

## A STUDY OF KNITTING.

(Continued from page 309.)

FLEECE-LINED HOSIERY is seldom used except where special warmth and softness is required. Such hosiery is best made on the flat-bed spring needle machine, in the same manner as full-fashioned hosiery, since the flat fabric can be handled better for raising the nap and cutting it, to form the *fleece*, etc., than can be done with a tubular web of goods. Fleece-lined hosiery may be made in the same manner as fleece-lined underwear is made, *i. e.*, by knitting a plain fabric with a thread or yarn caught in the stitches but not forming a part of the stitches itself. This filling yarn or thread is then napped on appropriate machines to produce the familiar *fleece-lined* effect. Fleece-lined hosiery is commonly made on the spring needle knitting machine, using what is known as the "single" or "double plush feed," according to the quality desired in the finished goods, the latter process giving a heavier and closer fleece to the fabric. The backing yarn is put into the fabric on the knitting machine by interlacing it among the needles before the face or body yarn is looped under the beards of the needles, the backing yarn not going under the beards. To lace the backing yarn in the needles, a special additional burr is used, similar in shape to a sinker burr but larger and with a deeper blade and reverse angle. This burr is blocked so that the needles will be pushed back at proper spaces and the backing yarn will be placed in front of the needles thus pushed back, and therefore back of the needles not moved by the burr. The clearing burr for the backing yarn is like the cast off wheel but is on the outside of the cylinder instead of inside, and works downwards instead of upward. This combination is called the *single plush feed*.

OPEN WORK OR LACE WORK HOSIERY, as the name indicates, is hosiery made with open work in stripes or bands, or all over, in imitation of lace. The open work is usually in stripes alternating with stripes of plain knit fabric or in sections alternating with plain web or arranged in patterns surrounded with plain web, or sometimes the entire sock or stocking may be open work with the exception of the heel and sole of the foot, which are knit solid on account of the wear at these parts. The finest grades of open work hosiery are made on the flat-bed or straight-bar type knitting machines, its form of construction allowing any desired number of transfer points to be provided for the needles, so that stitches and loops may be transferred to and from them and the needles, so as to produce any desired pattern, ornamentation or lace work effects. This is accomplished by the addition to the machine of the so-called *lace needles*, to which the loops of yarn or thread are transferred for making the pattern, so that tuck stitch, transferred stitch or dropped stitch can be used in the same or different pieces as is desired. The circular latch needle type knitting machine can also be employed for this work, and in fact, these machines are used for making the cheaper grades of open hosiery, on account of their greater rate of production.

The finest and most elaborate effects in open work hosiery produced with the circular knitting are made with those machines using spring needles, this type of knitting machine being especially suitable for making open work or fancy stitches because of the method by which its needles are operated, *i. e.*, by a presser wheel that opens and closes the beards of the needles. By varying the arrangement of the blades of the presser wheel all sorts of effects can be produced, since some needles can be made to knit plain stitch, other needles to knit tuck stitch, or the same needles can be made to knit different stitches on different courses, and thus drop stitch effects can be introduced or any desired pattern can be worked into the web of the sock or stocking. Presser wheels are now made with removable blades, which can be set so as to produce a great variety of stitches or changes in operation of the needles. Another point in favor of spring needle machines is that their needles can hold more loops of yarn at one time than latch needles can, and since there is less strain on the yarn with them, finer counts of yarn can be used.

The basis of open work hosiery is the tuck stitch, loops of yarn being held by the needles for two or more courses and then knit into one stitch, thus drawing the loops together and leaving an open space above or below the finished stitch. The usual way of making open work hosiery is to alternate with plain stitch and tuck stitch, the action of the needles being controlled by cams and a pattern wheel or chain on the latch needle type, or by the presser wheel on the spring needle type of knitting machine, so that needles are alternately thrown into plain stitch and tuck stitch action. Open work stockings can be made on the circular type machine from one continuous thread or by using one thread for the leg and top of the foot and a second thread for the heel and sole, or the heel and toe can be knit from one thread in plain stitch and the rest of the stocking made from another thread with open stitches, etc., or three, four or more threads can be used for making the leg, in the desired fancy effect. Another way of making open work hosiery is by using a machine from which certain needles are omitted, the needles being left out so as to form certain combinations, as, for instance, omitting a needle from either side of an intermediate needle, or omitting two or more needles at certain points, etc., as was previously referred in connection with "needle-out" work. In knitting the stocking, the yarn is floated for several courses at the points where it would be taken up by the needles if they were in place, then catching up these floating threads and knitting them into a stitch, continuing this method to produce the desired pattern. A variation of this same method is to set the needles and cams so that there will be a sequence of action, as for instance, plain stitch needle, omitted needle, tuck stitch needle, etc., the needles being thus spaced in turn around the cylinder so that the stitches will produce a pattern.

In knitting an open work sock, for instance, the machine would be set so as to knit plain stitch and tuck stitch in proper order to produce the open parts



and solid parts of the web. When the heel and the toe are to be knitted, all the tuck stitch needles are changed to knit plain stitch and the omitted needles, if there were any, are also thrown into action, so that these parts of the sock will be strong and properly made. Very pleasing effects and seemingly intricate designs can be obtained by proper combination of the various stitches and omitted needles, which can be further elaborated by modifications of the presser wheel, if the work is done on a spring needle machine.

(To be continued.)

#### Knit Fabric Presenting a Curled Face.

Three systems of threads are used in the construction of this fabric, viz:

- (1) A Face yarn of Mohair or Worsted,
- (2) A Back yarn of Worsted or Cotton, and
- (3) A Tying-in yarn of Cotton.

The gist of the new fabric structure consists in first curling and setting the face yarn, then straightening this curled yarn by means of suitable tension in order to be able to place it properly upon the needles, after which the tension on said thread is relaxed, permitting the latter to resume its normal (curled) condition on the needles and thus on the face of the fabric. By thus curling the face yarn, prior to the knitting operation, a fabric is obtained having curls of practically even height, of regular form and sufficiently close together to prevent the body structure from showing through on the face. This new construction of a fabric is superior to former imitations of curled faced knit goods and when the finishing operations are relied upon to impart a curl to the face yarn of the knitted fabric, whereas in the new fabric the finishing operation the knitted fabric is subjected to after it leaves the machine (dyeing, washing, singeing and shearing) are not relied upon to produce this curled face effect. The curls being set in the yarn prior to the knitting operation will not uncurl, neither in the finishing process nor during wear.

We will now give a description of the manufacture of this new knit fabric as patented by the Salt's Textile Mfg. Co., and for which reason the accompanying five illustrations are given and of which Fig. 1 is a plan view of a portion of a knitting cylinder, employed in the manufacture of the fabric. Fig. 2 is a side view of a portion of said cylinder to illustrate the manner of introducing, *i. e.*, stretching the curled face yarn, the needles being spaced apart for the sake of clearness. Fig. 3 is a view of the face yarn as it comes from the curling machine, Fig. 4 a face view of the finished fabric, and Fig. 5 a section thereof.

Numerals of reference accompanying the illustrations indicate thus: 1 the curled face yarn, 2 the back yarn and 3 the tying-in yarn.

The machine shown for illustrating the manufacture of the new article is what is known as a circular spring beard needle knitting machine, only one feed being shown, comprising a backing wheel 4, blocked two and two, so as to stagger alternate pairs of needles; a clearing wheel 5; a plain wheel 6 for the

tying-in yarn; a landing wheel 7; a plain wheel 8 for the back yarn; a plain presser wheel 9; a landing wheel 10; and a throw-off wheel 11. In addition to these wheels, the cylinder is provided with the usual horns and other elements necessary to carry out the knitting operation.

