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BI-MONTHLY BULLETIN FOR HANDWEAVERS

HANDICRAFTS

MAY 1953

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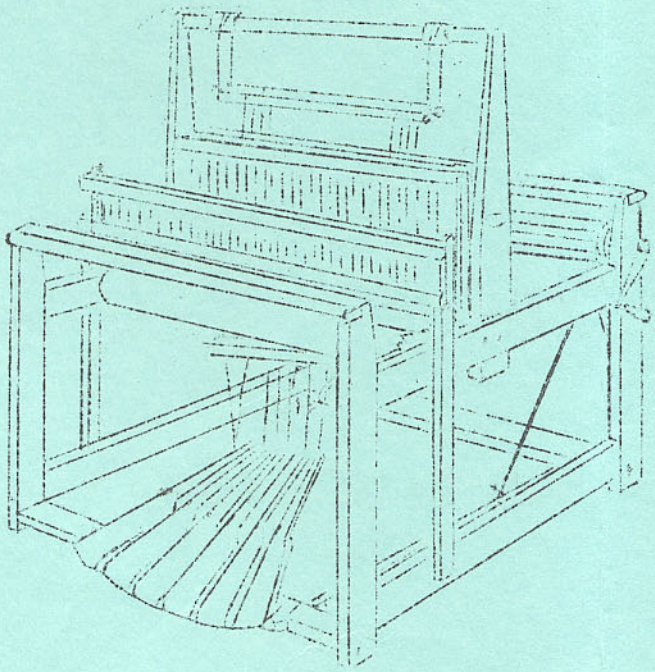

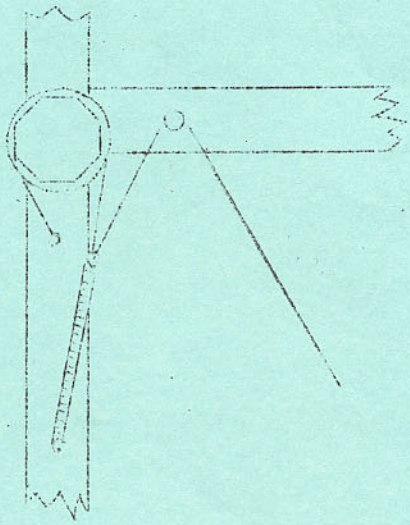

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MASTER WEAVER

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May, 1953 No.9

SHUTTLES AND SHUTTLE-RACES

The shuttle is probably the part of weaving equipment which is the least understood by both the weaver and the manufacturer. There are very few satisfactory shuttles on the market, and most of the less satisfactory ones can discourage a beginner for ever.

A shuttle does not need to be very elaborate or precisely made. Its lines are of little importance as long as they fulfill a few simple requirements. They can be made from other materials than the classical boxwood. But they must have certain properties, and certain factors cannot be disregarded.

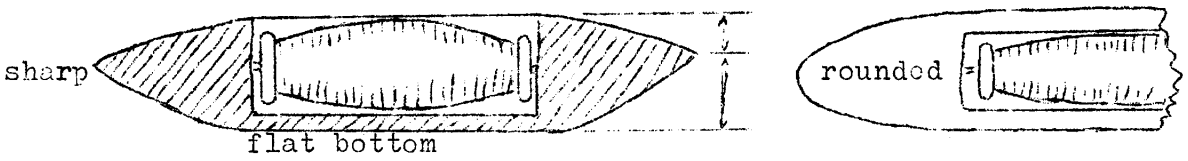
In the very principle of the hand shuttle there are already contradictions. For instance: each weaver works best with one particular kind of shuttle. But he should have at least two types: one for narrow, and one for wide warps. The first should be lighter (but not smaller), the other - heavier. Both should have exactly the same shape, and size. This is because the action of throwing and catching the shuttle must be completely automatic, so that the hand unconsciously assumes a certain position, regardless of the shuttle used. If there is a necessity of adjusting this position to the different shuttles, the weaving suffers at least in speed if not in quality.

Thus we have the first important condition: all shuttles used by the same weaver should have the same shape. This does not apply of course to special shuttles used in rug weaving etc.

But what shape? The bottom must be flat and straight, so that there is no tendency to roll or dip when going over comparatively soft shed. Whether there are ribs or holes in the bottom, does not make any difference except for the price. The varnish will stay longer on a solid flat bottom, than on a ribbed one. The curve from the bottom to the tip should be rather a short one. The tips should be raised higher than the center of the shuttle. They must be sharp in the vertical cross-section, but well rounded in the horizontal one. Too pointed tips are hard on fingers - dull ones break the warp ends if they strike any. Metal tips are all right if they are not too sharp, i.e. they should have the same shape as the wooden ones.

