Fig. 1.

Fig. 2.

WEAVING WITH SMALL APPLIANCES

WRITTEN & ILLUSTRATED
BY
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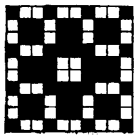
BOOK I—THE WEAVING BOARD



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INTRODUCTION

SINCE writing my little handbook *Weaving for Beginners*,[1] in which I pointed out the educational value of the practice of simple weaving, many more or less successful attempts have been made to introduce the practice of the craft into elementary and other schools. Unfortunately, however, from actual specimens of school work of this kind which I have seen, as well as from reports which have been communicated to me, it appears that teachers and others responsible for the direction of this particular study have been satisfied with too low a standard of attainment. It is true, " and pity 'tis 'tis true," that, with a few notable exceptions, even the handicraft workers in many of the gilds and art and craft societies, who produce textile fabrics for profit, in competition with ordinary commercial manufacture, are open to the same accusation. It cannot be urged too strenuously then, that in order to be of any educational or commercial value weaving, however simple, must be well and truly done. This is not by any means too much to expect, for even on the smallest and simplest appliance, if it be suitable for its purpose, the possibilities

[1] *Weaving for Beginners.* (Sir Isaac Pitman & Sons, London.)

for good, practical and really artistic results are very great, and there is no valid excuse either for teachers or pupils to be at all satisfied with any low standard of attainment.

There is no need for the student to use large, complicated and expensive appliances in order to produce good, simple, or even perfect elaborate work. The skill of the worker in any art and craft, but especially in that of weaving, is always better developed if only simple, convenient and appropriate tools and appliances are made use of. In commercial production, of course, the case is different, and it is for the craftsman himself to decide how far he can make use of the various time-saving inventions, which are available to him, without detriment to the quality of his work.

The appliances for weaving and the instructions for using them to be described in this book are not intended for commercial craftsmen; they are specially designed for and adapted to the use of students, but, at the same time, the principles and processes of weaving to be learned by their means are exactly the same as the principles and processes on which the most complicated weaving machines are constructed to work, and with which all the textile fabrics of commerce are produced, all the world over.

The designs, patterns, textures and warp enterings, as well as the mountings necessary for weaving them, although specially prepared for the use of students on small looms and appliances, are all practical, and can be used without alteration for setting up and weaving, either on full-sized tapestry or carpet looms, or on the ordinary traditional automatic horizontal looms such as

that fully described in *Weaving for Beginners*,[1] to which volume the present work, especially in its third and fourth parts, is the promised sequel.

This book, one of a series of three, deals with the weaving board and introduces the student to simple brocading or inlaying ornament in plain, narrow webs, tapestry weaving and carpet knotting. The second book will explain the methods of making braids, galloons, and other trimmings by the use of cartons or tablets, an art which was carried to a great pitch of perfection by the Egyptians and other ancient nations, and is still practised in the Near and Far East. In the third book, the weaving of ordinary plain and ornamental materials, more or less automatically, on table looms suitable for domestic or school use, will be dealt with.

[1] *Weaving for Beginners* (p. 101).

CHAPTER I

HOW WEAVING CAN BE MADE A SIMPLE, PLEASANT, AND USEFUL STUDY—THE REQUISITE MATERIALS AND APPLIANCES FOR THE SIMPLEST WEAVING

MY special object in preparing this book, and devising the appliances which it describes, is to introduce young students to the pleasant, ingenious, artistic and useful craft of weaving, and to introduce it in such a way that they may be able to produce *at once* little pieces of woven material of real beauty and utility, such as bands, panels, braids and other trimmings, mats, table centres, sideboard cloths, towels, etc. There is perhaps no other craft in which such good results can be achieved, even by beginners, as in that of weaving, providing always that it be done with care and exactness. At the same time, of course, in its highest branches weaving affords scope for the very greatest ingenuity and artistic expression. Even if the work be so simple as a plain tape or braid on a warp of half-a-dozen threads, real excellence cannot be attained without great care being given (1) to preparing the warp threads themselves and keeping them stretched at an even tension ; (2) to intersecting them regularly by the weft thread which passes from edge to edge of the warp as successive openings are made for it ; (3) to pressing the weft together so that there are an equal number of

lines of weft threads to every inch woven, and (4) to taking care that no loops or roughnesses are left at the edges or on the surface of the finished work to spoil its appearance.

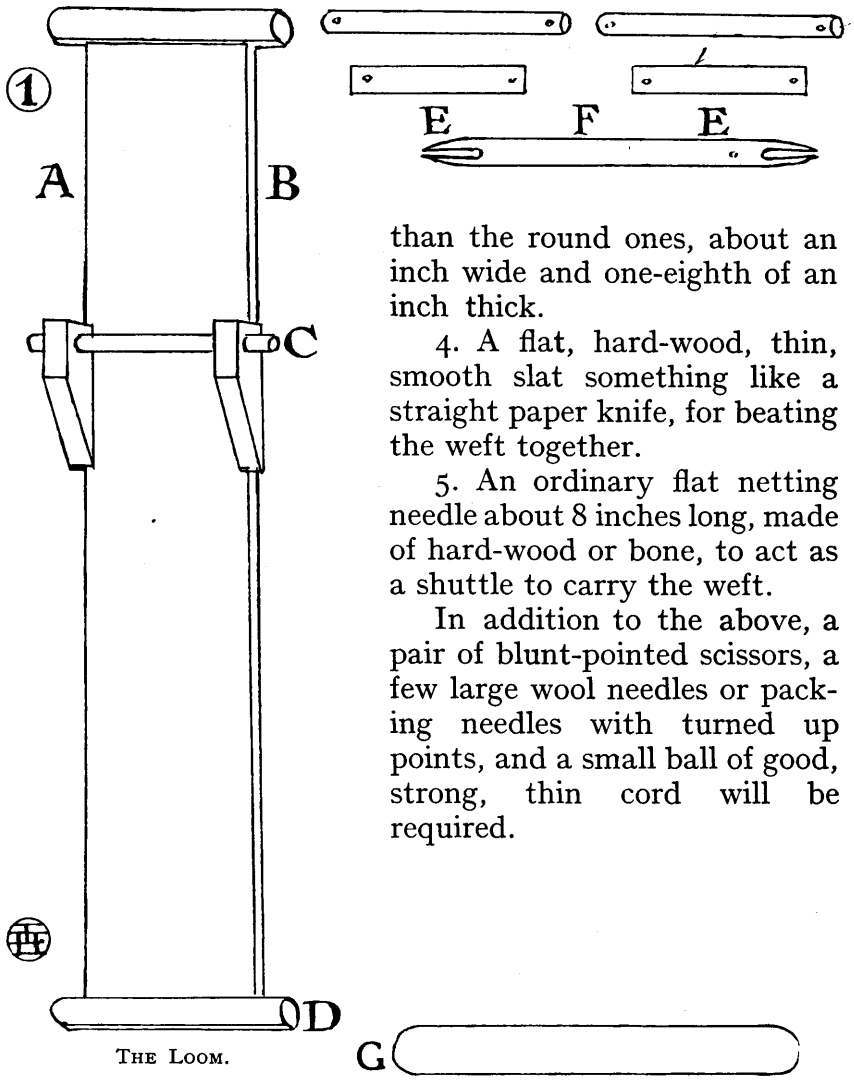
The practice of weaving, if thus conscientiously done, naturally develops a habit of attention to details which is so essential to success in all occupations, but unfortunately it is a habit too often lacking in the mental equipment of the students of to-day.

As to the materials and appliances for simple narrow weaving, they are as follows—

1. Two kinds of thread will generally be required, the term *thread* being understood to stand for all kinds of spun fibre, whether cotton, linen, wool, silk, hemp, jute, ramie, sisal, or any other raw material. The *warp*, which is the collection of threads, whatever their number, running lengthwise in any woven material, and the *weft*, which is the intersecting thread, may both be of the same material. Generally, however, a better effect in the finished piece is obtained by the use of a fine, hard, well-twisted thread for warp and a soft, less twisted, thread for the weft. For instance, a warp of strong sewing cotton wefted with soft embroidery silk or fine worsted, would have a pleasanter effect than a warp and weft of the same sewing cotton. As a general rule, the warp is for strength and the weft for filling up and covering.

2. An appliance called a *loom*, on which the warp threads can be stretched and be kept in perfect order at an even tension, whether they be few or many.

3. Two smooth round sticks, a few inches long and half an inch thick, and two flat sticks, rather shorter



THE LOOM.

than the round ones, about an inch wide and one-eighth of an inch thick.

4. A flat, hard-wood, thin, smooth slat something like a straight paper knife, for beating the weft together.

5. An ordinary flat netting needle about 8 inches long, made of hard-wood or bone, to act as a shuttle to carry the weft.

In addition to the above, a pair of blunt-pointed scissors, a few large wool needles or packing needles with turned up points, and a small ball of good, strong, thin cord will be required.

Chapter II

THE SIMPLEST LOOM

THE first and most important of the appliances required is the *loom* on which the warp has to be stretched before the work can commence. A loom is sometimes a very expensive and complicated piece of machinery, but in this case it is a very simple affair, as will be seen by the drawing (Fig. 1). This loom is simply a narrow board of hard wood $4\frac{1}{2}$ inches wide and 28 inches long, whilst its thickness is three-quarters of an inch, for it must be strong. Screwed to the ends of the board are two pieces of the same wood of the same thickness, and 6 inches long by 2 inches wide: these must have their edges nicely rounded. At the sides of the board two other pieces of wood are fixed, shaped as in the drawing and pierced with holes just large enough to take the half-inch rod C and hold it firmly in its position. The rod must be 7 inches long, and must stand 5 inches from the front of the board and 9 inches from its top. For convenience in winding on the warp, a process which will be explained later, two strong screw eyes must be fixed a little above the centre of the board, near the edges, with eyes large enough to allow a half-inch steel rod to pass through them and be easily withdrawn. In the drawing (Fig. 5), the loom is shown mounted on the warping stand, an appliance which will be described in the next chapter.

CHAPTER III

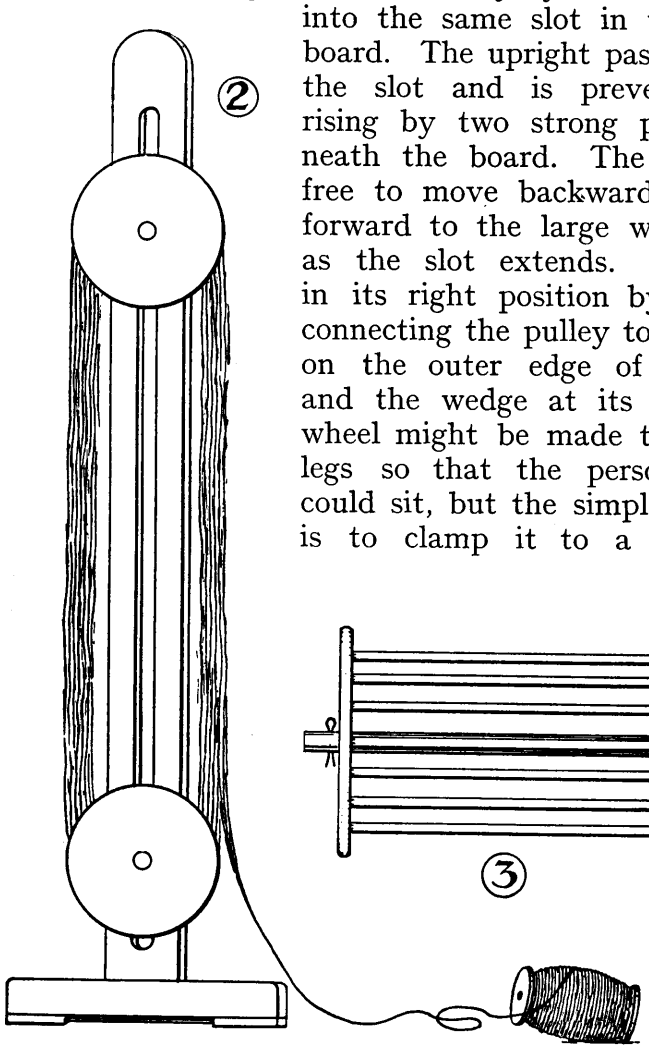
APPLIANCES FOR WINDING AND WARPING

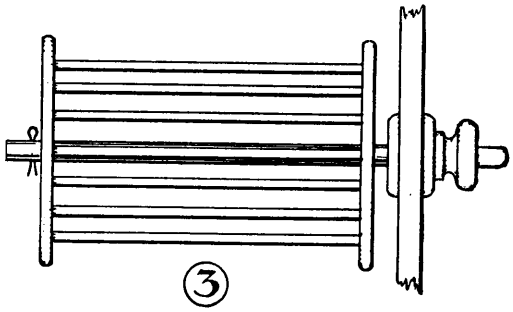
FOR class teaching, such a board loom as described in Chapter II will be required for each student. Three other appliances will, however, be necessary for general use, but only one of each will be wanted unless the class is a very large one. These are for the purpose of winding the different kinds of thread, used from skeins, on to bobbins or reels, for winding the warp from reels on to the looms and for doubling the thread for weft when two or more thicknesses of thread are used together.

Fig. 2 is the front view of a stand for holding a skein to be wound. The skein may be of cotton, wool, flax, silk, or any other material, which may be made up either in long or short skeins, so the runners or wheels must be adjustable as to their distance apart. This is arranged for by having a long slot in the upright stand, so that the spindles on which the runners revolve can be placed at any relative distance apart and fixed there by strong wing nuts at the back, as in Fig. 3.

Fig. 4 is a design for a winding wheel which exemplifies all the qualities to look for in this appliance. The large wheel has a very heavy rim and is fitted with a small handle. This makes it easy to turn and keep revolving at a regular speed. The small pulley, to which the spindle for the reels or bobbins is attached, is mounted

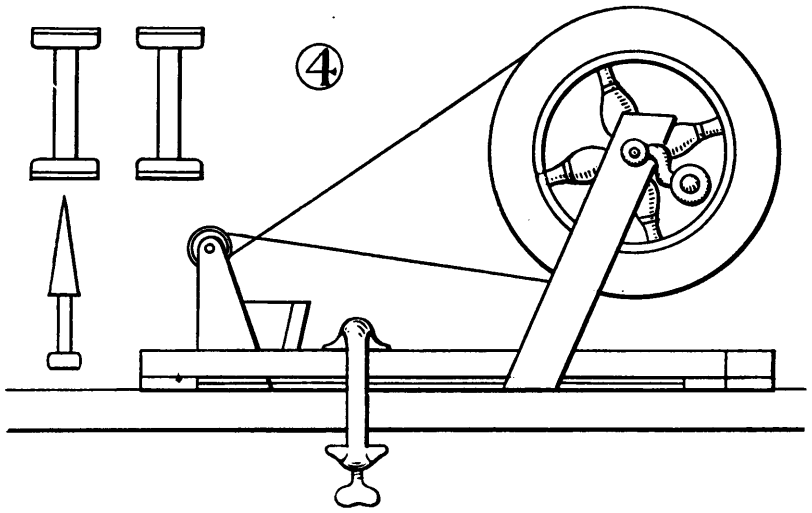
on a strong, short upright, and its distance from the large wheel is regulated to a nicety by the wedge driven into the same slot in the bottom board. The upright passes through the slot and is prevented from rising by two strong pegs underneath the board. The upright is free to move backward from and forward to the large wheel as far as the slot extends. It is fixed in its right position by the cord connecting the pulley to the groove on the outer edge of the wheel and the wedge at its foot. The wheel might be made to stand on legs so that the person winding could sit, but the simplest method is to clamp it to a firm table,





as shown at Fig. 4, in which case the operator must stand.

The stand represented at Fig. 5 is made for the purpose of enabling the weaver to wind the warp thread from the reel on to the board loom without twisting

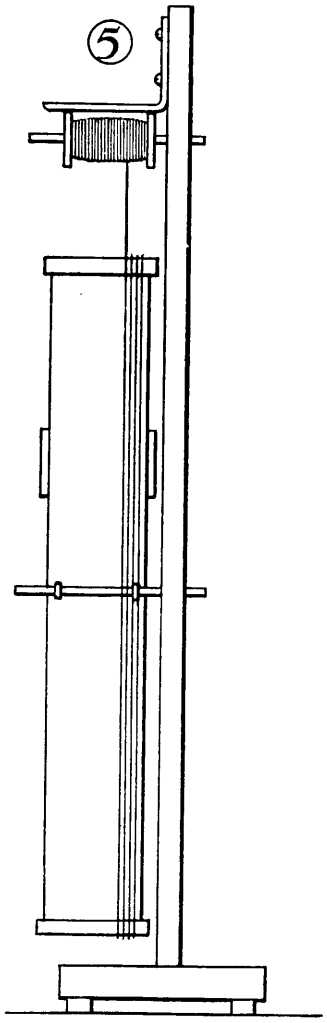


it at every turn of the hand, and also to lay the several threads of the warp together without overlapping, and to lay them at an even tension.

It is very important to note and remember that over-twisted and badly-wound thread is liable to tangle up and give much trouble at every subsequent stage of the progress of the work, however simple it may be.

The appliance, which may be called a board loom warping stand, is a wooden upright about 5 feet high, fixed in a solid board so as to stand firmly. Of this appliance Fig. 5 is a side view. Not less than 2 feet from the ground a strong steel rod, from 9 inches to a foot long and about half an inch thick, is firmly fixed. Near the top of the upright another rod, thin enough to carry a reel, is placed in like manner. In the drawing, a reel of cotton warp is represented on the top rod, and a metal spring is so fixed to the upright as to act as a strong brake on the flanges of the reel. The purpose of this brake is to regulate the tension of the cotton cord as it is transferred from the reel to the loom, which is shown on the lower rod. It will be seen at once that if the loom is gently turned on the rod and the cord guided to its place, the latter can be wound on without any tendency to twist or entangle.

Although a separate stand (Fig. 5) is certainly best for warping, the two rods may be fixed in a wall or on a board to hang on a wall, but for class use the stand will be found most convenient for many reasons.



WARPING STAND

Chapter IV

THE CHOICE OF THREADS AND WINDING REELS

IN preparation for weaving, the first thing is to choose the warp and weft suitable for the kind of web which it is our intention to weave. We will suppose, then, that we have decided to weave a strong band of rather coarse texture, $2\frac{1}{2}$ inches wide, on a warp of strong, twisted cotton, 15 threads to an inch. (*See* designs Nos. 1 and 2, Plate I.) The weft will be worsted thread a little thicker than that of the warp and of any colour in tone not too strongly contrasting with it. This being decided we can set to work, for the brocaded spots and bars, as regards colour and material, may be left for choice till the work is actually begun.

Before we can begin warping we must wind two or three reels full of warp cotton, care being taken not to fill them higher than their flanges. This must be done very carefully and in a particular manner as follows: The skein of cotton must be opened out and, before attempting to find the end which will run freely, the winder must place it on the top skeleton reel of the skein holder (Fig. 2) so that it hangs loosely over the lower reel. The lower reel must then be nicely adjusted to the size of the skein: it must be neither too loose nor too tight; not so loose as to draw up and tangle as the wheels revolve, nor so tight as to prevent the reel

on the winder from turning quickly and regularly. The two ends of the skein must next be untied, and the end that runs freely from the outside of the skein is the one to fix to the reel on the spindle of the winding wheel. The winding wheel (Fig. 4) must be placed to the right of the skein holder, about 3 feet from it and just a little backward so that the tension on the thread may keep the skein or any part of it from flying off the reels of the holder. The thread being attached to the reel by a twist round the barrel which will lightly hold it in place, the large wheel must be turned very gently till a few revolutions of the spindle have fixed the thread firmly enough to the reel for the quick winding to begin. The thread must be guided on to the barrel of the reel by the thumb and finger of the left hand, the hand itself moving gently, but incessantly, backward and forward so as to spread it in flat, regular layers between the two flanges of the reel. It must not be allowed to heap up at any part of the barrel, but especially at the ends, which it always has a tendency to do. When finished, the wound mass of cotton should be quite solid on the reel, gently rounded at the centre, but the highest part not higher than the flanges of the reel. So important is it that winding should be well done that good weavers, especially silk weavers, generally insist on winding their reels and spools for themselves, although it takes a good deal of time to do it well.

CHAPTER V

WARPING

HAVING properly prepared two or three reels of warp thread, the next thing is to turn the thread into a warp by winding it carefully on to the loom itself. The manner of winding it will be easily understood if a little study be given to Fig. 5. Here the warp reel is seen in position on its rod near the top of the upright, and the spring brake is firmly pressing on the rims or flanges of the reel. The loom is also in its place on the lower rod, and it will be noticed that the little stick which connects the two side pieces of the board has been removed so as not to interfere with the warping, as it would otherwise do. To proceed, the end of the thread hanging from the reel must now be tied firmly, but in a knot or bow that can easily be undone at will, to one of the small screw eyes at the lower end of the loom, it does not matter which. Now, if the top of the loom is brought forward and turned completely over, one thread of warp will be laid on both sides of the board. If the loom is turned in the same direction thirty-nine times, and the end of the last thread is cut off and tied in the same manner as the first to the second screw eye, thirty-nine threads will be laid on. That is the number of threads required for weaving the selected design (No. 1, Plate I), which it will be seen is drawn on thirty-nine squares of design paper, counting

from side to side. It will prevent a great deal of trouble and annoyance, as the weaving goes on, if the board is turned with great care and steadiness, and it is essential that the threads do not overlap each other and are of the same tension throughout. Any joining knots which have to be made if a reel runs out should be made at the centre of the back of the loom, so that they may not interfere with the weaving at the front. The loom must now be removed from the warping stand although the warp is not quite completed. If nothing else were added to the warp, the threads would be always getting twisted round one another and give a lot of trouble even with such a small warp as the one with which we are now dealing. This final addition is one common to every kind of loom and is perfectly adapted to its purpose : it is called the lease or cross of the warp, and is so important that it must be very fully described in a separate chapter.

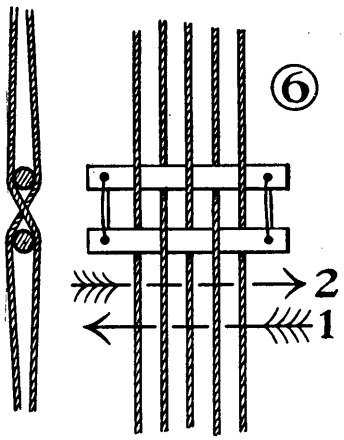
Chapter VI

THE LEASE OR CROSS ON THE WARP

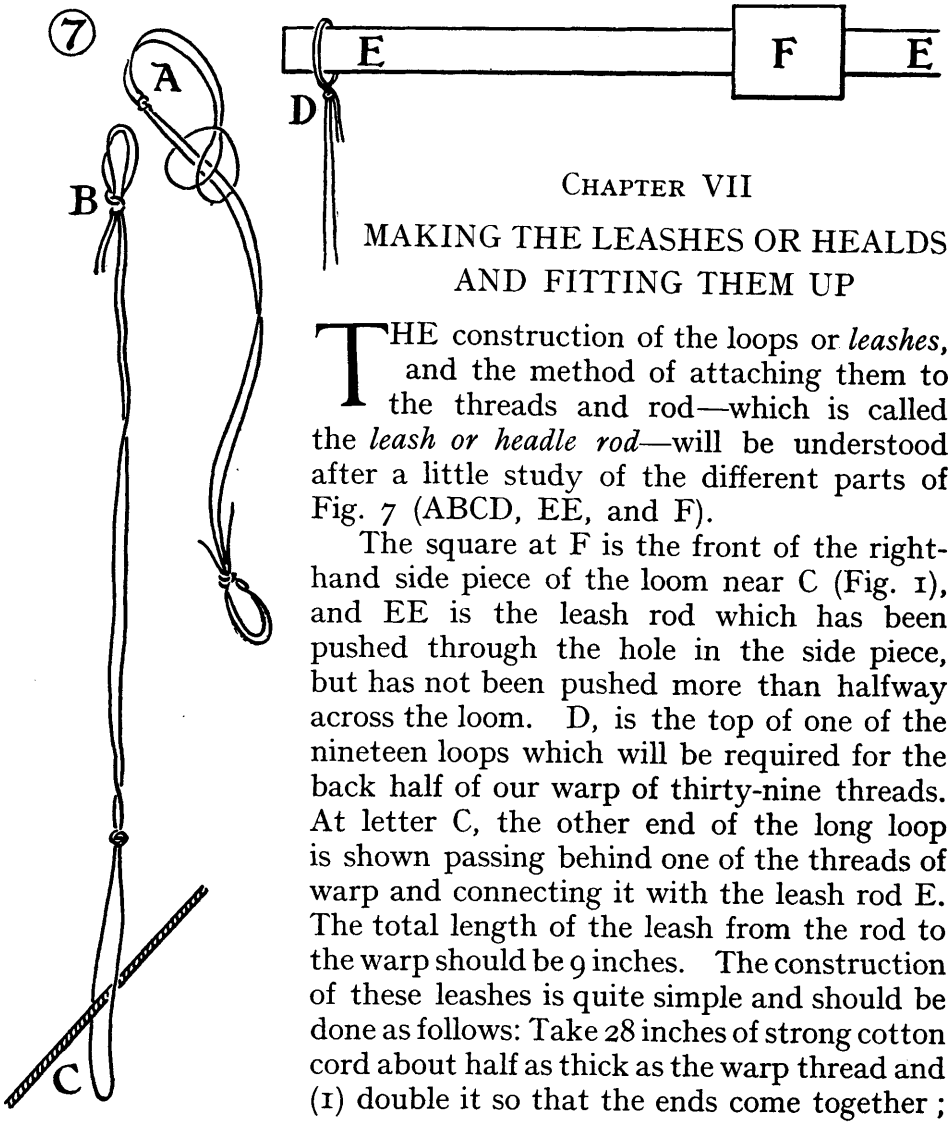
THE cross in the warp is made by means of two rods (*see* Fig. 1), which are inserted between alternate threads of the warp in such a manner that it is quite impossible, while the stick remains in position, for the threads to overlap each other. The side and front views of the cross in the warp are given clearly in Fig. 6; a little examination of the two diagrams will no doubt make this essential device for keeping the warp in order quite obvious. The cross has to be made when the warp is on the board by inserting between alternate threads the two sticks in the position marked AB (Fig. 1) and tying their ends together to prevent them dropping out, as shown in Fig. 6.

In Fig. 6 (side view), it will be seen that an opening—technically called a *shed*—is made between alternate threads of the warp below the cross sticks, as at letter A: this opening is kept as long as the sticks remain in position, and is used all the time of weaving for passing the weft thread from *right to left* from one edge of the warp to the other, as shown by the arrow No. 1 (front view, Fig. 6). Passing the weft through this opening is, of course, quite an easy operation; but the second opening required for returning the weft over and under the alternate threads, as shown by arrow No. 2, is rather more difficult and, unless a still

further addition to the loom is made, requires a good deal of practice, especially if the warp threads are fine and there are a large number of them. Each of the back threads would have to be picked up and brought to the front exactly between the ones next to them, either by the fingers of the weaver or by a pointed



implement of some kind, and great care would have to be taken not to bring them forward in the wrong places or twist them with any of the front set of threads. This difficulty is obviated by the addition of a set of long loops—called leashes—which are attached to the rod (Fig. 1, C) after being passed round each *back* thread and brought forward between each pair of *front* threads.



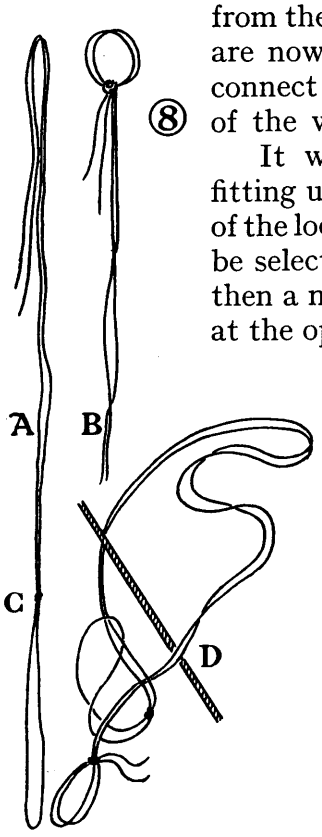
Chapter VII

MAKING THE LEASHES OR HEALDS AND FITTING THEM UP

THE construction of the loops or *leashes*, and the method of attaching them to the threads and rod—which is called the *leash or headle rod*—will be understood after a little study of the different parts of Fig. 7 (ABCD, EE, and F).

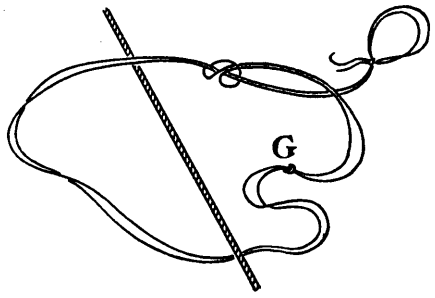
The square at F is the front of the right-hand side piece of the loom near C (Fig. 1), and EE is the leash rod which has been pushed through the hole in the side piece, but has not been pushed more than halfway across the loom. D, is the top of one of the nineteen loops which will be required for the back half of our warp of thirty-nine threads. At letter C, the other end of the long loop is shown passing behind one of the threads of warp and connecting it with the leash rod E. The total length of the leash from the rod to the warp should be 9 inches. The construction of these leashes is quite simple and should be done as follows: Take 28 inches of strong cotton cord about half as thick as the warp thread and (1) double it so that the ends come together;

(2) fold the loose ends over about 1½ inches, as at A (Fig. 8); (3) tie a knot about an inch from the bend so as to form a loop just large enough for the leash rod of the loom to pass easily through it, as at B (Fig. 8); (4) cut the ends off neatly near to the knot and go on to make nineteen other loops exactly the same size; (5) at the opposite end to the small loop, which fits on to the leash rod, tie knots in all the leashes 5 inches from the end, as at C (Fig. 8). The leashes are now complete, and it only remains to connect the leash rod and the back threads of the warp by this means.



(8)

It will be most convenient to begin fitting up the leashes at the right-hand side of the loom where the first back thread must be selected and a leash slipped behind it; then a noose or slip knot must be formed at the opposite end to the leash rod loop, as at D (Fig. 8). The noose must be put over the leash rod loop, past the knot, and drawn fairly close, then slipped down the



double thread till stopped by the knot C (Fig. 8). Thus the position will be reached shown at C (Fig. 7), where the leash and the warp thread are in their proper relation to one another. As soon as the leashes are all in place on the back threads, the first leash on the right can be looped on the rod, care being taken that it does not twist round either of the two front threads next to it. The second of the back threads with its leash can next be connected with the rod, and so on, leash by leash and thread by thread, until the whole set are connected. This being all done, the leash, or headle rod as it is called, can be fixed in its proper place and, if all the preparation has been carefully done, weaving can begin.

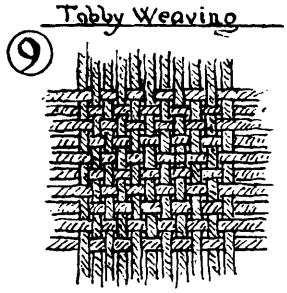
If the warping has been properly done and a good, firm, even tension has been given to the thread as it was wound on to the board, no further tightening of the threads will be required for ordinary weaving in which the warp shows, on the surface of the web, more or less equally with the weft instead of being covered entirely by it, as is the case with *tapestry* weaving. The method of tightening the threads of the warp for advanced tapestry work will be dealt with later.

CHAPTER VIII

BEGINNING TO WEAVE

BEFORE beginning to weave any braid with a weft of coloured cotton, linen, wool, or silk, an inch or two of plain weaving with a weft of flax twine or cotton cord must be woven. This is for the purpose of getting the warp evenly distributed, so that the same number of threads will be found in each inch of the width of the proposed braid. In order to make a firm foundation for this preliminary cord wefting, it is necessary to weave into the first and second openings two flat pieces of wood. (*See* Fig. 1, p. 8.) This must be done in the following manner: Into the opening between the front and back threads of the warp, just below the cross rods (Fig. 6, A 1) and just above the side pieces at Fig. 1 (C), a rod the same length as the headle rod, and fully an inch thick, must be inserted; this is for the purpose of holding open the first *shed* so that the weft can be easily passed through it a good way below the leashes which are on the back threads. (2) At the bottom of the board (Fig. 1, D) one of the thin slats of wood (Fig. 1, EE) must be passed into the shed and left there. (3) The first four or five leashes at the left side of the board must now be firmly pulled forward until a second opening is made in front of the forward threads. This is the second shed, and into it, from the left, the second slat must be pushed by the left hand of the weaver, and held

there until a few more threads are raised by the leashes and it can be pushed further in towards the right. This alternate raising and pushing must continue until the second slat stands exactly above the first one and as close to it as the crossed threads between them will allow. The two slats must be placed quite at the bottom of the board and be tied firmly together by a cord passing through the holes in their ends. It will now be seen that the two slats at the bottom of the board stand in exactly the same relation to the warp as the two cross rods at the top. (4) The shuttle F (Fig. 1) will now come into use. For the board looms this is the most convenient form of shuttle; it is simply a netting needle about 7 inches long and may be made of wood or bone, and the thinner it is the better. The shuttle is for winding a long length of weft upon, so as to enable the weaver to pass the continuous thread through the successive sheds as they are opened, and so to interlace the warp and weft together. It is necessary to remember that the shuttle must always be passed into the first, or always open shed, from *right* to *left*, and into the second, or leash-made shed from *left* to right. *This order must never be deviated from.*

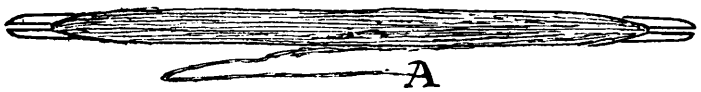


The first wefting, as mentioned above, is to be fine cotton cord or flax twine. Its purpose is to equalize the distance of the strings apart, and to form a firm foundation for the finer kinds of weft which are to form the braid itself. Too much care cannot be taken to get the warp exact as to the number of threads to the inch, the

regular crossing of alternate threads, and to see that there are no double or superfluous threads.

The weft must be wound upon the shuttle without twisting. A yard and a half or 2 yards of cord should be enough for the foundation of the work. When finished, this foundation should look like Fig. 9, having an equal interlacement of alternate threads. Before the weft is passed through the first opening, it will be well to clearly mark the centre of the slats with a strong vertical line and also to draw two other lines $1\frac{1}{4}$ inches from this centre. The whole warp must then be examined and shifted exactly into this central position. It

(10)



must also be ascertained that all the threads are flat and clear from one another. All being right and in readiness, the end of the weft A (Fig. 10) must be tied to the right-hand end of the upper slat, and about a foot of weft unwound from the shuttle before passing the latter through the first opening from right to left. Before passing the shuttle, the weaver must also be quite sure that the threads to which the headle loops are attached have returned to their proper place and left the first opening quite clear. The weft must be left lying straight in the opening, and care must be taken not to pull it so tight as to draw in the opposite edge thread, nor so loose as to loop up the kink when pressed down with the beater G (Fig. 1). The first thread being laid, the

shuttle must be returned through the second shed which must be opened as before ; and after the second shoot is laid, it must be firmly pressed down, and an opening for the third shoot of weft will be ready. This is, of course, the whole compound operation of plain weaving whatever appliances are used. (1) Opening the shed ; (2) passing the weft through ; (3) beating the weft together so as to make solid cloth.

When the first shuttleful of weft is used up, there should be about 1½ inches of solid cloth exactly 2½ inches wide, 1½ to 2 inches high, and having sixteen threads of warp and twelve threads of weft in every square inch.

Having woven the foundation of the work to the exact measurements as above, the students' consideration must be given to the design, colour, and material of the actual braid to be woven.

Fig. 1.

Fig. 2.

CHAPTER IX

WEAVING AN ORNAMENTAL BAND OR BRAID

THE simplest form of design for the beginner to weave will be such as the one given on Plate I at Fig. 1. It consists of a prevailing ground of gold-coloured mercerized cotton or silk, woven with a rather open texture so as to show equal proportions of the warp and weft. Across this ground, at different intervals, stripes of various colours and proportions are more solidly woven or darned over two warp threads, as will be presently explained. This example is only given as a specimen of the kind of original design the student should make. Few or many colours may be used for the bands, and the bands themselves may be of different widths, interspersed with spaces of ground as the designer may wish, care always being taken to have as pleasing, well-balanced, and harmoniously coloured whole effect as possible. At first, it will be best to draw out the design on ruled paper in the colours to be used, but very soon the student should have sufficient confidence to choose a certain set of colours and compose the arrangement as the work proceeds.

The paper on which the designs (Plate I, Figs. 1 and 2) are drawn is ruled out in half-inch square divisions, each subdivided into eight spaces horizontally and twelve spaces vertically. The eight spaces to the half inch

represent the warp and the twelve spaces represent the weft. When we wish to show the weft coming in front of a particular warp thread, we put a spot of colour in the square and so hide the warp, as in plain weaving. A study of the diagram of technique at the foot of designs 1 and 2 will make the matter clear. Although any scheme of colouring may be arranged, too many colours should not be used, as a simple design always proves to be the best.

The gold coloured mercerized cotton for the ground must be wound on to the shuttle in a double thread, and care must be taken to wind both threads at the same tension, or the weaver will find loops and knots disfiguring the surface of the weaving from time to time. The weft for the stripes will also be used double, but it will be best to use packing needles about $3\frac{1}{2}$ inches long for weaving them over and under double threads of warp.

The shuttle and needles being ready, the work can begin.

Referring to the design (Plate I, Fig. 1), it will be seen that twelve spaces above the line B are filled with little gold squares alternated with white squares; this indicates that the weft is passed straight through the successive openings, first from right to left and then from left to right, and pulled at each passing just tight enough to prevent it beating down and quite covering up the warp. Six right and six left passes should fill up about half an inch, as far as letter C in the design. At C the weft can be twisted once round the edge thread and cut off, leaving about an inch or so hanging to be trimmed off afterwards. The only difficulties the student will have to master so far are two, viz., (1) to keep the width

of the braid exactly the same, as it will have a tendency to draw in narrower, the threads at the centre always trying to gather closer and closer together; (2) to maintain an equal number of shoots of weft to the inch. This is to be done by pressing each shoot down with exactly the same force as soon as it is in its place.

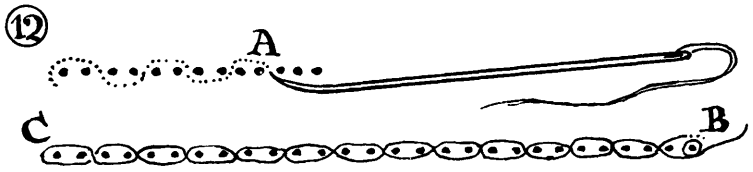
The stripes will have to be woven in by the technique indicated at B (Plate I, Fig. 1), and presently to be explained. The most convenient implement for inlaying or brocading ornaments of all kinds of design on plain warps is shown at Fig. 11. It is simply a stout packing needle which can be bought at any ironmongers or tool

shop. Several needles will be required; half-a-dozen at least should be in readiness threaded with the different coloured cottons, wools, or silks to be used in the design.

As we have to use a double thread for our inlaying, it must be passed through the eye A (Fig. 11) and the two ends loosely tied together, leaving a double thread not more than 2 feet long. The turned-up point of the needle (B) is useful for picking up two or more threads of warp at a time as required for the kind of brocading shown at Plate I (Figs. 1 and 2) and in the frontispiece (Fig. 1).

Plain weaving having been carried on up to the point C (Fig. 1, Plate I), the needle threaded with coloured weft must be taken in the right hand, twisted round the first thread of warp, as shown at B (Fig. 12),

and then carried by the needle under and over each pair of threads, as indicated by the dotted line at A, until it reaches C, where the needle must be drawn out, leaving the weft in the opening covering alternately the front and back of each pair of warp threads. The weft must not be drawn tight, but must just comfortably fit into its place without strain and, on the other hand, must not be so loose as to leave any loops on the surface. When the first shoot of weft is in its place, the needle being in the left hand, it must be returned from left to right in the same manner as before, and cover the alternate pairs of threads left bare by the first shoot



as shown on the two lines above B (Plate I, Fig. 1). Before going on to the next shoot, the two already laid must be carefully pressed down and examined to see (1) that they have not been drawn too tight, so as to draw in the braid; (2) that the edges are not left with loops to them; (3) that the two completely cover up the warp in a straight line, as on the fourth line above B (Fig. 1, Plate I). All being right, six more shoots, making, with the first two, four lines, will carry the work to D, where a twist round the first thread will complete the first solid band of purple colour.

The rest of the design will be carried on in the same way, in its different colours, until the point E is reached, when one repeat of the design will be complete.

CHAPTER X

WEAVING A BROCADED WEB

THE method of working Fig. 2 (Plate I), which is also Fig. 1 of the frontispiece, will now be readily understood if a few additional points of technique are carefully noted. (1) The groundwork is the same as No. 1. It is openly woven with a shuttle filled with double mercerized cotton of a yellow colour ; but instead of the grounding being discontinued when the stripes begin and only recommenced between them as in Fig. 1, in Fig. 2 it is continuous on four threads, on each edge of the braid, throughout its whole length. It is also filled in not only between the stripes, but in all the spaces between the different shapes of the ornamental design. One shoot of ground weft, too, is passed between each complete line of the ornaments throughout, although, owing to the *flushing*[1] of the coloured wefts, it does not show in the finished work. This will all be made clear by reference to Fig. 13 and letter A, Fig. 2, Plate I. These diagrams will explain how the ground weaving is to be kept even at the edges and in the places between the ornaments, and at the same time allow for the space occupied by the thick brocading weft. They both show clearly the course of the ground weft

[1] *Flushing* is the technical name of the effect given by causing a weft or warp thread to miss two or more intersections of the web and form a rather long, loose loop.