A FULL DESCRIPTION OF THE PROCESS: The yarn which is to constitute the face is first run through a curling machine to produce a yarn similar to that

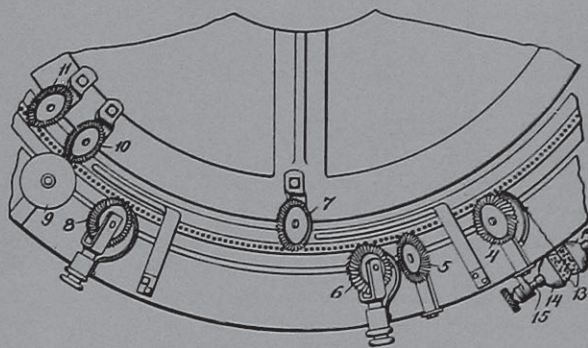


Fig. 1

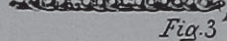
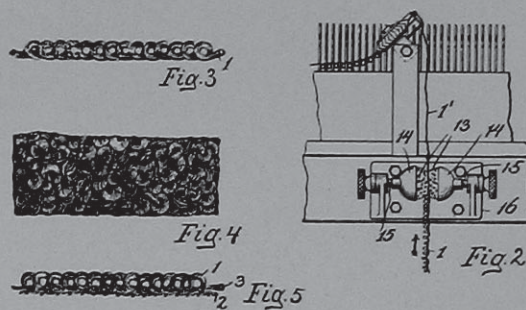


Fig. 3



Fig. 4

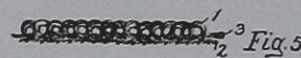


Fig. 5

shown in Fig. 3, the rings or curls being regular in form and closely disposed. It is impossible for such a curled yarn, in its normal condition, to pass through the backing wheel and in order that the said yarn may be properly placed upon the needles, it is necessary that it be straightened. For this purpose the tension device shown in detail in Fig. 2 has been designed, the same comprising two sponges 13, supported in cups 14, said cups being carried upon threaded studs 15 adjustable in brackets on a base 16, the latter being secured to the machine frame in proximity to the backing wheel. The sponges 13 are saturated with olive oil, and are so adjusted relatively to each other that as the curled yarn is drawn between them, the drag or tension placed thereon is just sufficient to straighten the yarn, as indicated by the portion 1'. The yarn is thus made practically straight between the tension device and the backing wheel 4, but as soon as it leaves the latter the normal curled condition is resumed. The presence of the curls in the face yarn after being placed on the needles does not interfere with the subsequent stages of the knitting operation, the said yarn being acted upon by the several wheels of the feed called into play after being placed upon the needles, and bound to the back yarn 2 by the tying-in yarn 3, in the same manner as is done with common yarn.



**To Prevent the "Running-back" of the End of Discontinued Wales in the Manufacture of Fancy Knitted Fabrics.**

This feature is accomplished by hitching the end loop of each discontinued wale to a special loop formed by one of the adjoining wales and thus prevent the

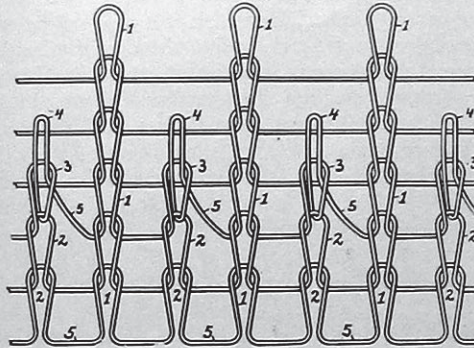


Fig. 1

running-back of the former. The procedure is applicable to either ribbed or plain structures as well as to such comprising a combination of both systems of knitting. As will be readily understood, these discontinued wales do not form a part in the forma-

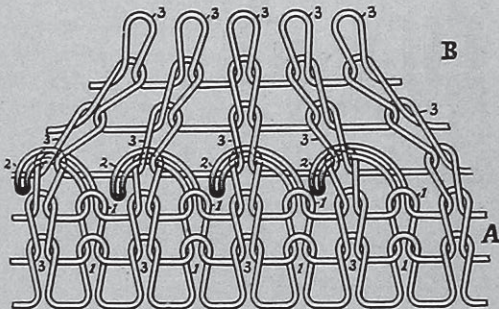


Fig. 2

tion of the wale to which they are hitched, the end of each discontinued wale being simply drawn through the stitches of one of the adjoining wales, *i. e.*, hitched to it.

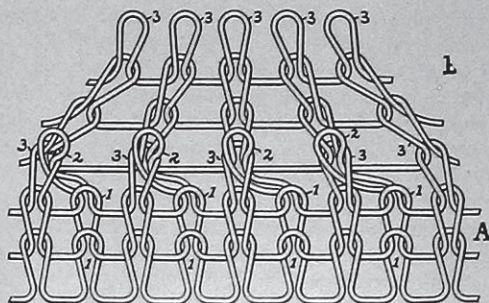


Fig. 3

The procedure and which forms the subject of two late inventions, will be readily understood from the accompanying illustrations, of which

Fig. 1 illustrates a plain knit fabric structure, the wales 1 being the continued wales, and the wales 2 the discontinued wales, the latter being present only either in wider or in more closely knitted portions of the fabric. To prevent the running-back of the loop 3 of any one of the discontinued stitches, a loop 4 is drawn from an adjoining sinker wale 5 through it.

The illustration will readily explain that if a strain is exerted on to the end 3 of any one of these discontinued wales, tending to draw it through the preceding stitch of its wale, said loop is tightened upon the loop 4 of the adjoining wale, which will provide a hitch, preventing any further slipping of the loop 3, and will thus prevent the running-back of the discontinued wale of which it forms a part, the length of the loops 4 being sufficient to prevent them from being drawn through the loops 3 by any strain which

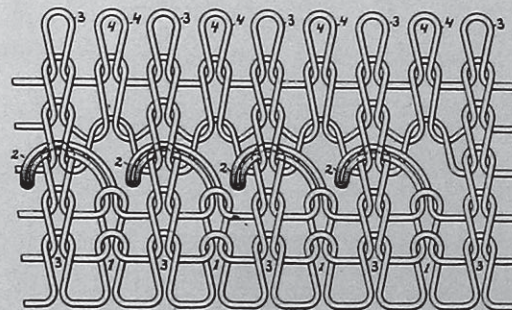


Fig. 4

is likely to be exerted upon the stitches of the continued wales 1.

Fig. 2 illustrates a fabric structure partly ribbed (A) and partly plain (B), having discontinued rib wales 1 whose end loops 2 are prevented from run-

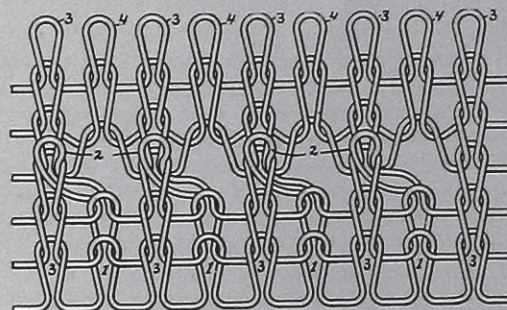


Fig. 5

ning-back by being carried across the adjoining plain wale 3 and held thereby, due to frictional hold upon it. The same is also true of fabric structure Fig. 3, although in this case the loops 2 of the discontinued wales 1, instead of being engaged with the adjoining continuous wales by being laid across the same as is the case with fabric structure Fig. 2, is in this instance drawn through a stitch of said continuous wale 3.

Fabric structures shown in Figs. 4 and 5 are similar to those shown in Figs. 2 and 3 respectively, with



the exception that plain wales 4 supplant the discontinued rib wales 1. In the event of the discontinued wales being plain wales, rib wales may supplant the latter in the same manner.