The shuttle should be deep enough, so that the bobbin or quill when filled with weft can be completely hidden. Otherwise the weft on the bobbin rubs on the upper part of the shed. Many shuttles are too low from this point of view.

The weight is very important. It should be sufficient to carry the shuttle through the shed and overcome not only the friction between the shuttle and the warp, but the friction of the unwinding weft as well. The weight must be distributed so that the shuttle is light in the center and heavy on both ends. This prevents it from swinging to the sides. The ends should be of solid wood or even weighted with metal.



All the above remarks apply to hand-shuttles only. Flying shuttles are constructed much more scientifically for the simple reason that the machinery cannot correct their trajectory, and the hand can.

Another important factor which decides upon the quality of a shuttle is the way the weft is unwound from a bobbin or quill. The most common arrangement is to have the bobbin which rotates on a spindle. It is simple and efficient but not very precise mechanism. The tention of the weft depends on too many factors and cannot be controlled satisfactorily. Even very well wound bobbin unwinds unevenly towards the end. On one hand it weights less then than when it is full, on the other - the smaller diameter when the bobbin is nearly empty makes it more difficult to start. These two factors do not eliminate each other and the movement of the weft is not even. If braking devices are used either on the bobbin or on the weft itself. they only partly correct this irregularity, and nearly always produce too much tension.

From this point of view a perfect arrangement is the one used in flying shuttles. Here the bobbin does not rotate. The weft comes from one end of a "plug" with hardly any resistance. The tension required for good weaving can be regulated and is independent from other factors, such as the amount of weft on the plug.

Consequently the best shuttle is one built as a hand-shuttle but with the releasing mechanism of a flying shuttle.

The shuttle-races (or race-boards, race-blocks etc) are great help if they are properly built, and they have no disadvantages. If they increase the weight of the batten, it is all for the best in most cases. However, they should be wide enough, and mounted at such an angle to the batten, that the fully opened shed just touches the board on its entire width. If the shed is too high, the race is useless, if it is too low, the race will rub against the warp and may damage it.

In connection with shuttle races special shuttles with rollers in the bottom can be used. Otherwise these shuttles are not to be recommended.

The shuttle races are particularly helpful in cases when the lower part of the shed is very soft, or when it has comparatively few ends, as in swivel weaves woven right side up.

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DOUBLE WEAVES

Stitched Layers

There are different reasons for which we may want to have two layers of fabric stitched together. It may be that one layer is used as lining to protect one side of an otherwise weak cloth. Or to reinforce the fabric. Or to make it much heavier.

Since it is impossible to discuss here all the cases when the stitching is applied, we shall take one example from each of the above groups.

Lining. There are quite a number of pattern weaves which have long floats on the back of the fabric. If these are cut, there is a danger that the pattern weft (or warp) may be pulled out. If they are left they look unsightly, and they still may be pulled out. The best solution then is to cover them with another fabric stitched to the first one at long intervals.

A typical case is swivel weave in several colours. Let us take to start with the draft on fig.1. Here the treadling is always 1, 2, 3, 4 with always the same colour on treadle 4, and different colours on other treadles according to the pattern woven. On the back side we have a mass of long floats (2/3 of the pattern weft is wasted here in floats). To cover them we need a tabby backing occasionally stitched to the front. If it has the same count of cloth as the front - the two drafts will alternate all the time, as in fig.2.

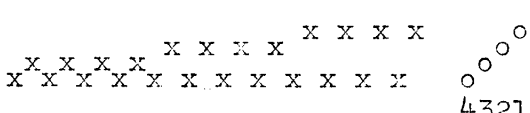

Fig.1

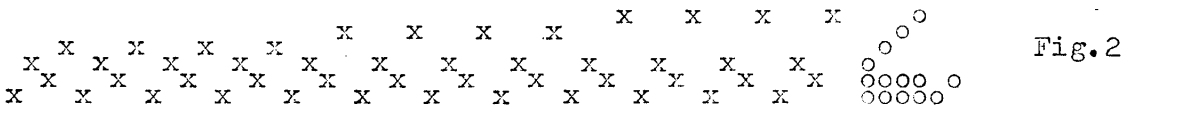

Fig.2

The two lower heddle-frames carry the lining, the upper four - the pattern fabric. But in such a draft we cannot get any regular stitching since none of the frames has properly spaced heddles. Thus we have to introduce one additional frame just for stitching. This is frame 3 in fig.3:

