the foot of the stocking, so that half of it is one color and half another color, the two halves being joined by the interlooping stitches at their edges. The same principle can be extended to include the whole stocking, making half of it one color and half another, or the two different colored yarns can be interlooped in the same given pattern. By alternately operating various sets of needles in the manner described, a great variety of fancy effects in colors can be produced. Usually, split-foot hosiery is made with the sole of the foot white and the top or the rest of the stocking black or any desired color.

The best grades of split-foot hosiery are made nowadays on the flat-bed machine, of the Cotton type, one style requiring four separate machines for its completion. The leg is first made on the regular plain or circular rib stitch machine, the heel is knitted on one of the Cotton machines and when it is finished, the ends are looped together on a looping machine and run on point bars along the inner selvedge ends. The piece is now transferred to the footing machine, which knits the bottom of the foot, to the toe, after which it is taken off and put on the point bars and then transferred to the knitting machine, which completes the top of the foot, the toes being finally closed by the ordinary looping machine. Another style of split foot has only one seam down the middle of the bottom of the foot and no seam at the back of the heel, this style being known as *French foot and pocket heel*. In knitting this kind of hosiery, the heel is made in one piece on one machine and the foot, in one piece, on another machine, the two being joined together, and the foot is completed by looping the seam along the bottom of the foot. In the first mentioned style, the foot is looped at the bottom of the heel and toe and seamed at the back of the heel and along the sides of the foot. Naturally, it is more expensive to make than the last mentioned style, since more operations and handling are required, and therefore the French foot is most commonly employed.

Split-foot hosiery can be made on the ordinary circular latch needle machine by using two yarn feeds



for the foot part and feeding the different colored yarns alternately to the needle on each side, half of the needle knitting with one yarn and half with the other yarn. The yarns are fed to the needles in turn, feeding both yarns to two or three of the needles at the ends of the halves so that the two parts will be joined together by the interlooping of the stitches. The free ends of yarn are floated across the inside of the foot and cut off close to the web when it is completed. This method, using white and black yarns for the feeds, as an example, will produce a foot in which the upper part is black and the lower part is white, the two parts being joined together by a seam of interlooped threads, which, if the operation be done properly, will be as strong as the rest of the stocking, although the two parts are not actually knit together. The important point in the operation is the timing of the feeding of the different threads so that they will be fed alternately at the proper moment. While knitting the heel and the toe, one color can be used for knitting the upper part by itself and the other thread can be used for knitting the lower part alone.

An imitation split-foot stocking can be produced by special manipulation of white or unbleached hosiery during its dyeing in the following manner: Patterns are cut from metal that will exactly cover the lower part of the foot of the stocking and these are tightly clamped over the foot so as to protect the part to be left white from any contact with the dye liquor or from absorbing it during the dyeing. The stocking is then put through the dyeing process in the usual manner, care being taken that it is not left in the bath long enough for the dye to soak up into the protected part. If the operation be carefully done, when the patterns are removed the lower part of the foot will be found white, with a well-defined contrast between it and the dyed portion, which will more or less resemble the genuine produced split-foot effect.

**Striped Hosiery** may be made with either vertical or horizontal stripes. Vertical stripes may be made by a modification of the operation previously mentioned for making split-foot hosiery. Horizontal stripes may be made by feeding different colored yarns to the needles, at proper intervals, from bobbins carried on holders set on the machine. The alternate feeding of the different colored yarns may be done automatically or by the operator, in the first instance, the automatic feed is regulated by a pattern chain or a pattern wheel. In changing feeds, the old yarn should be continued for a couple of courses with the new yarn before breaking it off, so that the different sections of the web will be securely joined together by the interlooping stitches. Another method of making striped effects with the use of a continuous yarn is to have the yarn dyed previously in lengths to correspond with the desired stripes, or separate yarns could be used, which must be spliced together at the end of one stripe and at the beginning of another.

**Fancy Hosiery:** other color effects may be produced in a variety of ways, different colored yarns being fed together as one, for example, or at proper intervals. When two colored threads are fed together as one, the

tendency is for them to twist around one another, thus producing varied effects. In fact, there is an almost infinite variety of colored effects possible by using different colored threads and varying the feeds. Still other colored effects can be obtained by suitable manipulation of the needles, by preventing some from coming into action during certain courses or by throwing some out while others are in, the result being that some needles will take only colored threads at times, and at other times all of the needles will take the same thread. Again, by using tuck stitch and plain stitch at intervals, and with different yarn feeds, very attractive colored and fancy designs can be produced in patterns, stripes, bars, etc. Hosiery can be knit with tops of a different color from the rest of the leg, or, this difference can be confined to a narrow stripe of a contrasting color around the top of the stocking or sock, or the welt at the top can be made a different color. A neat and finished appearance can be given to even cheap hosiery by use of this contrasting stripe or bar around the top, which will make the stocking look like a much more expensive quality. Still another method of producing fancy color effects is by the use of two separate sets of needles, the latches of one set being longer than the latches of the other set, with two separate yarn feeds, each feed carrying a different colored yarn. The needles are controlled by cams, etc., so as to take first one and then the other of the two yarns and to knit them into stitches, the long latch needles making tuck stitches at certain points and plain stitches at others, the short latch needles making plain stitches all the time. The fabric made by this method can be knit in diagonal, broken or colored stripes or will give a herringbone pattern, accordingly as the cams are set to actuate the needles.

Of course, all sorts of colored effects can be produced by various methods of dyeing hosiery, but this will not properly come in under this discussion of actual knitting methods, the reference is made chiefly in connection with dyeing imitations of knitted patterns. Cheap grades of hosiery with fancy colored patterns can be made by the application of a printing process similar to that used for making printed goods, but the results will not be equal to those obtained by actually knitting the patterns in the web, either as to durability or appearance. Formerly, this method was much used, but since the invention and application of the many devices and attachments to knitting machines by which all sorts of fancy and colored effects can be produced, printing is less used.

An example of the devices by which fancy patterns can be produced in hosiery is the so called *Jacquard knitting machine*, on which the patterns are made by automatic moving parts which work with independent threads to form combinations in color or design. Fancy effects can also be made with the rib stitch knitting machine by combining the various rib stitches with the drop stitch and tuck stitch.

Another method of producing fancy hosiery is by working designs in colored silks or mercerized cottons on a background of plain knitted fabric. These designs and patterns can be made as simple or as elab-



orate as may be desired, their only limitation being the selling price of the finished article. The designs can be worked by hand embroidering or on a machine, according to the price of the goods, very pleasing patterns being worked with the chain stitch on sewing machines adapted to this work. A point to be borne in mind is that neat and harmonizing color effects and patterns will always sell better than extreme designs which may be called for by a passing fad.

**RIBBED HOSIERY:** Ribbed hosiery is knit on the rib stitch machine, which has two sets of needles, one on the needle cylinder and the other set on the dial, each set being worked by a separate cam system, which produce the rib stitch previously explained. The characteristics of ribbed hosiery are its greater elasticity and thickness than plain knit hosiery, and it is consequently more durable. The foot of a ribbed stocking is made on a plain-stitch machine, the leg being transferred to the needles of the plain-stitch machine so that the end loops are taken up by them and then the foot is knit in a continuous piece with the leg.

A great variety of fancy patterns and fancy ribbed effects can be produced on the rib stitch machine by manipulations of the needles, omitting some at regular intervals in the cylinder or in the dial or from both. Wherever needles are omitted, drop stitch effects will appear in the web, and these may be varied in width or separation, as may be desired, by omitting needles at certain fixed intervals. The pattern produced depends upon the way the needles are grouped together and omitted, and the resulting fabric is usually given a name to correspond with the way the needles are placed. Thus, if two needles are in the dial and two in the cylinder and separated by two omitted needles, the resulting fabric will be called 2 and 2 rib, plain rib knitting being called 1 and 1 rib. Where one needle is omitted between groups of two or three needles, the work is often called *line work*, and is known as *two-needle line work* and *three-needle line work*, respectively, according to the grouping and spacing of the needles. This work is also sometimes called *needle-out effect*, and many varied patterns can be produced according to the manipulation of the needles. In some mills, all needle-out work is referred to as *Richelieu-rib*, in others, the term is restricted to apply to a certain combination, usually 5 and 3, with 2 and 2 work in between. Richelieu-ribbed hosiery is generally understood to mean a stocking with a single drop stitch in lines separated by a narrow strip of plain rib web, these running the full length of the sock or stocking. Similarly, *Rembrandt-ribbed* hosiery is the name given to hosiery which has several drop stitches, usually five, separated by a strip of plain rib web an inch or so wide, both extending the full length of the sock or stocking. *Derby-ribbed* hosiery has six ribs showing on the outside alternating with three ribs showing on the inside.