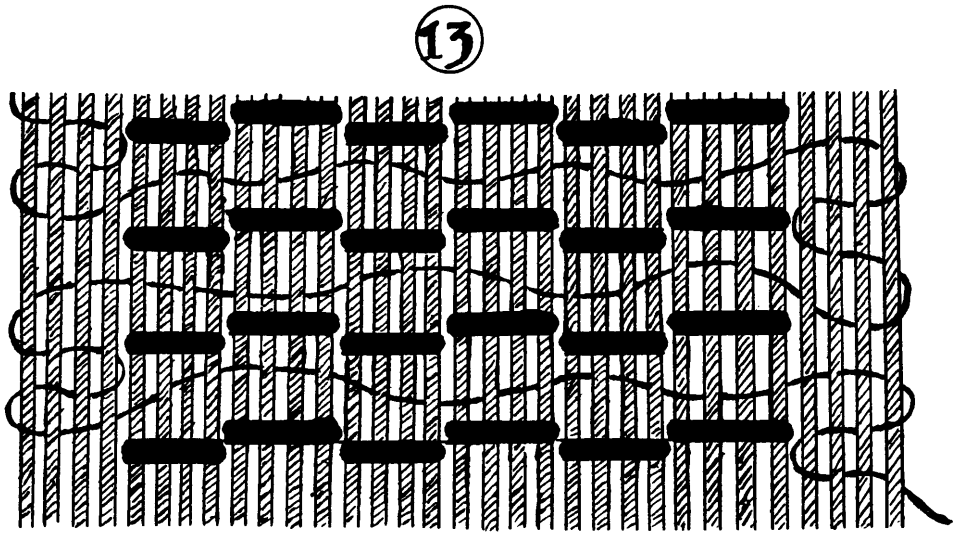


DIAGRAM SHOWING THE COURSE OF THE GROUND WEFT IN FIG. 2, PLATE I

from its entry at A (Plate I, Fig. 2). (2) The weft for the brocading must be fourfold instead of double as for Fig. 1, and the number of warp threads covered by each loop must be four instead of two. (3) At CC, two brocading needles will come into use, one threaded with red and the other threaded with green weft. The red weft will start by entering at the right-hand side ; but, instead of coming back as before, the needle is to be left hanging at the back, and the green weft passed in from the left so as to cover the spaces left bare by the red weft. This must be repeated six times, after which the green weft must start at the right and the red at the left to work out the checkered figure.

CHAPTER XI

VARIOUS EXERCISES IN BROCADING

VARIOUS suggestions of designs for brocading figures are given in Plate II; they can all be worked on plain woven grounds similar to those of the designs 1 and 2 on Plate I.

The brocadings of Figs. 1 and 2 are, however, different

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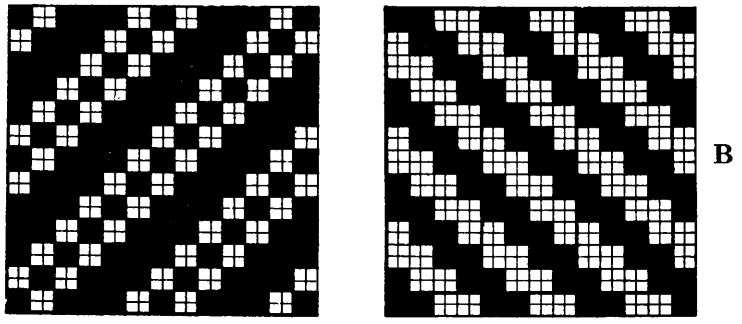
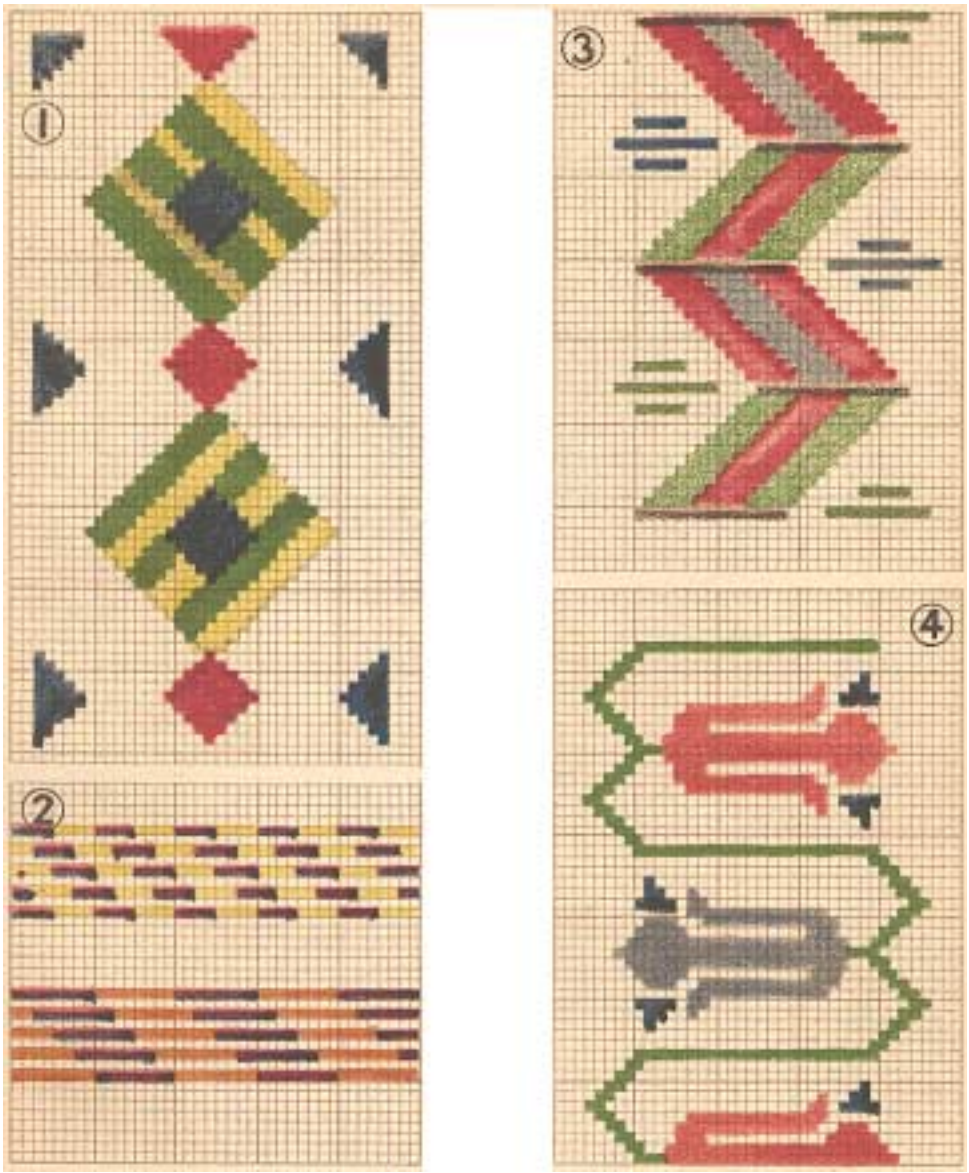


in effect, being woven in diagonal lines instead of directly upright ones. This diagonal weaving is called *twill* weaving.

Figs. 14 (A, B, C, and D) give illustrations of various twill effects which can be used in the weaving of the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ornaments such as those of Plate II, and an infinite number of similar designs which the students should be able to invent for themselves.

The technique of twill weaving is shown at Fig. 2,

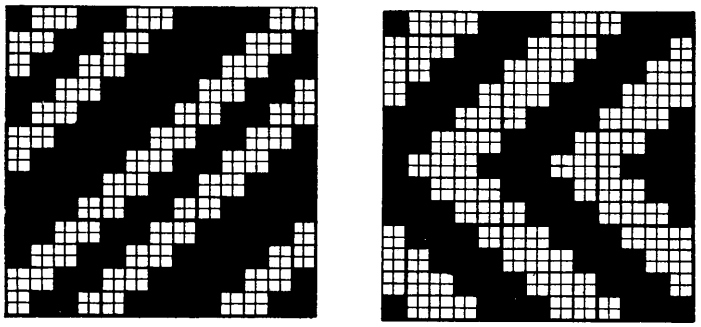

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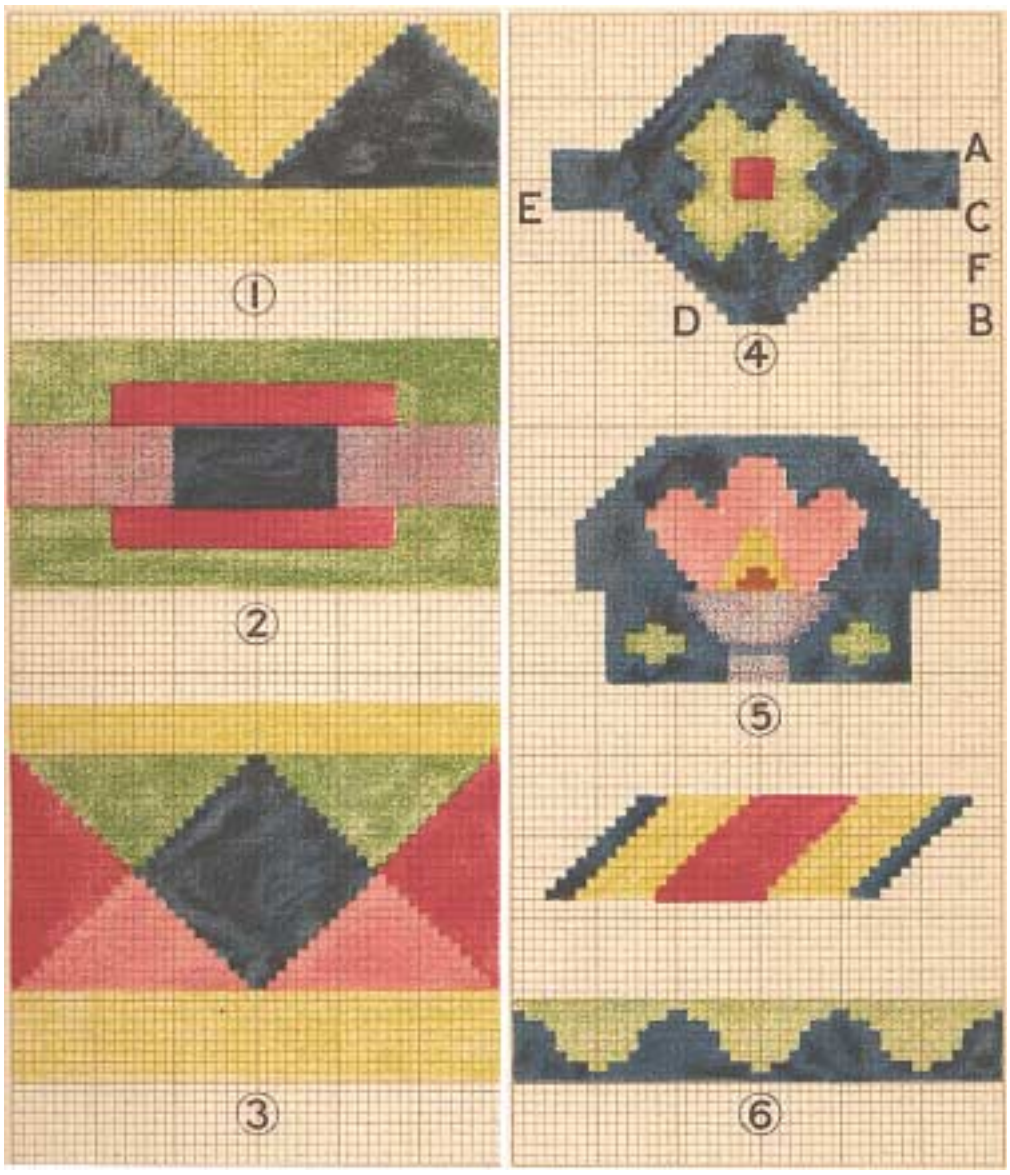
Plate II. The diagonals in any design may, of course, be turned either to the right or left.

Fig. 4 of the same plate is an easy design to weave, consisting as it does of horizontal lines and diagonals only.

CHAPTER XII

TAPESTRY WEAVING

EXERCISES for the next step in advance in weaving on the board loom are shown on Plate III. These studies are to be worked in what is called the *tapestry* method of weaving. In this kind of weaving the warp threads are entirely hidden by the weft both on the back and front of the material. In order to obtain this effect the weft is passed through the first opening of the warp (1) from right to left, covering the front and back of alternate warp strings, and (2) in the second opening from left to right, covering the front and back of the warp strings left bare by the first passing. The weft has to be passed loosely enough to allow it to fit in a kind of chain around each warp thread so as to form by the two passings one unbroken line. This will be understood if reference is made to the two diagrams (Fig. 15), A being a section of the warp with the chain of weft around it, and B the effect of the chain of weft as seen from the front and back after the two movements have been completed. These two movements, from right to left and back again, are technically called *one pass*, because they only complete one continuous line across the web. In this respect, tapestry weaving differs entirely from ordinary plain weaving in which both warp and weft generally show equally throughout the web and two passings, or shoots as they are generally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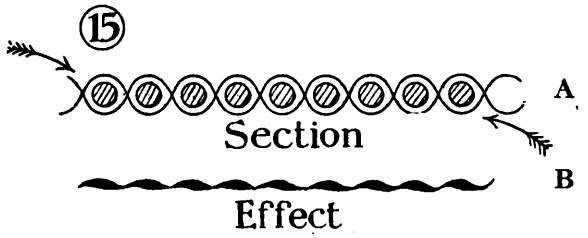
called, form *two* lines instead of *one*, as in tapestry weaving.

In tapestry weaving, the only apparent effect of the *warp* is to give a clear ribbed texture to the work. The design, whether simple or complex, has to be built up by weaving, in different coloured wefts, the variously-shaped forms of which it is composed. The difficulty of tapestry weaving consists in fitting the different shapes accurately together. This method is the most primitive form of ornamental weaving ever practised,

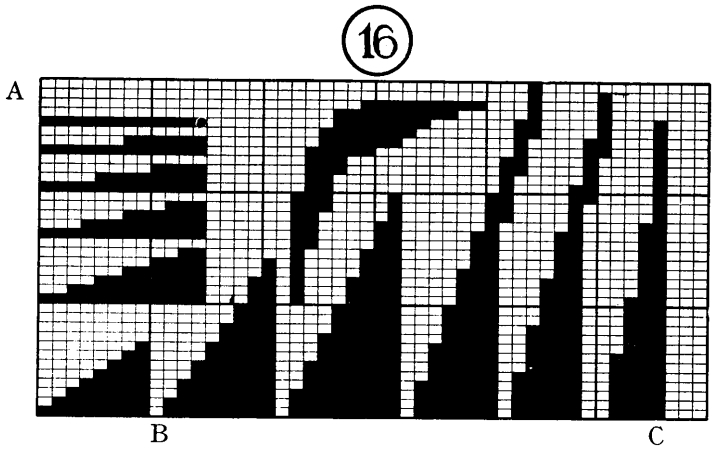


and it was carried to a very high pitch of perfection by the Chinese, Egyptian, Assyrian, and other ancient weavers.

As a general rule, in tapestry weaving it is necessary to use weft of such a size as to require two complete passes, in order to form one step of the design, which generally should equal the thickness of each rib of warp. The most convenient way to regulate the thickness of the weft is to use such fine worsted as to require two or more strands wound together to make up the necessary size.

Figs. 1, 2, and 3 on Plate III should be woven as tapestries on 16-warp threads to an inch, as already

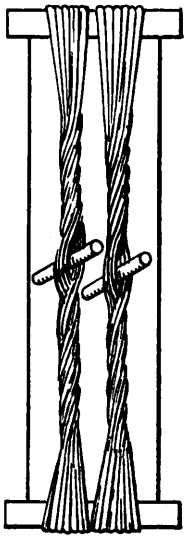
described, care being taken to fit the forms exactly into one another, step by step, as shown on the ruled paper. These figures give the easiest forms to weave, viz., diagonal lines of 45°, horizontal lines, and vertical lines. In the last case, however, there will be a slit between the upright sides of any shapes woven. These vertical slits will be seen to occur in Fig. 2 ; the beginner, however, need not be troubled about them at present, but in more advanced work they must be joined up in



a manner which will be explained later. Primitive weavers were enabled, in even very elaborate designs, artfully to avoid upright lines on account of this disadvantage ; and, if it be desired to arrange a modern tapestry to work easily and quickly, the designer must follow the example of the primitive artist in this respect. Horizontal lines and diagonal lines at any angle up to 45° are easy to weave, because they ascend in steps of two passes which are no higher than the thickness of a

warp thread; but lines more and more approaching to the vertical ascend by higher and higher steps, and leave longer and longer slits the nearer the line approaches the upright. If the student will carefully examine Fig. 16 or any of the designs in this book and try to weave them, this matter will be made quite clear. In Fig. 16 from A to B are easy forms, but from B to C the forms are increasingly difficult.

(17)



Figs. 4, 5, and 6 on Plate III will be found rather less easy, and should also be first woven on not more than 16-warp threads to the inch, great care being taken to fit the steps of the different patches of colour exactly into one another.

The tension on the strings of the warp for tapestry weaving has to be greater than is necessary for ordinary weaving. In the former, as we have seen, the warp has to be completely hidden by the weft; but in the latter warp and weft both show on the surface of the material. In tapestry weaving it will be found very difficult to prevent the warp showing, in places, and spoiling the solid effect it should have, unless the tension of the warp is great enough to allow of the weft being beaten closely together with very little force. It is necessary, therefore, when preparing it for tapestry, either to wind the warp on to the board very tightly, stretching the thread equally at every turn of the board, or to have

some method for tightening the warp after it is in its place. For the simple studies of Plate III, this can be done by twisting together groups of, say, 10 strings at the back of the board, as shown by Fig. 16; but a little fitting will be described in Chapter XIV, which renders the regulation of the tension of the warp perfectly easy.

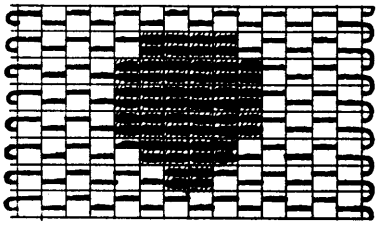
Care must be taken in tapestry weaving to press the weft down very closely at each pass so as to make the work quite solid, and hold the ends, where the weft has to be broken off, quite firmly. If this is attended to the ends can be cut off close, after a few passes have been built up, and will never come out.

Chapter XIII

WEBS OF MIXED WEAVING

THE designs on Plate IV are of the same character as the many specimens of fabrics woven 2,000 years ago and more by Egypto-Roman and Coptic weavers, and now exhibited in the textile galleries of the Victoria and Albert Museum at South Kensington (London) and the British Museum. Most of these ancient webs consist of a combination of two kinds of plain weaving, the ground being woven in the ordinary way, so that every throw of the shuttle forms a distinct line on which both warp and weft appear in equal proportions, crossing each other at right angles.

(18)



In this plain woven ground spaces are left clear of weft, and in the spaces tapestry-woven ornaments are cleverly inset. The ornaments are woven in their allotted places on double threads with a loose weft two throws to every line, with the effect described in the last chapter. (*See* Fig, 18.)

Chapter XIV

STUDIES IN MIXED OR EGYPTIAN WEAVING

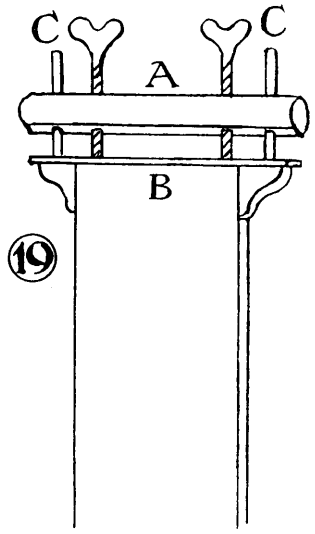
THE ancient method of weaving tapestry ornaments on plain grounds, already mentioned, is, of course, akin to the simple brocade or inlay method which the student has already practised, as recommended in Chapter X, as well as in the more advanced studies of Chapter XII. There should, therefore, be little difficulty in successfully working out the more complicated studies of Plate IV, which are to be woven in the manner of the Egyptian and Coptic examples.

In this method of weaving it is sometimes necessary to slightly vary the tension of the warp, in order to suit the two kinds of technique. For this purpose an extra fitting to the weaving board is required. It consists of a movable top, a thin plate of metal, and two winged screws. (*See* Fig. 20.) The warp is wound on to the board with the wooden top A, close to the metal plate B. CC are two metal pegs which pass through holes in the top A, in order to keep it steady when raised by the winged screws, which latter pass through two nuts in the top itself and, when turned, press upon the metal plate and so raise it, and, by its means, tighten the strings.

The studies of Plate III should now be woven in the mixed method described for Fig. 2, Plate I, but on a fine linen or hard twisted cotton warp, 32 threads to an inch instead of 16. This must be prepared on the

weaving board with the additional fitting (Fig. 19) in its place in the manner already described.

The warp being ready and carefully spaced out 32 threads to each inch and 3 inches wide, plain weaving may begin and continue till the effect of plain linen is obtained. The weft should be cotton or linen about the same size as the warp thread, but rather softer and less twisted. We will suppose, then, that about 2 inches of plain linen is woven ; that it is fairly even, from 16 to 20 *threads of weft* to the inch, and the width of 4 inches has been maintained throughout. Let us start, for example, on the fourth study on Plate III. A green cross with a red centre in a dark blue panel on a light grey ground. The plain linen sides of the panel of tapestry must first be woven as far as the point marked by the letter A in the following manner. Starting at B, the shuttle must enter the open shed ; but instead of being taken right across the whole warp, it must be turned back 6 threads to the right of the centre, that is, half the number of spaces to be occupied by the first line of dark blue tapestry. It must be remembered that, in this kind of work, while the linen ground is woven on *single* threads, the tapestry work is done on *double* threads, so that each tiny square of ruled paper represents two threads of warp and two



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passes of weft. The ground shuttle turning back therefor at the point named above will lay the second line of ground weft and complete the first step of the diagonal line leaning to the right. To begin the left-hand diagonal the shuttle must enter at D in the open shed and rise step by step to point E. The vacant space for the tapestry weaving up to that point will now be ready. The space having been thus left for it, the tapestry beginning with dark blue weft can be started on the six double threads left bare at B and carried on until the space as far as F is filled up, two passes of wool weft being given to each step so as to exactly fill in the space so far allotted to the tapestry panel.

As soon as this point has been reached, room must be left in the blue panel for the green cross; the blue can be filled in as far up as letter C and the little blue pyramid at the centre can be completed. Next, the green cross can be fitted in as far as A, care being taken to leave space for the red square at the centre of the design. The red square can be finished and then the blue worked up as far as A. Then the green cross can be completed, and this will only leave the blue panel to be finished off at the top.

The panel being complete, it only remains to weave the plain linen surround in exactly the same method and order *reversed* as the portion beneath the panel was woven.

Fig. 1.

Fig. 2.

Chapter XV

DIRECTIONS FOR WEAVING IN THE COPTIC METHOD THE DESIGNS ON PLATE IV

AFTER weaving, as suggested, some, if not all, of the studies on Plate III, the student will be ready to attempt the more complicated designs on Plate IV, which are to be worked, also, on a warp 32 threads to an inch, and with a similar kind and proportion of warp and weft, viz., for the ground, softly spun linen weft about the same size as the warp; and for the tapestry portions, worsted fine enough to allow of being used *two*, or even *threefold*, and yet only occupy by *two complete passes*, when pressed closely together, the same space *as two shoots of the linen weft* used for the ground.

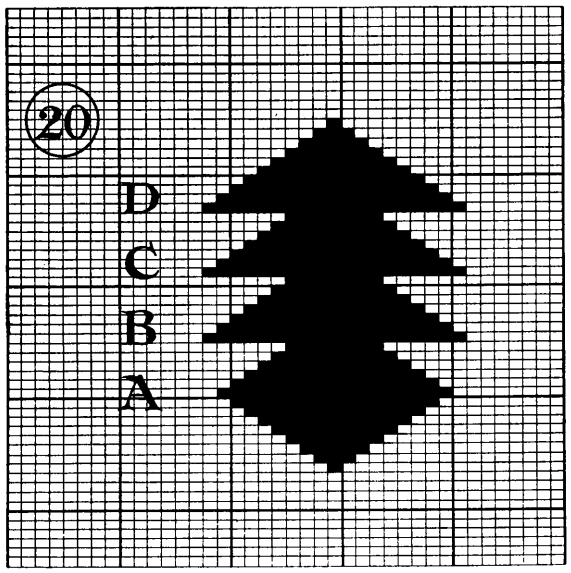
In the design Fig. 1 (Plate IV) several coloured worsteds will be required. From A to B, dark grey and light red; at C, yellow takes the place of the dark grey, and blue and green take the place of the light red. From D to E, plain linen ground is woven; at E, the dark grey comes again into use, and the yellow edge of the central diamond-shaped panel begins, very soon too the light green of the inner diamond shape is added. At F, the dark grey is dropped, and at G the dark red of the central floral form is begun. The centre of the design is reached at H, and after that the colours and shapes are carried on in the same order *reversed*. Thus the

colours required for the tapestry are seven, viz., very dark grey, light red, yellow, blue, dark green, light green, and dark red. In starting the design, plain weaving with an ordinary weft, as before explained, must be carried on for an inch or two before reaching the point A. Here the beginning of the triangle of tapestry work must presently start on the *centre pair* of warp threads. The space of vacant warp threads must be left clear and unobstructed by the cotton weft. This is to be done by ceasing at this point to carry the weft right across the warp and turning it back (1) from the four centre threads for *two shoots* ; (2) from the eight centre threads for two shoots, and so on by ten equal steps until the point B is reached. The plain weaving to the right-hand side of the triangle will now be complete, and the same order must be observed in weaving the left-hand side. The first entry of the shuttle must, however, be made at the left side of the two centre threads (indicated in Fig. 1 by a cross below the square), and the steps must be made at the *beginnings* instead of at the *ends* of every two shoots. If both sides have been correctly woven so far, there will be an unwoven space of bare warp threads left clear to be filled up with the coloured tapestry triangular form. If the studies on Plate III have been conscientiously worked out, there should be no difficulty in filling in the tapestry triangle in the two colours, as shown in the design.

The first triangle being successfully filled in and the tapestry beaten together so as to entirely cover the warp threads, plain weaving will go on till the point C is reached. Here the yellow shape with its small blue and green triangles begins. For this, a space must be left

in the centre of the work, the sides being built up step by step, as before explained.

When the tapestry panel is finished it can be covered in by half an inch of plain weaving which will carry the work as far as letter E. From E to F, the right and left-hand sides of plain weaving must be done first ; then the two dark grey diagonal figures can be fitted on in



their proper places. Next, the diagonal pieces of plain weaving will require special care, and the sides of the space for the yellow diamond shape will be piled up as far as the centre letter H. The V-shaped space being left in the plain weaving and carried to the centre of the design, the principal feature of the composition can be filled in and carried on until the top point of the diamond

shape is reached. The yellow sides can be woven as far as H. Next, the light green can be fitted in until the red flower begins, and then the red and green can be manipulated as far as the centre. This is really the only difficult part of the design, but the difficulty will easily be overcome by a little care and thought. It must always be remembered that it is *impossible to fill in any form underneath another, however small.* This will be explained by Fig. 20, which represents a square of tapestry. From the bottom edge to A, the white sides can be worked as far as that letter. The black form is then woven as far as B ; the white sides must then be filled up to the same place before the black form can be carried on. At B the black figure overlaps the white, and can only be carried higher than C after the white sides from B to C are woven. Between C and D the same thing occurs, but at D the difficulties are ended, and from this point the black ornament can be finished ; then, to complete the square, the white surround can cover it in. *It is this gradual building up the underneath shapes which is perhaps the chief difficulty in working out complicated forms in tapestry weaving.*

The centre of the study (Fig. 2, Plate IV) being reached, the tapestry panel must be completed before the sides are woven which cover it in with plain linen, and the completion of the design should present no further difficulties, as from this point it is only the same as the beginning, reversed.

CHAPTER XVI

THE WEAVING OF FIG. 2, PLATE IV

IF the course of study hitherto indicated has been thoughtfully worked through, Fig. 2 on Plate IV should not present insuperable difficulties to the student, although its detail is much less easy to weave than the purely geometrical forms of which all the previous designs have been composed. Notwithstanding that the design has all been worked out on ruled paper and could be counted in, square by square and line by line, there is no need for it to be so worked. The effect, when finished, will be more artistic and less formal if the shapes are modelled by the guidance of the eye rather than worked on the rigid squares. This does not, of course, apply to the panel shapes, in which the ornaments are set; these must be geometrically true, and must be counted and set out accurately on the strings.

The student should first make a copy of the two panels of the design the exact size of the spaces they are to occupy on the warp.[1] This copy should not be drawn on squares but drawn freehand, and the colours filled in in their proper places. From this drawing a tracing in strong clear lines must next be made. This tracing must be strong enough in line to be seen through the spaces between the threads when it is fixed at the

[1] This design must be worked on a warp 4 inches wide, so as to show half an inch of plain ground on each side of the large panel.

back of the warp to which it has to be transferred in the following manner—

(1) A strong, thin string has to be passed through the opening in the warp made by drawing forward all the leashes. This will enable us to bring all the threads of the warp to one level surface. (2) The string must be tightly stretched between the points marked X–X just above the space which has to be filled with the large panel. (3) The tracing, mounted on a piece of strong card or thin board, must be fixed so as to press firmly against the back of the warp in the exact position required, and be seen between the threads at the front. (4) The tracing must be repeated on the threads in indelible Indian ink or other paint which will not powder or rub off while the tapestry is being woven. (5) When the tracing on the warp is finished, a dot or dots only will be found on each string, which, as the strings twist about in the weaving, would often be lost to view. This disadvantage is obviated by painting a line round the string at every dot, so that whichever way the string turns the extended dot is always visible. This is certainly a very tedious operation but is well worth while, as it saves a great deal of time and uncertainty in the end.

The back tracing and the string being removed the weaving may begin, but must not proceed above point A until another matter has been explained and attended to. It has already been mentioned, and the student will have noticed for himself, that in tapestry weaving wherever a form is bounded by an upright line a split in the work is left unjoined. In very primitive tapestry weaving no attempt is made to join the web in the places where the splits occur. Designers for tapestry

generally avoid vertical lines as much as possible ; but when they must be used, the adjacent wefts are interlocked or carefully joined up afterwards with a needle. The former plan is certainly the better one, so, needless to say, the student must learn to interlock them in the weaving.

In the panel Fig. 2 (Plate IV), these slits would occur at the sides of the small panel AA, and in the large one between B and C at both sides. Instructions for continuing the design on Fig. 2 (Plate IV) must be continued in Chapter XVIII, as the technique of joining up the slits is so important that it must have a chapter to itself.

CHAPTER XVII

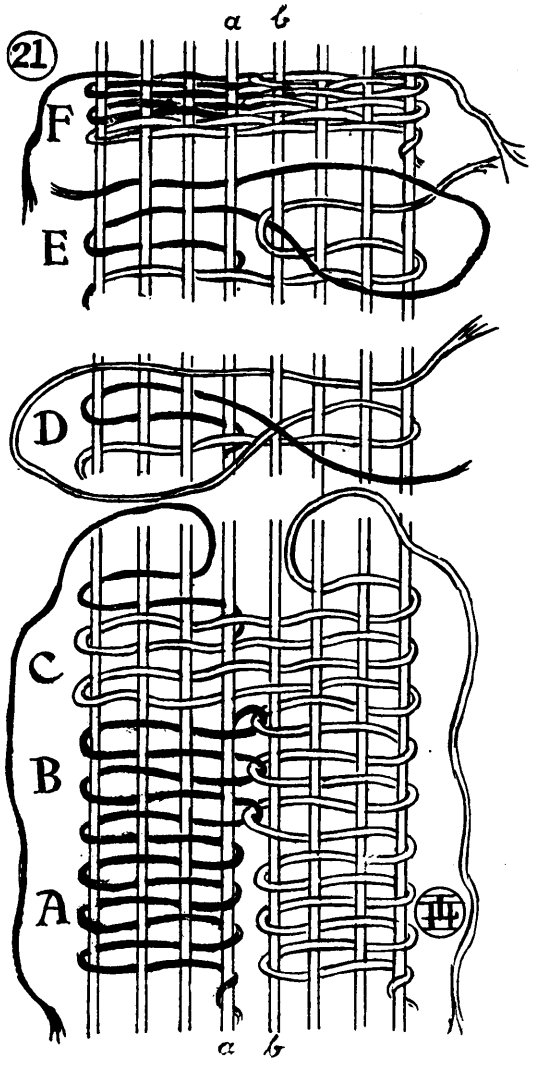
TWISTING OR JOINING UP THE WEFTS

THE method of joining or interlocking the wefts, called *twisting*, will be made quite clear by a careful study of the drawing, Fig. 22 (A, B, C, D, E, and F).

The upright lines of the drawing represent eight strings of a tapestry warp, the centre pair being marked *ab*. At the bottom of the diagram (letter A), two different coloured wefts have been loosely woven in and between *a* and *b* where the two colours meet the split, as described, is illustrated. At letter B the two wefts have been looped together. This looping, if properly and neatly done, effectually joins up the split, and is scarcely to be detected either on the *back* or *front* of the work.

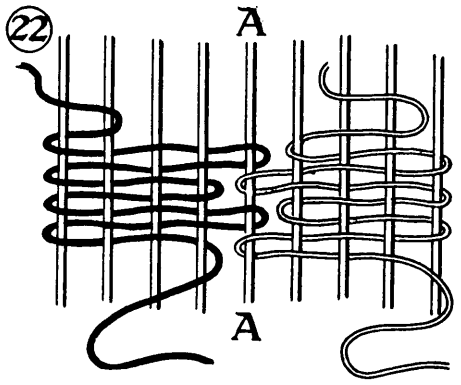
The method of looping the wefts together is shown in the three portions of the drawing marked C, D, and E ; and at F the effect of the joining, when the wefts are almost closed by being pressed or beaten together, is approximately given.

At letter C the light weft has been woven right across the eight strings for two passes. Then the dark weft enters the open shed behind string *a* ; is carried from right to left and returned from left to right in the shed opened by means of the leashes until it reaches string *a*, on the *left* side of which it is left hanging for the moment. The light weft is now brought along in


a b
21
F
E
D
C
B
A
IIII
a b

the open shed until it reaches string *b*, on the right side of which it, in its turn, is left hanging. In this position the two warp strings *a* and *b* are left uncovered, and the light weft hangs to the right of them and the dark weft to the left. The problem now presented is how to join the two wefts in such a manner as to not only prevent the slit in the work, but to turn each weft into its proper shed for continuing the weaving.

At letter D the light—the right-hand weft—is shown



passed *under* the dark weft and turned in a large loop, for the sake of demonstration, into its proper shed opened by the leashes behind string *b*.

At E the dark weft has been picked up and *passed* behind string *a* into its proper shed which is the open one. It will thus be seen that *the wefts approach and recede from each other in opposite sheds*; it is this fact which makes this most effective method of interlocking the wefts rather puzzling. When both wefts have been evenly drawn into their places, the joint is complete and

hardly perceptible either at the back or front of the tapestry.

Very often in ancient work, and in traditional Scandinavian tapestry, the twisted or interlocking joint is avoided by a device which prevents the split, but makes an indefinite line between the two opposing colours. Indeed, sometimes this blurred line is made use of as a special decorative feature of the work. This method of avoiding the twist is shown in Fig. 22.

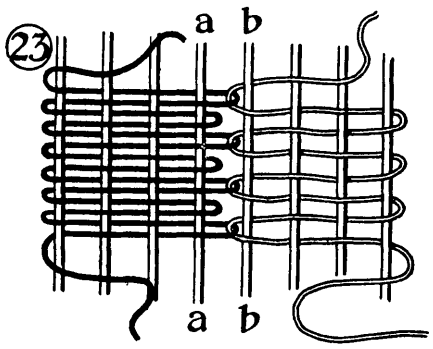
Here, alternate pairs of different coloured weft-passes dovetail into one another on either side of the warp string A ; this dovetailing, of course, prevents the slit and is perfectly strong and permanent.

It is not necessary to join the wefts at every pass unless the weft is very coarse in comparison with the warp, but no slits of more than two passes should generally be allowed to remain. The amount of joining required must, however, be left to the discretion of the weaver, and the kind of effect and strength of the work intended. Much joining is, of course, a great hindrance to the weaving, and the necessity for it should be avoided as much as possible by the designer.

CHAPTER XVIII

THE WEAVING OF FIG. 2, PLATE IV (*concluded*)

IN Fig. 2 (Plate IV) the principal places which require joining up are the vertical sides of the panels where the linen ground abuts on the tapestry. In ancient tapestries these slits were frankly left by the weaver and sewn up afterwards, or left open, as the case might be. The most satisfactory way, however, is to join



them together at the time of weaving by interlocking them in the manner just described, with a slight modification which can be understood by an examination of Fig. 23, where every second pass of tapestry weft is interlocked with every second shoot of ground weft before the latter is passed into the shed opened for it by the leashes. It will be found more convenient to use a packing needle for the linen weft in places where interlocking is required.

Turning once more to the design (Fig. 2, Plate IV), it will be seen that there are 16 shoots of linen weft required to weave the half-inch of plain ground below the small panel A A. This being done and tested, the first line of the panel, consisting of two passes of tapestry of two colours—green and purple—and 2 shoots of linen weft to the right and left of them, must be carefully completed. The line of panel occupying 2 inches, together with the inch of plain ground on either side, will occupy the warp strings, which, in the case of this design, is to be made 4 inches wide, as before explained. The weaving of this line must be carefully studied as the panel and ground require the use of the twist or join described in Chapter XVII and at Fig. 23 in this chapter.

(1) Two needles must be threaded with linen weft for the plain ground edges, two others with green wool and one with purple wool for the panel.[1] (2) The linen weft must enter in the open shed at the right-hand edge and be brought out 1 thread short of the panel and left hanging there. (3) the green wool weft must enter from the back of the warp between the second and third strings from the beginning of the panel, and be carried *over* and *under double* strings far enough to reach the spot where the purple weft is to be fitted in. After the pass is completed by returning the weft under and over the strings to the starting place, fourteen double threads will be covered. The joining with the linen weft is not to be effected until the second pass, which must take

[1] It will be found more convenient to use the packing needles for weaving edges and small pieces of plain linen ground. (*See* Chapter IX, p. 28.)

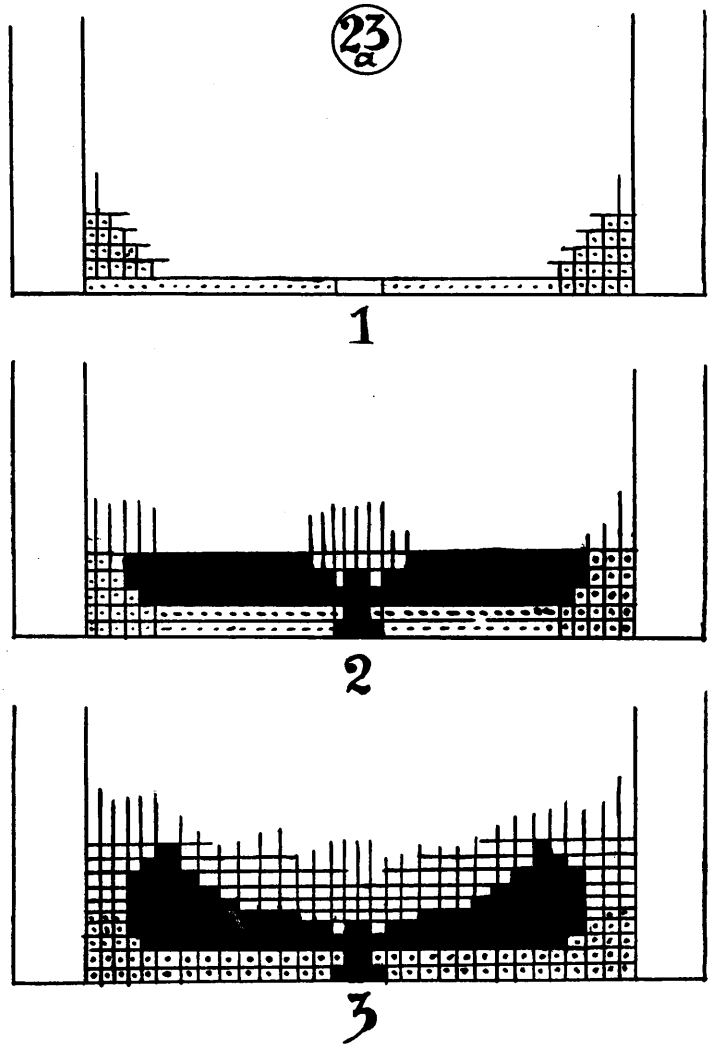
exactly the same course, has been completed and the needle left hanging at the front three single strings from the linen weft. These three strings will be left bare, and the joint must be made in the way shown in Fig. 20, between *a* and *b* at D, with the result shown by Fig. 23, at the top of the diagram. (4) The second shoot of linen being complete the linen needle will be hanging at the right-hand edge of the web and the green wool needle in front, between the first and second tiny squares of the line of green tapestry. In order to fix the twist in position it will be best to take the green weft under and over *five* double strings of warp, and, after carefully drawing the threads of linen and wool weft tight, so that they interlock *between the linen ground and the tapestry panel and remain fixed*, leave it and the linen needle hanging in their relative positions for a time. (5) Before weaving on the four squares of purple at the centre, the remaining portion of the green tapestry of the line must be woven and joined to the second shoot of the left-hand linen edge. In order to effect this the second green needle must enter from the back, leaving five double strings vacant, and go *over* and *under* thirteen double strings, return, and complete the pass, covering the fourteenth string and going under it for the second pass. The second pass cannot be completed until the linen weft is put in and brought back to meet it, so the needle must be left hanging while the necessary 2 shoots of linen at the left-hand edge are put in. The linen must enter from the back, between the two strings next to the green tapestry, and going to the left edge, must be returned so that the second shoot may be twisted with the green wool as on the

other edge. (6) The four squares of purple tapestry (two passes) can now be filled in, beginning, of course, from the right, and when this is done the first line of the tapestry panel and linen ground will be complete.

It is not always, of course, necessary when joining has to be done to work in complete lines, it is often much pleasanter and quicker to work up pyramids and diagonals two passes at a step and avoid having to make more than one joint at a time. This little panel is a case in point. We left the first green needle hanging from the open shed five squares to the left of the join, we may now take and complete two passes on the five squares, then, doing 1 shoot of the linen, make the joint and carry on with the green two passes, but only on four squares, and so on, reducing the green tapestry every two passes, one square at a time, until there are only two squares next to the plain ground. The opposite side must be built up and joined in the same way ; to start, however, the green weft must be carried at the back to the right-hand side of the fifth square from the join, taken over and under double strings and twisted with the linen weft at every second pass, as on the right-hand side.

The panel will now have reached the stage represented in Fig. 23A, No. 1, and be ready to receive the purple weft on the squares at the centre of the line. This being done, the second line of tapestry can be completed by filling in (1) the green squares, leaving room at the centre for two squares of purple, (2) by filling in the latter.