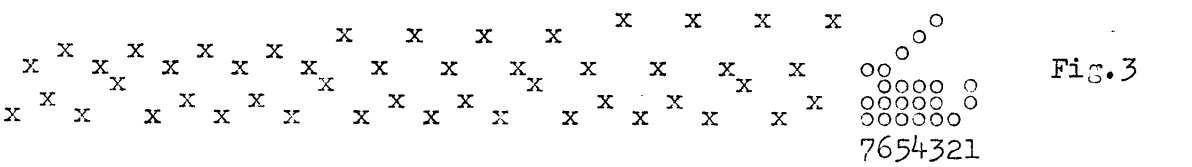

Fig.3

Here the treadles 1 and 2 weave the lining, and 3 to 6 - the pattern fabric. Treadle 7 is used occasionally instead of tr.6 to stitch both layers. The treadling may be: 1 3 2 4 1 5 2 6 1 3 2 4 1 5 2 7.

Reinforcing. When we want a stronger fabric, the stitching must be closer, and since it probably will show on, or through the upper layer, it must be planned more carefully than in the case of plain lining.

Let us suppose that we weave a very open basket fabric - so open that it would not hold together without a background. Let us make the basket - old gold, and the ground - black. Here the count of the lower layer will be much higher than of the basket weave. We shall need two stitching frames to alternate the stitching and to avoid thus making rows of stitches which would be visible. The upper layer requires two frames, and the lower - four. Six in all. The complete draft is shown on fig.4.

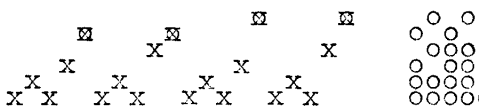

Fig.4

⊠ - is the heavy gold yarn for the basket,
x - the black background.

Treadles 1 and 2 weave the tabby ground or lower layer. Treadles 3 and 4 weave the basket. Finally treadle 5 is used instead of 3, and 6 instead of 4 for stitching. The treadling will be: 1 2 1 2 3 1 2 1 2 5 1 2 1 2 4 1 2 1 2 6. Black weft on 1 and 2, gold on 3, 4, 5, and 6.

This is not the only way of stitching. As we explained in the 7-th issue of MW (Drafts for double weaves), any change in the original tie-up for independent layers (fig.5 in our case) made either in the "empty" corner or in the "full" corner will result in stitching. These two corners (lower left, and upper right on fig.5) have ties which serve to separate the two layers.

Fig.5

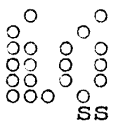

Fig.6

For instance treadles marked S in the tie-up on fig.6 can be used for stitching, and we could add these two treadles to our tie-up on fig.4.

Quilting. To increase the thickness of a fabric, we may not only double it, but insert a padding between the two layers. This is the case of Quilt Weaves. The simplest weave of this kind can be made on 4 frames (fig.7).

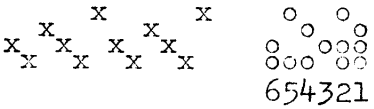

Fig.7

The upper layer (frames 3 and 4) has yarn about four times as heavy as the lower one (fr. 1 and 2). Treadles 1 and 2 weave the upper layer; 3, 4, and 5 - the lower layer, but they stitch both layers at the same time. Finally treadle 6 opens a shed for padding (called wadding). Treadling goes as follows: 3 4 1 3 5 2 6. Fine weft on 3, 4, 5, heavy on 1 and 2, and very heavy on 6.

The stitching may form a pattern. With 6 heddle-frames diamond patterns are quite easy to make. In fig.8 we have a draft for such pattern.

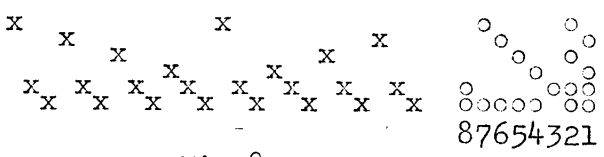

Fig.8

Frames 3,4,5,6 - heavy warp,
1,2 - fine warp,
Treadles 1,2 - heavy weft,
3,4,5,6,7 - fine weft,
8 - wadding.

Complete treadling, without wadding which may be used as often as required: 1 3 4 2 3 5 1 3 6 2 3 7 1 3 4 2 3 7 1 3 6 2 3 5.
In the above examples the two layers have been of a different count. They can be of the same count, and even of the same yarn, provided that the draft is changed accordingly.

