figures the 4-harness broken twill setting, two different figures being used, each placed by means of this 4-harness broken twill setting; numerals of reference 1, 2, 3, and 4 referring to one of the figures, and numerals of reference 1′, 2′, 3′, and 4′ referring to the other figure as planned after the 4-harness broken twill setting in our design. The present fabric sketch is laid out on what we call a rectangular plan of setting, *i. e.*, having the repeat of the design considerably longer in the length of the pattern, or filling ways, than width ways; a feature which as already previously referred to gives us more space at our disposal for one repeat of the pattern, since filling ways, this repeat is not limited by the size of the Jacquard machine used.

In connection with fabric sketch Fig. 27, one of the neatest plans of setting figures in connection with jacquard designing for dress goods is given, the same being the planning of the distribution of the figures after the 6 leaf satin setting, the construction of which on the point paper has been previously already referred to in connection with Fig. 19*b*, and which plan we have indicated in our fabric sketch by means of numerals of reference 1, 3, 5, 2, 6 and 4 respectively.

Examining fabric sketch, with reference to position of figures in the same, it will be noticed that this position has been changed in every instance; two repeats of the pattern each way being given in connection with this fabric sketch. The figure itself is the same figure as previously used in connection with Fig. 22 with the 5-leaf satin setting, in Fig. 23 with the 8-leaf satin setting and in Fig. 25 with the 4-harness broken twill setting; clearly showing to the student how he can use the same figure in connection with any number of settings.

An affair the designer will frequently come in contact with in his practical work, is to reproduce a given design of which it is only possible to furnish him a portion of the repeat; *i. e.*, for him to reproduce a design from a small clipping (less than one repeat of pattern) furnished for example by the commission house. In some instances, it may be permissible for him to vary somewhat from the original effect desired, whereas in most instances a true reproduction of the original design will be required.

Although, as previously mentioned, only a portion of one repeat of the pattern is then given him, the designer will have to exercise his skill, in order to arrive at the proper result in the finished fabric. He must for this purpose possess a thorough knowledge of the various bases on which designs are constructed, he

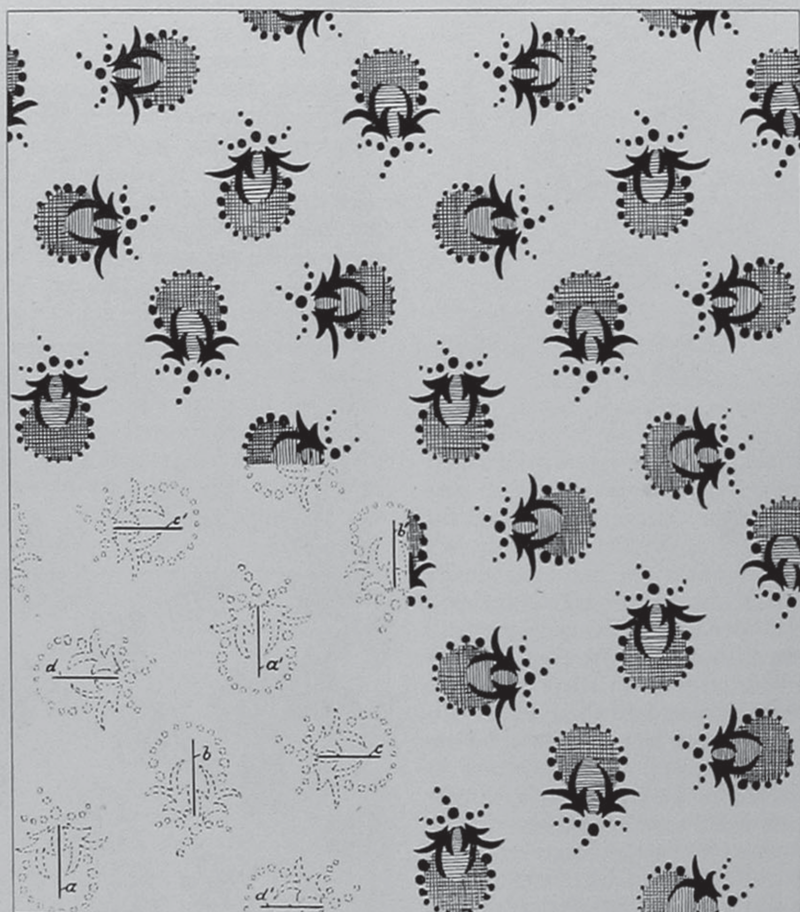

FIG. 24.

must be well acquainted with the various settings of figures as well as the permissible chance of turning the individual figures in one repeat, and finally he must know what is meant by a well balanced design; all being features, a knowledge of which will greatly assist him in his labor.

FIG. 25.

Provided he finds the complete repeat width ways in the sample submitted, it certainly will be an easy matter for him to solve the most important point for him to consider at first, *i. e.,* the size of the jacquard machine necessary to produce the particular design in question, whereas if the sample only contains a portion of its repeat, after tracing this portion of the design from the sample submitted, he then must fill in the missing portion, in order to adapt the figure to the compass of the jacquard machine at his disposal. After having satisfied himself with reference to the width of one repeat, and at the same time its compass with the size of the jacquard machines in the mill, and which is always the most important feature for him to consider first, he then will have to sketch the missing portion of the repeat lengthways in his sketch, being sure that after having obtained in this manner one repeat, to sketch or trace two additional repeats each way, in order to be sure that the design is perfect, *i. e.,* well balanced all around. In order to obtain a true reproduction of the portion of the design as in the fabric portion submitted, a good plan for the beginner is to secure the portion of the fabric, by means of pins, to the sketching paper and prick around the edges of the various forms or figures the sample contains.

Before going any further with lessons in practical designing for the various textile fabrics on point paper, a few words as to *color* will not be amiss. Color is a sense met with, in a more or less perfect form, in connection with some people, by which we mean that the effect of color produces sensations varying in character with different persons, some of which may be partly affected by red, others by yellow and so on whereas there are people which cannot distinguish one from another, they being what we call color blind. There is, however, a way in which it is possible for some color blind persons to correct in a measure their erroneous impression. If they have something green to match and fear they may mistake red for the green, by looking at their samples through a green or red glass, they can prove whether or not they are correct, for the fact that through a green glass, the green will keep its color, while the red will look nearly black. Again, when viewed through a red glass, red will remain unchanged, whereas the green will appear as nearly black.

The beam of white light, when decomposed by means of a triangular glass prism, is found to consist of the three primary colors, blue, red and green, which, immerging at their junction, produce mixtures, red and green resulting in yellow, blue and red in violet, and blue and green in a sea green, said mixtures being called secondary colors. The textile worker, however, takes for his primaries, red, blue and yellow, known as the pigment primaries and for his secondaries, violet, orange and green. A third range of colors, known as tertiaries are citrine, olive and russet.

Color changes in its appearance according to colors joining, for example, red along side of green becomes redder and the green also greener. Blue is heightened in its tone by being placed against orange, while a dark rich red, placed for example along side a pale red, will slightly neutralize the latter, making it to appear still paler and apparently less pure.

FIG. 27.

One of the most important items to the designer, when dealing with color selection for his designs, is that of the daylight which eliminates the colors and when he will observe that ordinary daylight is very far from being always uniform with reference to lightness and uniformity of quality, since some days he will find it slightly reddish or of an orange hue, while other days it will predominate towards the blue and violet rays. The white diffused daylight, towards the end of May and coming from a northerly direction is considered the standard of a good pure daylight, since it possesses the necessary whiteness and purity for showing colors in their truest aspect. June, July and August are the next best months for good light, although towards the end of August, the atmosphere and the light becomes hazy and duller in quality, November being about the poorest, *i. e.*, darkest month of the year for matching colors, which in these dark months of the year is a most difficult task for the colorist as well as the dyer, who certainly will be then aware of the great need of a good artificial light that can show all colors, at any time, in their true daylight aspect.

Fig. 26.

The electric arc light, giving a beautifully clear bright light, certainly in most cases forms an excellent substitute for daylight during the dark months of the year; however, we must remember that colors matched in this light are in many cases considerably altered when viewed by daylight. To overcome these disadvantages of the arc light with reference to matching colors for textiles is the object of the Dufton-Gardner Light, and where the electric arc light is surrounded with a special tinted blue-copper globe, which absorbs an exact amount of the preponderating red rays from the arc light, in turn making it similar to good daylight.

Incandescent lights on the Welsbach principle, certainly are a great improvement over gas, however, they contain a considerable excess of red and yellow rays if compared to electric arc and magnesium lights.

(*To be continued.*)

A PRACTICAL TREATISE ON THE KNOWLES FANCY WORSTED LOOM.

By E. P. Woodward,

Master Weaver.

(*Continued from page 231.*)

Setting the filling stop motion.

The filling stop motion can now be set, and as the shipping device has already been attended to, the setting of the stop motion can be done with the assurance that the parts once set will not need readjusting on account of having to set any part of the shipping device.