The third line of the purple is quite simple as it fills up the whole space between the four green squares at the edges of the panel. The fourth line has to be done


23
a
1
2
3

in three parts so as to leave the two single squares, afterwards to be filled in with green, on each side of the purple stem. The fifth line is the same as the fourth, except that the space must be left for three squares of green on each side of the purple stem. Stage No. 2 (Fig. 23A) is now reached and, if all is correct so far, the purple part of the panel can be completed with the green at the outsides, the latter being, of course, joined with the linen edges where necessary. In perfect tapestry no splits are left of more than two passes, and if the present study is to reach perfection the sixth and seventh lines of weft must be joined in two places, viz., between the purple and green at the centre and the white linen edging. Stage No. 3 (Fig. 23A) is now reached. Space does not permit us to continue the close analysis of the weaving of this study, the student must work out the rest for himself. This little panel is in some respects the most difficult portion of the whole work, and if successfully mastered will encourage the weaver to persevere to the end and thus produce a satisfactory piece of work in the Coptic method.

Chapter XIX

ADVANCED TAPESTRY

PLATE V and Fig. 2 of the frontispiece are respectively the design and a sample of tapestry woven from it by an expert weaver. It is given here to illustrate the possibilities which the board loom affords, in skilful hands, for the production of most finished and elaborate work.

The design for this work (Plate V), although drawn on ruled paper, is not fitted into the squares; in fact, the attempt to count in such free forms as the design consists of would limit the weaver and prevent the rendering of the general spirit of the subject. At the same time the ruled paper is very helpful to the designer in setting out the general plan of the work without measuring and tracing for the repeats, etc. Designing thus on squares is also advisable, as it checks any tendency to niggling, unnecessary detail, and constantly reminds the artist of the limitations of the craft and material for which he is working.

PLATE V

Chapter XX

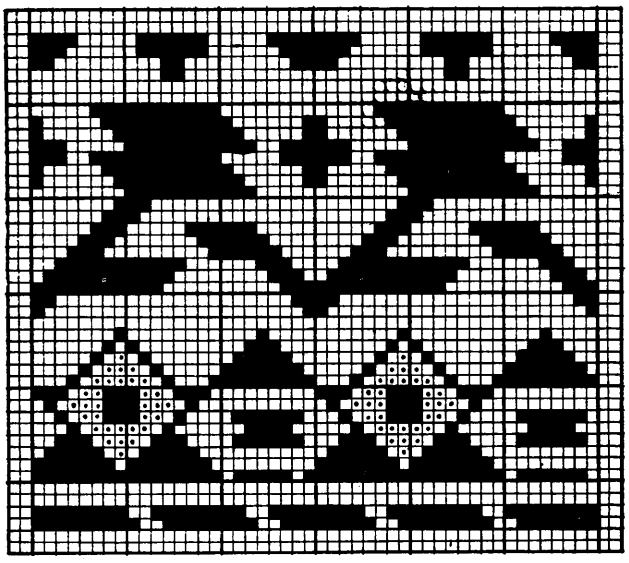
KELIM, SOUMAK, AND KNOTTED PILE CARPET EFFECTS

VERY pretty designs may be woven on the weaving board in the technique used for carpet weaving of different kinds in the East. Perhaps the most ancient carpets were the Kelims, which were used either as hangings, coverlets, or floor coverings.

The Kelim carpet stitch is simply that of ordinary tapestry weaving, the technique of which has been already fully described. In the Kelim carpet, however, no attempt is made to join up the vertical slits which occur ; but, in the design, long slits are generally avoided, and the weft is so solidly beaten together that the short slits have little chance of being observed. Curved and circular forms, which are more or less difficult to weave, are also avoided, and the designs consist, for the most part, of diagonal-sided forms, horizontal lines of various thickness with diagonal ends, triangles, zigzag lines, and small squares. With these simple geometric forms, skilfully arranged in compartments and with great variety and interchange of colour, a very pleasing and artistic result is achieved.

The Kelim carpet is reversible except that on one side, that on which it is worked, the ends of coloured weft are, for the sake of speed in weaving, carried across from one form to another and so left. They can be all

cut off close to the material without injury, for, if the work is properly beaten together, the ends can be shorn off without any tying or fixing in.



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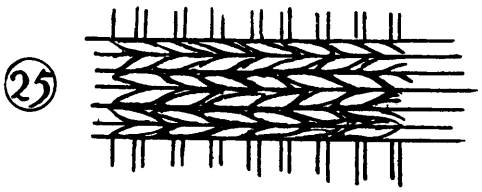
DESIGN FOR KELIM CARPET

Fig. 24 is a specimen of Kelim design rendered in black and white, and the Kelim at the top of Plate VI shows the working out of an interesting design of small squares.

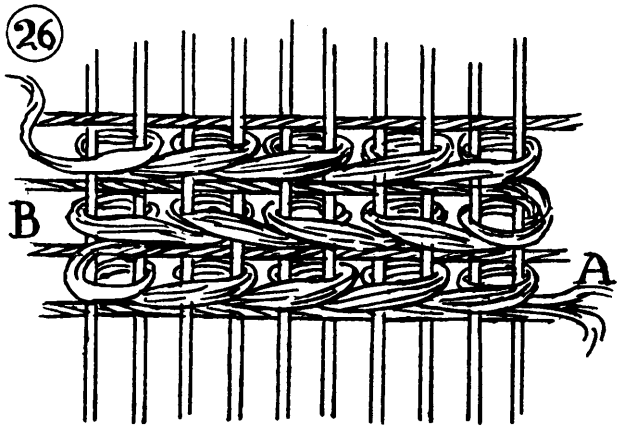
In this design one square of ruled paper represents the space *one thread* of warp and *two passes of tapestry weft* would occupy.

The Soumak stitch is a very interesting and effective variant of the Kelim technique; in fact, at the back it appears to be a very coarse tapestry on double strings

of warp. It may be used for brocading or inlaying simple forms in plain or tapestry-woven grounds, as shown in the fragments at the lower part of Plate VI. At the front the Soumak stitch resembles the embroiderers'



chain stitch, alternate horizontal lines having a bias in different directions. (*See* Fig. 25.) In Soumak weaving, each row of stitching is kept in place by having a shoot

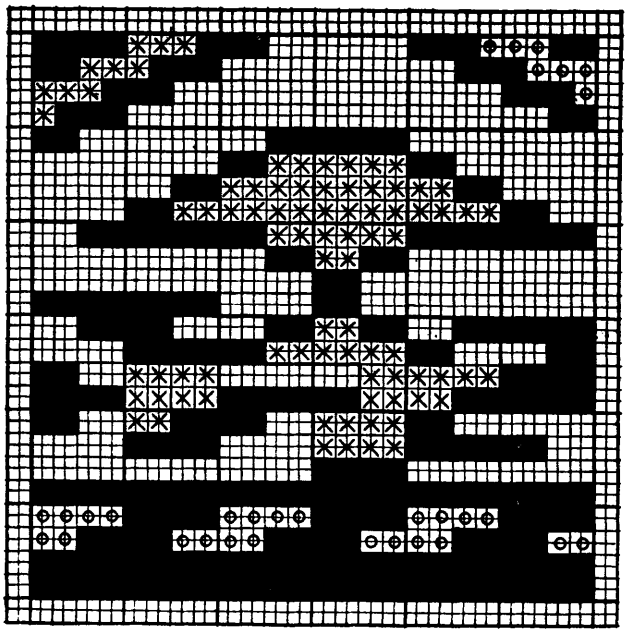


of weft or half a pass of tapestry woven between it and the next pair.

Fig. 26 will explain the technique of the Soumak stitch.

The needle or spool carrying the weft begins at A by passing in front of two warp strings, then, going

behind the same pair of strings, it is brought to the front, carried over four strings then back behind the next two and so on, over four strings and back two as far as that particular coloured weft is required. The chain is continued in various colours right across the



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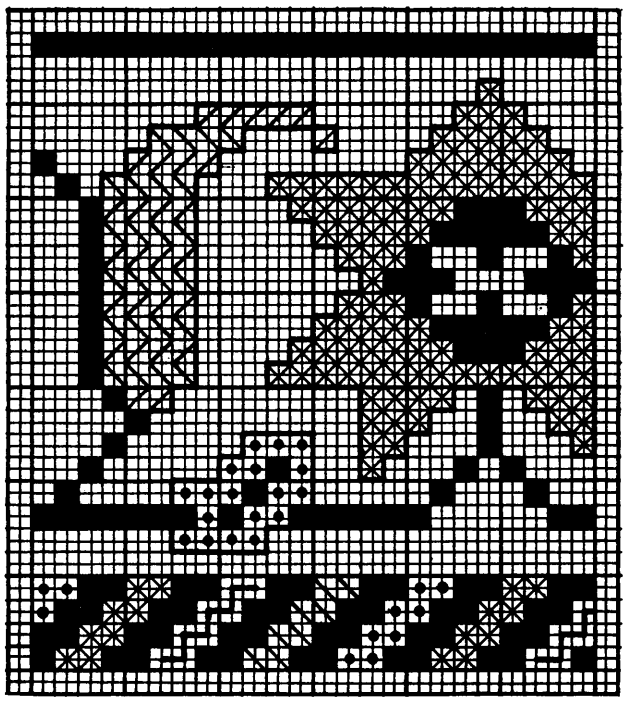
DESIGN FOR SOUMAK WEAVING

carpet according to the design, and when the line is complete, a single shoot of weft, or half a pass of tapestry, is woven to keep it in its place and bind all solidly together.

The next line of chain is begun in the same way, but from the left, marked B in the diagram; and after it is finished the second shoot of weft, or the second

half pass of tapestry, is put in to fix it down. The chain effect is made more distinct if a whole pass of tapestry is woven between each double row of stitches. This goes on line by line until the whole design is finished,



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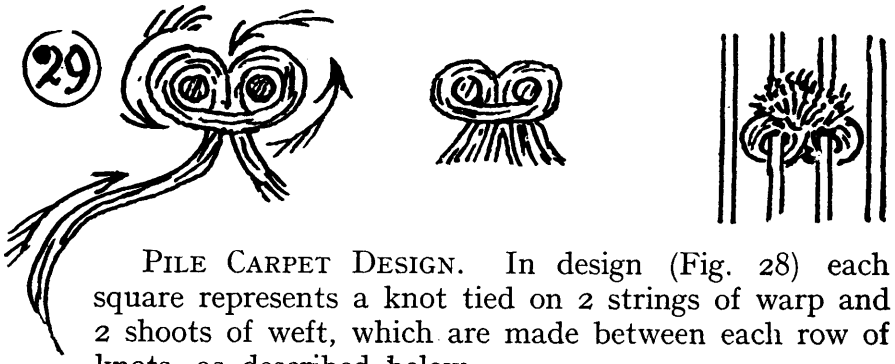
PART OF DESIGN FOR PERSIAN PILE CARPET
SHOWN WOVEN AT PLATE VII

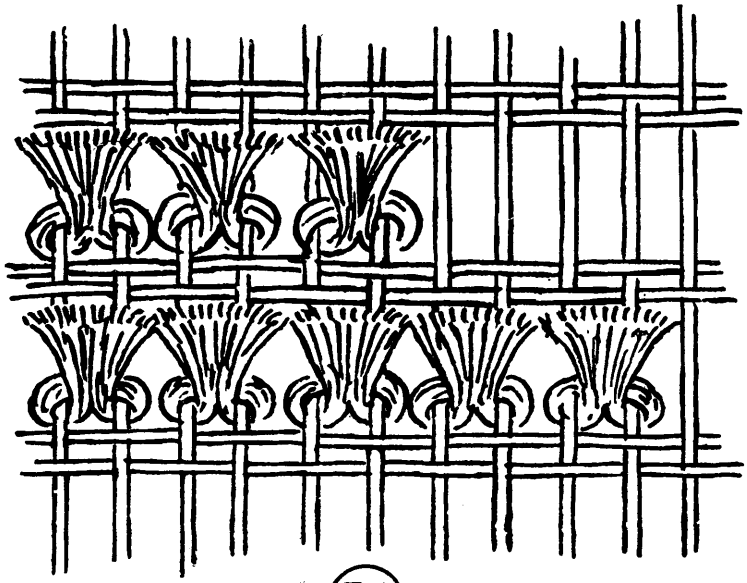
whether it be a little panel inset on a plain ground, or a whole rug or carpet.

In the design (Fig. 27) each space of four small squares represents 4 strings of warp, 2 lines of chain and 2 shoots of weft.



PILE CARPET DESIGN. In design (Fig. 28) each square represents a knot tied on 2 strings of warp and 2 shoots of weft, which are made between each row of knots, as described below.

The pile of a carpet, whatever the design may be, consists simply of rows of knots so tied on pairs of warp



strings that their ends stand up on the surface of the woven web, and, being cut off of an equal length, present a soft, even surface, and completely hide the foundation of plain weaving. Two shoots of weft are interlaced with the warp after every row of knots. This is perhaps the simplest form of pattern weaving that can be devised; for when the design has been once drawn out on ruled paper, and a warp of strings, evenly spaced and tightly stretched, set up, the number of knots, allowed to each colour by the designer, have simply to be counted and tied on row by row.

Fig. 29 will illustrate the most general method of tying the knots on two strings of warp, and Fig. 30 gives an opened-out diagram of several knots in a small space on the strings, with the ground weft between each row.

Chapter XXI

THE UPRIGHT TAPESTRY TABLE LOOM

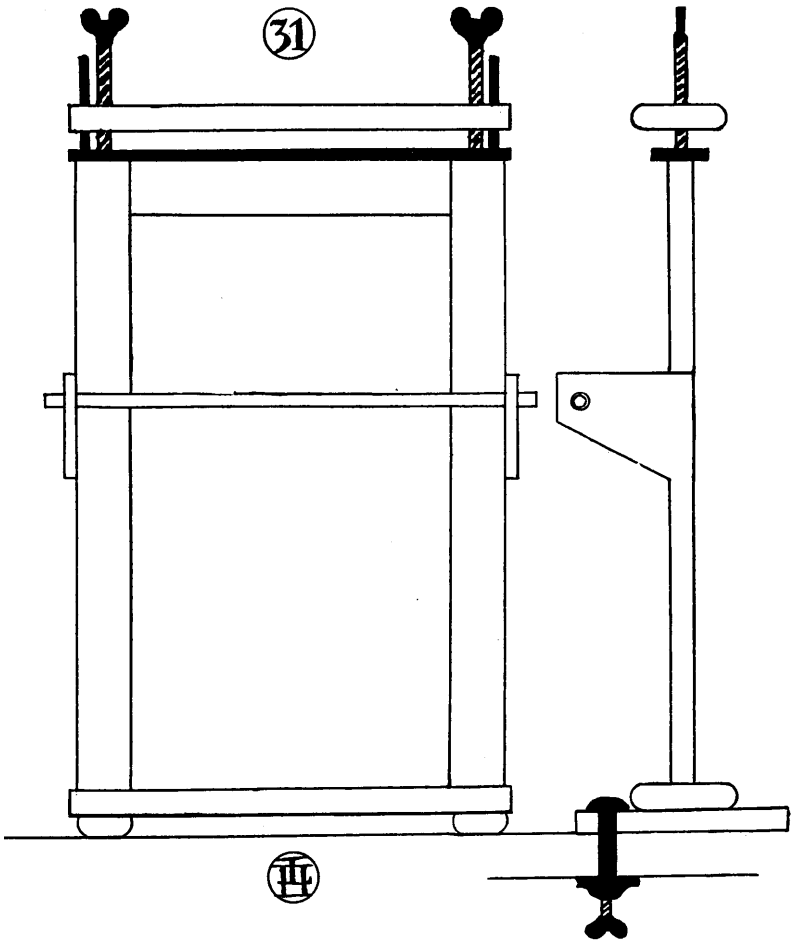
FIG. 31 is a front view and side elevation of a handy and effective tapestry loom of such dimensions as to be conveniently fixed by a clamp to an ordinary table or bench. It is about 2 feet 6 inches high and 2 feet wide. On it a panel of tapestry can be woven 1 foot 8 inches wide, and any length up to 3 feet 6 inches. With the addition of a pair of rollers at the back, which can be easily fitted on, 3 or 4 yards' length could quite well be made.

It will be seen that, like most of the appliances recommended in this book, it is not a miniature copy of the ordinary full-sized looms, etc., in general use. Such looms, when reduced in size, are not strong enough to bear the strain on the warp necessary for successful weaving, although they are, of course, quite useful on the lecture table to illustrate the principles of the craft. It has therefore been necessary to specially design and construct for students' appliances which will not only illustrate the principles of weaving, but will bear the strain of actual and constant working.

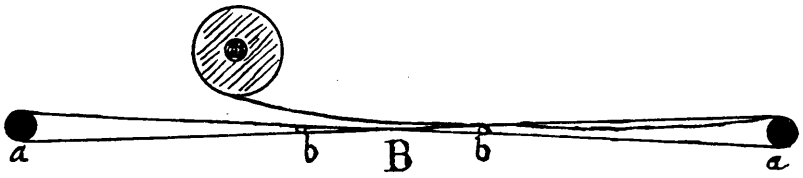
All the instructions given for tapestry weaving in previous chapters will apply to this table loom.

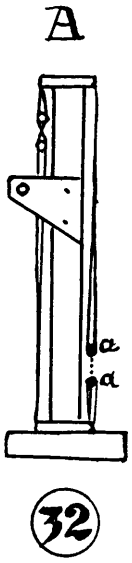
All the different parts of the table loom and the board loom will, on comparison of Fig. 31 with Fig. 1, be seen to resemble each other, and all the instructions

PLATE VII.



TAPESTRY TABLE LOOM





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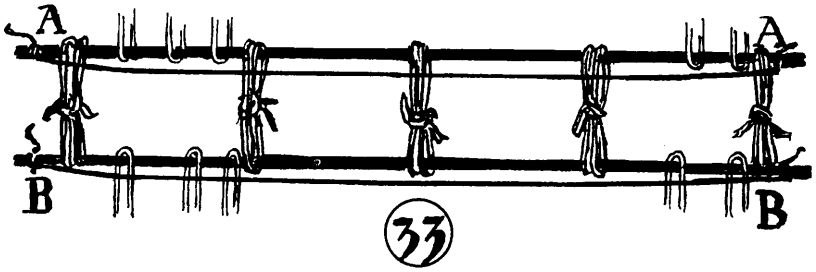
given for tapestry weaving in previous chapters will apply equally to work on the table loom. The warping, however, must be differently arranged for.

The table loom *can* be warped by simply twisting a single cord, *by hand*, round and round over the top and under the bottom boards, but this is a rather tedious method. The best way of warping is to fix two half-inch iron rods at such a distance apart that a double cord, if passed round the loom (as shown in Fig. 32 A), would allow the rods *a a* to approach not nearer to one another than 8 inches. When these rods are fixed the warp thread can be wound on to them from a reel, care being taken to cross the threads every time, as shown at B (Fig. 32).



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When the requisite number of threads are wound on to the rods, two sticks, as long as the width of the loom, must be inserted at *b b* and tied together so as to keep the cross between them. The whole warp, with the iron rods at its ends, can then be transferred to the loom and the rods lashed together tightly with strong cords, as shown in Fig. 33. It is almost needless to say that the iron rods must be prevented from slipping out of the loops at the ends of the warp by a cord being tied securely to *their ends*, outside the warp, so as to enclose it. In Fig. 33 only a few loops of warp are indicated on the rods for the sake of clearness, although the actual number may be two or three hundred if the warp is fine.

Chapter XXII

CONCLUSION OF BOOK I

THE limit of space allotted to the Author for this division of the subject of *Weaving with Small Appliances* has now been reached, but the capacities of the weaving board have been by no means exhausted: all sorts of experiments, both in tapestry and carpet weaving, to say nothing of automatic weaving of different textures and designs, are possible on this little appliance; in fact, *no interlacement of warp and weft which ever has been or can be devised, whether complex or simple, can be said to be impossible on it,* providing the weaver has sufficient patience for the work and unlimited time at his disposal.

Enough, however, has been advanced to introduce the student to the use of this handy little loom; and the Author feels sure that, having gone so far in the fascinating study of textile art, the student will continue to practice the craft, probably on a loom fitted with certain more or less automatic appliances which render complicated work less laborious and more speedy.

INDEX

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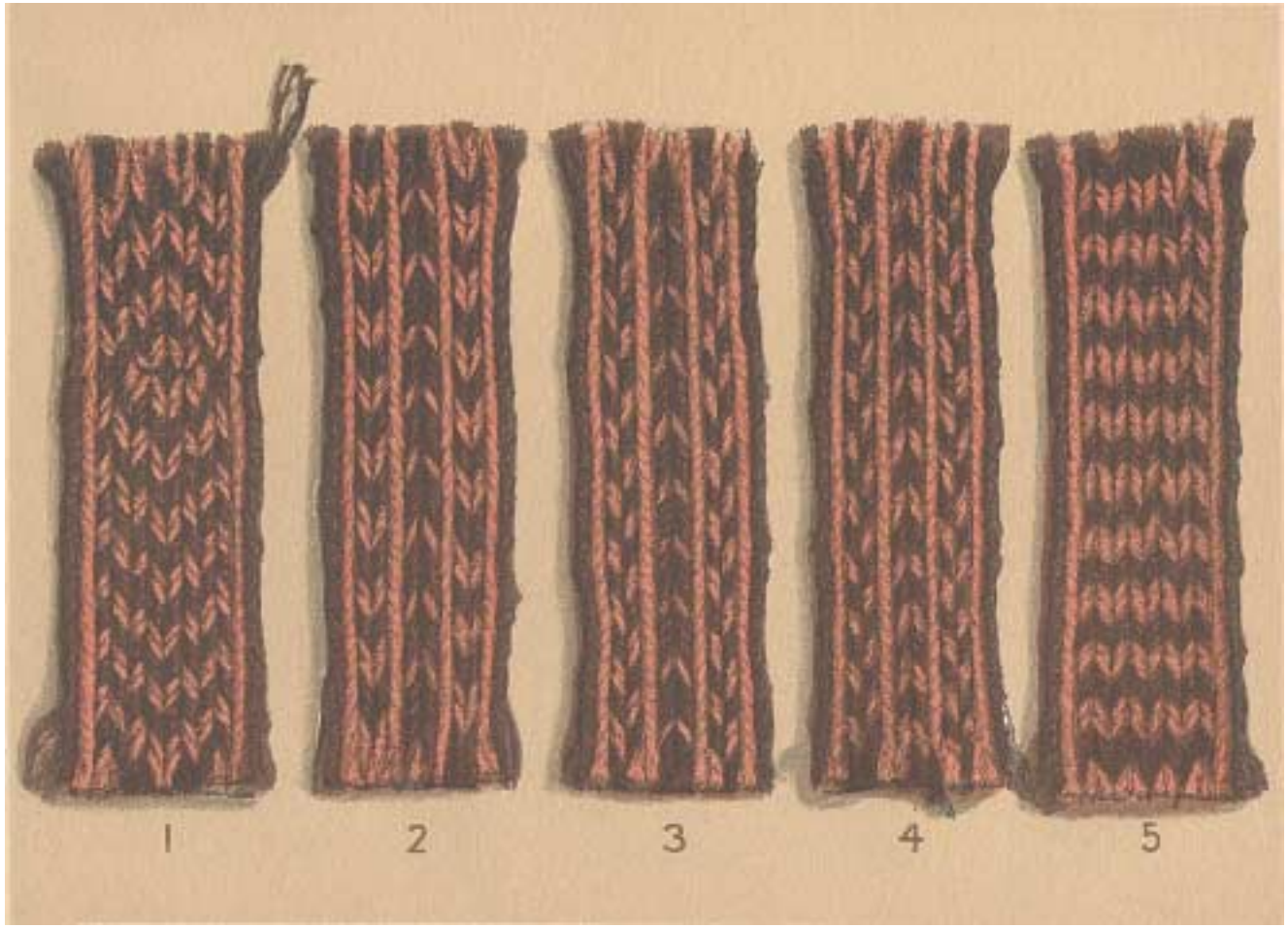
WEAVING
WITH SMALL APPLIANCES

BOOK II—TABLET
—— WEAVING ——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WEAVING WITH SMALL APPLIANCES

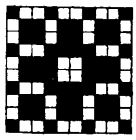
WRITTEN & ILLUSTRATED

BY

LUTHER HOOPER

DESIGNER AND WEAVING EXPERT; AUTHOR OF "HAND-LOOM WEAVING, PLAIN AND ORNAMENTAL"; "SILK"; "THE LOOM AND SPINDLE"; "WEAVING FOR BEGINNERS," ETC.; LATE LECTURER AND TEACHER OF WEAVING AT THE LONDON COUNTY COUNCIL CENTRAL SCHOOL OF ARTS AND CRAFTS, SOUTHAMPTON ROW, LONDON

BOOK II — TABLET WEAVING



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INTRODUCTION

MANY years ago I was shown, by the keeper of the Ethnological Department of a provincial museum a little bundle of thin squares of bone, having holes perforated at their four corners, through which a number of hopelessly entangled threads of different colours were passed. I was told that the simple appliance was an ancient, pattern weaving machine of Arabian origin, but that the method of working it was a mystery. I puzzled over the machine for an hour or two but could not solve the problem of the manner of using it, and, being very much occupied at the time, deferred the further study of it to a more convenient season. As usual in such cases the matter passed from my mind and seemed to be entirely forgotten. About four years ago, however, Mr. Kendrick, of the Textile Department of the Victoria and Albert Museum at South Kensington, who is aware of the interest I take in all kinds of weaving, recommended me to see two books in the Art Library which treat of the history and technique of what their authors term *Carton* or *Tablet* weaving, and on doing so I found

Note.—The two books mentioned above are—

1. Ueber Brettchen-Weberei von Margarethe Lehmann Filhés, 1901.
2. Le Tissage aux Cartons et son utilisation décorative dans l'Egypte ancienne, par A. van Gennep et G. Jéquier, 1916.

a more or less lucid description of the method of making braids and laces, of an infinite variety of designs, by means of little bundles of perforated cards such as the Arabian set I then remembered being interested in so long before. From these books we learn that the art of tablet weaving is pre-historic, was very generally used in the ancient world, both Eastern and Western, was practised in Europe in the Middle Ages and the Renaissance, and, that many kinds of beautiful braids and other narrow webs, for various uses, are still woven by this simple method in remote places where the primitive traditional arts and crafts still survive.

My interest in the subject was further stimulated by the very clear representation of the appliance in use which forms the most prominent object in the wonderful tapestry belonging to Rheims Cathedral, which was lent for exhibition, amongst many others, by the French Government two years ago to the Victoria and Albert Museum. In this tapestry the central figure, the Virgin Mary, is depicted weaving an elaborate lace on a tablet loom which stretches across the picture. Since seeing this work I have been studying the technique and capacity of the little appliance with much interest, and the outcome of the experiments I have made I have endeavoured to set forth clearly in the following pages.

CHAPTER I

HOW TABLET WEAVING DIFFERS IN PRINCIPLE FROM WEAVING ON THE BOARD LOOM, AS DESCRIBED IN BOOK I

THE student of board-loom weaving, as described in Book I of this series, whether it be tapestry, brocade, or carpet weaving, will agree that all the effects obtainable in that branch of the craft are achieved by pure handwork, and also, that in working, the weaver is at perfect liberty to produce any ornamental forms he pleases, even without making a previous drawing, if he so desires.

All other kinds of weaving are more or less *automatic*, that is, they require definite pre-arrangement not only of the design to be woven but of the order of its weaving. The number of threads to be warped must agree with the repeats of the design as regards width, the lifting of the warp threads, to allow for the intersecting of the weft, must all be contrived beforehand so as to work out exactly line by line and complete one repeat of the design in a certain number of lines. In perfectly automatic weaving all the artist's skill is required in making the *design* and *preparing the loom to weave it.* The actual weaver only turns a handle, manages a treadle or a set of treadles in regular sequence, pulls down certain cords in a prescribed order, or, as will be shown in the following chapters, turns backward and forward a little bundle

of tablets perforated with holes and threaded with various coloured warps.

Of course there are degrees of automatism in different kinds of weaving machines, which vary according to the mechanical perfection to which the loom and its mountings are carried ; for instance, a very simple loom fitted with a pair of treadles will automatically cause even thousands of *warp* threads to rise and fall in such a manner that the necessary intersections with them of the *weft* for plain weaving can be very quickly and easily made. Without this automatic arrangement each alternate thread of warp would have to be picked up separately; this would take a very long time to do. In such a case the benefit of the automatic lifting is obvious. On such a loom, so fitted with a pair of treadles, the processes of throwing the shuttle and weaving in additional weft ornaments on the plain ground, called *brocading* or *inlaying*, have to be done by hand, and those require as much skill on the weaver's part as do tapestry or carpet weaving.

Automatic arrangements can be, and are, carried to such perfection in some machine looms, that, threads in bewildering order and proportions can be lifted, and numerous shuttles carrying variously coloured threads be kept running in regular succession, so that elaborate designs, after being once set up and arranged for, can be worked out by the mere continuous turning of a shaft and pulley. With such perfect machinery the actual weaver has merely to watch for broken threads and mend them, and to keep the shuttles fed with weft.

Weaving with tablets is so far automatic, as will be presently shown, that many simple-patterned braids and

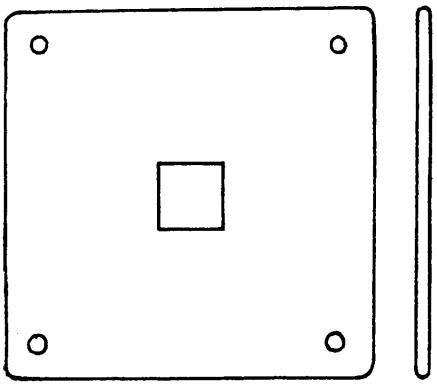
other webs can be woven by merely turning the set of perforated cards backwards or forwards, according to the design, after the warps have been arranged in a certain order, and the whole warp conveniently stretched on some kind of frame.

2—(525 4A)

Chapter II

THE TABLETS AND THE WEAVING STAND

FIG. 1 is a drawing of one of a *set of tablets* which may consist of any convenient number from, say, twelve to fifty. A tablet is simply a square made of some kind of hard material—wood, bone, ivory, or very strong, tough cardboard. The tablet must be very



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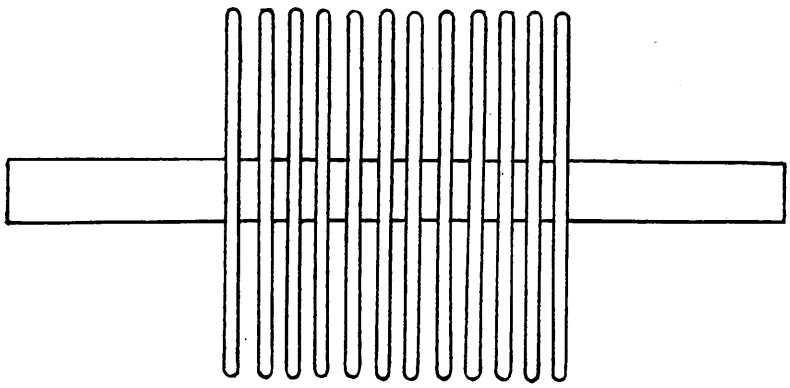
thin and smooth, and have all its corners and edges very nicely rounded, so as to retain no points or sharpnesses which would catch and fray any sort of delicate thread which may be used in the braid-making. The tablets may be of any reasonable size, but the most

usual measurement is about two inches square and as thin as possible consistent with strength. The square hole in the centre is half-an-inch in diameter, and the corner holes an eighth of an inch. The corner holes must be circular, very smoothly bored and their edges carefully rounded, so as not to ravel out the thread which



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is passed through them and is subjected to a good deal of friction as the tablets are turned about and moved backward and forward in the weaving. For first practice a set of twelve tablets will be quite enough for the beginner to manage. The warp for such a set will consist of forty threads, single or double threads as the case may be, four threads for each separate tablet.

For some kinds of weaving a rod which will easily pass through the centre holes of the tablets and keep them in position (*see* Fig. 2) will be required. It will

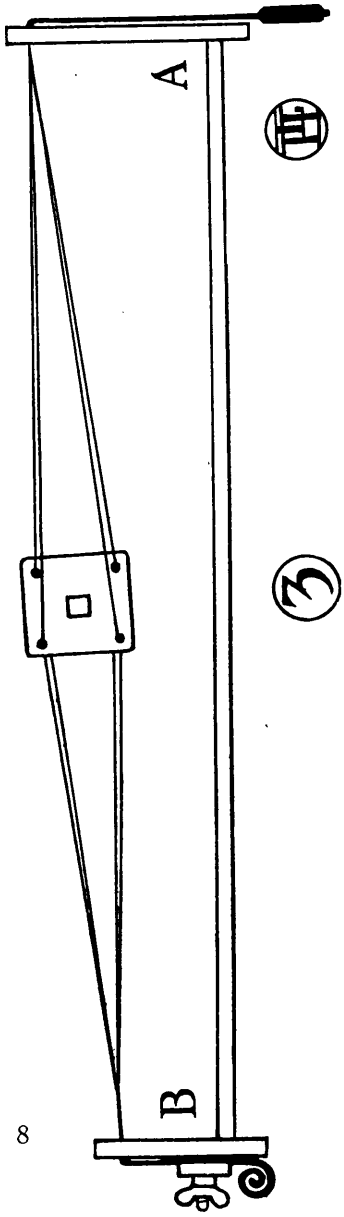


Fig. 3

also be useful when threading the warp and mounting it on the strand for stretching it. This stand must next be described. Fig. 3 gives a general view of it with the tablets mounted ready for weaving.

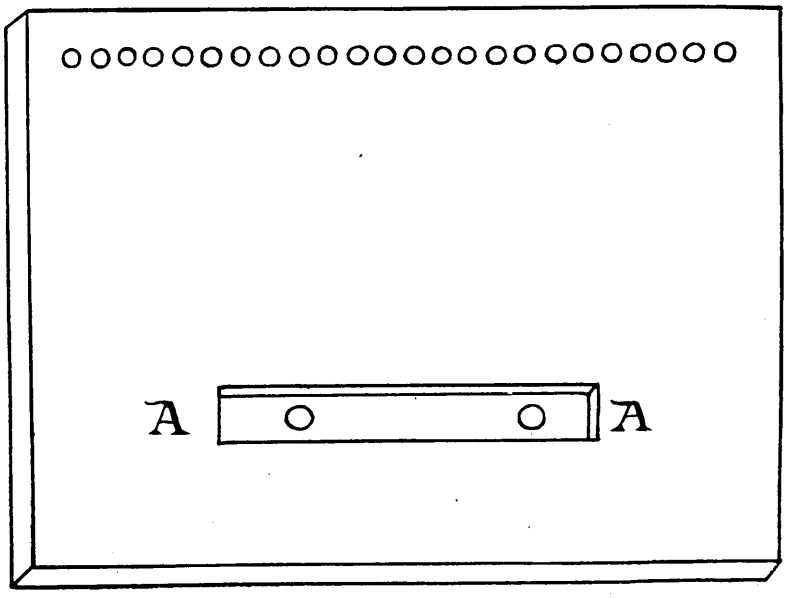
It is quite possible to weave rough kinds of braids by means of the tablets without any frame or mounting whatever, but it is much more convenient to mount them on a portable stand, which will hold them firmly in the position required for weaving and keep them stretched at an even tension.

If no frame is used one end of the warp is fastened to some object which will hold it firmly, and the other—the weaving end —is attached to the belt of the weaver. By this arrangement the tension on the threads required for weaving can be made greater or less by a slight movement of the weaver's body ; it is difficult, however, to keep a steady, even tension by this method, and accurate weaving is almost impossible.

The details and measurements

of the stand shown in Fig. 3 are as follows. The stand consists of three parts: Fig. 4, Fig. 5, and Fig. 6.

Fig. 4 represents the most important part of the



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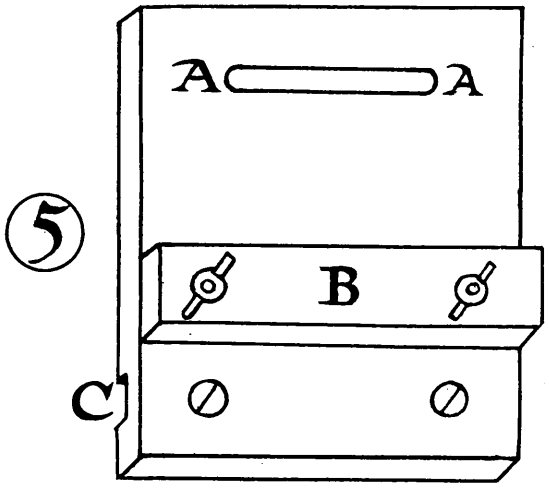
stand. It consists of an oblong piece of wood eight-and-a-half inches wide, six inches high, and three-quarters of an inch thick. Half-an-inch from the top edge a row of holes is pierced, the holes being fully eighth of an inch in diameter, and not fewer than three holes

to an inch. The holes must be cleanly bored and perfectly smooth at their edges, like the corner holes in the tablets themselves. Four inches from the top of the board a shallow slot must be cut four inches long, three-quarters of an inch wide, and not more than a quarter of an inch deep. The slot is marked A A in the drawing, and the two holes shown in it are pierced right through

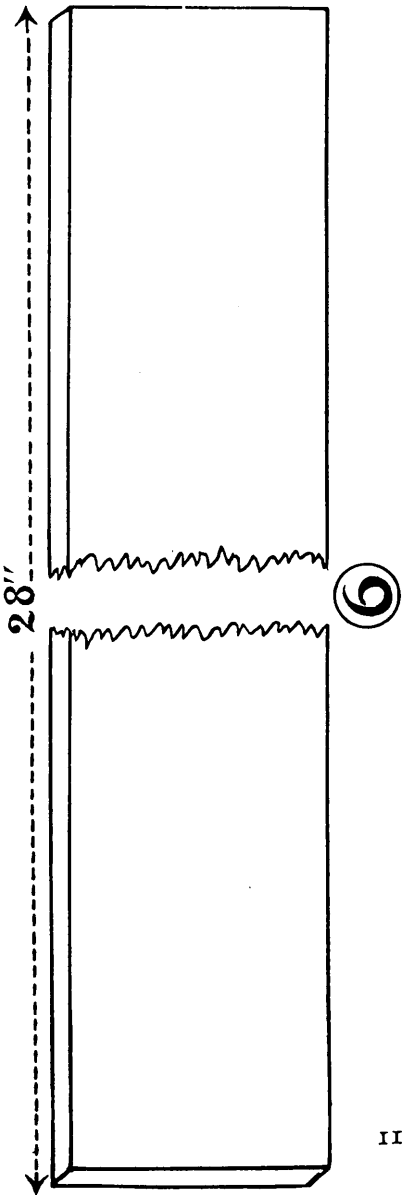


the board. The position of the board in the frame is shown at A, Fig. 3.

Fig. 5 is a drawing of the opposite end of the stand, B, Fig. 3. It is the same thickness as Fig. 4, but is only four inches wide by five inches high. Instead of the row of holes near the top, as in Fig. 4, there is cut in Fig. 5 a narrow slot, A A, two inches from end to end and

three-sixteenths of an inch wide. This slot is cut right through the wood and has also its edges nicely rounded. The attachment B is merely a smooth piece of wood about an inch wide and half-an-inch thick, fixed by wing-nuts so as to fit closely to the surface of the board. Quite near the bottom edge of the board, a groove C is cut to match the slot A in Fig. 4.

Fig. 6 is merely a narrow board four inches wide, twenty-eight inches long, and three-quarters of an inch thick. Its purpose is to join the two ends of the stands (Figs. 4 and 5) together as shown in the sketch, Fig. 3. The ends of the board D D fit into the slots, letters A A, Fig. 4, and C, Fig. 5, and is kept in its place by screws which pass through the holes in the slot, Fig. 4, and by the screws shown in the lower part of the end at Fig. 5.



Chapter III

THE WARP AND HOW TO MAKE IT

IN all kinds of weaving the preparation of the warp—the threads that run the length of the woven stuff—and the threading, or *entering* as it is called, of it in the loom is a very important operation, and much of the pleasure and success of weaving depends on its being correctly done. It is necessary, therefore, that great care be taken, even with the smallest and simplest warp, to do it evenly and well.

No very elaborate appliance for the making of a warp for *tablet* weaving is required, in fact it can be done without much difficulty on the backs of two or three chairs. What has to be done is to lay an equal length of from about fifty to a couple of hundred threads and take a cross at both ends, between alternate sets of four, to keep them from getting hopelessly entangled. Each set of four threads may be composed of one, two, three, or four different coloured ones, according to the design to be woven.

A little warping board can easily be made on which any length of threads, up to two yards or even more, can be quite perfectly laid. Its construction and the method of using it are shown by Figs. 7, 8, 9, 10, 11, and 12.

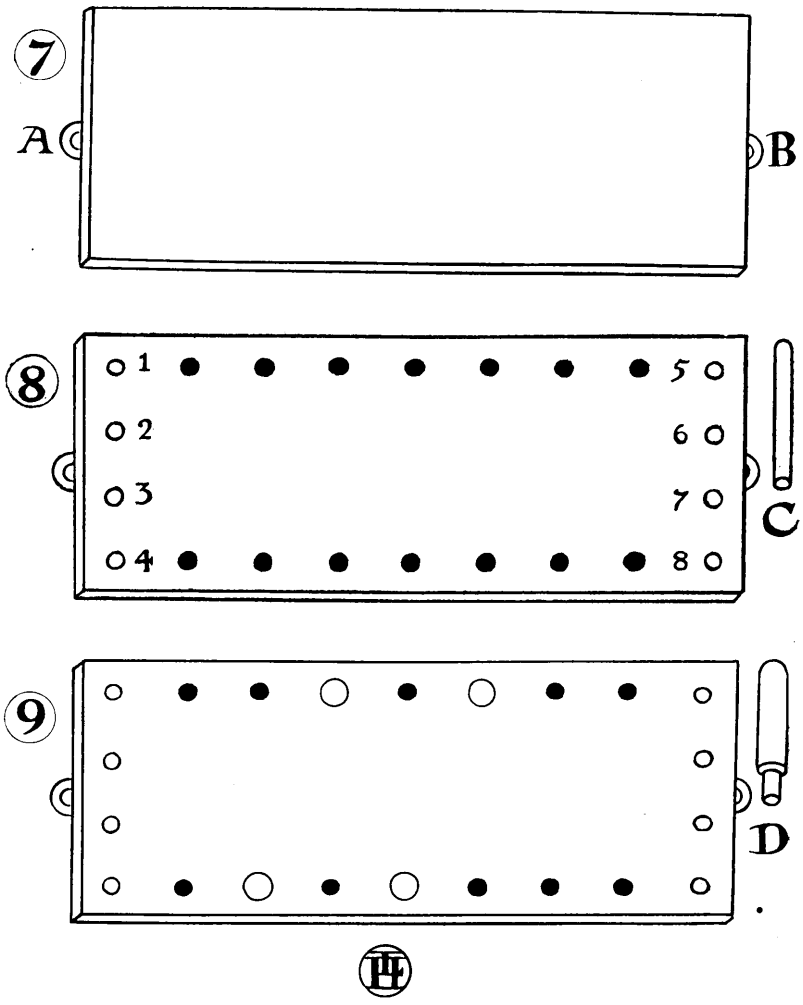
Fig. 7 is a half-inch board, seventeen inches long by seven inches high, which can be fixed to some upright surface, such as a wall or door, by means of the two little plates or staples A, B showing at the sides.

