

## WEAVING IN WEFT EFFECT

treadle released, the second ground shoot must be made from left to right by the ground shuttle, and before preparation is made for the second pattern shoot the second ground shoot must be firmly beaten down to fix the pattern shoot in its place. An examination of the work at this stage will show a thin line of coloured weft crossing all the spaces of pattern in accordance with the first line of the design, as regards width, which only requires adding to by *three or four similar lines in order to complete one lateral line of square units according to the design.*

*More than one throw of weft generally required to make design unit*

(6) The first pattern shed must now be reopened, held by the catch, the *second binder shed* raised, and the second line of pattern weft shot from left to right, bringing both shuttles to their first position on the right of the loom. After the pattern shed is closed and the wefts pressed together, the third line of ground weft must be shot and beaten close; it can then be determined how many shoots of ground and pattern will be required to fill out to their right proportions each lateral row of the design as drawn on the ruled paper.

Of course, the proportion of the design when woven can only be determined by experiment, as it depends not only on the number of shoots of weft in each row of squares, but on the size of the wefts, both of the ground and the pattern, and also the closeness with which they are beaten together by the reed.

*Proportion of design must be kept*

It must never be forgotten that the *binder shed* has to be changed for *every shoot of pattern weft, no matter how many shoots are required for each line of design units, or*

*Changing the binder at every shoot*

## THE NEW DRAW-LOOM

*whether it is a tabby binder on two headles or a twill on four.*

*When in lines of weft two or more colours are thrown*

In the case of designs, such as that of Plate XXVI, at *A*, where two colours are used in the same line of wefting of the pattern, either in certain portions or all over the design (as shown in the illustration at letter *A*), every line of ground weft is followed by a line made up of two different coloured wefts which appear and disappear in certain appointed places in the line not covered by the ground. This change of colour in a single line of weft is arranged for on the "simple" by having a separate lash for each colour to be used in succession after each single shoot of ground weft. This necessitates the making of a separate working drawing for each colour if the design be at all complicated. In reading-in, therefore, for the first lash of the pattern shed of the specimen sample of Plate XXVI, the drawing *B* would be used, and for the second lash the use of drawing *C* would be required, and this order would be maintained throughout *as long as two colours run together in the lines of the design*. The lashes are distinguished by being made of different coloured threads and, generally, the first shoot of pattern following each ground weft is for the leaves, stems, or structural lines of the design.

*A clearing for each colour required in complicated patterns*

When two or more coloured wefts are shot in the same line of a pattern, *the same binder shed is repeated for them.*

## Chapter XVII

### DRAW-LOOM NO. IV

THE bold step from draw-loom No. III to draw-loom No. IV proved to be a very great advance in the development of the table-loom series of draw looms. In effectiveness it brought the mechanism, for artistic pattern weaving, a little in advance of the traditional draw-looms of the early part of the nineteenth century: the time when the Jacquard machine was first used in the silk industry.

*Draw-loom  
No. IV as  
great advance  
in development*

This new draw-loom (No. IV) embodies in its small compass two important inventions which render it manageable by a single weaver and, at the same time, simpler in the method of extending the size of a design without interfering with the fine texture of the warp. The first of these innovations is the removal of the simple to the front of the loom, which is quite a modern innovation, while the second invention referred to, which is called the *split harness*, was made by John Gough, a Spitalfields silk weaver, about the middle of the nineteenth century. This was a very important invention indeed, and will require full explanation, as it effects in a much simpler manner the enlargement of the units of design, the principle of which is explained in Chapter XI on draw-loom No. II.

*Two important  
inventions  
adopted in  
No. IV  
draw-loom*

The general appearance of draw-loom No. IV is given in the exceptionally good free drawing of it made by Miss Alice Hindson, which is first of the group of six at the beginning of this chapter, in which it will be seen that

## THE NEW DRAW-LOOM

the framework very much resembles that of the full-sized draw-loom described in Part I.

*Side elevation  
of draw-loom  
described*

The side elevation of the loom is given in Plate XXVIII, sundry details on Plate XXIX, also a design on ruled paper suitable for it forms the subject of Plate XXX, a diagram of pattern and brocade wefting, Plate XXXI, and a brocaded sample of silk tissue, woven from the design, Plate XXXII, completes the special set of illustrations devoted to its description.

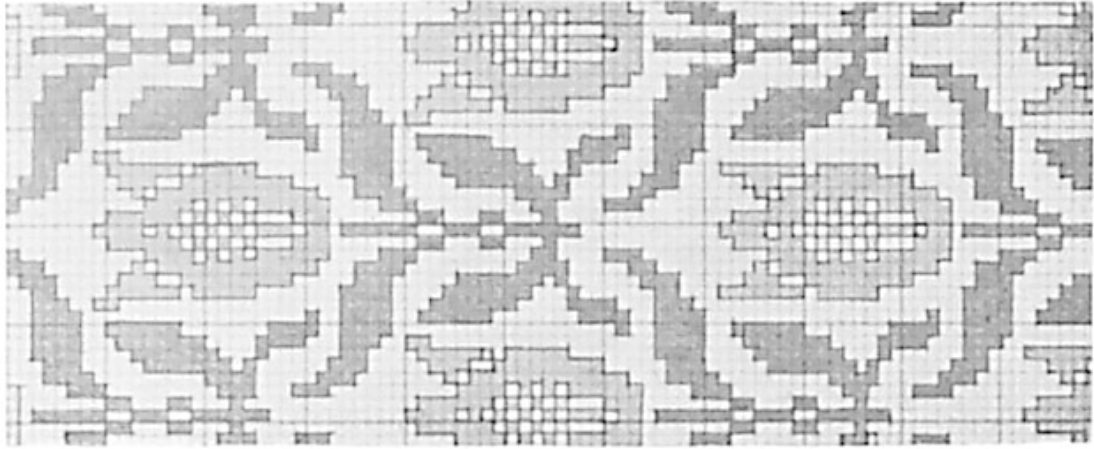
*Why the  
comber board  
was introduced  
in No. 4  
draw-loom*

In draw-loom Nos. I, II, and III of this series, the pulleys, over which the cords pass to the front of the loom and connect the shafts of the harness with the cords of the simple, were placed on the top of the simple frame in a single row: but, as it was desired to make No. IV a draw-loom which would allow for the weaving of a *wider repeat of design* than was possible on a headle harness, the number of shafts of which is necessarily very limited, the perforated comber board with its corresponding appliance, the pulley-box, as well as the simple frame and cords to match the comber board, became essential fittings.

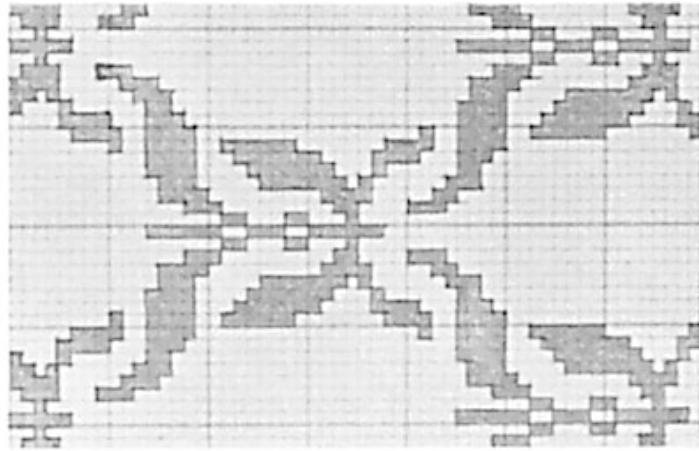
*Parts of the  
draw-loom  
previously  
described*

Full descriptions of all the parts of the single-thread draw-loom have been given in Part I. These will apply equally to several of the parts of the draw-loom No. IV. The comber board, the pulley-box, the simple frame and its cords, the composite healds of necking cords terminating in the couplings with their lingoos; which hang on the shafts and work independently of the pattern lifting mechanism of the simple; all, with slight variations, are adapted to the smaller loom. These variations will all

A

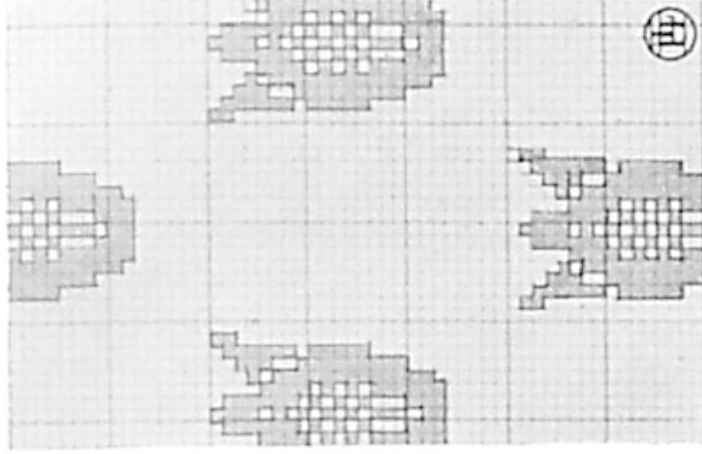


B



FIRST COLOUR

C



SECOND COLOUR

DESIGN

PLATE XXVI

DESIGN IN THREE COLOURS, REPRESENTED IN THREE TONES, FOR WEAVING ON NEW DRAW-LOOM No. III

## THE NEW DRAW-LOOM

require brief noting, but the nature and value of the "split harness," which has been referred to for the first time at the beginning of this chapter, will be fully dealt with later, together with explanatory illustrations.

*Plate XXVIII  
described*

*The comber  
board and  
pulley box  
of draw-loom  
No. IV*

In the drawing of the side-view of draw-loom No. IV, Plate XXVIII, the end of the comber board is shown in position at letter *A*, just above the row of pulleys *DD*, over which the cords pass, which connect the shafts of the harness to the treadles. The board in this case is not made of perforated slips held together by a solid frame, as in the full-sized looms, but it is simply a thin board of hard wood, 18 in. long and 4 in. wide. Its perforations will be presently explained, as well as its close agreement with the count and other particulars of the warp and the design. In these small looms it is necessary to keep all the fittings as light and open as possible so as to be easy to handle and adjust; hence, the adoption of this simple type of comber board. The board is held in its place in the frame by a pair of bent iron hooks fixed to a strong cross-piece which is firmly screwed to the back of the upright frame. An enlarged reproduced drawing of one of the hooks is given at Fig. 2, showing its attachment to the crosspiece, and the front of the board is further supported by a strong cord being attached to its corners and carried upward to the top of the loom frame, and there secured, as in Fig. 3, letters *C C*, Plate XXVIII, which show the relative positions of the pulley box, *A A*, the bottom board, *B B*, and the comber board, *C C*.

The perforation of the comber board and its division

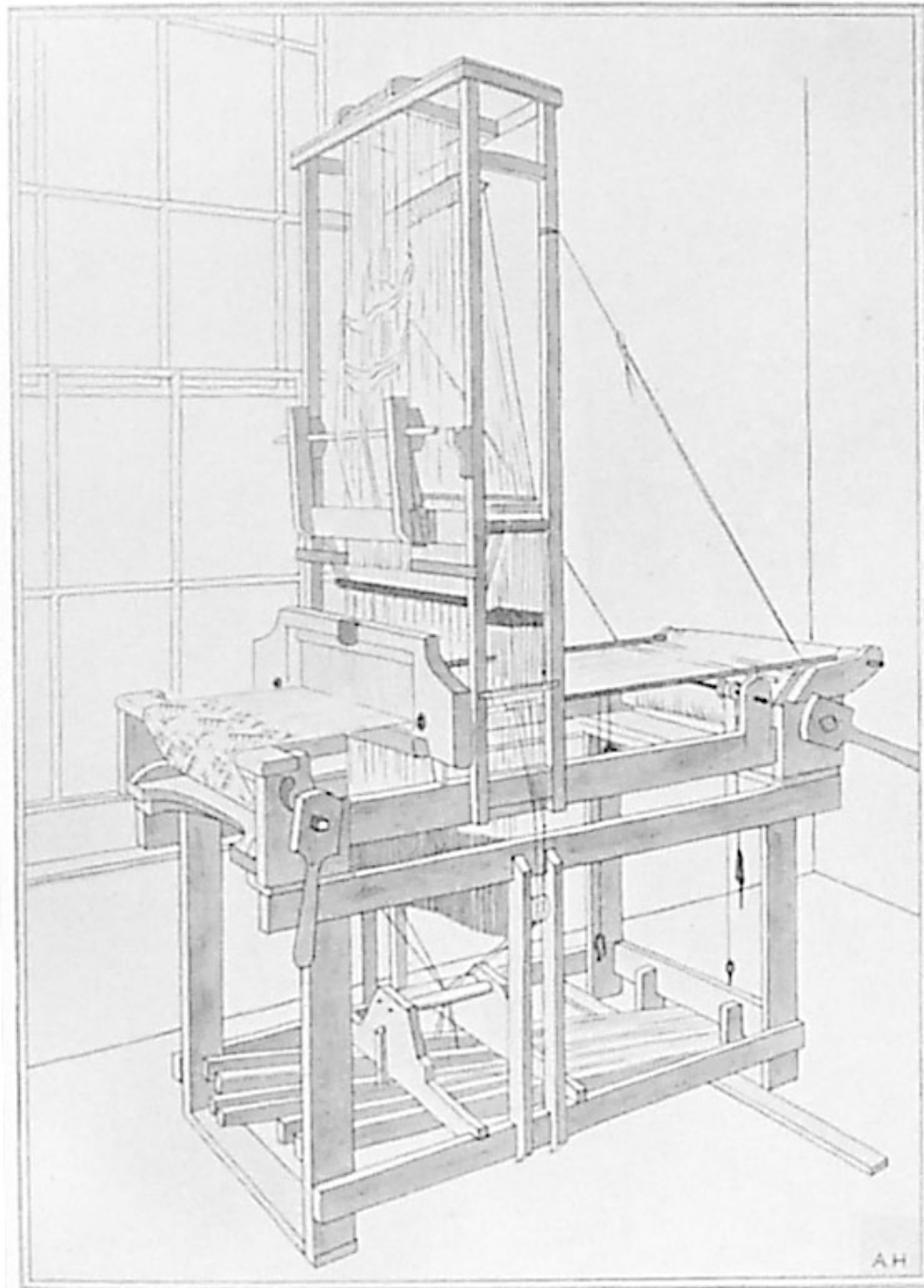


PLATE XXVII  
NEW DRAW-LOOM No. IV  
*(From a freehand drawing by Alice Hindson)*

