

WEAVING
WITH SMALL
APPLIANCES

LUTHER HOOPER

SIR ISAAC PITMAN & SONS, LTD
LONDON, BATH, MELBOURNE, TORONTO & NEW YORK

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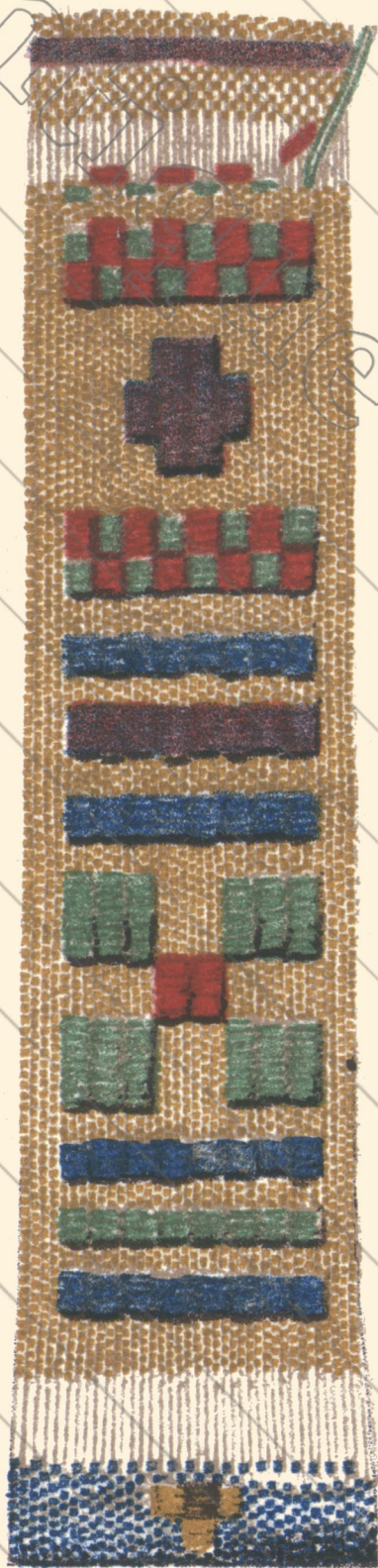


Fig. 1.

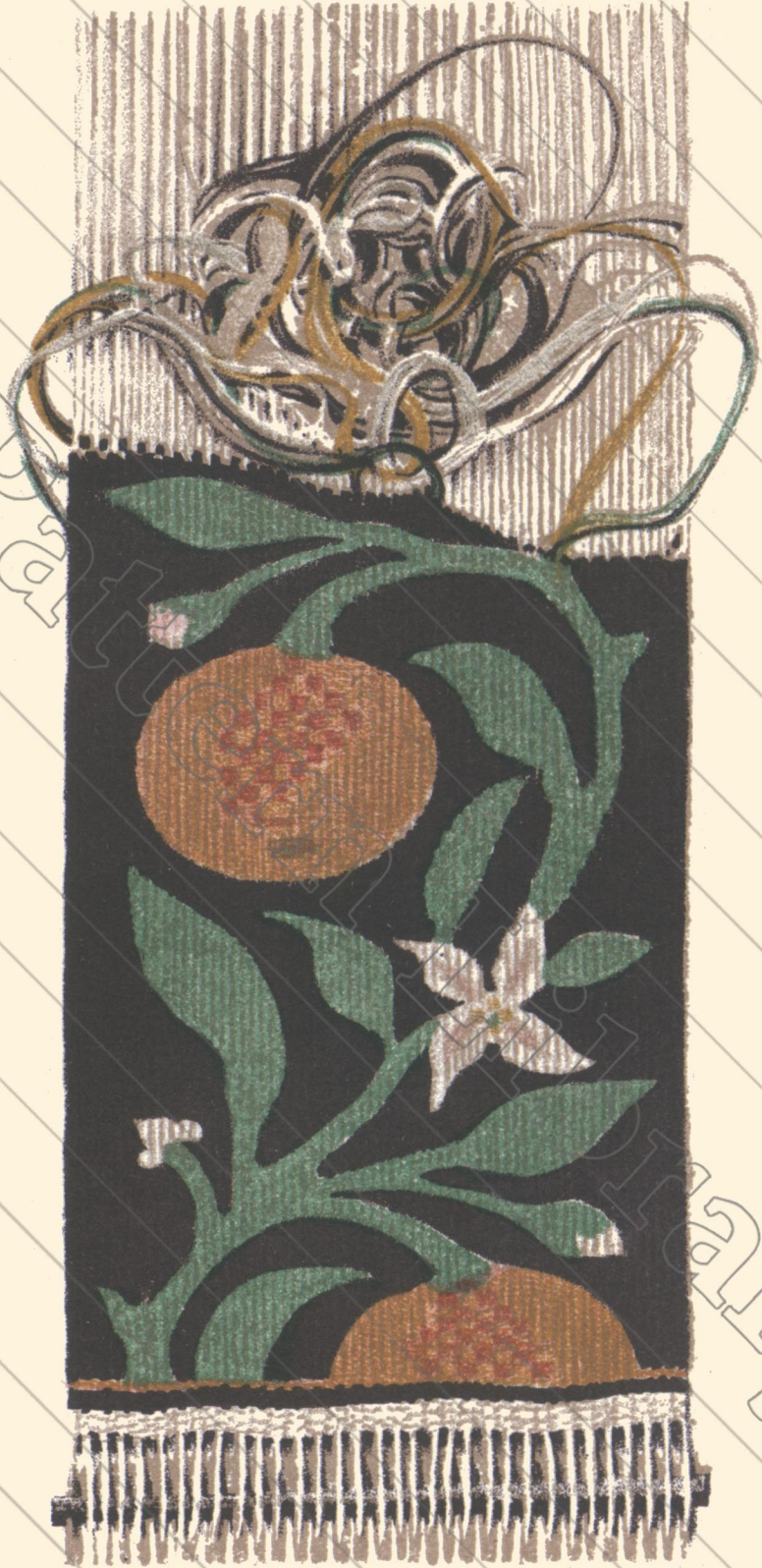


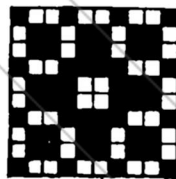
Fig. 2.



**WEAVING
WITH SMALL
APPLIANCES
WRITTEN & ILLUSTRATED
BY
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BOOK I—THE WEAVING BOARD



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WEAVING WITH SMALL APPLIANCES

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 guilds 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 REQUI- SITE 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.

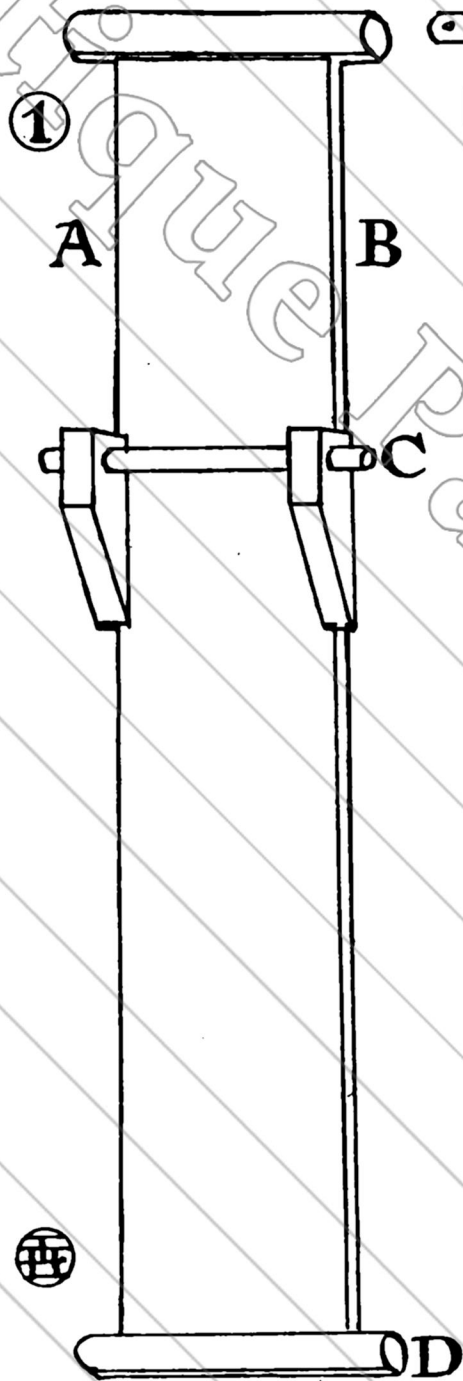
The practice of weaving, if thus conscientiously done, naturally develops a habit of attention to details which is so essential to success in all occupations, but unfortunately it is a habit too often lacking in the mental equipment of the students of to-day.

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

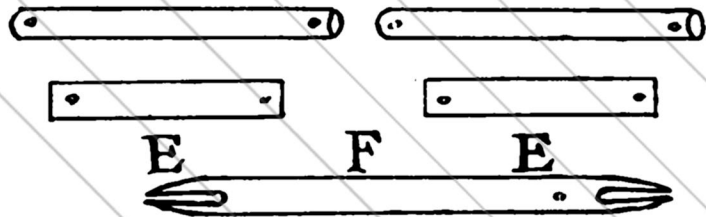
1. Two kinds of thread will generally be required, the term *thread* being understood to stand for all kinds of spun fibre, whether cotton, linen, wool, silk, hemp, jute, ramie, sisal, or any other raw material. The *warp*, which is the collection of threads, whatever their number, running lengthwise 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.

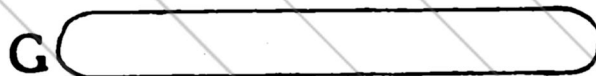


than the round ones, about an inch wide and one-eighth of an inch thick.