Fig. 8 is the same board pierced with twenty-two holes exactly the same size, say, a quarter of an inch. Of course the dimensions and numbers given may vary, but it is best in descriptions of this kind to be as definite as possible, for the sake of clearness. Into each hole, numbered respectively 1, 2, 3, 4, 5, 6, 7, and 8, pegs, such as that shown at C, Fig. 8, are firmly and permanently fixed by being glued in, whilst the holes between pegs 1 and 5, and 4 and 8, are empty.

By the side of Fig. 9, at D, another kind of peg is shown of the same length as C, Fig. 8, but it is of a slightly different shape. Up to half-an-inch from the lower end it is the same thickness as the other peg, and should firmly fit into any of the empty holes without being glued in. The upper part of the peg is thicker, and has a shoulder which rests on the surface of the board when the peg is fitted into a hole. Of these pegs there are four, two for the top and two for the bottom row of holes, and it is clear that they can be fixed in any position desired along the top and bottom of the board.

Fig. 10 is a drawing of the board with the movable pegs arranged in pairs, in such a manner as to make the longest warp possible on a board of this size pierced with this number of holes. Also it will be seen that there is a space of three inches between the two pegs of each pair. The pegs are so placed in order that it may be convenient to make the important crossing of the alternate threads at the *beginning* and the *end* of the length of warp.

Within certain limits it is possible to vary the length of warp with great nicety. If the length of a warp, the course of which is indicated by the dotted line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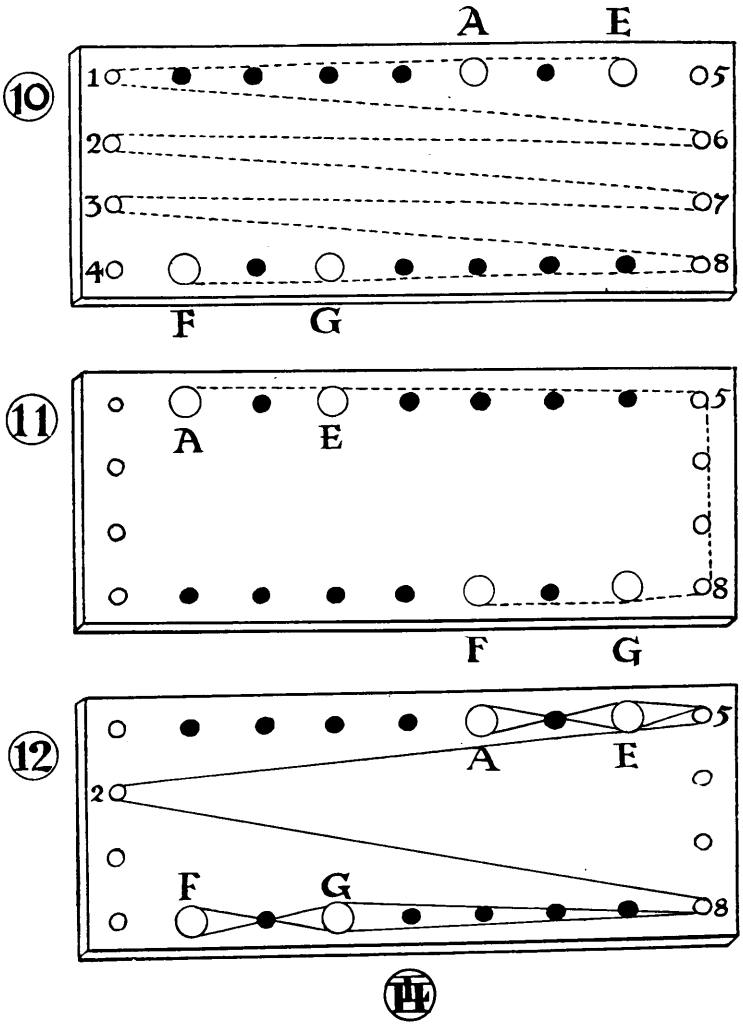
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F
G
11
A
E
5
8
F
G
12
A
E
5
2
F
G
8
13

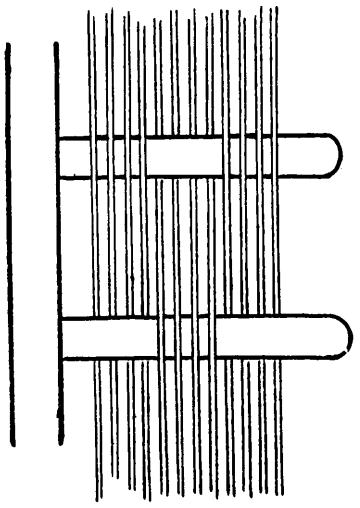
running between the pegs E and F, Fig. 10, be calculated, it will be found to measure seven times fifteen inches, less three inches, that is, one hundred and two inches, or eight feet six inches. The line goes from peg E to peg 1, from 1 to 6, from 6 to 2, from 2 to 7, from 7 to 3, from 3 to 8, and 8 to F.

Any shorter length can be arranged by altering the direction of the course from peg to peg and shifting the position of the pairs of pegs A, E, F, and G. Thus from E to 1 and from 1 to 8, then direct to F, will be three feet six inches, whilst from A to E round pegs 5 and 8 will give two feet (*see* Fig. 11). It is not necessary to give more examples as the student can work them out for himself.

At Fig. 12 the board is shown with a warp on it of a convenient length for our first tablet warp, which we will determine to make four feet long. The crossings of the alternate warp threads referred to above are shown between the pegs A and E and F and G. Having been looped on to peg A, the starting point, the thread, or group of threads, was taken *over* peg E, round the fixed peg 5, taken right across the board to peg 2; from peg 2 it was carried direct to peg 8 and round peg 8 as far as the movable peg G. It was taken *over* G, *under* and round F, *under* G, and back in the same course until it reached peg E; it was then taken *under* E and carried *over* and *round* A, which finished the first course as shown at Fig. 12. This course has to be repeated exactly again and again, until as many threads are laid as are required for the work in hand.

Now let us consider what is the simplest braid we can weave on our frame fitted with twelve tablets and then proceed to warp it in the manner just described.

The simplest braid we can weave is, of course, one made with only one colour, perfectly plain, and the same on the back as on the front.



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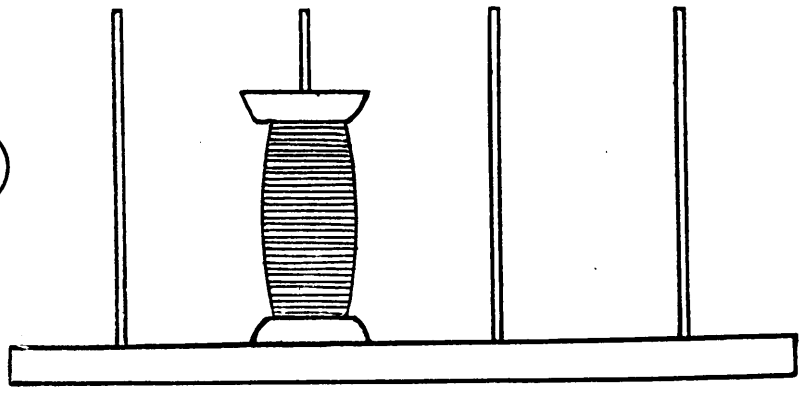
In order to make this braid we shall have to warp forty-eight threads in all for a set of twelve tablets; four threads for each tablet. The cross at each end of the warp need not be taken between every alternate thread, but between every group of four as shown in Fig. 13.

The little stand (*see* Fig. 14) will be found convenient for holding the four reels on which the thread for the warp is first to be very carefully wound, as described in Book I,



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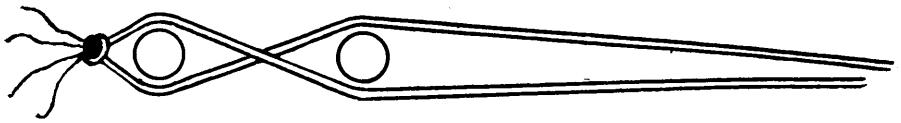
Chapter IV, on board loom weaving. The stand is merely a flat board with four stout wires fixed upright in it about two inches apart. In order to make it stand quite firmly, it must be fixed by a small clamp to the edge of a table. The reel stand, with the reels on it, must be placed in a convenient position a little to the left of the warping board, wherever it is fixed, and, the ends of the four threads being tied together, they must be divided into pairs and be looped over peg A, Fig. 12, one pair passing *over* and the other pair passing *under* it. The two threads passing under peg A must then be passed *over* peg E, and the two from above peg A must be carried *under* peg E, thus making a cross of double threads between pegs A and E (*see* Fig. 15).

This is the most convenient way of beginning and ending the warp because it saves unnecessary knots, but all the intermediate crossings are between alternate four threads, as shown in Fig. 13.

The first cross being made, the four threads are carried together, great care being taken not to twist them, over peg 5 and then follow the same course as that indicated in the diagram, Fig. 12. When the four threads reach peg G they must go *over* it, *under*, *round* and *over* peg F, *under* peg G, and so back in the same course to peg E, which they must all go *over*, then *under*, *round* and *over* peg A and start the next course by going *under* peg E.

Six times forward and six times backward, passing along the same course, will lay the forty-eight threads required for our set of twelve tablets, so that after the sixth return the four threads are to be divided into pairs as at the beginning, and when these threads are crossed, cut off, and tied together behind peg A, the warp is



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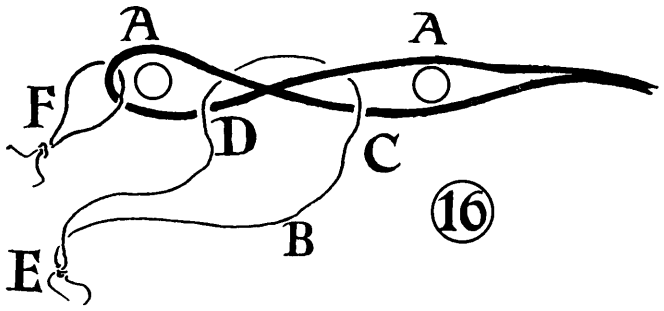
finished and it only remains to secure the crossings and remove it from the warping board.

The crosses can be easily secured in the manner illustrated by Fig. 16. As the two ends of the warp are alike they will naturally have to be secured in the same way.

In Fig. 16, A A, are the movable pegs, A, E, F, and G, Fig. 12, with the crosses in the warp between them, the warp being represented by the thick line. B is a short length of strong thread or cord, an end of which has been put in the opening at the front by the side of the peg at C, and brought through from the back of the cross by the side of the other peg at D. After making sure that the thread was clearly through each opening with the pegs, the operator tied the ends firmly together as at E. It



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will at once be seen that this effectually secures the cross. In the same opening as the cord passed through at D, but on the other side of the peg, a shorter piece of cord F is also passed and its ends tied together. This has nothing to do with the cross, but is useful in handling the warp when it is removed from the board, and it requires to be just as carefully done.

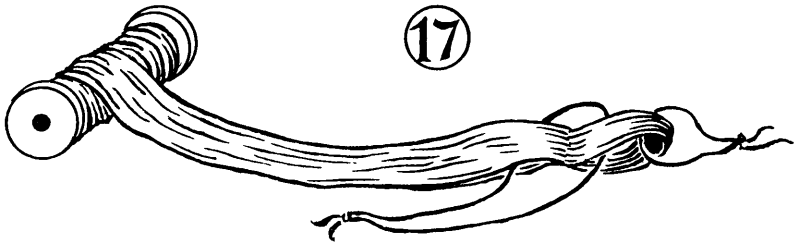
It should, perhaps, be added that Figs. 15 and 16 represent both ends of the warp when finished.

CHAPTER IV

FIXING THE WARP ON THE LOOM AND MOUNTING THE TABLETS

WHEN the warp is taken off the board it should be wound on to a reel, care being taken to wind it evenly and to prevent its being twisted (*see* Fig. 17).

Fig. 18 shows the tablet frame ready for mounting. In fact the mounting has just been started by the drawing



of the loop F through the slot A A in the end board. The holder B has been removed, and the cross-loop F and the end loop E have been drawn through with the warp end. A small rod, four inches long and about a quarter of an inch thick, will now be required for fixing the warp in its place in the end board and preventing its being drawn through the slot A A when tension is given to the threads. The rod must be placed in the opening kept by the loop E and the part of the loop F. When

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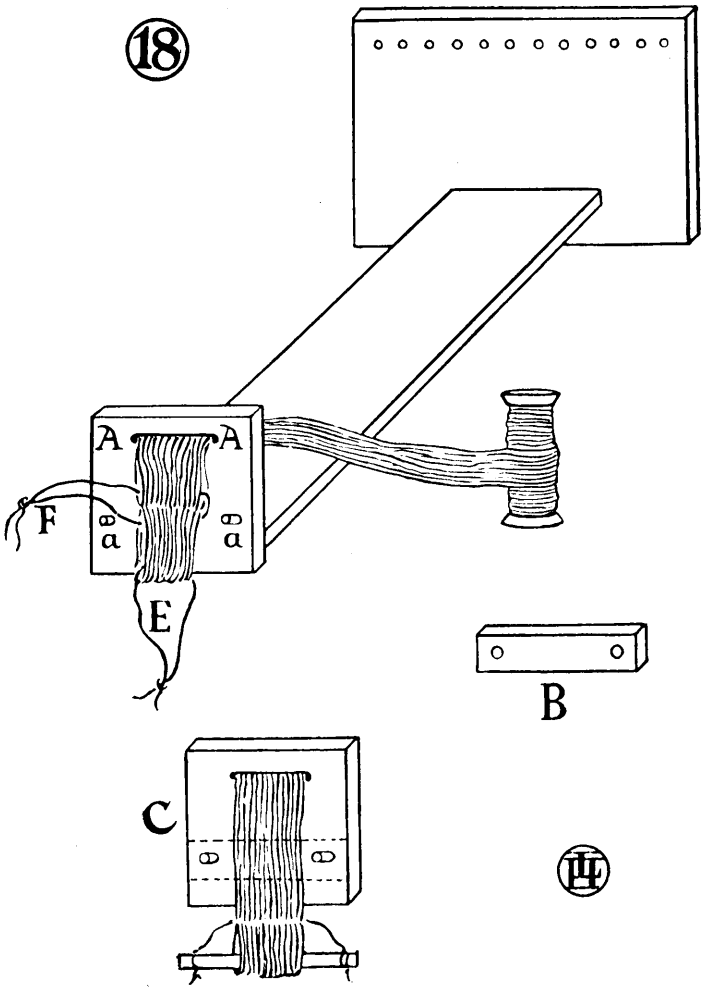
18
A
A
F
a
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E
B
C
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a
四

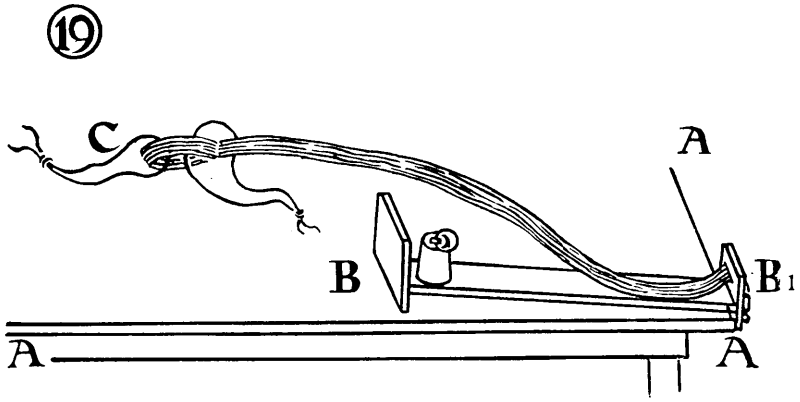
the rod is in the opening the loop E must be removed and the knot at the ends of the cord which forms loop F cut off or untied. The half of the loop F which remains in the opening with the rod must be then drawn out and both ends of the cord tied firmly to the ends of the rod. It will now be possible to arrange the warp end as shown at C, Fig. 18, and the bar B, Fig. 18, can be fitted on the screws a a and fastened down by the wing-nuts, leaving the rod below it, thus effectually preventing the warp end being drawn through the slot A A in the end board. The dotted line C, Fig. 18, shows the position of the bar B, when it is fastened down. Before the bar is tightened the rod must be drawn close to it.

Having thus secured one end of the warp the next thing will be to thread and mount the tablets. This is such an important part of the work that it must have a chapter to itself.

Chapter V

THREADING THE TABLETS

IT is probable that other ways of threading the tablets than the one set out and described below, varying in unessential details, will suggest themselves to the student as experience in setting up the loom is gained by practice ; but a description of one method of proceeding will be sufficient for the purpose of indicating the

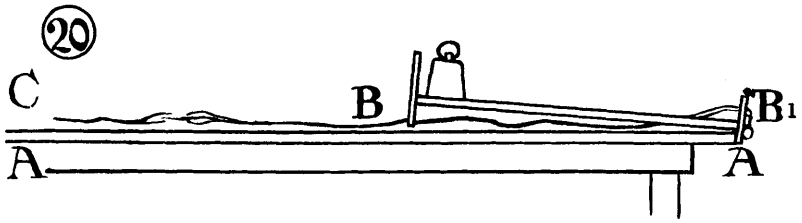


points which are essential to observe, and the errors which must be avoided in the process, whatever exact method may be found most convenient in the end.

Letters A, A, A, Fig. 19, indicate the corner of a table seen from above, on which the mounting is to take

place, and between letters B and B the loom is represented at the stage of mounting at which we left it in the last chapter, that is, with the end of the warp fixed in the slot of the board where the weaving is to begin.

Fig. 20 is the side elevation of Fig. 19: it shows clearly the manner in which the loom is held firmly to the table. The perforated end board at B has a fairly heavy weight placed near it on the back board, and that at B_1 laps over the edge of the table and prevents the loom being pulled in the direction of the letter C. The

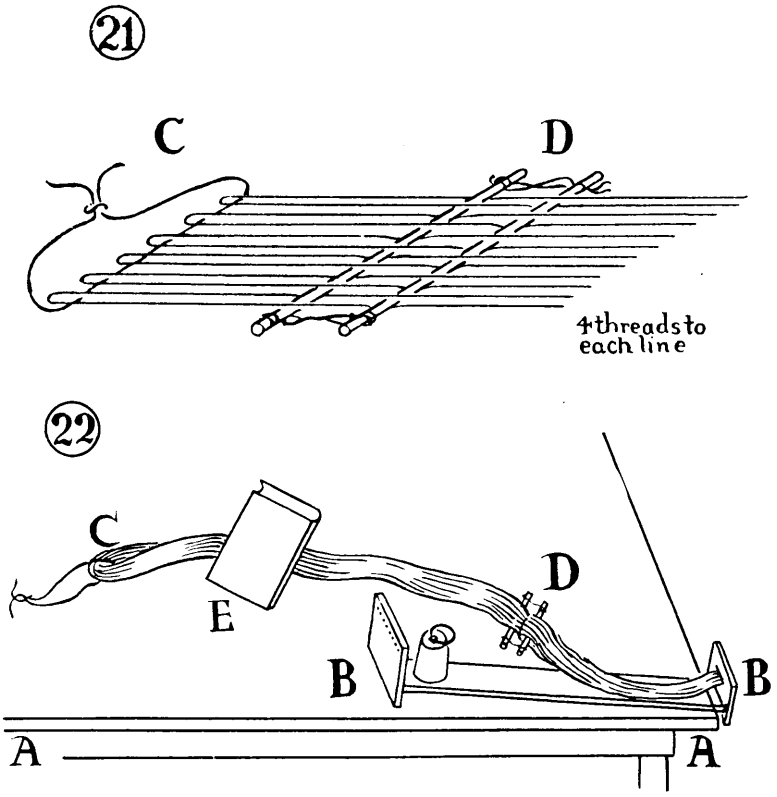


warp is shown lying loose, but flat and untwisted between B_1 and C in both drawings.

The end loop C in the warp must now be taken in hand, and the cross loop being spread out, two little sticks must be inserted in place of the string, which keeps the warp threads divided into separate groups of four. The sticks are for the purpose of making the cross quite clear as in the drawing, Fig. 21.

Fig. 22 shows the next stage of the process of mounting. Here the sticks, after being tied together at their ends, have been slipped along the warp with the cross between them as far as D, and a heavy book has been placed near the end of the warp so as to hold it firmly down to the table.

In order to draw each set of four threads out in regular order for entering in the tablets it will be necessary next to separate the ends of the threads. This will be done



by cutting through the loop of threads at C. This is clearly shown at Fig. 23, A and B. All preparations are now made and the entering of the tablets may begin.

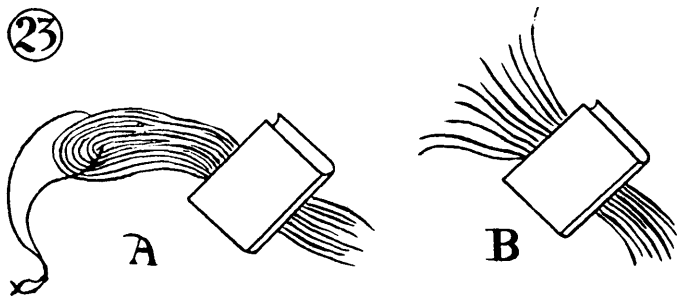
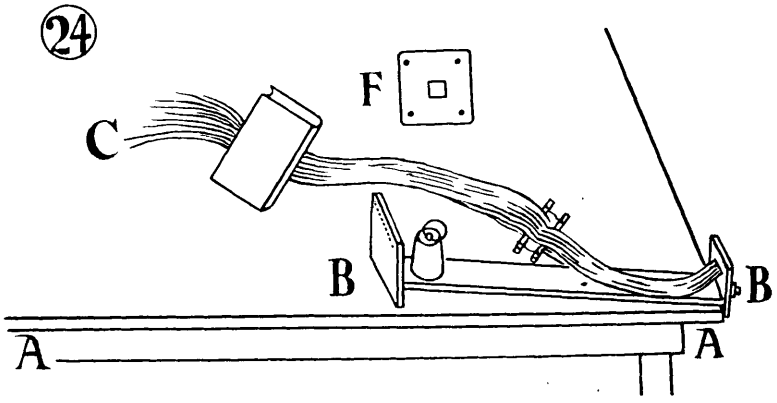


Fig. 24 is exactly the same as Fig. 22, except in two particulars. In this drawing the ends of the threads at C have been separated as shown at B, Fig. 23, and the first of the bundle of tablets (letter F) has been placed near at hand for entering.



In Fig. 25 two tablets (A and B) are shown side by side. A is unentered and B has been threaded with the first four threads drawn from between the cross rods at D, Fig. 22, one thread being passed through each hole at the corners in the order shown by the numerals 1, 2, 3, and 4, letter A.

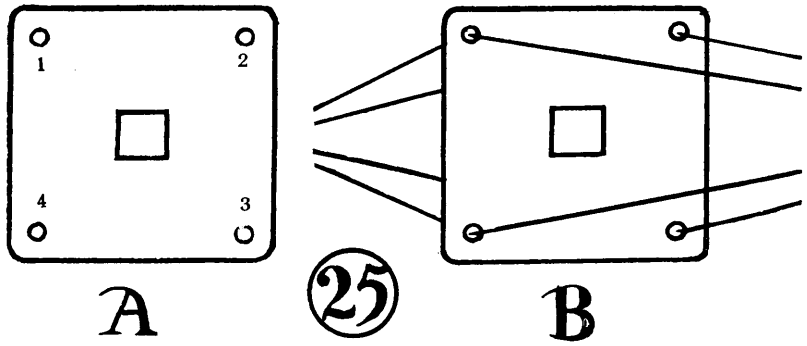
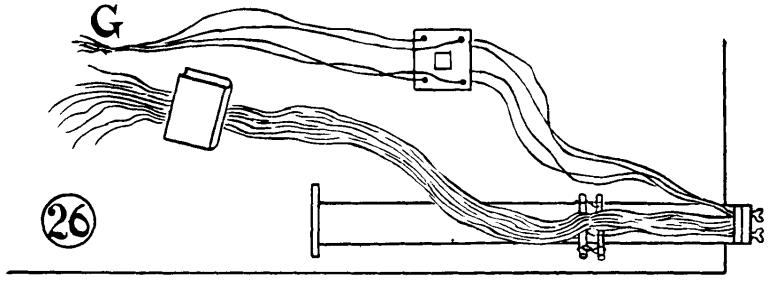
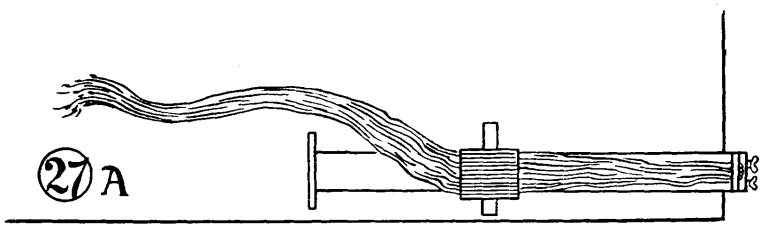
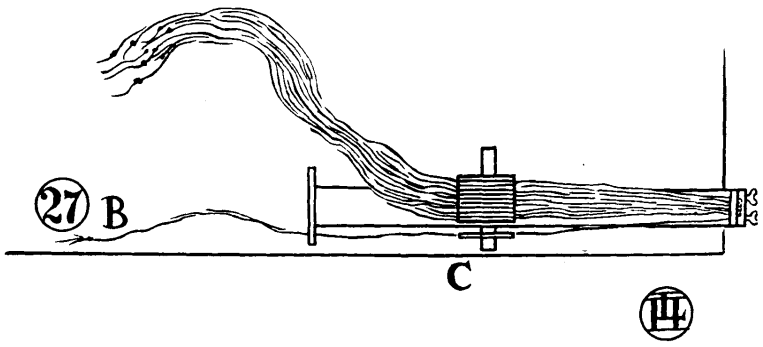


Fig. 26 is the same as Fig. 24, with the addition of the first tablet of the set entered and laid ready to receive the rest of the tablets, as, in succession, they are entered and laid on one another till the pile is complete. They must all be entered in *exactly the same way* and, as each set of four threads is drawn through, the ends must be tied together by a single knot as shown at letter C, Fig. 25. The pile of entered tablets being complete, the two sticks, which have kept the cross in the warp, can be put away for future use. The pile of tablets must now be taken fo hand and the short stick, shown in position in Fig. 2, must be passed through the centre hole so as to hold them in position, all together, near the centre of the loom, as at C in Fig. 27.







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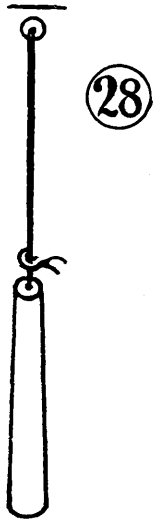
At letter A (Fig. 27) the warp ends, between the tablets and the top board of the loom, are shown loose but securely tied together in separate groups of four, each group being connected with a separate tablet.

At letter B the first tablet (near C) has been pushed along the stick a little way, and the knotted end of the group of four threads connected with it has been passed through the hole at the end of the board; it has been left for the present loosely hanging there. The group from the second tablet has now to be passed in like manner through the next hole, and so on, hole by hole, the tablets must be connected with the top board until all the warp is entered.



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The next thing necessary is to give tension to the warp sufficient to enable the weaver to beat the weft up evenly when the work commences. This is to be done by hanging on to the group of threads coming from each tablet a little lead weight (Fig. 28) weighing about four ounces. The purpose of this separate weighting for each tablet will be obvious where the work is in progress. It is a very great addition to value of the tablet loom, although it has not been made use of before to the author's knowledge.

Fig. 3 may now be again examined, as it is a drawing of the loom complete and ready for work to commence on it.

Chapter VI

YARNS SUITABLE FOR USE IN TABLET WEAVING

IT is a great matter in all kinds of weaving to select exactly the right sort of yarn for the work we are about to commence ; but especially is this the case in tablet weaving, in which the warp is of the greatest importance.

For this work the warp thread must be firm, strong, smooth and pliable, so as to bear without fraying the friction caused in the four corner holes of the tablets by the continual turning which they have to bear as the weaving proceeds. Smooth, clean thread is also necessary in order to bring out clearly the ornamental pattern, which depends on the distinct contrast of two or more threads, of different colours, being twisted together with great regularity in each cord of the braid.

Rather coarse net silk, spun silk, or good mercerized cotton, all of which can be purchased in small quantities ready dyed, are the best yarns to use for tablet warps ; they must be well spun and have plenty of twist, in order to make them strong. Wool yarn, on account of its soft and fluffy nature, is not so generally suitable for tablet weaving, although if it be very highly spun and made smooth by being carefully gassed, it can be used with advantage for thick, coarse work.

Linen thread is the least suitable of all for tablet warps because of its harsh and uneven nature.

The colours of the yarns used in this branch of weaving are of the utmost importance ; they require to be *bright and strong* so as to tell out clearly in the designs, which for the most part consist of thin lines and minute spaces of contrasting colours.

The thread for the weft, in tablet weaving, requires to be strong, fine, and inconspicuous ; it plays no part in the design ; its only office is to bind the cords of the warp firmly together. It should only be seen at the edges of the braid and then only as a tiny speck. It is best as a rule to choose weft of the same colour as the *edge threads of the work.*

CHAPTER VII

BEGINNING TO WEAVE BRAID

THE loom being set up with suitable warp, as described in chapters IV, V, and VI, preparation for the weaving may begin.

An examination of the tablets must be made in order to see that all the sets of threads enter and pass through them in exactly the same way. (Figs. 29, 30, and 31 will help to explain this point.)

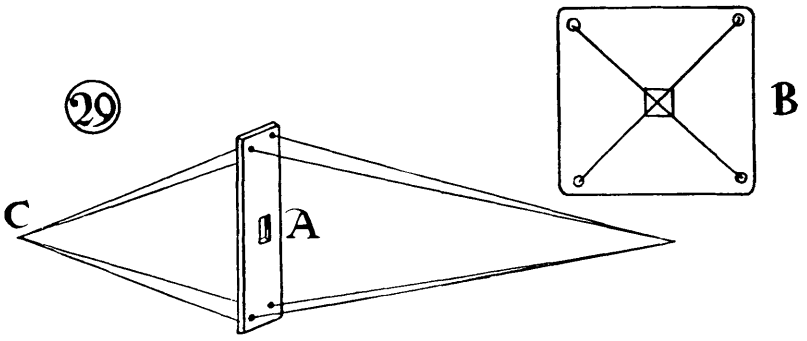
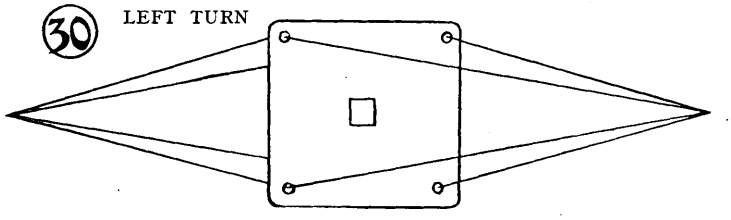
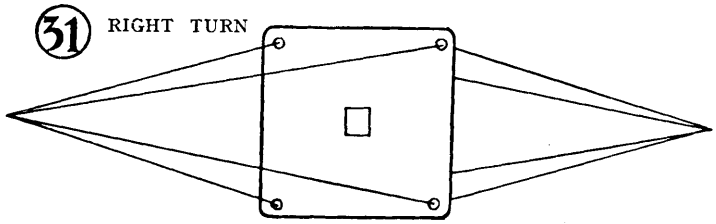


Fig. 29, A, B, and C, shows a single tablet entered with four threads. A is a perspective view of it and B, is a front elevation as seen from letter C. If the threaded tablet A, is to be laid flat so as to take its place in the bundle of twelve, as shown at Fig. 27, Chapter V, and Fig. 3, Chapter II, it must be turned either to the *left*, as in Fig. 30, or to the *right*, as in Fig. 31.

It will most likely be found on examination that some

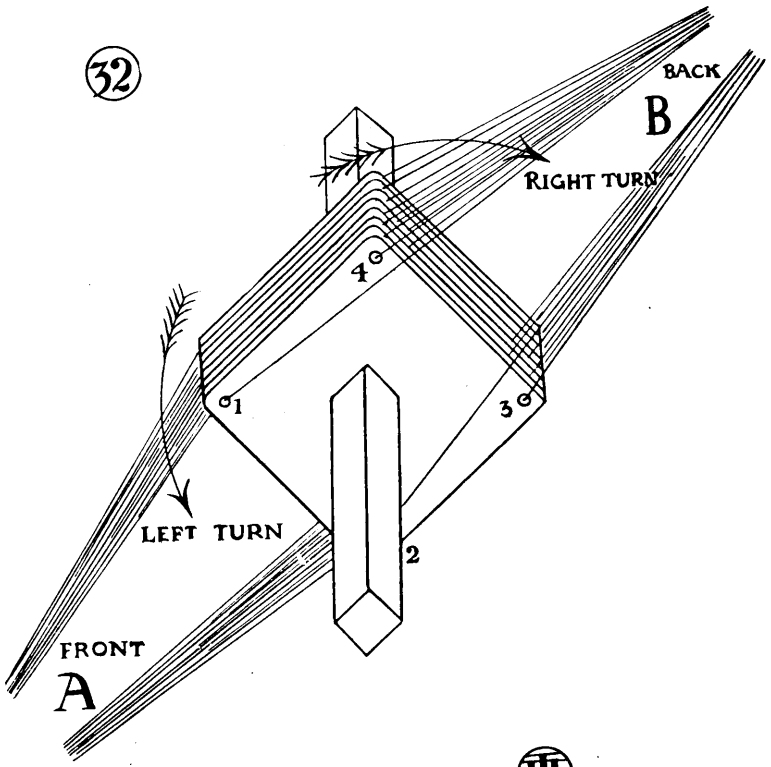
of the tablets have been turned to the right and others to the left. The first thing to be done, therefore, is to remove the stick from the centre of the bundle and to see, for our first study, that *all the separate tablets are turned in the same direction* : either as in Fig. 30 or 31. When this is done the stick can be replaced and the tablets will be secured in their proper position, as in Fig. 32.





We must pause to note here that the *texture of the web* in tablet weaving, as it is generally done, differs from that of *tapestry* weaving as described in Book I, or ordinary *table loom* or *treadle* weaving to be described in Book III. In both these methods the perfectly straight stretched warp and the straight, though more or less tight, shoot of weft are simply interlaced at right angles, but the texture peculiar to tablet weaving depends on *the warp threads being twisted together* between each throw of the weft ; moreover, the weft is generally very inconspicuous and simply binds and holds the twists

together between each turn of the bundle of tablets, whether they are turned forward or backward. The necessary twisting of the warp is effected by turning the



whole bundle over in the direction parallel with the warp threads (*see* arrows, Fig. 32). Thus, *turning the tablets, one way or the other, a quarter, half, three-quarters, or a whole turn, gives a more or less complete twist to each four threads of the whole warp.* From this description it

will be gathered that tablet weaving is almost entirely *a warp effect.*

The holding stick must now be removed from the centre of the tablets, as otherwise it would interfere with their turning.

In order to make a firm foundation to work upon, we must first weave in, in place of weft, a few slips of thick card or thin wood about a quarter of an inch wide and two inches long ; that is, a little longer than the width of our web. The first slip must be placed in the opening in front of the tablets (*see* Fig. 32A) and then carried between the upper and lower threads till it reaches the front board of the loom and rests in the slot A A, Fig. 5. In Fig. 32 it will be seen that the corner holes of the tablets are numbered respectively 1, 2, 3, and 4, and that if the bundle is turned backward or forward the relative position of all the threads will be changed and a different opening will be made for passing on the slips of card or weft. Leaving then the first slip in its place in the slot, the whole bundle of tablets must be turned a quarter round to the right, that is, towards the back board of the loom ; this will alter the position of all the threads which pass through the four holes. No. 1 will take the place of No. 4 ; No. 4 will take the place of No. 3 ; No. 3 will take the place of No. 2, and No. 2 will be in the first position of No. 1. This quarter turn will make the second opening, into which a second slip of card must be placed and pressed close up to the first one. Another quarter turn in the same direction will bring hole 3 to the top front position and make the opening for the third slip, which must be pressed close to the second. Still another quarter turn, and hole 4 will be at the top front and No. 1 hole will

be at the bottom front ; this will make the opening for the fourth slip of card, which must be also pressed close to the other slips; and the next turn will bring again No. 1 hole, with its thread, into the first position at the top, in the front. *Thus turning and turning in the same direction a regular succession of openings will be made,* and when in these openings a thread of weft is passed from side to side, a plain braid of *twisted cords* will be woven.

Six slips will be sufficient to make a firm foundation, and when they are pressed up close together weaving with a *weft thread* can begin.

In our first study we must take care that all the tablets turn together and that the bundle is moved only a quarter round, *in the same direction,* each turn.

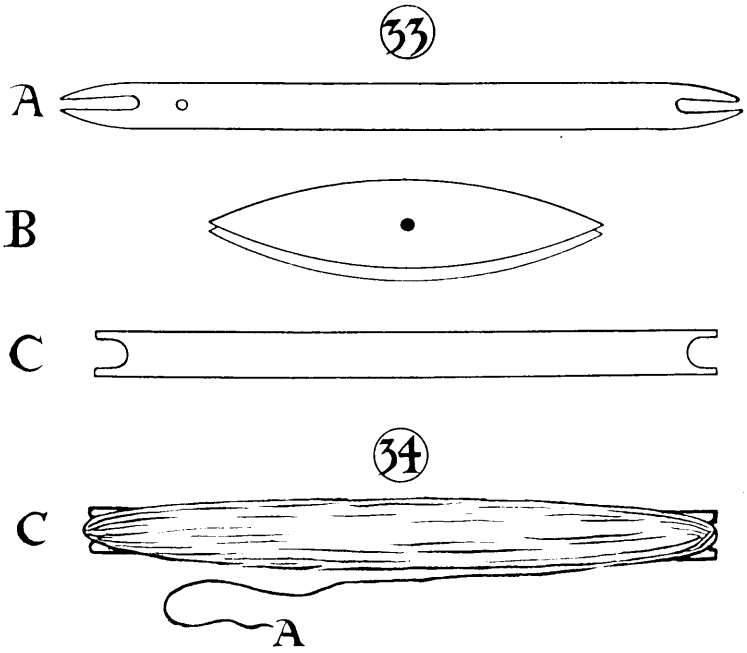
For introducing the weft a shuttle of some kind will be required ; a flat, short netting needle made of wood or bone makes a good shuttle ; or a tatting shuttle may be used; but the simplest implement of all is a piece of flat, hard wood about six inches long, half-an-inch wide, and just thick enough to have no tendency to bend.

Fig. 33, A, B, and C, shows these three implements in the order named above.

Fig. 34 shows the shuttle C with the weft wound upon it ready for weaving.

Six slips of card or wood having been woven into their places and pressed close together, the seventh opening must be made in the same manner as for the slips, but into this, from the right-hand side, the weft must be passed by means of the shuttle. Before passing the shuttle through, the end A, Fig. 34, may be tied to the last slip so as to prevent it escaping when the shuttle

is drawn out on the other side of the warp. As soon as the weft is placed in the opening, another quarter turn of the tablets will prevent it springing out after it has been pressed close by the beater. The best implement



for beating up the weft in tablet weaving is an ordinary smooth paper knife, the knife to be put into the opening after every quarter turn of the tablets, and its edge pressed close to the last laid weft. Care must, of course, be taken to press the weft evenly so that every inch of the braid may contain the same number of weft threads.

The first crossing of the weft being laid, the next opening made, and the weft pressed down, the shuttle

must be returned through the opening from left to right and be drawn just tight enough to bind the warp threads together, but not so tightly as to close them in too much and make the braid too narrow. As soon as the shuttle has been passed six times from right to left and six times

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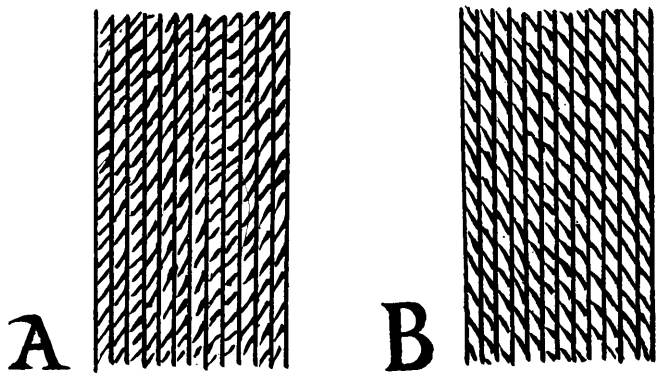


from left to right in twelve successive openings, thus laying twelve lines of weft, a square of braid will be woven, *its size depending on the size of warp thread used.*

Before going on, the weaving must be examined to see that (1) all the warp cords are the same distance apart, and if they are not so, the spacing must be corrected by means of a pointed implement which can be pushed between them in places where they are too close together. (2) By equalizing the weft in the same way; this, however, is more difficult; care must therefore be taken to beat the weft as evenly as possible with the paper knife as soon as it is laid.

Fig. 35, A and B, is a drawing of the effect of this, the simplest form of tablet weaving, viz. with the tablets warped with thread of one colour only and always turning a quarter turn in the same direction either to the right (letter A) or to the left (letter B).

Notes to Chapter VII

1. The beater must be heavy and be pressed close to the weft immediately after the next opening is made in the warp. It is no use beating the weft before the next opening is made, as it will not stay in its place until held there by the twist of the warp cord.