The plain rib stitch is often combined with drop stitch and tuck stitch to produce fancy effects in hosiery, and with *needle-out work* very pleasing patterns can be made in imitation of lace-work, or, regular openwork designs can be produced in this way.

**PLATED HOSIERY** is a term applied to designate hosiery that has been knit from two or more different yarns, in such a manner that the outside of the web is made from one yarn and the inside face is made from another yarn, or, the centre of the web may be made from one kind of yarn, the outer face of another kind and the inside face from still another yarn. The effect is the same as if two or more separate fabrics were laid together, with the difference that the separate webs are so interlooped together in the knitting that the resulting web is practically a single fabric. Plated hosiery can be made in a variety of styles and from a variety of textile fibres in one piece, the socks or stockings so made being thicker and heavier than plain knit hosiery and much more durable. The chief uses of this method are for producing a web of extra weight or durability or to produce an expensive looking garment at a low cost, which can be done by using several different kinds or grades of yarn, using an expensive yarn for the outside face of the piece and a cheaper yarn for the inside face. For example, hosiery can be made with a wool or silk face and a cotton backing, or, with a cotton centre and wool on both sides, or, a heavy yarn on one side and a lighter yarn on the other side, etc. Plated hosiery is also made with the face of one color and the inside of another, or the sides may be made from yarns of different counts or texture, in fact, the range of combinations and effects possible is almost unlimited. The effect of this combination of yarns and webs is to produce a thick, sometimes heavy, fabric, of great durability when properly made and much closer and warmer in texture than single thread knit goods. Its chief advantage is that by this method it is possible to make expensive looking hosiery at a much lower cost than if the entire web was made from the higher priced yarn or thread, thus, a fine-looking silk stocking can be made with the outside silk and the inside cotton, and this article will not only look as well as an all-silk stocking but will also be more durable.

On latch needle knitting machines, plated hosiery is made by using two or more yarn feeds, one feeding inside the other, the two or more threads or yarns going into the hooks of the needles and being made into stitches as if they were only one thread. The threads or yarns are laid in the needles in their proper relative positions to form face and back of the web by the feeding devices, the latches of the needles being made longer than for the ordinary needle so that there will be room in the hooks for the several threads. On spring needle knitting machines, plated hosiery may be made by using a thread guide with two sets of holes to feed the two yarns, the face yarn being fed from the upper hole and the backing yarn being fed from the lower hole. A better way is to use two sinker burrs, one for each feed, and to deliver the face thread to the first burr in order of rotation, making the stitch of this burr longer than the stitch of the burr for the backing thread. The advantage of this latter method is that by using two sinker burrs the work of making the stitches is divided between them and a more even stitch is therefore made.

(To be continued.)



## Wool, Cotton and Silk Designing and Fabric Structure for Harness Work.

### DIAGONALS OR 63° TWILLS.

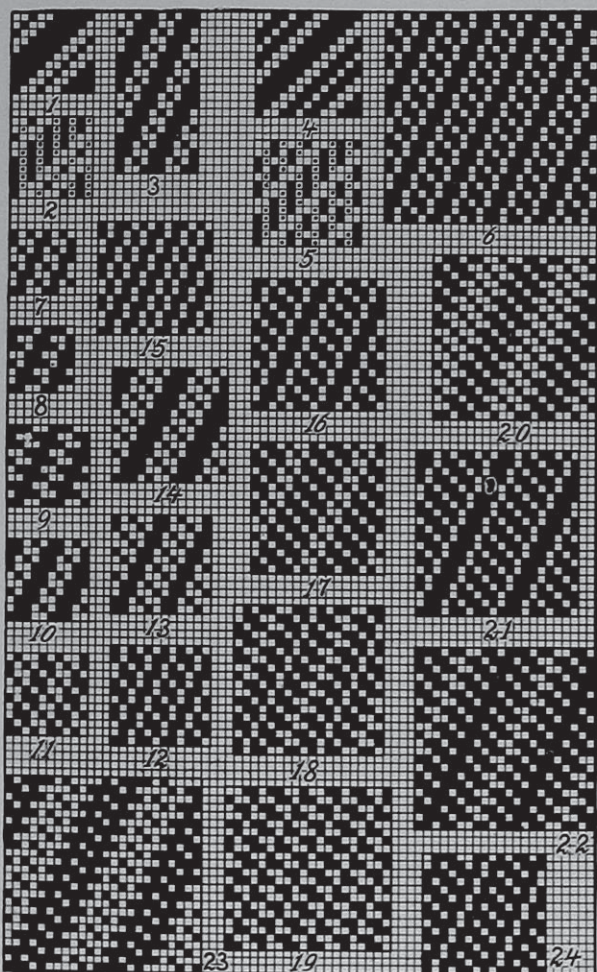
This system of weaves is another subdivision of our regular or 45° twills, from which they are obtained in three ways:

(a) By means of warp drafting, from one 45° twill;

(b) By means of filling drafting, from one 45° twill; and

(c) By means of filling drafting, combining two 45° twills in the formation of the new weave.

We will treat each of these different ways of producing diagonals separately.



Diagonals obtained from one 45° twill by means of warp drafting.

**RULE:** Use every other warp thread only of your regular twill for the new diagonal. This rule at once will explain to the student that for this reason 45° twills having an even number of harnesses for their repeat produce diagonals calling for half the number of harnesses only for their repeat, as is required for the foundation twill; *i. e.*, a 10-harness regular twill will result in a 5-harness diagonal, a 16-harness regular twill will produce an 8-harness diagonal, etc.

Foundation twills having an uneven number of

harnesses for their repeat will not reduce the number of harnesses required for the diagonal, and when consequently a 9-harness regular twill, if used for foundation, will result in a 9-harness diagonal; a 15-harness regular twill in a diagonal requiring 15 harnesses for its execution on the loom, etc. This feature, of not reducing the number of harnesses for diagonals obtained from regular twills of an uneven number of harnesses for their repeat is explained in that in this instance two repeats of the foundation twill have to be used for drafting until the repeat of the diagonal is obtained, drafting first all the uneven number of warp threads of the foundation twill, and then all the even number warp threads of the foundation twill; for the fact that the last uneven number of warp thread drafted from the foundation twill throws the drafting on the even number warp threads, to be taken in succession, and when the last even number warp thread drafted from the foundation twill, in turn throws the drafting back onto the uneven number warp threads of the foundation twill, *i. e.*, the repeat of the diagonal is then obtained.

We will now explain this system of designing diagonals by a few practical examples, selecting nothing but good, practical weaves for this purpose, each and every one of which can be put to use as occasion for this style of weaves demands, they all being practically tested, *i. e.*, weaves which have been used with good results.

Weave Fig. 1 is our 5 up 2 down 1 up 2 down, 10-harness regular twill, one repeat being executed in one kind of type.

Diagram 2 shows this same weave executed in two kinds of type, all the uneven warp threads (1, 3, 5, 7, 9) being shown by means of *black* type, whereas all the even number warp threads (2, 4, 6, 8, 10) are shown by means of *dot* type.

According to rule of construction for these diagonals given before, we now use only all the warp threads shown by means of *black* type in Diagram 2, in the construction of the new diagonal, *i. e.*, drafting warp threads 1, 3, 5, 7, and 9 successively for the new diagonal, the procedure resulting in weave Fig. 3, *i. e.*, the new diagonal or 63° twill obtained by means of warp drafting from its regular twill shown in weave Fig. 1. This new diagonal repeats on 5 warp threads and 10 picks.

We will now show this system of drafting diagonals in connection with regular twills having an uneven number of harnesses for their repeat by weave Fig. 4, Diagram 5 and weave Fig. 6, and of which:

Weave Fig. 4 is the 4 up 2 down 2 up 1 down 2 up 2 down, 13-harness 45° twill, executed in one kind of type.