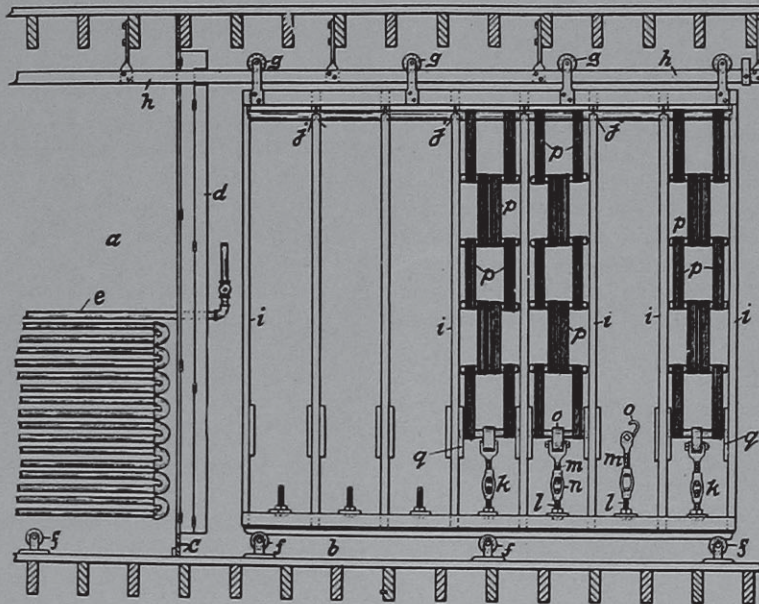
### SILK LUSTERING.

#### Description of the Process and a New Machine for Doing this Work.

The silk, during boiling off or dyeing, as the case may be, has a tendency to contract, which action causes it to lose its smoothness and lustre. In order to give back to the silk these lost properties, the operation of lustering is made use of, and which consists in stretch-

to sort the skeins, as is necessary with the common methods of lustering in use, in the effort to then secure a uniform stretching and thus overcome the non-uniformity of stretching, which more or less is the case if stretching any number of skeins on one pair of rollers or rods, owing to the impossibility of sorting skeins absolutely true in length.

The accompanying illustration is a view of the new machine taken in vertical section, showing the heating chamber *a* and one of the series of stretching frames removed therefrom into the chamber *b*, provided for unloading and reloading these frames. Chambers *a* and *b* are separated from each other by wall *c*, provided with a series of vertical slits or openings for entering



ing the silk, in the shape of skeins, while damp, either to its original length, or slightly longer, maintaining said skeins in a stretched condition from one to three minutes; together with the action of steam under pressure upon it during the operation, which in turn aids in making the lustre permanent, *i. e.*, setting it. (In connection with some makes of machines, the rollers on which the skeins are placed are rotated or turned gradually while the skeins are stretched upon them.)

By this process the silk is prevented from shrinking while drying, every portion of the skein of silk during the revolution of the skein being acted upon and a uniformity in the lustre produced throughout the whole skein. Lustering is of special advantage when applied to black dyed silk, and in all instances dry steam should be used.

In the new silk lustering machine to be described, the skeins are, in large quantities, first put under the desired tension and then introduced into a chamber supplied with the heat necessary to produce the required lustering effect. The skeins of silk are so arranged in the apparatus that when subjected to the stretching action, the strain is exerted uniformly on all the skeins although their lengths may vary somewhat, thus avoiding the loss of time and labor required

or removing the frames, containing the silk skeins, from one chamber to the other as required. These slits may be closed by a door *d* comprising two or more hinged leaves so that, if desired, the door may be manipulated in such manner as to expose only a limited portion of the opening, for instance when it is desired to determine from the outside the progress of the lustering process, whereas it is opened entirely when entering or removing a frame from one chamber to the other.

*e* shows one of a series of steam coils for quickly heating chamber *a* to the desired temperature.

The frame for holding the silk skeins travels on its lower end on a series of grooved rollers *f*, and on its upper end by means of grooved rollers *g* secured to it on rail *h*, secured to the beams of the upper floor.

The uprights *i* of the frame are formed at the top and on the faces thereof adjacent the other uprights with pockets *j*. To the lower side of the frame are attached the tension devices *k*, consisting of reversely threaded parts *l* and *m*, a turn buckle *n* connecting said parts and a hook *o* pivoted to the part *m*, the part *l* being directly attached to the bottom of the frame.

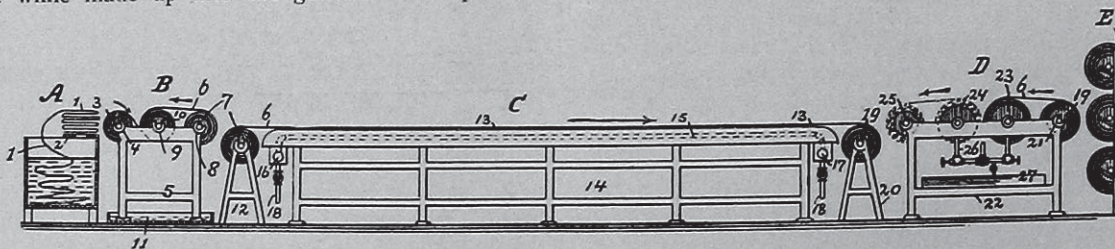
The skeins *p* are strung or linked together in the



manner shown, the uppermost rod in each series resting in the pockets *j*, the lowermost rod being engaged by the hook *o* of the corresponding tension device and having its ends disposed between guides *q* attached to uprights *i*. When tension is put on the series of skeins, the tendency for the latter to turn while the turn buckle is being manipulated is resisted by these guides *q*. The skeins are threaded on the rods from top to bottom of frame, *i. e.*, until what is to be the bottommost rod is reached, when the hook *o* is engaged with said rod and tension applied to the whole series of skeins by manipulating the turn buckle *n*. When the frame has been filled with skeins in this manner, the same is run into the chamber *a*, as are also all the other frames when the operation of filling them with skeins has been completed. The doors *d* are then closed and steam admitted and allowed to remain until the combined effect of the heat and tension has produced the desired lustre on the skeins. The heat is then turned off, the doors opened and the frames run out, the skeins removed from the frames and refilled with new skeins to be in turn lusted, as before described.

### SPONGING AND RE-FINISHING WOOLEN FABRICS; With a New Procedure of the Process in Connection with a New Machine.

Sponging, also called shrinking, has for its object to bring the fabric to what we may call its natural limits of being shrunk, in order that no shrinking of it while made up into the garment takes place; a



minor object of the process being to remove some, if not all, of the press lustre imparted to the fabric in its final stage of the finishing process in the mill.

Following the finishing process of any fabric during its various stages in the mill, will show us that in most all processes it then has been subjected to, there has been a strain exerted on the fabric both ways, although more pronounced in the direction of the warp, in order to be able to properly manipulate on the fabric. This strain, necessary for the various finishing operations naturally had a tendency to leave the fabric rather longer than it ought to be, also in many cases somewhat wider, and when then, if a garment should be made from such a fabric not sponged, stretched for example three-fourths of an inch in its length to the yard, the tailor's goose in pressing then touches the garment, this three-fourths of an inch of fabric length will disappear in proportion, with the consequent result of a bad fit of the garment. Again, should the tailor's goose not accomplish this result fully, it is assured that the first wetting (in a rain

storm) the garment will receive, this shrinkage of the garment will be the cause of a misfit. Certainly the more fully a fabric has been shrunk during the fulling process and the less stretching to it has been done during the after processes, the less of this final shrinking at the sponging will take place; however, we must remember that most of the fabrics met with are only slightly fulled and some frequently not at all, being only scoured, and when then the sponging of such fabrics is a most important item, *i. e.*, bringing such a fabric to what we may call the limits of the conditions to which it will be subjected to in the making of the garment.

Sponging will be readily understood by the reader, if he enters a common tailoring shop and watches the process of the tailor previously to cutting up the fabric. You will see him then wet a cloth and after wringing it out, spread this moist cloth evenly on the face of the fabric, after which he will roll them both up smoothly and leave them lay for about five hours, by which time the fabric thus treated will have absorbed most of the moisture from the wet cloth, this procedure effectually shrinking the fabric so it can be made up into the garment and stand the goose without detriment; the process at the same time removing the press lustre adhering to the fabric. This procedure as thus explained is most satisfactory in connection with a small tailoring shop, where possibly one or two garments a day come under operation; however, it will be readily understood that in connection with our wholesale clothing houses and where hundreds and hundreds of pieces of cloth have to be cut

up daily, sponging has to be done by machinery, remembering at the same time that one of these sponging and re-finishing establishments frequently does the work for several wholesale clothing houses.