Before setting the stop motion it is well to know what the principles of its working are, as these can not fail to help one to a clearer idea of adjusting the parts.

The stop motion has in its construction the following three essential parts:

(1) A *feeling* device, to detect the absence of the filling.

(2) A tumbling device or cam, to raise the feeler wires in time for the passage of the shuttle.

(3) A knock off device to cause the stopping of the loom when the filling is not under the feeler wires.

In addition to these, the Knowles stop motion has a device known as the *Stevenson Safety Shield*, which by shielding the knock off lever from the dagger on the first pick taken after the stopping of the loom, prevents these parts from acting and pulling the shipper handle away from the operator. Before trying to adjust the parts, it should be known by the fixer just what their relative positions should be, in theory at least; and he will find in this case practice will prove the truth of the following statements:

1st. The feeler wires must rise high enough and early enough to allow the shuttle to pass and not be in danger of striking the wires.

2nd. The feeler wires must be of sufficient length, in conjunction with the knock off dagger, that the dagger will have passed the engaging point of the knock off lever by the time the feeler wires have been drawn away from the filling.

3rd. The stop motion dagger must be high enough above the engaging point of the knock off casting to clear it without danger of interference when the ends of the feeler wires are leaving the filling.

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With these parts set to these ideas, one has the margin of safety on his side, since to these positions is added the speed of the loom against the distance the stop motion dagger has to drop from the clearance position to the engaging position with the knock off lever, and by the time this is accomplished the stop motion dagger has been carried beyond the engaging point of the knock off lever.

When the filling is missing, the parts involved will cause the stopping of the loom and at the same time cause the safety shield to cover the engaging point of the knock off lever. These are the conditions desired, and now the question is how to get them in a quick and satisfactory way.

One can begin by setting the stand which bolts onto the breast beam. This stand is curved on the arm, and this curve is the arc of a circle whose radius equals a line drawn from the centre of the lay sword pin to the lowest position the stop motion dagger reaches. In other words, it fits the path the stop motion dagger makes when in its lowest position as it is swung back and forth by the lay. If the part of this casting, which comes in contact with the breast beam, is set as nearly perpendicular as reasonable care can make it, this curved part will be located practically true.

The cam which engages the stop motion dagger to raise the feeler wires, can now be adjusted, and the stand which carries it should be so placed that the cam can be set to give all motion possible, *i. e.,* raised on the arm to give required lift to feeler wires and still have the point low enough that the stop motion dagger cannot get caught under it. This setting of the stand will allow the cam to give all the necessary lift to the feeler wires and at the same time allow the cam to be set properly, *i. e.,* the bottom edge of the cam to stand level, and the cam to be moved to a position in the adjusting slot in which it is bolted, so as to have the feeler wires raised to their highest position required, when the lay has just reached its position farthest from the breast beam. This gives a good amount of crank time for the shuttle to pass the stop motion, while the lay is practically stopped on account of the crank working each side of the dead centre.

The stop motion cam is laid out to give a steady even lift to the feeler wires and when they have reached their highest position, they are maintained in this position for a part of the crank time just referred to.

A very satisfactory length to run the stop motion dagger is the length which is furnished by the loom makers, and which when set as far in its socket as possible, reaches out about $\frac{3}{8}''$ from the socket to the front of the dagger. The cam is supposed to be set where the lifting point of the dagger will have reached the highest desired point on the lifting curve when the lay is about $\frac{1}{4}$ of an inch from the back centre. Sometimes it will be found impossible to set the lifting cam high enough without its striking the lay, to get the required elevation of the feeler wires and at the same time have them bed properly, *i. e.,* when the feeler wires are resting in the slot, the dagger should barely touch the curved part of the arm on which the lifting cam is bolted. Care must be taken when setting the lifting cam to have sufficient space between the point of the knock off lever and the lifting cam, to allow the stop motion dagger to drop between them, failing to do this it will not stop the loom.

To get these desired positions, it is only necessary to lengthen the connector, (which connects the feeler wire crank and the stop motion dagger socket) by a few strokes of a hammer—less than $\frac{1}{16}$ of an inch added will make a great change in the appearance of things and will give ample working room, both for the cam and for the shuttle.

The knock off lever can now be set, and this when the shipper is locked should be about $\frac{1}{4}$ inch from the block which prevents its throwing over too far. It should be remembered that this block is only for the purpose of preventing the knock off lever from going too far, and the casting should never be drawn up closer than ¼ of an inch to this check block by the shipper handle. If it is, the continuous pounding given it every time the loom is started, will break the castings. When setting the lever on the shipper handle rod to adjust the knock off lever, be sure to have a little space between it and the side of the curved knock off lever with which it is engaged, as otherwise it will be apt to interfere with the free working of the shipping device and also the stop motion. With the shipper handle thrown off, the safety shield can now be adjusted, care being taken to set the spring, which raises it, far enough away from the end of the stop motion dagger to avoid touching it. This spring should only touch the angle lever which raises the safety shield, when the shield is fully raised. This setting will do the work perfectly and preserve the spring.

These directions while giving the principles involved do not imply that positions of the different parts cannot be adjusted to meet the ideas of the fixer. Variations in work may call for slight changes in the setting of some parts. To sum up, the stop motion if properly set should have:

(1) The proper setting of the cam stand as to height and its relation to the rocker pin.

(2) Room for free adjusting of the cam without striking the lay.

(3) Stop motion dagger, in conjunction with the feeler wires, long enough to clear knock off point before feeler wires leave filling.

(4) Feeler wires resting in bottom of lay slot, at same time as stop motion dagger rests on curved arm which supports cam.

(5) Knock off lever set with at least ¼ inch clearance from check on arm.

(6) Spring which raises safety shield set out of the way of stop motion dagger and lightly resting on crank which raises shield when the shield is at its highest position.

(7) Clearance between stop motion dagger and knock off lever when feeler wires are leaving filling.

(8) On rear end of dagger socket, means of balancing, in order to get a light dropping of feeler wires when needed. This extra weight should be screwed firmly to position and never allowed to swing loosely on dagger casting as this would cause an uneven dropping of the feeler wires.

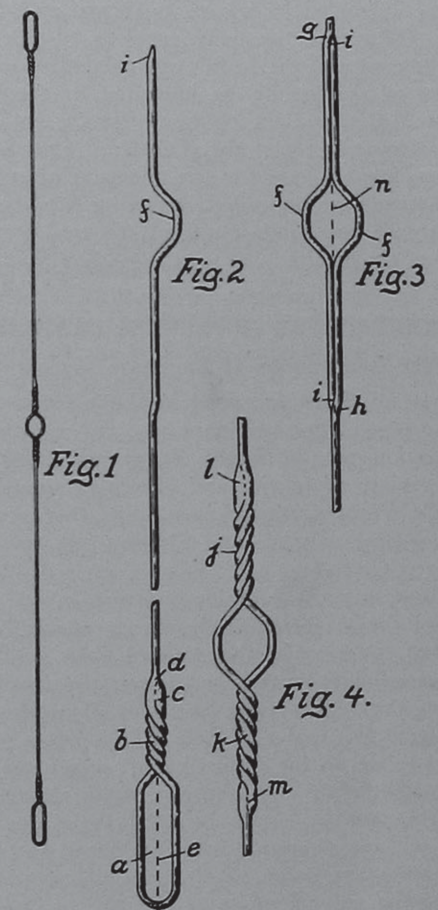
The small flat spring (which pushes down the stop motion dagger and the feeler wires) is there for the purpose of giving a steady and quick return motion to the feeler wires and all spring should be off by the time the wires are resting on the filling, as otherwise the feeler wires may be the means of looping or kinking the filling. This is done by means of the adjusting screw which stands close beside the spring.

(*To be continued.*)

A New Make of a Heddle.

The body portion of this heddle is made of a single wire having its eye formed also of the same size wire, this mode of construction, it is claimed by its manufacturer Mr. Hakes, improving the strength as well as general appearance of said heddle as well as reducing the liability of the threads chafing during weaving.

The accompanying four diagrams clearly show how this new heddle is formed, and of which Fig. 1 is a side elevation of this new heddle. Fig. 2 is a side elevation (on an enlarged scale) of one of the component wires forming one-half of the heddle, showing the completed loop at one end of the heddle to receive the rod of the harness, or the lingoe (if heddle is used in connection with Jacquard work.) Fig. 3 is a central section, on an enlarged scale, showing the heddle eye, formed by the component wires of the heddle prior to their being twisted together, and Fig. 4 represents the same portion of the heddle when the component wires



of the heddle have been twisted together above and below the eye.