Diagram 5 is the same weave shown in two kinds of type, with *black* type and *dot* type, and

Weave Fig. 6 shows two repeats each way of the new diagonal, obtained by means of warp drafting from weave Fig. 4; the drafting observed in this instance, and which will at the same time explain any drafting for any diagonal obtained from a regular



twill having an uneven number of harnesses for its repeat, is: 1, 3, 5, 7, 9, 11, 13, 2, 4, 6, 8, 10, 12; repeat of the diagonal obtained being 13 warp threads and 13 picks.

Weave Fig. 7 is a diagonal repeating on 4 warp threads and 8 picks, having the *3 up 2 down 1 up 2 down*, 8-harness regular twill for its foundation.

Weave Fig. 8 is another diagonal repeating on 4 warp threads and 8 picks, having in this instance the *4 up 2 down 1 up 1 down*, 8-harness regular twill for its foundation.

Weaves Figs. 9, 10 and 11 are three diagonals, repeating on 5 warp threads and 10 picks; either one having for its foundation a 10-harness regular twill, readily obtained by the student by simply *reading off* the interlacing of any one of the warp threads with its picks, through one repeat of the respective diagonal.

Weaves Figs. 12 and 13 are two diagonals, repeating on 6 warp threads and 12 picks, both having 12-harness regular twills for their foundation.

Weaves Figs. 14 and 15 are two diagonals, repeating on 7 warp threads and 14 picks with their corresponding 14-harness regular twills for their respective foundations.

Weave Figs. 16 and 17 are two diagonals, repeating on 8 warp threads and 16 picks, obtained from their 16-harness, 45° foundation twills.

Weave Fig. 18 repeats on 9 warp threads and 18 picks, and calls for its mate 18-harness regular twill for foundation weave.

Weaves Figs. 19, 20 and 21 are three specimens of 10 by 20 diagonals, obtained from their respective 20-harness regular twills.

Weave Fig. 22 is a diagonal repeating on 11 warp threads and 22 picks, it being obtained from its mate 22-harness regular twill.

Weave Fig. 23 is a diagonal repeating on 12 warp threads and 24 picks, it being obtained from its 24-harness regular twill, readily read off by the student, from any one of the warp threads of the diagonal.

In connection with all the examples of diagonals quoted, from weave Fig. 7 to and inclusive weave Fig. 23, in every instance we have shown two repeats of the diagonal warp ways but only one repeat of said diagonal filling ways.

Weave Fig. 24 is a diagonal repeating on 15 warp threads and 15 picks and which belongs to the class of diagonals explained in connection with Diagram 5, *i. e.*, diagonals drafted from regular twills having an uneven number of warp threads for their repeat. Only one repeat, warp and filling ways, is given in this example.

**Questions.** Construct five (5) diagonals from the following five regular twills:

(1)  $\frac{3}{3} \frac{5}{3} \frac{3}{2} \frac{3}{2}$  24-harness regular twill. Repeat of diagonal, 12 by 24.

(2)  $\frac{4}{5} \frac{4}{5} \frac{4}{2}$  24-harness regular twill. Repeat of diagonal, 12 by 24.

(3)  $\frac{5}{1} \frac{2}{1} \frac{5}{3} \frac{1}{1} \frac{2}{1} \frac{1}{3}$  26-harness regular twill. Repeat of diagonal, 13 by 26.

(4)  $\frac{1}{2} \frac{1}{1} \frac{2}{1} \frac{2}{1} \frac{4}{1} \frac{2}{1} \frac{2}{1} \frac{1}{1} \frac{1}{2} \frac{1}{2}$  28-harness regular twill. Repeat of diagonal, 14 by 28.

(5)  $\frac{6}{3} \frac{1}{3}$  13-harness regular twill. Repeat of diagonal, 13 by 13.

Paint always two repeats warp ways in your answer. This will show up any mistake at once. Paint two repeats filling ways of your diagonal, if in doubt.

### A PRACTICAL TREATISE ON THE KNOWLES FANCY WORSTED LOOM.

By E. P. Woodward, Master Weaver.

(Continued from page 269.)

#### Shuttle Binders.

The form given to the shuttle binder has much to do with the smooth and true boxing of the shuttle. A poorly formed binder can affect the true delivery of the shuttle and be the cause of the shuttle crumbling and splintering on its side, because of its contact with the binder after having made its flight. A binder not properly cared for can also be a cause of much trouble to the weaver and the fixer by causing the filling to cut in the shuttle box. This trouble quite often means imperfect cloth caused by picking out and starting up to avoid misspicks.

The *form* of the binder consists of a curved part which projects into the path of the shuttle, and a part which stands parallel to the back of the shuttle box, when the shuttle (by contact with the curved part) has thrown the projecting end of the binder as far towards the check pin on the shuttle box as may be desired.

The *action* of the binder on the shuttle is to check its flight by frictional resistance (caused by the binder spring and protecting rod springs) after the shuttle, by means of the curved part of the binder, has thrown the shuttle checking part of the binder in a position true to the face of the shuttle. The curved part of the binder should be so formed that the shuttle will not meet an abrupt angle but something more like a long, easy curve. This will prevent the pounding and consequent slivering of the shuttle for two reasons:—

First, the shuttle, when thrown will not be apt to be whipped out of a straight course by the side pressure of the binder and protector springs and the curve of the binder.

Second, on entering the box it will glide in smoothly and then be gradually checked by the flat part of the binder which stands parallel to the back of the shuttle box and true to the face of the shuttle.

The rear end of the binder should not bind the shuttle too far back towards the binder pin, since if it does the shuttle will be pretty sure to cause trouble by *holding* in the picker and retarding the movement of the shuttle boxes, thereby causing the shuttle to fly out or break the picker stick or some other part of the picking device and probably cause a *smash* or breaking of the warp ends.

The binder should not be thrown out so far as to strike and hold against the binder pin, but should have at least  $\frac{1}{16}$  inch clearance between the binder end and the check pin. This will allow the shuttle, to slide freely into the box when the binder is held open and will allow the shuttle to leave the picker easily when the box is changing positions.



Quite often it will be found that the binder pins will creep upwards when the loom is running and it may puzzle the learner why, since he finds the holes are large enough in the binder for the easy fitting of the binder pin. The trouble will be found to be in the lining of the binder to its lugs, through which the check pin passes. The end of the binder will bind on either the top lug or the bottom one. This should not be, and as long as the binder has room to go between the lugs easily it should not be filed to position but taken out and *thrown* to a position which will let it work freely between the lugs and rattle easily from one lug to the other. This throwing can be readily done by a stroke of the hammer on the edge of the binder as follows: Place the binder edgewise on a flat hard surface and strike it as near to the pin hole as possible until the desired alignment is obtained. When all the binders are working freely, there will be no trouble about pins creeping.

Where the protector finger rests on the binder it should be flat against the box and where the binder covers the truing holes in the shuttle box it should be bent away from the box very slightly, in order to prevent the binder cutting the filling. This also applies to the binder in relation to its position with the part of the box near the check pin lugs. The filling will get between the box and the binders at times and if these precautions are not taken to prevent its cutting it will cause an unnecessary amount of trouble to the weaver and in many instances damage the goods.

The groove in the shuttle binder is placed there for the same reason as the groove is made in the side of the shuttle, *i. e.*, to prevent the filling cutting when the shuttle is entering and leaving the filling box.

This groove on the binder should be smooth and rounded on its edges and the face of the binder should be polished with emery cloth, especially when fine yarns are used for filling. If the binder does not show a truly positioned *face to the face* of the shuttle, it can readily be made true by twisting with a wrench. To do this the binder should be taken from the shuttle box and held in the vise because if trued while in the shuttle box it would be very apt to bend the pin and twist the box cell.

Binder pins, springs and binder lugs, as well as the hole worn in the picker by the shuttle, all make for a smooth moving box if they are properly oiled.

The binders to work well should be:—

(1.) Properly lined between lugs so as to work freely.

(2.) They should be formed to present an easy curve for the shuttle to act upon and have a reasonable checking length to hold the shuttle, and the shuttle should not be too closely bound near the fulcrum pin of the binder.

(3.) The binder should not be thrown by the shuttle nearer than  $\frac{1}{16}$  inch to the check pin and the binder should not touch the box back of the check pin lugs and at the truing holes near these lugs. Binders should stand true to the face of shuttle.