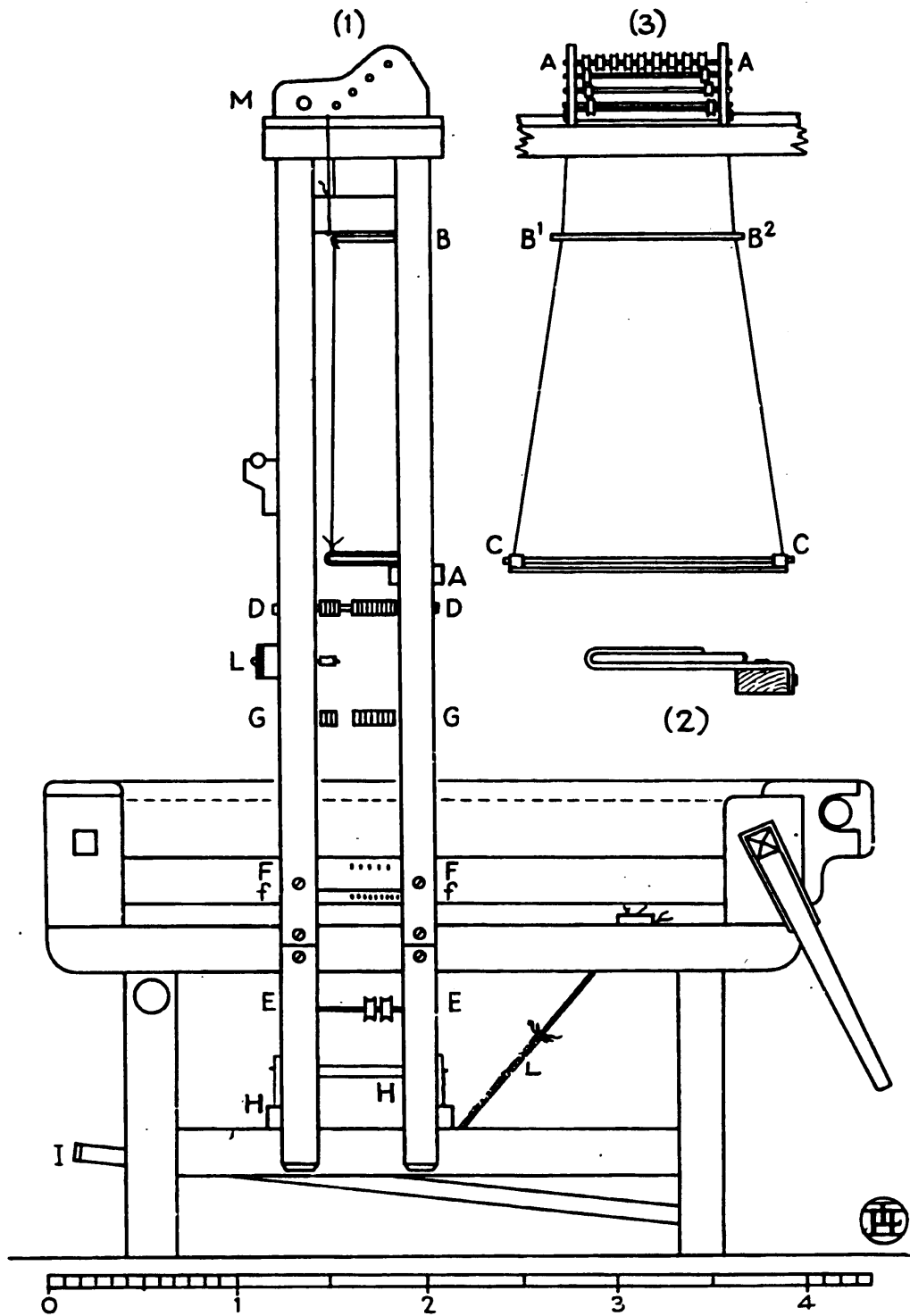


PLATE XXVIII  
 NEW DRAW-LOOM No. IV, SIDE ELEVATION AND DETAILS



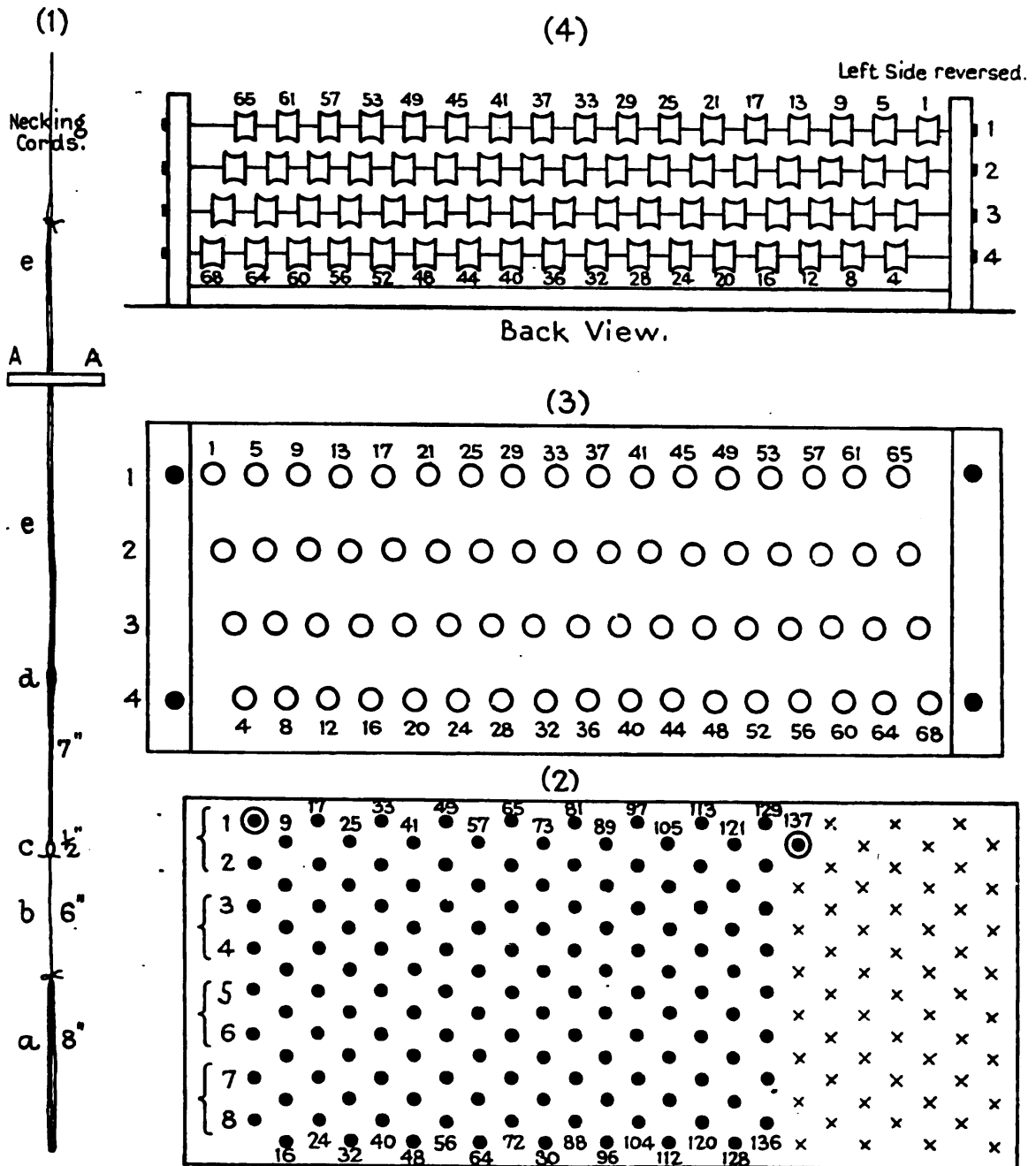


PLATE XXIX  
 COMBER BOARD, BOTTOM BOARD, AND PULLEY BOX OF NEW DRAW-LOOM No. IV

PLATE XXX.



Design for Silk Brocade to be woven on Draw-loom No. IV.



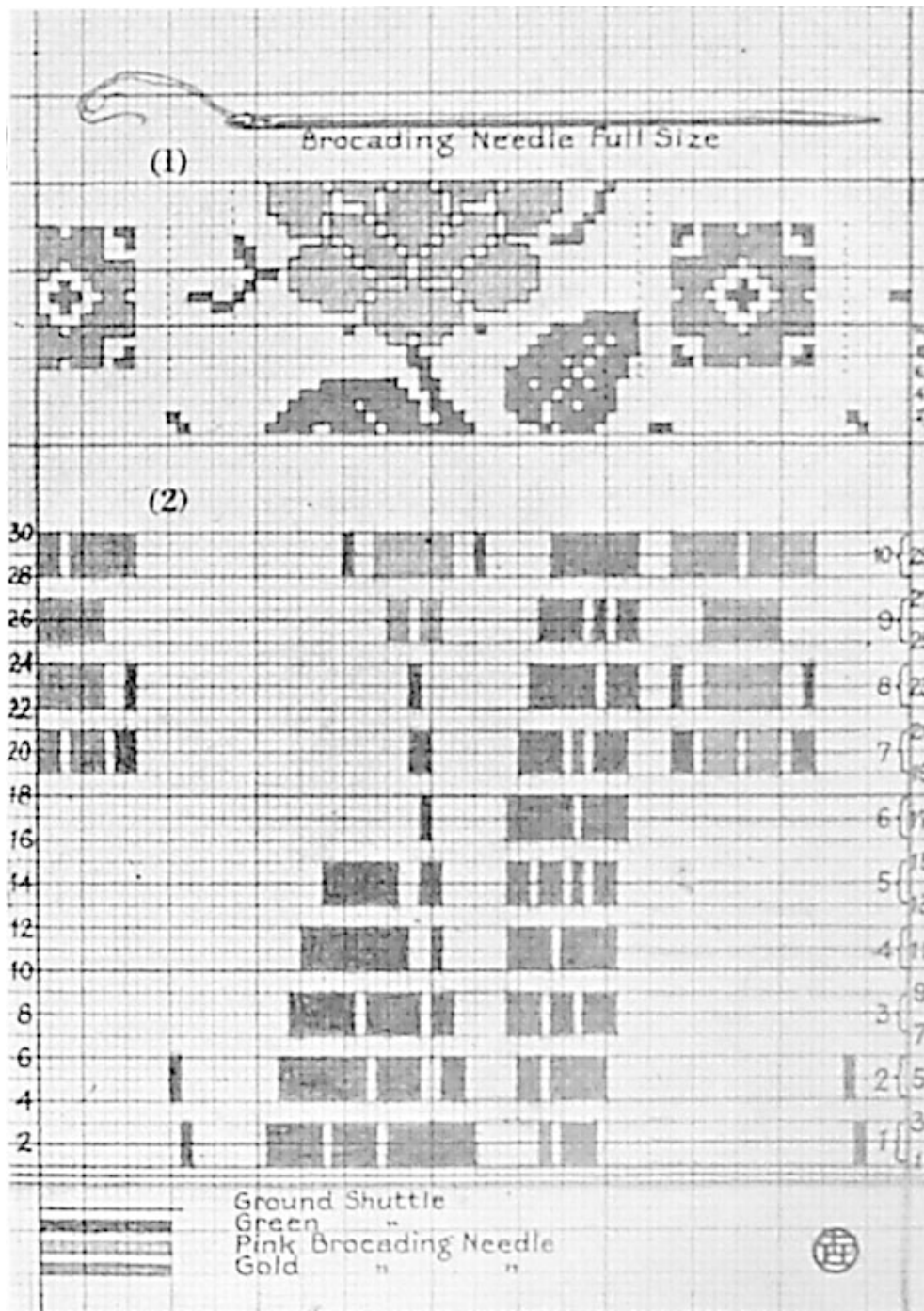


PLATE XXXI  
BROCADING FOR PLATE XXXII



Silk Brocade woven by the Author on Draw-loom No. IV.

## DRAW-LOOM NO. IV

into repeats will, of course, depend on the count and width of the warp to be set up, each thread of which has its appointed separate hole in the comber board exactly above its place on one of the shafts of the harness.

The width of the warp, and the arrangement of the shafts and couplings, always being determined by the perforations of the comber board, it is, of course, necessary that all these several parts be in exact agreement.

We must now, therefore, examine in detail the separate parts of the harness of draw-loom No. IV in order to show how perfectly this agreement is maintained.

The board being 18 in. from end to end will allow a width for each row of the perforations of 17 in. This, of course, necessitates the use of a reed at least 17 in. wide, exclusive of selvages, making 18 in. in all, the same as the comber board. See Plate XXIX, Fig. 2, where one-third of the complete board is shown.

In 17 in., therefore, the warp, whatever count it may be, must be contained.

As draw-loom No. IV was intended for students' use, the yarn for the warp was chosen of such a size as to work freely 48 threads to 1 in., so that in 17 in. there would be 816 single threads. The reed selected for use was one of 24 dents to 1 in., or 408 dents in 17 in.

*The reed  
for draw-loom  
No. IV and  
its warp*

It was next considered that 48 threads to 1 in. would make a much finer tabby ground than was required for the design of the brocade it was intended to weave (see Plate XXX), therefore, the yarn was warped double, so that each coupling depending from the shafts had to be

## THE NEW DRAW-LOOM

entered with a double thread, and the two threads in each dent of the reed would rise together as a single thread.

*The number  
of shafts for  
pattern harness*

The next matter to arrange was the number of shafts on which the 408 couplings were to hang, and the number 8 was determined on because it is most convenient for weaving either plain tabby, twill, or satin grounds. 408 divided by 8 gives us 51 as the number of couplings to hang on each shaft, and as the eight shafts require  $2\frac{1}{2}$  in. space to hang and work in, the corresponding eight rows of holes in the comber board must occupy a space of  $2\frac{1}{2}$  in. by 17 in., and each row must have 51 holes pierced in it.

*The short  
couplings*

The short couplings which are to hang on the shafts, are made in the same manner as the couplings for the single thread monture described in Chapter VI, Part I, but, in order to hang them on the shafts of the "split harness," invented by John Gough, previously referred to, an additional knot has to be made 7 in. above the eye of the coupling, called the bannister knot. The "split harness" coupling is shown on Plate XXIX (Fig. 1), with its various parts lettered in italics, *a* being the lingo 8 in. long; *b*, the lingo loop, 6 in.; *c*, the eye,  $\frac{1}{2}$  in.; *d*, a shaft with the bannister knot 7 in. above the eye resting upon it; and *ee*, the long loop passing through the comber board, letter *A*, and reaching as far above it as the comber board itself is above the bannister knot.<sup>1</sup>

*The bannister  
knot*

In exactly the same way as described for the thread

<sup>1</sup> For a full description of the split shaft harness and its wonderful utility in silk weaving, consult *Hand-loom Weaving, Plain and Ornamental*, Chapter XVI.

## DRAW-LOOM NO. IV

monture couplings in Chapter VI, the split harness couplings must be prepared, hung on their shafts by their banner knots, 51 couplings on each shaft, and the long loops drawn up through the holes of the comber board a row at a time to finally join the necking cords from the pulley box.

*Hanging the couplings on shafts*

Turning now to the design for brocade weaving for which the loom is being prepared, Plate XXX, it will be seen that it is a comber repeating design, each repeat occupying laterally 68 square units of design. Three repeats, therefore, would fill out 204 squares of ruled paper, and supposing each square represents two couplings with their entered threads of warp to be lifted, the 408 couplings hanging on the eight shafts and drawn through the comber board will be accounted for.

Leaving for the present all the long ends of the 408 couplings hanging in an orderly manner over the front edge of the comber board, we must return to the first description of the monture building, in order to note that the long end of each coupling, after passing through its appointed hole in the comber board, is joined to one of the several necking cords which are connected in their turn to a single pulley cord above the bottom board of the pulley-box; the latter hanging, as it is always placed, immediately over the centre of the comber board; see Chapter VI and its illustrations, where full directions are given for joining the couplings and necking cords of a typical monture.

*How connected with necking cords*

Returning to the side view of our draw-loom No. IV, Plate XXVIII, the position of the bottom board of the pulley-box is shown at letters  $B^1$  and  $B^2$ , as well as a front

## THE NEW DRAW-LOOM

*The bottom  
board of  
pulley box:  
its position*

view of the box and its fittings at Fig. 3. In Plate XXIX, Fig. 3, the bottom board with its perforations is drawn as seen from the top, and above it the pulley-box is shown from the back.

*Agreement of  
comber boards,  
bottom board  
and pulley  
reinforced*

At Plate XXIX, Fig. 2, a repeat of the comber board of draw-loom No. IV is also shown, and when all these parts of the monture are compared and thoroughly understood, the perfect and admirable agreement of the different parts of the mechanism will be realized. In order that all this may be made perfectly clear, the various figures in the two plates must be taken in their natural order.

(1) The portion of the comber board (Fig. 2), Plate XXIX, must be explained. It is a bird's eye view of one-third of the whole board, and it contains 17 rows of eight holes, counting from back to front, as indicated by the numerals; its total number of holes is, therefore, 136, ending at the front of the board. Hole No. 137 at the back of the board begins the second repeat for a comber design, as explained fully in Chapter IV.

(2) Fig. 3, in Plate XXIX, represents the upper side of the bottom board of the pulley-box. It will be realized that its perforations, although numbering only 68 and arranged as they are only in four rows of 17 holes, agree with the perforations of the comber board, when it is remembered that each single cord from the pulley-box has to raise two couplings from two separate holes in the comber board; thus, couplings 1 and 2 will be joined by their top loops to a necking cord which, in its turn, is joined to No. 1 pulley cord; Nos. 3 and 4 in a like manner



## DRAW-LOOM NO. IV

will be joined to No. 2 pulley cord; Nos. 5 and 6 to No. 3 pulley cord, and couplings Nos. 7 and 8 will be joined to No. 4 pulley cord. Of course, the compound necking cords when all joined together to each pulley cord, as described in Chapter VI, Part I, will draw up the corresponding couplings in every repeat across the whole warp.

Before passing on to describe the pulley-box arrangement of the pulleys, it will be most convenient to pause just here to point out that the principle of the split harness has almost explained itself, as it will have been noticed that the single couplings from the comber board, being joined in pairs to single pulley cords in the order indicated, are, in every case, *resting by their bannister knots on separate shafts*. This is a great advantage, simple matter as it may seem, for it allows the shafts with their single couplings to work quite independently of the pattern arrangement above them; also that the cords of the pattern can be raised in any combination without at all disturbing the unraised threads resting on the shafts.

*The principles of the "split harness"*

General particulars of the construction of the pulley-box will be found in Chapter V, and should be re-perused before the building of the special box for draw-loom No. IV is begun. This being done, the accommodation for the requisite number of pulley cords in the pulley-box must be made. We have already calculated that the number of cords to be accommodated with pulleys in the box for the harness of draw-loom No. IV is 68, and that they have to be arranged to match exactly the four rows of holes in the bottom board, as shown at Fig. 3, Plate XXIX. The

*To arrange pulleys in box*

## THE NEW DRAW-LOOM

shape and details of the pulley-box decided on is given in Plate XXVIII, Figs. 1 and 3, the side view of the box being shown in Fig. 1, and the front view in Fig. 3. In Fig. 1, letter *M*, one of the two sides of the pulley-box is shown perforated near the front with a large hole, and four small holes rise one above the other from front to back, being the same distance apart as are the rows of holes in the bottom board. Fig. 4, Plate XXIX, gives the back view of the box, which has four iron bars resting in the eight holes of its sides. On these bars the 68 pulleys are placed and spaced and fixed by washers in such a manner that every pulley cord has a clear run forward to the front of the box. In order to do this, the pulleys have to be arranged on the rod diagonally, as shown in the illustration, which gives the back view of the box with pulley No. 1 on the highest bar to the right; but, of course, when seen from the front it will be exactly above No. 1 hole in the bottom board on the left.

*Boring the  
bottom board  
of the box*

The perforations of the bottom board of the pulley-box, Fig. 3, Plate XXIX, in order to be immediately beneath the pulleys to which they belong, are bored in rows with a bias from left to right, so that every pulley cord to which three necking cords, one from each repeat, are joined, may be drawn straight up and have no tendency to be diverted from the groove of the pulley to which it belongs. From this point the pulley cords are all carried to the front, over the glass rod after passing through the dents of the pulley-box reed to join the simple cords, and finally reach the bottom bar of the simple in exactly the same way as described in Chapter VII.

*The course of  
the compound  
coupling to the  
simple*

## DRAW-LOOM NO. IV

The four-headle binder harness, in draw-loom No. IV, is placed *in front of the pattern harness*; the ground, whether tabby or twill, being made by the eight shafts of the latter. The binder warp is made of fine white silk, 12 single threads to 1 in. It is entered in every alternate dent of the reed, after being brought between the second and third double threads of the pattern harness. The healds have ordinary  $\frac{1}{2}$  in. eyes, and the headles have both top and bottom shafts. *Position of the binder harness*

Only two treadles are necessary for the tabby ground, and these are placed in the centre. The binder treadles, four in number, are corded to the headles, 3 and 1 to the right, and 2 and 4 to the left of the tabby ground treadles.