Some mills think, to give the fabric simply a good steam brushing before measuring is a satisfactory sponging, which, however, is not the case, for the fact that even during that process and the after processes of measuring, rolling up, etc., tension is exerted upon the fabric.

Lately a new machine has been invented for sponging and re-finishing woolen fabrics, having for its object to give to the fabric besides a thorough sponging an exceedingly fine and permanent final finish and this without danger of disturbing colors not absolutely fast, the thus finished fabric being at the same time delivered to the clothier free of creases or other undesirable marks.

THE PROCESS consists in:

(1) Winding the fabric to be re-finished simultaneously with a wet dampening sheet of cotton on



one roll, in order to moisten the woolen fabric by said wet sheet;

(2) Unrolling the fabric and the dampening sheet, passing them in opposite directions and re-rolling the same;

(3) Unrolling the woolen fabric again, and passing it in its open width, with its face in contact with a heated surface, so as to dry the fabric and at the same time set its face; and finally

(4) Sponging the dry fabric.

The new process is best explained in connection with quoting letters and numerals of reference given with the accompanying illustration, which is a side elevation of the new apparatus. The same consists essentially of the following parts, viz:

- (A) A saturating tank,
- (B) A rolling-up device,
- (C) A drying apparatus,
- (D) A sponging device, and
- (E) A rack for holding the bolls of cloth.

The tank *A* is filled with water in which the dampening sheet 1, preferably of cotton, is immersed in open width, and when properly saturated, is lifted up, fold by fold, and placed on draining slats 2 arranged on the top of the tank *A*. The dampening sheet 1 is now rolled up on a roller 3, which afterwards is placed in bearings 4 of the frame 5 of the rolling-up device *B*. The woolen fabric 6 to be shrunken is first opened out in a loose pile in open width, and then rolled up on a roller 7 removably journaled in bearings 8 of the frame 5. On the latter are provided also bearings 9 for holding a roller 10 on which both the woolen fabric 6 and the dampening sheet 1 are rolled up together in alternate layers, so that the moisture contained in the dampening sheet passes by capillary attraction into the layers of the dry woolen fabric 6 to uniformly and thoroughly moisten the latter. 11 is a drip pan.

When this moistening of the woolen fabric has been accomplished, the latter and its dampening sheet 1 are then unrolled from the roller 10 and re-rolled on the rollers 7 and 3, respectively. The dampening sheet is then re-used by first unrolling it and returning it to the tank for re-saturation.

The roller 7 with the moistened woolen fabric rolled up thereon is now transferred from the bearings 8 to bearings on a stand 12 arranged adjacent to one end of the heated surface 13 of the drying apparatus *C*, mounted on a frame 14. The heating surface 13 is in the form of a long copper shell, rounded off at the ends, and underneath the heating surface are arranged steam pipes 15 connected at their ends with heads 16 and 17, connected by inlet pipes 18 with any source of steam supply. These heads are also provided with suitable drain cocks for drawing off the condensed water.

A portion of the woolen fabric 6, corresponding to about the length of the heating surface 13 is now unrolled from the roller 7 and is passed over the heating surface in the direction of the length thereof and with the face of the fabric downward and in contact with the heating surface 13. This extended portion of the

fabric 6 is now left in contact with the heating surface 13 until the portion is sufficiently dry and in proper condition for the subsequent shrinking process.

The dried portion of the fabric is now rolled up on a roller 19, removably journaled in a stand 20. By this operation another wet portion of the woolen fabric is passed over the heating surface 13, to be dried in the same manner as the first portion, and then this second dried portion is rolled up on the roller 19. This operation is repeated until the entire fabric has been dried and wound up on the roller 19, which then, with the dried fabric rolled thereon is now transferred to bearings 21 arranged on one end of the frame 22 of the sponging device *D*. The latter consists of steam cylinders 23 and 24 journaled on the frame 22, so that the dried fabric 6 can be unwound from the roller 19 and first wound up on the cylinder 23, from which then the fabric is unwound and wound up on the other cylinder 24, to then be unwound therefrom and wound up on a roller 25, removably journaled in bearings arranged on the frame 22. The cylinders 23 and 24 are supplied with dry steam through valved pipes 26. 27 is a drip pan. By subjecting the fabric to the action of dry steam on the cylinders 23 and 24, a steam finish is produced which is not only permanent, but also gives the fabric a most desirable lustre.

After the cloth has been subjected to the action of the dry steam in connection with cylinders 23 and 24, and wound upon roller 25, the latter is then transferred to the rack *E* and left thereon a sufficient length of time to properly dry, cool and re-finish, after which the fabric is ready to be measured, cut, or re-rolled.

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

(Continued from page 249.)

### The Metric System.

In chemistry we use only one system of measurement. This system is the metric system. It is the most simple and practical system of measurement of the present day. The metric system is based upon the idea of using as a unit of measure some standard from nature which will be unchangeable, and to have the units of length, weight and volume related to each other.

The unchangeable unit which was selected was one-fourth the distance of a terrestrial meridian, extending from the equator to the pole. One-ten millionth part of this distance was selected as the unit of length and was called the metre. The metre is approximately 39 inches. The sub-divisions of the metre are, the decimetre (one tenth of a metre) the centimetre (one hundredth of a metre) and the millimetre (one thousandth of a metre).

The volume contained in one cubic decimetre was called the litre. Its volume is equal to about four fifths of a quart. The weight of one litre of water at its greatest density (4° C) was adopted as the unit of weight and is known as the kilogram. Its weight is about two and two-tenths pounds.

(Continued on page x.)



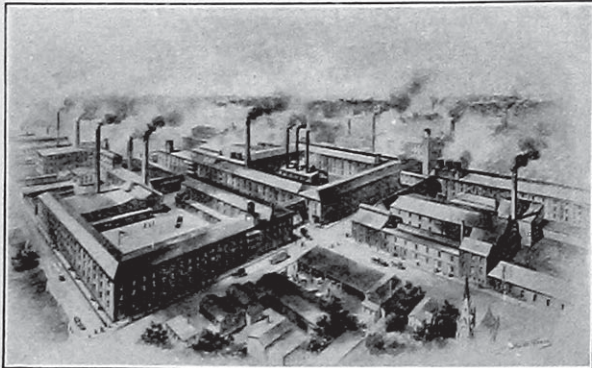
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(Continued from page 358.)

The simplicity of the metric system is shown by the following tables.

TABLE OF LENGTH; unit is the metre (m).

10 Millimetres	= 1 Centimetre	=	.3937 inches
10 Centimetres	= 1 Decimetre	=	3.937 "
10 Decimetres	= 1 Metre	=	39.3704 "
10 Metres	= 1 Decametre	=	393.7043 "
10 Decametres	= 1 Hectometre	=	3,937.043 "
10 Hectometres	= 1 Kilometre	=	39,370.43 "
10 Kilometres	= 1 Myriametre	=	393,704.3 "

TABLE OF WEIGHTS; unit 1 gram (gr).

10 Milligrams	= 1 Centigram	=	.1543 grains.
10 Centigrams	= 1 Decigram	=	1.5432 "
10 Decigrams	= 1 Gram	=	15.432 "
1000 Grams	= 1 Kilogram	=	2.204 lbs.

The decagram and hectogram are not generally used, so their values are not given, but these values are easily determined, deca meaning ten, and hecto meaning one hundred.

In measuring volumes only two terms are used, the cubic centimetre (cc) and the litre (l) whose volume is 1000 cc. However the complete table is given below.