2. Care must be taken to turn the tablets in one direction only—a quarter turn at a time. If the successive turning brings the bundle into an inconvenient position, it can be corrected by pushing the tablets backward or forward altogether after slightly opening them out to prevent undue friction of the threads. A good weaver keeps the bundle always in the same position by a little push backward at every turn. This movement also helps to regulate the tension of the warp.

3. Always replace the holding stick in the bundle before extra beating down, planning any alteration in the threading or leaving off work. This is in order to prevent the bundle or any separate tablet getting into another position, as they are very apt to do if loose.

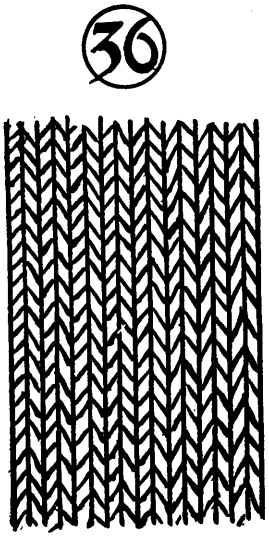
4. When the warp becomes twisted on the opposite end to the weaving so as to interfere with the work, as it naturally will, it can be easily corrected by inserting the hand in the opening above the tablets and pushing the twist as far back as the row of holes in the back board; the separate weights connected with each tablet will do the rest.

5. It is well to separate the tablets occasionally and examine them to see that the warp is not entangled so as to prevent a clear opening being made.

CHAPTER VIII

ORNAMENTAL WEAVING WITH TABLETS

AS we have remarked in an earlier chapter, tablet weaving is entirely a warp effect, the office of the weft being simply to bind the fourfold twisted cords of the warp together. This being so, it is obvious that any ornamental designs, whether simple or elaborate, must be arranged for in the threading of the warp or obtained by manipulating the tablets in different ways.



The simplest ornamental effect to be woven is achieved by arranging the tablets in pairs. Figs. 30 and 31, on page 34, will help to illustrate this point. If alternate tablets are arranged so that the left turn of one faces the right turn of the next throughout the pack, the twist of the alternate cords of warp will turn to the right and left as in Fig. 36. This should be compared with Fig. 35, A and B, page 39.

It is quite easy to turn any *one*, or any *portion* of the bundle of tablets, so as to make them work in pairs, as just described. Thus turning the

twist of groups of warp threads in one direction or the other will greatly add to the diversity of the braids.

This has been fully described in Chapter VII, but as these points are extremely important in ornamental tablet weaving, the student should re-read that chapter, at the same time making experiments on the loom.

CHAPTER IX

DESIGNS OF COLOURED STRIPES

AS is the case in ordinary weaving, many very beautiful designs can be made in *tablet weaving* by means of using various coloured threads for the warp and arranging them in differing proportions as to number.

This, indeed, seems to be the foundation of all ornamental pattern designs for textile fabrics, and, simple as it may appear, it affords great opportunity for the artist to display his skill and taste.

On Plate I are six examples of stripe designs, the stripes being made up of different numbers of cords of various colours, each cord being composed of four threads of a colour. It will be noticed that the designs of this plate, and all the successive ones, are drawn on ruled or *point* paper, and that each *vertical* row of tiny squares represents a cord of twisted threads, and each *horizontal* row of squares represents a quarter turn of the cord, each quarter turn being separated by a shoot of weft.

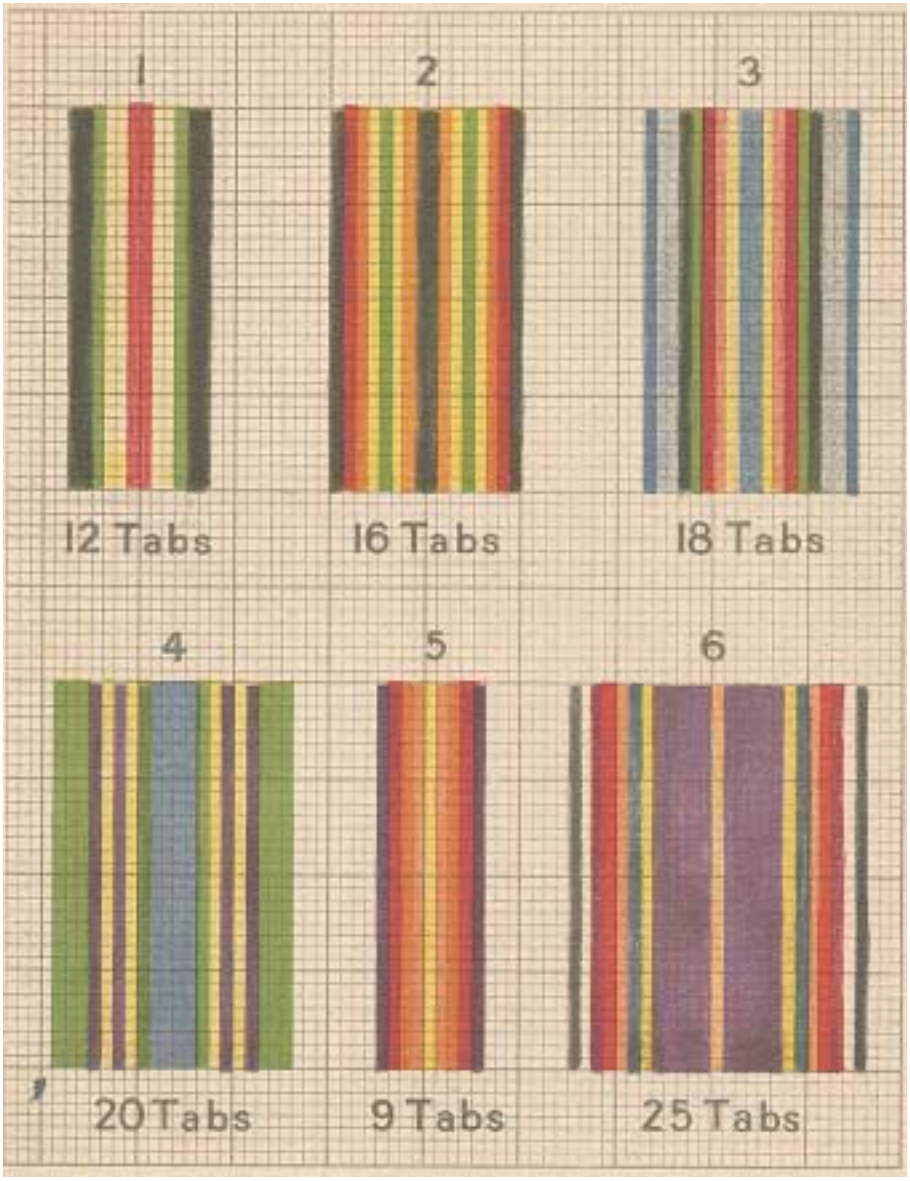
Any one of the designs on Plate I would make an effective braid if woven in harmoniously contrasting colours. It must be pointed out here that the colours of thread used for tablet weaving must be fairly strong in contrast, as the edges of the shapes of the ornamental details are not so definite as they are generally made,

for instance, in printing, painting, or even in ordinary weaving.

It is not necessary to describe in detail the warping of all the six examples given on Plate I, but it will be well to give directions for carrying out design No. 4. This explained, the student should be able to prepare the loom for weaving any of the others illustrated, or any designs of a similar character he may invent.

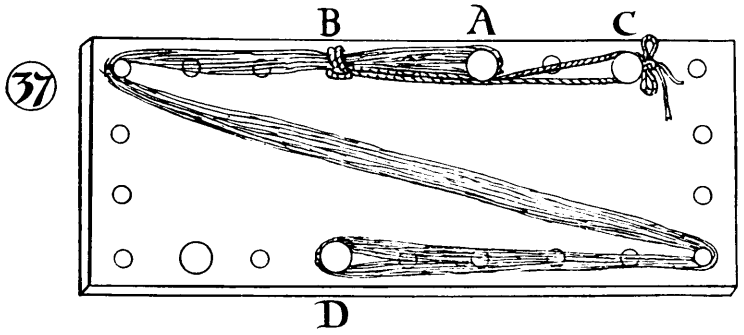
No. 4, Plate I, is drawn on twenty vertical lines. There are sixteen lines to an inch, the most generally convenient size for tablet weaving. Each line represents the twisted cord of four threads entered through each tablet; consequently four threads of warp will be required for every vertical line of the design. The colours of the design are four—green, purple, yellow, and blue—and they are in the following proportions: thirty-two green, sixteen purple, sixteen yellow, and sixteen blue threads. The first thing to do then is to measure off, on the warping board, a sufficient length of thread of each of these colours. It will not be necessary in this case to take the crosses at each end, as described in Chapter III, but the board affords the most convenient means of cutting off the threads exactly the same length and prevents waste. Fig. 37 shows a short warp on the board between pegs A and D.

In the drawing on page 45 a cord with a slip loop is represented between letters B and C. The noose has been drawn tightly round the whole warp at B and the cord has been securely tied to the peg C. The loops of warp can now all be cut at A, thus separating all the threads at that end. The threads at A being cut will make it possible to select any coloured thread at D and draw out of the warp


1
2
3
12 Tabs
16 Tabs
18 Tabs
4
5
6
20 Tabs
9 Tabs
25 Tabs

a *double thread of the exact length required* without tangling up the remainder which is securely held by the noose of cord at B.

Referring to our design, Plate I, No. 4, at the left-hand side, we see that tablets 1, 2, and 3 have to be threaded with green warp; we therefore draw out at letter D, Fig. 37, one loop of *light green*, which will give us a double thread. Placing the double thread on a table with the loop hanging over one edge, we take a tablet and



pass the two loose ends of the thread through its two corner holes. A second double thread of the same colour must be drawn out and its ends passed through the remaining holes in the first tablet, which can then be laid flat on the table after the ends of the threads have been securely tied together. (*See* Fig. 26, page 29.)

The second and third tablets must be treated in the same manner and laid in order on the first one. For the next tablet, No. 4, two loops of *purple* must be drawn out and threaded and the tablet added to the three already filled with green. One tablet of *yellow* threads, then another one of *purple*, followed by another of *yellow*, will

complete the *seventh* cord of the design. The *eighth* tablet is to be threaded with the same colour as the first *three,* and two tablets of *blue* will complete the first half of the design. Beginning with two tablets of blue we have only to reverse the order of threading to finish the design, thus ending with three tablets of *green* as at the beginning.

No other directions for weaving are necessary here; in fact, for all designs in tablet weaving, except in very special and difficult ones, *the pattern depends entirely on the threading and arrangement of the tablets before the weaving begins.*

CHAPTER X

DESIGNS OF CHECKERS OR DICE PATTERNS

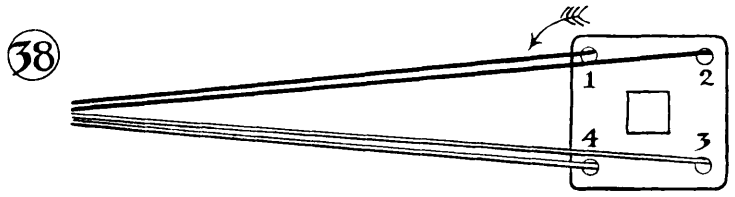
BY far the largest proportion of the traditional designs for tablet weaving consists of diverse arrangements of vertical lines, horizontal bands, and checkers or dice patterns. The threading of the tablets which produces horizontal bands and checkers is the same; the difference between the two effects is brought about by *placing the tablets themselves in different positions in relation to one another.*

The five examples of horizontal bands and checkers illustrated on Plate II are all produced by the same threading, which is shown in Fig. 1 of the plate and Fig. 38, on page 48.

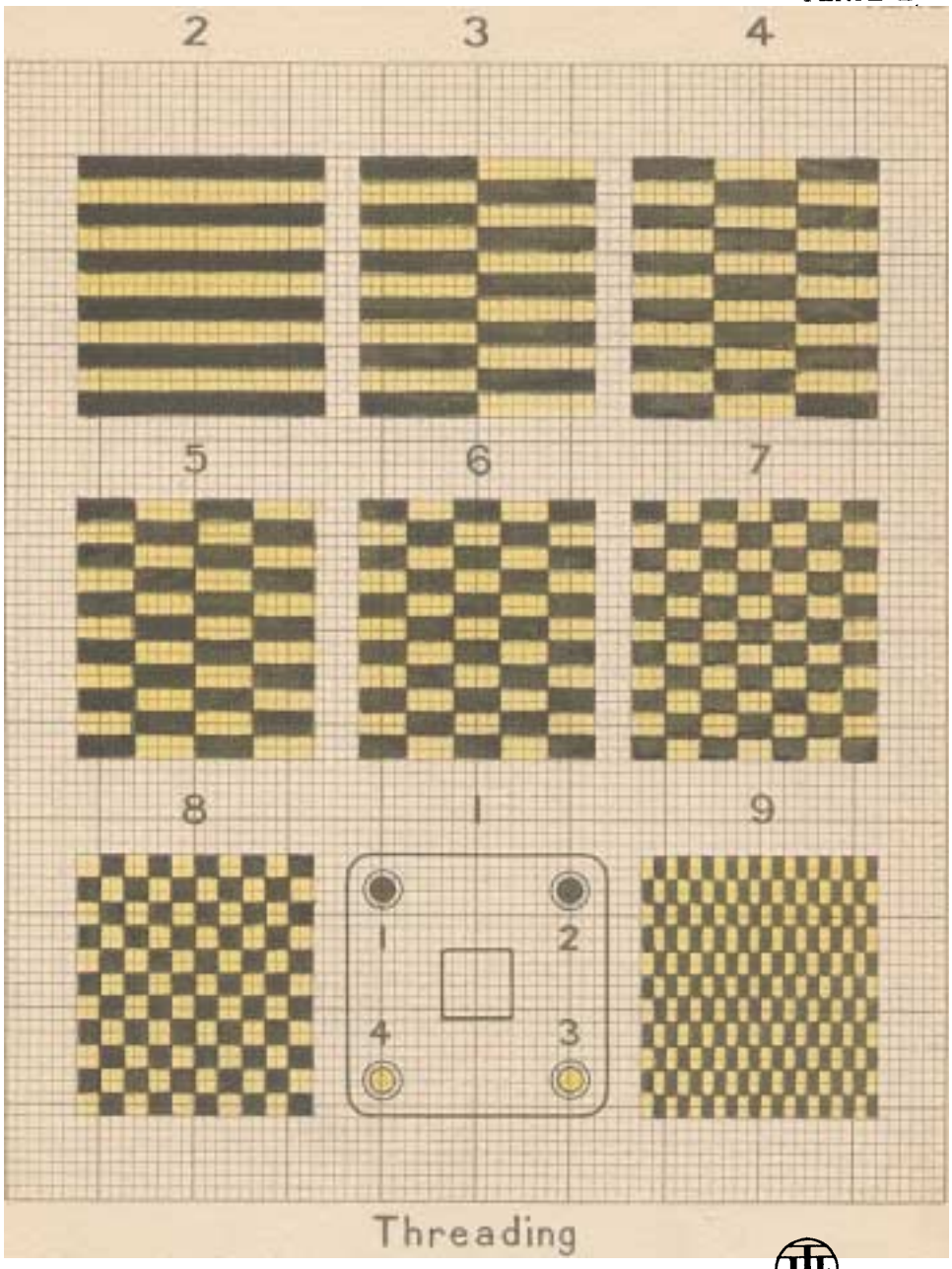
From these drawings it will be seen that each tablet has, entered through its corner holes, two *dark* and two *light* coloured threads numbered 1, 2, and 3, 4. Nos. 1 and 2 are dark and Nos. 3 and 4 are light. If the tablet thus threaded is turned to the left, as directed by the arrow in Fig. 38, a fourfold cord of two distinct colours will be produced; this is shown at A, Fig. 39; but if turned to the *right* the general effect will be the same, but, the twist will be in the opposite direction as at B. This right and left twisting has been fully explained in Chapter VII, but is again mentioned because when two or more colours are used and a design is to be woven,

its importance is greatly enhanced; it must therefore be quite clearly understood before proceeding further.

Let us suppose a bundle of tablets in the loom thus entered with two black and two yellow threads in each tablet, the *black threads all being at the top*. The weft is passed through while they are in that position, then a quarter turn is given and the weft pressed down; the weft is returned through the second opening, and, after



the third opening is made, is also pressed down. The whole loom should now be examined, and it will be seen that the two yellow threads are at the *top* of all the *tablets* and the black ones at the bottom. It will also be found that the two *black* threads of each of the twisted cords show at the *front* of the work and the two *yellow* ones are underneath at the *back*. Proceeding, after two more turns of the tablets the front of the work will show two yellow threads on every cord and all the black threads will be again at the top of the bundle of tablets. If the weaving is continued, always turning

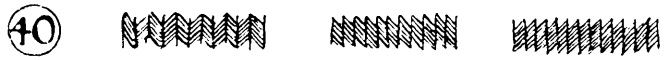


Threading

the tablets in one direction, the general effect of No. 2, Plate II, will result.

In weaving this design (No. 2, Plate II) the tablets may be arranged in pairs, as explained in Chapter VIII, or simply with a right or left bias, as described in Chapter VII ; the latter arrangement is the better one for the reason stated below.

The student will notice, no doubt, that the horizontal bars are not straight and clear at their edges, as shown on the ruled paper design, but are more or less sharply



40

A In pairs. B Right twist. C Left twist.

serrated like the cutting edge of a saw. The effect is illustrated by Fig. 40, A, B, and C.

If clear cut bars and checkers therefore are desired the tablets should all be arranged either for the right or left twist, as the *serration* is much less obvious than when they are arranged in pairs. The arrangement in pairs should not, however, be despised, for very many pretty and distinct effects are to be woven by making use of it in checker designs thus arranged.

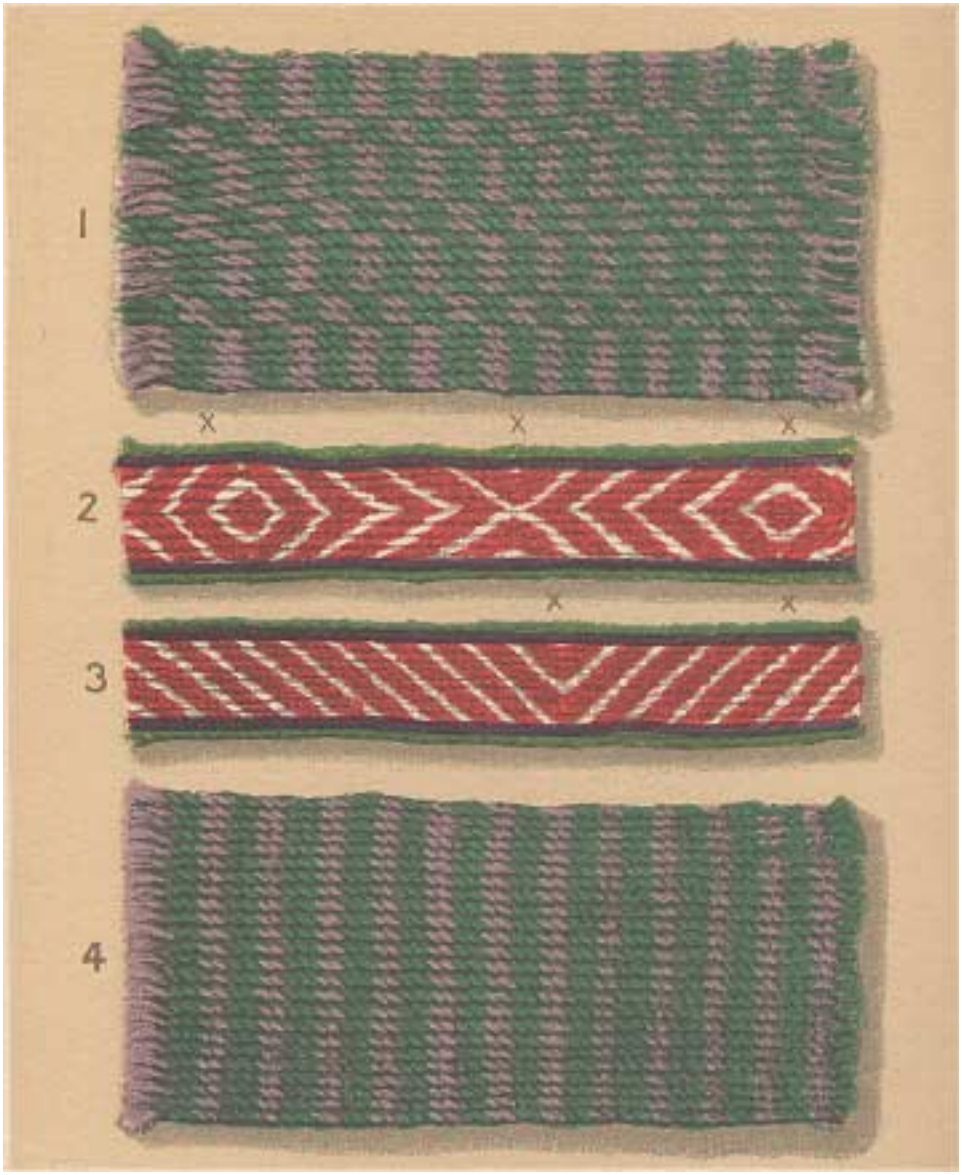
In order to weave checker designs, such as those of Plate II, the tablets must be arranged in groups before weaving begins, so many with the *dark threads* at the top and so many with the *light threads* at the top. For No. 4, Plate II, for instance, tablets 1 to 7 and 15 to 21 (inclusive) must be placed with the *dark* threads at the

top, but tablets 8 to 14 must be turned so as to have the *light* threads at the *top*. With the tablets so arranged, the weaving can be carried on as before, and the result will be that a checker of dark and light oblongs agreeing with the design will be woven.

The student will now realize that by making the arrangement of the tablets agree with any of the other designs of Plate II, checkers on any number of cords can be woven as easily as a plain web or braid.

It must be noted that although the *width* of the checkers can thus be varied horizontally, the *height* of the checkers still remains the same as *long as the tablets are turned continuously in one direction*. The method of varying the height of the bars or checkers will be dealt with in a subsequent chapter.

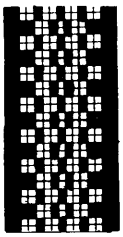
The two braids, Nos. 1 and 4, Plate III, show the effect of weaving with tablets all arranged in one direction, not in pairs. No. 1 is a checker made on 2, 4, and 5 cords respectively. No. 4 is made by the same threading, but started with all the green threads at the top and the purple ones at the bottom; Nos. 2 and 3 of Plate III will be referred to in Chapter XIII.


1
2
3
4

CHAPTER XI

DESIGNS OF CHECKERS MIXED WITH PLAIN VERTICAL STRIPES IN TWO OR MORE COLOURS

FIGS. 41, 42, and 43, and the eight figures on Plate IV, are all designs for braids to be woven in various checkers and vertical lines or cords, and, with one or two exceptions, they can be woven on twelve tablets. Fig. 43, and Nos. 1, 2, 7, and 8, Plate IV, require, in the



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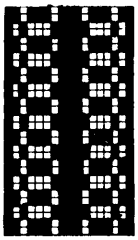

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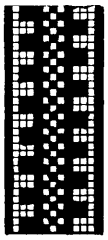
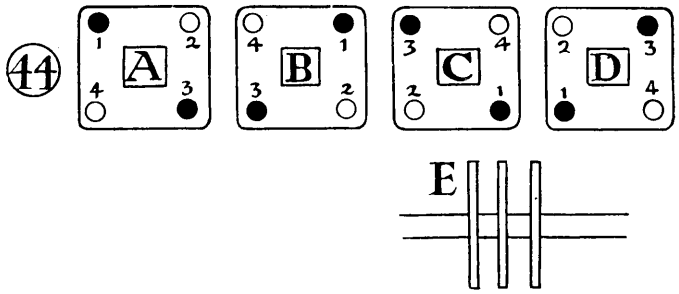


43

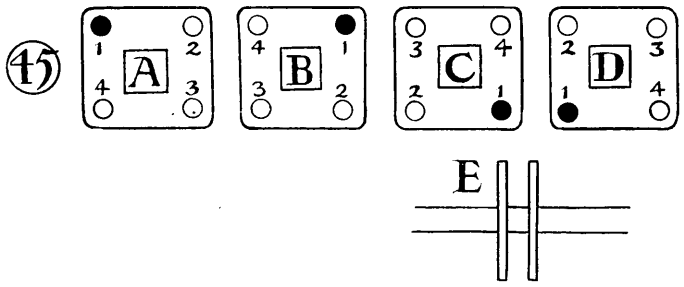
small checkers, a new threading and placing of the tablets ; this must be explained before any of the designs can be dealt with in detail.

In Fig. 41 the centre stripe is composed of three cords, each cord having alternately two twists of dark and two twists of light thread at the front, making each checker twice as high as it is wide. This should be compared with the centre stripe of Fig. 43, and it will be seen that whilst the checkers of the latter design are the same width, that of a single cord, they are only half the height of

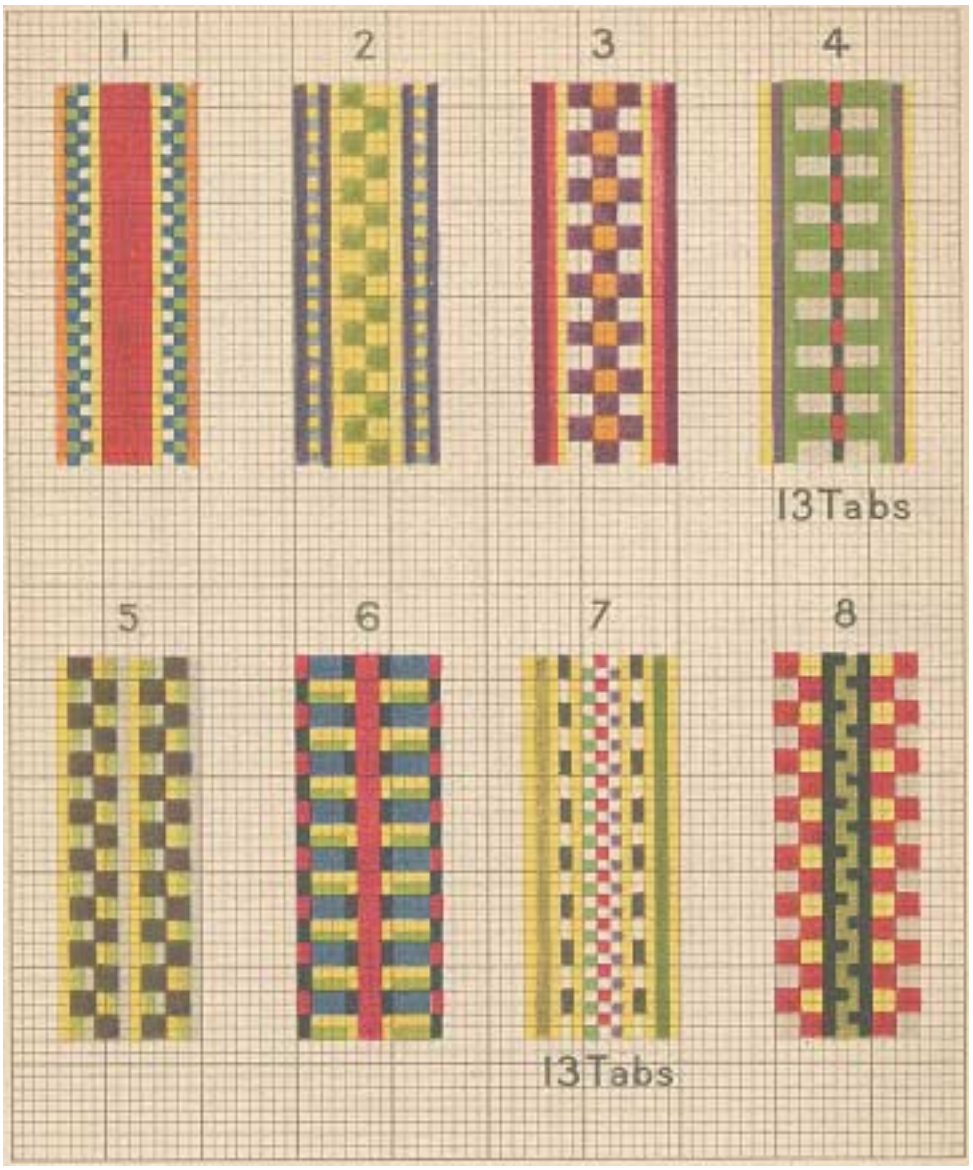
those of Fig. 41. The threading required for this checker is shown diagramatically in Fig. 44.



If the three central tablets, shown in position at E thus threaded, are turned with the others continuously in the direction indicated by the letters A, B, C, and D, or in the reverse direction, the result on each cord will



be the smallest checkers it is possible to weave, Fig. 43, etc. Design No. 8, Plate 4, furnishes another variant of a single cord checker in its centre stripe. In this case the tablets are entered with only one dark thread and three light ones, as shown in Fig. 45.


1
2
3
4
13Tabs
5
6
7
8
13Tabs

In this design (No. 8, Plate IV) and threading (Fig. 45) it will be seen that the dark thread No. 1 only comes to the top front position once in four turns, as shown in the design.

The effect of the threading of Fig. 45 is also shown in the Frontispiece Plate (Nos. 2 and 3) at their centres. In these cases the tablets are threaded with three darks and one light, and not only arranged in pairs, but so placed that both lights come to the front *together* instead of alternately.

The method of threading and weaving vertical lines has already been explained ; it is therefore only necessary to point out here that the effect of introducing them into the designs is to divide the composition into stripes which give it a pleasant diversity and distinctness of feature.

CHAPTER XII

DESIGNS ON PLATE IV AND THE FRONTISPIECE EXPLAINED BY MEANS OF PLATE V

ALL the designs on the Frontispiece and Plate IV, as well as Figs. 41, 42, and 43, are composed of different sized checkers, stripes of various widths, and horizontal bands ; some of them having the tablets arranged in pairs and others singly, they are also all turned together either backward or forward. These materials for composition and arrangements enable the designer to make very rich and effective combinations even with only two colours (*see* Frontispiece) ; but if various colours are used, there is no limit to the number of designs possible even on twelve tablets. Of course if the number of tablets be increased, the scope of the design will be extended and the difficulty of manipulating the bundle of tablets will be proportionally greater. It is said that some expert tablet weavers have been able to work with as many as 250 tablets in a bundle.

The following dissections of designs No. 3 of the Frontispiece, Nos. 1 and 8 of Plate IV, and Fig. 43 will be found instructive and furnish a key for the arranging of any of the others on Plate IV, or of any original designs the student may be able to invent.

On Plate V, Nos. 1 to 24, are given all the threadings and possible positions in a bundle of tablets entered with threads of more than one colour. The effect of most

of these twenty-four can be again diversified threefold by arranging the tablets singly and turning them in one direction or the other, or by placing them in pairs as already described.

The threading and arrangement for starting the braid (No. 3 of the Frontispiece) should be sufficiently explained by the following specification in conjunction with Plate V.

Tablet	Threading	Direction	Colour
1	1	Left	Chocolate
2	2	Right	Orange
3	3	Left	Chocolate and Orange
4	5	Right	Orange and Chocolate
5	2	Left	Orange
6	10	Right	Chocolate and Orange
7	10	Left	,, ,,
8	2	Right	Orange
9	5	Left	Orange and Chocolate
10	3	Right	Chocolate and Orange
11	2	Left	Orange
12	1	Right	Chocolate

It is necessary to note that the numerals in the second column of this and *all the following specifications* refer to the diagrams of threading on Plate V, also that the first tablet always makes the first cord to the left in the designs.

It is interesting to notice the difference between Nos. 2 and 3 of the Frontispiece. The difference results simply from beginning to weave No. 2 design with the third and fourth and the ninth and tenth tablets in the same position, either No. 3 or No. 5, instead of placing 3 and 5 side by side, at the start, as in No. 3 design.

All the tablets being in position, as indicated in

the specification, the centre braid represented in the Frontispiece works out by simply turning the tablets in one direction as usual.

The threadings and positions for starting the tablets of the designs, Nos. 1 and 8, Plate IV, are as follows—

Tablets	Threading	Direction	Colour
1	1	Left	Orange
2	11	,,	Green and Blue
3	12	Right	Blue and White
4	2	,,	Yellow
5	1	Left	Red
6	1	Right	,,
7	1	Left	,,
8	1	Right	,,
9	2	Left	Yellow
10	12	,,	Blue and White
11	11	Right	Green and Blue
12	1	,,	Orange

SPECIFICATION FOR NO. 8, PLATE IV

Tablet	Threading	Direction	Colours
1	3	Left	Blue and Red
2	3	,,	,, ,,
3	5	,,	Red and Yellow
4	5	,,	,, ,,
5	1	Right	Purple
6	13	,,	Black and Green
7	15	Left	,, ,,
8	1	,,	Purple
9	5	Right	Red and Yellow
10	5	,,	,, ,,
11	3	,,	Blue and Red
12	3	,,	,, ,,

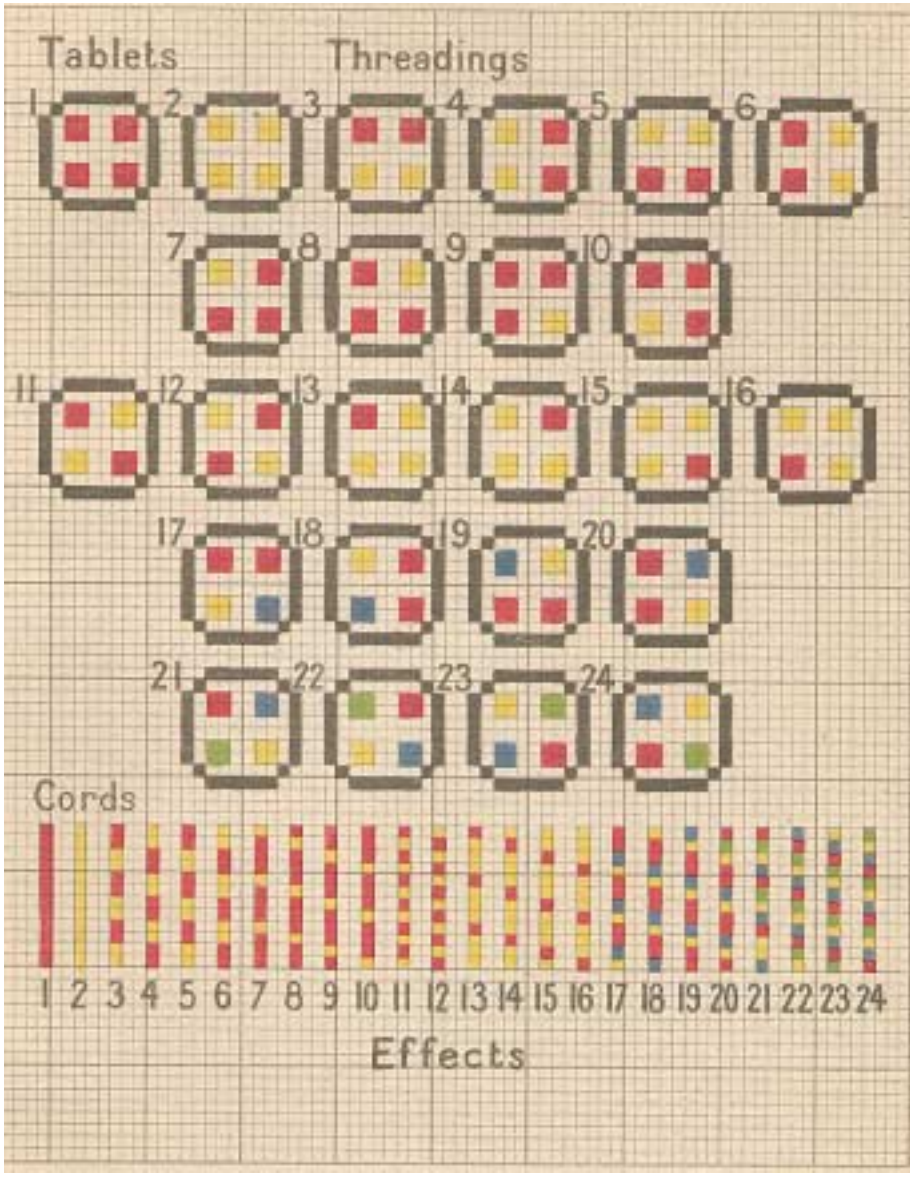

Tablets
Threadings
1 2 3 4 5 6
7 8 9 10
11 12 13 14 15 16
17 18 19 20
21 22 23 24
Cords
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
Effects

Fig. 43, page 51, is on thirteen tablets and must be arranged thus—

SPECIFICATION FOR FIG. 43, TO BE WOVEN IN TWO COLOURS

Tablet	Threading	Direction	Colours
1	1	Right	Black
2	2	,,	White
3	3	,,	Black and White
4	3	,,	,, ,,
5	1	Left	Black
6	11	Right	Black and White
7	12	Left	White and Black
8	11	Right	Black and White
9	1	,,	Black
10	5	Left	White and Black
11	5	,,	,, ,,
12	2	,,	White
13	1	,,	Black

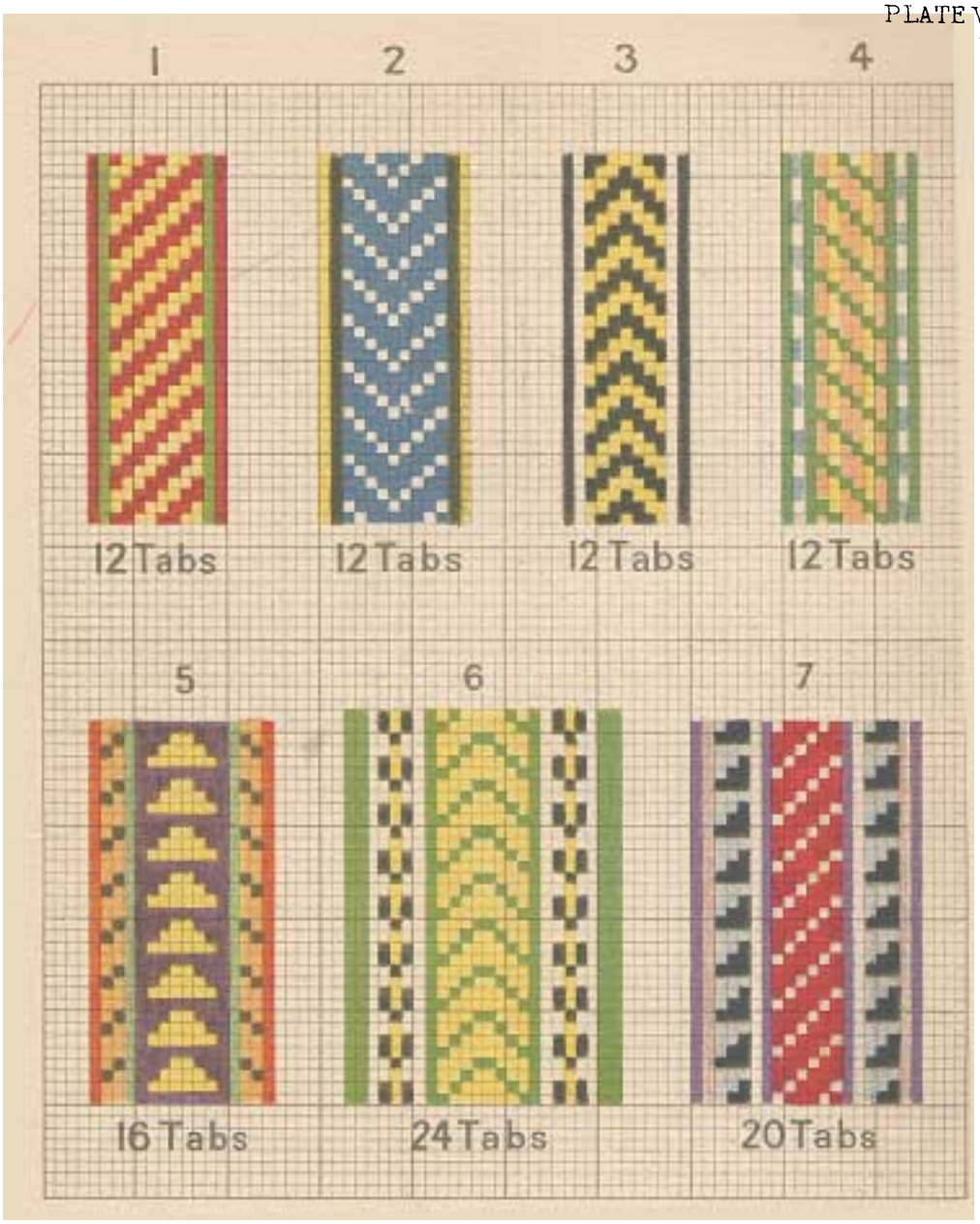
Chapter XIII

DIAGONALS AND CHEVRONS

IN Plates III, VI, and VII diagonal lines are introduced into the designs in addition to vertical lines, bands, and checkers. These new features do not result from new *threadings*, but from the order in which the similarly threaded tablets are placed in relation to one another, before starting to weave. *If the tablets are rightly placed at the beginning, the pattern, however complicated, will work out automatically* as the weaving proceeds, no matter which line of the design it starts on.

Of course, in order to match the threading and arrange the tablets correctly, great accuracy is required, and a careful study of the key (Plate V) and the diagram of the twisted cords at its foot is essential. This is particularly the case when several different colours are used, and the more complicated forms are attempted.

The use of diagonal lines, which have the effect of *twills* in ordinary weaving, and triangular forms in addition to squares, checkers, vertical lines, and bands immensely extend the scope and interest of designing for this fascinating branch of weaving, as will be seen from the few examples given on Plate VI and reproduced from woven examples on Plate VII.


1
2
3
4
12 Tabs
12 Tabs
12 Tabs
12 Tabs
5
6
7
16 Tabs
24 Tabs
20 Tabs

If the student has followed and thoroughly mastered all the instructions given up to this point, there should be no difficulty in working out and weaving from the following specifications any of the designs on Plate VI.

In the designs Nos. 2, 3, and 6, Plate VI, as well as on several designs on Plates III and VII, chevrons are introduced. For these it is not necessary to have an odd number of tablets, as indicated on No. 2, Plate VI. Figs. 5 and 6 on the same plate are correctly drawn. The blunt point of the figure disappears when woven with the tablets *facing one another* as shown in the specification, No. 5, page 61.

In chevron designs the point of the chevron can be turned up or down at will, as in Nos. 2 and 3, Plate III, by a method of reversing, which will be described in the next chapter.