Fig. 2 shows one-half of the heddle, two such parts one above the other, being combined in the formation of the new heddle. This half portion of the heddle is formed from a single piece of wire, bent at one end to form loop *a* for receiving the rod of the harness shaft, or having secured to it the lingoe. The thus doubled wire is then twisted (*b*) and its tip *c* brought closely against the side of the body portion of the heddle and imbedded in solder, in order to form a smooth joint and prevent the accumulation of lint. Opposite the tip *c*, the wire is offset slightly to one side (*d*) so that the axial line of the wire when extended will pass through the centre of the twisted portion *b*, also through the centre of the loop *a*, as indicated by the dotted line *e*. Near its opposite end, the wire is bent into a bow shape (*f*) to form one side of the heddle eye.

Two such wires are then placed side by side with their bow shape bend *f* placed opposite each other (see Fig. 3), the single end of each wire being placed in contact with the body portion of its mate half. These body portions of both sections of the heddle are obliquely offset at *g* and *h* and the ends of the wires chamfered (*i*) to form a close contact with the oblique offsets *g* and *h*. The doubled wires are then united by twisting above and below the eye as shown at *j* and *k*, Fig. 4; and the chamfered tips of the wires are imbedded in solder, as shown at *l* and *m*, Fig. 4. Offsetting the body portions of the wires, brings the centre of the heddle eye coincident with the axial line of the heddle, as indicated by the broken line *n* in Fig. 3, and the oblique offsets *g* and *h* also project over and protect the chamfered ends *i* of the wires and form a base for the adhesion of solder in which the ends are imbedded, removing liability of the warp threads becoming engaged by any projecting portions of the heddle.

THE MANUFACTURE OF PLUSHES, CARPETS, ETC.

The Construction of Furniture Plushes.

Nearly all fibres are used in the manufacture of furniture plush, the combination of various materials in connection with different weaves resulting in an endless variety of fabrics and effects produced. Besides Silk, Wool, Cotton, Linen, Jute, there are used Mohair, Ramie, Tussah and Chappe Silk as well as Mercerized Cotton.

MOHAIR, a most prominent factor in the manufacture of these fabrics, is the harsh, elastic lustrous fibre, *i. e.*, covering of the Angora Goat, and which fibre is excellently suited for the purpose, on account of holding the color it is dyed with for a long time. The Angora goat is a native of Asia Minor, but is now extensively raised in the Cape Colony, which made it a fibre of commerce. On account of its characteristic harsh feel, mohair cannot be used skein dyed since the dye will not penetrate into the thread and if used in this state the point of the cut pile would show traces of the natural white of the fibre. This is the reason why Mohair Plush is piece dyed, *i. e.*, after the pile is cut on the loom, fancy effects or patterns being obtained by using cut and an uncut pile, *i. e.*, figuring with one kind of pile upon the other, the latter mentioned pile, the uncut or terry pile, showing a lighter shade compared to the cut or velvet portions of the figure or ground, as the case may be. Any portions of the design left empty, *i. e.*, bare of either system of pile in turn can be either interlaced with any suitable regular weave, or Ramie or Tussah pile may be used additional.

RAMIE is synonymous with China grass, since the character of both fibres is practically the same. The method for obtaining the fibre, as practiced in India, China and Japan, where it is chiefly grown, is splitting and scraping the plant stems and then steeping them. The ordinary retting process, as used for flax, etc., is not sufficiently effective, since the succulent nature of the stem and the great amount and acridity of the gummy matter causes it to rapidly coagulate and become insoluble on exposure to the air. The ramie fibre in the raw state has a soft silky feel, but by pulling the staple, this quality becomes reduced and gives way to more or less harshness in the feel. The fibres are about 4 inches in length and are snow white.

TUSSAH SILK is the most important variety of the wild silks and is the product of the Tussah moth which is widely distributed throughout India and Southern China. The cocoons are of a large size and vary in color from silver gray to brown. They are hard and difficult to reel, unless specially treated, for which reason they are mostly worked up in the same manner as defective cocoons of cultivated silk in connection with spun silk. Tussah silk has a vitreous lustre, and is somewhat stiff compared to cultivated silk, the fibres being more or less irregular.

CHAPPE, FLOSS or FILOSELLA SILK is produced from silk waste of various sources, amongst which we find: First, the coarse, loose, outer layers surrounding the true cocoon; Second, defective cocoons, *i. e.*, such as have been used for breeding purposes and from which the moth has emerged, and which are therefore difficult or impossible to reel, also double cocoons and those from diseased worms; Third, the parchment like skin left behind in reeling the sound cocoons; Fourth, the waste made in reeling the cocoons, as well as such as made in silk throwing mills. This waste silk fibre, after being properly prepared, *i. e.*, boiled off, in turn is carded, combed, drawn and spun into a yarn partaking of some of the qualities of raw silk, although it is not as bright as the latter, its lustre varying largely according to the amount of gum retained on the fibres. The more the gum has been boiled-out, the greater will be the lustre of the fibres.

Tussah differs from that of chappe by its greater lustre as well as great hardness and elasticity of the fibre.

MERCERIZED COTTON is obtained by subjecting regular cotton yarn, under tension, to a chemical process, by which the same obtains a silk like lustre, and which it retains in the successive dyeing and finishing processes.

Either one of the materials quoted, in the manufacture of furniture plush, may receive a different color during piece dyeing, on account of the different nature of the various materials, each taking a different color, and which feature is made use of in order to produce new designs, effect, etc.

The binder warp in furniture plush, as a rule, is double and twist cotton, although in connection with some of the mohair plushes, occasionally we may find a linen warp used. No preparatory processes, like sizing, are used in preparing the warp yarn for the loom, except in special cases. The binder warp as well as the pile warps in connection with smooth plushes are dressed on regular section warpers.

Since an immense variety of weaves are used in the manufacture of furniture plush, and since the proper fabric produced depends upon the proper selection of the weave used, it will be well first to discuss the rules for constructing these weaves.

The original object of plush fabrics was to produce an imitation of animal skins, which, however, is only yet noticeable in few fabrics, like astrakans, zibelines and the lately so popular lamb skin imitations. Considering, however, the bulk of our plush and velvet fabrics, the object aimed at, *i. e.*, the finish required, is a smooth even close straight pile; remembering at the same time that to accomplish this, care must have been exercised in connection with the weave, that the loops are properly constructed, *i. e.*, interlaced with the filling, in order that the pile, when cut, will not spring too far one way or the other. This trouble will be worse, the more elastic the material of the pile warp is. Remember that a good straight plush will always give a good cover to the face of the fabric.

The use plush is put to, has considerable to do with which weave to use. For instance, plushes and velvets destined for decorative purposes, like for example, for dress trimmings, and where the pile is not subjected to pressure and hard wear, may be woven with what we technically call a *pile-up weave;* however, with plushes to be used for covering furniture, such a pile must be a great deal stronger in construction, since such plush fabrics are subjected to an immense amount of wear compared to the formerly referred to trimming plush or velvet fabrics, and when then a good solid three or four pick interlacing of the pile warp in the body structure must take place. There are, however, many *pile-up* plushes used for upholstery purposes, in which, in order to prevent pushing through of the pile on the back of the fabric, there is used on the back of the structure what we call a cover warp, using besides a sufficiently high warp texture, and this in connection with a proper weave. This will answer in many cases the purpose, although it must be remembered that if *pile-up* woven plushes show the loop on the back of the structure, such a material cannot be considered as a reliable material for covering furniture. As previously referred to, erect standing up of the pile loops is the first requirement for a good face for a plush fabric, for which reason this point never can be left out of consideration when selecting a weave for a certain fabric to be made, since the pile warp, on account of the formation of the loop during weaving, is always brought out of a straight into a bent shape. It will thus be readily seen that the thread as forming the loop, needs a brace, so as not to return after cutting into its original straight position, and which tendency will be so much greater the stiffer the nature of the material used in the manufacture of the pile warp. Mohair certainly is the most obstinate material in this manner, for which reason we must be more particularly careful, when using such yarns, in order to select a proper weave.

In the same way the loop needs a brace side ways, in order to preserve its position against the warp threads.

There are any number of standard weaves at the disposal of the manufacturer, except special effects or low priced fabrics, compel him to look for new combinations.

Fig. 1

Figs. 1 and 2 show two such weaves for plush fabrics. In these diagrams as well as in all successively shown diagrams of plush and velvet, the binder warp threads are omitted, for sake of clearness. The same will be dealt with later on in connection with special fabrics, whereas now, we will more particularly only pay attention to the formation of pile. Examining both diagrams, we notice that the pile warp raises between two ground picks. In connection with every good weave, *i. e.*, perfect fabric, these two picks must be pushed, *i. e.*, beaten up by the reed in the loom close together, for which reason they are introduced in the same shed, with the result that both ends of the loop form (unite into) one bunch of pile when cut, protruding from the body structure of the fabric as one pile loop spreading apart on its top and forming a nice, close, well covered plush face to the fabric. There is no necessity for the loop standing deeply imbedded in the body of the structure, in fact the two ground picks may rest slightly above the level of the body structure without the pile to suffer, a feature which, for sake of saving in amount of pile warp needed for a given quantity of yards of goods woven, is frequently made use of. However, it must be mentioned that at the same time the two halves of a pile loop do not push past each other, since otherwise a good, straight, erect pile will not be the result. This a point we will refer to later on.