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

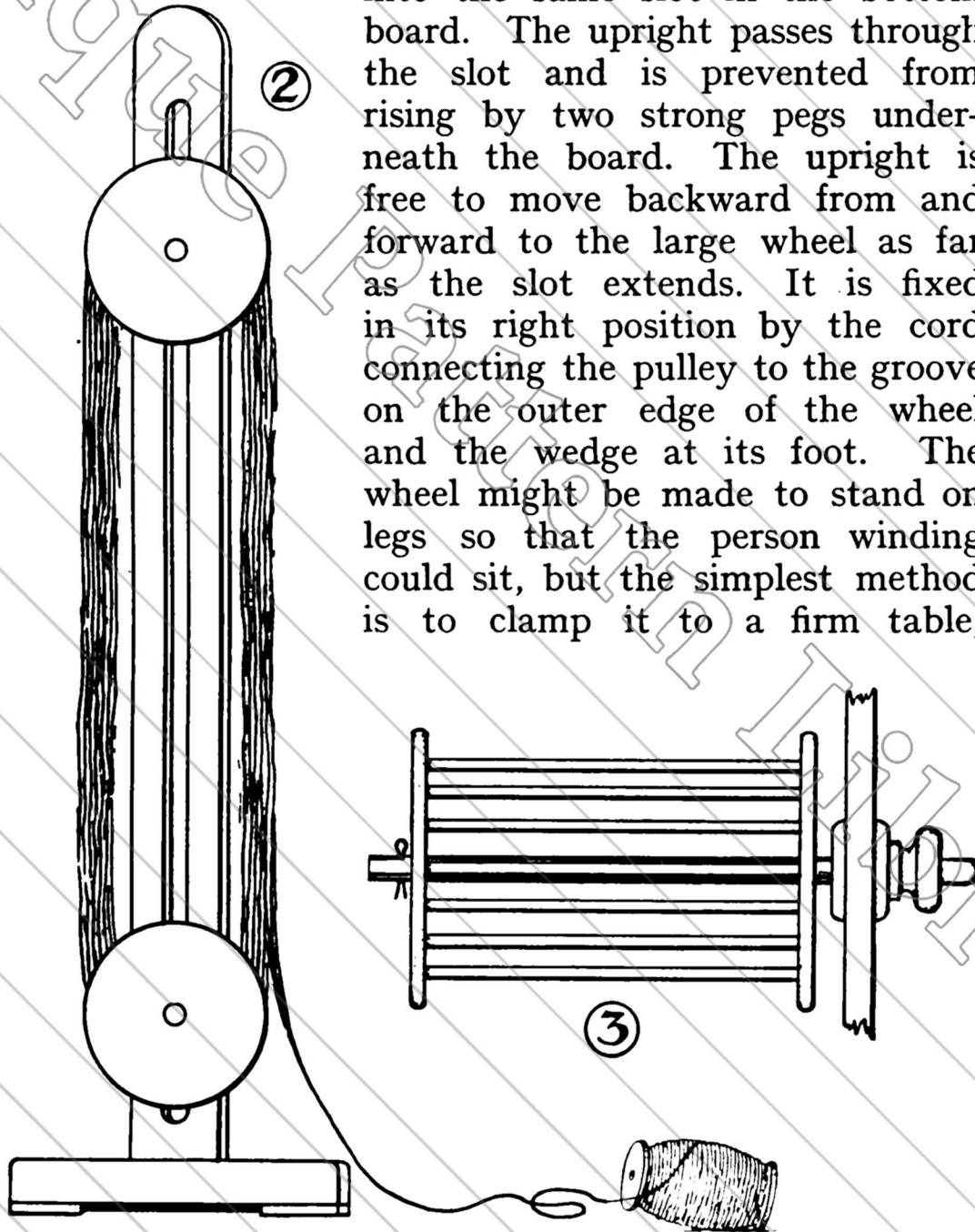
APPLIANCES FOR WINDING AND WARPING

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

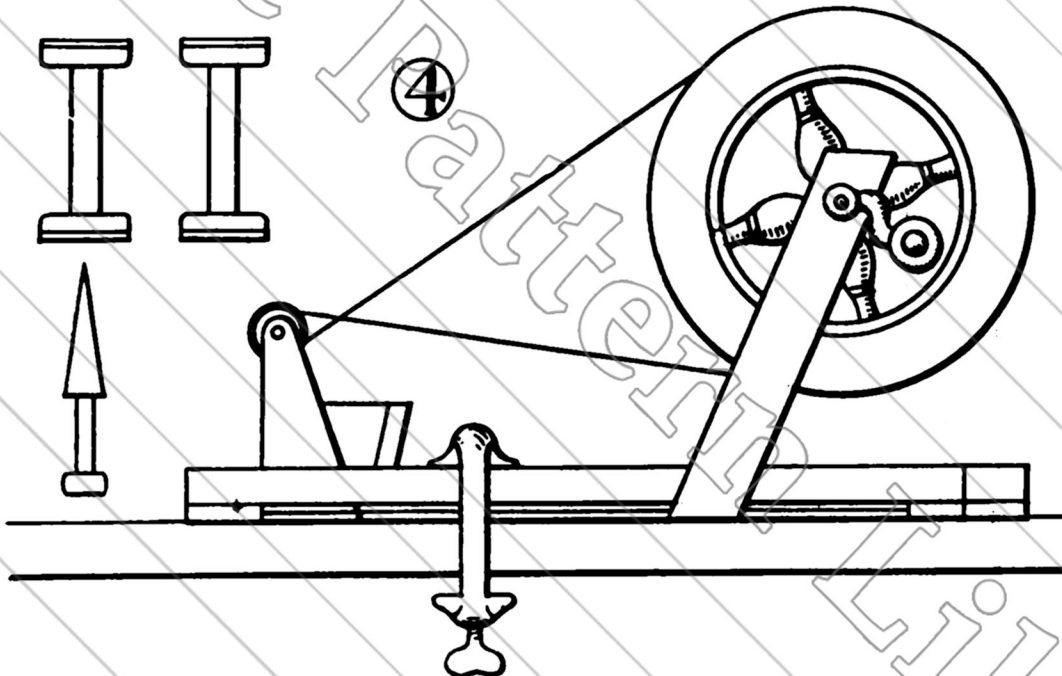
on a strong, short upright, and its distance from the large wheel is regulated to a nicety by the wedge driven into the same slot in the bottom board. The upright passes through the slot and is prevented from rising by two strong pegs underneath the board. The upright is free to move backward from and 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,



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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

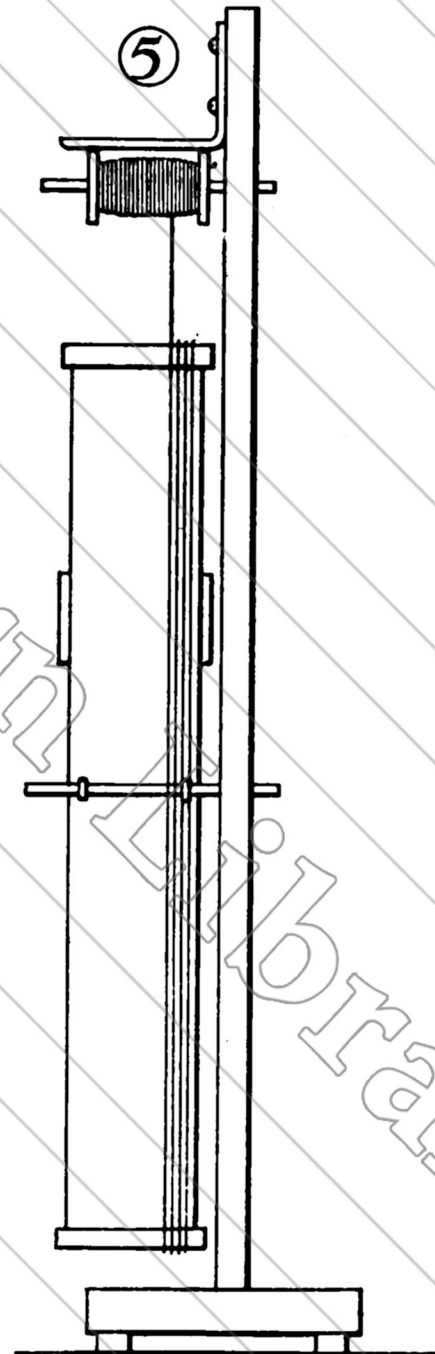


it at every turn of the hand, and also to lay the several threads of the warp together without overlapping, and to lay them at an even tension.

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

II

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.