NO. 1—PLATE VI

Tablets	Threading	Direction	Colours
1	1	Left	Red
2	2	,,	Green
3	3	,,	Red and Yellow
4	4	,,	,, ,,
5	5	,,	,, ,,
6	6	,,	,, ,,
7	3	,,	,, ,,
8	4	,,	,, ,,
9	5	,,	,, ,,
10	6	,,	,, ,,
11	2	,,	Green
12	1	,,	Red

No. 2—Plate VI

Tablets	Threading	Direction	Colours.
1	1	Left	Yellow
2	2	,,	Black
3	7	,,	White and Blue
4	8	,,	,, ,,
5	9	,,	,, ,,
6	10	,,	,, ,,
7	10	Right	,, ,,
8	9	,,	,, ,,
9	8	,,	,, ,,
10	7	,,	,, ,,
11	2	,,	Black
12	1	,,	Yellow

No. 3—Plate VI

Tablets	Threading	Direction	Colours
1	1	Right	Black
2	2	,,	White
3	3	,,	Black and Yellow
4	4	,,	,, ,,
5	5	,,	,, ,,
6	6	,,	,, ,,
7	6	Left	,, ,,
8	5	,,	,, ,,
9	4	,,	,, ,,
10	3	,,	,, ,,
11	2	,,	White
12	1	,,	Black

No. 4—Plate VI

Tablets	Threading	Direction	Colours
1	1	Right or Left	Green
2	5	,, ,,	White and Blue
3	1	,, ,,	Green
4	13	,, ,,	Green and Orange
5	14	,, ,,	Green and Yellow
6	15	,, ,,	Green and Orange
7	16	,, ,,	,, ,,
8	13	,, ,,	Green and Yellow
9	14	,, ,,	Green and Orange
10	1	,, ,,	Green
11	3	,, ,,	Blue and White
12	1	,, ,,	Green

No. 5—Plate VI

Tablets	Threading	Direction	Colours
1	1	Left	Red
2	13	,,	Black and Orange
3	14	,,	,, ,,
4	2	,,	Green
5	1	,,	Purple
6	10	,,	Purple and Yellow
7	5	,,	,, ,,
8	13	,,	,, ,,
9	13	Right	,, ,,
10	5	,,	,, ,,
11	10	,,	,, ,,
12	1	,,	Purple
13	2	,,	Green
14	14	,,	Black and Orange
15	13	,,	,, ,,
16	1	,,	Red

No. 6—Plate VI

Tablets	Threading	Direction	Colours
1	1	Left	Green
2	2	Right	Silver
3	6	,,	Black and Silver
4	14	,,	Black and Yellow
5	14	Left	,, ,,
6	6	,,	Black and Silver
7	2	,,	Silver
8	1	,,	Green
9	16	,,	Yellow and Green
10	15	,,	,, ,,
11	14	,,	,, ,,
12	13	,,	,, ,,
13	13	Right	,, ,,
14	14	,,	,, ,,
15	15	Right	Yellow and Green
16	16	,,	,, ,,
17	1	,,	Green
18	2	,,	Silver
19	6	,,	Black and Silver
20	14	,,	Black and Yellow
21	14	Left	,, ,,
22	6	,,	Black and Silver
23	2	,,	Silver
24	1	Right	Green

In weaving the above for Plate VII, No. 4, it was necessary, in order to work the small check inverted chevrons of the borders, to begin with only one cord of green so as to allow two cords for the point, as before explained.

No. 7—Plate VI

Tablets	Threading	Direction	Colours
1	1	Left	Purple
2	2	,,	White
3	13	,,	Blue and Black
4	3	,,	,, ,,
5	10	,,	,, ,,
6	2	,,	White
7	1	,,	Purple
8	8	,,	Red and White
9	9	,,	,, ,,
10	10	,,	,, ,,
11	7	,,	,, ,,
12	8	,,	,, ,,
13	9	,,	,, ,,
14	1	,,	Purple
15	2	,,	White
16	13	,,	Blue and Black
17	3	,,	,, ,,
18	10	,,	,, ,,
19	2	,,	White
20	1	,,	Purple

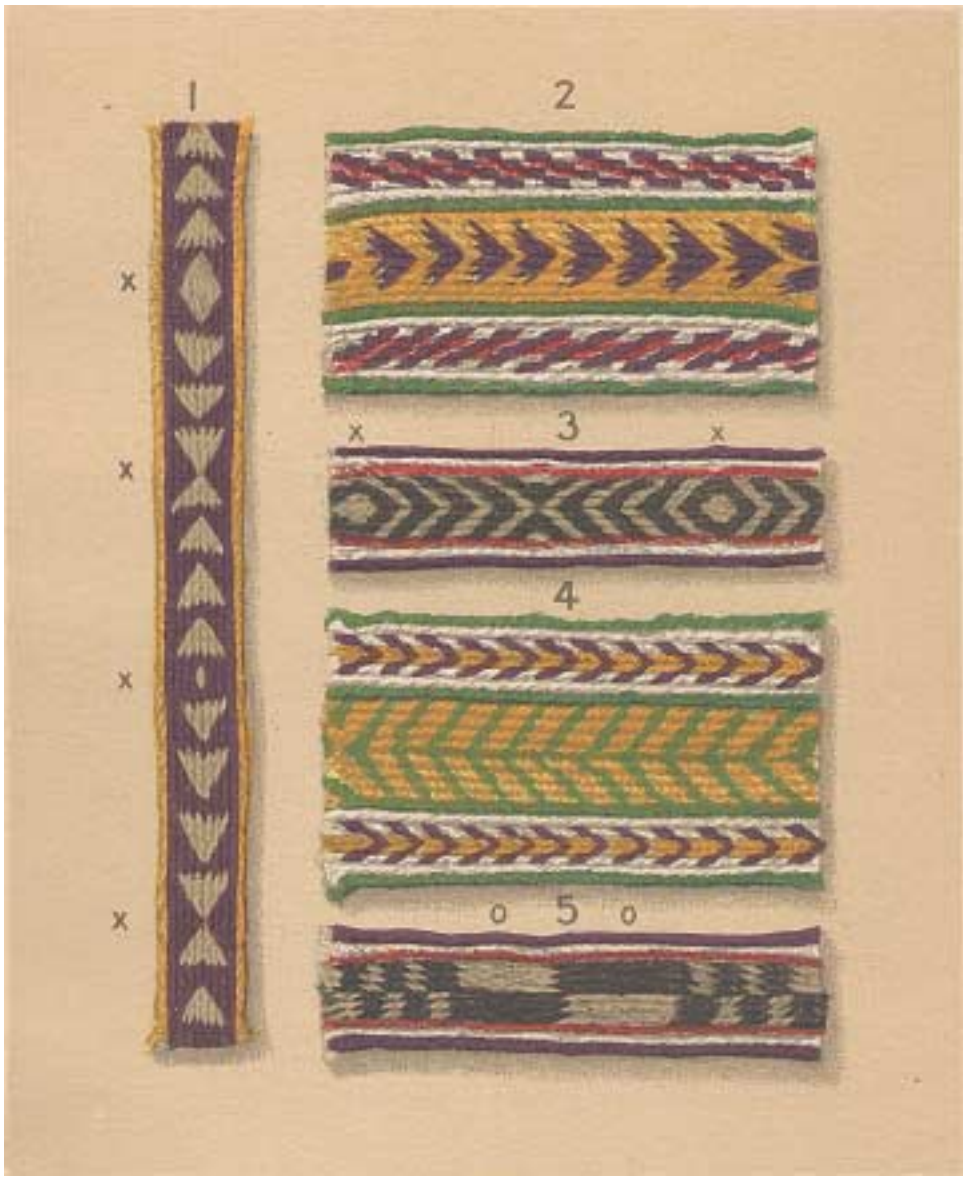
CHAPTER XIV

REVERSING

THE woven braids on Plates III (Nos. 2 and 3) and VII (Nos. 1, 3, and 5) are examples of the effect of *reversing*, as it is called, which is simply ceasing to turn the tablets *one way*, backward or forward, and turning them in the *opposite direction*. In all these examples, except No. 5, Plate VII, the places where this reversing takes place is marked with a cross. It will at once be seen what a great addition to the scope for designing this facility for giving variety to the repeats of a pattern affords.

It is not necessary for all the tablets to be reversed, although it is rather easier to turn them all than to turn a portion of them. It is generally best to keep the edge cords of a braid turning one way throughout, because at the point of reverse a little dent is apt to be made which spoils the continuity of the edge.

Plate VII, No. 5, at O O, gives an example of reversing at every two quarter turns. This is the only method of making any one feature of the braid in tablet weaving of greater height than four quarter turns of the tablets will weave. It is sometimes effective, but should not be used to a great extent because the character of texture it gives is not quite the same as that which the ordinary straightforward turning gives : the twisted effect of cord


1
2
3
4
5
x
x
x
x
x
x
o
o

almost disappears and the texture is more like that of ordinary weaving.

With this description of the method of reversing the present course of instruction in tablet weaving must terminate. It is true that much more elaborate designs may be woven if more tablets are used, or if they are divided into groups and turned in opposite directions, or if tablets pierced with six holes instead of four are made use of. Ordinary double weaving can also be done by special arrangements.

All these developments, however, require a very great deal of study to understand and much practice to manipulate. This advanced tablet weaving would, of course, be very interesting to the ingenious student, but would scarcely repay him for the labour necessary to master it, as similar effects can be produced more readily by other methods of weaving. There can be no doubt that it is in the production of such simple, useful, and delightful braids as those which have occupied our attention hitherto, that the special province of the tablets, in the general art of weaving, is to be found. It is true in weaving as in all the arts that the best results are always produced by the simplest means.

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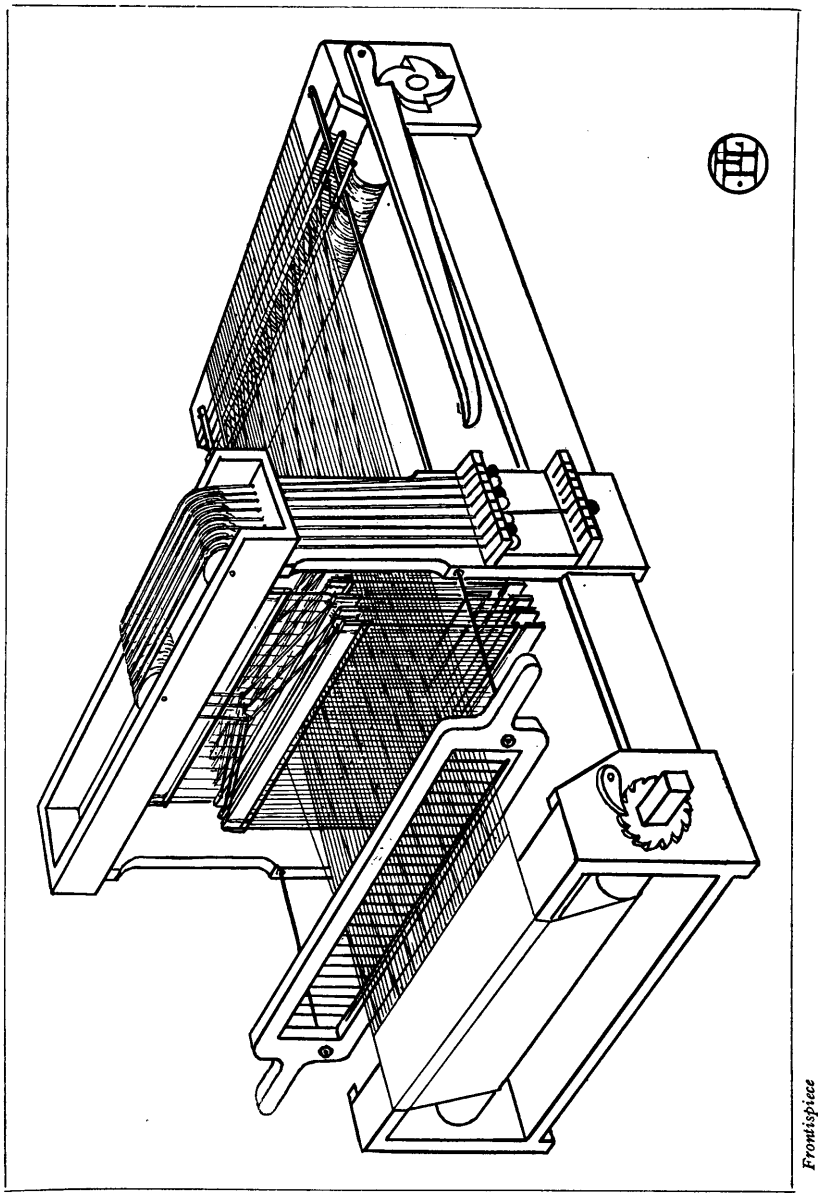
WEAVING WITH SMALL APPLIANCES



Frontispiece

WEAVING WITH SMALL APPLIANCES

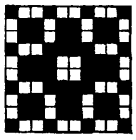
WRITTEN & ILLUSTRATED

BY

LUTHER HOOPER

DESIGNER AND WEAVING EXPERT; AUTHOR OF "HAND-LOOM WEAVING, PLAIN AND ORNAMENTAL"; "SILK"; "THE LOOM AND SPINDLE"; "WEAVING FOR BEGINNERS," ETC.; LATE LECTURER IN AND TEACHER OF WEAVING AT THE LONDON COUNTY COUNCIL CENTRAL SCHOOL OF ARTS AND CRAFTS, SOUTHAMPTON ROW, LONDON

BOOK III — THE TABLE LOOM



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1925

CONTENTS

ILLUSTRATIONS

COLOURED PLATES

PLATE I.

THE TABLE LOOM

CHAPTER I

THE TABLE LOOM

THE table loom, a drawing of which forms the frontispiece illustration of this, the third part of WEAVING WITH SMALL APPLIANCES, has been carefully planned by the author so as to be adapted not only for weaving plain fabrics for domestic use, where only a small space can be afforded for the process, but, with the addition of certain simple fittings, to furnish the student of ornamental weaving with a loom on which a very great range of designs can be worked out with the least amount of tedious alteration of the mounting and mechanism. This handy loom should also prove useful to the designer, in any weaving workshop, for making samples for approval as well as experiments in new interlacements and combinations of threads, to which the experienced weaver must have realized there is absolutely no limit.

The simplest form of table loom can be mounted for weaving materials 16, 20, 24, 32, or 40 threads of warp to an inch according to the count of reed made use of. The warp, in this loom, is entered on two headles mounted on rollers which are actuated for opening the shed, through which the shuttle is passed, by a convenient handle

placed at the right-hand side of the loom. This handle takes the place of the treadles of the ordinary loom.

The table loom, for automatic pattern weaving, is mounted with a system of pulleys and cords, the latter terminating in a rack and bead in such a manner that one or more of the headles may be raised at will in the same manner as was possible on the ancient *draw loom* and its successor the Jacquard weaving appliance. The number of headles on this loom may number 4, 8, 10, 12, 16, or even 20, so that quite extensive designs may be arranged to work out on it, especially when it is entered for compound weaving.

Each kind of loom is made in two sizes, viz. : to make material up to 18 or 21 inches wide.

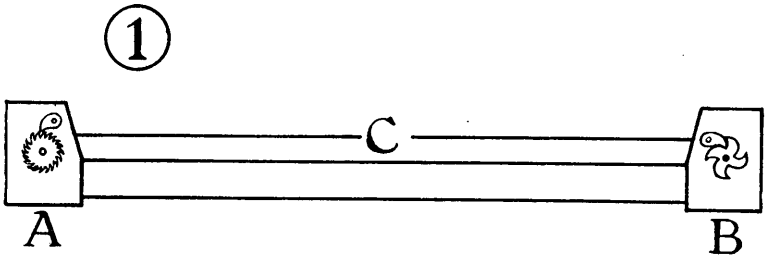
A description of the essential parts of the loom, the method of fitting it up, the appliances for preparing the warps and entering them in the loom and setting to work, as well as typical designs and specifications will all be contained in the following chapters. It will be necessary however, in order to limit this part of the book to its allotted proportion of space, to make the description of the parts of the loom which are common to all looms very brief, in order that the greatest possible number of designs, examples and specifications for plain and ornamental webs may be furnished to the student. It may therefore be necessary for the reader sometimes to refer, for the description and explanation of certain details, to the Author's former works, *Hand-Loom Weaving, Plain and Ornamental*, and *Weaving for Beginners*.[1]

[1] *Weaving for Beginners*, 5s., and *Hand-Loom Weaving, Plain and Ornamental*, 10s. 6d., both published by Sir Isaac Pitman & Sons, London.

CHAPTER II

THE PARTS OF THE LOOM AND THEIR USES

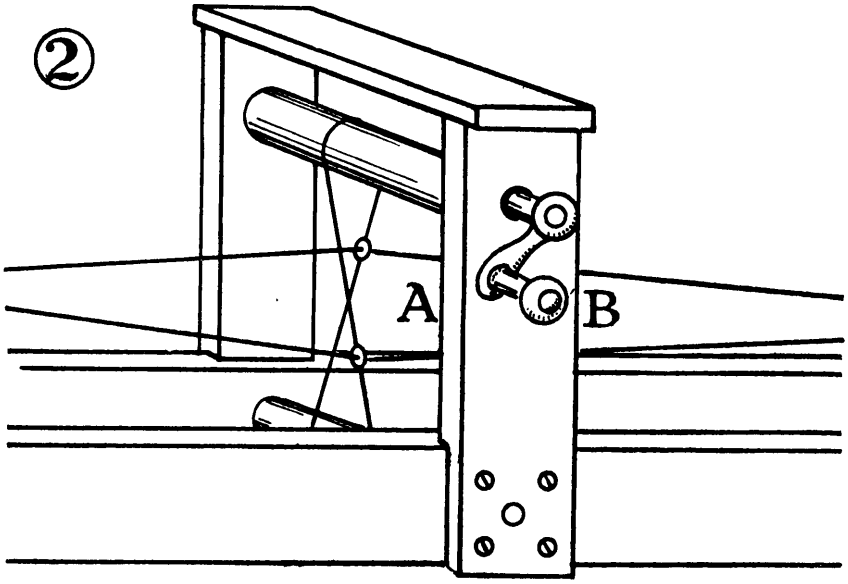
AS will be seen in the frontispiece, the framework of the table loom is designed for strength and solidity. These are indispensable qualities in all kinds of looms which have any pretensions to utility. The frame itself consists of four parts, viz.: two ends, each of which is fitted with a roller, one for the front and one for the back of the loom, and two side pieces which are firmly bolted to the ends and have to bear the strain of the warp, which is stretched between them at a great tension, from one roller to the other. The only difference between the front and back ends of the loom frame is in the rollers; that at the front has a ratchet wheel at one end of it having very small teeth, whilst the roller at the opposite end has a ratchet wheel with very large teeth: also that the teeth themselves are placed in opposite directions, so that when the catches of the ratchets are in position as shown in the drawing and in Fig. 1, the rollers can only be turned in opposite directions away from each other and will remain fixed, when the warp is attached to them, and hold the latter at any tension which may be desired by the weaver. In Fig. 1, A is the front of the loom, B the back, and the line C is the warp stretched between the two rollers.



The next part of the loom to claim attention is the *Harness holder* which is firmly bolted to the sides of the frame rather nearer to the front roller than to the back one. Beneath the cross-pieces at the top of the holder the *headles* of the harness are suspended, either from a roller governed by a handle or from a set of pulleys as already mentioned and shown in the frontispiece which is drawn from a table loom *fully mounted for ornamental weaving*.

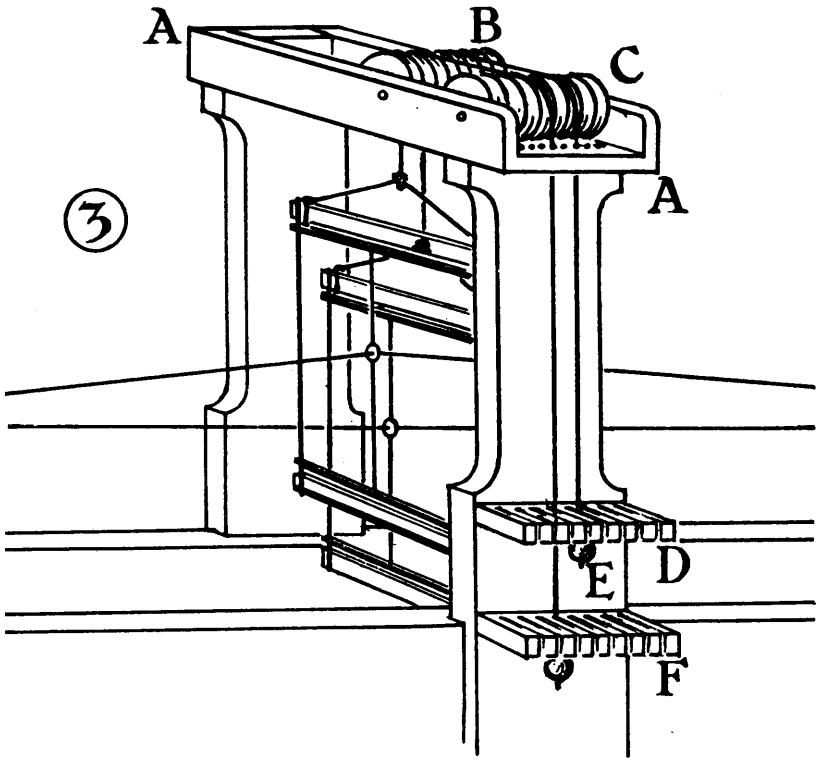
The *shedding motion*, as the more or less complicated fittings for opening the shed are technically called, of the two looms will be best described with the help of the two diagrams, Figs. 2 and 3.

The shedding motion (Fig. 2) for the plain weaving loom, is quite simple and consists only of a pair of rollers fixed one above the other. There is a handle at one end of the top roller by means of which it can be turned half round, backward or forward, as the weaver desires. Only two headles are required for warps up to forty threads to the inch and under, and they are so fixed to the rollers that when the handle, connected with the top rollers, is turned half round one headle is raised and the other depressed. The result of this is that an open shed is formed between all the odd and even threads of the



warp. For example, when the handle is in the position shown at A, Fig. 2, the odd numbered threads of warp Nos. 1, 3, 5, 7, etc., will be near the top of the reed, and the even Nos. 2, 4, 6, 8, etc., will be at the bottom, thus opening the first shed. If the handle be then turned half round to letter B the even threads will come to the top and the odd threads sink to the bottom; the second shed will thus be opened.

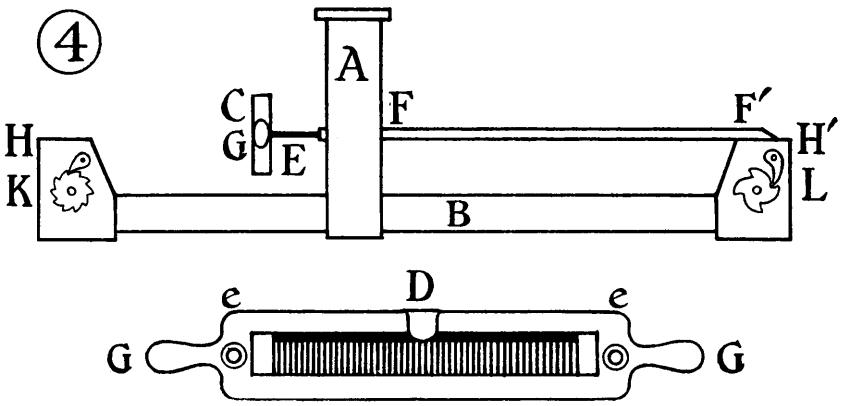
The pulley motion for ornamental weaving, Fig. 3, is rather more complicated, as might be expected. It can be adapted to control as many as twenty headles and, if special enterings of the warp threads are made use of and the compound principle of weaving is arranged for, quite extensive designs can be readily woven on the table loom to which it is attached.



The diagram, Fig. 3, represents a pulley mounting for a harness of eight headles, and a careful study of it will make clear the method of its working and demonstrate its great utility in ornamental weaving. It enables the weaver to have perfect command of any one of the headles or any combination of them. The designs on Plates III, IV, and V are only a few of the vast number of patterns possible on such a mounting. The method of working out these designs will be given later, but just

here the mounting itself must be described. In this case the top of the harness holder is a strong frame in which two rows of eight pulleys each are fixed, one row at the centre B B, and the other at the end C C. Over these pulleys run the cords from which the eight headles of the harness are hung, as shown in the frontispiece. In Fig. 3, however, for the sake of clearness, only two headles are shown fitted up, and from these it will be seen that the cords on which they hang pass over a pulley at B, then over a pulley at C, and, after passing through a hole in the rack, terminate with two large beads at E and F. When the loom is at rest all the headles are in the position of the one with the bead at E. In order to make a shed for weaving one or more of the headles must, of course, be raised. This is effected as follows : four inches below the rack D there is another rack F. This rack is notched, one notch beneath each bead ; now it is obvious that if the bead E be pulled down and fixed below the first notch F, the headle at the other end of the cord will be raised. In the drawing the front headle is shown thus raised. The eight headles, cords and beads being all fitted up in the same way, any headle, or combination of headles, necessary to form one line of a design can be raised by *selecting and pulling down the bead or beads corresponding to it.*

In the table loom, the reed for beating the weft together is fixed in a holder which works in such a manner that every time it is pulled forward the blow falls horizontally on each line of weft left in the shed by the shuttle. This direct pressure is a great advantage, especially in a small loom. Fig. 4 is a side elevation of the loom which will explain the mechanism of the reed holder. A, Fig. 4,



is the headle frame fixed on the side of the loom frame B. C is the end of the reed holder, the front view of which is given at D. A stout iron rod is screwed into each end of the reed holder, D, at the places marked e, e, and is shown in position at E in the side elevation, Fig. 4. F F′ is a tube of metal which is passed through a hole in the side of the headle holder and is firmly fixed to the end of the loom, above the back roller as at F′. There is one such tube at each side of the loom and into these tubes the two rods, attached to the reed holder, run just easily enough to allow the reed to be brought forward by means of the handles (G, G, and G, Fig. 4) and pressed with some force against the weft as it is gradually added line by line to the web. The advantage of the weft beater over the ordinary batton or sleigh will be explained later on.

CHAPTER III

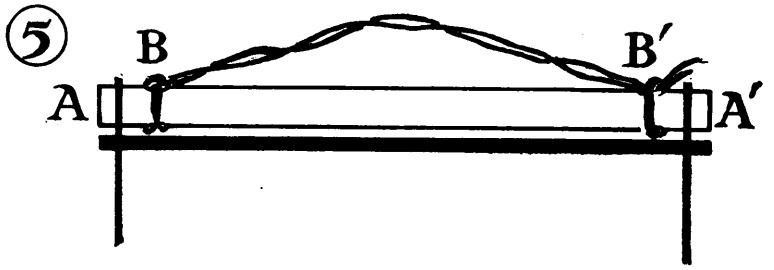
SETTING UP THE LOOM FOR WORK

EXCEPT for a few special points peculiar to the table loom, in which it differs from the ordinary treadle loom, the description of winding, warping, *beaming* or warp spreading, *entering* or threading and starting to weave, contained in the first book of this series, *Weaving for Beginners*, and the author's larger book, *Hand-Loom Weaving*, will apply perfectly to the preparation and setting up of the table loom for work. As, therefore, it is desirable that all the space possible in the present part of *Weaving with Small Appliances* should be devoted to examples, designs and specifications for different textures and ornamental fabrics, the student is referred to these earlier books for exact information and details of these necessary preparatory processes.

The table loom, if supplied in parts for convenience of transit, will first have to be fitted together. The four parts of the frame, the ends with the rollers, and the sides must be bolted together and fastened by means of the wing nuts on the bolts. Next the headle frame, Fig. 2 or 3, must be placed in position as in Fig. 4, A, and firmly bolted to the sides of the frame. In the case of the cross headle loom (Fig. 2) for plain weaving all is now ready to receive the warp, but in the ornamental weaving loom (Fig. 3) the headle frames must be strung and fixed in their position in the headle holder. The

stringing and mounting of the headle frames must be done very carefully and accurately in order that the warp when at rest may lie perfectly flat and horizontal between the front and back edges of the frame H H, over which it passes from the warp roller 1 to the cloth roller K (Fig. 4).

Fig. 5 illustrates the method of stringing the headles and Fig. 6 shows the cording by which they are hung from the pulleys and connected with the beads below

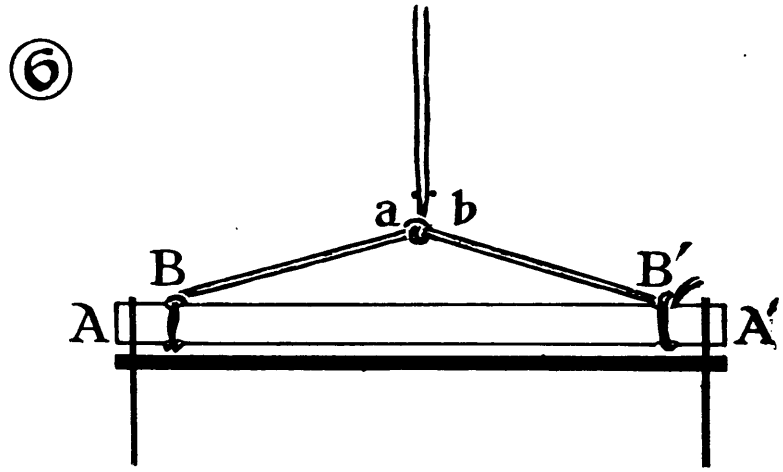


the pattern rack at the side of the headle frame D, Fig. 3.

A A′, Fig. 5, shows the top lath of a headle frame having a double cord securely tied to it. It is prevented from slipping along the lath by two notches made in the top of the lath at B B′. The cords on all the headles must, of course, be exactly the same length, their length being just sufficient to draw the cords when they are all looped to the pulley cord, at such an angle as shown by Fig. 6 between B and B′.

The simplest way of stringing the headles is as follows. Take a cord about three times as long as the space on the lath between the two notches B and B′, Fig. 6, and after doubling it, place the cord at its exact centre across

the lath in the notch B, Fig. 6. Next pass the two ends of the cord in *opposite directions under* the lath, bring them up on each side of it and tie a double knot very tightly over the cord in the notch. One end of the double cord being thus firmly fixed, the two separate strings must be joined together about four inches from the ends by a simple knot. This knot must be placed in the



notch B′ which remains empty, and the two loose ends passed under, brought up and tied over the knot in the notch in the same way as the knot in the notch at B, Fig. 6. In tying the cords to the lath great care must be taken to stretch them round it and to tie the double knots very firmly so as to prevent the cords from slipping along the lath when the weight is on and the harness is in constant use.

Before the headles can be attached to the pulleys, as shown in Fig. 3, they must be hung in their position in

the headle frame, on two temporary supports, at the exact height at which they will have to remain when the loom is at rest. These temporary supports are merely short, flat laths, the ends of which are seen at D D, Fig. 7, and they are placed underneath the top laths of

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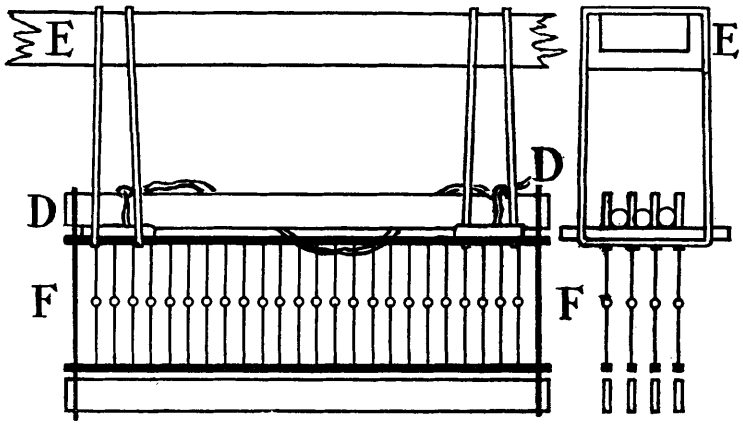


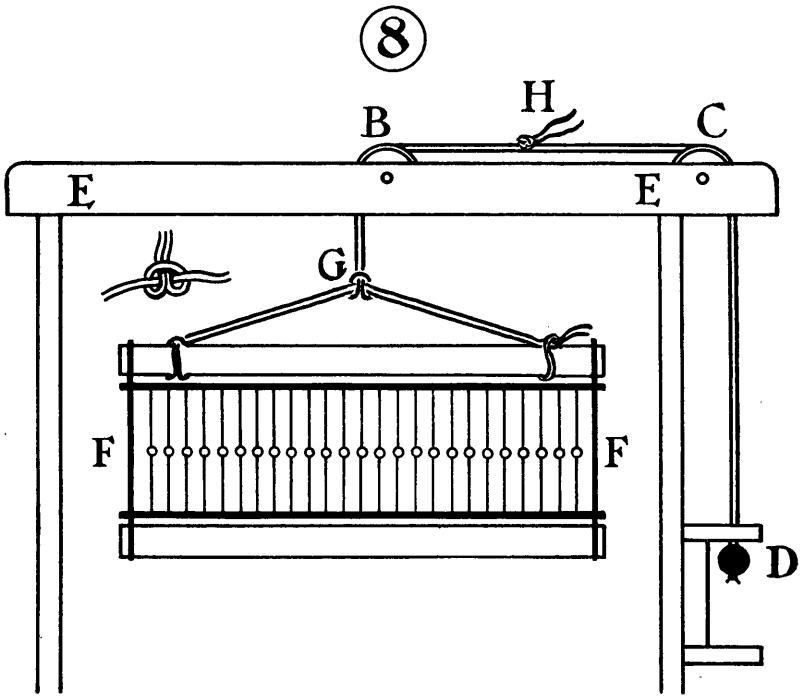
the headles, near the ends, and are slung by a cord to the headle frame E E, as in the drawing.

The height of the headles in the loom must be such that the eyes of the headles F F, Figs. 7 and 8, are exactly on a level with the front and back bars of the loom H and H′, Fig. 4.

The headles being in position may now be connected with the rows of pulleys B C, and the bead rack D D, Fig. 3 and Fig. 8. The way in which this is to be done

will be readily understood by reference to the drawing, Fig. 8.

In the first place eight lengths of cord will be required long enough when doubled to reach from the top lath of



the headles to C, after passing over the pulley B. These cords are all to be attached to the double headle cords at G, Fig. 8, by a slip loop, shown to the left of G, before it has been drawn tight.[1] When these cords have been

[1] The method of making this loop and its great utility in loom harness construction are fully described in *Weaving for Beginners*, page 2.

attached to the headle cords another set of eight cords will be required to connect them with the beads in the rack D. These cords must be long enough, when doubled, to reach from B over the pulley C to about 4 inches below D, Fig. 8.

When these lengths are ready, one length must be taken and doubled and a slip loop must be made through which the two ends of the cord from the first headle can be passed after going over the first pulley at B. The loop must be drawn tight and the two ends of the headle cord tied together in a single knot : this junction must be made half-way between B and C. The loop knot being drawn close and firm, the double cord must be carried over the pulley C, through the hole in the headle frame, corresponding with the groove in the pulley, down to the bead rack D, threaded through the bead and tied in a firm knot so as to fix the bead in its place. This will, of course, complete the connection between the *bead* in the rack and the *headle* in the frame. The loop and knot H are for the purpose of nicely regulating the length of the pulley cord at will. To shorten the cord it is only necessary to draw the ends of the pulley cord through the loop of the bead cord and tighten the single knot, while to lengthen the cord the knot must be loosened and slightly moved before drawing it tight again. When the warp is entered in the headles and the slings D D (Fig. 7) are removed, the headle cords will, of course, require nicely adjusting, by means of this slip knot, so as to make them hang evenly and level.

As mentioned on page 7, a special feature of the table loom is the arrangement made for beating the weft

together with the reed. It is called the reed carrier and takes the place of the batton of the ordinary loom. In one respect in particular it is superior in its action to the ordinary swinging batton, whether the latter is hinged above or below the warp. The reason of its superiority is that its blow on the weft is directly *horizontal* during the progress of weaving, not *oblique* as is more or less the case when a hinged or swinging batton is used.

The horizontal movement of the reed holder in the table loom obviates the necessity of altering the position of the web by winding it on to the front roller so frequently as in the treadle loom with its swinging batton. When, however, the movement of the reed between the work and the headles becomes too restricted, all that is necessary is to raise the lever,[1] placed behind the headle frame which fixes the ratchet wheel, and so free the back roller as to allow the catch to pass over one or two teeth of the wheel: at the same time the front roller must be turned by means of the handle so as to wind the woven cloth on to the front roller. This must, of course, be done very carefully and in such a way as to allow the cloth to remain in its true position in relation to the reed and headles. After the back roller has been again fixed by the lever catch, the warp must be tightened up by means of the handle and the small toothed ratchet of the front roller.

The reed holder for the table loom is fixed by locknuts on two iron rods which fit into two metal tubes placed between the headle frame and the back bar of the loom as described on page 7 and illustrated by Fig. 4.

[1] The lever is shown in the drawing of the 8-headle loom in the frontispiece but not in Fig. 4.

Chapter IV

MAKING, TURNING ON AND ENTERING THE WARP

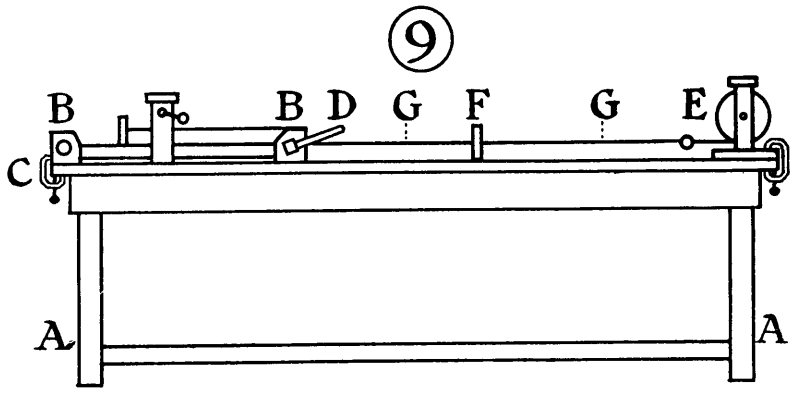
As mentioned in the last chapter the processes of warping, turning on and entering are so fully described in *Weaving for Beginners* and *Hand-Loom Weaving*, that in the present chapter it will only be necessary to deal with the special arrangements required for applying the instruction there given to the table loom, whether it be the simple two headle loom for plain weaving or the more complicated eight to twenty headle one for ornamental weaving. Chapter VI in *Weaving for Beginners*, if the warping board with pegs is used, should be studied at this point, but if a warping mill is available, which in many respects is far better than a board, Chapter IV in *Hand-Loom Weaving* should be carefully read and mastered.

The warp being ready, the arrangements to be made for turning it on to the back roller of the table loom must be next considered, as these differ slightly from those described for the ordinary loom.

First the loom must be firmly fixed by clamps or tied by ropes to a table top, in such a way as to leave the back roller clear to receive the rod having the end of the warp attached to it, in the manner presently to be shown.

The most convenient way of fixing the loom and its position on the table will best be described by the drawing,

Fig. 9, in which A A is a table or bench, the heavier and longer the better, and B B is the loom fixed by a strong iron clamp C to the edge at the end of the table top and exactly in the corner so that the handle of the roller D can be freely turned without coming in contact with the side edge of the table.

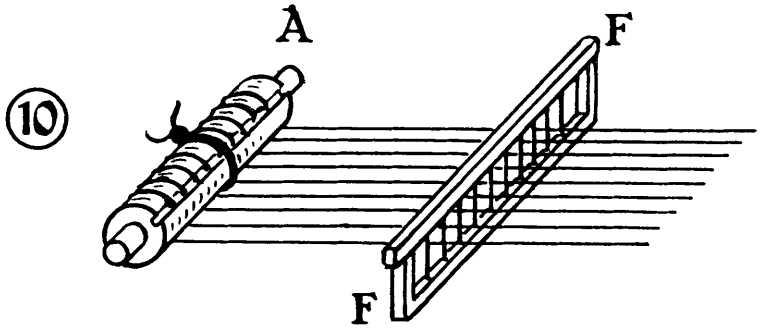


The loom being thus ready and the warp wound on the hand stick as described at the end of Chapter VI in *Weaving for Beginners*, Chapter VII in the same book must be read and its directions followed until page 49 is reached, from which point *turning on* for the table loom requires different directions.

If the handy appliance for beaming the warp shown at E, Fig. 9, which will be explained later on, is not used the work can be done, though less accurately and quickly, with the help of two assistants, one to manipulate the raddle F, Fig. 10, and one to stand at the end of the table and pull the warp as evenly and at as equal a tension as possible as it unwinds from the hand stick and is

wound on to the roller of the loom by the operator at the handle D.

The line G G, Fig. 10, is the warp spread out by means of the raddle which it passes through, as described at page 51 in *Weaving for Beginners*. The rod with the end



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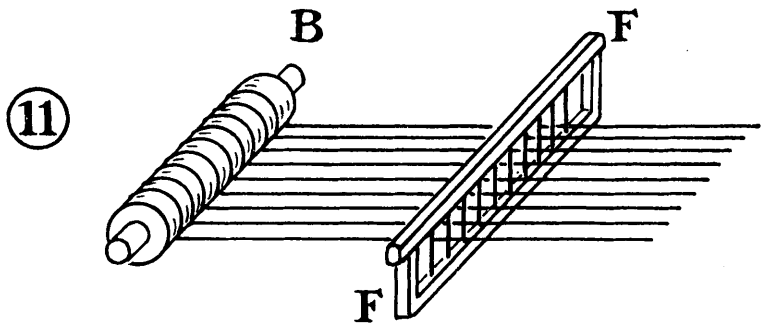

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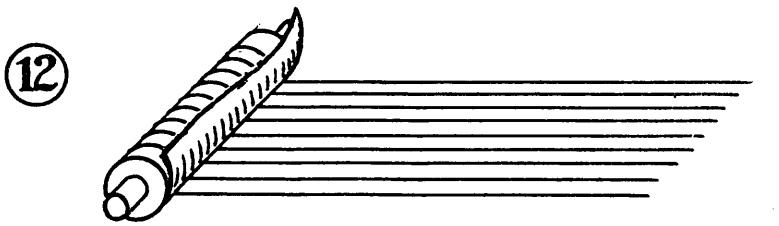
of the warp looped round it has, of course, been put into its groove in the centre of the roller at B, securely tied in and the roller turned *once* round so as to fix the rod safely in the groove before any strain or tension is given to the warp by the assistant. The fixing of the rod thus in the roller will be made clear by Figs. 10 and 11.