TABLE OF VOLUMES:

1 Millilitre	= .001 Litres	=	.061 cu. in
10 Millilitres	= 1 Centilitre	=	.6102 " "
10 Centilitres	= 1 Decilitre	=	6.102 " "
10 Decilitres	= 1 Litre	=	1.7608 pints
10 Litres	= 1 Decalitre	=	2.2009 gallons
10 Decalitres	= 1 Hectolitre	=	22.009 " "
10 Hectolitres	= 1 Kilolitre	=	220.09 " "

## (2) Volumetric Analysis.

Volumetric Analysis is that, in which we use a solution of accurately known strength, to test the unknown solution, and from the amount of solution used we can calculate the amount of the substance tested for in the solution. The following are some of the instruments required:

(1) *Burettes*, are tubes of uniform bore throughout the whole length; they are divided into cubic centimeters and are closed at the bottom, as shown in Fig. 1, by means of a glass stop-cock or with a piece of rubber tubing containing a glass bead *h*. The latter form is used as follows: The tubing is seized between the thumb and forefinger at the place where the glass bead is, and by means of a gentle pressure a canal is formed at one side of the bead through which the liquid will run out. Instead of the glass bead an ordinary pinch-cock is frequently used.

(2) *Pipettes*. A pipette has only one mark upon it, and serves for measuring off a definite amount of liquid. They are constructed in different forms; usually they consist of a glass tube with a cylindrical widening at the middle. The lower end is drawn out, leaving an opening about  $\frac{1}{2}$ -1mm. wide. Pipettes of this nature are constructed which will hold respectively 1, 2, 5, 10, 20, 25, 50, 100, and 200 c. c.

(3) *Measuring-flasks*, are flat-bottomed flasks with narrow necks provided with a mark, so that when they are filled to this point they will contain respectively 50, 100, 200, 250, 300, 500, 1000, and

2000 c. c. They serve for the preparation of standard solutions and for the dilution of liquids to a definite volume.

(4) *Measuring-cylinders*, are graduated into cubic centimeters and are used only for rough measurements.

(To be continued.)

## A New Spot-Veiling Machine.

Consul Frank W. Mahin, of Nottingham, advises that after eight years' experimenting, at a heavy expense and against many discouragements, a machine has been perfected by a mechanic and a lace manufacturer of that English city, for spotting veilings with chenille, concerning which he says:

Hitherto this has been done by hand. The new machine, it is claimed, will do in a few minutes what would require months of handwork. The chenille used in spotting is made in lengths and is cut off as each spot is inserted into the veiling, which is a slow and laborious hand process.

In the new machine there are placed in a frame as many lengths of chenille as are required for the width of the veiling. The chenille passes from this frame down into the machine, which inserts and cuts it automatically as the veiling passes through the machine. The machine is adjustable so that the spots may be in rows of absolute uniformity, or by an automatic shifting device the spots may be placed in varying rows.

The initial difficulty, which took several years of experiment to overcome, was that many of the spots fell off the veiling, though apparently fast when set in by the machine. This defect was removed by gradually perfecting the operators acting upon the chenille. Another equally serious trouble was the breaking of the net by the inserting of the chenille. This was overcome after long and patient effort.

A final triumph has been gained in a machine with jacquard appliances, which can spot veilings in any design suitable to the gauge of the machine. The designs are, of course, quickly changeable, five minutes sufficing to substitute one set of cards for another.

All the present machines are narrow, and comparatively small, yet the production of one of them, on a close set-out, is stated to be nearly 200,000 spots an hour. As such machines may be widened, their possible achievements are beyond conception.

The lengths of the chenille being limited, must be united by knots or otherwise, and these joints give trouble in passing through the machine. To overcome this the inventors are now building a machine of their own device to make their own chenille. When com-

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pleted, it will remove the only apparent defect in the present work of the spotting machine.

The product of the machine is now being marketed, but the quantity will be small and scarcely appreciable till more and larger machines are made. Then the immediate probable effect will be to greatly reduce the price of veils spotted with chenille.

Veils and other articles of spotted net are an entirely different product. The spots on these are made from the same thread when weaving the net. The machine halts at fixed intervals, and makes a certain number of motions which create the spot, and then resumes the weaving movement.

The inventors of the new spotting machine have received liberal offers for their patents, among them such as would take the machines entirely away from Nottingham, but all have been declined. They believe they have an invention of too great value to part with on any conceivable terms that might be offered.

### SOME SPECIAL COTTON FINISHES.

(Continued from May issue.)

**WHITE SATEEN.** These goods are finished to imitate half silks, and must therefore be glossy and have as much lustre as it is possible to put on them. They must not be too heavy, and have a somewhat crisp feel and crackle. There are many qualities of sateens, the best of these are used in making corsets, and are largely exported to France. What are called Royal Ribs are sateens finished for the same trade. In the home stay trade, besides sateens, cotails and nankeens are used, and what are called satin tops are used for cheaper class of corsets. Many low makes of twill cloth are finished to resemble sateens and intended to replace them in the stay trade.

Sateens are finished in a variety of ways, but the following plan can be recommended:—Mangle through cold water on the five bowl mangle, dry on the tins and condition on damping machine. This is important, as much depends on it. Then glaze on the five-bowl calender, with sycamore and brass bowls, generally chasing two or three times, hot press between glazed cards in the hydraulic press and make up. In glazing these goods a calender with sycamore and metal bowls gives the best results and the metal bowl cannot be too highly polished. Royal Ribs are only slightly calendered, one nip being given.

**CORDUROYS.** The finishing of cotton corduroys requires great care. As soon as they have been dyed they are hung up to dry and then brushed to raise the pile. The brushing is done across from selvage, and the brush never goes back over the same path. After leaving the brushing machine, the right side of the fabric is lustred with beeswax on a calender. The fabric is then dressed. To make 300 lb. of dressing, take:—

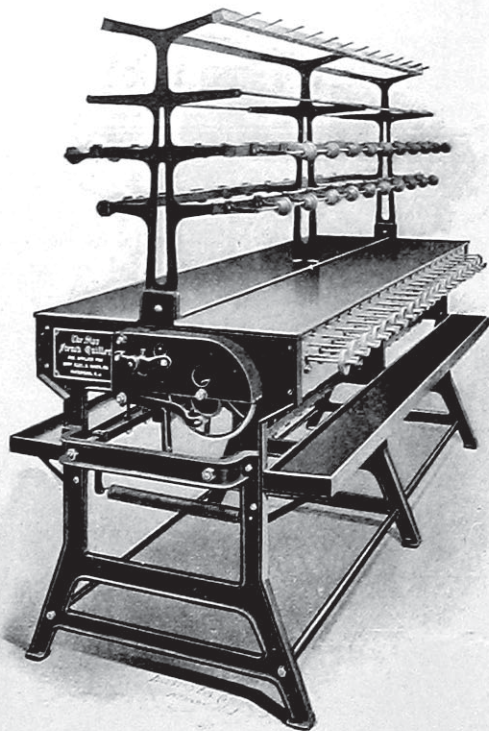
White dextrine .....	70 lbs.
Glauber's salt .....	25 "
Soaked glue .....	15 "
Softening .....	15 "
Turkey red oil containing 50% of oil .....	15 "

Fill a cask with cold water and put in the glue, softening and dextrine. Heat to complete solution, and then add the oil and Glauber's salt, and boil again for a few seconds. The finished liquid should be from 20 deg. to 22 deg. Tw. at 140 deg. F. It must then be slightly diluted with water, as the strength required is from 12 deg. to 18 deg. Tw., according to the quality of the goods. The dressing is applied to the wrong side, and the goods are then dried on the cylinder drying machine with the right side against the heated roller. The goods are again brushed as previously described, shorn and again lustred with stearine. The goods are again brushed, finished with beeswax and brushed again.