Another case of quilting is a fabric with two identical layers penetrating each other (but not stitched) so that the lower layer becomes the upper one and vice versa. For instance (fig.9):

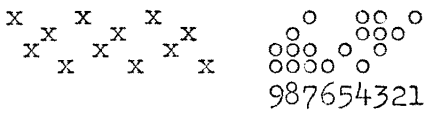

Fig.9

The treadles 1 to 4 weave the fabric in one position, and 5 to 8 in the reversed position. Thus for instance we can weave on tr. 1-4 for a quarter of an inch, then open the shed 9 for wadding, continue weaving on tr. 5-8, then again insert heavy weft in shed 9, and start from the beginning.

A similar fabric can be made with layers staying always on the same side but with a row of stitching joining them in the horizontal direction from time to time:

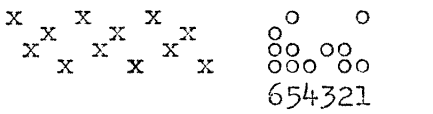

Fig.10

Treadles 3 to 6 weave two separate fabrics. Treadle 1 serves to stitch them together, and treadle 2 - to fill them with wadding. An example of treadling: 3 4 5 6 3 4 5 6 3 4 5 6 2 1. In this case as well as in the last one the fabric will be heavily ribbed.

As a practical project in this line we may take a heavy couch cover. The lower layer will be of woven in 2/12 cotton, the upper 2/4 wool (about 1100 yards per lb). The wadding may be the same wool doubled. The sett for cotton 24 ends per inch, for wool 12 ends per inch. If the size of the cover is about 2 by 3 yards we shall need a little more than one pound of cotton, and about $2\frac{1}{2}$ pounds of wool for the warp. The same amount of cotton for the weft, and up to 4 lbs of wool. In all the couch cover will weigh up to 9 pounds.

We shall use the draft on fig.7. The treadling may be the one given with the draft, or for lighter fabric: 3 4 1 3 4 2 3 4 1 3 4 2 6.

The problem in such cases is always the reed. No.12 should be the best - it will be slayed with 2 ends of cotton and 1 end of wool per dent. Should there be still too much friction in the reed (and this depends to a large extent from the wool used) we may try No.8 - 3 cottons and alternately 1 or 2 wool ends in one dent. As a rule very open reeds should be used with all double weaves.

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PROBLEMS IN TEACHING

VARIATIONS ON ONE THREADING

One of the greatest achievements from the point of view of a beginner, and often not only from his point, is to thread the loom, correct the mistakes, and in general - get prepared for weaving. Consequently the progress in mastering different weaves is comparatively slow at first, even if the student is very good at the theory of weaving.

Thus such weaves or groups of weaves which may be woven on the same warp without re-threading, and with only small changes in the tie-up, must be of interest to every teacher - and practically every advanced weaver is a teacher by profession or hobby.

As an example of what can be done with one threading, we selected a modern draft for 10 x 10 huckaback.

In the first place the student will have to understand the principle of huckaback weaves. Huck is a typical "woven-as-drawn-in" weave, where repeats of threading and treadling are identical in length and order. In practice this means that one side of the fabric is identical with the other after it is turned by 90°. The repeats can have either 6, 10, or 14 threads in both directions. Thus we have 6 x 6, 10 x 10, or 14 x 14 huckback. The threading draft can be written in several ways (fig.1) but this does not affect the fabric in any way.

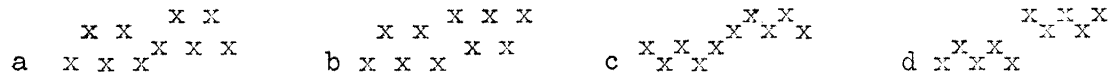

Fig.1

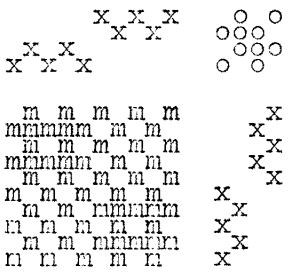

Fig.2

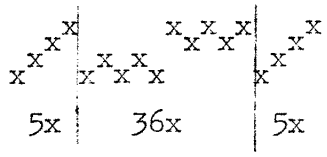

Fig.3

We shall use in this case the last draft (d on fig.1). The tie-up, treadling and draw-down is shown on fig.2.