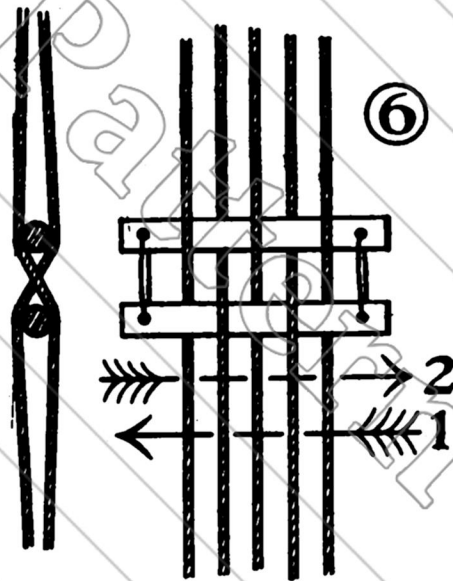
CHAPTER VI

THE LEASE OR CROSS ON THE WARP

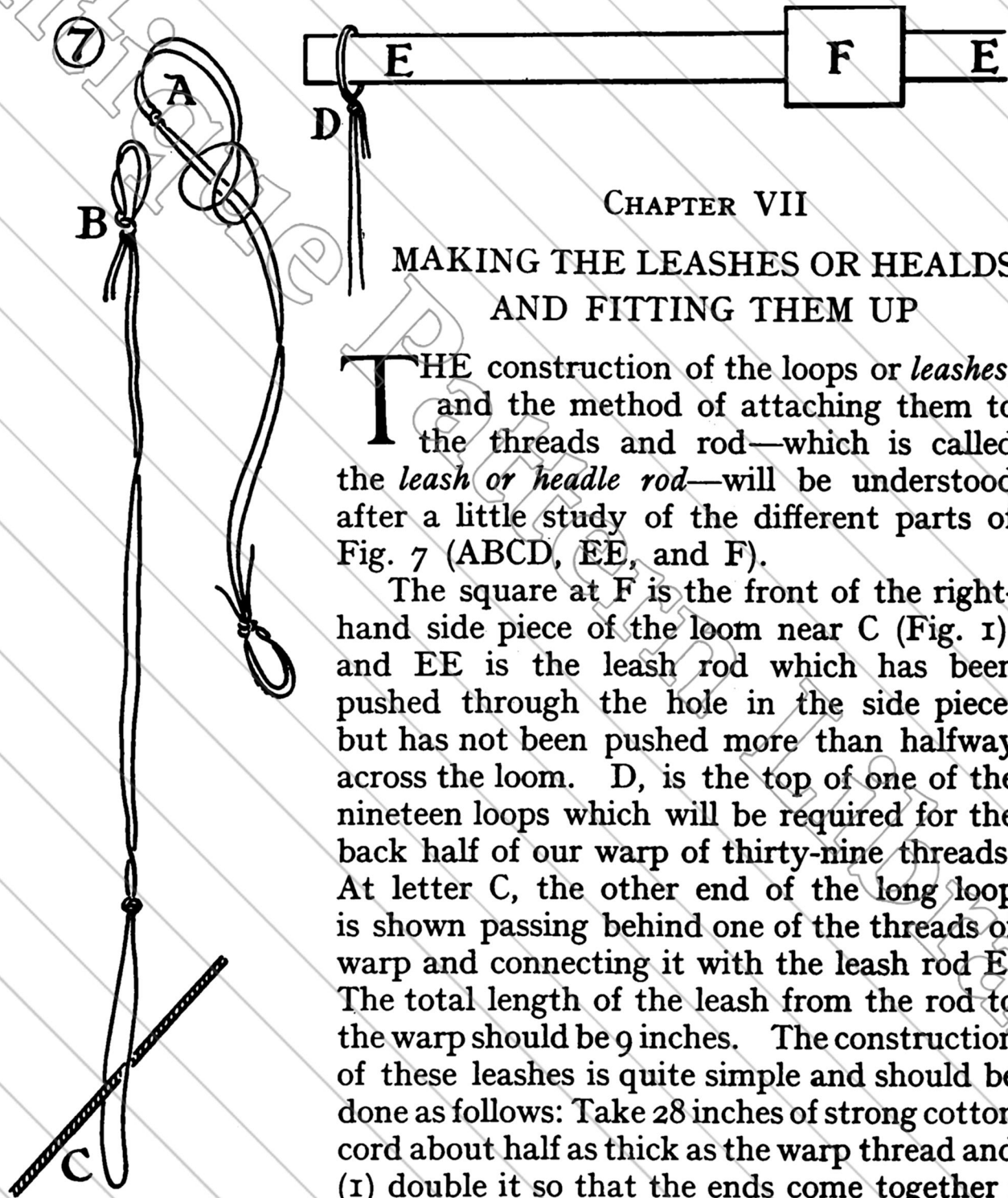
THE cross in the warp is made by means of two rods (see Fig. 1), which are inserted between alternate threads of the warp in such a manner that it is quite impossible, while the stick remains in position, for the threads to overlap each other. The side and front views of the cross in the warp are given 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 HEADLS
AND FITTING THEM UP

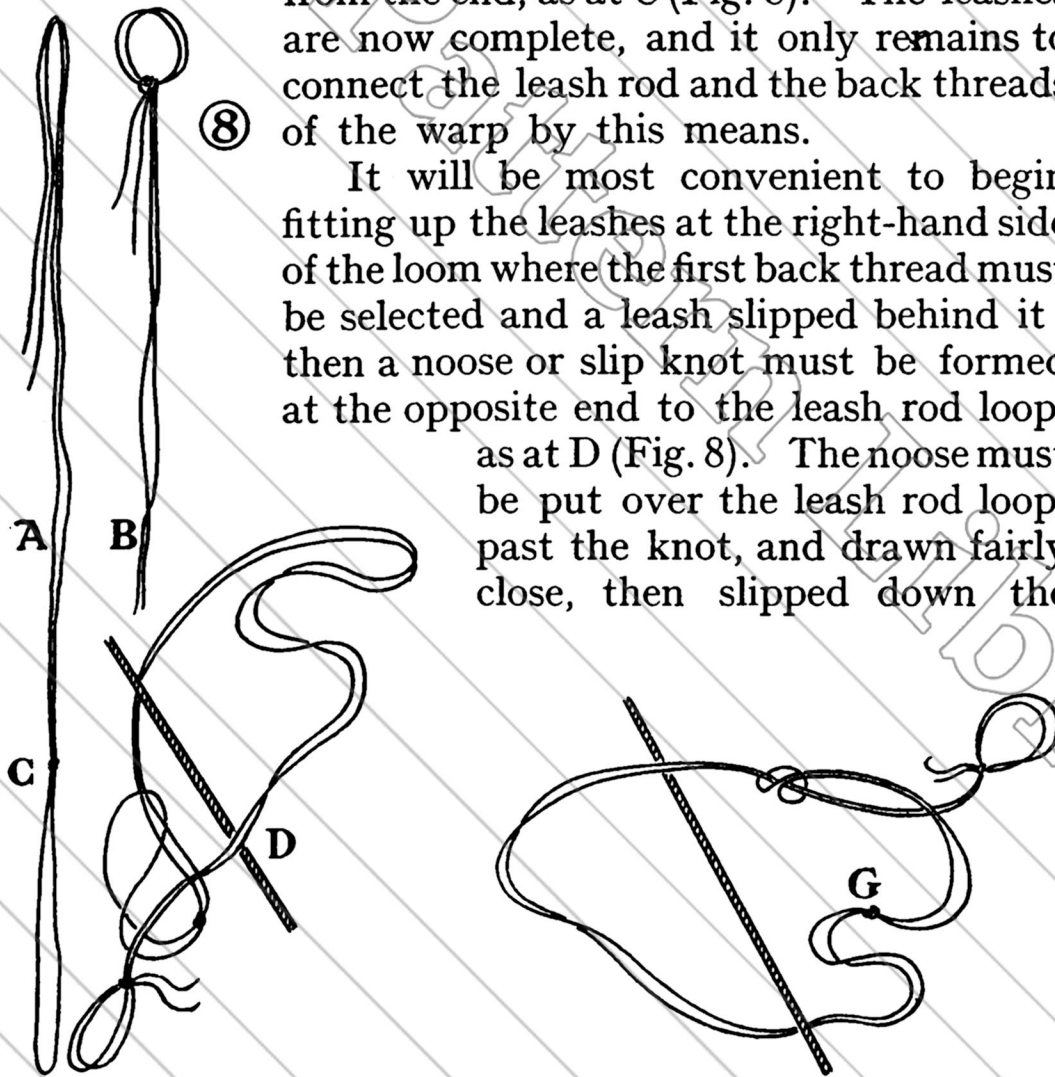
THE construction of the loops or *leashes*, and the method of attaching them to the threads and rod—which is called the *leash or headle rod*—will be understood after a little study of the different parts of Fig. 7 (ABCD, EE, and F).

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 $1\frac{1}{2}$ 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.

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.

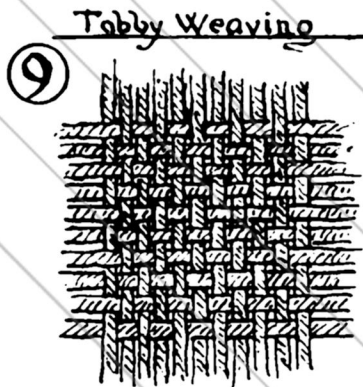
If the warping has been properly done and a good, firm, even tension has been given to the thread as it was wound on to the board, no further tightening of the threads will be required for ordinary weaving in which the warp shows, on the surface of the web, more or less equally with the weft instead 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



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 $1\frac{1}{2}$ inches of solid cloth exactly $2\frac{1}{2}$ inches wide, $1\frac{1}{2}$ 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.

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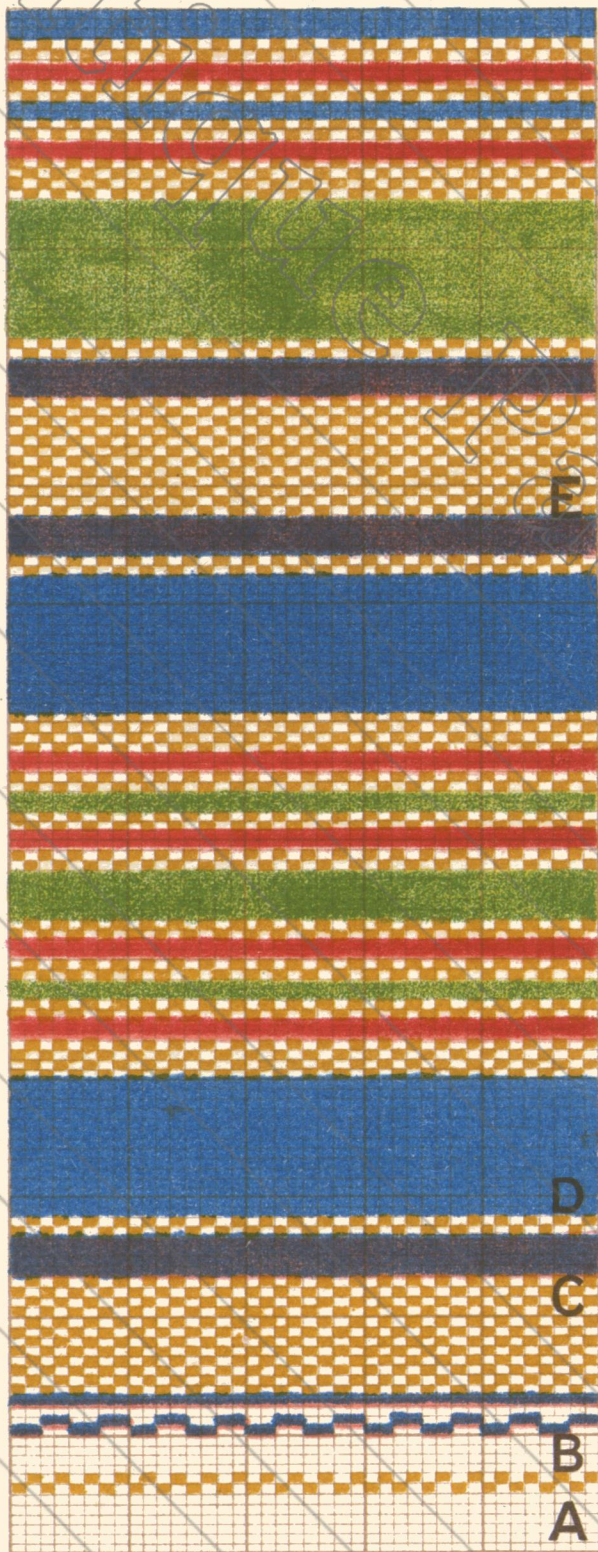


Fig. 1.