**ZEPHYRS AND COUNTERPANES.** These colored goods of rather loose weave require a dressing to fill the interstices and to impart a certain amount of lustre, together with a smooth, full, and not paper-like handle. It is often requisite to give them, in conclusion, a short mangling to improve the handle. In this case the mangling must be light as well as short. Too heavy mangling crushes the dressing and imparts an empty feel. For a half-day's output of, say 4,000 yards, 30 in. wide, about 77 gallons of dressing bath are required, prepared with 44 lb. of best potato starch and 33 lb. of China clay, which has first been soaked for some time, over-night if possible, in water. For goods very loose in texture more kaolin may be necessary. When the starch and the clay have been well mixed, add 33 lb. of white dextrine and the rest of the water, making up to 77 gallons. Finally, boil up the bath and add 4 lb. of pure tallow and about 5 oz. of blue.

**BOOK MUSLIN.** Book muslin is a textile term that is somewhat of a misnomer, having no connection with fabrics used for book coverings. The goods are used very extensively for stiffening and lining clothing, and for the foundation work of ladies' hats; they are distinguished more by the feel or finish than by appearance. They vary in appearance from plain weave or small checks. Being made more for utility than effect, fancy weaves are not called for or necessary. One of the principal weaves used is a leno, one end crossing one. Before finishing, the goods feel very sleazy. The effect obtained by finishing is to change this cloth into a very stiff, board-like fabric. Goods for linings are sized the least; those for stiffening and millinery purposes are sized heavily. After being woven, the cloth is washed, dyed, dried, sized, dried and folded as desired. No burling, singeing or shearing is required, as perfect cloth is not absolutely essential, and the glue or size, combining with the pressing, lays the loose fibres. In sizing, the cloth passes through the size box and on to the driving cylinders. If a glazed finish is required, it is subjected to pressure by the heated rollers of the calender machine. The sizing substances are usually glue, gum, flour and size, of variable proportions, mixed with water to the desired consistency. The weight of size in a piece will vary from about 5 per cent. to 40 per cent. of the entire weight.





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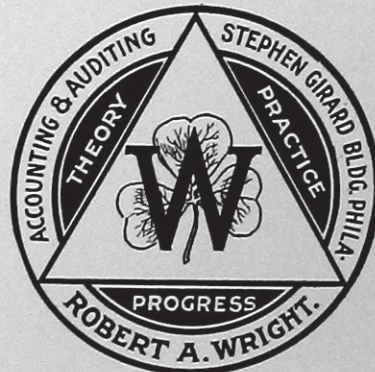
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## MILL NEWS

*Philadelphia.* Operations will be started as soon as possible in the Star and Crescent Mills, and the plant will be run as the Star and Crescent department of Stead, Miller & Co., by which concern it was purchased. Turkish towelling will continue to be the product.

*Philadelphia.* The Philadelphia Knitting Company, it is reported, has taken over the business of the Friedman & Neiman Knitting Company, 337 South Second street, and moved it to 56 North Seventh street.

*Philadelphia.* The Guarantee Hosiery Company has started operations at 730 Girard avenue.

*Philadelphia.* Collins & Aikman, plush manufacturers, have added 54 new looms to the equipment of their factory on the River road, Manayunk.

*Philadelphia.* E. H. Morris & Co., manufacturers of carpet yarns, have moved from Roxborough to their new building, at Walnut lane and Main street, Manayunk.

*Doylestown, Pa.* A new hosiery manufacturing company, it is reported, is to be formed by Harvey Sheatz, who bought the plant of the Doylestown Hosiery Mills at receivers' sale a short time ago.

*Camden, N. J.* The Nelson Manufacturing Company is a new enterprise which has just started in the manufacture of knit goods.

*Phillipsburg, N. J.* The new Continental Silk Mill is now being equipped with machinery and will be ready for operation in about two months.

*Paterson, N. J.* The Universal Weaving Company has filed articles of incorporation. The company will engage in the manufacture of ribbons and other textures.

*Cohoes, N. Y.* The Harmony Mills have resumed operations on full time, after having been running on short time since December 23.

*Cohoes, N. Y.* The Granite Knitting Mill and the two big mills of the Root Manufacturing Company are running on full time, with orders ahead.

*Perry, N. Y.* The Perry Knitting Company's plant is running full time,

both day and night. They are planning to begin the manufacture of heavy weight goods for next winter's delivery.

*Troy, N. Y.* The Wynantskill Manufacturing Company has been incorporated with a capital of \$50,000, to manufacture yarn and cloth.

*Utica, N. Y.* The mills of the Avalon Knit Wear Co., which have been running on full time, have started running nights.

*Minetto, N. Y.* If the Columbia Shade Company takes over the Minetto Shade Cloth plant the new owners may erect a large cotton mill here for the manufacture of cloth used in the shades.

*Niagara Falls, N. Y.* The Visor Knitting Company has been reorganized with a capital of \$40,000. The latest improved knitting machinery has been installed.

*Ogdensburg, N. Y.* Fred S. Maguire, of the Ogdensburg Woolen Mill, has purchased the Allen estate building at 14 North Water street, for establishing a woolen mill there.

*Middleboro, Mass.* The Nemasket Worsted Mills are running on full time, with plenty orders on hand.

*Amesbury, Mass.* The Hamilton Woolen Company, manufacturing cotton prints, and which has been running on a four days a week schedule for several months, has resumed full time.

*North Adams, Mass.* Eight more printing machines were set at work at the Arnold Print Works, making a total of 19 machines being operated of the 23 machines with which the works are equipped.

*Fitchburg, Mass.* The Shirreffs Worsted Company has started to erect a one-story brick and steel weave shed, 187 feet long and 95 feet wide, to be equipped with 100 looms.

*New Bedford, Mass.* The mills of the New England Cotton Yarn Company have increased their running time by fourteen hours a week. The mills have been on short time since last fall.

*New Bedford, Mass.* Directors of the Bristol Manufacturing Company have declared a regular quarterly dividend of 1½ per cent., asking their stockholders to vote on a proposition to increase the stock from \$700,000 to \$800,000.

*Webster, Mass.* The Intervale Mills Corporation will start up their Webster plant in full within a few days, after being closed several months.

*Fall River, Mass.* Work of installing machinery in the plant of the new Lincoln Manufacturing Company is proceeding satisfactorily, and operations could be begun as a 25,000 spindle mill on very short notice. The mill when complete will have a capacity of 50,000 spindles and make goods of the same grade as those made in New Bedford. The yarns used will be 60's warp and 90's filling.

*Lowell, Mass.* The Shaw Stocking Company as well as The Lowell Hosiery Company have been running on full time for many months and expect to continue doing so all summer.

*Lowell, Mass.* After being on short time since last November, the Faulkner Manufacturing Company has started on full time.

*Lowell, Mass.* The Merrimack Mills have gone on full time.

*Lowell, Mass.* The Massachusetts, Appleton and Boott cotton mills are running on full time.

*Salem, Mass.* All departments of the Naumkeag Steam Cotton Company have started running on full time again after having run only four days a week for some time.

*Providence, R. I.* The woolen mills at Allentown and Mapleville, R. I., and at Plainfield, Conn., controlled by Joseph E. Fletcher, of this city, are running overtime every night until 9 o'clock.

*Olneyville, R. I.* At the Riverside Mills more operatives have been put to work, and the carding and combing departments are running all night.

The Weybosset Mills are also running some of its departments overtime. The Valley Worsted Company's plant is run full five days in the week.

*Warren, R. I.* The mills of the Warren Manufacturing Company have gone on full time, after having run five days a week for nearly two months.

*Westerly, R. I.* The establishment of a plant for the manufacture of silk linings is proposed, the Westerly Board of Trade being interested in furthering the enterprise.