(To be continued.)

## RIBBONS, TRIMMINGS, EDGINGS, ETC.

### A Treatise on Narrow Ware Manufacture.

By O. Both.

The manufacture of narrow ware is so much more interesting, since it embraces weaves, effects, yarns, etc., not met with in the other branches of weaving.

It may be interesting at the same time to note that narrow ware fabrics are subjected as much to fashion as other textile fabrics, thousands and thousands of new designs being introduced every season in these narrow surfaces of textile fabric structures, some of them only one-eighth of one inch wide, facts clearly demonstrating that the designer in this line of textiles must be equally competent in his profession as the one for broad goods.

The various narrow ware fabrics we come in contact with are:

Smooth ribbons, interlaced with plain (taffeta), twills, satins, rib weaves, etc., made from cotton, linen, wool, silk, etc.

Gents' and ladies' hat bands, belts, etc.

Hose ribbons, cigar cases, ribbons for covering buttons, etc.

Ribbons with initials, badges, etc.

Wash ribbons, corset and apron trimmings, embroidered ribbons produced (figured) with fast colors in warp or filling upon plain or figured ground.

Suspenders, garters, rubber ribbons.

Curtain ribbons and point-laces.

Velvet ribbons, carriage borders, horse reins and girdles.

Furniture trimmings.

Ribbons for Venetian blinds.

Ribbon loom laces.

Church trimmings.

Dress protectors.

Collar and coat stiffenings.

Boot straps.

Fancy ribbons and trimmings made out of most any kind of material, in the greatest variety of weaves and effects, as desired by the constant change of fashion, etc.

On the Continent, the manufacture of narrow ware is carried on both, as a home industry as well as in factories, the latter, however, driving the former more and more out of existence. In both cases the ribbon or narrow ware loom is driven either by water or steam power or electricity; hand power driven looms, in years gone by the backbone of the industry, becoming a feature of the past and are only rarely met with.

### Raw Materials.

With reference to materials used in the manufacture of these fabrics, the same include cotton, linen, wool, silk, artificial silk, metal yarns, rubber yarn, glass, straw and feathers; also part fabrics like, heavy counts of plain and fancy twist yarns, gimps, chenille, bast ribbons, etc.

Mr. Both now gives a short description of cotton, linen, woolen and silk yarns, *i. e.*, describes on thirteen pages of text the characteristic features of these



fibres and the grading of these yarns in single and ply, etc.; features which will not interest our readers, they being dealt with in most any book on textile manufacturing, in our own systems of grading yarns, whereas the author uses the German and French system. The reader is referred to the definition "Counts" in our Dictionary of Textile Terms, and which covers the subject.

**Special Yarns.**

(1) METAL YARNS, such as gold, silver, steel, copper, aluminum, etc., are used either in their pure state, *i. e.*, in a flat ribbon shape, or twisted with a silk or cotton thread (tinsel yarn). The grading of these yarns has no solid basis.

(2) RUBBER YARN. The same is the product of the caoutchouc tree. The grading of this yarn is done by the thickness of the respective thread, *i. e.*, how many of these threads will conveniently lay side by side in one inch. It is sold by the pound and comes in the market in skeins of about 66 yards long.

**Weaves and Effects used in the Manufacture of Narrow Ware Fabrics.**

The author now gives in rotation, a description of what is warp and what is filling—the object of point paper—the repeat of a weave—plain, twills and satins; double satins, rib weaves, binder warps and binder picks for rib weaves to strengthen the structure, basket weaves, broken twills, pointed twills, skip twills, granite weaves and curved twills.

We will quote weaves and weave-plans given by Mr. Both on point paper, explaining them as briefly as possible.

Fig. 1 shows us a portion of a fabric interlaced with the plain weave also called the *taffeta* weave in the silk industry. From 2 up to 8 or more harnesses are used for it. Using more than 2 harnesses, place your outside selvage threads on the back harnesses in order to raise them as high as possible, so they will be as much as possible out of the way of the filling bobbin, when the same enters the shed.

Fig. 2 shows a complete weave plan (see *black type*) and its draft (see *dot type*) for 4-harness, for a taffeta ribbon constructed with 18 warp threads.

Fig. 3 is two repeats, each way, of the 1 up 2 down 3-harness uneven sided twill.

Fig. 4 shows a weave plan for a ribbon, having for its body 19 ends, 1 up 7 down, 8-harness twill and for each selvage 4 ends plain. Place the harnesses as carry the selvage threads in front, *i. e.*, next to the reed, since they have to make four changes to every one change of a twill harness, and when then, the nearer the reed the less high they have to be raised, hence the less strain on the thread.

Fig. 5 is the 4-harness, uneven sided, warp effect, twill.

Fig. 6 is the 6-harness, uneven sided, warp effect, twill; direction of twill from right to left or the reverse from the former twills given.

Fig. 7 is the 2 up 4 down, 6-harness twill, twilled to the left.

Fig. 8 is the 3 up 1 down 1 up 2 down, 7-harness twill and

Fig. 9 the 4 up 1 down 2 up 1 down 1 up 3 down, 12-harness twill.

Fig. 10 is the 4-harness even sided twill, twilled to the left.

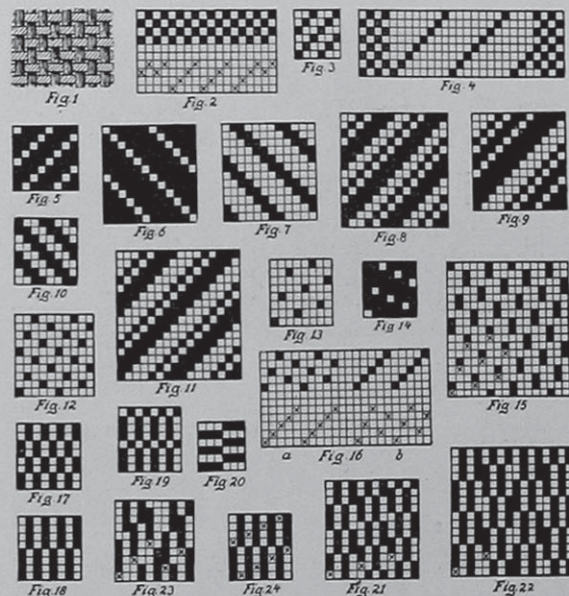
Fig. 11 is the 3 up 1 down 1 up 3 down, 8-harness even sided twill.

Fig. 12 is the 5-harness satin, filling effect.

Fig. 13 is the 8-harness satin, filling effect.

Fig. 14 is the 7-harness satin, warp effect.

Fig. 15 is the 8-harness double satin, filling effect (*cross type* shows the foundation).



If with a satin weave for harness chain, a few ends of the fabric structure have to interlace with its mate twill, then use a satin draw for such ends. Do the same vice versa, if required. Fig. 16 explains the subject. *Black type* shows harness chain, *dot type* shows draft, the result is in both instances the same in the fabric—the 5-harness satin; or in other words:

The 5-harness satin in chain, with a straight draw (diagram a) = 5-harness satin in fabric.

The 5-harness satin in chain, with a satin draw = 5-harness twill in fabric.

The 5-harness twill in chain, with a straight draw = 5-harness twill in fabric, and

The 5-harness twill in chain, with a satin draw (diagram b) = 5-harness satin in the fabric.

Fig. 17 is the 2 up 2 down, 2 by 4 warp effect rib weave.

Fig. 18 is the 4 up 4 down, 2 by 8 warp effect rib weave.

Fig. 19 is the 3 up 1 down, 2 by 4, warp effect rib weave.

Fig. 20 is the 3 up 3 down, 6 by 2, filling effect rib weave.