The woven piece must have some kind of borders. If only huckaback were woven we could have tabby borders by threading the edges: 1 4 1 4 etc. But since we are going to use this threading for several weaves, the edges will be as on fig.3. The number of repeats given on the draft should fill about 12 inches in width with 2/16 mercerized cotton set at 32 ends per inch.

Now here is the list of weaves which can be executed on this threading with changes in the tie-up and the treadling only. We give a short description of each weave, as well as the draw-downs.

1. Huckaback.

The only huck which we can weave will have to be 10 x 10 of course. The draw-down is as in fig.2, but for practical purposes the tie-up should be changed, so that both feet can be used alternately (fig.4). The treadling with this new tie-up is: 1 3 1 3 1 4 2 4 2 4. Huckaback has a very peculiar texture which shows best when we look at a woven piece against the light. There are tiny slits which run on a diagonal in both directions.

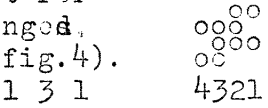
Fig.4

2. Turned Huckaback.

Ordinary huck has floats running in one direction on one side of the fabric, and in another on the back. If for any reason we want to have floats in both directions on the same side, we make one half of the repeat as before, and "turn" the other half (fig.5). But, since both halves of the repeat are based now on the same tabby shed (treadle 4), they must be separated with an additional shot of tabby on treadle 2. Thus the repeat in treadling is longer than in threading, and to square it we must beat a little harder than usual.

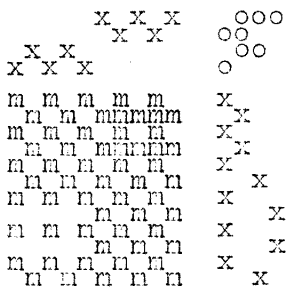
Fig.5

3. M's-and-O's.

Here it is only the principle of M's and O's which we use. The result looks more like Huck on one side and like M's and O's on the other. The texture here is a little softer than in case of huckaback, otherwise the weave is of little interest.

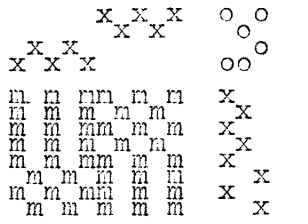
Fig.6

4. Turned M's-and-O's.

This can be considered as a farther development of Turned Huckaback. The floats here are longer (7 instead of 5) and they form squares on one side of the fabric. The repeat is again longer in treadling than in threading.

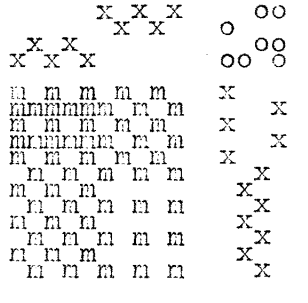
Fig.7

5. Double Waffle.

This is a very attractive and practical weave. Very similar to the plain waffle, has two instead of one float around each square. The floats form more ties with the ground, thus the weave is much firmer. Then both sides are identical, so that the fabric is reversible. When weaving it attention must be paid to good squaring, and the beating must be

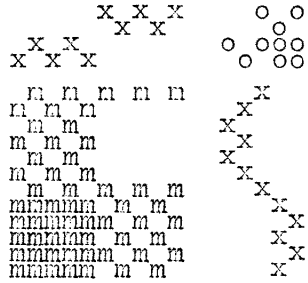
Fig.8

rather not too heavy.

6. Huckaback Lace.

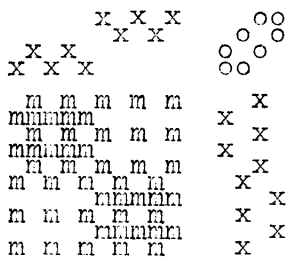

Fig.9

This weave has been already described in the 4-th issue of MW. The lace opens during weaving, and not after washing as in Spot-Lace, and any yarn can be used.

Huckaback lace is called sometimes False Basket. Then a stronger colour should be used in threading on frames 2 and 3, and in weaving on treadles 1 and 4. Thus the floats stand out on a background of less striking colour, and give an effect similar to the Basket Weave.

7. Paper Spot.

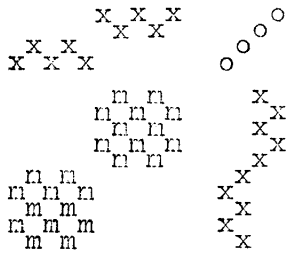

Fig.10

We use here this name because we do not know a better one. Original Paper Spot Weave has been used for rather involved patterns, and in our case we get only texture, but the principle is the same in both cases. The fabric woven in this way is very soft. Very interesting effects are obtained, when using four different colours: 1-st for frames 2 and 3, 2-nd for frames 1 and 4, 3-rd for treadles 2 and 3, and 4-th for treadles 1 and 4.