The *cording*, as the system of connecting the healds and shafts of the harnesses to the treadles is called, is such an important matter that a separate chapter must be devoted to its consideration. *The cording*

## Chapter XVIII

### THE PULLEY MOTION AND ITS CORDING

*Superiority  
of the pulley  
motion for  
cording*

**I**N all the draw-looms designed by the author the ground and binder harnesses are connected with the treadles by cords running over pulleys instead of the usual system of levers and marches, for it has been found that a pulley motion, when accurately arranged, is far more dependable than one of levers, and is, at the same time, more easily adjusted.

The pulley motion for draw-loom No. IV is quite a simple one, but for the full-sized looms, particulars of which will be given in Part IV, the pulley motions and cordings will be found to be rather more complicated but equally adjustable. Plates XXVIII and XXIX must be consulted for particulars of the arrangement of the pulleys and cording of No. IV draw-loom.

*Pulley motion  
of draw-loom  
No. IV*

1. Between letters *DD*, Fig. 2, Plate XXVIII, a row of 12 small pulleys will be seen; they are divided into two sets by a long washer, the set near the front post of the loom consists of four pulleys, and there are eight pulleys in the back set.

2. Immediately below the back set of pulleys, two larger ones are mounted, close together on an iron rod fixed between the two upright side posts of the loom on the side of the loom table, which match the upright side frame of the loom. These pulleys are kept in position by

## THE PULLEY MOTION AND ITS CORDING

washers exactly under the centre of the set of eight pulleys *DD*. The two large pulleys are lettered *EE*.

3. Below the eight pulleys, *DD*, on the side frame of the loom, a slat of wood is screwed and lettered *FF*; it is furnished with eight small screw eyes spaced so as to be exactly underneath the centre grooves of the eight pulleys, *DD*.

4. About midway between the eyes *FF*, and the pulleys *DD*, a row of short vertical lines, lettered *GG*, is drawn, which indicates the position in the loom of the ends of the eight shafts of the pattern harness and the four top shafts of the binder harness.

Having identified these various objects and their relative positions, the reader will see at once that eight cords attached to the ends of the pattern harness shafts *GG*, brought over in the grooves of the eight pulleys *DD*, threaded separately through the screw eyes *FF*, divided into two sets of four, as will presently be explained, can be tied to two strong treadle cords coming from the centre of the loom just below the two large pulleys *EE*, and perfectly connect the shafts of the pattern harness with a pair of treadles.

Before an explanation of the rather different cording of the binder harness is given, it will be more convenient to turn to the diagrams of the front views of the pulley motions and cording given in Plate XXXIII, Figs. 1, 2, and 3.

Fig. 1 shows the pulley motion for the pattern harness. No supports for the pulleys are shown, but the correctness

## THE NEW DRAW-LOOM

*Pulley motion  
of pattern  
harness*

of the position of the various parts will be at once recognized as they are lettered the same as in Plate XXVIII.

*Cording the  
pattern  
harness*

The letters *G G* indicate the ends of the pattern shafts to which strong, thin cords are attached and carried over the pulleys *D D*, on both sides of the loom. The cords are threaded through the screw eyes in regular order as they come off the pulleys; No. 1 cord being at the back and No. 8 towards the front of the loom. Below the eyes the cords from pulleys 1, 3, 5, and 7 are neatly joined together and connected by a snitch to the treadle cord the back-most of the two pulleys *E E*. The remaining pulleys, 2, 4, 6, and 8, must be gathered in like manner and joined a little lower down, so that the two knots work free of each other, to the treadle cord for the pulley *E* in front.

After passing under the pulleys *E E*, Plate XXXIII, the treadle cords from both sides, connected with shafts 1, 3, 5, and 7, are carried to the centre of the loom, and passing between two rollers, fixed in the position shown in the diagram at letter *B*, are attached in the usual way to the ground treadle No. 1. The treadle cords from the shafts 2, 4, 6, and 8 follow exactly the same course from the front one of the pair of pulleys *E E*, but after passing through the narrow opening between the two rollers are tied to the ground treadle No. 2.

*Bearings for  
rollers of  
pulley motion*

The bearings for the rollers are erected on two cross-bars, the ends of which are seen at *H H*, Fig. 2, Plate XXVIII, and one of the bearings between the rollers *B B*, drawn to the same scale as the loom, are given in Fig. 3, Plate XXXIII.

## THE PULLEY MOTION AND ITS CORDING

For the binder harness a pair of short rollers is fitted up at the back of the bottom bar of the simple frame, near its centre, the end of the bar is marked letter *L*, Fig. 1, Plate XXVIII.

The binder cording, Fig. 2, Plate XXXIII, is much simpler than that of the shaft harness of the pattern and ground, and only requires the pulleys *D D*, and the two small rollers *A*, in addition to the large rollers *B*. The cords, which can be quite fine ones, after being tied to the ends of the top shafts of the headles, pass up and over the pulleys *D D*, to the small rollers *A*, over them, straight down through the warp to the long rollers *B*, and so between them to the several binder treadles. The best order for tying them up is headle 1 to the first treadle on the right, and headle 2 to the first treadle from the left; headle 3 to the second treadle from the right, and headle 4 to the second treadle from the left. The advantage of connecting the headles and treadles in this order is that the treadles can be used without alteration of cording either for tabby or twill binders. For tabby binders, treadles 1 and 3 can be tied and trodden together alternately with treadles 2 and 4.

It must be added that in making both pairs of rollers, letters *A* and *B*, the spaces for the cords to pass between them must be as narrow as possible, and the cords to be used must be of the best highly twisted flax; also that every part of the cording must have snitch joints in convenient positions, making it easy to regulate, adjust, or mend at any moment.

*Pulley motion  
of binder  
harness*

*No alteration  
of cording  
required for  
tabby or twill  
binders*

## Chapter XIX

### TYING UP THE SIMPLE FOR A DESIGN AND WEAVING A BROCADED TISSUE ON NEW DRAW-LOOM NO. IV

*Larger repeats  
of design  
possible on  
draw-loom  
No. IV*

THE great advance in the construction of the draw-loom No. IV consists in the provision it makes for weaving wider repeats of design than No. III, or any of its predecessors of the table-loom series. The previous looms were, as we have seen, limited as to the size of the design, as regards width, by the great space occupied in the loom by any considerable number of headles. Except for this limitation, which, however, is no insignificant one, draw-loom No. III with its more easily constructed pattern harness, is equally serviceable for weaving small elaborate warp or weft effect patterns in cotton, linen, or silk, however fine in count of warp they may be. It may also be claimed for these earlier looms that their pattern shaft harnesses are not only just as effective for small designs, but are more original and simple in construction than any looms hitherto invented for ornamental weaving, whereas draw-loom No. IV follows exactly in the draw-loom tradition, except for the position of the simple and the arrangement of the pulley-box.

*Design for  
draw-loom  
No. IV  
described*

The design chosen for illustrating the kind of work for which draw-loom No. IV was constructed, is the subject of Plate XXIX, and a sample of the silk brocaded tissue woven from the design is reproduced in colour in Plate XXXI.

Before describing the weaving of the brocade, the



## TYING UP THE SIMPLE FOR A DESIGN

design itself must be briefly considered. It is made on ruled paper squared 12 by 12 to 1 in., which agrees exactly with the size the design will appear when woven in a warp 24 threads to 1 in., two threads being raised for each unit of design as arranged for on the simple.

The design is a comber one, and is on 64 squares of ruled paper in width by 66 squares high. It is Persian in character, insomuch as the charming convention of the rose spray is copied from a portion of an old Persian pile carpet. It well illustrates, in the present arrangement as a silk tissue, the free and graceful nature the designer can give to his work by the use of the comber repeat, in which the design can be doubled and reversed *above*, instead of *by the side of the subject*, as in the point repeat. This arrangement throws the principal feature, *the rose*, into positions which suggest an elongated diamond shape as the geometric basis of the pattern. The freedom and gracefulness of the design result from the comber repeat form, which throws the reversed curved stems of the spray into a vertical wavy line from which the leaves, flowers, and secondary features spring in varied positions.

*Freedom of design due to comber repeat form*

The order of the tie-up of the design of Plate XXIX for the brocaded tissue is almost the same as that for the two-coloured design of Plate XXV, described in Chapter XVI, illustrating a tie-up where two colours are provided for; in fact, they are exactly the same up to and including the seventh line of the rose and star design, after which point the gold star begins, and, consequently, at this point, a second tie-up for the star form must begin to be added

*The tie-up for brocading*

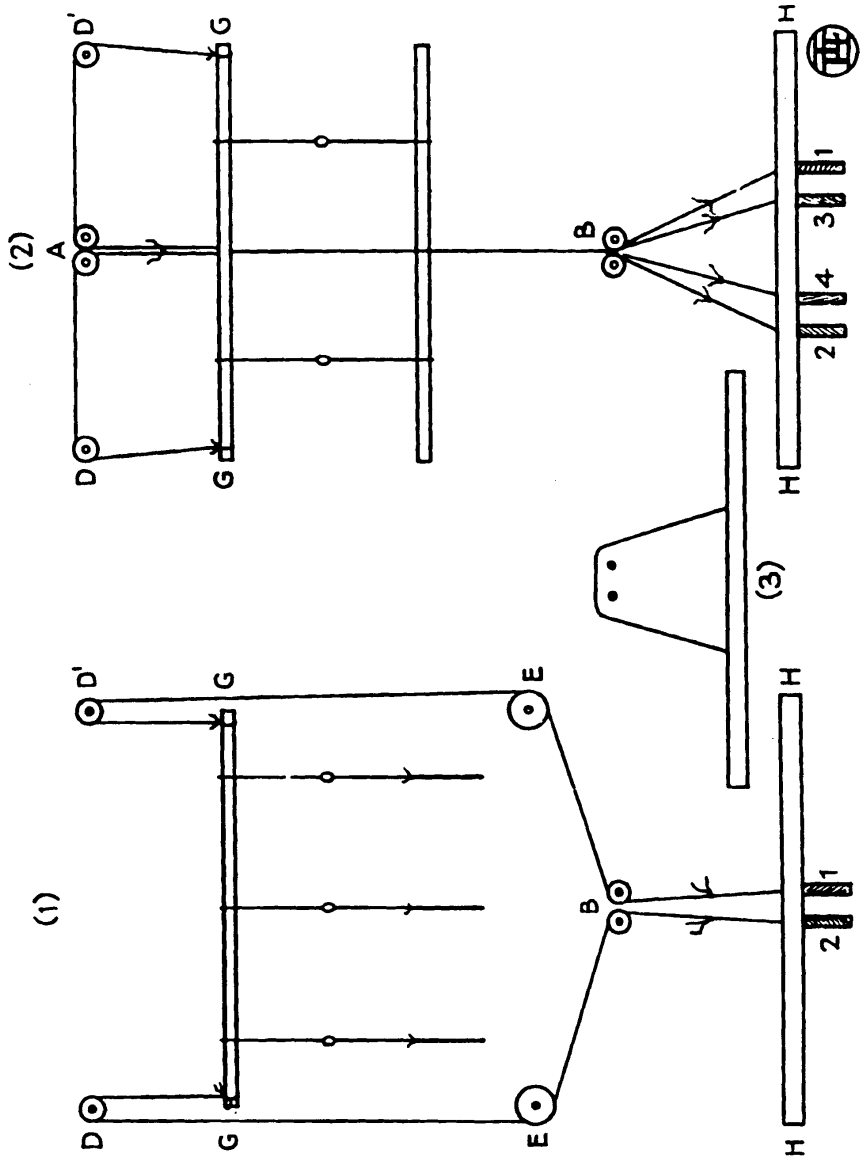


PLATE XXXIII  
 PULLEY MOTIONS FOR THE NEW DRAW-LOOMS

## TYING UP THE SIMPLE FOR A DESIGN

to the tie-up for the green leaves, stems, and small embellishments.

A short digression must be made here in order to explain the method adopted for varying the colouring of certain parts of the pattern of a web, without thickening the material by extra wefting. It is used when the variations consist of small spots and patches of colour standing quite clear of each other, as in the case of the flowers and stars of the design under discussion. This will be at once seen in the reproduction of the coloured tissue in Plate XXXI. This process is called *inlaying* or *brocading*. In the design the figures intended for brocading are indicated by being enclosed in dotted lines for the guidance of the "reader-in" of the simple.

In elaborate commercial weaving, with a Jacquard machine, whether by hand or power, brocading is generally done face downwards in the loom, and the separate brocaded wefts are inserted by means of several small shuttles, or swivels, worked at the back of the material. This is, of course, very difficult work when done by hand, and requires great skill and judgment on the part of the weaver. It is, however, not necessary to discuss it here, as in the new draw-loom the webs are woven face upwards and *the brocading is done from below* by means of needles, as will be explained before the end of this chapter, when the process of weaving the brocade is described in detail.<sup>1</sup>

*Weaving  
webs face  
downward  
in Jacquard  
weaving*

*Brocading  
with needles*

<sup>1</sup> It is interesting to note that the antique figured velvets are often embellished with small brocaded figures in gold thread or strips of gilded parchment, which must have been inserted from below with a needle in the way described: cut velvets must be made face upwards if cut by hand.

## THE NEW DRAW-LOOM

*Reading-in  
the tie-up for  
brocading*

Returning to the consideration of the tying up of the simple, at the point reached before the above necessary digression was made, and line No. 7 had been read-in as follows: "Take 16. Pass 2, take 9. Pass 4, take 1. Pass 1, take 1. Pass 3, take 7. Pass 2, take 9. Pass 2, take 11." The tie for first line of the brocaded star has then to be made in a separate coloured thread in order that the six yellow or gold thread units might be brocaded in their appointed place in the same seventh line. It will be noticed that the designer has surrounded both the star and the rose with a dotted line for the guidance of the *reader-in*, which indicates that *only the portion of ground warp threads within the dotted boundaries* need be lifted as the star and rose have to be *brocaded*. The reading for the brocading tie in line 7 would be: "Pass 42, take 5. Pass 3, take 1. Pass 3, take 5. Pass 9."

After the reader has carefully studied the above paragraph and compared it with the design, he will realize that only the ground between the dotted lines has to be "taken" in the ties of the brocading lines, and that all the other squares, including those of the roses and the stars, have to be passed.

*Reading-in  
for draw-loom  
No. IV*

Another sample pair of ties for reading-in had perhaps better be given before leaving the design and passing on to the explanation of the weaving brocade of Plate XXXI. Line 13 of the design will be a good example, as the tie will include portions of both the rose and the star brocadings. In this line the tie for the running shuttle with the green weft will be a very full one. It is: "Pass 1, take 48.

## TYING UP THE SIMPLE FOR A DESIGN

Pass 3, take 12. Pass 2, take 2," and line 13 of the brocading will be " Pass 3, take 3. Pass 6, take 1. Pass 7, take 1. Pass 6, take 3. Pass 9, take 6. Pass 2, take 7. Pass 2, take 6. Pass 6."

In conclusion, as regards the design and tie-up on the simple, it will be seen that owing to the fact that in the spaces from line 1 to line 6, and from line 34 to 39, inclusive, in which there is no brocaded ornament to be provided for, the whole tie-up is made with only 120 lashes for the brocading instead of 132, as might have been expected.

The entering and preparation of draw-loom No. IV for the tying up of the two warps to the front roller as well as weaving the tabby ground of the material, so as to make a good foundation for the pattern structure; are all to be done in the same manner as described for the weft effect pattern of No. III draw-loom: moreover, they should not be affected by the slight differences made by the alterations in the position, and the difference of construction of the eyeless front harness and the moving of the binder harness from the back of the pattern harness to its front next to the reed. In fact, both these alterations render the entering and working obviously more simple.

Naturally, before beginning to weave the design, the tabby ground must be brought to great perfection, and each headle of the fine silk binder should be brought up and tested, in order to make sure that all its threads rise exactly in their places, *to the right of the double thread of warp in each alternate dent of the reed.* It must also now be decided whether the binders on the coloured wefts are

*Preparation  
for tying up  
and weaving,  
draw-loom  
No. IV*

*Testing the  
various parts  
of the  
monture*

## THE NEW DRAW-LOOM

to be worked tabby or twill. In the example, Plate XXXI, the binder is a tabby one. This being the case, the binder treadles which are placed in pairs to the right and left of the ground treadles, 1 and 3 being on the right, and 2 and 4 on the left, must be coupled together in order to make the treading easy and certain.

*Wefting  
for the  
brocade*

For the wefting, the same white silk as that used for the binder can be wound double for the ground shuttle, and the other running shuttle, as a shuttle that runs right across the warp is called, should be wound treble, in order to well cover the white ground, the same silk dyed green being used. The silks for the brocading figures, the colours of which can be varied to any extent if desired; in the present sample are rose pink, deep orange, gold and silver. Real gold and silver threads were used in the sample, but they are rather difficult to manage, and are liable to tarnish, so that it is generally thought best to use gold and silver coloured silks except for very special works.

*Where small  
shuttles are  
used for  
brocading*

For certain reasons, which it is not necessary to discuss here, rich satin brocades and tissues are woven face downwards in the loom. When they are so woven, the brocading is inserted by means of small shuttles carrying the different wefts, several such shuttles being moved in regular order, as indicated in the design. In the sample of Plate XXXI it will be seen that most of the brocaded lines would require six shuttles in every line. These would be used after each line of green weft was thrown, and as the stuff was being woven face downwards, each tiny shuttle could be moved the little space required, and rest on the back

## TYING UP THE SIMPLE FOR A DESIGN

of the material without getting into disorder. As, however, it was found more convenient and pleasant in the new draw-loom to weave face upwards, a new method of brocading had to be devised for inserting the small spaces of colour from below the warp, and large embroidery needles were found to answer the purpose perfectly and be even less difficult to manipulate than the small brocading shuttles.

The order of weaving the brocade will best be explained by tabulating the several separate movements, assisted by the diagram of wefting, Figs. 1, 2, and 3, Plate XXXI.