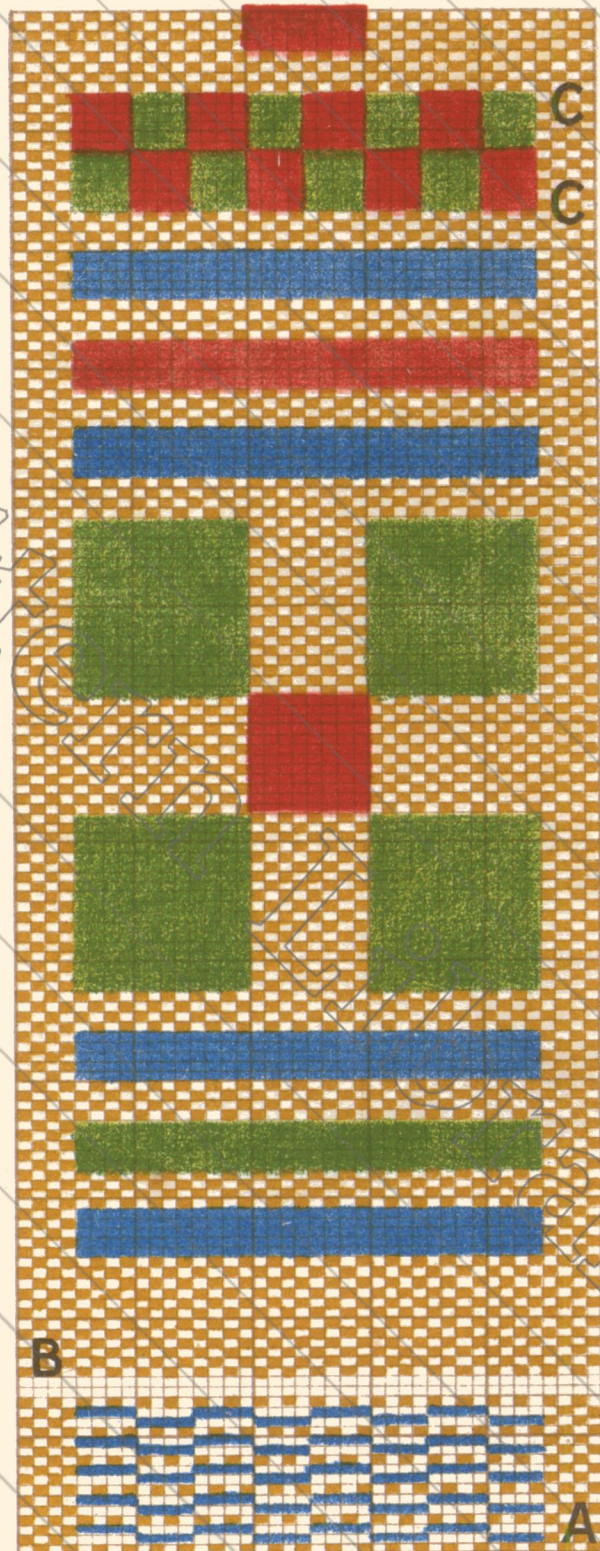


Fig. 2.



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

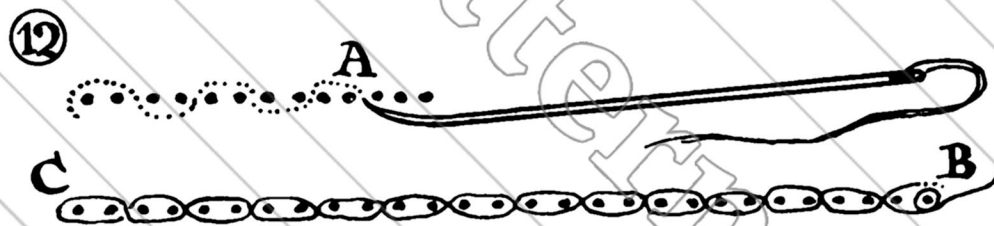


shop. Several needles will be required ; half-a-dozen at least should be in readiness threaded with the different coloured cottons, wools, or silks to be used in the design.

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.

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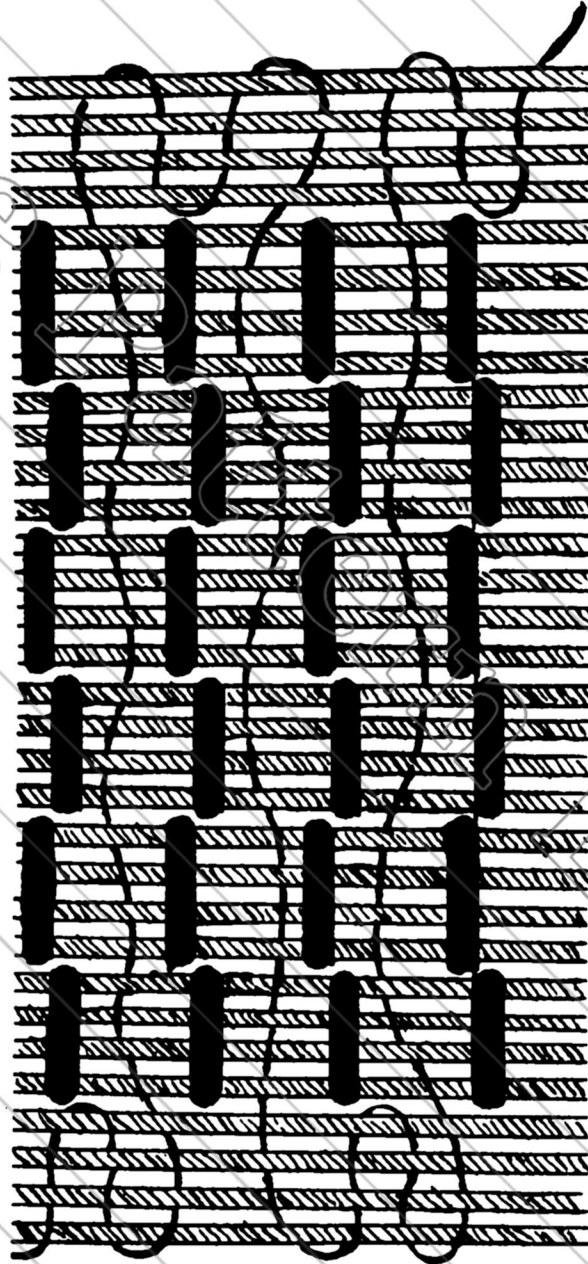


DIAGRAM SHOWING THE COURSE OF THE GROUND WEFT IN FIG. 2, PLATE I

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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.

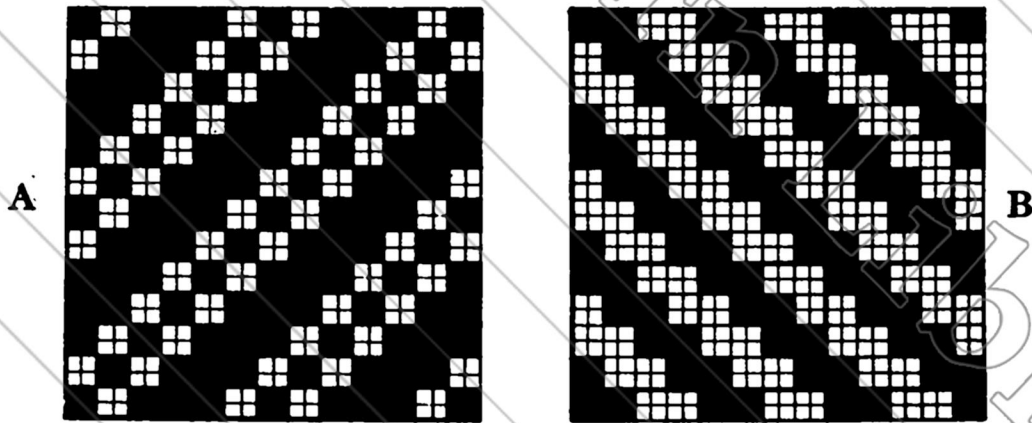
CHAPTER XI

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.

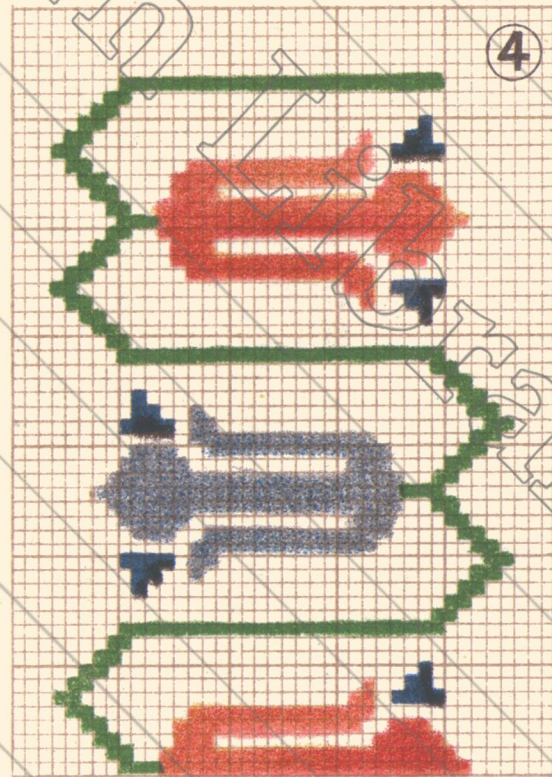
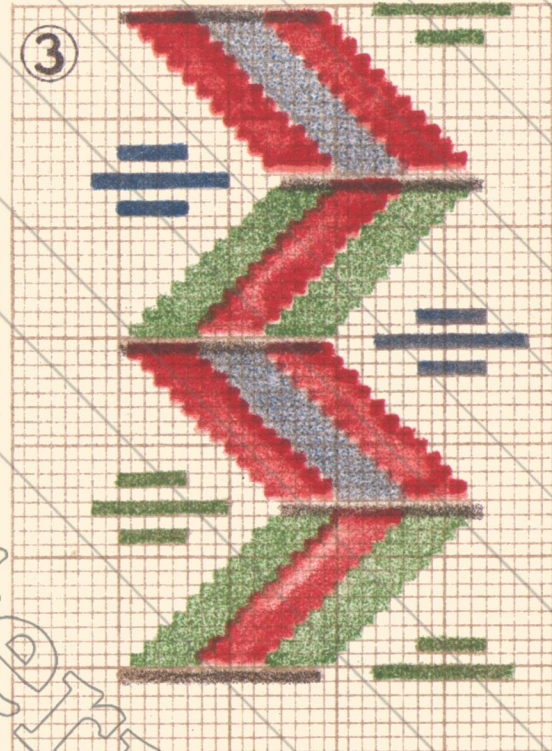
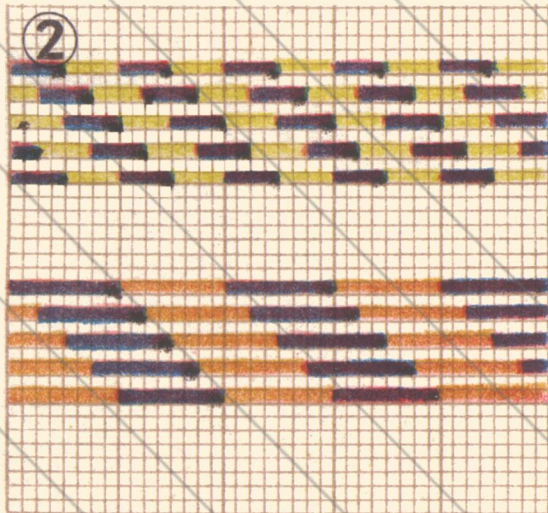
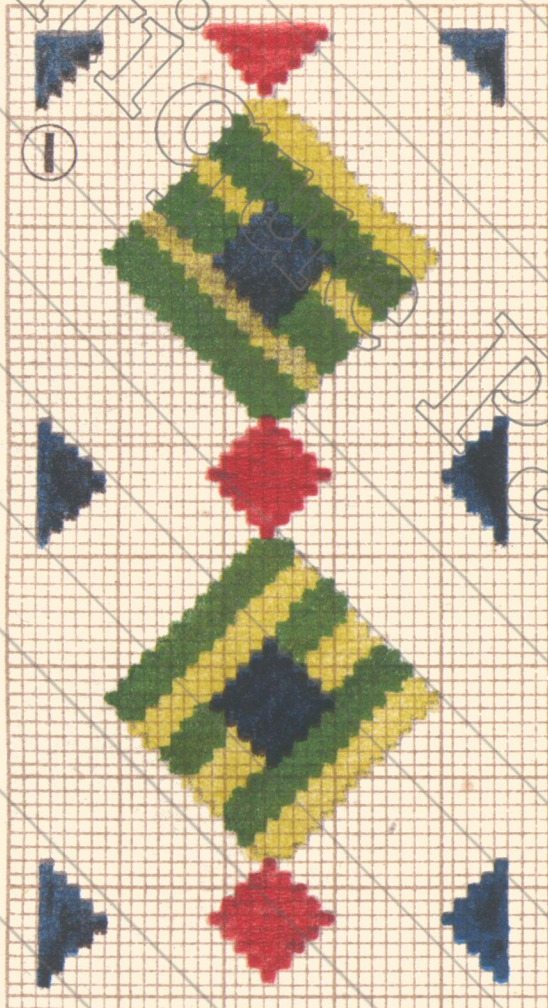
The brocadings of Figs. 1 and 2 are, however, different