8. Overshot.

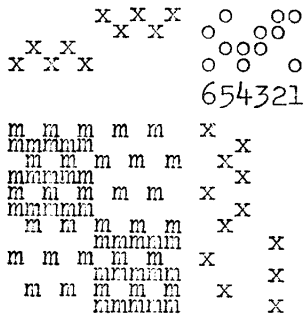

Fig.11

This of course will be a texture based on overshot principle, not a pattern weave. It is woven with one shuttle only. One treadling is given with the draft. Another variation may be: 6 2 5 2 6 2 5 1 6 4 5 4 6 4 5 3. The number of pattern shots depends on the grist of weft. The small spots should be approximately square.

9. Bound Overshot.

As a rule overshot woven on opposite sheds does not give satisfactory results, because of the different lengths of floats. Here it will work much better since all the floats are of the same length. Examples of treadling (draft on fig.11):

1) 1 2 1 2 1 2 1 2 1 4 1 4 1 4 1 4.

2) 2 4 2 4 2 4 2 4 2 4 5 6.

3) 3 4 3 4 1 3 4 3 4 2.

All these fabrics will be rather heavy. The warp will be partly visible, and no attempt should be made to cover it. Thus we shall keep to the usual sett of warp, instead of making it very open. The beating too should be quite normal.

10. Corduroy.

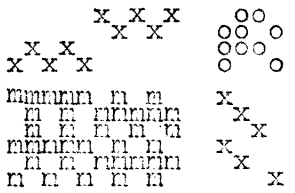

Fig.12

This weft-pile fabric called sometimes Velveteen (but not Velvet) is probably the easiest to make. It has a number of special drafts, but it can be woven on our threading as well. For best results a special soft weft (wool, pearl cotton) should be used on treadles 3 and 4, and a strong thin weft on treadles 1 and 2. The colours of warp and both wefts must be similar if not the same. The floats are cut (to form the pile) either on the loom or later on. Very sharp scissors with rather narrow blades must be used. When cutting one must be careful not to pull out the already cut floats. By cutting only parts of the fabric, and leaving floats in other places, interesting patterns can be made.

The loom used for this project should be either good jack-type, or a counterbalanced one with a shed regulator. Only 3 tie-ups in the whole series are suitable for plain counterbalanced looms. However if only weaving of samples is projected, all weaves can be made on a counterbalanced loom with a certain care, but not at a great speed.

The weaves have been described here in a certain logical order, but this order may be changed so as to save time in making the tie-ups. For instance on the standard tie-up for overshot, we can weave as well M's-and-O's and Huckaback Lace. The corduroy and plain huck have the same tie-up. Turned M's and O's, and Double Waffle can have the same tie-up if all 6 treadles are tied, just by adding the other tabby treadle to the Waffle tie-up (fig.13). Such combined tie-ups are quite suitable for weaving of samples, but when a longer piece is being made, it always pays to make the proper tie-up.

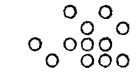

Fig.13

For teaching purposes it is advisable to take up the weaves in such order as to be able to point out their similarity, relationship to each other, and development into derivate weaves.

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WEAVING TERMINOLOGY

Some mistakes made in weaving have very interesting even if obsolete names. Thus:

BLOTCH or SCOBB - A place in the fabric where the shuttle missed one or more warp threads, and thus produced floats in weft. The origin of both expressions is doubtful. Blotch may be colloqial corruption of Blot. Scob might come from Latin scobis (sawdust).

JISP - is the result of uneven beating, and means the same as SHIRE. The origine of the first is unknown, the second comes from old English. It meant something thin and scanty.

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HORIZONTAL WARPING MILL

THE HECK BLOCK

As we have explained in the last issue of MW, a good warp is necessary for fast and uninterrupted beaming i.e. that there is no need to straighten out, comb or adjust the tension of the warp between the warping mill and the loom. Such a warp must have all the ends of the same length, all going parallel to each other without crossing or twisting, and not piled up in a haphazard way one on top of another. Although it is possible to warp in this way by hand - it takes quite a long time. A very simple gadget can do the same work in a small fraction of the time necessary for hand-warping. This gadget guides the yarn during warping, and is called Heck-Block.