Diagram 1 shows us what we technically call *a single pile warp,* resulting in a rather open space between the different pile loops. This, however, is not a disadvantage as long as the fabric structure when in use lays flat, like for example, in connection with velvet carpets and when by a higher texture or a longer pile loop, such open spaces or troughs in the pile, as we might call them, are closed up. However, if dealing with fabrics requiring in their use bending of structure, like furniture plushes, these troughs in the pile will open, a feature which is undesirable, hence such a weave can not be used in connection with furniture plushes, where the material is bent around an angle at the edges of the furniture. For this reason, what we call *a double pile warp,* as shown in connection with diagram 2 is used with

Fig. 2

furniture plush. In this diagram we show the two sets of pile warps distinct from each other, one set being shown in full lines, the other set in dotted lines, a loop of one set of pile warp alternating with a loop of the other set of pile warp in the fabric structure, a feature which will result in a nice, close pile surface in the fabric. *Pile-up* weaves are less satisfactorily used,

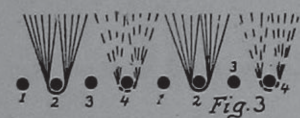


Fig. 3

both in connection with hand weaving as well as on the power loom, as long as we deal with loose textured fabrics, since the cutting in connection with loops thus formed is more difficult; however, they are extensively used in connection with double plush weaving, since then the knife is automatically sharpened after every pile pick.

Diagrams Figs. 3, 4, 5 and 6 show different perfect plush structures.

Diagram Fig. 3 shows the pile warp interlacing with every fourth pick, two sets of pile warp threads being used so that every second pick carries half the pile. One set of the pile warp is shown again in full lines, the other in dotted lines.

Diagram Fig. 4 shows again *pile-up* for every other pick, using however in this case only one set of

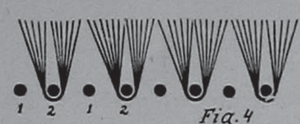


Fig. 4

pile warp. Since the entire pile then has to be raised on every other pick; it will be readily understood that fabrics interlaced with such a weave must be set lower in texture as compared to such as woven with weave Fig. 3, in order to permit perfect weaving.

Diagram Fig. 5 shows again two sets of pile warps employed, having in this case every pick carry half the pile warp used.

Diagram Fig. 6 shows a fabric structure in which every pick carries the entire pile.

The shorter the pile, the more loops to the inch have to be used, whereas in connection with high pile fabrics, like for example, mohair plush, as a rule a lower texture, *i. e.,* less pile loops per inch can be used.

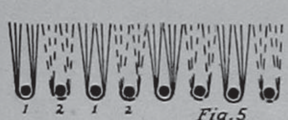


Fig. 5

Diagram Fig. 7 shows a pile structure formerly extensively used in connection with velvet ribbons, a weave which however, cannot be used in connection with double plush on the power loom, neither can we use weave Fig. 2 for this purpose.

Diagram Fig. 8 shows the pile warp interlaced *1 down 1 up 1 down* while interlacing in the ground structure, a principle of interlacing the pile warp made use of in connection with furniture plush. The same also refers to the plan of interlacing the pile warp shown in diagram Fig. 9 and where the pile warp is made to interlace *1 down 2 up 1 down.*

In connection with all weaves used for plush, and by which the pile loops do not brace themselves, the picks must be so placed in the structure that a spreading out of the pile ends in the fabric is prevented. This certainly would be a very simple affair, provided if by a wrong placing the loops would not bend towards the other side. We then might use, for example, the weave producing a fabric structure illustrated in Diagram 10 and which weave is used satisfactorily in connection with certain articles. In connection with the same, we have to use a taut and a loose weaving warp. All pile picks are then placed below said taut warp, whereas all picks not carrying pile are placed above it. Using a proper texture as well as proper mounting of the loom, yarn, etc., a good fabric will be the result, however a too deep embedding of the pile warp in the structure is liable to bring up the disadvantage that the loops may bend towards each other; again in connection with plushes with a heavy ground or body structure and an extensive pile warp, the amount of material necessary for producing the fabric in connection with construction quoted plays a most important part, both with additional amount of material used for body structure as well as pile. This also may influence the more or less tightly interlacing of warp and filling. In connection with furniture plush, the weight of the fabric is of less importance as long as a certain amount of natural stiffness and handle is present in the fabric. In connection with three and four pick pile weaves, the interlacing of the pile warp in the body structure will give to the fabric more stiffness and handle than *pile-up* weaves will do. Considered in a general way, fabrics with closely interlacing weaves will have a better handle than such in which loosely intersecting weaves are used, and when with the latter a higher texture or a heavier count of yarn must be used. At the same time it must be remembered, that the extensive pile warp, having to wind around an extra heavy body pick will lose in length, *i. e.,* more pile warp will be needed to produce a certain amount of pile in the fabric, if using a heavy filling, compared to using a higher count of filling yarn. It will be in place to mention, that in connection with lower grades of plushes a lower placing of the pile loops may be often desired, a feature obtained by special weaves.

We will also come in contact with weaves in which the pile warp after cutting, lays itself down at once, a feature which in connection with certain fabrics is desired. Such fabrics, however, cannot be sheared smooth, for which reason preference is given to the mechanical laying down of straight up woven pile fabrics.

Having produced by means of proper weave and texture a fabric with a perfect straight standing pile, we are then not yet sure, in connection with piece dyed fabrics, that a salable fabric is the result, since as soon as the fabric is brought in contact with the hot dye bath, etc., different changes take place with the fabric structure. The tightly stretched interwoven binder warp will become shorter, the filling will be more indented again, by fabrics constructed with a tight and loose warp, the first will lose more in length than the latter, with the result that a complete pushing out of proper position of the ground structure may occur, which may cause trouble any time when using a new weave.

In connection with *pile-up* weaves, made with a cover warp, the erect positioning of the pile in the fabric can be regulated by the amount of tension given to said cover warp. If weaving such plushes with a straight standing pile, then during the dyeing process, on account of the shrinking of the binder warp,

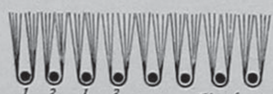


Fig. 6

the cover warp will become proportionally longer and thus the pile loops sink down into the body structure. This will bend the originally erect woven pile, towards its mate loop, with the result that on the loom perfectly produced pile will show a poor (open) face after the dyeing process, *i. e.,* in the finished fabric. For this reason fabrics thus constructed must be woven so as to present a somewhat spread out pile after leaving the loom, and when then the sinking down of the loop, during the dyeing process, into the body structure, will result in a smooth, well covered face to the finished fabric.

An experienced overseer, as well as careful loom fixers are a necessity to any mill manufacturing plushes and other pile fabrics; they must not only understand the construction of pile fabrics and the management of the loom, but they must also closely study the after effects of the dyeing and finishing processes the fabrics are subjected to after leaving the weave room.

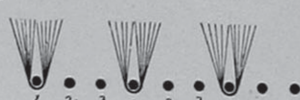


Fig. 7

In the same way as we have to strengthen the pile loops in front and back, we also have to see to it that the same is done on both sides, for the fact that said loops do not positively take the position planned for them on the point paper designed. Every fabric has a tendency to shrink towards the middle, during weaving, and this is also the case with plushes, for which reason the tightly stretched warp threads will lay themselves closely to the inside situated dent wire of the reed. If then, by the arrangement of the weave, a less tightly stretched thread is placed on the weave plan between such a thread and the dent wire referred to, such a thread, if having the same interlacing as the tight thread, will permit the latter to slide past the loose thread, *i.e.,* the two threads referred to will exchange position in the fabric structure from that laid out for them in the weave plan. Although no objections are made to this feature in connection with some pile structures, for example, Moquette carpets, in connection with furniture plushes this is not permissible, for which

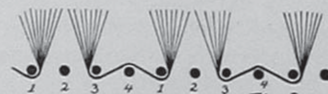


Fig. 8

reason the binder warp threads, as placed next to the pile threads, must be arranged to interlace differently, so as to keep the pile loop in its proper place in the fabric structure. Different it is with cover warp threads, which have to cover the connection of the pile loop to the ground structure on the back of the fabric. These threads are placed next to the pile warp threads and interlace with the latter on the same picks. Binder threads drawn next to a pile thread cannot interlace similarly with the pile warp; if so, such threads must be drawn in separate dents. In connection with mohair plushes as woven on the double plush loom, this dividing by the reed is not sufficient and when then the binder warp threads on both sides of the pile loop, must interlace with the pile thread, by which, however, is not meant that the same are to interlace correspondingly at every pick.