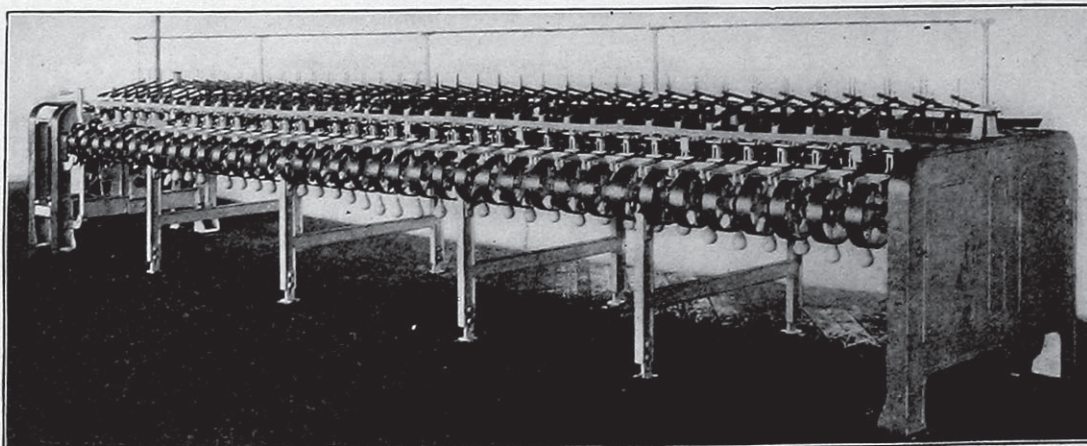
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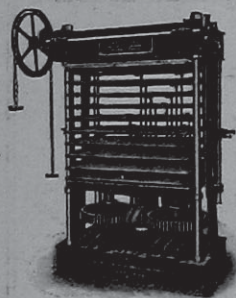


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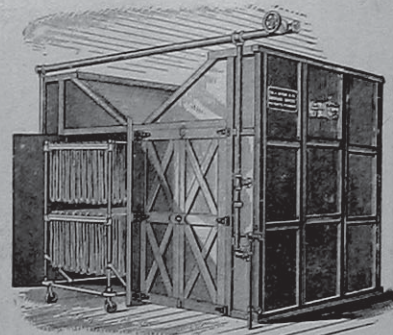
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*Stafford Springs, Conn.* The Central Mill is building a 58 by 30 feet addition to their mills.

*Mystic, Conn.* The Ninigret Mills Company, manufacturers of silk linings for coats, overcoats, etc., will move from Massachusetts to occupy the plant now being built here for it immediately upon its completion, which is expected to come in about four months.

*Dover, Me.* The Mayo & Son Co. are preparing plans for the erection of a new mill building near their present mill. The building will be 125 feet in length, built of concrete, and will be equipped with new machinery.

*Brunswick, Me.* The Cabot Manufacturing Company will erect a new building 100 by 120 feet and five stories high, to replace the present part of the old plant, and with the addition built in 1891 the factory will be 500 feet long.

*Bridgewater, Vt.* The Bridgewater Woolen Company, which has been running on four days' time for several months, has started on a five-day schedule.

*China Grove, N. C.* The plant of the Patterson Manufacturing Company will soon be run by electricity. The equipment of the mill consists of 12,000 spindles and 160 looms. The concern is building a large plant at Kannapolis, which will operate 20,000 spindles and 400 looms.

*Greensboro, N. C.* It is reported that Caesar Cone, the president of the Proximity Mfg. Co., and White Oak Cotton Mills, and associates are intending to erect another mill at Greensboro.

*Wendell, N. C.* The construction of a 3,000 spindle hosiery yarn mill has been started by R. B. Whitney.

*Greenville, S. C.* The Carolina Mills have increased their capital stock from \$100,000 to \$200,000, to cover the expenditures of recently doubling the plant's capacity.

*Clinton, S. C.* It is reported that the Clinton Cotton Mills are intending to build a large additional mill during the next six months. They operate at present 37,000 spindles and 900 looms.

*Gaffney, S. C.* The mill buildings of the Merrimac Mills are about completed and will have an equipment of 10,240 spindles and 300 looms for the manufacture of convertible cotton goods.

*Savannah, Ga.* It is stated that the management of the Savannah Cotton Mills contemplates increasing the projected capacity of the plant by between 300 and 400 knitting machines.

*Tallapoosa, Ga.* The greater part of the machinery of the Tallapoosa Mills has been started. It is to be a 10,000 spindle plant with facilities to add 2,000 spindles.

*Laurens, S. C.* The Laurens Cotton Mill had a prosperous year and the regular 6 per cent. semi-annual dividend was declared.

*Alma, Ga.* It is claimed by the Commercial Club that a deal for a knitting mill will soon be closed, which will give employment to 100 people.

*Paducah, Ky.* The big Wisdom Hosiery Mills is doing a rushing business, running the mills until 10 P. M.



# "Textile Designing Simplified."

The object of this chart is to show how easy weaves for all classes of Textile Fabrics can be constructed; it will be a search light in the misty matters in the field of designing Textile Fabrics. Keep this chart of weaves for reference. Millions of new weaves can be obtained by it.

All weaves for Textile Fabrics have their foundation in Plain Twills and Satins.

**PLAIN.**—This weave and its sub-divisions are explained on the chart in the top row by 16 weaves, the sub-divisions covering common, fancy and figured Rib and Basket weaves.

**TWILLS.**—The foundation of constructing regular (45°) twills is shown by rows 2 and 3 with twenty six weaves, covering twill weaves all the way from 3 harness up to 13-harness. The sub-divisions of twills are quoted next on the chart, being Broken twills, Skip twills, Corkscrews, Double twills, Drafting twills, Curved twills, Combination twills warp drafting, Combination twills filling drafting, 63° twills, 70° twills, Wide wale twills, Entwining twills, Checker-board twills, Pointed twills, Fancy twills, thus covering every sub-division of twill weaves possible to be made.

**SATINS** are next shown, giving also their sub-divisions, viz: Double satins and Granites.

**HOW TO PUT A BACK FILLING ON SINGLE CLOTH** is shown below the satins by two examples, and at its right hand is quoted the principle of

**HOW TO PUT A BACK WARP ON SINGLE CLOTH.**

On the bottom line are given the four steps for:—

**THE CONSTRUCTION OF DOUBLE CLOTH, 2 @ 1;** and above the same one example, with the arrangement 1 @ 1.

**THREE PLY CLOTH** is shown by one example.

**HOW TO BACK SINGLE CLOTH WITH ITS OWN WARP** is shown by two examples.

**WEAVES FOR SPECIAL FABRICS** are quoted: Tricots (warp, filling and Jersey effects), Rib fabrics, Honeycombs, Imitation Gauze, Velveteen, Corduroy, Chinchillas, Quilts, Plush, Double-plush, Tapestry, Crape, Terry, Worsted coating stitching, Huckes, and Bedford cords

## HOW TO WORK THIS CHART OF WEAVES.

**CAPITAL LETTERS** of references refer to the plain weave and its sub-divisions.

**SMALL LETTERS** of references refer to twills and their sub-divisions.

**NUMERALS** of references refer to satins and their sub-divisions.

**Example.**—How to ascertain the construction of the weave at the right hand top corner of the chart; being the figured rib weave marked C C'? These two letters of reference mean that said figured rib weave is nothing else but the combination of the 2-harness 6 picks common rib weave warp effect C, and the 6 harness 2 picks common rib weave filling effect C'.

**Example.**—The letter of reference *e*, underneath the first broken twill indicates that the same is obtained from the  $\frac{1}{2}$  4 harness twill *e*, (third weave on the second row; in other words, letter of references below each weave of any of the various sub-divisions refer always to the corresponding foundation weave.

**Example.**—Twill *q* and *o*, are the foundation for the eight combination twills filling drafting, said common twills are drafted 1 @ 1, the different designs being obtained by means of different starting.

**Example.**—The wide wale twill *l' w'*, has for its foundation the 63° twills, marked also respectively *l'* and *w'*, the latter two weaves have again for their foundation respectively the common twills marked *l* and *w*.