Fig. 21 is the 3 up 3 down, warp effect rib weave,

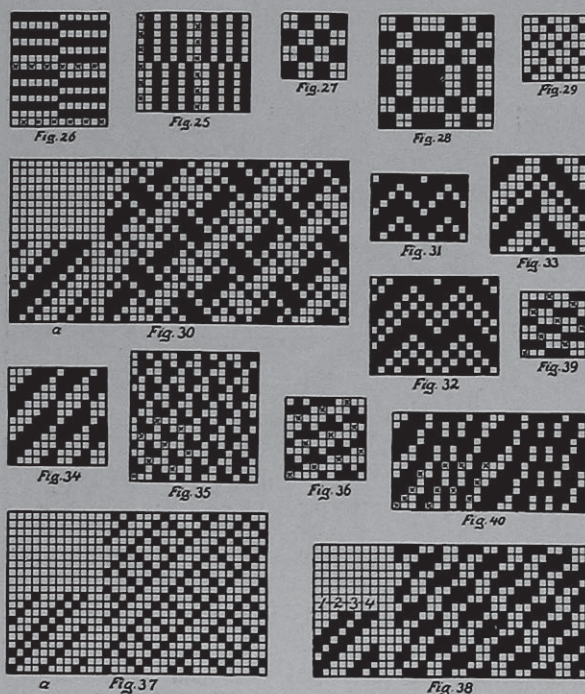


transposed with four warp threads in a set, after the 3-harness twill for motive (see *cross type*). Repeat of weave 12 by 6.

Fig. 22 is the 4 up 4 down, warp effect rib weave, transposed with four warp threads in a set, two picks higher (see *cross type*), repeat 8 by 8.

Fig. 23 is the 5 up 5 down, warp effect rib weave, transposed with two warp threads in a set after the 5-harness satin (see *cross type*) for its motive. Repeat of weave 10 by 10.

Fig. 24 shows how to strengthen a too loosely interlacing rib weave; the weave used being the 4 up 4 down, 2 by 8 rib weave warp effect, the strengthening of the cloth being done with the 4-harness uneven sided twill (see *cross type*). This procedure, however, results in what we technically term a one sided fabric.



Provided an even sided fabric structure required, this interlacing of the threads into the structure, in place of floating, is not permissible since it will change the general appearance of the back, and when then resort to binder warp threads must be had.

Fig. 25 explains the subject. The weave used is the 6 up 6 down, 2 by 12 warp effect rib weave (see *black type*); the binder warp threads, as interlacing with the plain weave, and not visible on the face or back of the fabric, being shown by *cross type*.

Fig. 26 shows the 6 up 6 down, 12 by 2 filling effect rib weave (see *black type*), every seventh pick interlacing with the plain weave (see *cross type*).

Fig. 27 shows the 2 up 2 down, 4 by 4 plain basket weave.

Fig. 28 shows the 2 up 2 down 4 up 2 down 2 up 2 down, 14 by 14 fancy basket weave.

Fig. 29 is the 4-harness broken twill filling effect.

Fig. 30 is a fancy effect broken twill, having the 3 up 1 down 1 up 3 down 1 up 1 down, 10-harness

even sided twill (a) for its foundation. The drafting done being: take 3 threads in rotation and break; the latter however being arranged not as a clear break as could have been done, *i. e.*, in place of skipping ( $10 \div 2 = 5 - 1 =$ ) 4 ends, only 2 ends of the regular twill are missed at the break. The drafting thus, considering our foundation twill as harness chain is: 1, 2, 3-6, 5, 4-7, 8, 9-2, 1, 10-3, 4, 5-8, 7, 6-9, 10, 1-4, 3, 2-5, 6, 7-10, 9, 8. The repeat of the broken twill is 30 by 10.

Fig. 31 is the printed twill, having for its foundation the 3 up 1 down, 4-harness twill, drafting 4 warp threads running from left to right to alternate with 4 warp threads drafted the reverse; repeat of weave ( $4 + 4 = 8 - 2$  point ends  $=$ ) 6 warp threads by 4 picks.

Fig. 32 is the pointed twill, having for its foundation the 3 up 1 down 1 up 1 down, 6-harness twill drafted:

6 ends left to right  
4 " right to left  
4 " left to right and  
6 " right to left; repeat of weave ( $6 + 4 + 4 + 6 = 20 - 4 =$ ) 16 warp threads by 6 picks.

Fig. 33 shows a broken twill designed with clear breaks. Foundation weaves are the 3 up 1 down 1 up 3 down, 8-harness even sided twill and its mate even sided twill. Draft 6 ends in one direction from one arrangement of said twill, to alternate with drafting 6 ends in the reverse direction from the other arrangement of said twill, arranging a clear break at the places where the two twill effects meet. Repeat of weave 12 by 6.

Fig. 34 shows us a skip twill, having the 3 up 3 down, 6-harness twill for its foundation; the drafting done being:

take 6 ends and skip  
take 4 ends and skip  
take 2 ends and skip. Repeat of weave 12 by 6.

Fig. 35 shows a granite weave, having the 8-leaf satin (see *cross type*) for its foundation; adding three risers to every one of these foundation spots for the granite weave.

Fig. 36 shows us another granite weave, having the 10 harness satin for its foundation.

Fig. 37 explains the drafting of fancy twills from regular twills by means of satin draws. The foundation twill is the 1 up 1 down 1 up 3 down 1 up 3 down, 10-harness twill (a), and which by means of drafting 1, 8, 3, 10, 5, 2, 7, 4, 9 and 6, results in the new fancy twill given. Repeat 10 by 10.

Fig. 38 is a fancy granite twill, having for its foundation the 2 up 1 down 2 up 3 down, 8-harness twill and which is divided into 4 groups of 2 threads each, and which are transposed, arranged thus: 4, 3, 2 and 1, as indicated on top of foundation twill (a).

Fig. 39 shows another 8 by 8 granite weave, having the 8-harness satin for its foundation (see *cross type*).

Fig. 40 shows us a curved twill having for its foundation the 4 up 2 down, 6-harness twill drafted thus (see *cross type*):

3 ends 45° twill, 3 ends 63° twill, 3 ends 70° twill and 3 ends 63° twill. Repeat of weave: 12 by 6.

(To be continued.)



## JACQUARD DESIGNING

(Continued from page 267.)

### HOW TO TRANSFER SKETCH ONTO THE POINT PAPER, PROVIDED THE PROPER RULED POINT PAPER IS NOT ON HAND;

Or Unable to be Obtained; or the Texture of the Fabric does not Figure to a Standard Ruling of Point Paper in the Market.

The rule for ascertaining the proper size of point paper to use for a single cloth structure is to select said point paper ruled in the proper proportion to the texture of the fabric to be made.

For this reason, any fabric made with an even texture (like for example  $50 \times 50$ ,  $130 \times 130$ , etc., *i. e.*, textures where number of warp threads and picks per inch correspond) requires an even ruled paper like  $8 \times 8$ ,  $10 \times 10$ ,  $12 \times 12$ , etc., to be used.

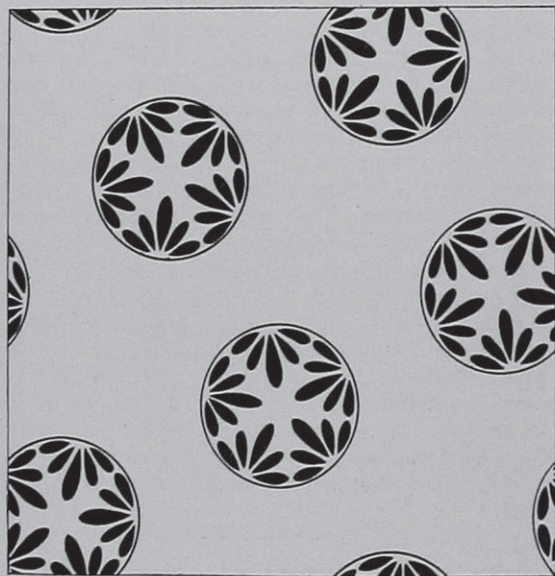


FIG. 28.

For fabrics made with an uneven texture, *i. e.*, fabrics in which there are either more warp threads or more picks per inch to be used, we must, as mentioned before, select the proper size, *i. e.*, ruling off of the point paper to use, by figuring by proportion, taking 8, 10, 12 or any other suitable number as the basis for warp (or if necessary for filling) for one of the standard numbers of the paper we are to calculate for.

The following example will explain this subject: Suppose texture of fabric to be 56 warp threads  $\times$  70 picks per inch.

Question: Find proper point paper to use?

(texture	:	(texture	::	(basis for	:	(its proper
of warp)	:	of filling)	::	paper to use	:	ruling fill-
56	:	70	::	for warp)	:	ing ways)
				8	:	x
				$70 \times 8 = 560 \div 56 = 10$		

Answer:  $8 \times 10$  is the proper point paper to use for a single cloth jacquard fabric, to be constructed with a texture of  $56 \times 70$ .