Fig. 9

A point which now might be raised is, which arrangement of pile and binder threads will be the most satisfactory to use to produce a perfect even pile face? In connection with Turnay carpets and similar fabrics, as well as by mohair plushes, for reasons stated, the pile thread is placed midways between two binder threads. Again, with other fabrics, it will be more satisfactory to place the pile warp thread at one side, since this means less strain and chafing to the yarn. The question, which then is the best place for the pile thread, *i. e.,* to the left or right of the dent wire, has been frequently discussed by practical men. In connection with double plush, it certainly is immaterial, however, if dealing with wire woven plush, it is different. In connection with the wire plush loom, whether hand or power loom, the cutting of the pile is done from the left to the right hand

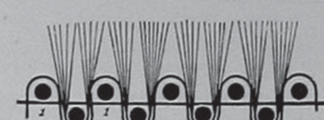


Fig. 10

side, except the power loom is provided on both sides with wire pulling attachments. Cutting the loop, must exercise tension on the same, more particularly if the knifes are not continually sharpened, hence this cutting of the pile has a tendency to pull the loops towards the right hand side of the fabric, more so if then on said side of the dent a binder warp thread is placed which interlaces the same as the pile thread. Considered from this point, it seems preferable to place the pile warp thread to the left of the dent wire, although this is not always done. The drawing in of the threads in the harness (the pile warp being drawn in the front harnesses) may be the reason for it, again some overseers or designers may consider the affair of minor importance.

Some manufacturers contend that the less often the changing of the harnesses with a plush weave, the more satisfactorily the same. This may be all right with reference to the binder warp, but will not hold good for the pile warp, and when it has been found that leaving the pile threads rest for more than two picks in one section of the shed, will stretch and roughen them, with a consequent detriment to the face of the fabric structure. Using too many harnesses in the loom or too high a texture may also act detrimental.

To produce good cutting of the pile warp and thus an erect pile, plush manufacturers on the Continent use the filling in a moist condition, subjecting the filled bobbins for this reason for from 20 to 30 minutes to boiling in water. The same object is also obtained with cold water by the use of a moistening apparatus, consisting of a cast iron kettle, fitted with an air tight cover, and having connected to it a small air pump. After placing the bobbins with the necessary amount of water in the kettle, this air pump is started; and when within a few minutes the air is taken out of the bobbins, the water in turn entering in the same.

One of the greatest troubles to contend with in the manufacture of mohair plushes are knots. Neither the common round or flat knots, nor our regular weavers knot will answer the purpose. In order to reduce the amount of knots in a warp to its minimum number, it will be advisable, if not spinning your own yarn, not to buy the same in skeins, but order it delivered on dresser spools or on warp beams. Be careful that such warps or spools are delivered minus knots, what in connection with the better grades of yarns and dealing with a reliable firm will be the case. With the lower grades of mohair yarns, dresser spools may be advisable, instructing then your man to be careful and remove any poor knot or imperfection adhering to the yarn, from it during the dressing of the warp. The knot to use is known as *twister knot* and is the only one which will work, *i. e.*, which will not open during weaving nor catch the filling. To make it, requires practice. Twist the two ends together and to prevent opening, tie one of the ends as a knot around the twist. In order to prevent unavoidable knots from being pushed open during weaving, have your reed about 6 inches high and smoothen down the end of the lay next to the reed.

Sizing of mohair warp is not necessary, neither is it advisable.

Defects caused to the fabric during weaving must be remedied previously to dyeing and finishing, using for this purpose silk yarn in place of mohair, since sewed in loops of mohair yarn will not stand erect. To prevent kinks, put a friction break for the thread in the shuttle so the latter presents a taut thread to the shed, which should not be closed until the filling is beaten home by the reed. The speed of plush looms of German build (60 to 68″ reed space) is from 80 to 100 picks on the double plush loom, about 60 picks on the wire plush loom with a double shed and about 75 picks with single pick looms. This is considered on the Continent the speed where quantity and quality of fabric produced go hand in hand, although the looms will stand a higher speed if so required. (Specially prepared for the journal from Die Florgewebe by W. Bosheck.)

(*To be continued.*)

An Improved Construction of a Bobbin for Filling Changing Cotton Looms.

The affair refers to bobbins of this class of looms, which are provided with a tube on its spindle, said

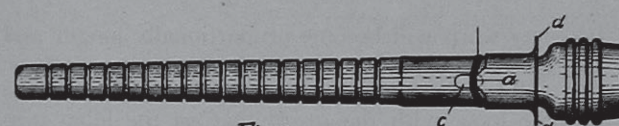


Fig. 1

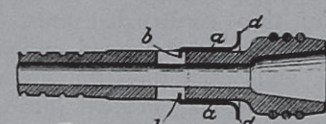


Fig 2

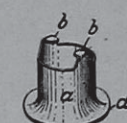


Fig 3

tube being held in position by the thread until but little of the latter is left on the spindle, and when said tube moves from its position and allows the bobbin to be drawn off.

Some three years ago, the patentee of the new bobbin, Mr. Lemyre, then patented a similar make of a bobbin, in which the tube is connected with the spindle by means of ears, which extend from the inner end of the tube into longitudinal slots in the spindle, said ears bending substantially from their extreme rear ends—the ends which join the tube—diagonally or at obtuse angles into the slots. It has been found in practice that in tubes, whether conical or with parallel sides, provided with ears of this shape, the thread is frequently pinched against or under the inner end or edge of the tube and is thus broken.

The new construction of this bobbin has for its principal object to obviate this difficulty by preventing the thread at or about the time when the sleeve is being released by the unwinding of the thread from coming in contact with the end of the sleeve, the thread being prevented from or against such contact by the shape of the ears or projections themselves. As the improved ears send off the thread from the adjacent end or edge of the tube, pinching and consequent breaking of the thread is prevented.

Of the accompanying illustrations, Fig. 1 is a view of a bobbin with the improved tube in position thereon, the thread being nearly unwound from the bobbin, and that which is left on, being guarded from contact with the tube *a* by the portions *b* of its ears which extend into the slots *c*, as are in the spindle of the bobbin. Fig. 2 is a longitudinal section of a portion of the spindle with the ears in the same position as in Fig. 1. Fig. 3 is a view in perspective of the tube removed.

When during weaving the thread is nearly unwound, and the tube *a* is loosened in its position, the latter is checked in its approach toward the thread by its ears and the thread comes in contact only with the portions of said ears, being held off from the adjacent edge or end of the tube by the portion *d* of the ears, the same being long enough to prevent any possibility of the thread being reached and pinched by the sleeve and thus broken. *d* is the annular flange of the tube, which may be engaged by any suitable mechanism which is exposed to the direct blows of the feeler.

THE "MASON" COILER DRAWING FRAME.

The object of this machine is to prepare the carded or carded and combed sliver, as the case may be, for the slubber, at the same time eliminating as far as possible any defects which are in the sliver.

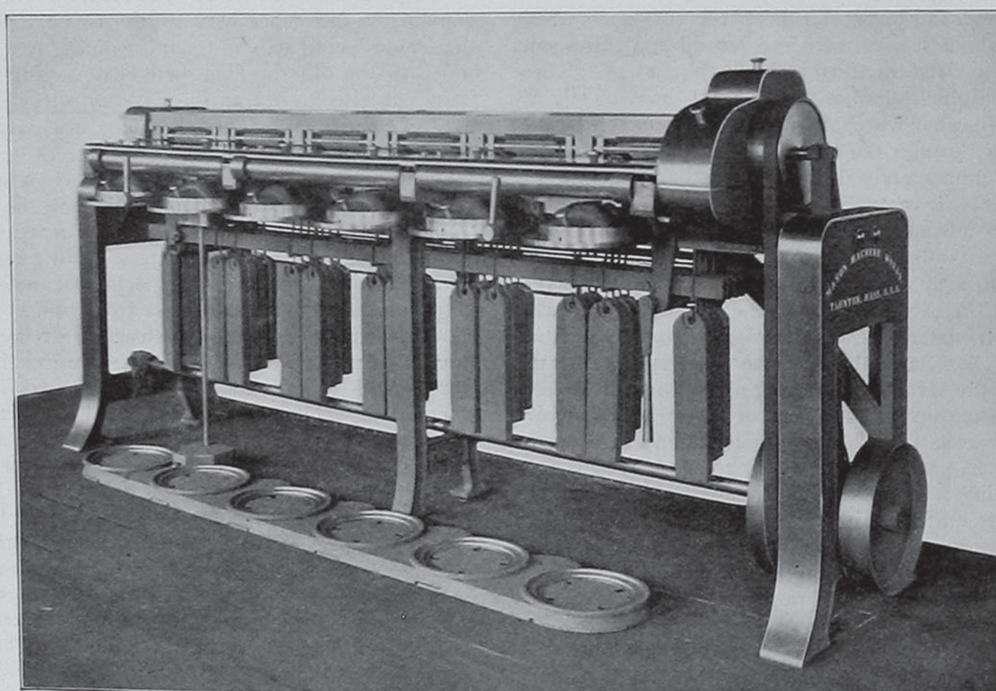
If dealing with a sliver only carded, the object then is to correct the more or less tangled condition of the fibres composing the sliver, due to the manner in which the cotton is taken from the cylinder by the doffer (but which is necessary in that machine in order to give the sliver enough strength to be properly delivered from it) as well as to correct the unevenness of the sliver produced, which is unavoidable owing to the unevenness of the scutcher lap which is fed to the card.