At Fig. 1, Plate XXXI, a portion of the brocade is drawn in three shades of grey, representing the three different colours of the finished sample of Plate XXXII. The ornamentation is all in correct proportion, and the separate lines of the units of design are numbered at the right-hand side from No. 1 to No. 10. Between line No. 10 and No. 11 a strong line is ruled across the sketch. It will be seen that the space below the line includes foliage drawn in a dark shade, a portion of a rose in a very light shade, and a part of a star in a middle tint.

In Fig. 2 an elongated drawing of the same parts of the design will be easily recognized when carefully compared with the lower part of Fig. 1 above it. The 30 lines ruled across the diagram represent shoots of *ground weft*, and at *one* end of every such line a numeral is placed. By means of the numerals the course of the shuttle can be traced from No. 1 at the right, where it enters the shed, to No. 30 on the left, where it is ready to start on the final

## THE NEW DRAW-LOOM

shoot of No. 30 in preparation for line No. 31. The inner column of numerals and brackets, Nos. 1 to 10, at the right-hand side, show that *three shoots of weft* of various colours are compressed into the space occupied by each row of the units of design as represented at Fig. 1, lines No. 1 to No. 10, and all the other lines of the design.

*All shuttles and needles must follow in regular order and direction*

1. In preparation for every line of the design, a shoot of white silk must be made in the tabby ground shed, the shuttle alternately entering the shed from right to left, or from left to right, and each shoot must be well pressed down by the reed in order to keep the web solid and square; also all the entries of the green pattern running shuttle and the brocading needles of each line, however many there may be, must follow in *the same direction as the tabby ground shuttle*. This order must be absolutely kept or inextricable confusion will be the result.

*Order of weaving*

The ground shuttle, left resting on the right-hand side of the foundation of woven tabby ground, must be driven across in the shed opened by the right-hand ground treadle, and when the weft has been beaten down, must remain resting on the left-hand side ready for its return.

*Order of weaving brocade*

2. The rod which rests on the handles of the shed opener must be pushed to the right and rest on the hook placed on the side post so as to leave the space in front of the cords clear; the first lash of the simple can then be brought down and selected, the simple cords pulled forward by means of the lash, placed on the rod, as it is gradually pushed towards the hole in the left handle, secured, and there remain quite free from the hook on



## TYING UP THE SIMPLE FOR A DESIGN

which it rested. The lash, freed from the cords, can then be allowed to sink below the handles and remain there.

3. The shed for the green weft can now be made by pulling forward the handles of the shed lifter till they are held in position by the catch or catches. *The first pattern shed*

This being done, the threads of warp *under* which the green pattern weft is to run will be seen lifted on the surface of the web, and the spaces to be covered by the green weft will be unaffected.

4. The binder treadles on the *right*, which must have been tied together, as before mentioned, have to be pressed down, which will raise the first and third headles of the binder harness, and their warp thread, will be seen in all the spaces eventually to be occupied by the green weft.

5. The green shuttle with its weft can be shot from right to left, and be placed at rest on the web above the ground shuttle. *The first colour shoot*

6. The binder treadles can be released, and the catch of the shed lifter pushed up to close the shed.

One-thread of weft in accordance with the design should now appear properly bound at regular intervals right across the material.

7. The ground shuttle with its white weft must next start in the second ground shed from the left, and after being well pressed down, rest on the web as at the beginning, and be followed by the second pattern weft, from left to right. Both running shuttles will now be found in the first position on the web at the right-hand side. *Order for the second shoots of weft*

In weaving the sample, Plate XXXII, it was found that

## THE NEW DRAW-LOOM

in order to make the design work out in right proportion, three shoots of ground weft in alternation with *three shoots of green pattern weft* were required to fill out each row of the design without changing the pattern shed.<sup>1</sup>

On the completion of the first row of pattern units, both shuttles should be found on the left side of the web ready to begin the second row as soon as the second pattern shed is made by the lifter. Thus, in exact order, line after line, the rows of square units of design must be woven until the seventh row is reached in which the brocading of the gold and silver stars has to begin.

*Where the  
brocading  
shoots begin*

It must not be forgotten that, from row 7 to row 33 of the design, two pattern sheds have to be opened for each row of units, one opening for the running shuttle of green silk as before, and the other for the brocading figures which come on the same line. No. 7 is an instance in point. This has been explained previously in the present chapter under the heading "Reading-in the Design," and should now be made quite clear.

The weaving of line No. 7 of the brocade, Plate XXXII, as tabulated, if clearly understood, will be sufficient to explain the technique of the whole work as regards this matter.

The separate movements for weaving the first brocading row of the design are as follows—

*The movements  
for brocading  
tabulated*

1. Open the shed for the ground weft and throw shuttle from the right where it remains after the green weft of

<sup>1</sup> Although the *pattern shed* has not to be *changed* until the three rows of each unit are complete, the shed lifter with the cords remaining on the stick has to be pulled forward and let back in order to open and close the shed for each shoot of weft.

## TYING UP THE SIMPLE FOR A DESIGN

row 6 has been laid and is waiting to be pressed down by the first ground shoot of No. 7 row.

2. Shoot the ground weft and leave the shuttle on the left.

3. Open and fix the shed for the green weft.

4. Open binder shed by its appropriate binder treadles.

5. Throw green weft shuttle.

6. Open and fix brocading and binding shed, the same as No. 4.

7. From below the warp a brocading needle, threaded with gold thread or yellow silk, must be brought up close to the yellow star on the side nearest to the place from which the green running shuttle started.

8. Pass the needle *over* the six spaces to be covered by the yellow weft, but *under the raised binder* threads as well as the single unit of ground in the centre of the six yellow units.

9. Let the needle carefully down to hang below the web and remain there ready to be used in the next line.

10. The other stars in the same line, No. 7, must be brocaded in exactly the same manner, and the binder and brocading shed must, of course, remain open until they are finished. Each brocading figure, needless to say, must have its separate needle and weft, and all must hang clear below for use in the succeeding lines.

11. Close the brocading shed and binder and open the shed for the following shoot of ground weft which will press all neatly together, and begin the round of wefting in the opposite direction. If all the above directions are

*Pressing the  
brocaded line  
base by  
ground weft*

## THE NEW DRAW-LOOM

closely followed, the hanging needles and the running shuttles will be found in exact order and position for the next line of the design. It should, perhaps, be mentioned that the brocading needles must be brought up when required for the next line on *the upper side of the wefts of the two running shuttles*. Unless this be remembered, the weft already laid will simply be drawn out and the star left blank.

In row No. 9 of the pattern the brocading of the rose begins and the star is continued up to row 20, although the rose is continued to row 33.

*Brocading with  
small shuttles*

Should the practised weaver be used to work with the face of the material downwards and prefers to continue to do so, the brocading with small shuttles will be rather easier to do, as the brocading is done by passing the shuttles one after the other forward or backward in the tiny spaces of the brocading shed like a little fleet of boats, as they rest in a line near the edge of the woven portion of the web, whilst the running shuttles are driven swiftly from side to side. In this case, the design would have to be read for the cords of the simple: "Pass the ground and take the figure." By weaving face downwards, however, the difficulty of all the operations is very much increased, and the pleasure of the work is greatly diminished.

**PART IV**  
**SPECIFICATION**

## Chapter XX

### SPECIFICATION NO. I FOR A FULL-SIZED SINGLE-THREAD NEW DRAW-LOOM FOR FINE LINEN DAMASK WEAVING

IT will have been realized by the reader who has carefully studied the previous chapters of this work, that the general principles on which the draw-loom harness is constructed, complicated as they may at first sight appear to be, are actually extremely simple and unsophisticated; in-  
somuch that the whole mechanism, when well constructed, furnishes the handicrafter with a perfectly sympathetic and adaptable tool for the production of more or less elaborate ornamental webs. The student will also probably have gathered that, within certain definite limitations, the diversity of plans and arrangements for variations of repeating patterns possible to the skilful designer are practically inexhaustible.

*Simplicity of  
the draw-loom  
harness*

*An adaptable  
tool*

To weavers and designers well acquainted with the details of Jacquard machine weaving, whether by hand or by steam power, the plans and specifications for the full-sized draw-looms already constructed by the author and now in use, will not be unfamiliar, for the simple reason that, except for the Jacquard machine itself, the harnesses and fittings of *all modern looms for pattern weaving* are built on the same plans as they were many centuries before Jacquard's invention came into use, or steam power was adopted to actuate the loom instead of the foot-power of

*Draw-loom  
harness  
compared with  
that of the  
Jacquard*

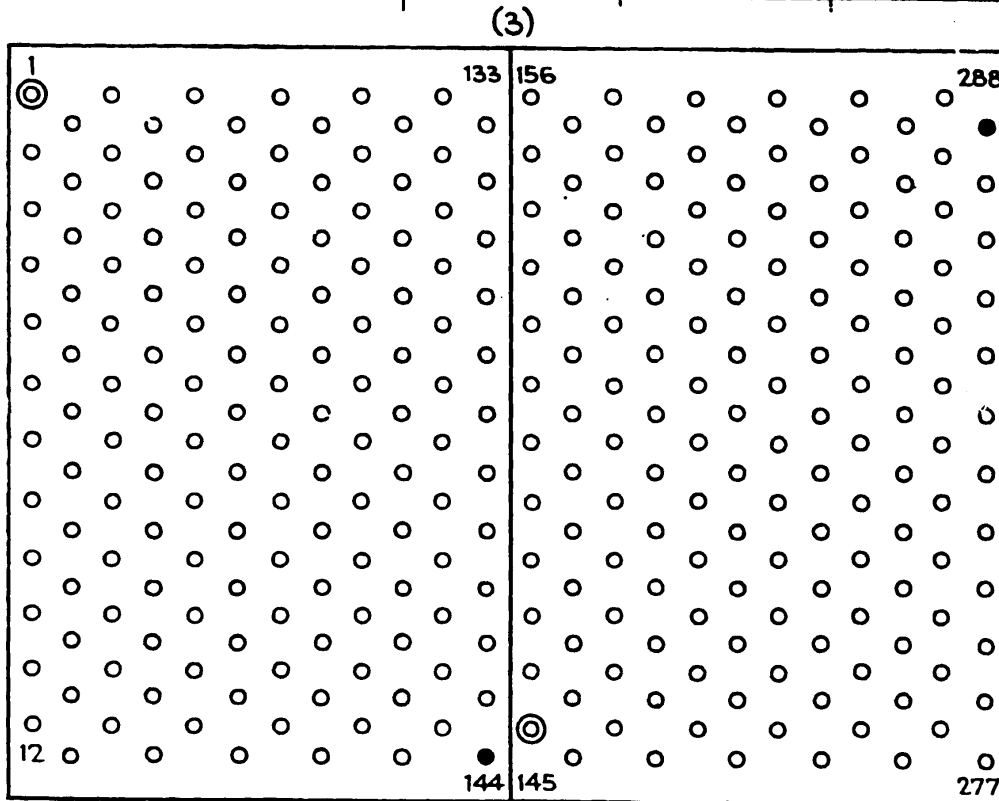
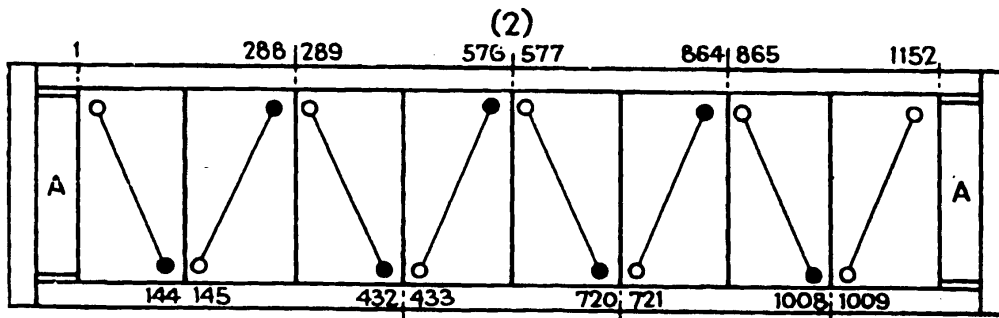
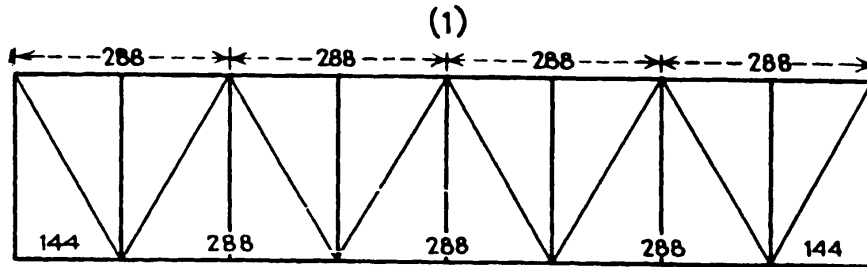


PLATE XXXIV

COMBER BOARD FOR FULL-SIZED NEW DRAW-LOOM, SPECIFICATION No. I



## SPECIFICATION NO. I

the weaver. This was fully explained at length in the author's first book, and only needs to be briefly mentioned here in order to point out that any combination of harnesses or repeating forms of design suitable for Jacquard weaving are appropriate and possible for use in the new draw-loom.

The first full-sized pattern loom to be described, although not the first to be built, is chosen here because of its great similarity to the typical loom which was the subject of Part I of this book. *The first full-sized new draw-loom described*

The loom was made for weaving fine webs of linen 48 threads to 1 in., the reed space being 24 in. There were, therefore, 1,152 threads to be accounted for in the comber board on which the repeats had to be arranged. The pattern in this case, however, was to be a point repeating one, four complete repeats in 24 in.

The comber board frame having to accommodate a set of comber slips, the combined width of which must equal that of the warp, must be about 3 in. wider at each end than the set of slips, in order to allow the necessary spaces required for the pulley cords which connect the treadles with the shafts of the harness to work freely (see Plate IV, Fig. 3). The comber frame has to measure outside from end to end, 30 in. This will at once determine the exact width of the frame of the loom itself, as the comber board has to rest upon the bars *D,D*, fixed between the upright side frames of the loom (see Plate II, Fig. 1). *The comber board frame*

The details and setting out of the comber board are given in Plate XXXII, Figs. 1, 2, and 3. Figs. 1 and 2 are diagrams of the repeats in the comber board, showing the *The design of the comber board*