Another example: Texture of fabric to be  $72 \times 60$ , basis of point paper most suitable for warp = 12. Find proper point paper to use?

$$72 : 60 :: 12 : x$$

$$60 \times 12 = 720 \div 72 = 10$$

Answer:  $12 \times 10$  is the proper point paper to use.

However, not all fabric textures figure out for even point paper; again, as stated before, the proper ruled point paper necessary for texture in question may not be on hand or possibly not in the market; for which reason we then must elongate or contract, as the case may be, our design on a separate sketch or direct on the point paper, to fit a certain kind of ruled point paper (the one coming the nearest to our



FIG. 29.

calculations) on hand. This drawing out of shape of a balanced design, either first on a sketch, or by the experienced designer direct on the point paper, has to be done so that the proper shape of said design will appear in the woven fabric, since the texture of the point paper used in this instance is not in proper proportion of the texture of the fabric. For this reason, the enlarging or reducing of designs, either warp or filling ways, on the point paper, compared to the proper dimensions of the design in the fabric, must be well understood.

As stated before, it may be an enlarging or a reducing of the design, either warp or filling ways, that is necessary, *i. e.*, as a certain case may require, and which feature is best explained by means of the accompanying two illustrations.

Fig. 28 is an actual fabric sketch, one repeat,  $3\frac{1}{4}$  inches  $\times$   $3\frac{1}{4}$  inches, to be made, for example, with



texture of  $123 \times 123$ , and in which case  $8 \times 8$  (or any other regular ruled paper like  $10 \times 10$ ,  $12 \times 12$ , etc.) is the proper point paper to use, giving us in turn on the point paper only a larger design (according to size of  $8 \times 8$  (or  $10 \times 10$ ,  $12 \times 12$ , etc.) paper used—there being different sizes, larger or smaller squares of such point paper in the market). However, no matter what size of such an even ruled paper used, the shape of sketch Fig. 28 is not changed, it is nothing more but an exact enlargement of every portion of the design in every direction. This design according to directions given before, calls for  $123$  (warp texture)  $\times 3\frac{1}{4}$  (width of repeat of pattern) =  $(399\frac{3}{4}$  or practically)  $400$  warp threads, or a  $400$  Jacquard machine.

The same calculations also refer to the filling, since warp and filling texture in our example given, are to be the same, also the repeat of the pattern, warp and filling ways, to be the same, hence  $400$  picks in repeat of pattern, or  $400$  Jacquard cards are required to be stamped.

For explaining the subject "to change design on sketch or on point paper, to suit a given texture and point paper, we have to use, but which is not in proper proportion to our texture," we will now proceed with a practical example.

For instance, suppose that a fabric texture of  $123 \times 135$  has to be used, and that the only point paper we have on hand or (for sake of an example) can procure is  $8 \times 8$  paper.

With reference to warp, this gives us the previous calculation, since no change in that texture has been made, *i. e.*,  $400$  warp threads in repeat of pattern = a  $400$  Jacquard machine.

For filling, however, a change occurs:

$3\frac{1}{4}$  inches, length of one repeat of design in fabric (see Fig. 28)  $\times 135$  (picks per inch ordered to use) =  $438\frac{3}{4}$  or practically  $440$  picks in one repeat of pattern, *i. e.*, Jacquard cards to use. We quoted  $440$ , since this is an excellent number, *i. e.*, divisible by  $5$  and  $8$ , two repeats of weaves for ground work most frequently used in this class of fabrics. (This also refers to the  $400$  warp threads used in one repeat of pattern.)

It thus will be seen that  $440$  picks have to go into the same number of inches ( $3\frac{1}{4}$ ) of cloth as were taken up in the previously given example by  $400$  picks.

Now the proper point paper to use will be:

$$123 : 135 :: 8 : x \text{ and}$$

$$135 \times 8 = 1080 \div 123 = 8\frac{3}{4}, \text{ or practically } 8\frac{1}{2}.$$

Thus  $8 \times 8\frac{1}{2}$  or practically  $8 \times 9$  point paper, since no  $8 \times 8\frac{1}{2}$  paper exists, will be the most suitable point paper to use, so as to preserve the shape of the figures from the fabric sketch on the point paper design. Using an  $8 \times 9$  point paper, certainly will to a small extent (only a trifle) change the shape of our figure on the point paper on account of the  $\frac{1}{2}$  short of the  $9$ , as used for filling, however, such a change will only slightly (hardly noticeable) influence the shape of the design on the point paper; in fact, the difference would be so little that to select  $8 \times 9$  for explaining the present lesson would not be sufficiently noticed to give

a clear demonstration of the object of our lesson to the student, hence we selected an  $8 \times 8$  paper to be used for our example, although in practical work in the mill we will use  $8 \times 9$  paper. In this case, the fabric sketch would appear slightly compressed on the point paper, hardly noticeable by the untrained eye, but still present, whereas by using  $8 \times 8$  paper, the reverse is the case, the fabric sketch will become somewhat elongated on the point paper, on account of using  $135$  picks per inch, as compared to the  $123$  ends of warp per inch used in the fabric.

Using  $8 \times 8$  point paper we find that we have to measure off on said point paper

$$400 \text{ warp threads} = 50 \text{ heavy squares, and}$$

$$440 \text{ picks} = 55 \text{ heavy squares, and en-}$$

large, and at the same time elongate (in height) our design (one repeat from fabric sketch Fig. 28) to this space ( $400 \times 440$ ) on the point paper.

To show up the amount of elongation of the design lengthways on point paper design is impossible, on account of the large size of such a working design not being possible to be brought within compass of size of our pages in the journal, besides this large design is not necessary, since a sketch representing said point paper design on a reduced scale, executed with reference to fabric sketch Fig. 28 will convey the idea to the student just as well, and for which reason, sketch Fig. 29 has been prepared, it being a sketch on a reduced scale of the large point paper design required in practical work, provided we use  $8 \times 8$  paper in connection with texture given.

*Proof:*  $440$  (cards or picks required)  $\div 123$  (warp threads per inch) =  $3.57$  inches, or about  $3\frac{1}{2}$  inches; thus sketch Fig. 29 is an exact reproduction of the large design (on point paper—not shown) on a reduced scale, clearly showing how the figures of the design have to be drawn out of shape (elongated lengthways) on account of texture of fabric and point paper used, not being in proper proportion to each other.

#### DICTIONARY OF TECHNICAL TERMS RELATING TO THE TEXTILE INDUSTRY.

(Continued from page 260.)

**CHOPS:**—The qualities or names under which raw and waste silk is sold.

**CHOQUETTE:**—An imperfect cocoon.

**CHROME:**—To subject wool previously to dyeing to the mordant action of a solution of potassium dichromate. A yellow pigment obtained from lead chromate; the basis of chrome green, chrome red, and chrome yellow. Chromium.