If dealing with a sliver from the comber, then the fibres composing said sliver have been laid almost parallel, as we might say, for which reason then the object of this drawing frame is to simply remove any defects in the unevenness of the sliver; besides, as mentioned before, condensing the sliver to the shape in which it can be handled by the slubber.

Thus it will be seen that the main object of this machine is to remove any weak places in the cotton thread, making the real strength of the thread vastly greater than it would otherwise be.

Previously to going into detail with reference to the construction of the Mason Coiler Drawing Frame, and its calculation required in the mill, it will be well to inquire more in detail first with reference to the principles of the process, and when then superior points of the construction of the machine will be more readily noticed by the experienced eye of the practical man.

These drawing frames are built with 4, 6 or 8 deliveries, each delivery consisting of the drawing rolls and the coiler head arrangement which condenses the six or eight slivers, which were fed to the machine, into one sliver, and delivers it into the can. A number of deliveries (generally six) makes up a head, there being several heads in the machine. Six or eight ends, *i. e.*, slivers, are fed to each delivery, and when consequently, for example, a drawing frame with six delivers with six ends fed to each delivery, will consequently be fed from ($6 \times 6 =$) 36 cans of carded or combed sliver,



THE "MASON" COILER DRAWING FRAME.

which in turn then is drawn into six individual slivers, each sliver being delivered into its own can. This process of drawing is repeated and varies from two to four, the most general number being three processes used, indicating that the sliver has been drawn and delivered three times.

four rows deep as is customary when using 12-inch cans. In connection with 10-inch cans they may be set three rows deep in order to make feeding handier. *b* indicates the coilers in front of each delivery. The arrow *D* indicates the direction of the passage of the cotton through this 3-process system of drawing.

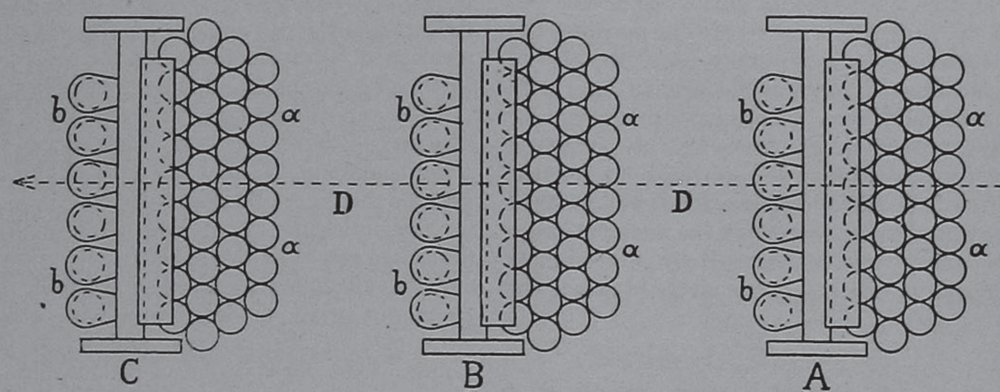


FIG. 1.

Four pair of drawing rolls or drafting rolls, as we may call them, are used in the machine, each pair being driven at a different surface speed. Assuming that six slivers are put up together at the back of the frame, the *draft* or amount of drawing-out between the first and second pairs of rollers, the cotton comes to, may be about 1.3, between the second and third pairs 1.8, and between the third and fourth pairs 2.6. These three multiplied together give a total draft of slightly over 6. In other words, assuming that 1 inch of cotton be passed through the first pair of rollers, the second pair will immediately draw it out into 1.3 inches; the third pair will draw out the same portion of cotton into 1.3×1.8 inches $= 2.34$ inches, and the fourth or last pair of rollers will draw out the same portion of cotton into 2.34×2.6 inches $= 6.084$. The six slivers put up at the back of the machine are therefore drawn out or attenuated to the dimensions of one by its four sets of rollers, and then, at the delivery side of the machine, the six slivers are united into one sliver, and automatically delivered in one, of the series of revolving coiler cans placed at the delivery end of the machine. It is perhaps not so easy to see how it is that the drawing rollers make the fibres of cotton parallel. As a matter of fact, it may be said that as each pair of rollers projects the fibres forward, the next pair of rollers takes hold of the fibres and draws their front extremities forward more rapidly than the other pair will let the back extremities of the same fibres pass forward. It is this action, often repeated, that draws the fibres straight, or in other words, reduces them to a condition in which they are parallel to each other.

As mentioned before, the 3-process system, *i. e.*, three separate drawing processes for the sliver, is the one most often met with, the three drawing frames required for the purpose being arranged either straight or across. The *straight arrangement* is shown by means of Fig. 1 in a plan view. *A*, *B* and *C* respectively indicate the three frames called for. *a* refers to the respective cans as placed at the back of each delivery. In the present instance we have shown the cans placed

In case only 2-process drawing is used, frame *C* is omitted, whereas in a 4-process system an additional frame is added. The *crossed arrangement* is shown in Fig. 2, the letters of reference being selected to correspond to those in Fig. 1, in order to more readily explain the difference between the two arrangements, the frames being set end to end, fronting first one side and then the other. This method of setting drawing frames is also known as the *Zig-zag* setting, it being used in smaller mills where the floor space available is suitable for it.

Drawing frames are known either as right or left hand machines, the word *hand* indicating the position of the driving pulleys of the frame, the custom being to determine left or right by standing in front of the machine where the slivers are delivered, noting then the position of driving pulley on front roll.

With reference to the construction of the Mason Drawing Frame, we find that the same has the usual four lines of steel drawing rolls, previously referred to, coilers, can tables, back, front and full can stop motions. All shafts throughout the machine are provided with cap bearings to facilitate removal when the case demands it.

Steel Roll and Calender Roll Stands, we find are cast in one piece, thus ensuring a very strong stand and rigid frame, with an absence of the vibration to the calender rolls prevalent in drawing frames where solid calender rolls, running at high speed are used. The cap bar stands, for the drawing rolls, are separated, each being bolted to the roll stand independently, which allows of individual setting for any length of staple. They are heavily bushed with brasses, which are easily renewed, or they may be made of cast iron, without bushings, if desired. The calender roll portion of these stands is made in box-girder pattern.

With reference to the drawing rolls, the bottom rolls are made of steel, irregularly fluted to prevent cutting of the top rolls, and have case-hardened necks and squares, which in connection with the brass bearings, ensures life to the rolls; or the fluted rolls, if so desired, may be made solid, in one length, without coupling, if preferred. The top rolls are usually shell for the front roll, and solid for the others. The front roll is usually made $1\frac{3}{8}$ inch diameter, and all others $1\frac{1}{8}$ inch. The calender rolls are 3 inches in diameter, and 27 inches long, of best quality of steel, turned and polished all over. By using this heavy calender roll, the Mason drawing frame produces a perfect condensing of the sliver, by the weight of the rolls, without the use of screws.

Dead weighting is used in connection with all top rolls in the Mason drawing frame, using for leather covered rolls about 22 pounds on the first, 20 pounds on the second, 18 pounds on the third and 16 pounds on the back roll. In connection with metallic drawing rolls, and which are very extensively used, the weights used are somewhat less. The special feature of this frame is the avoiding of cast iron wherever possible, consequently preventing stoppage of a frame so prevalent when cast iron is used.

In connection with the box girder calender roll stands, the Mason frame permits the removal of the entire coiler shaft, with all the bevel gears and connections to can-table motions intact, by simply removing the caps of shaft bearings, an advantage which carding room overseers appreciate. The coiler-tube gear is provided with a cover, which can be instantly removed, and is held in position without the use of springs or set screws, the coilers being made either for 10-inch or 12-inch cans. Can tables are covered all over, and are also made with plates for either 10-inch or 12-inch cans.

As mentioned before, the drawing frames of the Mason Machine Works are provided either with mechanical, electrical, or combined electrical and mechanical stop motion, as a manufacturer may desire. Their mechanical stop motion consists of a spider, on a quickly revolving shaft, driven by a train of gearing. The spoons are balanced on a knife edge, and the instant that the friction of the sliver is removed from the spoon by an end breaking, or a can becoming empty, the spoon falls back and arrests the motion of the spider, when, by suitable mechanism, the belt is thrown off and the frame instantly stops. These spoons are so arranged in the frame that the ordinary help cannot remove them and run the machine with one or more spoons lacking when the frame is out of order.