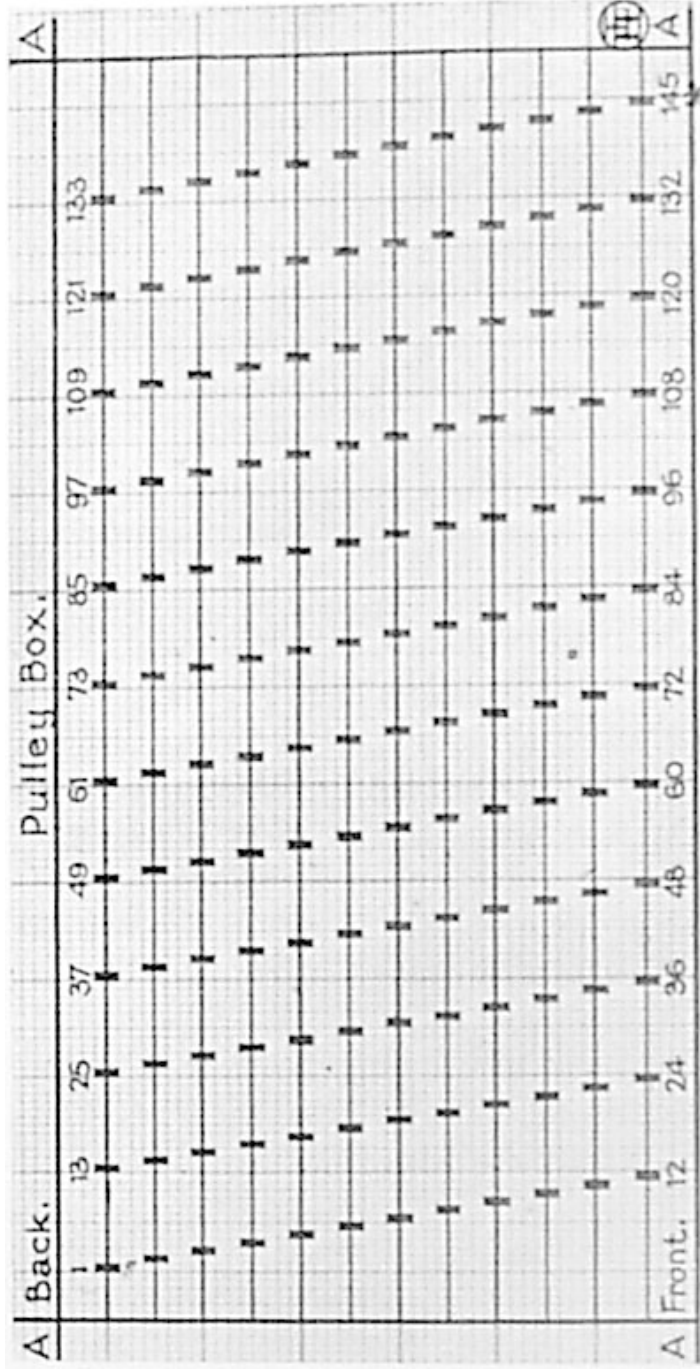


PLATE XXXVa  
 PULLEY ARRANGEMENT FOR SPECIFICATION No. I

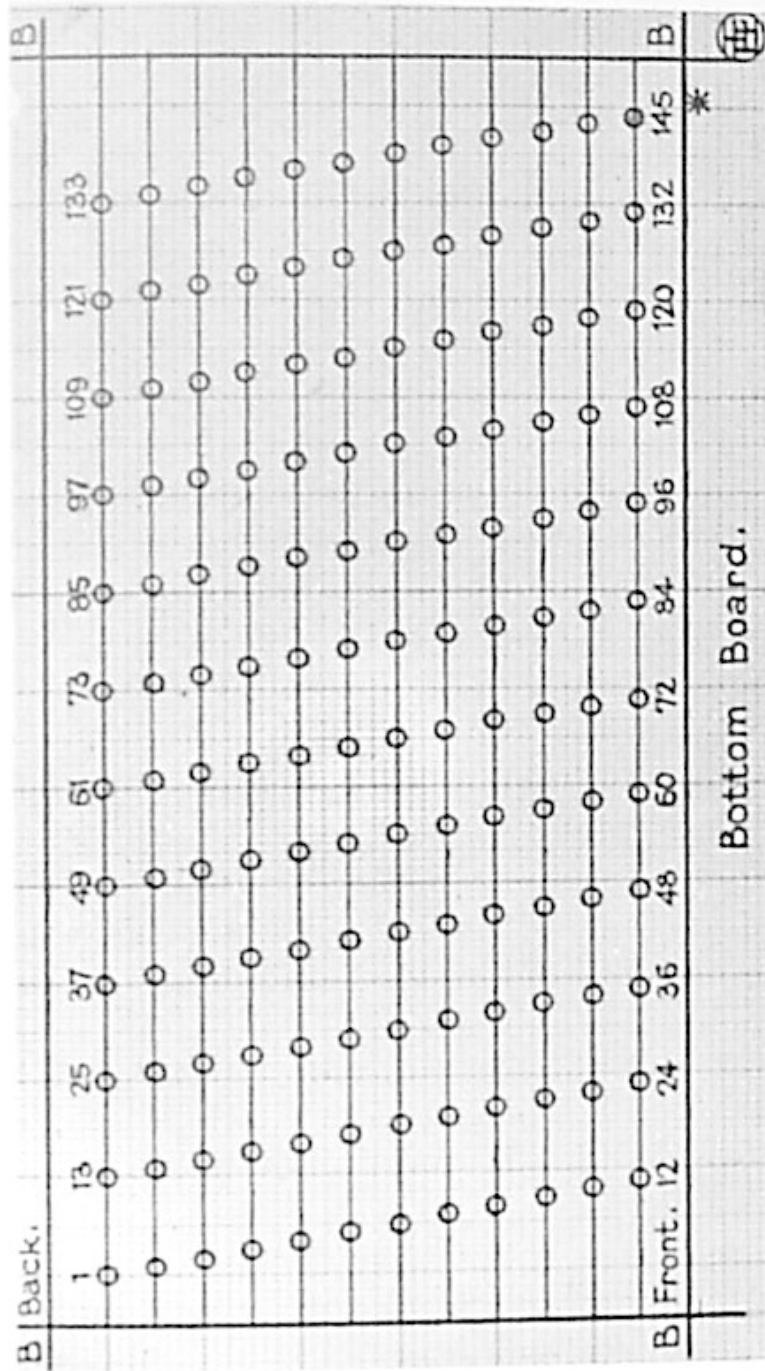


PLATE XXXV<sub>B</sub>  
 BOTTOM BOARD OF PULLEY BOX FOR FULL-SIZED NEW DRAW-LOOM, SPECIFICATION No. I

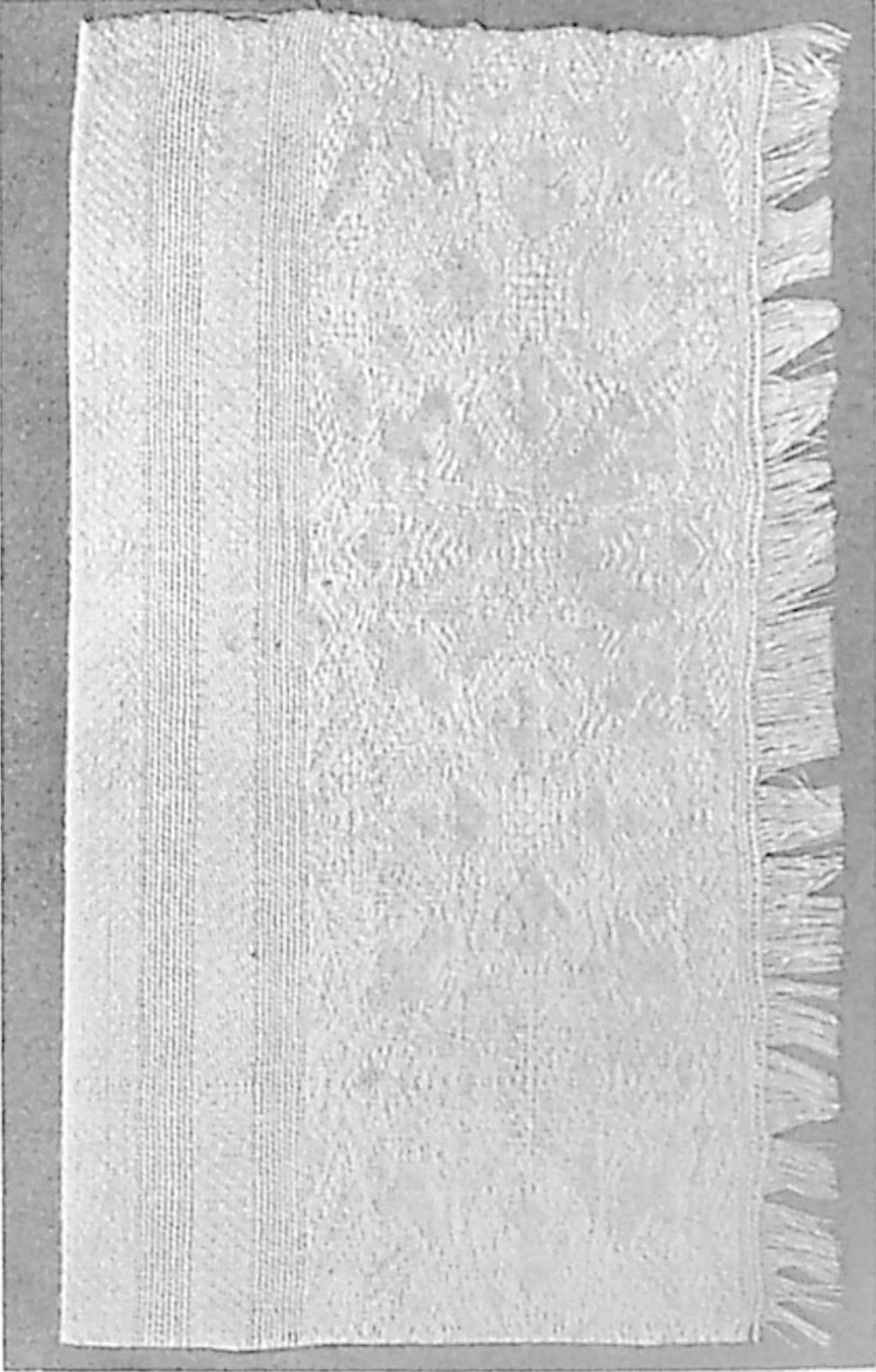


PLATE XXXVI  
LINEN DAMASK WOVEN ON FULL-SIZED NEW DRAW-LOOM, SPECIFICATION No. 1

## SPECIFICATION NO. I

arrangement of the holes for every thread of warp; beginning with No. 1 hole at the first point at the back, and finishing with hole No. 1,152 at the last point, also at the back, whilst all the other points have two threads side by side, the same as in the diagram of the comber board, Fig. 2, Plate IV. This is generally a disadvantage to the pattern, when the material is woven, because the unit of design at each point, except the first and last, consists of two threads instead of one, as in all the other units. This difficulty is obviated by leaving an empty hole and missing thread 144 at the end of each half repeat, and beginning the next half repeat at the beginning of the next row, thread 145. Fig. 3, Plate XXXIV, will help to explain this somewhat difficult point. In this illustration, which represents the end of the comber board under consideration, each comber slip is pierced with 144 holes, No. 1 hole being at the back and hole 144 at the front. Hole No. 1 is filled in in black, which indicates that it is to be left empty, and the thread which would have been No. 144 becomes 145, the first thread of the second half of the whole repeat.

By the above arrangement seven threads of the warp of 1,152 would remain over when the entering was complete, and as there is no way of unwinding surplus thread before the warp is woven out, the best plan to avoid that inconvenience is to lay the warp 1,145 threads instead of 1,152. *Entering arrangements*

As pointed out in Chapter III, the order of entering the warp for a point repeating design is changed at each point; accordingly, No. 1 thread at the back left-hand side

## THE NEW DRAW-LOOM

*Point repeat  
entering*

of the comber board is entered first and is followed forward to the front to No. 12; the next begins again at the back, Nos. 13 to 24 at the front, and so on until hole No. 143 towards the front next to the empty hole at the end of the half repeat from which thread No. 144 is missed. The entering for the second half repeat begins with thread No. 145 and proceeds from front to back, row after row, until the empty hole, No. 288, at the end of the whole repeat is reached, and the second repeat begins with thread 289 at the back. Thus, the entering of the warp changes at every point until the last repeat of all is reached, where the last thread of the warp is entered, to be coupled with the first threads of all the other full repeats, as shown in the diagram, Fig. 2, Plate XXXIV, where the order of entering the whole warp is shown by the zigzag line and numerals.

*The bottom  
of the  
pulley box*

As the comber board is perforated for a pattern harness of 12 shafts, and as every thread of the warp is to have its separate cord on the simple, it is necessary to pierce the bottom board of the pulley box with 12 rows of holes for the necking cords which connect every single thread of warp to each separate pulley cord. It was found necessary also to have 12 rows of 12 pulleys each in the pulley box, so that all the parts of the monture, the healds with their couplings, the comber board with its 4 point repeats, the pulley box with its pulleys and cords, and the simple with its 144 cords, should all be in exact agreement. This can all be traced out clearly on the diagrams, Figs. 1, 2, and 3, Plate XXXIV, and the diagrams *AA* and *BB* of

## SPECIFICATION NO. I

Plates XXXVA and XXXVB, which clearly illustrate the pulley box arrangement. *Arranging the pulleys in their box*

The healds and couplings, in the eyes of which are entered the 1,152 threads of fine linen warp, hung by means of their bannister knots on 12 shafts immediately under the rows of holes in the comber board. This not only keeps the eyes of the couplings at a perfect level, but allows of them being worked by treadles, with which they connected separately from the pattern harness above, so that plain tabby or twills of various kinds can be woven alternately with spaces of point repeating designs. Plate XXXVB shows the capacity of this fine loom in this respect.

## Chapter XXI

### SPECIFICATION NO. II

*Description  
by the owner  
of the loom*

A VERY useful draw-loom as well as one on which a great variety of beautiful silken fabrics could be woven, as shown by the reproductions in colour on Plates XXXVII and XXXVIII, was designed by the author for one of his most efficient pupils, and will, no doubt, be studied with interest, especially as the weaver for whom it was designed has written an excellent description of its construction and mounting; a great proportion of the work was done by herself and was described by her in a journal which she kept of her textile studies, called *Weaving Notes*, during the years 1925-29. The author has her permission to quote from the journal as follows—

*Height of  
draw-loom*

The height of the loom is about 7 ft. 6 in. The ceiling should be not less than 1 ft. higher. Width, 27 in., not counting the batten, which can be taken off without moving the reed. This goes through an average doorway. Length, 4 ft. 3 in. This could not be much more without making it impossible to move the loom intact. Weight: can be moved by two people.

*Width*

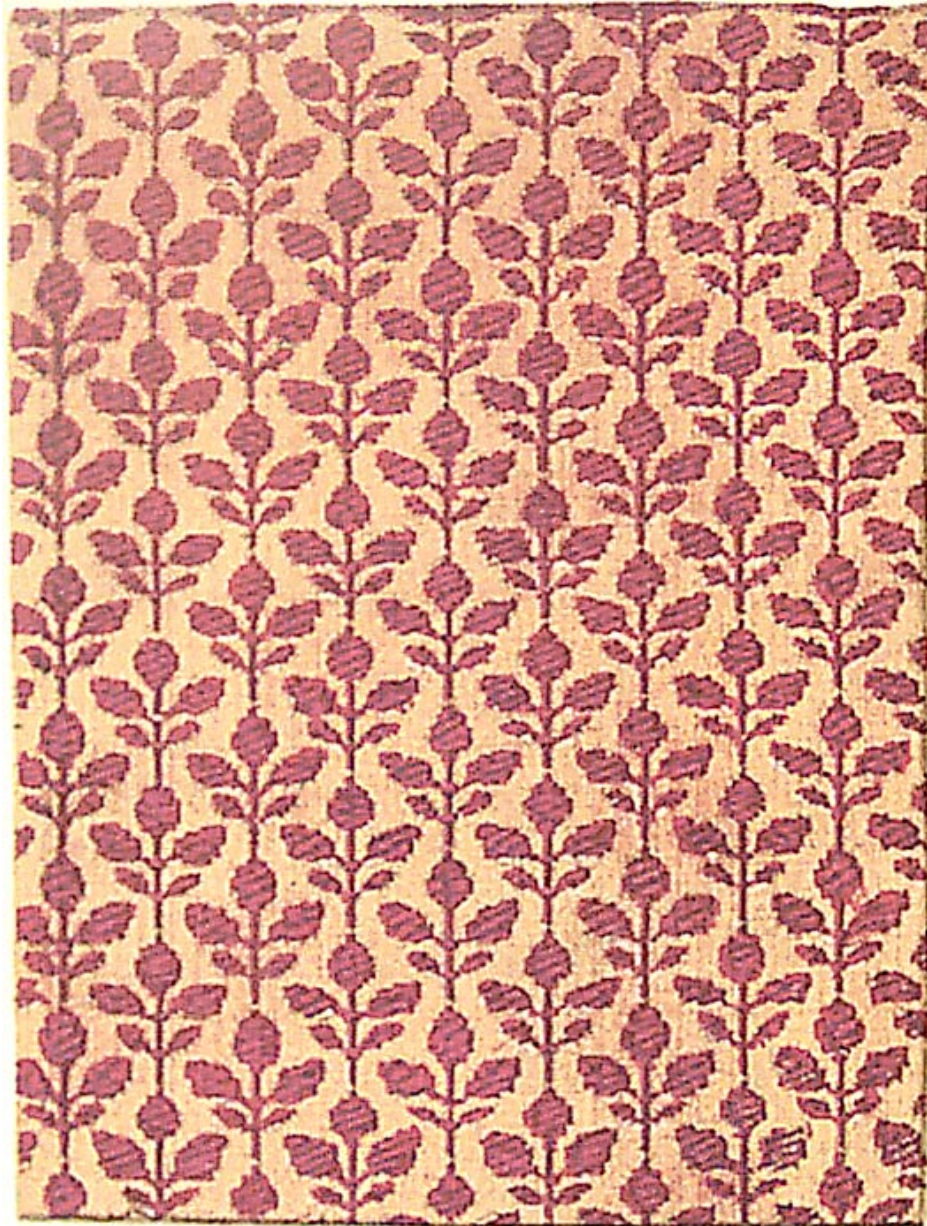
*Portability  
The wood*

The loom was made of unstained oak varying from  $\frac{3}{4}$  to  $1\frac{1}{2}$  in. in thickness. Designed as a table-loom, the whole upper framework lifting off the table without disturbing anything except the treadle cords, which have to be disconnected. It was made immovable for weaving by holes in the upper framework fitting like cups on to pegs projecting from the top of the table. If the upper framework is too unwieldy for awkward stairs, the pulley box, comber board, and the rest of the monture may be detached with the warp upon them, and packed with the front

*Detaching  
loom from  
table*

*Made fast  
to table*

PLATE XXXVII.



Silk Tissue woven on her Draw-loom.  
Specification 2 by Alice Hindson.

A. H.





Silk Brocades woven on her Draw-loom by Alice Hindson.

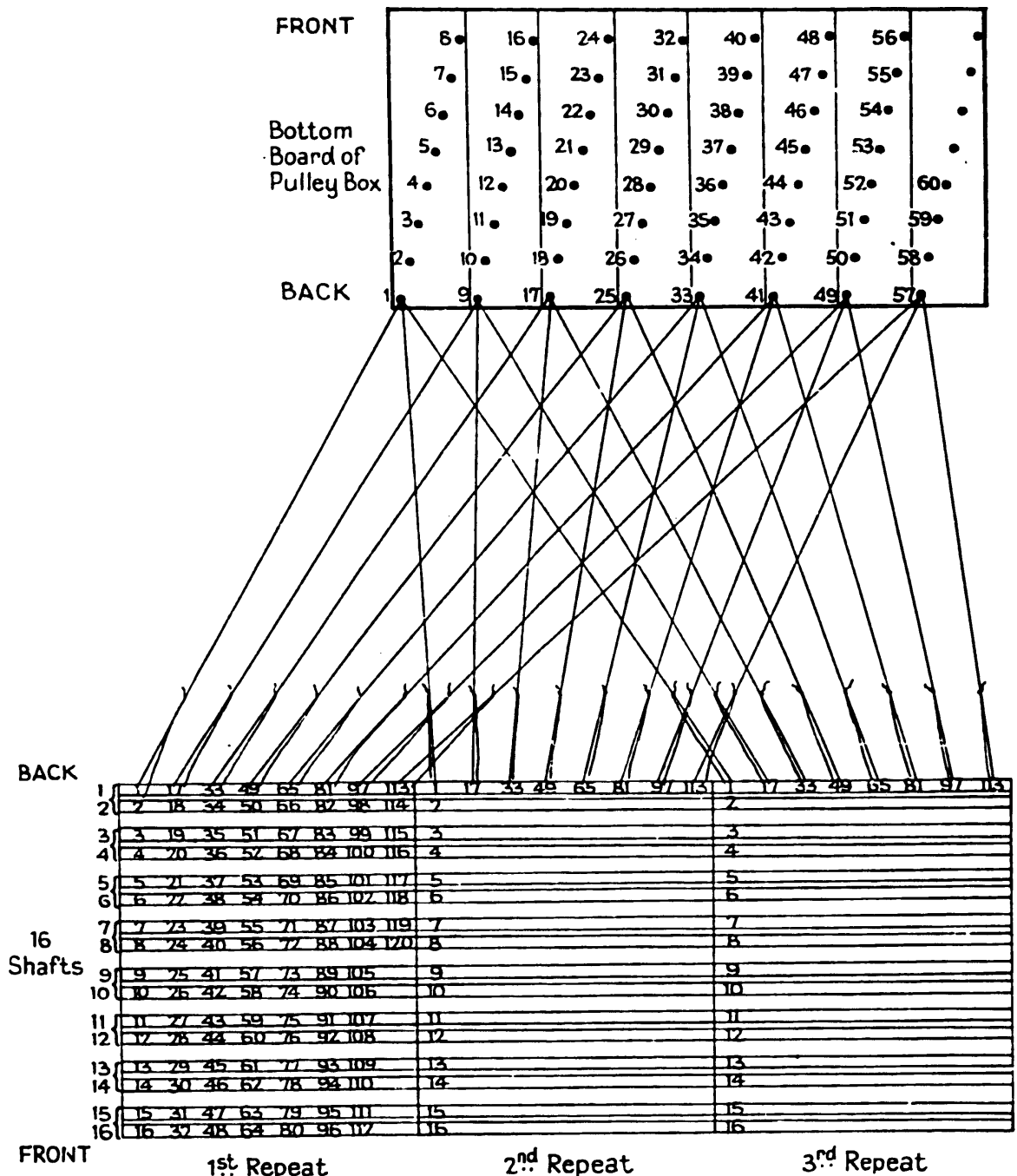


PLATE XXXIX  
 NECKING CORDS BETWEEN PULLEY BOX AND SHAFTS IN FULL-SIZED LOOM, SPECIFICATION No. II

## THE NEW DRAW-LOOM

*How to be  
packed for  
moving*

and back rollers in a box, still without disturbing the entering. If necessary, the framework supporting the pulley box and batten can be detached by undoing a few screws.