**CHRYSALIS:**—The third stage of the silk worm.

**CHRYSOIDIN:**—A coal tar dyestuff producing an orange-yellow on wool, cotton and silk.

**CHRYSOLIN:**—A coal tar dyestuff obtained from phthalic acid. It produces a fast yellow on wool, cotton and silk.

**CHUPKUN:**—A cloak worn by the male inhabitants of Upper India.

**CILICE:**—A coarse cloth, originally made of goats' hair, formerly worn by monks and others in doing penance.

**CIRCASSIENNE:**—An extremely light weight cashmere.



- CIRCULAR**:—A sleeveless cloak worn by women.
- CIRCULAR LOOM**:—A type of loom where the shuttle is made to travel in a circular race through warps arranged in a circle.
- CLAWKER**:—A ratchet feed pawl in a knitting machine.
- CLAY**:—Terra alba, kaolin, porcelain clay, china clay, pipe clay, argil. Sometimes used by the printers as resists.
- CLAY WORSTEDS**:—Fabrics woven with a twill similar to that of serge, but in which the diagonal lines, characteristic of this weave, are flat on the surface of the cloth and barely perceptible. Clay worsteds do not gloss as readily as other fabrics made from hard-twisted worsted yarns, on account of the warp and the filling being only slackly twisted. Named after Clay, the English manufacturer, who first introduced this make of fabric in the market.
- CLIP**:—The product of each sheep when shorn, and which in turn is tied into a bundle and termed the fleece. The wool product of one season.
- CLOAK**:—A loose outer garment for either sex; men's cloaks are usually made without sleeves.
- CLOAKING**:—The name given to cloth used in the manufacture of cloaks.
- CLOCK**:—An embroidered pattern on a stocking at the ankle.
- CLOSE SHED LOOM**:—Looms which do not change the position of the harness until a change in pattern calls for it.
- CLOTH**:—A fabric woven of any textile fibre, made up into garments or for other use.
- CLOTH-BEAM**:—The beam in a loom onto which the fabric woven is automatically wound.
- CLOTH OR FACE FINISH**:—The name given to the finish of woolen goods in which a nap is raised by means of giggering, and which is leveled by shearing and lusted by wet steaming and pressing.
- CLOTHING WOOLS**:—Are all short fibred wools that are transferred into yarn by carding; also known as *carding wools* to distinguish them from *combing wools*.
- CLOTH PROVER**:—A magnifying glass having an opening in the base, either  $\frac{1}{2}$ , 1,  $1\frac{1}{4}$  or  $1\frac{1}{2}$  inches square, used in counting the threads per inch in a fabric; frequently called *pick measure* or *pick counter* or *pick glass*.
- CLOTH TESTER**:—A machine for testing by a direct pull, from a sample, the tensile strength (point of tearing) of any kind of cloth. Cloth made under contract for government or corporation purposes must possess a certain strength, i. e., has to stand a certain amount of tension before tearing apart.
- COAL TAR COLORS**:—The name given to that class of dyes derived from coal tar, popularly called aniline dyes, since aniline was the first of them discovered.
- COATINGS**:—Such fabrics from which coats are made.
- COBURG, COBOURG**:—A thin fabric of worsted and cotton, or worsted and silk, twilled on one side, used for dress goods and as a material for mourning. A modification of what had been previously known as Paramatta cloth.
- COCHINEAL**:—An insect feeding on a species of cactus in Central America. The coloring matter is extracted from the insect by boiling it in water. The pure coloring matter of cochineal has received the name of carmine.
- COCKLING**:—The cloth, instead of presenting a smooth, even surface, is then irregular, some portions of it standing up in bubbles.
- COCOA MATTING**:—Matting made from coir fibre, obtained from the fibrous outer covering of the cocoanut, especially fibres that are heavy and thick and rather open in texture. It is used especially for door mats and floor covering in places where much wear is expected.
- COCOON**:—The protective covering in which the silk worm envelopes itself. A *double cocoon* indicates that two worms have spun side by side, whilst a *pierced cocoon* means that the moth has emerged or pierced the cocoon.
- COCOONERY**:—A place for rearing silkworms.
- CODILLA**:—The coarsest portion of hemp or flax.
- COIR**:—Coir fibre is obtained from the fibrous outer covering of the cocoanut. Besides its extensive use into door mats and floor covering, the fibre is valuable in the manufacture of ropes, on account of its property of resisting the action of salt water.
- COLD PIG**:—A shade of cloth that for some reason has not appealed to the public and therefore does not sell well. Such cloth is often sent to the dyer and re-dyed some more fashionable shade, this being governed by the original color, so that the same cloth that was previously neglected by the public will now find favor and sell.
- COLLARETTE**:—A small collar; also a narrow fichu of lace or the like.  
A wide, knitted neck band used on men's undershirts in place of binding.
- COLLOID**:—A substance which will not crystallize.
- COLOR DOCTOR**:—In calico printing, a blade placed in contact with the engraved roll for distributing the color over the latter.
- COLOR HARMONY**:—The pleasing effect due to the action upon each other of colors improved and made more beautiful by being put together; such an agreement between the different hues, tints, or shades of a design as will produce unity of effect.
- COMB**:—A rapid oscillating toothed blade, which removes the wool, cotton, etc., from the doffer cylinder of a carding engine.
- COMB CIRCLES**:—A part of the Noble comb, consisting of a brass or composition base in circular form, to fit the combing machine, being from one-fourth to three-fourths of an inch in thickness. Through this base, pins are driven in rows, the fibres for the purpose of combing being pressed between these pins by the dabbing brush.
- COMBER BOARD**:—Also called *cumber board*, or *compart board*, or *compass board*, a perforated board which guides and keeps the harness cords of the Jacquard harness in the required positions.
- COMBING**:—The process of removing or separating the short curly and neppy fibres (noils) from the long and straight ones in worsted or cotton spinning, and laying the latter more parallel in the sliver. The operation of wool combing differs from that of cotton combing.
- COMBING MACHINE**:—The type of machine used for combing wool is known as the Noble combing machine (so named after its inventor, James Noble) and is built by the *Crompton & Knowles Loom Works*, while the type used for combing cotton is known as the Heilmann combing machine (so named after its inventor, Josue Heilmann) and is built by the *Whitin Machine Works*. At the present time the Alsatian, the Nasmith and the Momfort's combing machines are types of cotton combing machines also used, the last named machine being built by the *Mason Machine Works*.
- CONDENSER**:—That part of the finisher card of a set of woolen cards which separates the film when it comes off the doffer, into a number of small roving strands, slightly rubbing them, ready for spinning.
- CONDITIONING**:—All textile fibres contain moisture in their normal condition. Since this amount of moisture present can be increased, with a consequent loss to the buyer, up to twice its normal percentage, in 1875 an international congress met at Turin, Italy, and when the following allowances or reprises were adopted as the



normal amount of moisture allowable in the various textile fibres: Silk 11 per cent., Wool-carded 17 per cent., Wool-combed  $18\frac{1}{4}$  per cent., Cotton  $8\frac{1}{2}$  per cent., Flax 12 per cent., Hemp 12 per cent., Tow  $12\frac{1}{2}$  per cent., Jute  $13\frac{3}{4}$  per cent. of the absolute dry weight of the fibres. To-day every prominent textile centre in Europe has a conditioning establishment, the decision of which is final in law.

The skeins of yarn, after having been reeled, measured and weighed, at first together and then separately, are for the purpose of conditioning, then dried in ovens and when perfectly dry, a certain amount of water is added to the yarn equal to the permissible percentage (normal amount) of moisture, for each fibre previously referred to. The count of the yarn thus treated is termed its conditioned count.

**CONE DUSTER:**—A machine used for freeing wool from impurities, as shives, dyestuffs, dust, etc., used more particularly with wools which are very dusty, excepting the very long stapled carpet wools, which remain a longer time in the duster, and for which a modification of it is used, by changing the character of the teeth and feeding device.

**CONSTANT:**—A kind of short arithmetic most frequently met with in cotton spinning, denoting a known dividend which at any time can be divided by some required quantity or condition, the quotient obtained being the gear, draft, twist, etc., necessary to be used to give the required condition; again, the converse of this rule may be used. For this reason, a constant number for change pinion is a number which if divided by any required draft will give the necessary change pinion; or vice versa, if divided by any change pinion will give the draft. A constant number for twist is a number, which if divided by any desired turns of twist per inch will give the requisite twist gear; again, if divided by any particular twist gear, will give turns of twist per inch put into the slubbing or roving. It will be readily seen that where a number of machines are running in a mill with certain gears that are seldom changed, while at the same time the counts of the sliver, slubbing or roving are frequently varied, that in this case constant numbers are very useful, it giving us a kind of short hand arithmetic, similar to the slide rule.

**COOTHAY:**—A variety of striped satin.

(To be continued.)

### SILK FROM FIBRE TO FABRIC.

True Silk—Silk Throwing—Splitting and Sorting—Soaking—Winding—Cleaning—Doubling—Tram—Organzine—A Typical Silk Spinner—A Silk Doubler and Twister—Defects met with in Thrown Silk—Singles—Reeling—Numbering the Silk—The Denier System of Numbering Silk—Dram System of Numbering Silk—The Ounce System of Numbering Silk—Comparison of Denier and Dram—Denier Constant—Testing Silk as to Counts—Conditioning—Scouring—Boiled-off Silk—Tinting—Souple Silk—Ecreu Silk—Bleaching Silk—Soap—Testing Soap—Soap Economy—Water—Weighting—Dyeing—Washing—Lustering—Wild Silk—Spun Silk—Waste Silk—Statistics—Winding—Warping—Drawing-in—Quilling—Weaving—Finishing.