In the warping reel described so far, we have already one part which will serve as a support for the "feeding" mechanism. It is the rail "D" (fig.4, page 9). The heck-block will slide on it from one end of the mill to the other, and back. This block (fig.1) is pulled by two cords (C) which go around pulleys (P) placed on each end of the rail. Both cords are wound on wooden cylinders (R) inserted on the bolts which support the rotating frame of the mill in the uprights of the base. This is why these bolts were made 8" long. The cords are wound in opposite directions, so that when the frame turns one way, the heck block is pulled to the right, and when it changes the direction of rotation, the other cord pulls the block to the left.

The larger the diameter of the cylinders, the faster travels the heck-block. For instance if the diameter is one inch, the block will travel about 3 inches during one rotation of the frame. This means that it will take about 11 turns of the frame to go from one end of the mill to the other, The warp will be rather long (about 30 yards) but narrow. If more bulky warp is required, the distance between two turns of the frame must be more than 3 inches. We can use then cylinders of 2" in diameter, and the turns of warp will be spaced 6 inches. The length of warp will be only 15 yards. It is advisable then to have two or three sets of cylinders for different warps.

The block itself has three functions: it guides the warp, it distibutes the warp so that it does not pile up all in one place, and it helps making the crosses.

The guiding is done by a "gatherer", or two vertical steel rods set in the block very closely together (G, fig.2). Two sets of half heddles made of one piece of wire each (H, fig.2) can open two small sheds which give the cross. One set of 4 heddles slides up and down on two steel rods (R, fig.2).

To space the warp evenly, we divide it into 8 sections and wind them one beside another. The block is not directly tied to the cords, but it sits on a longer board with 8 holes drilled in it (B, fig,2 and fig.3). The board is pulled by the cords, and the block is secured to the board with a peg (P, fig.2) which fits the holes in the board. We start warping with the peg in the 1-st hole (fig.3) and after making one eight of the warp we transfer the peg to the 2-nd hole, then to the 3-rd and so on, until the warp is finished.

We start with the rail, which already is mounted on the mill. It should be sand-papered until quite smooth, and oiled, or rubbed (but not painted) with varnish. Then the board (fig.3) is made of smooth hardwood. It has exactly the same width as the rail. The holes are drilled (not quite through) about $\frac{1}{2}$" apart and right in the center of the board. Their size may be about $\frac{1}{4}$". One screw eye is set in each end of the board.

The box is built around the rail and the board so that it will slide easily on both. Here again the exact dimensions are not important, and they depend on the thickness of the wood used. The dimesions suggested on the drawing are only approximate. The four sides of the block must be very smooth at least on the inside.

The half-heddles are made from wire (e.g. copper no.14) on a templet (fig.6) with 9 nails driven in two rows. The ends of each set are forced into two holes drilled in wood. One set into the front board of the box, another into the sliding part (S, fig.2).

The cylinders are made of one piece of wood turned down to the same size all over, and then cut in two. If only one set is made it should be about $1\frac{1}{2}$" in diameter. The $\frac{1}{2}$" hole should be drilled first, before turning, or it will never be in the center. Each sylinder has one small screw at one end, to which later on the cord will be attached. Both cylinders are placed on the bolts between two nuts and washers.

Two pulleys of any size from 1 to 2 inches are fixed with screws to the rail, one at each end (fig.5). Now the cord can be attached first to the small screw in one of the cylinders, wound several times around, passed around the pulley, and tied to the heck-block. In the same way the other cord is attached on the other side of the mill, but it must be wound in the opposite direction to the first one.

An ingenious craftsman will add two more features to the mill. One of them are two safety stops, which will prevent the frame from rotating when it comes to the end of the warp. These are just two pieces of wood screwed to the frame; they hit the the heck-block when it comes to the end of the rail. Another is a counter secured to the rail at one end. The heck-block or rather the board strikes it at the end of its travel, and thus gives the number of "portees" of the warp.

The operation of the mill starts with placing the tubes with yarn on a bobbin rack. If only two tubes are used, there is no necessity of passing the yarn through the half-heddles - it can go straight through the gatherer (G, fig.2). If more, the ends are threaded alternately through the lower and upper heddles. Then the whole bunch of yarn is tied to the lower peg of the right hand side of the frame. Now we start rotating the frame until we come to the other end. Here the cross is made with the help of half-heddles. Open one shed for the lower peg, another for the upper one, then again the first for the lower peg. After the cross is made, we turn the frame in the opposite direction until the first cross is reached. Since this cross will be later used only to spread the warp in the raddle, it may be made without dividing the warp into single crosses. From now on we proceed as previously described (MW, No.8, page 10).