*Capacity  
of loom*

1. To weave stuff 22 in. wide with  $\frac{1}{4}$  in. extra for selvages.
2. Warp 60 threads to 1 in.
3. Repeats *comber* each 2 in. in width, therefore containing 120 threads.
4. Reed 30 dents to the inch.
5. Sixteen shafts, making a ground of tabby, twill or satin.
6. Four binder shafts.
7. Two selvage shafts.
8. Swinging batten.

*Tension  
of warps*

Tension of warps—

1. Ground and pattern warp. Front roller controlled by ratchet on right side of loom. Back roller by lever and string tied to framework at front on left side.
2. Binder warp. Front roller same as above. Back roller by cord and weighted lever.
3. Selvage warps. Each selvage bobbin has a weight and counter weight so related to the tension of the warp and to each other, that they remain as nearly as possible in the same position, balancing in air.

*The shedding  
motion*

Shedding motion, rising—

1. The ground raised by depressing the treadles which are connected with the shafts by cords going over wooden pulleys. Pulleys instead of top-castle levers and marches economize space and simplify the tie-up.

*The pattern  
shed*

2. The pattern shed made by the simple cords being slipped over the harp rod, and the harp rod being drawn forward by the headles until the catches fall into position and hold the shed open.

*The binders*

3. The binders raised at the same time as the pattern, as the cords controlling the binder shafts lie parallel to the simple cords.

## SPECIFICATION NO. II

4. The selvages raised automatically with the ground and also with the binders. They have only one entering but a double tie-up; one to the ground treadle cords, and one to the binder shaft cords.

Binder harness on four headle shafts for binder warp 30 threads to the inch, making tabby, twill or broken twill. When the binder is weaving tabby the tissue threads float across four of the ground threads before it is bound down. When the binder is weaving twill the tissue thread floats across eight of the ground threads before it is bound down.

*The binder shafts and healds*

*The floating of the binder threads*

The cords which raise the headle shafts go over four pulleys on either side of the loom, then join together through four guide eyes, which direct them over pulleys at the back right-hand side of the pulley box, then over four pulleys at the right side of the pulley box at the front and down on the right side of the harp, to be secured to the bottom rod like the simple cords. If the pattern is tied up from left to right, the ties of the binder for it could be varied with very little trouble.

The diagram of the monture by Alice Hindson will show the design of it quite clearly, and will be perfectly understood by the reader who has studied the examples given in earlier chapters, and so her own description need not be quoted, but the description of her building is too interesting to omit.

*Building the monture*

Spent eighteen days building the monture. The time was spent as follows—

*Time spent on building monture*

1st day: Counting and slinging lingo on shafts.

2nd day: Entering each lingo through one hole in the comber board and threading it on to string (or a rod) to keep it in place.

3rd day: Ditto.

## THE NEW DRAW-LOOM

4th day: Temporarily tying up shafts and cutting necking cords, 330 pieces, as the 660 threads are lifted in couples.

5th day: Readjusting everything. Exact position of comber board decided, and comber board screwed in place (up till now it had been tied firmly in position with string); discussing method of attachment of lingoies to necking and necking to simples.

6th day: Finished 1st row and did half 2nd row. Six pieces of necking are taken and snitched through a loop altogether exactly half-way: as that gives twelve ends and there are only eleven repeats, one end has to be cut off, and its fellow tied as securely as possible by a snitch. The simple cord is then threaded through No. 1 hole in the bottom board of the pulley box and secured temporarily at the back of the loom. This leaves eleven ends of necking dangling from hole No. 1. Each end is taken in turn (taking care that there is no crossing) and roughly measured to turn back on itself and make a loop about  $1\frac{1}{2}$  in. off the comber board above the couple of lingoies which are nipped through the snitch made by this loop.

Therefore, as explained before—

All 1st and 2nd threads of each comber repeat go up through hole No. 1 of the bottom board of the pulley box and are all snitched together to simple No. 1, and threads 17 and 18 of each comber repeat go in hole No. 9, and threads 33 and 34 into hole 17, and so on. A couple of thin but strong steel rods are threaded through the eyes of the lingoies hanging from the two shafts which are being dealt with at the same time, and secured as accurately as possible on either side of the loom after being trued with a spirit level. (I only tied my rods down to the bottom framework of the loom with cord, which meant that it was almost impossible to get the tension equal. Also, I only regulated the level of the sixteen shafts by tying them down to the framework. This was not altogether satisfactory, and later we contrived to have them resting on a shaft of wood

## SPECIFICATION NO. II

bound to either side of the loom, so that they were all of the same level and immovable—which was what was needed.)

7th day: Finished second row.

Discussed binder: decided on eight headle binder 60 to the inch instead of 4, with a sparser count of warp as previously planned. With eight headles and a rich count like this, the binder warp could also be woven in alternate rows with the pattern warp to make sarcenet of 120 to the inch. Question, whether this very rich binder warp might not be wasteful of silk, and the weaving more trouble than it was worth.

8th day: 3rd and 4th rows.

9th day: 5th and 6th rows. Decided against the eight headle binder and in favour of original four headle.

10th day: 7th and 8th rows.

The rest of the eighteen days were spent by the builder in altering and adjusting the various parts, tying up shafts, threading simple cords, hanging binder headles, and the thousand and one things about the complicated mechanism of a silk-weaving draw-loom which have to be attended to, and to making and entering warps for the pattern and binder. *Finishing the monture*

The setting out of the comber board and the bottom board of the pulley box, as well as the pulleys in the box above it and the number of cords in the simple, will all be gathered from the diagram of Plate XXXIX. The board is pierced for 11 repeats of pattern, three of which are shown in the diagram, connected by lines which represent the necking cords, to the holes in the bottom board of the box. It will be noticed that eight holes in rows 9 to 16 remain empty at the end of each repeat. This, however, does not affect the continuity of the warp entering, as *The design of the comber board*

## THE NEW DRAW-LOOM

thread No. 121, the first in the second repeat, will be found on the first shaft and be entered in the reed by the side of thread No. 120, which is the last of the first repeat.

*Examples of  
weaving on  
the loom*

The two specimens of silken fabrics reproduced in Plates XXXVII and XXXVIII will show the fine artistic quality of the work produced on this draw-loom.

## Chapter XXII

### SPECIFICATION NO. III

THE Specification No. III was made for the building of the draw-loom represented in the frontispiece of this book. The plate is reproduced from a drawing made by Alice Hindson. This loom has some special features which render it different from any of the new draw-looms previously constructed from the author's designs.

One of the essential requirements in the order given for the loom was that provision should be made for the material woven on it to have a cross-border at the beginning which could be repeated at certain intervals in the web, and that borders to match it, about  $1\frac{1}{2}$  in. wide, should be arranged for, so as to be continued up the sides of the *all-over* repeating comber design of the fabric between them. The borders were also required to be the complementary halves of a point repeating design, while the centre comber design was to be in four repeats. The pattern warp was to raise two threads to form the design in large. The whole pattern warp of silk was to be 48 threads to the inch, and was to be 24 in. wide. It would, therefore, consist of 1,152 threads in all. This, of course, decided the width of the comber board and the number of holes with which it had to be pierced. The sketch for the comber board, pierced with its 1,152 holes, is shown at Fig. 1 at the bottom of Plate XL.

*Requirements of the customer's order for the loom*

*The count of the silk warp to be used*

*The diagram of the comber board*

The frame of the board is 30 in. long from end to end,



## THE NEW DRAW-LOOM

and rests as usual on the cross-pieces *DD* of the upright side frames of the loom.

*The comber slips*

The set of comber slips occupy 24 in. of the frame, and are pierced with 12 rows of holes, counting from the back to the front, each complete row containing 96 holes. The total number of holes in the board is, therefore, 1,152, in accordance with the requirements of the warp, and on this number the rather complicated plan of the monture had to be worked out.

*Dividing the comber board into portions for borders and filling*

In portioning out the holes, the first consideration had to be given to the side borders, which were each to be  $1\frac{1}{2}$  in. in width. The count of the warp being 48 threads to the inch, it of course required 72 holes, occupying six rows of 12 holes each, at the right- and left-hand ends of the board to accommodate the 144 threads of both the borders. This disposal of 144 holes left 1,008 holes to be divided off into four comber repeats.

*The space for the four comber repeats*

The number, 1,008, divided by 4 affords 252 holes for each repeat which fills out, including the holes for the borders, the whole space of the comber board, as shown at Fig. 1, Plate XL. These several points in the setting of the comber board are all indicated by the numerals at the beginning and end of the short lines which represent the rows of holes from the back to the front of the comber board.

*Entering of the two borders*

It will have been noticed, if the numbering of the holes has been closely observed, that at the back of the board beginning with No. 1 hole at the left, all the numerals are odd numbers, except those of the last six holes at the end,

### SPECIFICATION NO. III

which are all even ones; this is not a mistake, for it is necessary because the requirement regarding the borders was that their repeat should be a *point* one which requires, as before explained, the entering of the warp to change at every *point* in order to reverse the second half of the design.

When, therefore, the fourth repeat of the comber design ends at the 1,080th thread, the 1,081st thread, an odd number, is entered next to it at the front, and the rest of the entering proceeds from front to back line by line, and finishes on the 1,152nd thread at the back.

The bottom board of the pulley box is drawn at the top of Plate XL, Fig. 2. It will be seen that it has only half the number of holes for the left-hand border and one repeat of the centre design when compared with the comber board; 36 holes are allotted for the border and 126 holes for the centre comber design, as the warp threads had to be arranged to rise in twos to form one unit of the design in large.

*The pulley box, its holes and pulleys*

It must be added that the number of pulleys in the box is 162, and that they are arranged on six steel rods to agree with the perforations of the bottom board of the box.

The arrangement made for drawing up the necking cords of both borders at the same time as the cords of the centre repeating design has next to be described. It is shown in the same diagram, Plate XL, between Figs. 1 and 2, where the diagonal lines diverging from one row of holes in the bottom board of the pulley box are

*Necking cords for borders*

*Distribution of necking cords*

Comber Board with Borders.

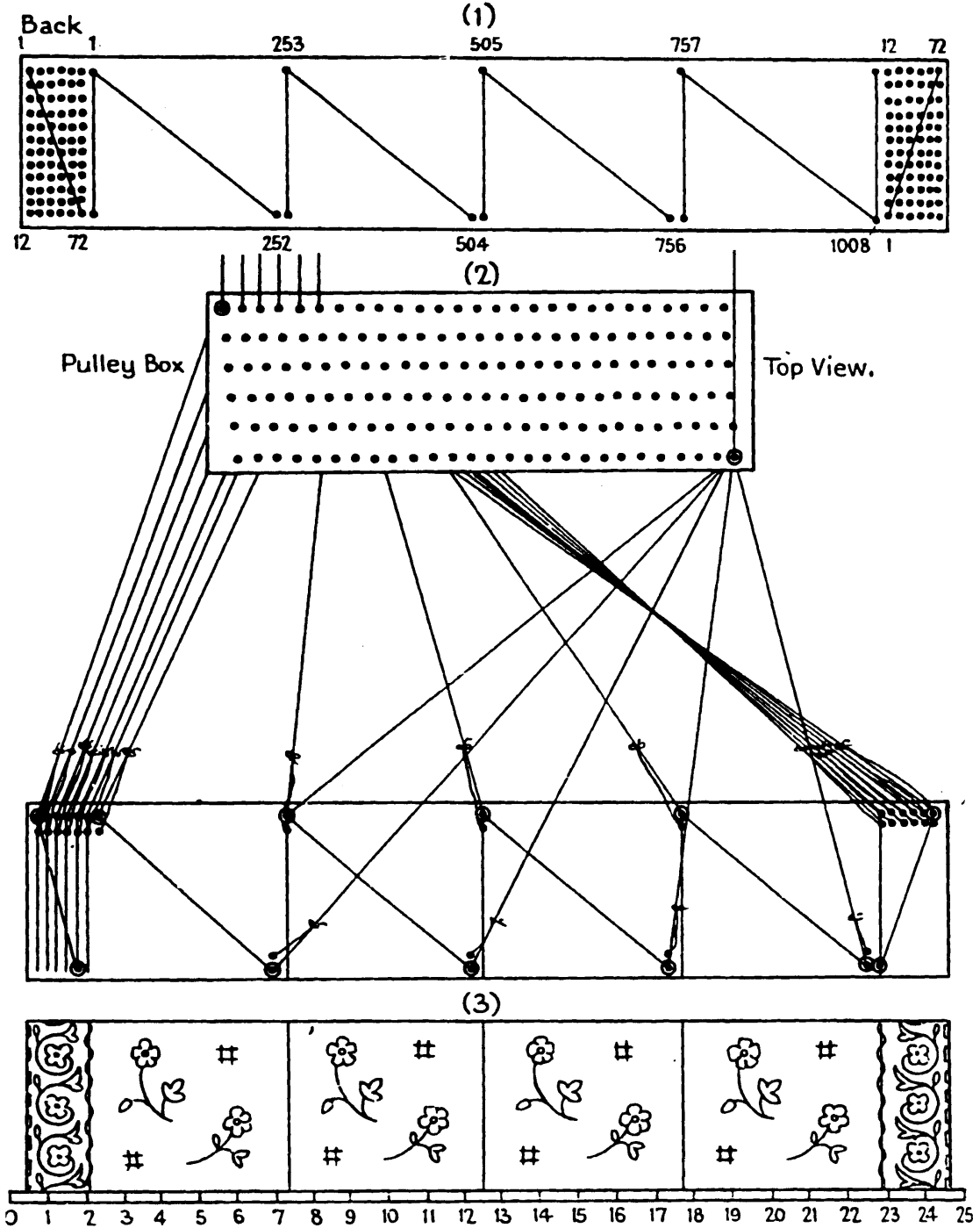


PLATE XL

FULL-SIZED NEW DRAW-LOOM, SPECIFICATION NO. III, SHOWING ARRANGEMENT FOR WEAVING SIDE BORDERS



### SPECIFICATION NO. III

distributed between the two corresponding back rows of holes in the comber board as before explained.

It will also be noticed as regards the borders that No. 1 hole in the bottom board of the pulley box is not only coupled with holes Nos. 1 and 2 at the left-hand end of the comber board, but that by means of the second necking cord, which is joined to the first cord of the pulley box, the 1st and the 152nd hole, as well as the 1st and the 151st, on the right side of the comber board, will be actuated by the same pulley box cord No. 1. *Control of both borders from one side*

It will be readily understood that if the necking cords going into the holes 3 and 4, 5 and 6, 7 and 8, 9 and 10, and 11 and 12 of the comber board are thus coupled to the several cords of the first row of six holes in the bottom board, and the necking cords of the last corresponding row of holes in the comber board, Nos. 1,152 and 1,151, 1,150 and 1,149, 1,148 and 1,147, 1,146 and 1,145, 1,144 and 1,143, 1,142 and 1,141, are all coupled to the first row of six holes in the bottom board of the pulley box, and the six rows of necking and pulley cords of the two boarders are all coupled together, the couplings of both being actuated exactly in the same way except for their being reversed.

The central portion of the monture, consisting of four comber repeats of 126 pattern units, or 252 single threads occupying that number of holes in the comber board, will be readily understood from the diagram, as will also the filling up of the whole board in the order already described; but the important matter of connecting the shafts of

## THE NEW DRAW-LOOM

the pattern harness, as well as fitting up and connecting those of the binder harness to the treadles, must be carefully and clearly explained.

The best arrangement for the treadles is for the odd numbered treadles of the tabby and binder to be placed on the right side of the pattern treadle, and for the even numbered ones to be on the left.

The tying up is as follows: The pattern shafts Nos. 1, 3, 5, 7, 9, and 11 are connected by their cords and pulleys to treadle No. 1 on the right of the central pattern treadle; while shafts Nos. 2, 4, 6, 8, 10, and 12 are tied to treadle No. 2 on the left of it. The binder harness, carrying a warp of single threads 48 to 1 in. on four shafts, is tied thus: Shaft No. 1 to treadle No. 1 at the extreme right, shaft No. 2 to treadle No. 2 at the extreme left, shaft No. 3 next to the ground treadle No. 1 on the right, and shaft No. 4 next to treadle No. 2 of the ground harness on the left.