(Continued from page 201.)

**TINTING.** Sometimes when the silk has a yellowish tinge after bleaching, or if the bleaching process has not been fully carried out, on account of the danger of tendering the silk, it is customary to pass the silk through what is called a *tinting bath* to make

it appear whiter. This tinting bath is a solution of some simple blue dye, just enough color being used to overcome the yellow hue of the silk. The blue color neutralizes, optically, the yellow color of the silk, making it appear white, on the same principle that laundry blue is used for white garments. Great care must be taken not to carry the process too far, or the silk will have a bluish tint, consequently the solution of the dye used must be very dilute. Tinting is more generally used for silks that are to be made up into white or uncolored fabrics.

**Souple Silk.** Souple silk, from which only part of the gum is removed, goes through four operations, the objects of which are, chiefly, to render it soft and pliable, hence its name, souple, English-supple. These processes are (1) Scouring; (2) Bleaching; (3) Sulphuring; (4) Softening.

(1) **SCOURING.** The object of this operation being to remove only a portion of the gum from the silk, it is not subjected to either such prolonged treatment or strong soap solutions as is boiled-off silk, nor is the temperature of the bath allowed to be so high. The silk is treated in a bath containing 10% of soap, at a temperature of about 85° to 95° F., for about one or two hours, after which it is taken out, squeezed, drained and rinsed well. The process removes any grease present and a portion of the gum, causing the fibres to swell, so that it is capable of absorbing other materials readily. This operation requires considerable care and judgment, lest it be carried too far and too much of the gum stripped off.

(2) **BLEACHING.** In this case, this is done by immersing the washed silk in a bath composed of one part of nitric acid and five parts of hydrochloric acid, diluted with water to  $3\frac{1}{2}$  to 4° Be., about one part of the mixed acids to fifteen parts of water. The silk is steeped in this acid bath for about fifteen minutes, then removed, drained and rinsed with clear water until free from acid, known by testing the rinse-water with *blue* litmus paper until it no longer is turned *red*. This is necessary, because any nitric acid left will cause the silk to rot, from its forming sulphuric acid with the sulphurous vapors of the next process. Great care is necessary here to prevent the silk being turned yellow by too long immersion in the acid bath, from the action of the nitric acid on the silk fibre, and the silk must be removed as soon as it has a slight greenish-gray tint. In making this acid bleaching bath, the two acids must be mixed together before being diluted with water, the object being to obtain as much free chlorine and chlorine compounds as possible, which compounds would not be formed, or if so, very slowly, if the acids were diluted with water before being mixed. A safer process would be to use chlorate of potash and hydrochloric acid instead, using one part of chlorate to five parts of acid, diluting the acid with two or three parts of water before mixing it with the chlorate of potash. The bath would be made up thus: put the chlorate of potash in the vat, spread over the bottom, pour on the acid diluted with two or three parts of water and allow this to stand about five or ten minutes, then add twelve parts of water.



The finished bath will have a pale greenish yellow tint, if properly made, from the chlorine compounds formed by the action of the hydrochloric acid on the chlorate of potash. There is no danger of yellowing the silk by using this bath, as there is no nitric acid present, the cause of yellowing from the other bath, and the bleaching action will be much more complete and thorough. The silk should be drained and well rinsed after sufficient treatment in the chlorate bath until free from acid.

(3) **SULPHURING.** The silk is now usually put through the process of sulphuring to bleach it finally, during which it is exposed to the fumes from burning sulphur in a closed chamber or vessel, for from four to six hours, after which it is taken out and well washed with cold water. The silk usually has a hard, rough feel after this process and also after treatment in the acid bath previously described, which is removed during the treatment of the next operation, softening. If the silk is not white enough after one treatment by sulphuring, the process must be repeated. As previously remarked, the process of bleaching by sulphur has many objectionable features, its lack of permanent effect, for instance, and it can be replaced by the peroxide of sodium bleach with advantage, both as to its effect on the quality of the silk, its permanent whiteness and the ease and simplicity of its operation. In case peroxide of sodium (or hydrogen) is used to bleach the silk, the treatment in the acid bath, previously mentioned, would be omitted as well as the sulphuring process. Neither will the silk thus treated be hard or harsh in feel. However, if special softness is required in the silk, it can be put through the softening process described in the following paragraph.

(4) **SOFTENING.** The silk after its treatment in the acid bath and by sulphuring has a harsh, rough feel that is objectionable, and its removal is the object of the next process. The silk is boiled in a weak bath of cream of tartar, made by dissolving six ounces of cream of tartar in ten gallons of water, the silk being left in the bath for from an hour to an hour and a half. It is then drained, squeezed, and rinsed lightly, then dried. It is not certain just what action the cream of tartar has, unless it acts in some way on the gum and softens it, the same effect being observed with other *gums* of animal origin. Sulphate of magnesia (Epsom salts) and sulphate of soda (Glauber's salts) have also been tried as softeners with some success, but neither is as good as cream of tartar.

**Ecu Silk** is white silk from which only a small part of the gum has been removed, but which has practically all the coloring matter taken out. The silk goes through several processes, which for ordinary ecru, are as follows: (1) Washing in cold water; (2) Washing in a 10% soap solution at 80° to 90° F.; (3) Sulphuring; (4) Bleaching; (5) Washing; (6) Sulphuring; (7) Washing.

These operations are carried out in practically the same manner as was previously described, the principal difference being that hot solutions are not used, as these would cause more of the gum to be stripped off the silk than is desirable. Some silk scourers prefer

not to use any soap at all in scouring ecru silk, so as to make the loss from solution of the gum as little as possible, using only lukewarm water, or adding a little ammonia to the bath if the silk is very dirty or greasy. The remarks as to sulphur bleaching apply equally as well.

When a very white ecru silk is desired, several of the previously named operations are repeated, once or oftener, as may be necessary. The sequence of operations to be followed would be about thus: (1) Soaping in 10% solution of soap in cold water; (2) Washing; (3) Sulphuring; (4) Bleaching; (5) Washing; (6) Soaping in a 10% soap solution at 80° to 90° F.; (7) Sulphuring; (8) Washing; (9) Treating with cold solution of carbonate of soda, about 1.5% to 2%; (10) Rinsing in a warm, weak soap solution, 3%; (11) Washing; (12) Sulphuring; (13) Washing.

The tedious work of the above process and its numerous operations can be almost entirely obviated if peroxide of sodium, or hydrogen, be used for bleaching the silk. In this case, the process could be completed in about three or four operations, omitting the treatment by sulphuring entirely and reducing the washings considerably. The process then would be (1) Washing in 10% soap solution at 80° to 90° F.; (2) Rinsing in clear water; (3) Bleaching by sodium peroxide; (4) Final rinsing in clear water. If the silk is very dark colored, it may be necessary to give it a second treatment in the peroxide of sodium bath, but it will be best, generally, to give the dark silk a longer stay in the peroxide solution at first.

(To be continued.)

#### A New Silk Throwster's Spindle.

The object in view is to construct a spindle, which will securely hold the bobbin, and at the same time prevent it from turning.

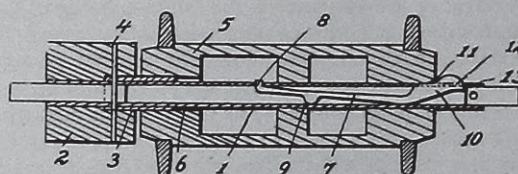


Fig. 1.

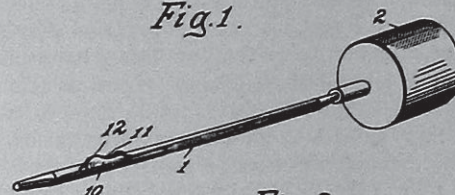


Fig. 2

Fig. 1 is a longitudinal sectional view of this spindle with the bobbin thereon, and Fig. 2 a detail perspective view of the spindle.

Numerals of reference in the illustration indicate thus: 1 is the spindle, provided with cylindrical head 2. A tapered bushing 3 surrounds one end of the spindle and fits within the inner side of the head 2, said bushing tapering towards the opposite end of the spindle. This bushing 3 is secured to the spindle by the same