In Fig. 10 at A, the rod has been placed in the groove and tied in by a string round the centre of the roller. This string would, of course, be insufficient to hold the rod in place if any strain were put on the warp, but if the roller be turned once round, so as to enclose the rod with the warp, as at B, Fig. 11, the more tension given to the warp the more safely the rod will be held in its place.

A second assistant must hold the raddle F, and by moving it backward and forward clear the threads as they are wound on, and also very slightly move it



in the opposite direction so as to spread it evenly on the roller. Great care in this part of the operation is well repaid by the result of a smooth, even and solid warp which will give the weaver little trouble from loose and uneven threads coming up as the weaving of the web proceeds. A great deal also will depend on the assistant at the end of the table keeping a strong, equal tension on the warp as it is turned on.

If the warp is of any considerable length it is very helpful to insert every now and then a sheet of thick smooth paper across the warp as shown at Fig. 12. The paper must be a little wider than the space occupied by the warp.

The little appliance shown fixed at the opposite end of the table to the loom at E, Fig. 9, is a miniature beaming drum which enables the warp to be turned on at any degree of tension required and with perfect equality throughout its length. It also dispenses, of course, with the services of an assistant at the end of the warp to give it the necessary tension as described at page 17.

(13)

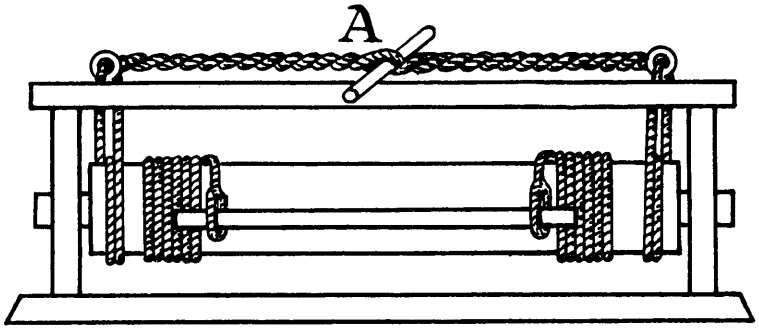


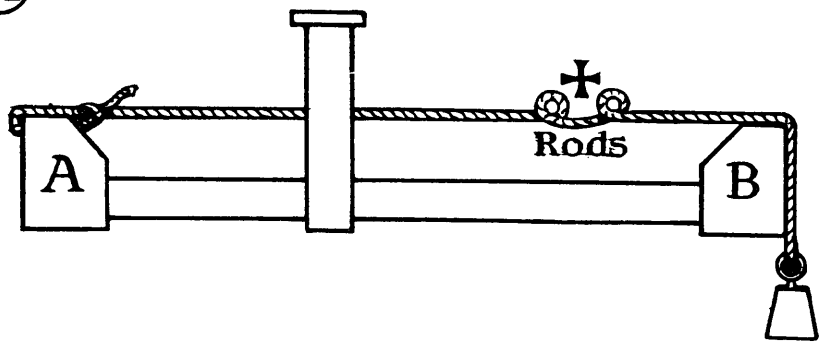
Fig. 13 is a representation of the small beaming drum suitable for use with the table loom. It is used in exactly the same way as the full sized drum described in *Hand-Loom Weaving* at page 73. If the description there given be well studied the student will have no difficulty in using the small drum shown clamped in the proper position for use at E, Fig. 9.

A comparison of Fig. 13 and the illustrations of the beaming drum in *Hand-Loom Weaving* will show that the only material difference between them is the method of regulating the weight of resistance to the turning on of

the warp. In the large drum the resistance is given by leather straps and weights, but in the small one the tension is regulated by a rope wound once round the roller at both ends and tightened in its grip by being twisted by means of a short, strong stick A, Fig. 13.

A full description of the general principles of entering the warp threads separately and in exact order in the headles and reed of a full sized loom is given in Chapter

(14)



VIII of *Weaving for Beginners*. This description applies also, with two or three slight modifications, to the entering of the table loom: these differences are as follows: The side cords which support the two sticks which keep the cross in the warp must be attached to the front *bar* of the loom at A, Fig. 14, instead of to the *post*. The cords must also pass over the back bar at B instead of being passed round the back roller. Then again, there is no need for the notched supports for the headles, Fig. 33, *Weaving for Beginners*; the slings shown at Fig. 7, D D, page 12, will be sufficient to hold the

headles quite firmly if a little piece of rod is rested on the slings between each headle and the whole number of headles tied tightly together by a cord as shown in Fig. 15 in which A A is the sling, and between B and B B B are the headles fixed by the rods and cord. In

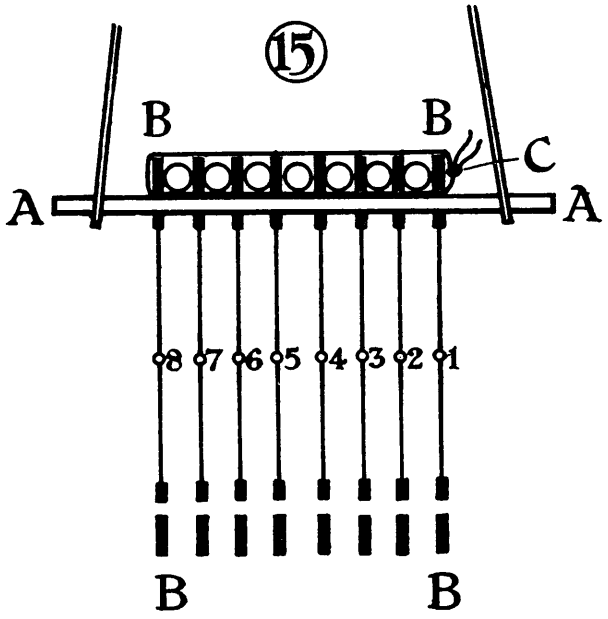


Fig. 15 the enclosed white circles are the short pieces of rod and at C the ends of the cord are shown which binds the top laths of the headles and the pieces of rod together.

For the simple plain weaving loom, the harness of which is shown at Fig. 2, Chapter II, all that is necessary for the entering is to separate the two sets of eyes as shown

in Fig. 16 and tie up the handles so as to keep the headles from shifting.

The numerals in both Figs. 15 and 16 indicate the order of entering. It may be noted also that it will be found most convenient in both cases to unscrew the reed holder from the iron rods and remove it whilst entering the harness, but it can be replaced when the reed itself is to be entered.

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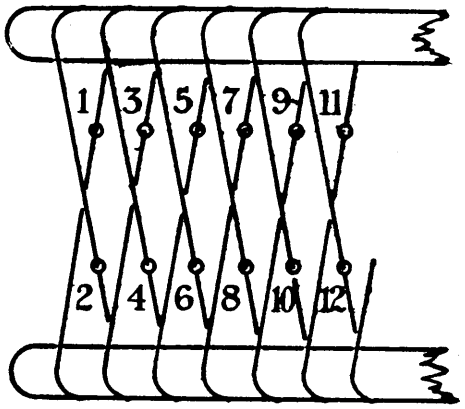
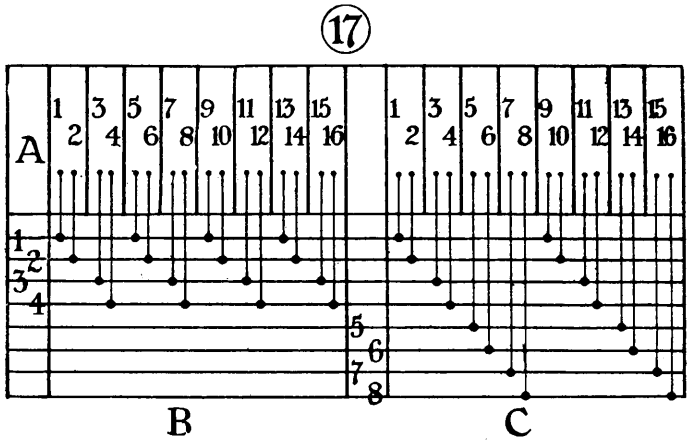


When the entering is finished the warp has to be attached to the front roller in exactly the same manner as in the full sized treadle loom. The student is referred therefore to the last paragraph on page 66 of *Weaving for Beginners*, where full directions for this important work will be found. The directions begin at page 66 and end with the first paragraph on page 69.

All these preparations having been properly made the table loom will be found ready for the weaver to regulate every part of the mechanism and begin weaving. How to do this must be treated of in another chapter.

The firmness or coarseness of the web to be woven will depend entirely on the number of dents or openings to

the inch in the reed. As a general rule *two* threads are entered in each dent so that the threads passing through *two* headles are contained in each dent. Unless otherwise ordered the simple, two headle loom has a reed of twelve dents to one inch and the ornamental loom has twenty dents. The warp for the former consequently



will have to be twenty-four threads to one inch and that for the latter forty threads. It will make no difference in this respect what number of headles are used as the entering will be as shown in the diagram, Fig. 17 at A, B and C, in which the headles are represented by the horizontal lines over B and C, the reed by the vertical lines to the right of A and the entering by the numerals. It will be seen at once that the same number of threads, in this case sixteen, are simply spread by the enterer over the greater number of headles and that the same *reed entering* will do for both.

Chapter V

REGULATING OR GATING THE LOOM FOR WEAVING

THE side cords can now be removed, the warp tightened up by means of the ratchet of the front roller and, in the case of the loom with more than two headles, the slings, which have hitherto held the headles level with the front and back bars of the loom, can be taken down and put by for future use. It will now no doubt be found that the headles hang very unevenly so that the warp passing through each headle is at a different level to all the others: this will, of course, prevent the warp in the reed at the front presenting, as it must, an unbroken horizontal line when the loom is at rest. The utility of the joint at H in the pulley cords of the headles shown in Fig. 8 will now be realized, as, by its means, as described at page 17, each headle can be either raised or depressed at will and this must be most carefully done until the line of warp in the reed is unbroken and the warp from the front bar of the loom to the back one is perfectly level. When this is all finished, the table loom will have assumed the appearance of that shown in the frontispiece, except that the actual weaving of the material has yet to be started.

CHAPTER VI

GETTING TO WORK

IN addition to the loom set up with its warp ready for weaving the weaver will, of course, require a few tools, the most important of which is the shuttle for holding the spool of weft and interlacing it with the warp. A full description of these will be found in Chapter X of *Weaving for Beginners*, and therefore need not be repeated here. For the most part the Chapters XI, XII and XIII on getting to work, in the same book, apply equally to the treadle loom and the table loom, but a few special points of difference in starting the latter must here be noticed. The most important difference arises from the fact of there being no *treadles* or *tying* up required in the case of the table loom. The place of the treadles and tie up is taken by the handle at the side, in the case of the simple plain weaving table loom, and by the strings and pulleys in the ornamental weaving loom. These must now be carefully described and their use made clear.

If we turn to Fig. 2, page 5, it is apparent that the eyes of the healds which are on alternate threads can be raised and depressed in two sets, one set on odd threads and the other on even threads of the warp by turning the handle A half-way round backward and forward, and that each half revolution will make an opening in front of the reed with a different set of threads at the top,

first all odd numbered threads, 1, 3, 5, 7, etc., and second all even numbered threads, 2, 4, 6, 8, etc. It is also obvious that if a continuous thread of weft be passed through each successive opening, made by turning the handle, the warp and weft will be intersected and cloth will be woven.

In the mounting Fig. 3 plain cloth can be made by pulling down first the four beads, 1, 3, 5, 7, from the row E E and slipping the cords into the grooves immediately below at F F; this will make the first shed of odd threads. The second shed of even threads is next made by pulling down the beads, 2, 4, 6, 8, and replacing the white ones. This arrangement will not, of course, weave plain cloth quite so quickly as the handle and roller motion of Fig. 2. This loom is, however, made especially for pattern weaving, twills, satins and fancy figures such as those of Plates III, IV, V, and VI, though occasionally spaces of plain cloth may be required.

The only other difference between the working of the table loom and the loom described in *Weaving for Beginners* is in the substitution of the ratchet on the back roller for the friction weight. This special ratchet enables the weaver to let off, by raising the long lever at the side of the loom (*see* frontispiece), sufficient warp to make about two inches of cloth without moving from the front of the loom. The warp is tightened up by moving the small toothed ratchet at the front in the opposite direction to the large toothed one at the back.

With the above exceptions all the directions for fixing the warp to the front roller and getting to work given in *Weaving for Beginners* are equally applicable to weaving on the table loom.

Chapter VII

THE POSSIBILITIES OF VARIETY IN TEXTURE AND PATTERN ON THE TWO-HEADLE TABLE LOOM

OF course, the possibilities of varying the appearance of the web, produced on the two headle loom, is limited to what is called by weavers *tabby* weaving, but generally known as *plain* weaving. Pure handwork, called *brocading*, can be used, more or less profusely, in addition to the automatic working of the headles and by this means highly ornamental designs may be added to the plain web in spots, bands or continuous patterns. Plate I is an illustration of this composite treatment. The ground web is woven twenty-four double threads of mercerized cotton to an inch and the lighter colour of the bordering is arranged in the warping. The small floral sprigs arranged symmetrically in rows and the larger floral group in the centre are *brocaded* in different coloured silks as described in Book I of this work, Chapters IX, X and XI, the only difference being that on the weaving board there described, the tabby ground is woven entirely by hand as well as the brocading.

Notwithstanding, as suggested above, that the two headle loom is restricted to tabby weaving its plain texture may be varied considerably. We must now, therefore, consider how this can be done. (1) Fine or

PLATE II.

coarse threads may be used for the warp ; coarse worsted with as few as sixteen threads to an inch or fine linen of 200 threads to the same space will naturally make material of a totally different texture. (2) The weft or interlacing thread may also be coarse or fine and its proportional size to the warp may result when woven in textures as far apart as a coarse worsted tweed, a fine silk taffeta or an Irish poplin. (3) The use of thread made from different kinds of raw materials either in warp or weft will result in materials soft and glossy as silk, harsh or rough as wool, uneven and stiff as linen or pliable and smooth as cotton. (4) Colour or dye affords opportunity for variation on plain webs whatever kind and size of the thread used. The warp and weft may be of different colours, when the result will be a shot effect, as it is called. Stripes of different colours and proportions may be arranged by the warper and highly ornamental effects obtained without extra work by the weaver as in Plate II, which is a piece of East African native weaving, woven in narrow strips and the strips sewn together with a needle. Stripes in the *weft* can also be designed, but for these the weaver has to be responsible. Great care has to be taken, if the stripes are to be kept even, to weave in the proper number of different coloured shoots of weft to form each of the stripes and the spaces of ground between them. When both warp and weft stripes are used the design called tartan or plaid results. Chapter XIV of *Weaving for Beginners* explains fully this branch of plain weaving and gives directions for designing and arranging for it. (5) The inlaying or brocading of ornament in plain tabby webs, referred to above, such as can be woven on this simply

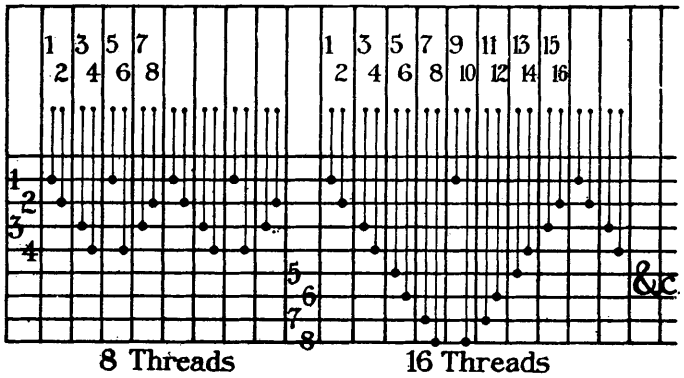
mounted table loom, affords almost unlimited scope for his invention and skill to the artist craftsman in the production of elaborate patterns as well as to the beginner for weaving in with the needle simple embellishments to decorate portions of the web : small geometrical spots, floral shapes and sprigs, wavy and broken lines, etc.

CHAPTER VIII

ORNAMENTAL WEAVING ON THE MULTI-HEADLE TABLE LOOM

WE have seen that even on the loom with only two headles a considerable variety of fabrics can be woven, especially if more or less elaborate brocading be added to the plain weaving. It will, therefore, be

(18)

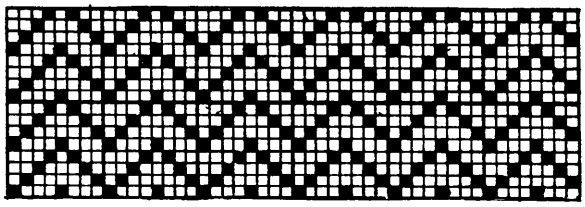


readily understood that if the harness of the loom consists of eight headles instead of two, the facilities for variety of texture will be considerably increased. Not only, however, can more elaborate plain textures, such as twills, satins, etc., be woven with an increased number of headles, but many small effective ornamental designs can be woven automatically, according to patterns worked out on ruled paper, as will be presently explained.

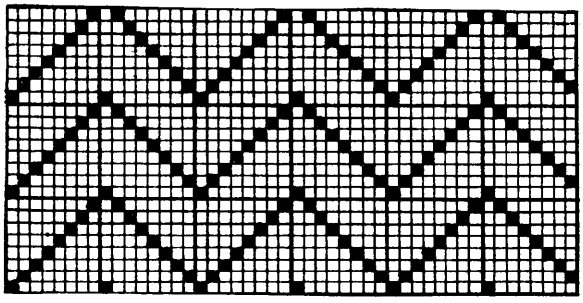
The frontispiece shows a loom with a mounting of eight headles, but that number may be increased to twenty or reduced to four. The order of entering the warp in the harness may also be altered so that instead of being entered straightforwardly as in Fig. 17, B and C,

(19)

A



B



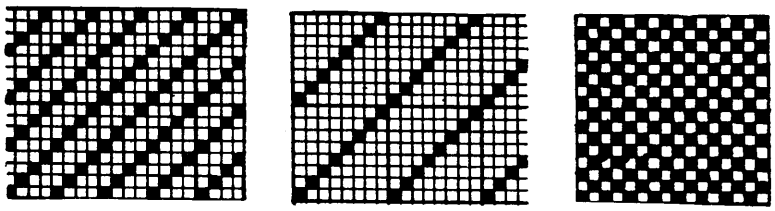
it may be entered in what is called a diamond entering as in Fig. 18, so that if the beads of the harness were pulled down in regular succession the number of threads affected by four headles will be increased to eight and the number of threads affected by eight headles will be increased to sixteen, consequently the woven effect would be extended as shown on the ruled paper at Fig. 19, A and B. There are many other more complicated

enterings, but these examples are sufficient for the present explanation.

Plain tabby, Fig. 20, C, may be woven on both the above enterings in the same way as directed at page 29, but with the entering Fig. 18, ordinary twills Fig. 20, A and B, cannot be made. The weaver always tries, whatever entering a special design may require, to so arrange it that plain tabby weaving can be alternated with any ornamental figure he may be weaving.

The effect of Fig. 19 is the result if the beads of the headle frame are worked repeatedly in the order 1, 2, 3, 4 or 1, 2, 3, 4, 5, 6, 7, 8, with the entering of Fig. 18; but if they are worked in the order 1, 2, 3, 4, 3, 2, 1, or 1, 2, 3, 4, 5, 6, 7, 8, 7, 6, 5, 4, 3, 2, 1, the diamond effect A or B, Fig. 21, will result. Hence, this entering is called the *diamond* entering, whilst the straightforward threading is called *plain* entering. Other enterings will be indicated in the specifications for special designs as they are required later on, but these two are the most usual ones.

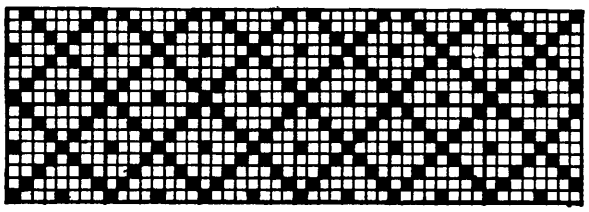
⑳



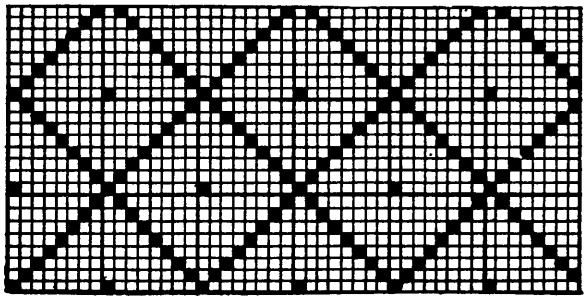
A B C

㉑

A



B



Chapter IX

FLUSHING, THE BASIS OF ALL ORNAMENTAL WEAVING

OF course, all that has been advanced as regards texture and ornamental *brocading* on the simple, two headle loom, is applicable to the loom fitted with an increased number of headles. In addition to these, however, a vast range of designs formed by passing or *flushing*, as it is called, the weft or warp over an arranged *group* of threads, instead of *every alternate* thread as in tabby weaving. This will be made quite clear if Figs. 19, 20 and 21 be re-examined. Fig. 20, C, represents plain tabby weaving in which the intersections of *single* threads of warp and weft are invariable. This effect can be got as already described on two headles, but it can also be woven with any *even* number of headles, 4, 6, 8, 10, etc. All that is necessary is to arrange for all the headles entered with the odd numbered threads to rise alternately with all those entered with the even ones. For instance, take Fig. 17, if, instead of raising the four headles in regular succession, Nos. 1 and 3 are raised together and, in alternation with them, headles 2 and 4 are raised, the tabby effect of Fig. 20, C, will be woven. The student should prove this once for all by drawing out on ruled paper all the examples in the group from Figs. 17 to 21. He should also note and confirm that when the headles are raised in regular succession,

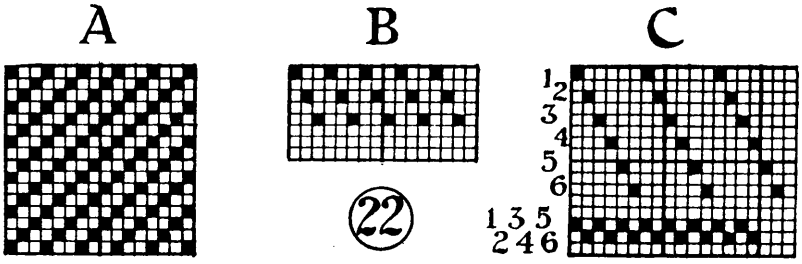
as in all the examples, Figs. 17, 18, 19, 20, and 21, except C, Fig. 20, *flushing* occurs between the intersections indicated by the black squares. In Fig. 20, A, it is over *three* squares or threads. In Fig. 20, B, the flushing is over *seven* squares, and in Fig. 19, A and B, and in Fig. 21, A and B, the flushing is over from *three* to *fifteen* threads.

This is a very important point and should be thoroughly understood by the student, for it is by means *of causing the warp or weft to flush over certain selected threads that all automatic pattern weaving whatever is effected.*

CHAPTER X

TWILLING ON FOUR HEADLES

FIG. 20, A and B, are diagrams of a texture the technical name of which is *Twill*: the original spelling of the word was *Tweel* and the method of making various ornamental fabrics of which the twill is the foundation was called *Tweeling*.

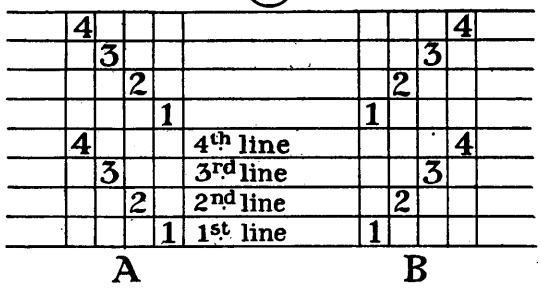


The smallest number of headles on which a twill can be made is *three*. In this twill the web passes under one thread of warp and flushes over two threads, *see* Fig. 22, A, and the entering is as shown at B in the same figure.

Looms are seldom mounted with only three headles because it is not possible to weave tabby cloth unless there are an equal number of odd and even threads in the entering. If a three headle twill is required it is generally woven on a harness of six headles entered as at C Fig. 22. With this harness, it will be seen,

an equal number of odd and even threads are available for tabby weaving as shown below C, and a three-headle twill can be arranged for by always lifting two headles together. Thus, in the first line, Fig. 22, the first and fourth headles are lifted together. In the second line the second and fifth lift together. In the third line the third and sixth are lifted together and this completes the sequence, as the fourth line is the

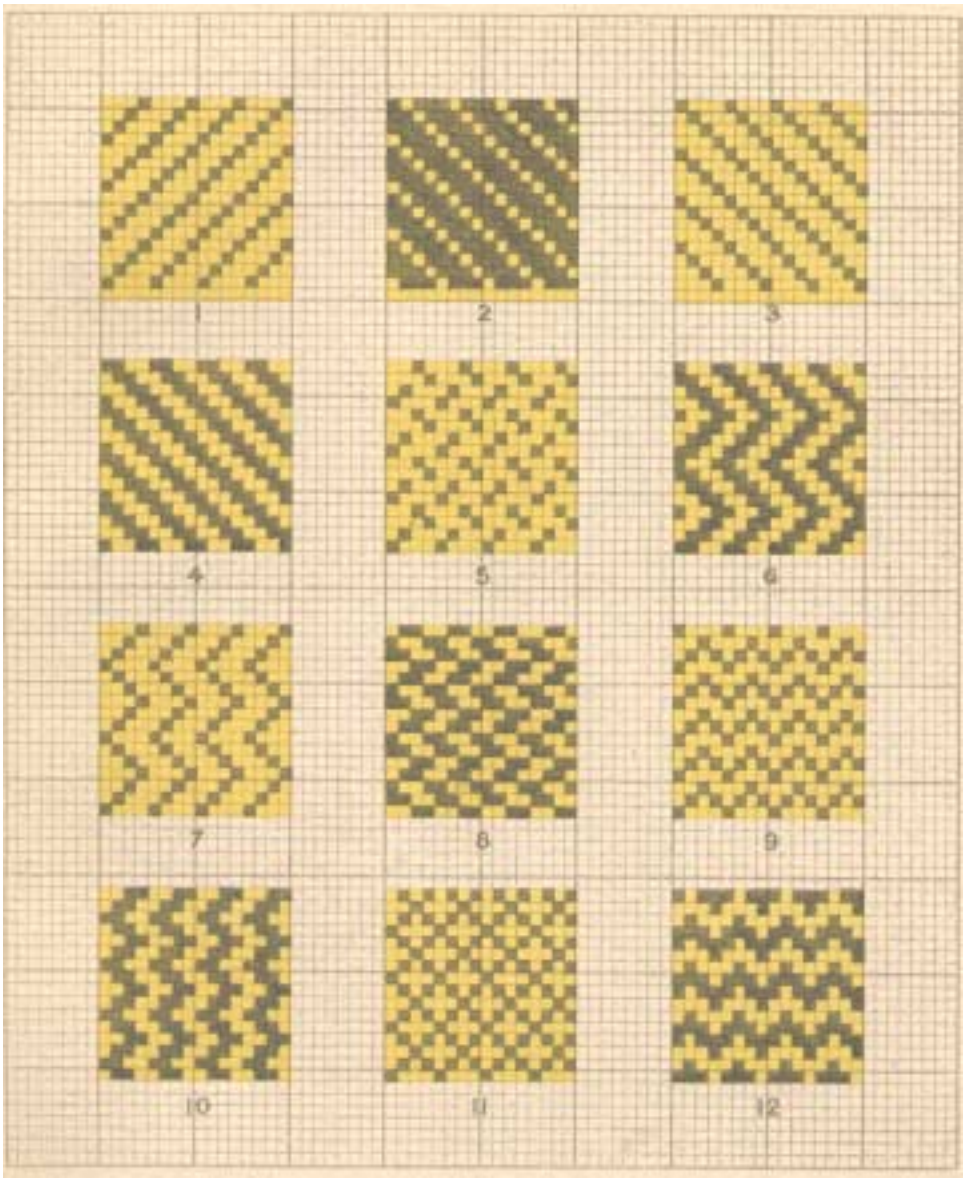
(23)



same as the first. From this it will be realized that it is always most convenient to have a loom mounted with an even number of headles.

A harness of four headles being the nearest even number to the tabby harness of two headles, let us see what variety of twilled texture it can be used to produce. Plate III gives twelve specimens of twill textures which can be woven on a harness of four headles.

No. 1 is what is called a biased or regular twill, because its intersections follow each other in regular sequence, in diagonal lines and always at an equal distance apart, in this case, the space of three threads both of warp and weft. These biased lines may be made, at will, to


1
2
3
4
5
6
7
8
9
10
11
12

incline either to the right or left according to the order in which the headles are lifted. In No. 1, Plate III, the headles are raised, by pulling down the beads and fixing them in the lower rack, in the order indicated by the numerals in Fig. 23, A.

It will be remembered that the entering of the warp began at the first heald on the back headle of the harness: accordingly the first line of weft will pass under the threads lifted by the first or back headle. For No. 3,

(24)

			2	6th line				2		
		3		5th line					1	
	4			4th line	4th		3			
		3		3rd line	3rd	4				
			2	2nd line	2nd			2		
				1st line	1st				1	

A B

Plate III, the order of lifting shown at letter B, Fig. 23, must be observed.

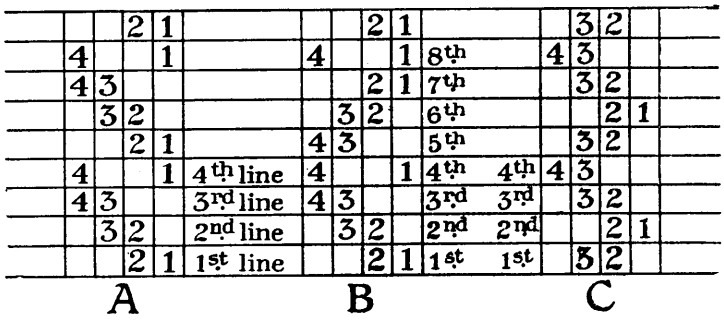
For No. 7, Plate III, the succession given at Fig. 24, A, must be worked. In this case there are six lines of weft in each repeat.

No. 5, Plate III, works out on four lines of weft in the manner shown at letter B, Fig. 24. This is called a *broken twill.* This effect will be explained later.

It must be noticed here that the regular twills, of which the above are specimens, have a peculiarity which is at the foundation of all ornamental weaving, *especially the weaving of figured damasks.* It is that the proportions of warp and weft showing at the front and back of the web are different. If a piece of stuff having, for

example, a black warp and a yellow weft, is woven with a twill texture like No. 1, Plate III, the effect on the upper surface will be like No. 2 of the same plate: a black ground with yellow spots. The reason of this is that, in the front, the yellow weft is in the proportion of 3 to 1 because it flushes over *three* threads of black warp and is bound or tied down by the fourth only; but on the underside the colour effect will be reversed.

(25)



No. 4, Plate III, gives another variant of the regular twill. It is woven by lifting the threads in pairs as shown in Fig. 25, A, and one repeat is complete on four lines.

This twill has not the peculiarity noticed above, as the only difference between the back and front of the material woven in this case is that the diagonals run in contrary directions. This twill is very generally used in worsted weaving and is the well-known *serge* texture. Nos. 6 and 10, Plate III, are variants of this twill; the plans for weaving these are given at B and C, Fig. 25.

CHAPTER XI

BROKEN TWILLS

NO. 5, Plate III, is an example of a texture in which, at certain intervals, the diagonal line of the twill is broken by intercepting the regular succession of the headles in the process of weaving. This is called *satinet* texture and illustrates the principle on which the

(26)

		3			4th line		3	2		
	4				3rd line	4			1	
			2		2nd line			2	1	
				1	1st line	4	3			

A B

				1		4th	4	3		1
		3			3rd line	3rd	4			
	4		2		2nd line	2nd			2	
				1	1st line	1st		3	2	1

C D

4th	4		2		
3rd		3			
2nd	4		2		
1st				1	

E

very important class of materials known as *satins* are designed.

Satins, more or less perfect, may be woven on any number of headles up to twenty-four, but the present example is on the smallest possible number of headles that the effect of satin can be produced by.

The plan for weaving satinet, No. 5, Plate III, is given in Fig. 26 at letter A.

No. 8, Plate III, is a variant of No. 5 and is woven on the plan given at B, Fig. 26.

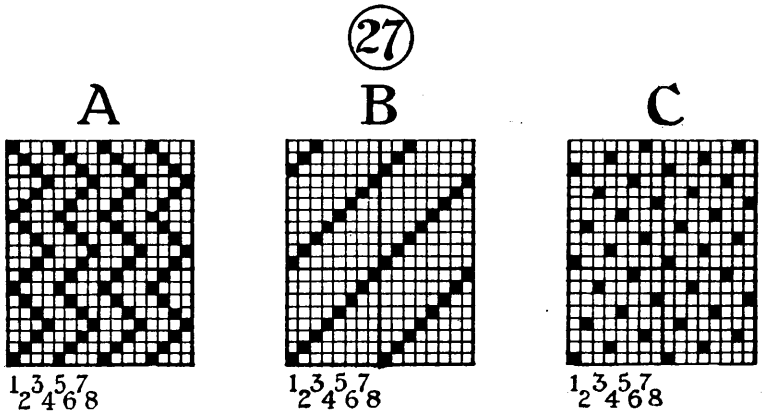
No. 9 of the same Plate gives another effect which although not a true satinet is akin to it. Plan C shows the method of weaving this texture, and the plan D, Fig. 26, which in many respects is similar to it, will work out like No. 12, Plate III. No. 11, Plate III is woven on the plan given in Fig. 26 and is akin to No. 9. It forms a tiny trellis design.

In connection with this chapter the student should consult *Hand-Loom Weaving*, before referred to, Chapter XI, pages 164 to 178, where directions are given for extending four headle twills into quite extensive designs by means of the *diamond* entering described at Fig. 16 of this book. The limits of the present volume will not admit of further consideration of the capacity of a four-headle harness here, and we must pass on to illustrate in the next chapter what can be done if the number of the headles is increased to eight.

CHAPTER XII

TWILL DESIGNS ON EIGHT HEADLES

NATURALLY all the tabby and twill textures that can be woven on a harness of four headles can be woven on one of eight. In such case the design will be repeated twice on eight threads of warp as shown



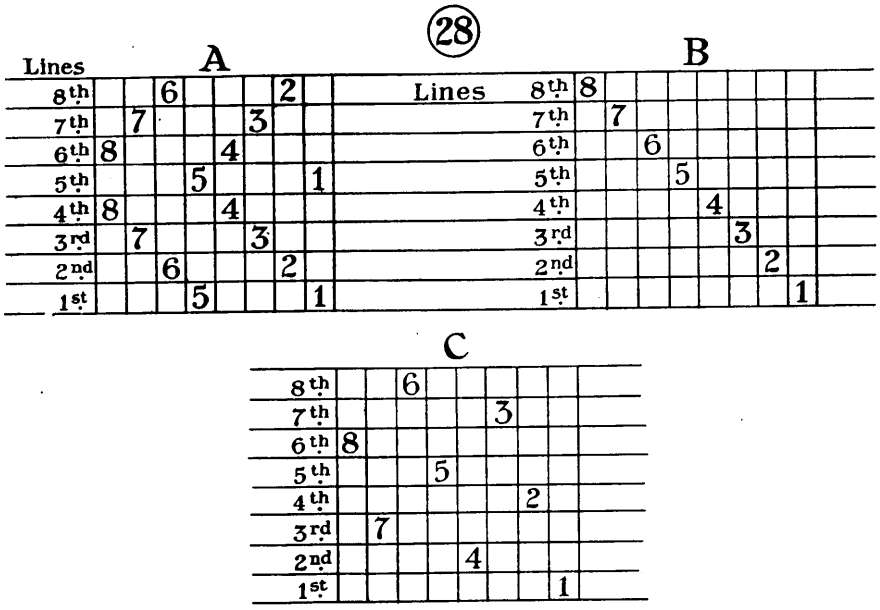
in Fig. 27, letter A, where the repeats are indicated by the numerals below the diagram.

It should be noted here that the increase in the number of headles only affects the number of *warp threads* actuated counting *laterally*, so that a twill on eight headles repeats as shown at B, Fig. 27. Also it should be noted that the height of a design is not limited by the number

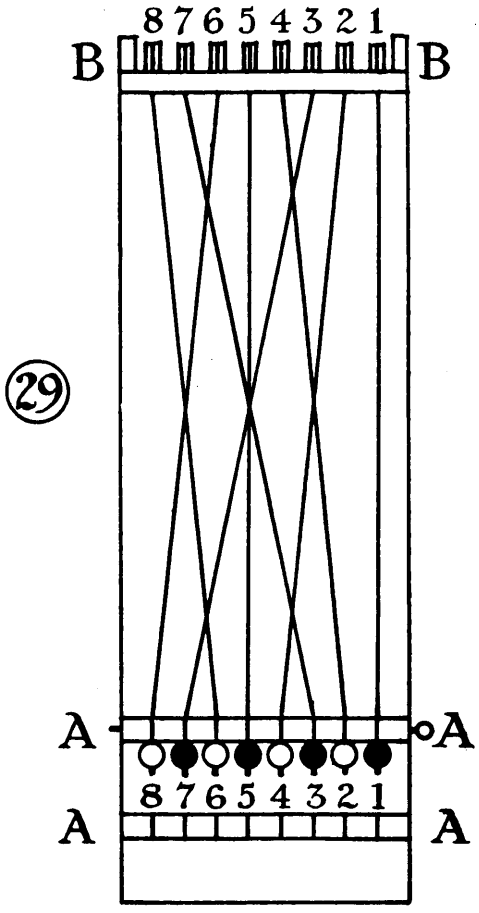
of headles it is woven on ; it may be extended from three shoots of *weft* to any number the designer can make use of.

The numerals below the diagrams B and C, Fig. 27, indicate the several threads of warp which are entered in consecutive order through each of the eight headles, the same entering being used for both the twill at letter B, or the most useful of all broken twills or satins, letter C. The order in which the headles are to be lifted for the designs A, B, and C, Fig. 27, are given in Fig. 28, A, B, and C.

Where, as in regular twills, the beads have to be pulled down in regular sequence, it is easy to remember the right

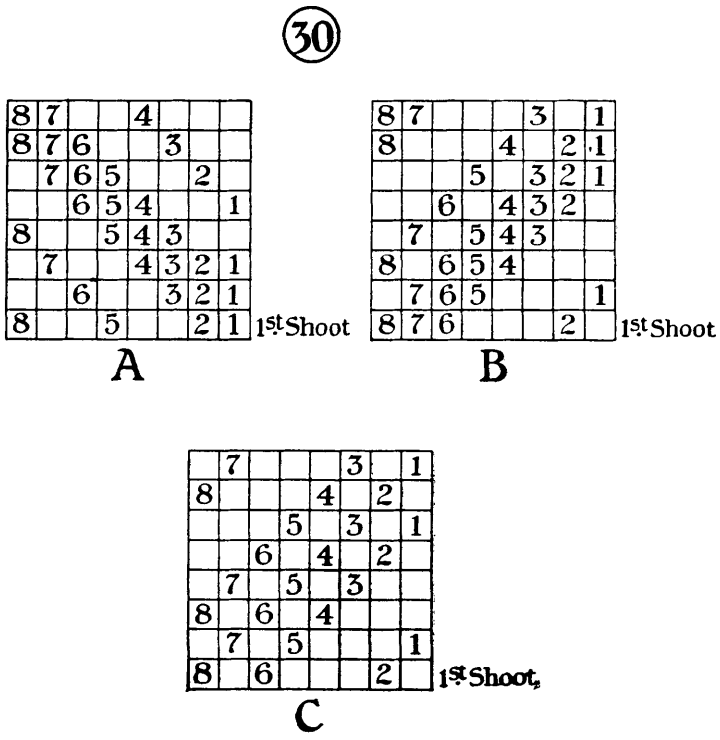


succession of bead after bead ; but in the case of satins the weaver is apt to forget which exact line of the design he is on, and may consequently raise the wrong headle. In satins, therefore, it is possible so to arrange the pulley cords that the beads may be pulled down from 1 to 8 in the same order as for a regular twill. Fig. 29 will illustrate this matter. This Fig. (29) represents the side of the headle frame of the loom with its bead rack A, A, A, A, at the bottom and its pulleys B, B numbered 1 to 8 at the top.



(29)

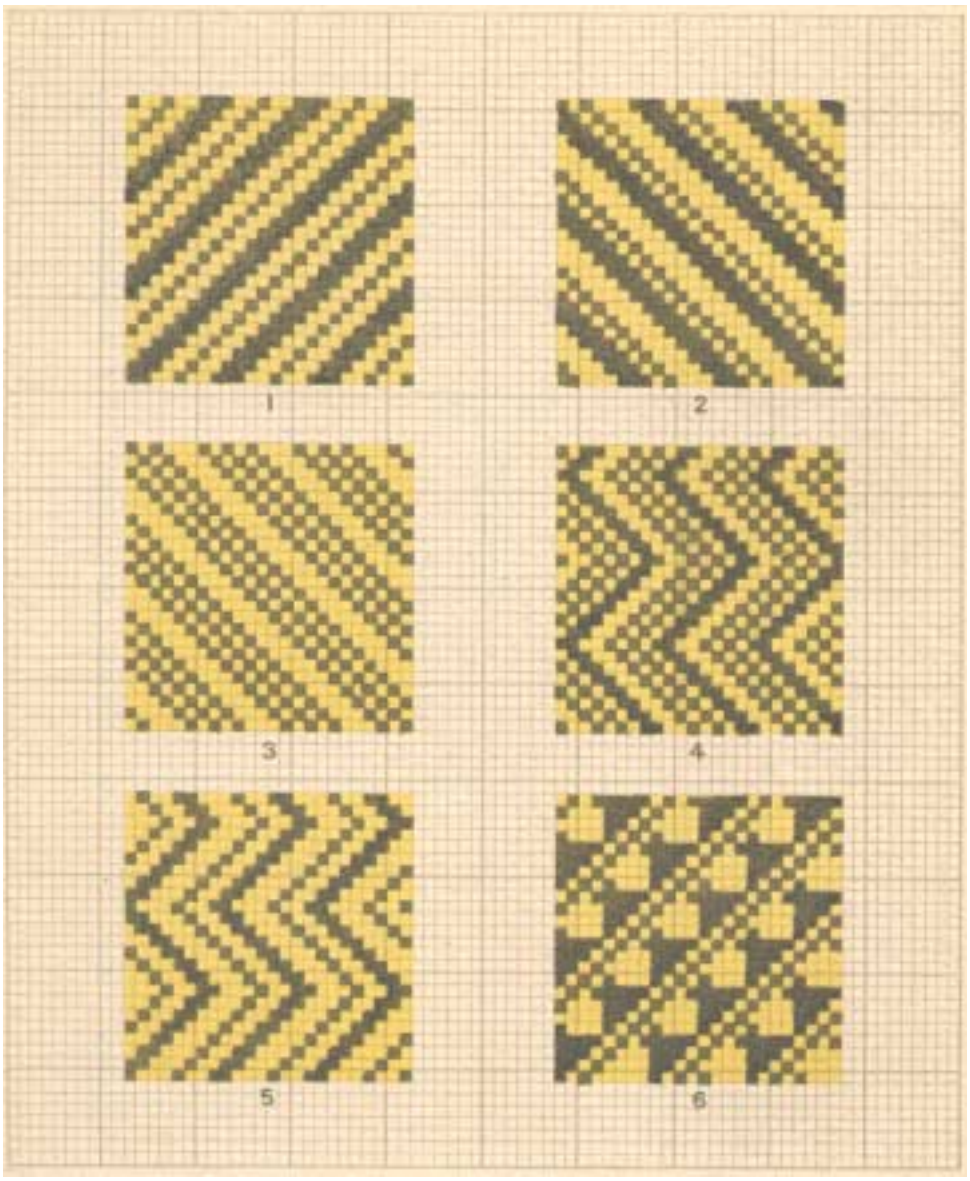
In this diagram the crossing lines drawn between B, B, and A, A, are the pulley cords which connect the beads in the rack A, with the pulleys and the headles. Pulley cord 1 goes direct to bead 1, cord 2 goes to bead 4, cord 3 to bead 7, cord 4 to bead 2, cord 5 goes direct to bead 5, cord 6 to bead 8, cord 7 to



bead 3, and cord 8 to bead 6. Thus, crossing each other between A and B, the cords can be pulled down in regular succession, as shown by the numerals beneath the row of beads in the rack, and at the same time draw up the headles necessary for forming the satin, letter C, Fig. 27.