There are, of course, many other ways of tying up the shafts of both the pattern and the binder harnesses to the treadles in order to produce other effects of ground or binders, but they must be left for the weaver to adapt to his own requirements as he becomes more and more familiar with the capacity of his loom.

## Chapter XXIII

### SILK DAMASK PATTERN WEAVING

**I**N figured damask material, unless the pattern is so small *The design in silk damasks* as to be woven on a thread monture, the design is produced on a warp of fine strong pure linen or silk, crossed by weft of a similar material, carried by a single shuttle. Damask is the most perfect of all pattern weaving, because the design is woven in the very texture of the web simultaneously with the satin ground itself, no extra binders being required. For a full description of satin damask weaving, its technique and effect, the reader should consult *Hand-loom Weaving*, pages 210 to 217; also the same work should be referred to for an explanation of satin weaving, pages 179 to 185. It must, however, be explained here, that a damask web design depends, for its definition, on the possibility that this method of weaving affords for producing definite, separate spaces of warp or weft satin at will on each surface of the web. In *warp satin* *The technique of damask weaving* the threads of the warp predominate in the proportion of 7 threads of warp to 1 of weft, and in *weft satin* the proportion is reversed, being 7 threads of weft to 1 of warp. Plate XLI, Fig. 1, letters *A* and *B*, represents a portion of the front and back of a figured satin web. At letter *A* the figure, a cross, is formed by flushing threads of *warp* tied down by occasional binders of weft, while the background is woven in flushed loops of *weft* tied down by tiny intersections of warp as at letter *B*.

## THE NEW DRAW-LOOM

*Silk damask:  
effect of  
pattern*

It makes little difference which surface of a silk damask is considered to be the front, as both are equally rich in effect and have the same general appearance and clearness of pattern. It is usual, however, to weave damasks face downwards in the loom and for the background of the design to be in warp satin. The example of Fig. 1, Plate XLI, at letter *B*, is the front of the material, and letter *A* the back.

*How large  
damask  
designs are  
arranged for*

Damasks of very small designs can be woven on a thread monture, each single thread being a unit of design, but if several threads are raised to form each unit, it is necessary to make use of a double harness, one to form the design in large and the other to weave in the satin ties.

*Healds of the  
binding  
harness  
described*

The harness by which the binding ties are produced (*the headles of which have very long eyes*) is placed in front of the pattern harness, and plays the most important part in the technique of damask weaving. It is so placed in the loom that the warp, which passes singly through its long eyes, does not rest on the bottom of the eye, but hangs free a little below the middle of it when the harness is not in action. Its action when in use is similar to that required for what is called *a rising and sinking shed*. The eyes of the healds are  $2\frac{1}{2}$  in. to 3 in. long, and the headles, 8 in number, are connected by a pulley motion to 8 treadles, according to a particular plan which causes each headle to rise or sink as required; and, moreover, *two separate headles if connected according to the plan, with any one treadle, can be caused, one to rise and the other to*

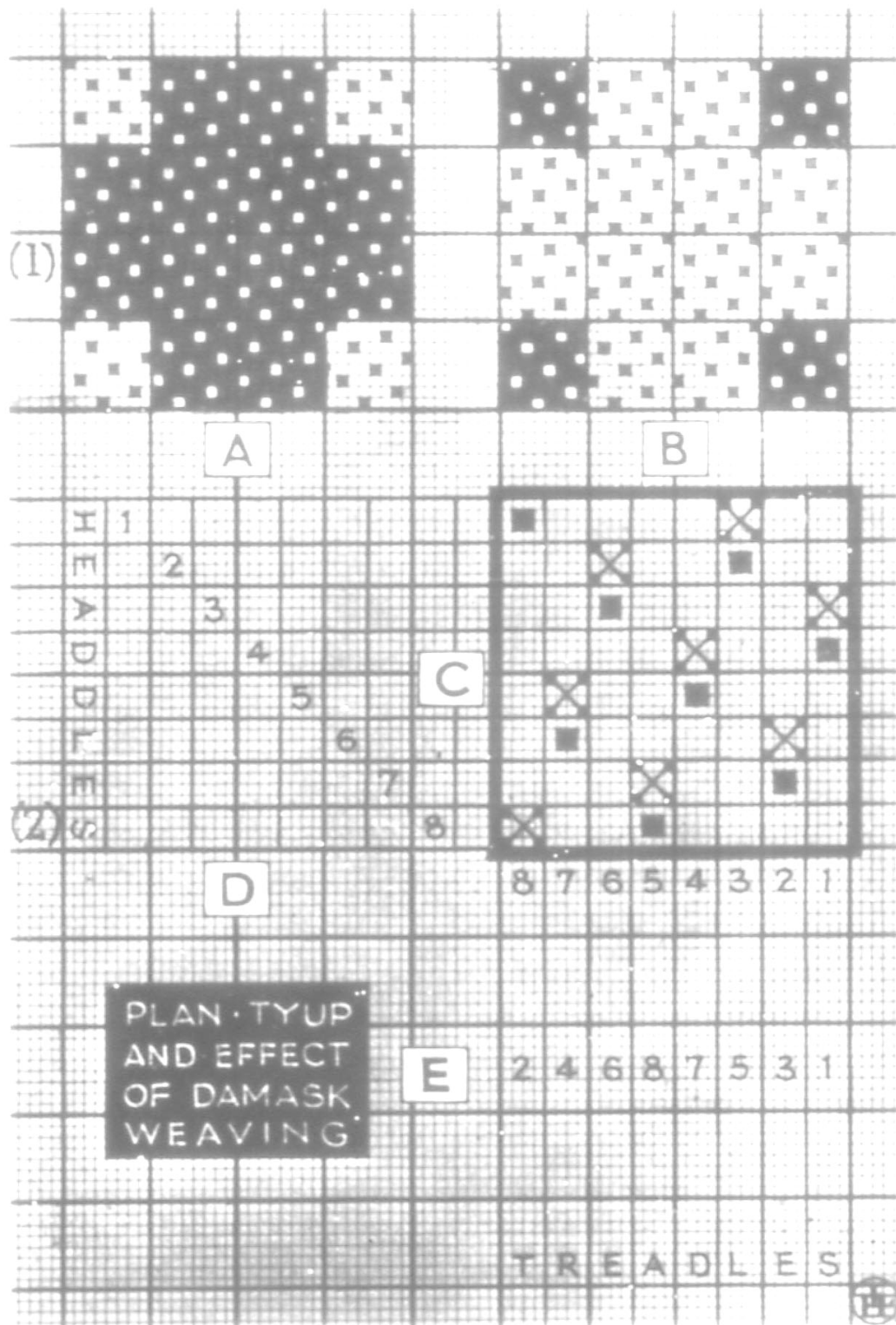


PLATE XLI  
EIGHT-LEAF SATIN DAMASK HARNESS, SPECIFICATION No. IV



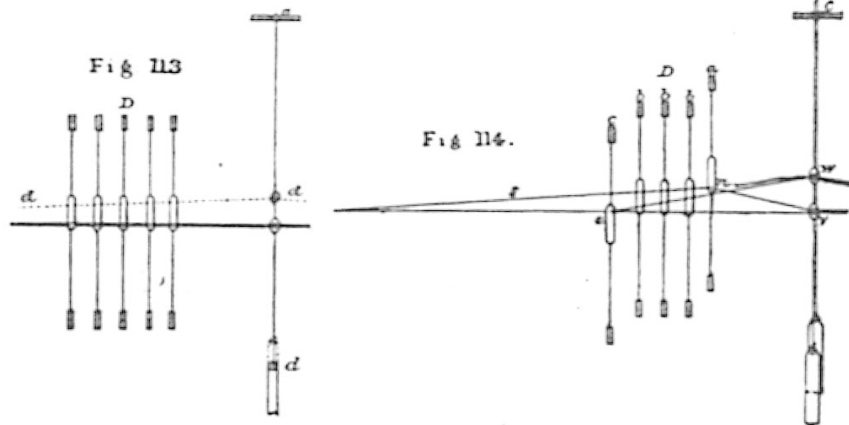
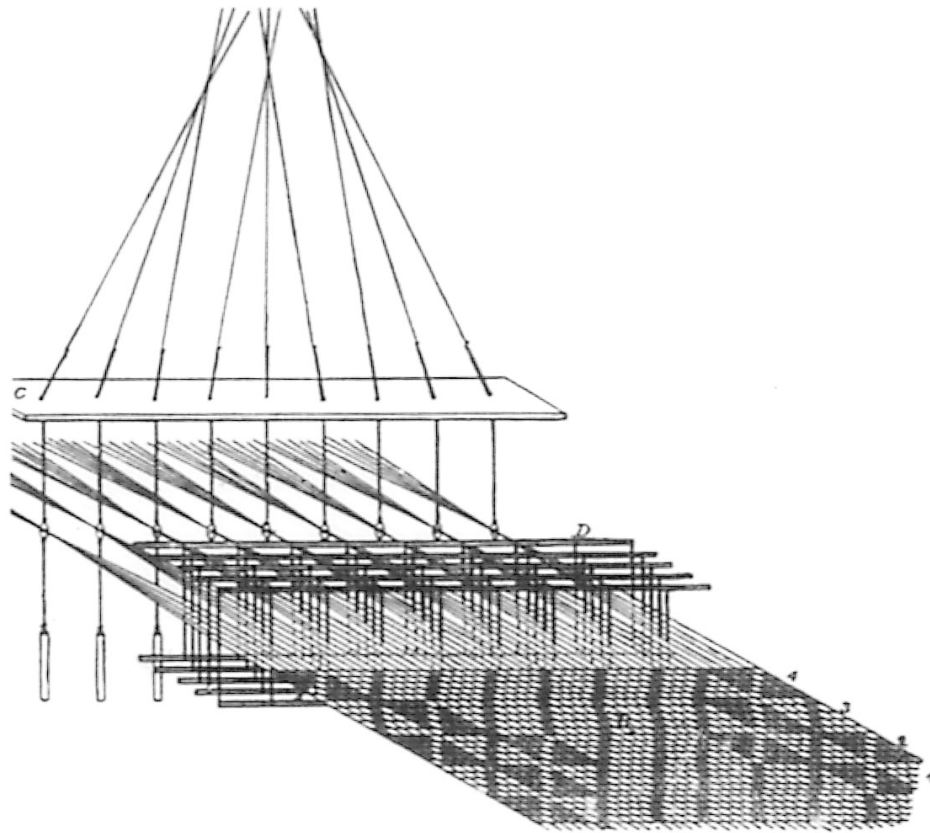


PLATE XLII  
 HEADLE SATIN HARNESS AND MONTURE FOR DAMASK WEAVING  
*(From an old print)*

## SILK DAMASK PATTERN WEAVING

*sink at the same time.* Plate XLI, Fig. 2 *D*, gives the plan of entering and the tie up of a harness of 8 headles. The crosses in the entering plan *C* indicate the tie to the treadles for raising a headle, and the squares the tie for holding another headle down. The numerals below the plan show the *order* in which the treadles are to be used, but not necessarily their *positions* or order of treading: these are arranged by the weaver to suit his own convenience. Probably he would arrange them as indicated by the numerals below the line at letter *E*; No. 2 taking the place of No. 8, No. 3 the place of No. 2, No. 4 that of No. 7, and so on, but this re-arrangement would not, of course, alter the *order in which the headles themselves would rise and sink.* The entering of the warp is shown at the left-hand side of the tie-up, letter *D*, and is that of the plain straightforward 8-headle twill.

*The plan and tie-up of the headles*

We must now turn to a description of the pattern harness, which, although entered with a far richer warp than any of the shaft harnesses already described, is much simpler in construction. Instead of each thread of warp having a coupling and lingo to itself, the couplings of the damask pattern harness are so constructed as to carry several threads each. Instead of having eyes of thread, or mails with one hole, the damask mail is perforated with several holes, in this case 8. One of these mails, therefore, at the centre of the coupling which is weighted with one heavy lingo, will lift 8 threads at a time.

*Construction of the pattern harness*

Plate XLII is a very beautiful and accurate diagram of the construction and action of a silk damask monture,

## THE NEW DRAW-LOOM

which was used by the author of a book on weaving, published a little later in the nineteenth century than Murphy's valuable book, from which we have already quoted. The lettering and numbering of the original drawings are retained in the reproduction, as will be readily understood by the reader.

*Diagram of  
5-headle  
satin monture*

Figs. 113 and 114 at the lower portion of the page are perspective views of the two harnesses of the monture. No. 113 shows a side view of the harnesses at rest, and 114 shows them in action. Fig. 113 gives the long-eyed healds mounted on 5 shafts only, as the loom is arranged for weaving 5-headle satin: but that detail does not matter as satins may be woven on almost any number of headles up to 16, and the principle illustrated in the diagram is the same in them all. The 5 headles are mounted in front of 2 lingo couplings of a pattern harness, through the eyes of each of which 5 threads of warp pass to the front of the loom, the 5 threads being entered *singly* in *regular succession* through the long eyes of each headle. The 2 couplings, with their mails and lingo, hang from two adjacent holes in the comber board, letter C; it may be No. 1 and No. 2 or any other odd and even numbers, and when the loom is at perfect rest, the diagram (without the dotted lines *d d* and the dots which represent the raised second coupling) might stand for either 1 coupling and 5 healds entered with 5 warp threads, or for the *whole row of couplings and the whole harness of healds with their long eyes*. With, however, a second coupling raised, as shown by the dotted lines, it is clear that the diagram

## SILK DAMASK PATTERN WEAVING

represents at least 2 couplings and 10 healds of binders. In Fig. 113, 5 threads of warp have been raised and have moved to the top of the long eyes without affecting the headles in the least, or disturbing the 5 threads of coupling No. 1, which still rest at the bottom of the long eyes.

In Fig. 114, letter *D*, the double action of the damask *Action of the pattern monture* is clearly shown. The mail of one coupling marked *W* has been raised, carrying with it 5 threads, but one of its threads has been held down by the headle *C*, at letter *e*, which has been *tied to the same treadle that has raised headle a*. The mail of the other coupling with its 5 threads has been held down by the weight of its lingzo, but one of its threads has been raised by the first headle, letter *a*, as shown by the single thread *SV*, which rests at letter *n*, on the lower knot of the long eye of the headle *a*. It will be seen that the headles *b b b*, which remain stationary, have no effect on the shed formed at *S*.

It must be remembered that in Fig. 114 the headles *a b b b c* represent two sets of 5 threads, and that the holding down of a thread at *e* takes place in one set of 5 threads raised by the mail *W*, and the lifted thread at *n* is from the set of 5 threads held down by the mail at *V*.

Before leaving the two diagrams of Figs. 113 and 114, it is perhaps necessary to call attention to the reason why only two shafts with leashes and mails are indicated in the pattern harness. The reason is that two couplings and mails are all that are necessary for the purpose of clear explanation, seeing that all the mails of a damask pattern

## THE NEW DRAW-LOOM

harness are alike, and that however many there are in the full harness, they only take two positions, viz. one portion of them is lifted to form the warp of the ground satin, and all the others are left down to allow the making of weft satin and form the design: also that the set of threads, whatever the number entered in each mail, has a complete set of healds to itself.

*How the  
pattern is  
defined*

So far, weaving the design "in large" is provided for by the ground harness. In the spaces of ground, on the face of the stuff, the raised warp will flush over the weft and, being a rich warp, as silk damask warps always are, it will hide the tiny ties of weft entirely. In the design spaces, on the contrary, the weft will cover up all the warp except the single threads raised for ties. The different shapes of the *design* and *ground* will cross threads and interlace *at their edges*, but if nothing else were done there would be no ties or binders either to ground or pattern. It is the office therefore of the important long-eyed heald harness described above to put in these ties, and so knit the whole fabric together, both on front and back faces, into a lustrous satin damask.

*Wefting a  
damask web*

In weaving fine silk damask, several shoots of weft are often required to make up the square units of design. While these several shoots are being made *the pattern shed must remain open*, but the front harness must be *changed by the treadles at every shoot*, as shown at letter C, Fig. 2, Plate XLI, in order to bind the fabric together into a perfect satin web.

## Chapter XXIV

### SPECIFICATION NO. IV FOR A SILK DAMASK WEAVING DRAW-LOOM

**S**PECIFICATION No. IV is for a loom to weave figured damask material of fine organzine silk which is, as will have been gathered from the description of its technique given in the last chapter, perfectly different, both in the method of its weaving and the nature and finished effect of its texture, from any of the webs hitherto described in this book.

*The silk damask loom different from all others*

The chief difficulty which has to be overcome by the silk damask weaver consists in handling the extremely fine and delicate thread of the fibre obtained from the cocoon of the silk-producing moth. When prepared for the weaver it is much finer than the finest human hair. The original fibre in its natural state is so minute in section that thirty or more continuous filaments have to be doubled and spun, or *thrown*<sup>1</sup> together, by carefully organized twisting, to form each single thread of the several thousands contained in the warp of the lustrous, sumptuous web.

*Special care required for handling silk*

*Silk throwing*

The monture for damask weaving is much less complicated than either of the full-sized looms, Nos. 2 or 3, last specified, as it only requires 1 warp. The pattern harness, too, has no shafts or bannister knots, and although

<sup>1</sup> *Throwing* is the name given to the process of doubling and twisting the raw silk fibre into usable yarn.

## THE NEW DRAW-LOOM

*Simplicity of  
damask  
monture*

there are a much greater number of threads to the inch in the warp, there are only a comparatively few couplings and lingoes in the comber board, whatever the size of the design.

As described in the last chapter, the chief peculiarities of the damask monture consist (1) in the many-chambered mails of the couplings by which 8 threads of warp are lifted together for each unit of design, and (2) the importance of the binder harness, in the healds of which every minute thread of the rich silk warp is entered separately.