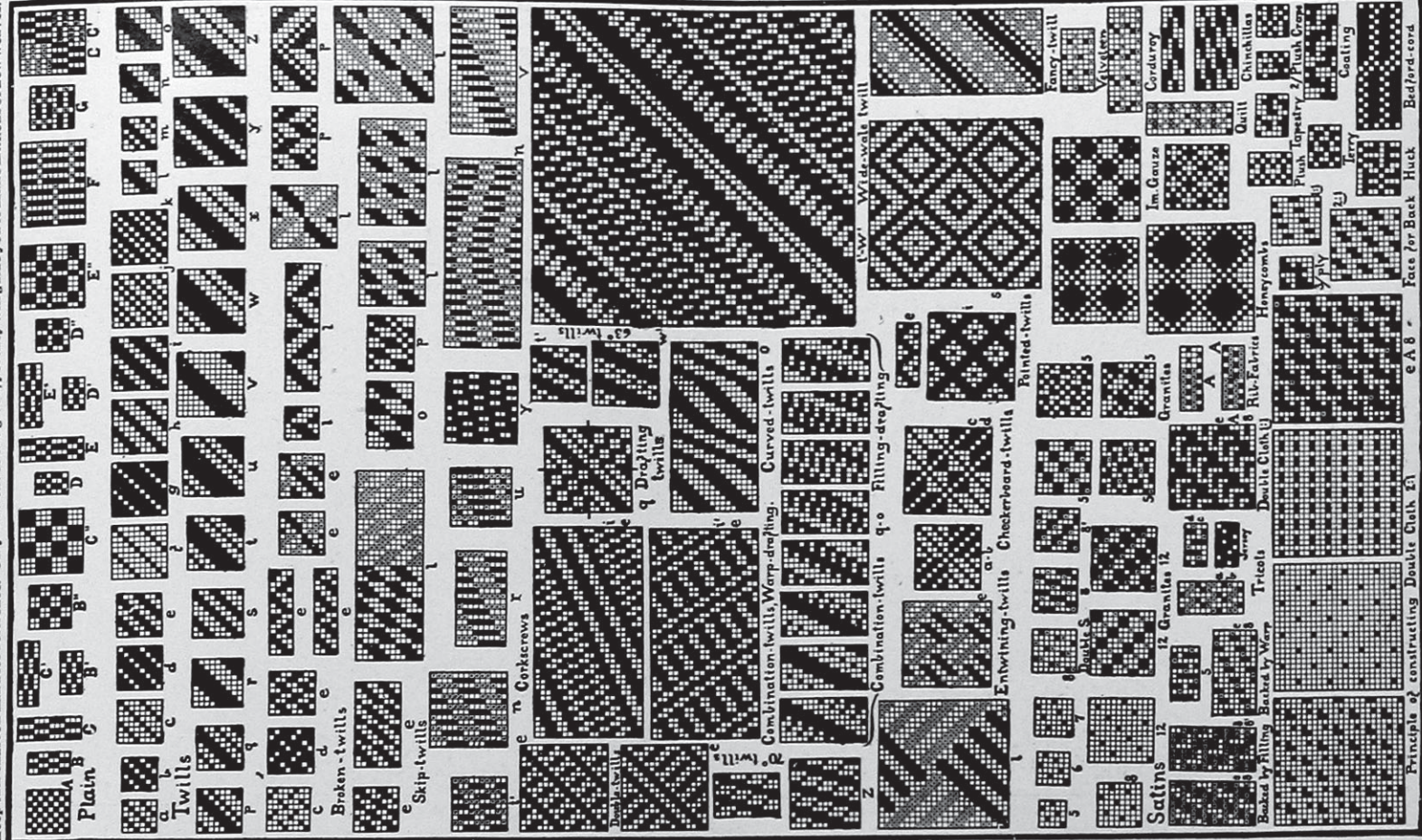
**Example.**—Granites marked 8 have for their foundation the 8-leaf satin, such as marked 12 the 12-leaf satin.

**Example.**—Backed by filling *e* 8, means the common  $\frac{2}{2}$  4-harness twill *e*, (fifth weave on second row) and the 8-leaf satin is used in the construction of this weave.

**Example.**—The complete design of double cloth, marked *e* 8 A, means that the common  $\frac{2}{2}$  4-harness twill (*e*), the common plain (A) and the 8-leaf satin (8) are used in the construction.

**Example.**—Rib fabric A, indicates that the plain weave forms the foundation.

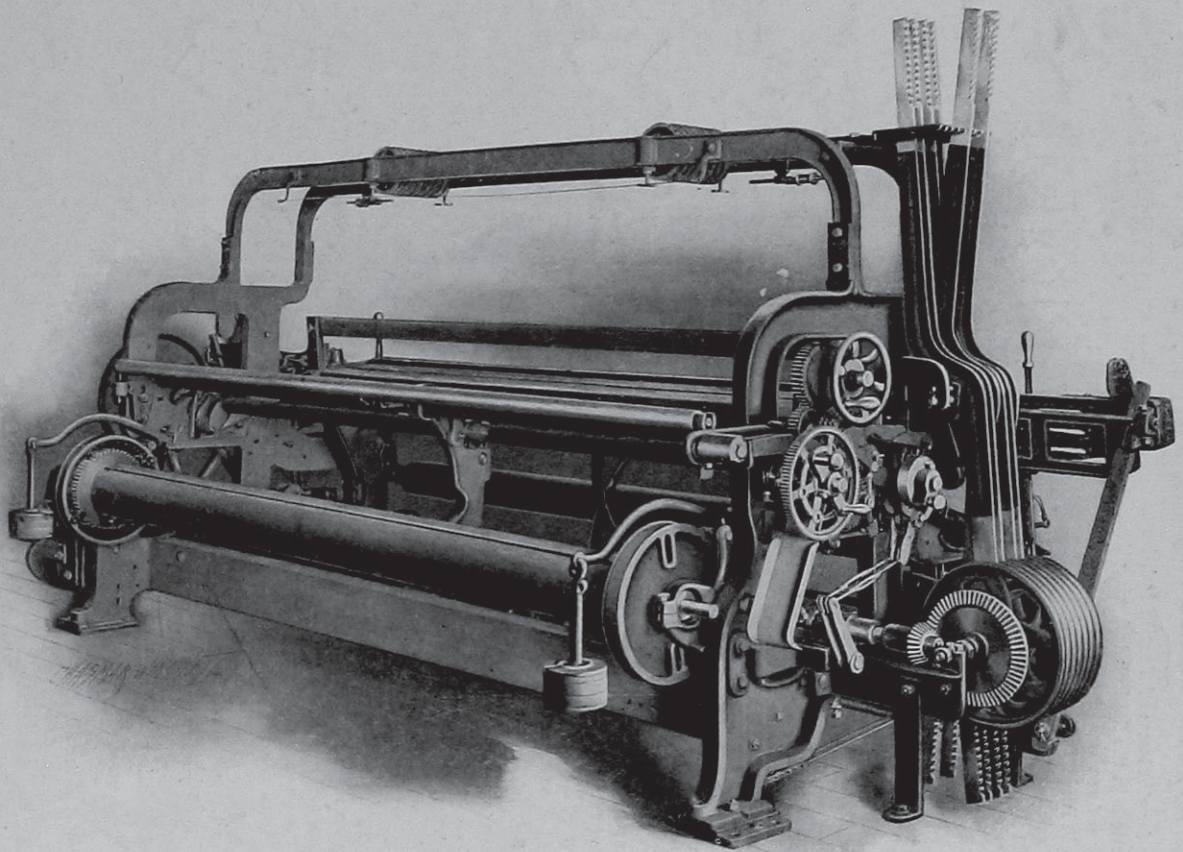
It will be easy to substitute different foundations in constructing weaves for heavy weights. In reference to single cloth weaves we only want to indicate that by following rules shown in the chart, millions of new weaves can be made up from it.





# LOOMS

FOR WOOLENS, COTTON, SILKS  
AND ALL SPECIAL FABRICS  
DOBBIES, JACQUARDS, WOOL COMBS  
PRINTING DRUMS, REPAIR PARTS and SUPPLIES



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