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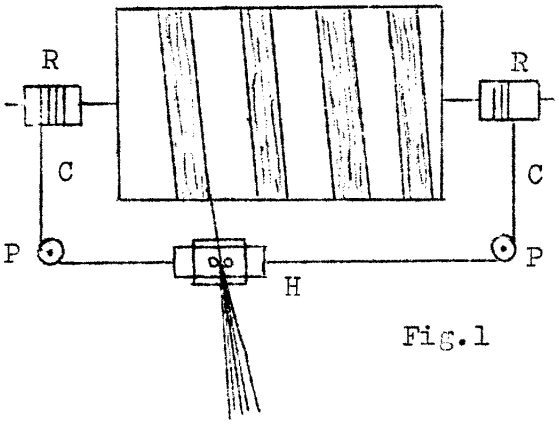

Fig.1

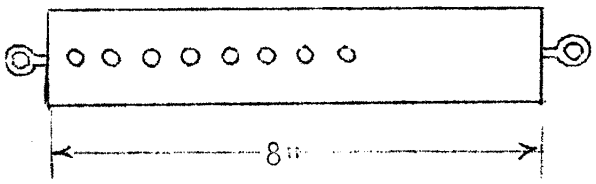

Fig.3

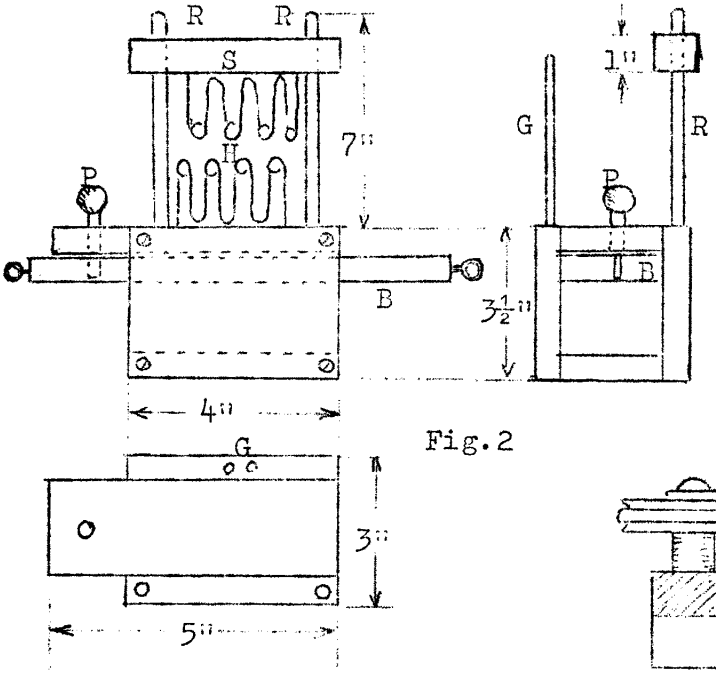

Fig.2

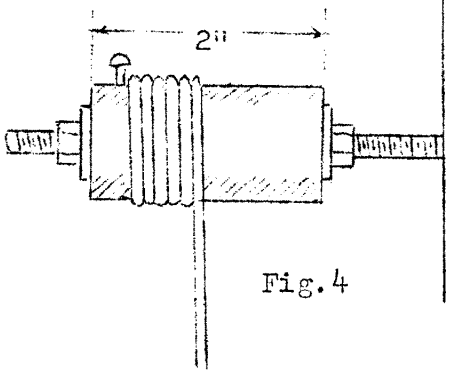

Fig.4

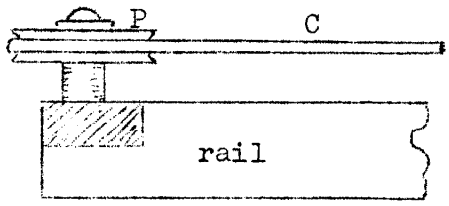

Fig.5

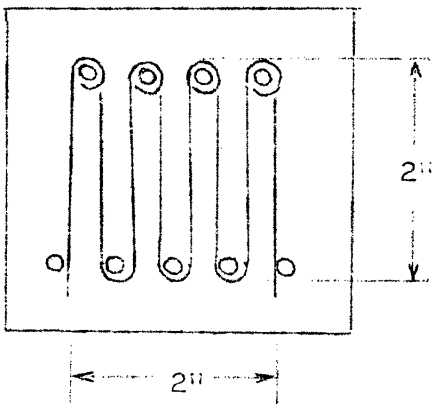

Fig.6

All dimensions given here are only approximate.