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

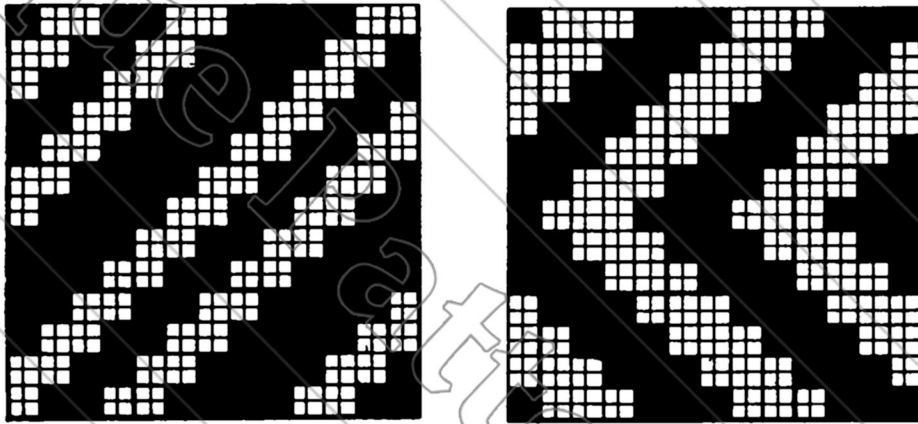
Figs. 14 (A, B, C, and D) give illustrations of various twill effects which can be used in the weaving of the



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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,



C

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D

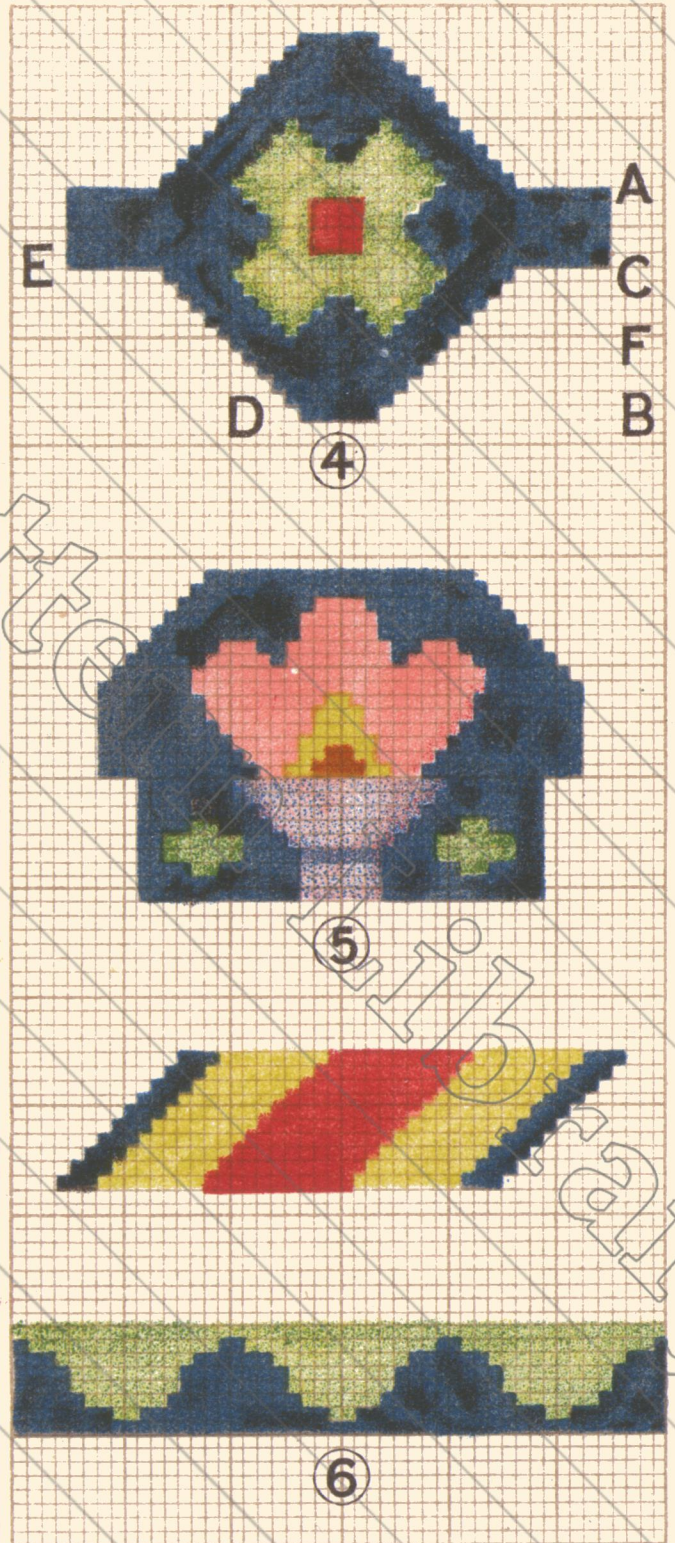
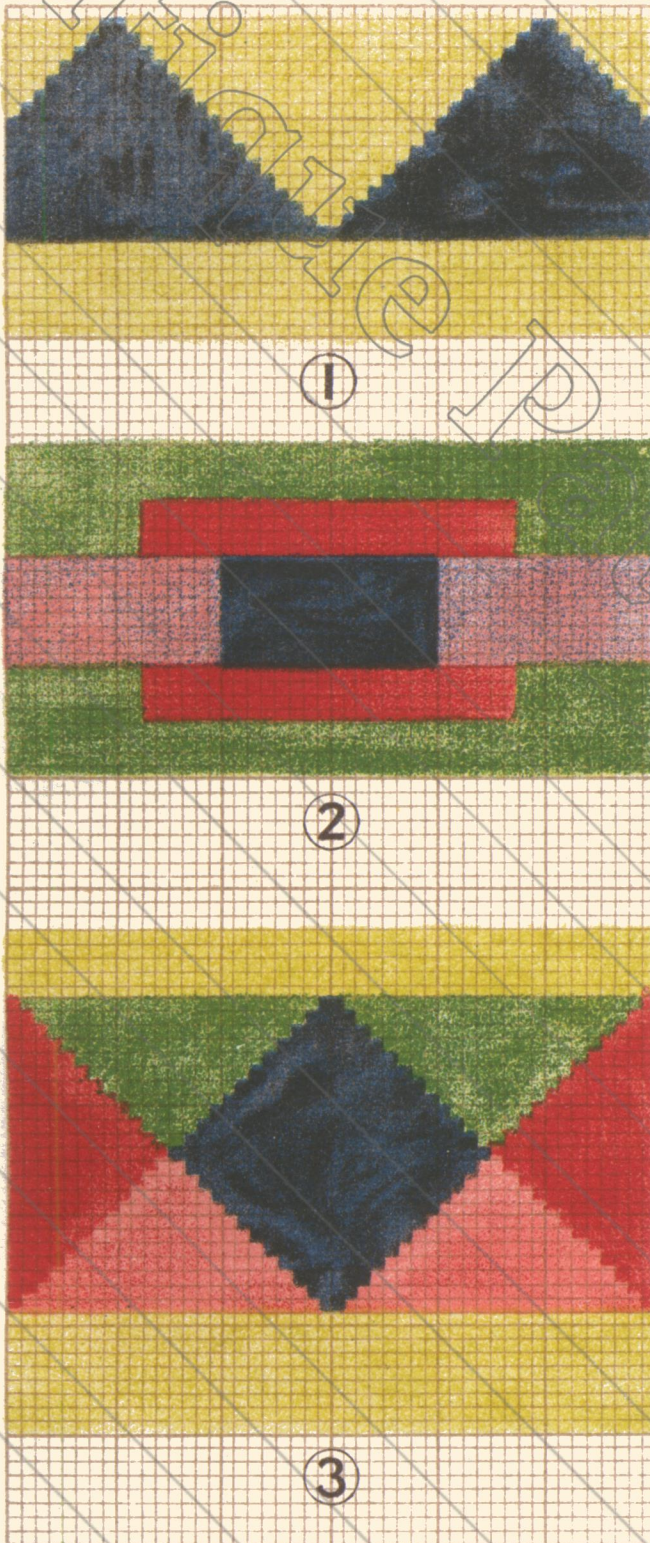
Plate II. The diagonals in any design may, of course, be turned either to the right or left.