The front stop motion of this Mason drawing frame consists of a lever, balanced from a stand on the beam, which, when the sliver from the front roll is passing through the trumpet, is caused by the friction of the sliver to be held down in front, and the rear end up out of contact with the spider. When a top or bottom roll laps up, or waste chokes the trumpet, or when from any cause the sliver fails to properly pass through the trumpet to the calender rolls, the friction in the trumpet is removed, and the rear end falls, and coming in contact with the revolving spider arrests its motion, and the frame is instantly stopped.

The full can stop motion is operated by the amount of cotton in the can. When the can gets full, the pressure of the cotton lifts the coiler tube gear about a sixteenth of an inch; this in turn operates on a small rod in connection with the front stop motion lever, and the frame instantly stops. The mechanism and connections to the belt shipper are simplicity itself.

The electrical stop motion, if such is used, is based on the fact that cotton is a non-conductor of electricity. The front calender roll is insulated from the beam. The back plate is insulated from the beam, but electrically connected with the front calender roll. The clearer covers are electrically connected to the back plate, but insulated from the rest of the frame. The operation is as follows: When an end runs out at the back, or breaks, the top carrying roll falls, and comes in contact with the bottom carrying roll; electrical connection is thus made, and the current attracts the armature on the magnet, arrests the motion of the clutch shaft, and the frame instantly stops. When a top or bottom roll laps up, it raises the top roll just enough to make electrical contact with the top clearers when action takes place, same as when a can runs out. When for any reason (such as the sliver breaking between the front rolls and calender rolls, or clearer waste choking the trumpet) the cotton fails to pass between the calender rolls, the front calender roll comes in contact with back calender roll, electrical contact is made, and the frame stops as before.

(The calender rolls are kept apart while the frame is in operation by the thickness of the sliver passing through).

(To be continued.)

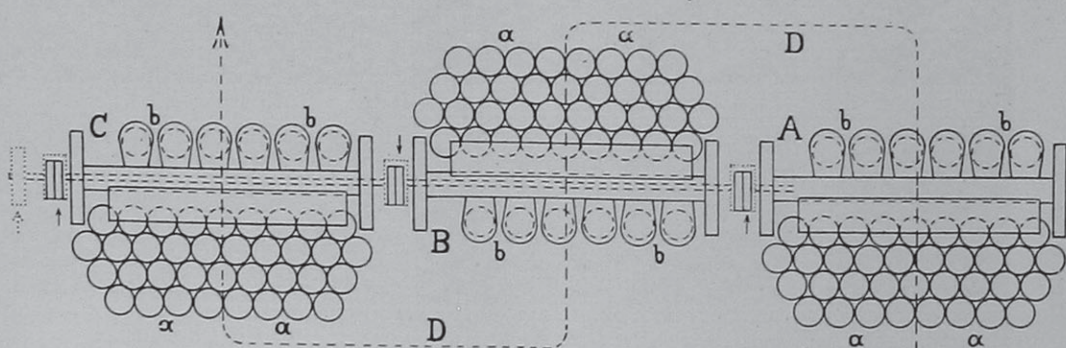
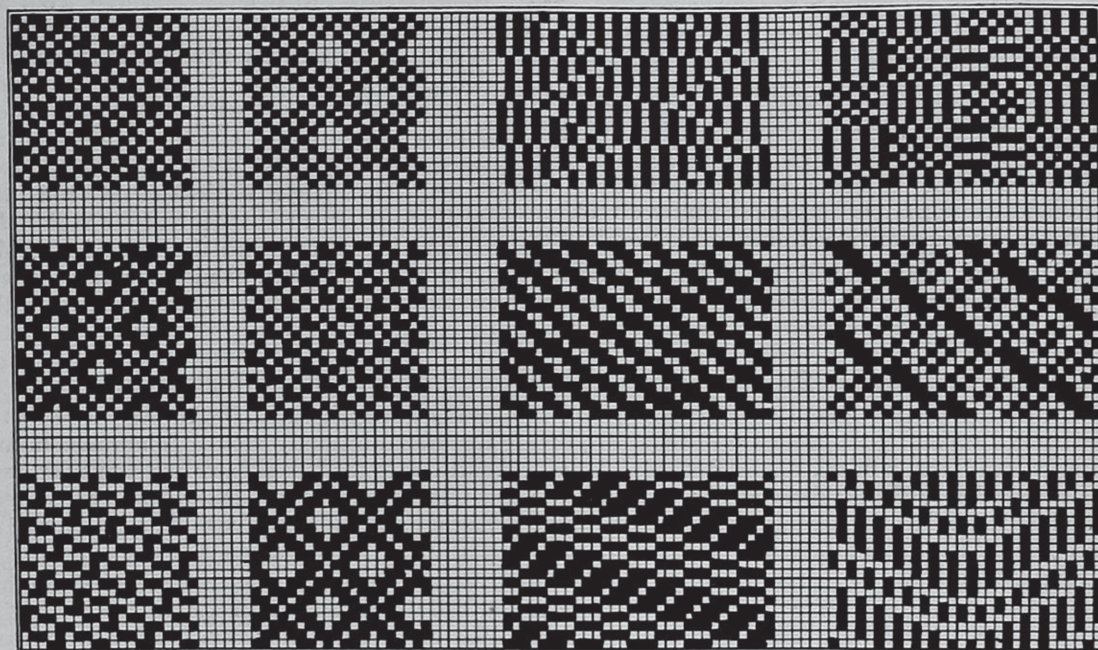


FIG. 2.

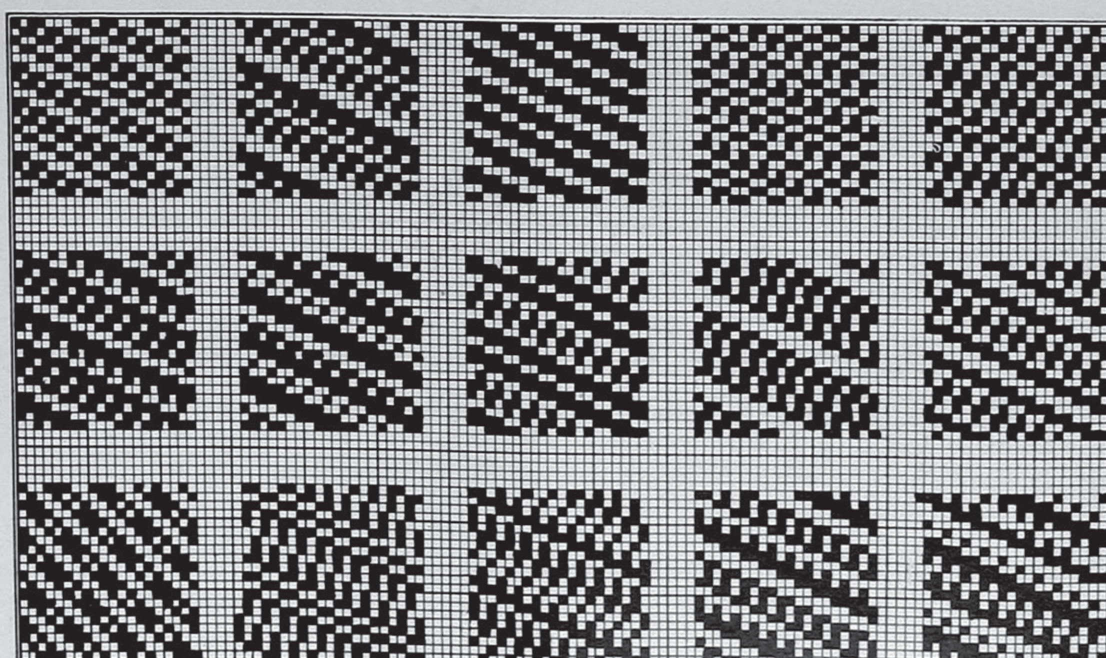
DICTIONARY OF WEAVES.

TEN HARNESS



10 × 10 and 10 × 30

TEN HARNESS



10 × 20

(Two hundred and thirteen (213) different 10-harness weaves appeared in the previous issues.)

Noveltiess From Abroad in Ladies' Dress Goods.

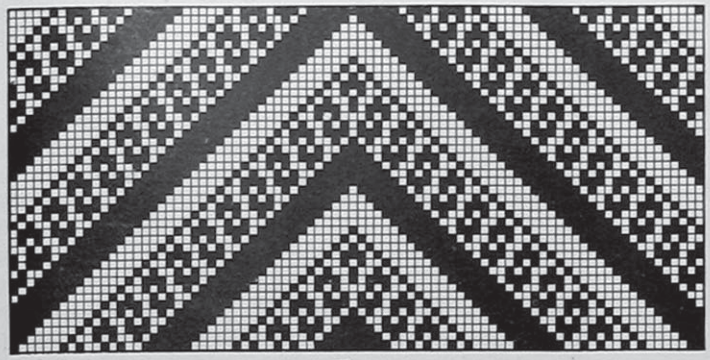


Fig. 1

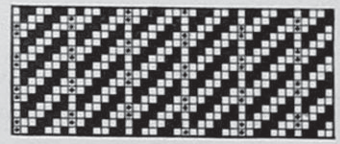


Fig. 3

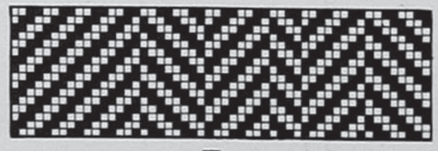


Fig. 2

Fig. 4

Fig. 1. Figured Pointed Twill.