In thus arranging for the cords to cross each other it may be necessary, especially if much of the satin is to be woven, to slightly lengthen some of the cords by

PLATE IV.

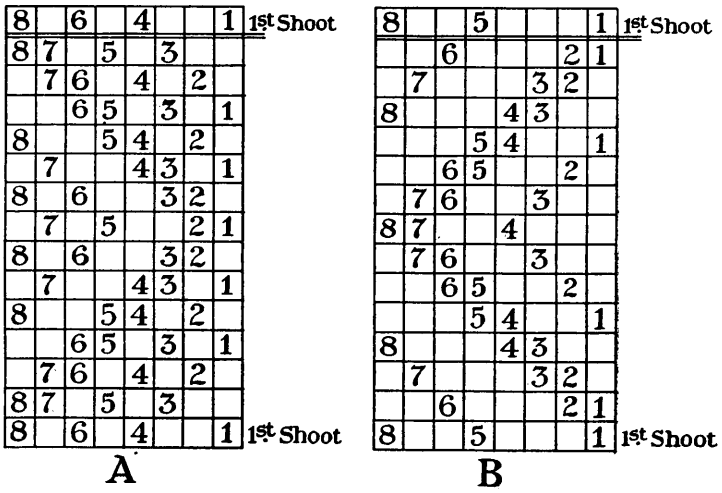


means of the slip loops between the pulleys at the top of the headle frame.

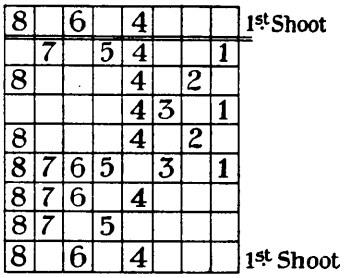
Another branch of twill weaving consists of what used to be called the *fancy* twills. These twills are illustrated on Plate IV, which contains only six specimens out of the very large number that can be designed.

It is only necessary to give three plans of these fancy

(31)



(32)



twills, as they are all worked in the same manner on eight headles and with the same straightforward entering as described in a previous chapter. The plans of 1, 2, and 3, are in Fig. 30, A, B, and C respectively.

The zigzag twill, whether plain, Fig. 27 A, or fancy, and whether vertical or horizontal, is called a wave, accordingly the Nos. 4 and 5, Plate IV, are wave twills. Fig. 31, A and B, gives the plans of these two examples.

The sixth and last specimen of a fancy twill for which space can be afforded is No. 6, Plate IV; its plan is given in Fig. 32 on page 47.

CHAPTER XIII

BIRDEYE DESIGNS ON FOUR HEADLES OR EIGHT HEADLES

FIG. 33 gives the type of what were named by the old weavers *Birdeye* designs. They were generally woven on a harness entered with a *diamond draught* in a manner which will be fully described presently. The only advantage, however, of weaving them with a special entering is that fewer headles are required for the purpose. The straightforward entering with which all the patterns hitherto described are woven is more generally useful, and even a greater variety of Birdeye designs can be worked out on it, than can be done with the special entering usually made use of.

(33)

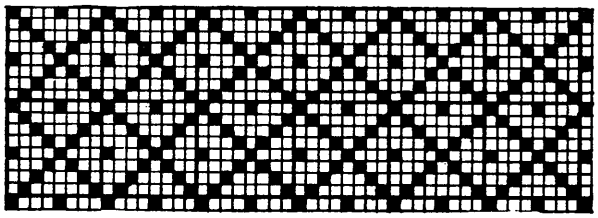
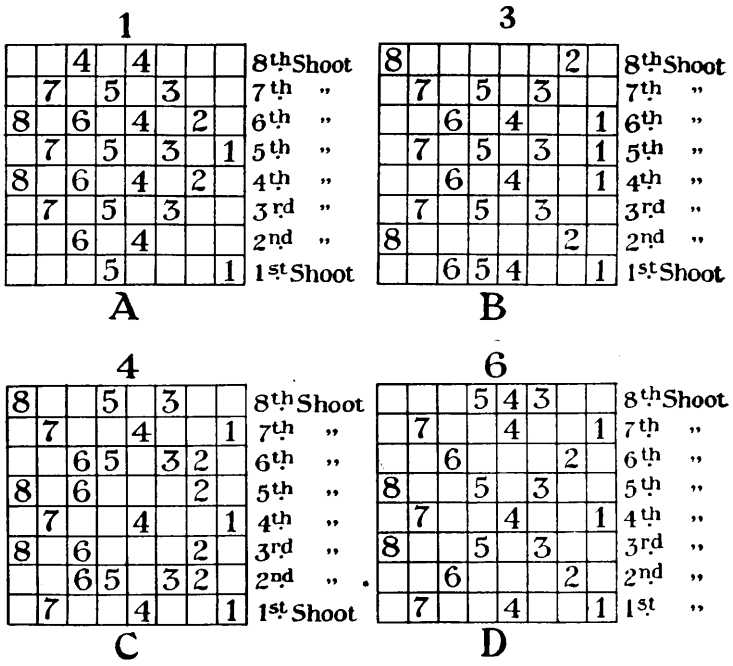


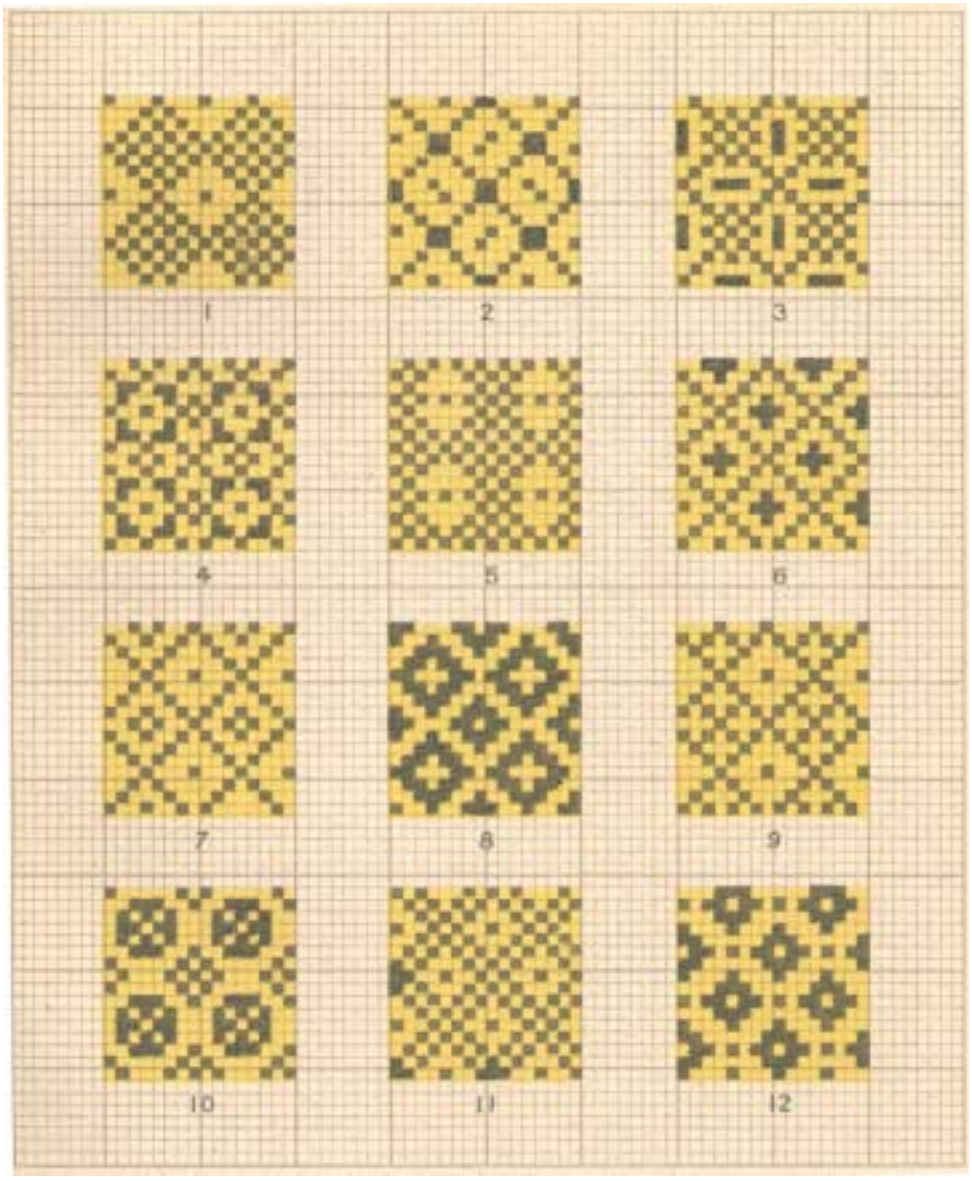
Plate V gives twelve examples of Birdeye designs. They are all founded on the crossing twill, or trellis, plan with a spot or *eye* in the centre of the diamond space. These of course are only a few specimens out of the very large number it is possible to design.

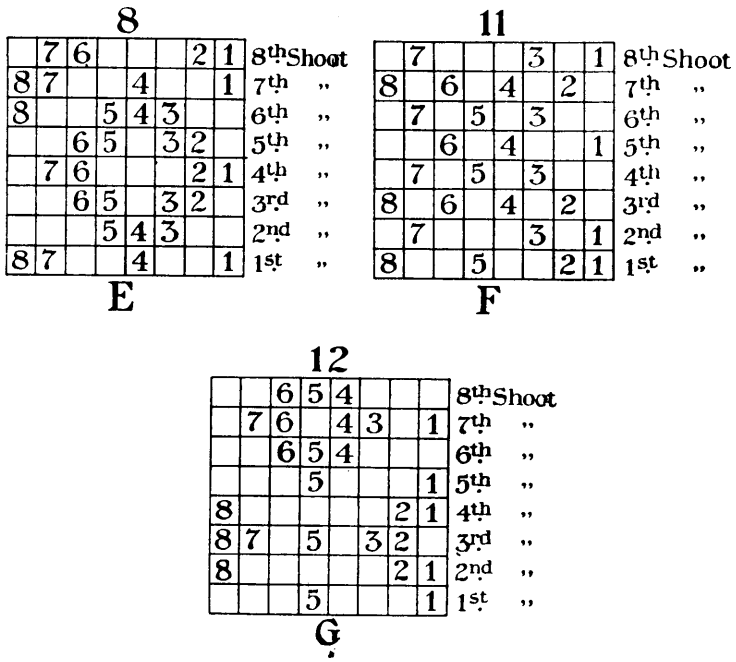
(34)



Working bead-rack plans for Plate V, Nos. 1, 3, 4, and 6.
Birdeye patterns.

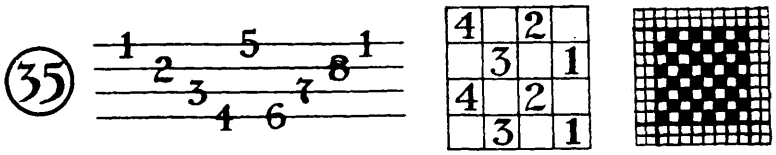
PLATE V.





Working bead-rack plans for Plate V, Nos. 8, 11, and 12.
Birdeye patterns.

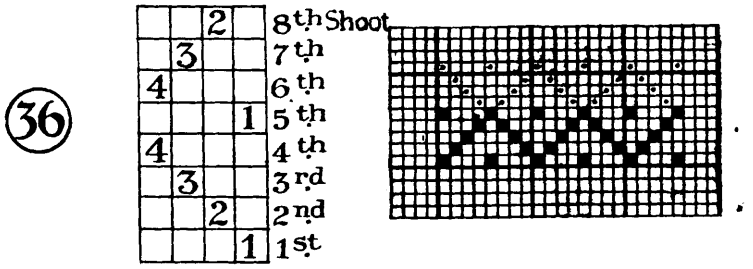
The only instructions necessary to give in regard to these patterns is that the weft and warp must be of the same thickness, and the weft must be laid the same



Entering A Plan B Effect C

number of shoots to the inch as there are threads of warp in the same space so as to work them four square.

The disadvantage of the diamond, or any other special



A B

entering of the warp is that it limits the number of patterns possible on the loom far more than the straightforward entering we have hitherto considered in this book. This is so notwithstanding the fact that it gives four headles command over as many threads of warp

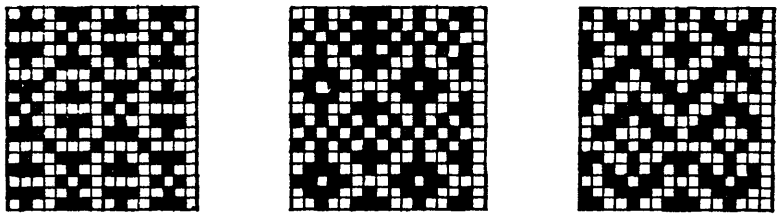
PLATE VI.

in each repeat of the design as is the case on eight headles with the ordinary entering.

The diamond entering is particularly disadvantageous in that twills, and the immense variety of designs founded on them, cannot be woven on it.

The diamond entering is chiefly used for weaving embellishments, bands of ornament, and such-like, at intervals on tabby grounds, for it does not prevent plain

(37)



tabby weaving being done. This is shown by Fig. 35, A, B, and C.

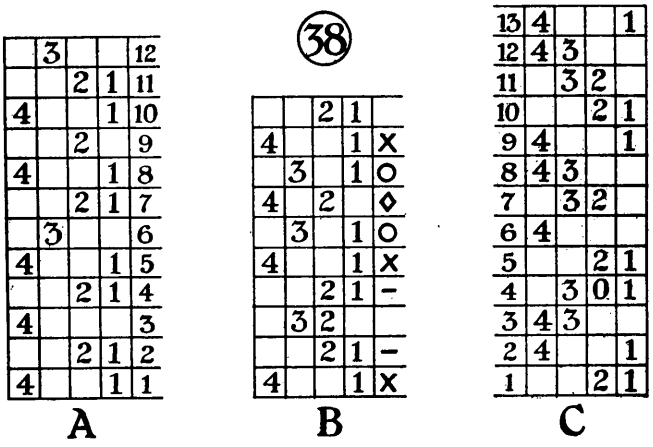
Thus, on four headles entered as in Fig. 35, A, the Birdeye design, Fig. 32, can be woven according to the simple plan Fig. 36, A.

The 1st headle will raise the 1st and 5th threads
The 2nd ,, ,, ,, 2nd ,, 8th ,,
The 3rd ,, ,, ,, 3rd ,, 7th ,,
The 4th ,, ,, ,, 4th ,, 6th ,,

The effect so far is shown on ruled paper at B, Fig. 36. Then to continue and complete the design, as at Fig. 32,

the first headle must rise again and fill the dotted squares on the fifth line. Next the fourth headle followed in turn by headles three and two will fill the sixth and seventh and eighth lines and so finish the pattern, the repeat of which will begin of course with headle No. 1.

Many variants of the Birdeye and other designs in which the diamond entering is used can be arranged for on four headles by the ingenious designer. Three



examples are given in Fig. 37, A, B, and C. At letter A is a design which has *eight* warp threads in the width and *twelve* shoots of weft in the height, of each repeat of the pattern.

Fig. 38 gives the plans of the three designs above and it will be seen that there is apparently no provision made for raising the fifth, sixth, seventh, and eighth in each design. This is because the threads are always lifted in pairs (*see* Fig. 34, A). The designer will find that

the fifth, the centre, thread of the harness is particularly difficult to manage.

It would be a good exercise at this stage for the student to carefully examine all the examples of pattern on Plate V and, where possible, make working plans for weaving them on headles. Such a study will prove very useful in preparation for advanced work on a full sized treadle loom, as the cording of the treadles can be done from any of the plans given for the table loom.

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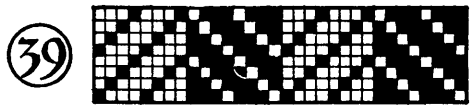
Chapter XIV

TURNED OR REVERSED TWILLS—THEIR VALUE AND CONSTRUCTION

WE have already remarked that in regular and broken twills, or satins, the greater proportion of warp is thrown, or *flushed* to the front of the cloth and the greater proportion of weft is flushed at the back. We also referred to this as the foundation of the most perfect of all pattern weaving, viz.: Diaper



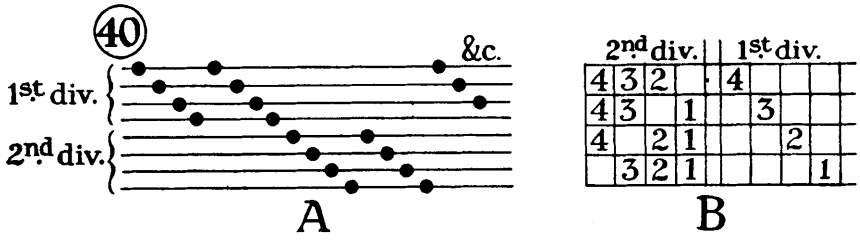
or Damask weaving. In this chapter the principles and mechanism on and by which this branch of weaving is done will be illustrated and explained by two or three examples such as can be readily woven on the table loom with eight headles.

The simplest kind of pattern that it is possible to form by thus contrasting a twill and its reverse is a vertical stripe such as Fig. 39.

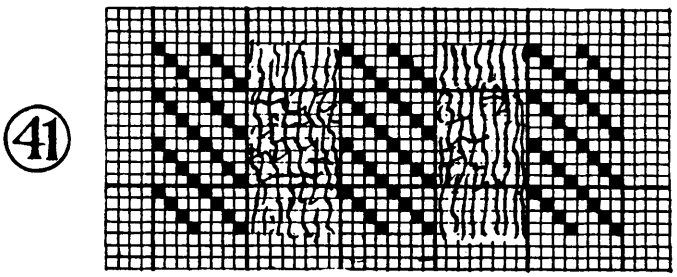
At A A, Fig. 39, the weft shows only in small spots and affects the warp only in proportion of 1 to 3, but at B B where the twill is reversed the weft shows in the

proportion of 3 to 1. The method of weaving this effect, which requires six, eight or any even number of headles and a special entering, is shown by the Fig. 40, A and B.

This design of stripes (Fig. 39, A and B) requires eight



headles for the warp and the headles are entered in *two* divisions, as shown in the plan at A, Fig. 40. In working, *both* these divisions are used at the same time. If only



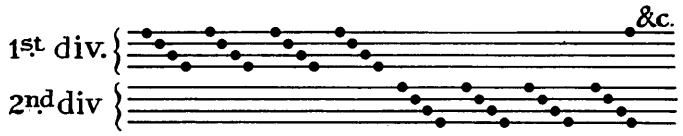
one, the first, division were used the woven effect would be like Fig. 41, showing vertical stripes of a four-headle twill with an unwoven space of the same width between each.

If both divisions working with the plan B, Fig. 40, were used together the effect of A and B, Fig. 39, would

result : that is a four-headle warp twill at A A, and the reverse, a four-headle weft twill at B B.

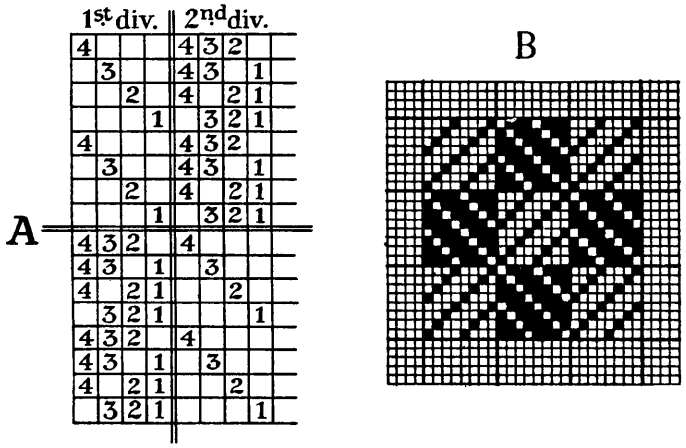
On this principle stripes of any width can be woven

(42)



simply by entering larger groups of threads together on each division of the harness. Thus, the entering Fig. 42 will produce, with the same lifting plan, stripes of double the width of that of Fig. 40.

(43)



It is not, however, in weaving stripes but in the production of checkers, or dice patterns, of which so many varieties are possible, that the great usefulness of this diaper entering is most displayed. If, with the same entering, Fig. 40, the plan given at Fig. 43 is used, the result will be a checker, as at B, Fig. 43.

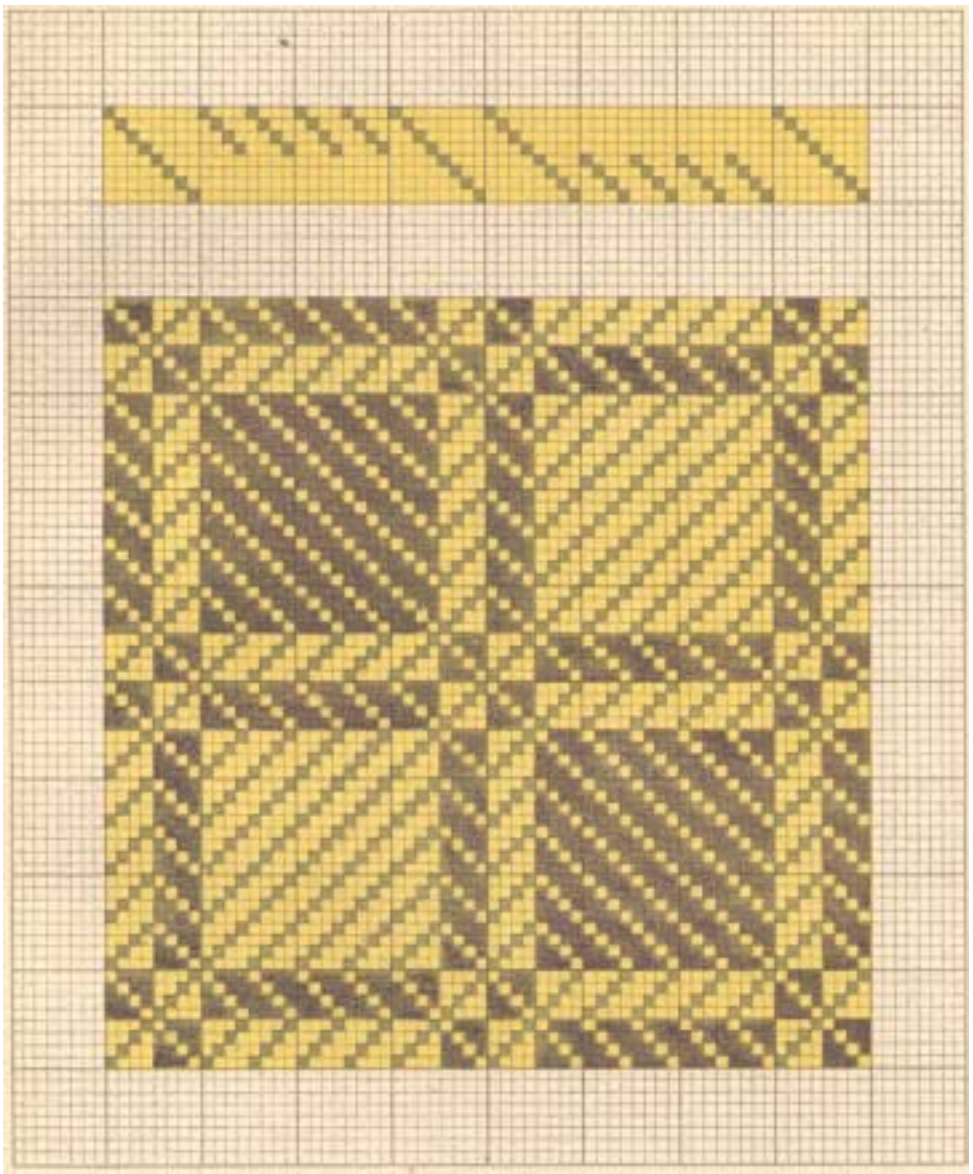


Plate VII gives an example of the pleasing variation that can be given to the checker design by slight alterations in the entering and wefting plans.

The space at disposal forbids a further development of this very interesting subject of diaper weaving, but sufficient has been explained to enable the student to experiment for himself with original inventions on the above lines.

CHAPTER XV

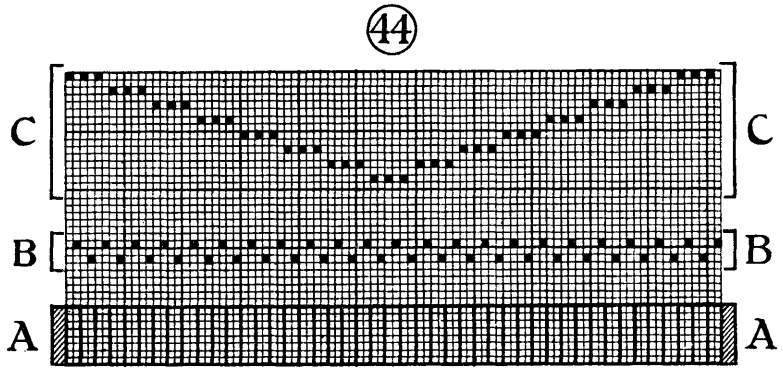
COMPOUND PATTERN WEAVING

TWO independent warps or two separate wefts working together in the loom are required in order to weave, automatically, designs of more or less complicated character and of broader effect than those we have hitherto described. Plate VIII displays a fabric of this class of weaving and is a good example of the simplest kind of what is known as *compound* pattern weaving. It is called *compound* because two warps, each on its separate roller, entered on two harnesses, one in front of the other, being worked simultaneously, enables the weaver to produce the complete web as shown in the illustration. Each of the two harnesses and warps has its own function: that of the front harness is to weave the ground or body of the cloth, and that of the back harness, in this case, is to bring up and flush over three shoots of weft three blue coloured threads of the second warp.

The front harness consists of two headles entered with greyish white cotton, twenty-four threads to an inch, while the back harness has the same number of threads entered in it, but they are spread over fourteen headles in groups of three, which are spaced and arranged on the headles in the same order as a diamond entering on ordinary single-thread harnesses. Fig. 44, letter C, gives a similar

harness spaced and entered on only eight headles because of the necessarily limited size of the diagram.

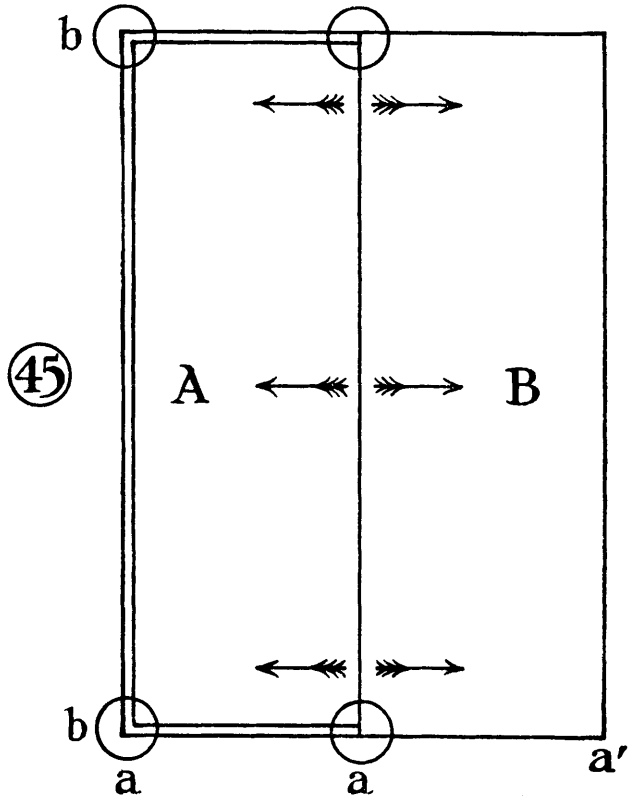
Fig. 44 is a diagram of the whole lifting mechanism of the mounting of the loom. A A is the reed, each opening of which is entered with two threads, one from the first headle of the ground harness B B, and the first one from the first group of the pattern harness C C. A careful examination of the diagram should make quite



clear the entering of the two harnesses for one repeat of the design whatever it may be. It should, however, be pointed out that the threads of the separate warps are not entered in the eyes of both harnesses but being entered in the eyes of one harness pass *between* the leashes of the other.

It is not always necessary to space and arrange the back harness leashed in the form of a *diamond* entering, but there is a great advantage in doing so as the width of the design is thereby doubled without increasing the number of headles required.

Fig. 45 shows how this doubling, turning over or *pointing*, as it is generally called, is effected. The enclosed spaces A and B are of equal size and together form the



area of the complete design whatever it may be. The whole width of the area (a to a′) may consist of any number of threads of warp either singly or in groups.

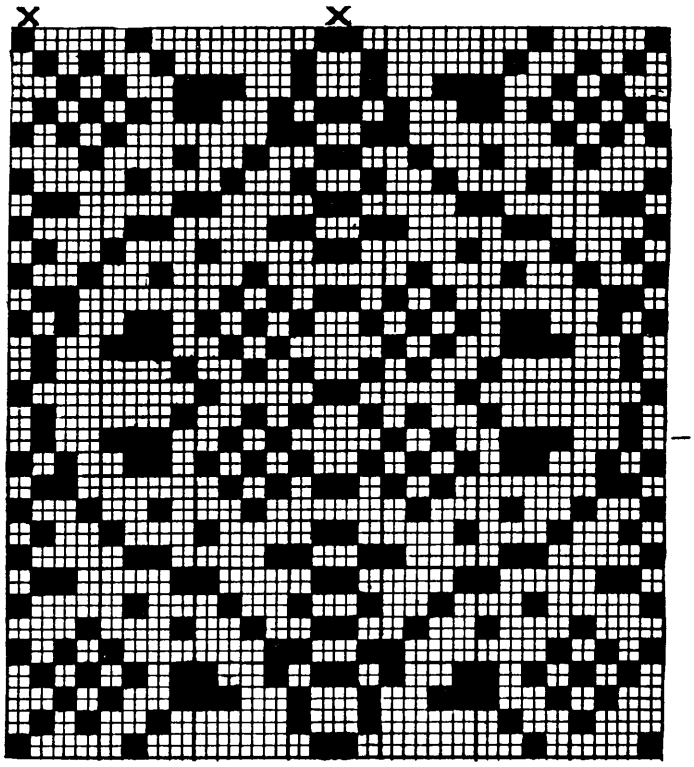
If the entering or arrangement of the groups on the headles is done in the ordinary straightforward way it is

manifest that the number of headles on which the design is to work will have to be sufficient to fill the whole space *a* to *a'*. If, however, the turnover or *point* arrangement is used the number of headles required will only be enough to fill the space between *a a*, just half the number. This, of course, simplifies the mounting of the loom and weaving and is a great advantage. Both spaces, A and B, are thus exactly alike except that whatever design is comprised in the space A is turned over in B space and points in the opposite direction (*see* the arrows, Fig. 45). The height of a design is not affected, for in both arrangements height is immaterial.

In order to make a design and weave it on a compound mounting such as Fig. 44 a drawing must first be made on paper ruled in squares, each square representing the number of threads (two or more) to be raised together in the pattern harness. Fig. 46 is such a design. It is made to work on fourteen headles lifting two threads together and arranged to turnover or point, as in Fig. 45. It therefore spreads over twenty-eight squares and covers fifty-six threads of tabby ground. If the same design were worked on a three-thread pattern harness it could be woven on the same mounting as the example on Plate VIII but would then be half as large again when woven.

Having made a design, the next thing is to work out in numerals the bead rack or tie up plan for the weaving. This is given in Fig. 47 which will explain itself. The above plan is numbered out to the full height of the design, but in working it is only necessary to draw it as far as the centre line, number 16, as the remainder can be read downwards until the first line is reached, which is exactly the same as the thirty-first.

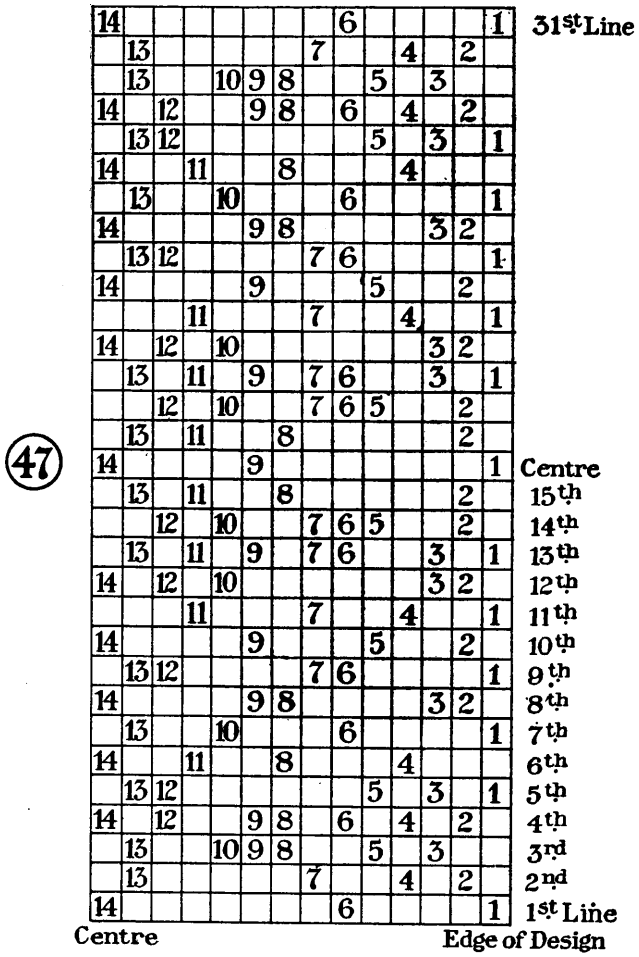
Before beginning to weave Fig. 46 or any other design it will be necessary to see that both warps, after being fixed to the front roller of the loom, are stretched



(46)

at sufficient tension to make them rise and fall readily when actuated by the treadles or drawcords.

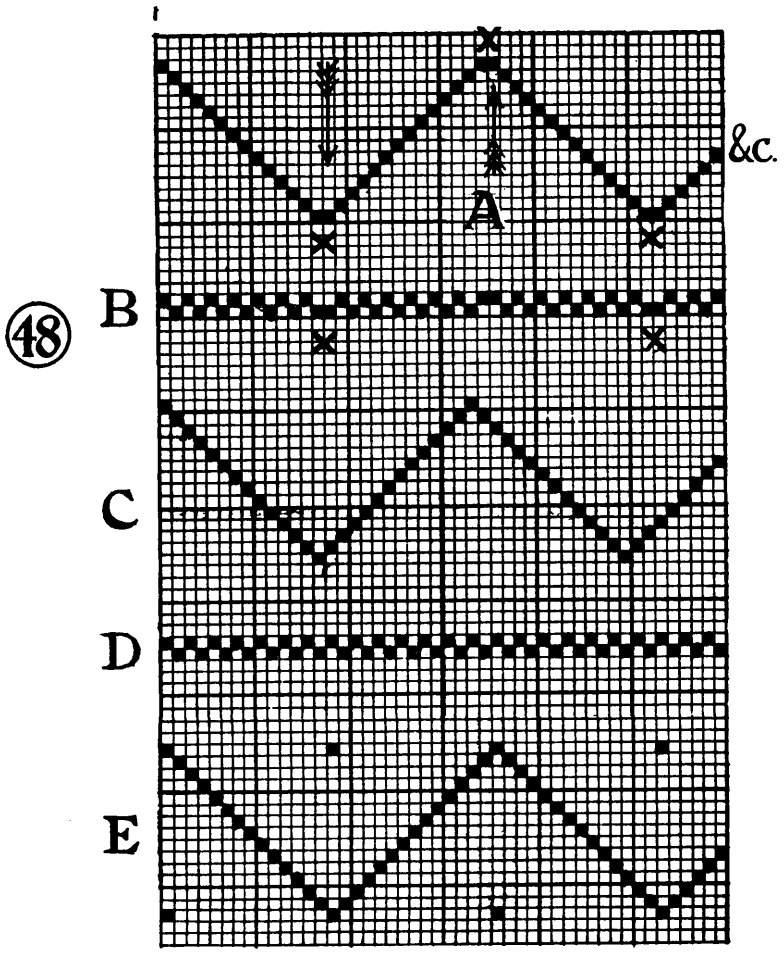
The tension of the warps being nicely regulated, two or three inches of good, regular tabby cloth must be made independently of the pattern warp, which simply remains *below it unwoven*. The second warp being separately


47
31st Line
Centre
15th
14th
13th
12th
11th
10th
9th
8th
7th
6th
5th
4th
3rd
2nd
1st Line
Centre
Edge of Design

weighted or stretched will not be mixed up with the tabby warps or interfere with the weaving of it in any way.

As soon as a good solid piece of tabby cloth is woven the whole of the pattern warp must be raised by drawing all the beads and fixing them in the rack. This will, of course, bring all the pattern warp to the top and allow tabby weaving to be continued *below* it. On the beads being all released, the pattern warp sunk and tabby weaving continued, a line of coloured loops closely flushing over the space of tabby ground will be left on the surface of the web. If all the previous operations have been properly done the flushing will be regular and even and a trial of all the groups of pattern warp threads should be next made by raising all the pattern headles in succession and weaving three shoots of weft beneath them as indicated in Fig. 48 A, where each square may represent from two to twelve threads of pattern warp according to the number to the inch and the fineness of the yarn used.

At B, Fig. 48, the odd and even pattern headles are raised alternately, forming a coarse checker with an occasional break at the points marked X in the diagram. This break in the checker and the blunt point in the zigzag, A, can be avoided in two ways : (1) by dropping out the two threads marked by the arrows in A, Fig. 48, (2) by making use of the birdeye arrangement in which the first and fifteenth threads are lifted by the same headle. By both alternatives the blunt point is avoided, but in the second the advantage of getting a slightly larger design is balanced by the necessity of always raising the spot at the centre of the trellis or whatever form the design is cast in. (*See* Fig. 48, E.)


(48)
A
B
C
D
E
&c.

It is no use beginning to weave a design until this preparatory weaving has resulted in a satisfactory condition and working of both the warps and both the harnesses in all their parts. On careful examination all being found correct, weaving the pattern may commence by drawing the first row of the plan beads Nos. 1, 6, and 14, Fig. 47.

The threads being correctly raised, three shoots of weft must be woven as before and the reading of the second line must begin. Where there is no need for a binding shoot, which is the case with many small designs such as Fig. 46, any beads of the first line which require to be drawn in succeeding lines may remain up until they are done with. The result of this will be that the flushed loops will not be of uniform length. This is not always a disadvantage, though often it may be, especially where large solid spaces are flushed.

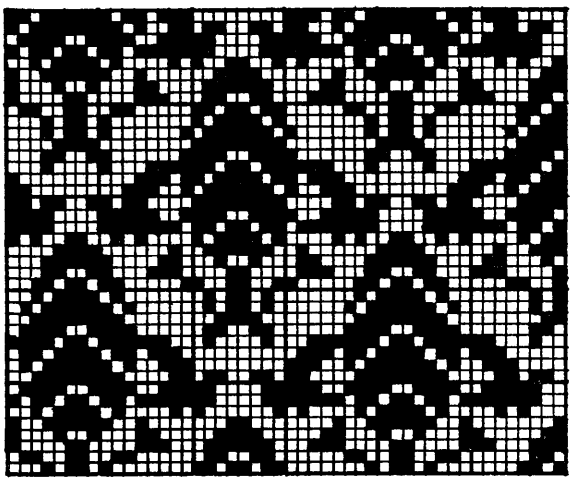
The weaver must determine by experiment whether a design requires binding, although the designer should be able to decide the matter and show his intention on the ruled paper.

If only a portion of a design requires binding it can often be managed by a little ingenuity on the part of the artist. For instance, in Fig. 49 the solid tree is the only portion of the pattern which absolutely needs binding when it is woven on a small scale. The artist has provided for this and at the same time improved the composition by introducing the twill in opposing diagonals at intervals across the tree.

If, however, an all-over binder is needed as in the case in Plate VIII, the binding is effected by means of an extra shuttle carrying a very fine thread of weft and

following every third shoot of the thick weft which forms the body of the cloth. Before the binding shoot is thrown the pattern warp must all be lowered even if the next line of the plan indicates that some of the headles should remain up.

(49)



If in order to make the material reversible a back binder is also needed the pattern headles must all be raised and a second shoot of fine weft be thrown.

The above method of binding the design not only effects its purpose perfectly but solidifies the material woven and adds to the artistic appearance of the work.

Compound harness weaving is capable of immense development and diversity even on the small appliance, the table drawloom, but further explanation of it must be left for a future work on advanced weaving which the author hopes to produce ere long.

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