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,



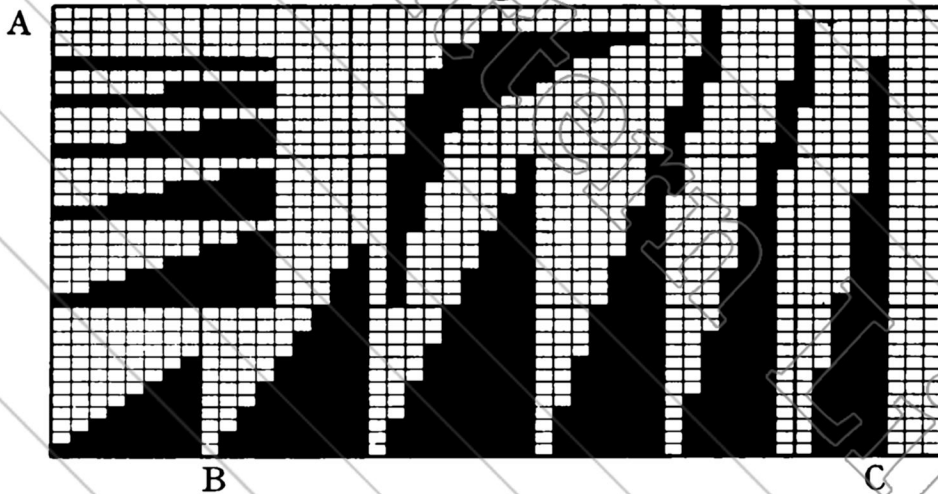
and it was carried to a very high pitch of perfection by the Chinese, Egyptian, Assyrian, and other ancient weavers.

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

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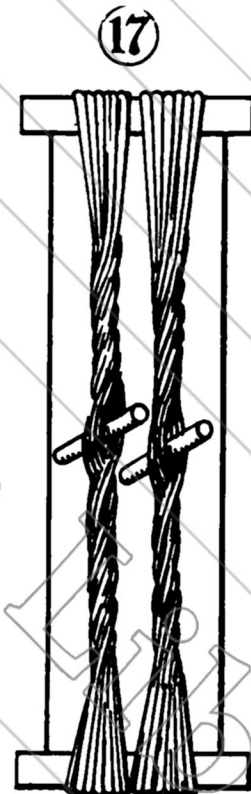


a manner which will be explained later. Primitive weavers were enabled, in even very elaborate designs, artfully to avoid upright lines on account of this disadvantage ; and, if it be desired to arrange a modern tapestry to work easily and quickly, the designer must follow the example of the primitive 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.

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.

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CHAPTER XIII

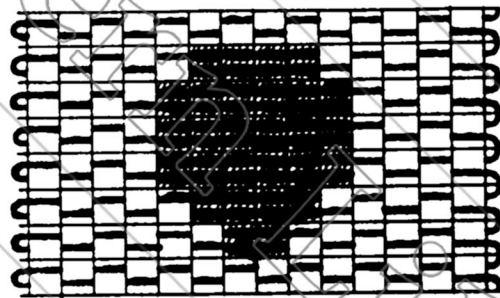
WEBS OF MIXED WEAVING

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.

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.)

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CHAPTER XIV

STUDIES IN MIXED OR EGYPTIAN WEAVING

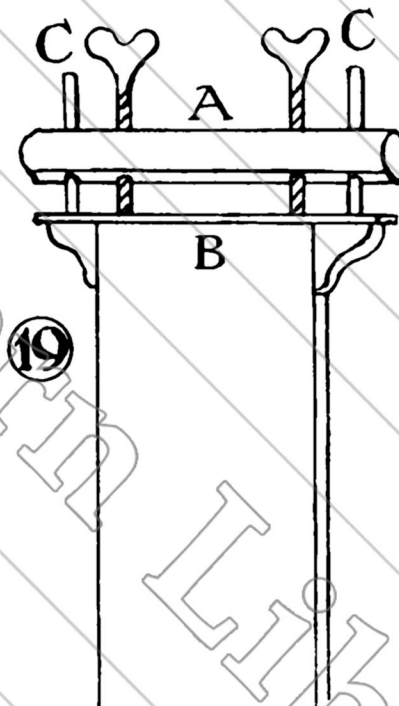
THE ancient method of weaving tapestry ornaments on plain grounds, already mentioned, is, of course, akin to the simple brocade or inlay method which the student has already practised, as recommended in Chapter X, as well as in the more advanced studies of Chapter XII. There should, therefore, be little 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



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.

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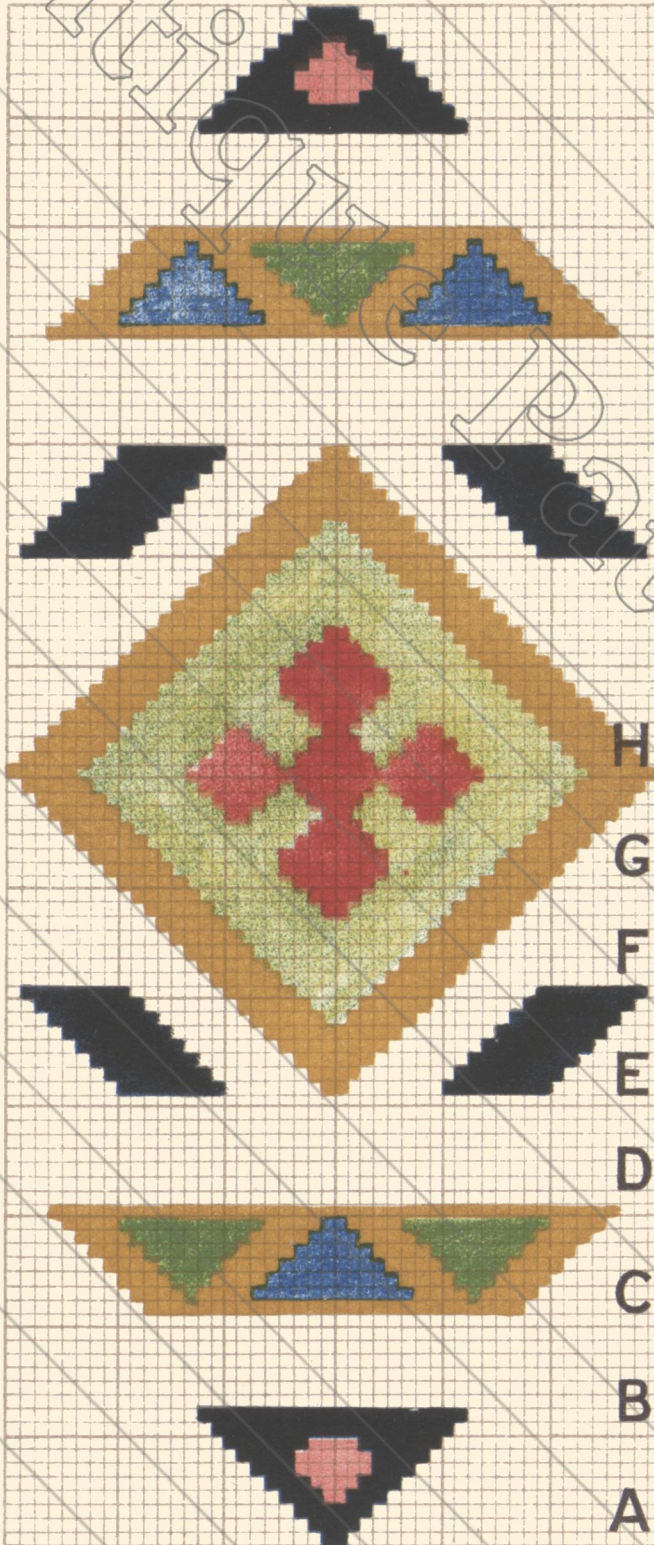


Fig. 1.



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.

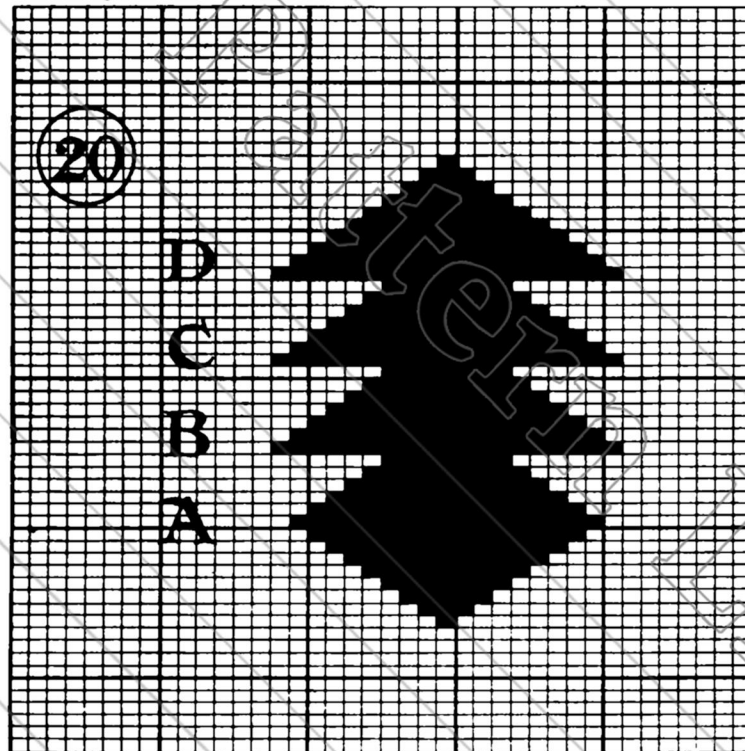
In the design Fig. 1 (Plate IV) several coloured worsteds will be required. From A to B, dark grey and light red ; at C, yellow takes the place of the dark grey, and blue and green take the place of the light red. From D to E, plain linen ground is woven ; at E, the dark grey comes again into use, and 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