(*Jacquard Effect for Harnesswork.*)

Repeat of pattern: 84 warp threads and 21 picks.
Warp: 5700 ends, 2/64's worsted, heliotrope; 21 harness, fancy draw.
Dress: 12 Sections @ 475 warp threads.
Reed: $16\frac{1}{2}$ @ $6 = 57\frac{3}{4}$ inches wide in loom.
Filling: 65 picks, 2/64's worsted, black.
Finish: Scour well, singe and press, 52 inches wide.

Fig. 2. Broken Twill Effect.

Repeat of pattern: 180 warp threads and 4 picks.
Warp: 4320 ends, 2/64's worsted; 8, 12 or 16 harness, fancy draw.
Dress: 12 Sections @ 360 ends (2 repeats of pattern).
Arrangement of warp:

16 ends light and dark olive green twist	} ×5	= 160 ends.
16 ends olive green mix		
4 ends light and dark olive green twist		= 4 "
16 ends olive green mix		= 16 "
Repeat of pattern		180 ends.

Reed: $20\frac{1}{2}$ @ $4 = 52\frac{1}{2}$ inches wide in loom.
Filling: 72 picks per inch, single 36's worsted; arranged thus:
16 picks olive green mix.
16 picks brown olive mix.
—
32 picks, in repeat of pattern.
Finish: Scour well, singe and press, 50 inches wide.

Fig. 3. Skip Twill Effect.

Repeat of pattern: 208 warp threads and 4 picks.
Warp: 3328 ends, 2/48's and 4/48's worsted; 8, 12 or 16 harness, fancy draw.
Reed: $13\frac{1}{2}$ @ $4 = 61\frac{1}{2}$ inches wide in loom.
Dress: 8 Sections @ 416 ends (2 repeats of pattern).
Arrangement of warp:

1 end	4/48's	worsted,	dark			= 1 end.
16 ends	2/48's	"	dark			= 16 ends.
1 end	"	"	light	} ×8		= 16 ends.
1 "	"	"	dark			
1 "	"	"	light			= 1 end.
1 "	"	"	copper brown			= 1 end.
1 "	4/48's	"	dark		} ×2	= 70 ends.
16 ends	2/48's	"	dark			
1 end	"	"	light	} ×9		
1 "	"	"	dark			
1 "	4/48's	"	dark			= 1 end.
16 ends	2/48's	"	dark			= 16 ends.
1 end	2/48's	"	light	} ×8		= 16 ends.
1 "	"	"	dark			
1 "	"	"	light			= 1 end.
1 "	"	"	moss green			= 1 end.
1 "	4/48's	"	dark			= 1 end.
16 ends	2/48's	"	dark			= 16 ends.
1 end	"	"	light	} ×9		= 18 ends.
1 "	"	"	dark			
1 "	4/48's	"	dark			= 1 end.
16 ends	2/48's	"	dark			= 16 ends.
1 end	"	"	light	} ×8		= 16 ends.
1 "	"	"	dark			
Repeat of pattern						208 ends.

Filling: 57 picks per inch, single 24's worsted, olive green.
Finish: Worsted finish, full slightly, scour well, clear on shear, press. 52 inches wide.

Fig. 4. Piece dye, Jacquard Effect Dressgood.

Repeat of pattern: 200 warp threads and 30 picks.
Warp: 4000 ends, 24 or 26 harness fancy-draw.

Reed: 17½ 4, 5 and 10 ends @ dent, = 50½ inches wide in loom.

Dress: 10 Sections @ 400 ends (2 patterns).

Arrangement of warp:

40 ends *A*, use 10 dents.
2 " *C*
2 " *A*
2 " *C*
1 " *A* } × 4 = 28 ends use 3 dents.
2 " *C*
6 " *A*
7 " *B*
2 " *A* } × 3 = 27 ends
6 " *B*
6 " *A* } use 14 dents.
2 " *C*
1 " *A*
2 " *C*
2 " *A* } × 4 = 28 ends
2 " *C* } use 3 dents.
55 " *A* use 14 dents.

Repeat of pattern: 200 ends.

Description of yarns to use:

A = 2/74's worsted, in the gray.
B = 2/64's worsted, black, acid proof.
C = 2/60's mercerized cotton, black, acid proof.

Filling: 70 picks per inch, single 36's worsted, black, acid proof.

Finish: Scour well, piece dye brown, clear face, 48 inches wide.

A New Double-ply Structure for Curtains, Draperies, etc.

This new fabric structure has as one of its plys a warp predominating cloth, the warp threads being sufficiently numerous to produce upon a rib ground, a figure formed by warp threads floating over picks.

The other ply of the fabric is a filling predominating cloth, formed by heavy picks and fine warp threads, the latter being only sufficiently numerous to form a fabric, when passed alternately over and under the filling.

The filling may also be used to form a figure, by floating the same, all or only some of it, over two or more warp threads, as required by the design. This ply may be further varied by the division of the warp threads into alternate dark and light warp threads, which in combination with the filling serve to produce figure effects, caused by the difference in shade, which the picks assume, when bound according to the design, by either dark or light warp threads; the warp of either color, which is not required for the use on the face, meanwhile floating between the two plys.

An equal number of picks may be used for both plies, or the same may be varied in either ply, as required.

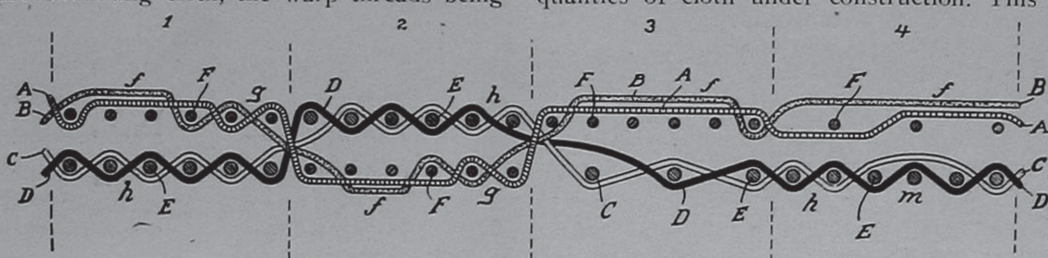
The joining of the two plies is done by passing them, the same as in reversibles, from face to back or back to face.

The construction of this new fabric structure, just patented by the Moss Rose Mfg. Co., will be readily understood by reference to the accompanying diagram, a section of the new fabric structure taken warp ways.

Examining this section of a fabric we find the same composed in one of its plies (shown shaded) of the warp threads *A, B,* and pick *F*. In sections 1, 3 and 4 this ply is shown as face, while in section 2 it appears as back structure. This ply is a warp predominating cloth in which the figure *f* is raised, formed by bringing the entire warp required for the figure of the face and permitting the filling to float on the back, between the two plies, and in which the ground *g* is formed by interweaving alternate warp threads with the filling by the plain weave.

The other ply (shown in outline and full black threads) is composed of fine warp threads *C, D* and heavy picks *E*. In sections 1, 3 and 4, this ply is shown as back cloth, while in section 2 it forms the face cloth.

In sections 1 and 2, the picks in both, the upper and lower plies, are shown to be of equal number; in section 3, the lower ply has only one-half as many picks as the upper ply; while in section 4, the upper ply has only one-half as many picks as the lower ply. The proportionate number of picks in either ply in section 3 and 4, may be varied to suit the various qualities of cloth under construction. This ply is a filling predominating cloth, which may be plain woven, as at *h*, or figured by floating picks as at *m* over the warp which goes to the back between the plies.



Bleaching After Mercerization.

An ordinary mercerizing process is first to cleanse the material from impurities by kier boiling, and then to treat with caustic soda lye, which effects the mercerization of the fabric. This is followed by washing, a passage through an acid bath, another washing, and then the bleaching operation, in which a further great amount of washing is necessary. A late English patent has for its object to bleach immediately after the washing process which follows mercerization. For this purpose, the goods, after being kier boiled, mercerized and washed in hot water, are passed through a bath of bleaching liquor of an oxidizing bleach ranging between ½ to 4 deg. Tw., according to the quality of the cloth. The goods then pass direct to the souring bath, containing hydrochloric acid at about 2 to 5 degrees Tw. Finally the goods are washed.