*Simplicity of  
framework*

The framework of the loom requires to be as simple and open as possible, and so arranged that the weaver shall have no difficulty in getting to any part of the monture or to the rich and delicate warp as it slowly passes through the loom, from the warp roller at the back, to the cloth beam at the front. This being borne in mind, the simple framework of the old Spitalfields weaver's loom was adopted for this draw-loom, which makes no claim to beauty, but is strong, square, and convenient for the difficult work.

*Dimensions of  
damask loom*

The frame of the loom from front to back is 7 ft., and the width between the posts 2 ft. 6 in.; this is sufficiently wide for weaving a 24-in. or even 25-in. material without a fly shuttle.

The height of the frame without the *top-castle* is 6 ft., and the bottom board of the pulley box, which rests on the topcastle, must be at least 2 ft. above the *capes* or top sides of the loom frame, so that the whole structure, including the pulley box, is at least 9 ft. high altogether.

## THE NEW DRAW-LOOM

The rollers between the posts are 2 ft. 6 in. by 6 in. *The rollers*  
in diameter. They are reduced to 4 in. at the bearings  
of the post through which at one end they project about  
 $\frac{1}{4}$  in., and at the other end about 3 in. These projections  
are cut square in order to fit the square holes in the  
movable handles.

The comber board is designed for a comber repeating *The comber  
board*  
pattern of 5 repeats in 24 in., and has 120 holes for each  
repeat = 600 holes in all. Plate XLIII, Fig. 1, shows  
the comber board with its perforations as above, and over  
it (Fig. 2) the bottom board of the pulley box is also  
shown as far as its first row of 20 holes. The necking *The necking  
cords*  
cords from the first hole in the bottom board will be seen  
diverging from the hole to the 1st, the 2nd, 3rd, 4th and  
5th repeats of the comber board. Also the line *A* repre-  
sents a necking cord connecting the last hole in the repeat  
No. 120 with the last hole of the 6th row of the pulley box,  
which is out of sight but, of course, will agree with the  
comber board, the hole being No. 120.

The baton, with its block, reed holder and shuttle race, *The baton*  
is a swinging one: it hangs from the top of the loom frame,  
resting on the capes of the loom.

The monture is built for a fine organzine silk damask *The monture  
and the warp*  
warp of 200 threads to the inch, and in 24 in. numbers  
4,800 threads. As before stated, these fine threads have to  
be raised in sets of 8 by couplings having glass mails with *The mails*  
8 separate divisions, one hole for each thread. See Plate  
XLIII, Fig. 3.

The satin harness with long eyes has 4,800 healds



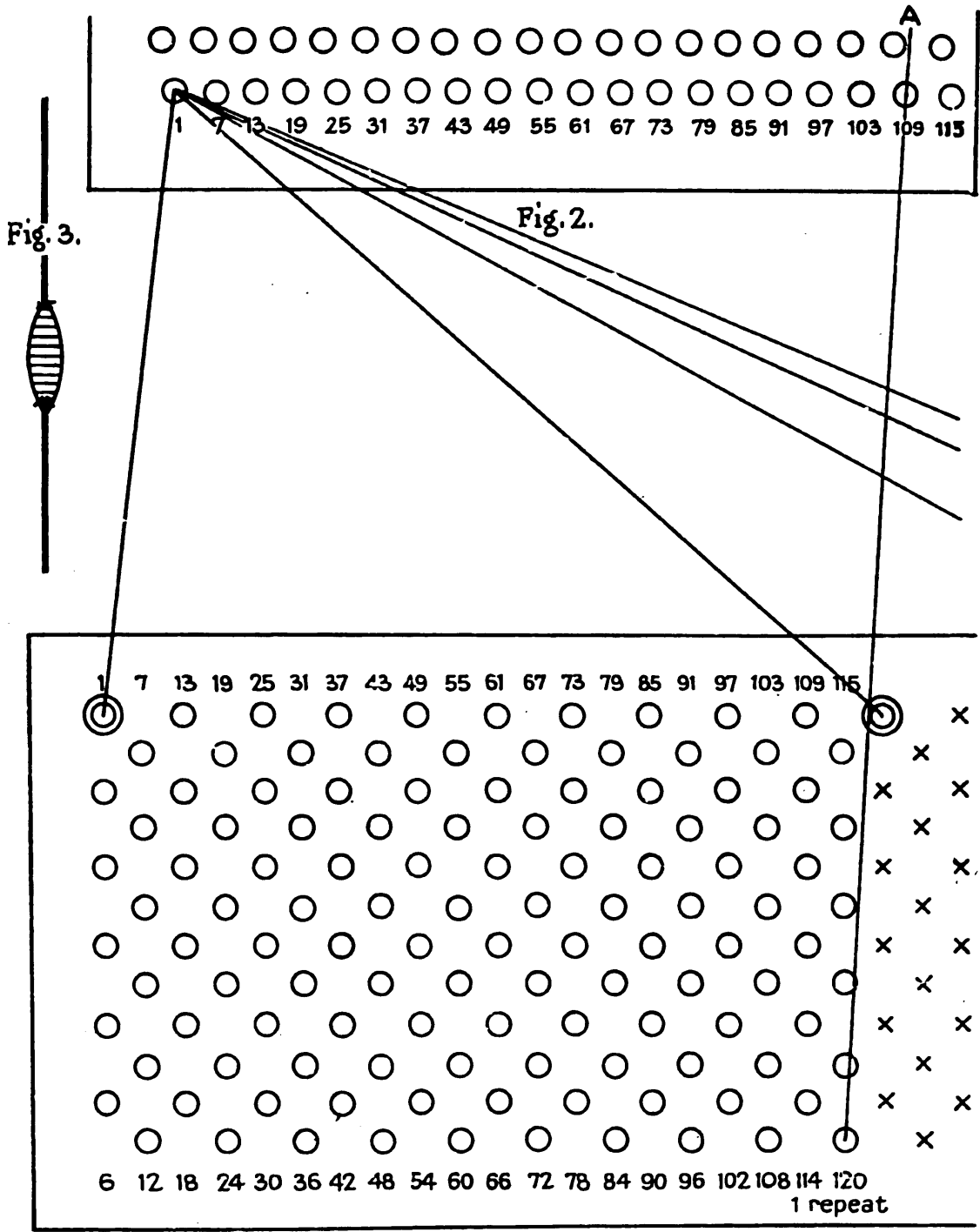


Fig. 1.



PLATE XLIII

COMBER BOARD, NECKING CORD, AND BOTTOM BOARD OF PULLEY BOX FOR DAMASK HARNESS,  
SPECIFICATION No. IV

## THE NEW DRAW-LOOM

arranged on eight pairs of shafts to accommodate each single thread of warp. *The long-eyed harness*

The simple of the loom consists of 120 cords, the shed-lifting arrangement being precisely the same as that of Specification No. 3. It has a centre treadle for opening the pattern shed, and the treadles for the satin harness, 8 in number, are placed four on each side of it, as shown in the plan and tie-up in Plate XLI, Fig. 2, letter *E*. *The shed-lifter*  
*The treadles*

Tension must be given to the warp by means of a friction brake or weight-box. It consists of a wooden box about 4 or 6 in. wide, by 8 in. deep, and long enough to hang easily between the sides of the loom frame, below the back roller, to which it is suspended by two thick ropes in the following manner. The ropes must be very thick, not less than  $\frac{3}{4}$  in. in diameter, and be very solid and smooth. They are attached to the box by a knot made at one end of each rope after it has been passed through a hole in the end of the box. The ropes are cut long enough to reach, when the top of the box hangs halfway from the roller to the ground, three turns round the roller and about 6 in. from the ground on the opposite side of the roller from the box. To this long end a thin cord is tied, having a small weight attached to it. When the loom is ready for working, the box is loaded with heavy iron or lead weights, and hangs balanced by the warp and the small weight hanging on the opposite side of the roller quite near the ground. A full description of the working of the friction brake is given in *Hand-loom Weaving*, page 91. *Tension of warp in damask weaving of special importance*

## *Conclusion*

WE have now reached the point when this book must come to an end, although the author feels confident that a still further advance in the development of the draw-loom is possible and can and will be made. If such be the case it must be done without destroying the essential simplicity of the construction and characteristics of the traditional pattern loom, or making less interesting and skilful, though perhaps more speedy and profitable, the work of the hand-loom weaver as an artist and craftsman.

As regards the series of small shaft draw-loom, Nos. I, II and III, as described in Part III of this book, for weaving designs of small dimensions, such as may be woven on any number of shafts up to 30, a contrivance for drawing the cords of the simple in a rather more speedy manner is in course of construction, and it is hoped that the invention will soon be perfected. This will allow of any number of designs being prepared and preserved so as to be easily changed at will; but for larger patterns, for which a comber board with many perforations and a simple of many cords have to be used, such as draw-loom No. IV, in Part III, and the full-sized draw-loom specified in Part IV, the extension of the new appliance can only be hoped for, but will no doubt be eventually devised by another inventor if not by the author.

## Glossary<sup>1</sup>

- Batten*, the frame of a reed.  
*Beam*, a roller.  
*Beaming*, winding on a warp.  
*Beaming drum*, the essential part of beaming machine.  
*Beaming posts*, supports for a beam.  
*Binder*, the tie for floating weft.  
*Binder harness*, headles for lifting binders.  
*Bobbin*, a reel.  
*Bobbin-carrier*, a reel-holder for warping.  
*Bobbin frame*, part of a warping mill.  
*Box batten*, batten with fly-shuttle boxes.  
*Breast roll*, front beam of a loom.  
*Brocade*, a brocaded web; originally silk wefted with gold or silver thread.  
*Brocading*, weaving detached ornaments in a web.  
*Brocatelle*, tissue with satin ties in figure.  
*Broché*, web to imitate brocading.  
*Cane*, a new warp.  
*Cane roll or roller*, the back roller of a loom.  
*Cane sticks*, sticks for fastening the warp in the beam.  
*Carding*, preparing fibre for spinning.  
*Cards or cardings*, fibres prepared for spinning.  
*Cloth beam*, the breast roller.  
*Comber-board*, a board perforated to hold the leashes of a monture.  
*Comber repeat*, repetition of a design which does not turn over.  
*Comber slip*, a portion of the perforated part of the comber-board.  
*Compound harness*, two or more harnesses working together.  
*Compound monture*, monture with two or more sets of leashes.  
*Cords*, the simple on which the pattern is tied up in a draw-loom.  
*Counter-march*, a short lower lever in a loom.  
*Couper*, the top levers of a loom.  
*Cross*, the crossing threads of a warp.  
*Cross, porrey*, the cross retained while weaving.  
*Cross, portee*, the cross used for spreading the warp for beaming.  
*Cross sticks*, smooth rods for preserving the cross.

<sup>1</sup> This glossary does not pretend to comprise all the technical terms used in weaving. These are of infinite variety, and often have totally different meanings in districts separated but a very short distance one from another.

## THE NEW DRAW-LOOM

- Damask*, a system of weaving said to be introduced from Damascus.
- Dent*, one space in a reed.
- Design*, a pattern; one inch square of ruled paper.
- Diaper*, a system of weaving small patterns.
- Distaff*, appliance used in spinning.
- Doubling*, winding two or more threads together.
- Draught*, drawing on ruled paper.
- Drawboy*, a boy employed to draw the cords of a simple.
- Drawboy's fork*, implement for drawing the cords in a draw-loom.
- Drawboy machine*, machine for drawboy's work.
- Entering*, threading warp in leashes or reed.
- Entering hook*, thin hook for entering warp.
- Eye*, centre loop of a leash.
- Fancy web*, see *Tissue*.
- Figured velvet*, cut velvet with pattern.
- Figure harness*, the monture or pattern headles.
- Float*, a loop of weft passing over two or more threads.
- Fly-shuttle*, a shuttle driven by a picking stick.
- Friction brake*, appliance for regulating weight.
- Gatherer*, a part of the heck-block.
- Gating*, adjusting a loom.
- Ground*, the plain part of a web.
- Ground harness*, headles which form the ground of a web.
- Guiding cords*, supports for the pattern loops on the simple.
- Half-reef knot*, a single knot: see Fig. VII, Plate VI.
- Hand-shuttle*, a shuttle for throwing by hand.
- Hand-stick*, a short stick on which warps are wound.
- Harness*, a collection of headles.
- Headle* or *heddle*, a number of leashes on a shaft.
- Headle frame*, a frame for knitting headles upon.
- Headle gauge*, a tool for making leashes.
- Inlaying*, see *Brocading*.
- Jack-in-the-box*, invention which reduces the number of treadles required in a loom.
- Jacquard machine*, a machine perfected by M. Jacquard to supersede the drawboy in pattern-weaving.
- Lam*, see *Headle*.
- Leaf*, see *Headle*.
- Lease*, see *Cross*.
- Leashes*, loops of a headle.
- Lingo*, the weight of a leash.
- Long march*, the long levers below a loom.

## GLOSSARY

- Loom*, any arrangement for supporting a warp and keeping it in order for weaving.
- Mail*, the glass or metal eye of a leash.
- Monture*, the mounting of a loom for pattern-weaving.
- Necking cords*, cords joining pulley cords and leashes in a monture.
- Pecker*, part of the drawboy machine.
- Pickers*, tweezers.
- Picking-stick*, the handle of the fly-shuttle motion.
- Pile*, the cut portion of a velvet.
- Plan and tie-up*, a sketch showing entry of harness and tie-up of treadles.
- Plug*, a tube on which weft is wound for the fly-shuttle.
- Point repeat*, a design repeating in opposite directions.
- Pole*, the pile warp of velvet.
- Porrey*, the warp between headles and cross-rods.
- Portec*, a collection of threads warped together for convenience of spreading on beam.
- Pulley*, a grooved wheel.
- Pulley box*, the upper part of a draw-loom superseded by the Jacquard machine.
- Pulley cords*, cords in a pulley box.
- Quill*, a tube on which weft is wound for a hand-shuttle.
- Race*, the beading on the race-block of hand-batten.
- Race-block*, the lower part of the reed frame of a batten.
- Race-board*, that on which the shuttle runs.
- Raddle*, implement for evenly spreading warp.
- Katchet and wheel*, a toothed wheel and catch.
- Reed*, a comb-like implement for keeping warps even and beating weft together.
- Reed hook*, hook for entering reed.
- Reef knot*, a double knot, see Fig. VII, Plate VI.
- Retting*, steeping flax in water in preparation for carding.
- Reverse satin*, a satin with weft predominating.
- Rising shed*, a shed in which part of the warp rises, the rest being stationary.
- Rocking shaft*, part of the drawboy machine.
- Ruled paper*, paper for draughting designs.
- Satin*, a web with infrequent intersections.
- Satinette*, a short tied satin.
- Selvage*, the edge of a web.
- Selvage bobbin*, reel for mounting separate selvages in a loom.
- Shaft*, a flat lath for holding headles: see headle.
- Shed*, the opening in the warp for the shuttle.
- Shed-stick*, a round or flat stick for keeping the cross.

## THE NEW DRAW-LOOM

- Shedding motion*, a contrivance for opening the warp.  
*Shoot or shute*, weft; also throwing the shuttle.  
*Short march*, see *Counter-march*.  
*Shuttle*, a tool for carrying weft.  
*Shuttle-box*, part of a fly-shuttle batten.  
*Simple*, the pattern cords of a draw-loom.  
*Sinking shed*, shed made by drawing threads down.  
*Skein*, a loosely wound length of thread.  
*Skutching*, cleaning retted flax.  
*Slot*, an elongated perforation.  
*Snitch*, a noose secured by a single knot, see *c*, Fig. X, Plate VI.  
*Spacing*, arranging threads or leashes in groups on headles.  
*Spinning*, twisting fibre to make thread.  
*Spinster*, a female spinner.  
*Tabby or taffeta*, plain weaving.  
*Tail cords*, the upper cords of a draw-loom.  
*Take-up*, the gradual winding of cloth on to breast roller.  
*Tapestry*, tabby weaving, in mosaic, with loose weft.  
*Tartan*, a web striped in warp and weft.  
*Temple*, implement for keeping out the edges of a web.  
*Terry velvet*, see *Velvet*.  
*Thread monture*, a monture for weaving patterns with single threads of warp.  
*Tie*, a binder on loose weft.  
*Tie up*, connecting parts of a loom together for forming patterns automatically.  
*Tissue*, a web having one or more binder warps.  
*Tobine*, ornaments formed by one or more headles rising and sinking together.  
*Topcastle*, the upper frame of a loom, on which the pulley box or Jacquard machine rests.  
*Trevette*, a knife for cutting velvet pile.  
*Tumbler*, a top lever of a loom.  
*Turning on*, beaming.  
*Twill*, a web with a diagonal tie.  
*Union damask*, damask woven of linen and wool.  
*Vateau*, implement for spreading the warp on cane roller.  
*Velvet, cut*, a woven fabric with cut pile.  
*Velvet, figured*, see *Figured velvet*.  
*Velvet knife*, see *Trevette*.  
*Velvet rod*, a grooved rod for the pile.  
*Velvet, terry*, velvet with uncut pile.

## GLOSSARY

*Warp*, longitudinal threads of a web.  
*Warping*, preparing a warp.  
*Warping board*, for making small warps.  
*Warping mill*, for warping large warps.  
*Web*, a piece of finished weaving.  
*Weft*, the crossing thread of a warp.  
*Whorl*, a spindle weight.  
*Woof*, weft.  
*Yarn*, thread of any kind.



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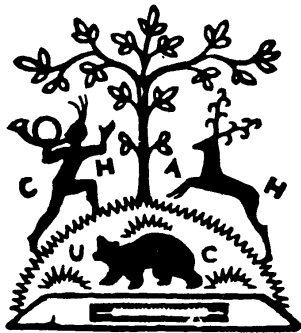
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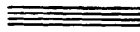
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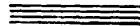
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