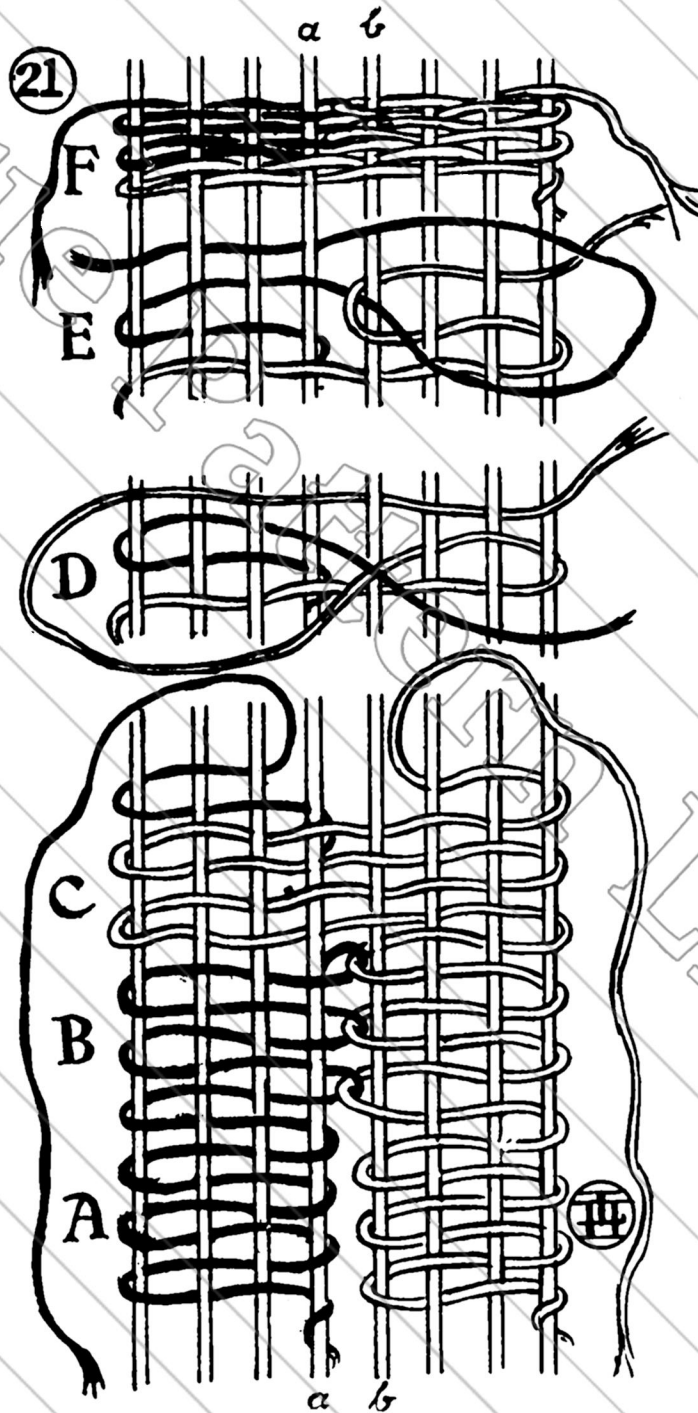
TWISTING OR JOINING UP THE WEFTS

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.

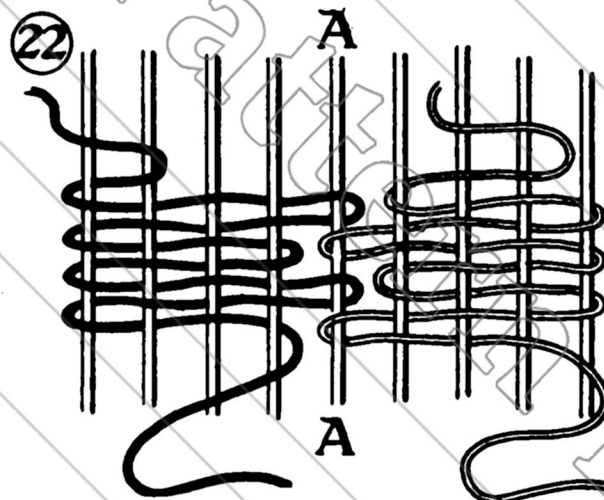
The method of looping the wefts together is shown in the three portions of the drawing marked C, D, and E; and at F the effect of the joining, when the wefts are almost closed by being pressed or beaten together, is approximately given.

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



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.

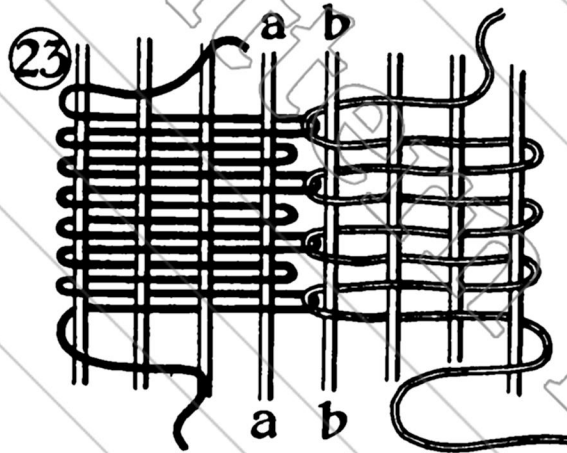
Here, alternate pairs of different coloured weft-passes dovetail into one another on either side of the warp string A; this dovetailing, of course, prevents the slit and is perfectly strong and permanent.

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.

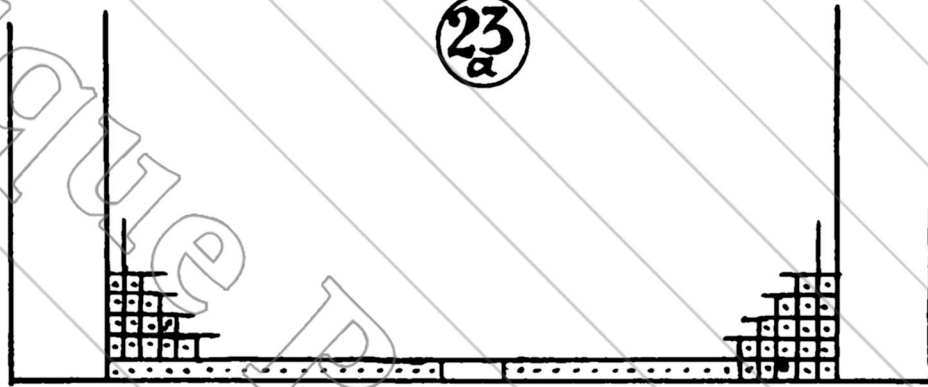
It is not always, of course, necessary when joining has to be done to work in complete lines, it is often much pleasanter and quicker to work up pyramids and diagonals two passes at a step and avoid having to make more than one joint at a time. This little panel is a case in point. We left the first 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.

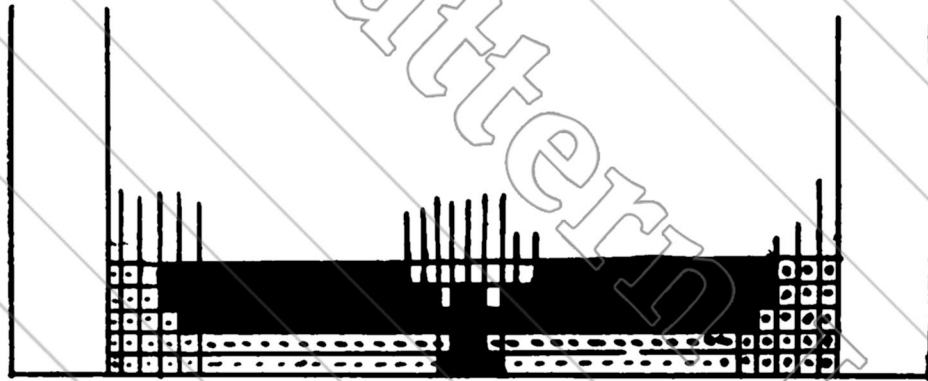
The third line of the purple is quite simple as it fills up the whole space between the four green squares at the edges of the panel. The fourth line has to be done

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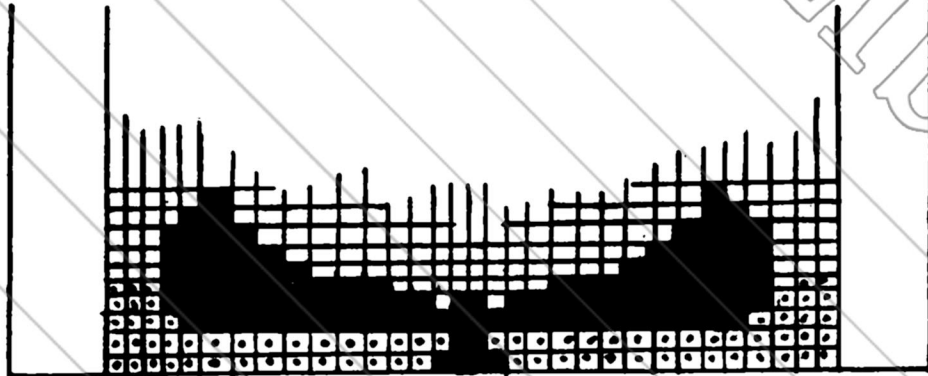
23
a



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.

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PLATE V



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CHAPTER XX

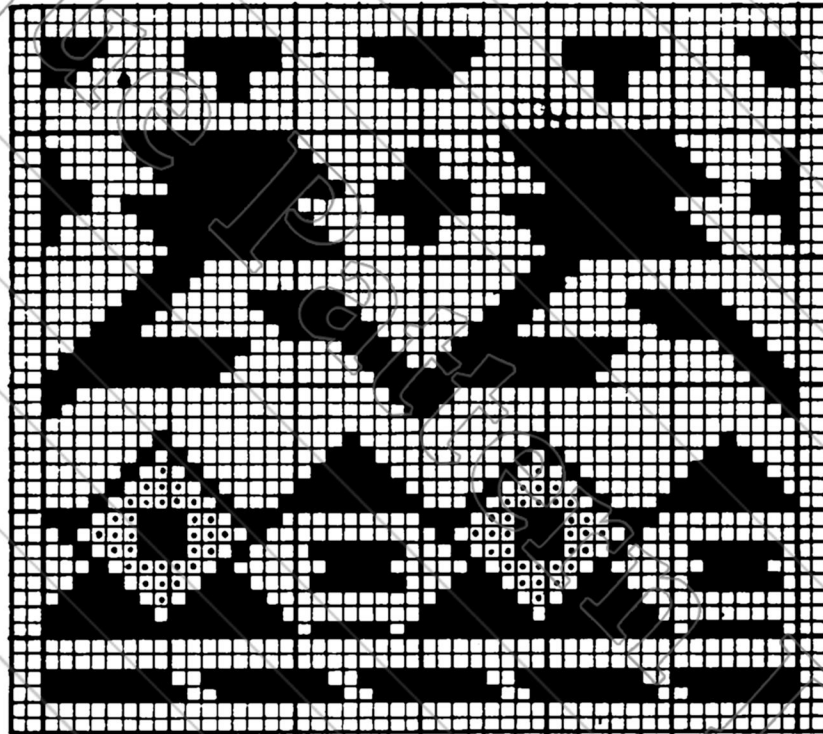
KELIM, SOUMAK, AND KNOTTED PILE CARPET EFFECTS

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.



24

DESIGN FOR KELIM CARPET

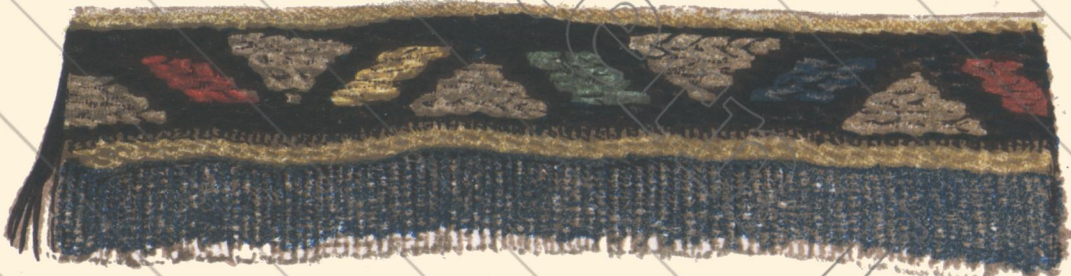
Fig. 24 is a specimen of Kelim design rendered in black and white, and the Kelim at the top of Plate VI shows the working out of an interesting design of small squares.

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

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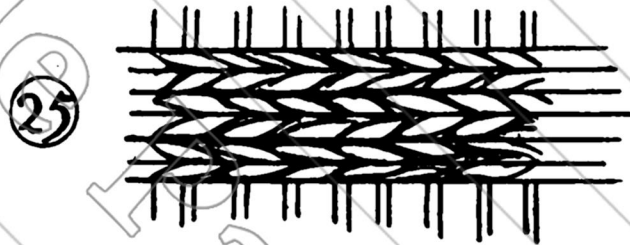
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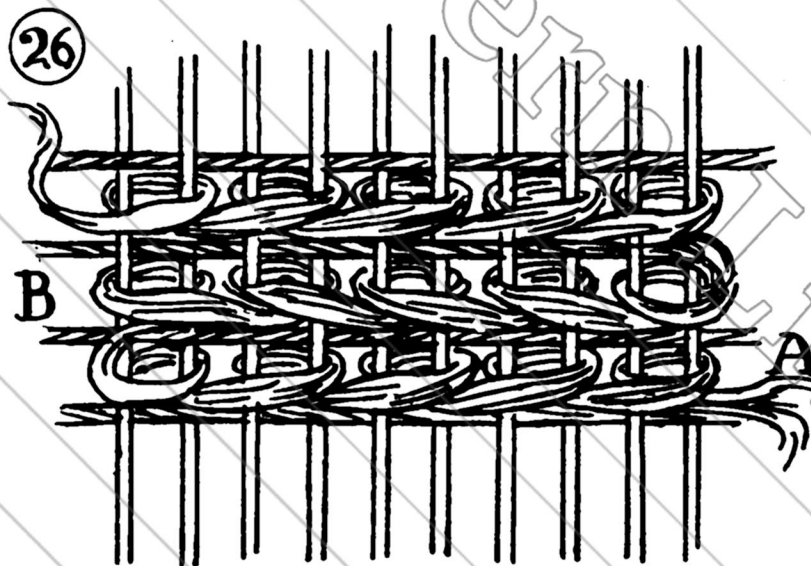
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of warp. It may be used for brocading or inlaying simple forms in plain or tapestry-woven grounds, as shown in the fragments at the lower part of Plate VI. At the front the Soumak stitch resembles the embroiderers'



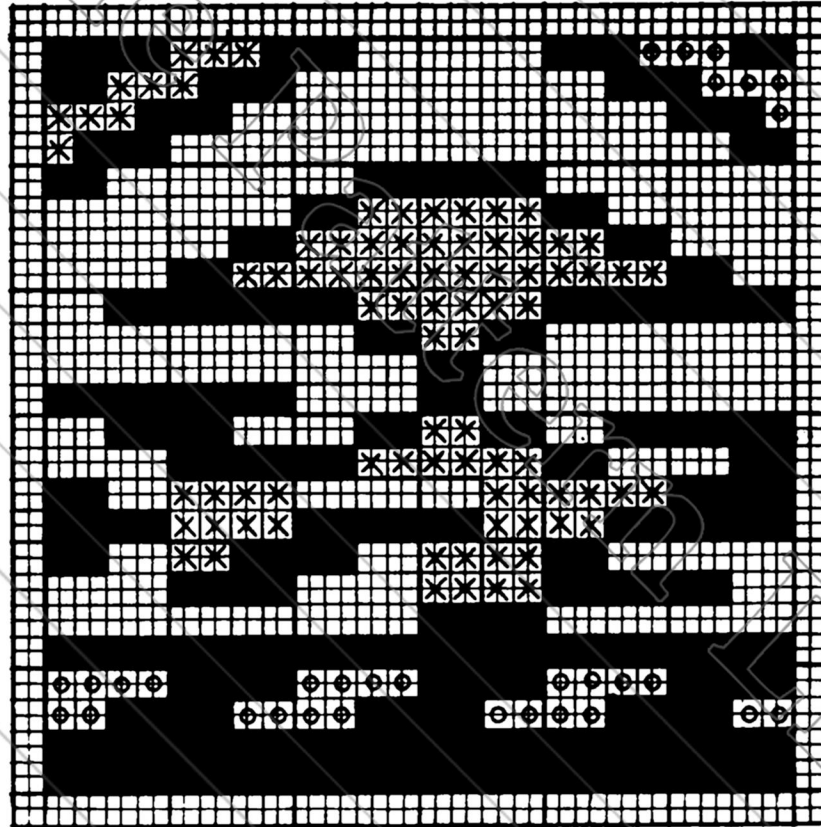
chain stitch, alternate horizontal lines having a bias in different directions. (See Fig. 25.) In Soumak weaving, each row of stitching is kept in place by having a shoot



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

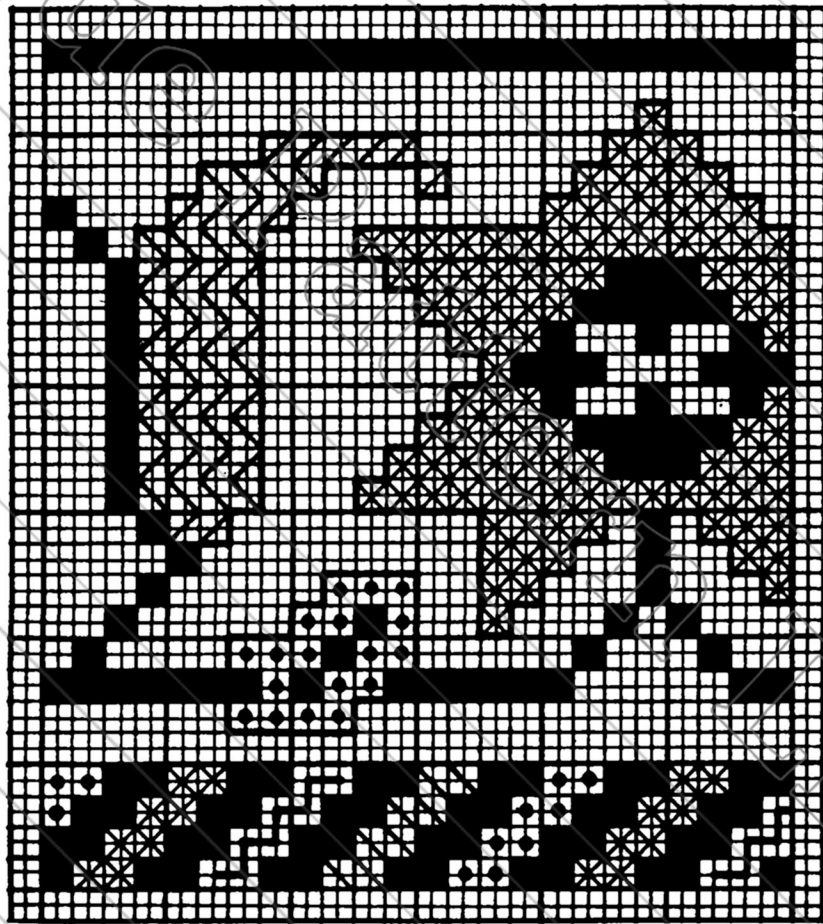


DESIGN FOR SOUMAK WEAVING

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,

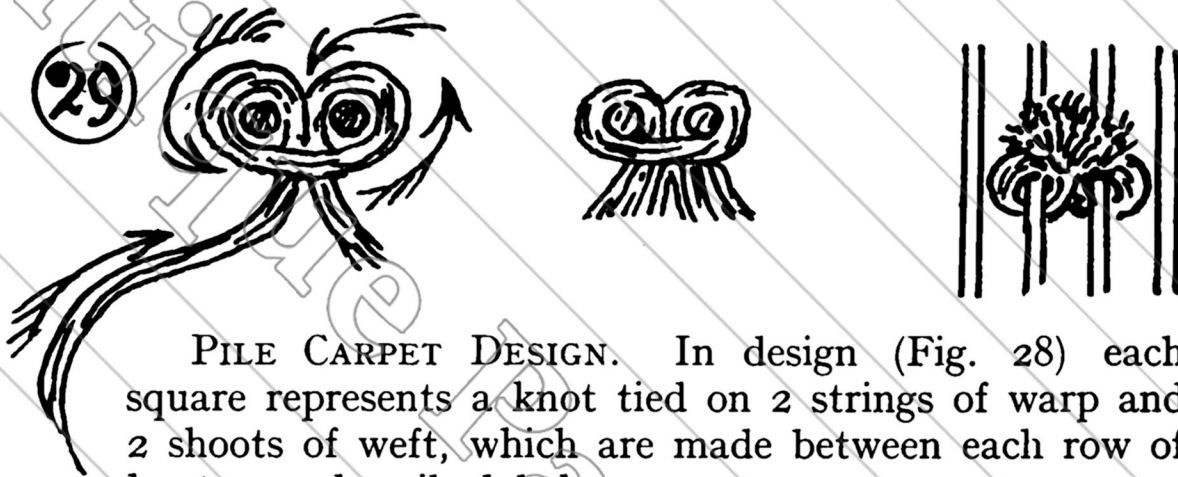


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PART OF DESIGN FOR PERSIAN PILE CARPET
SHOWN WOVEN AT PLATE VII

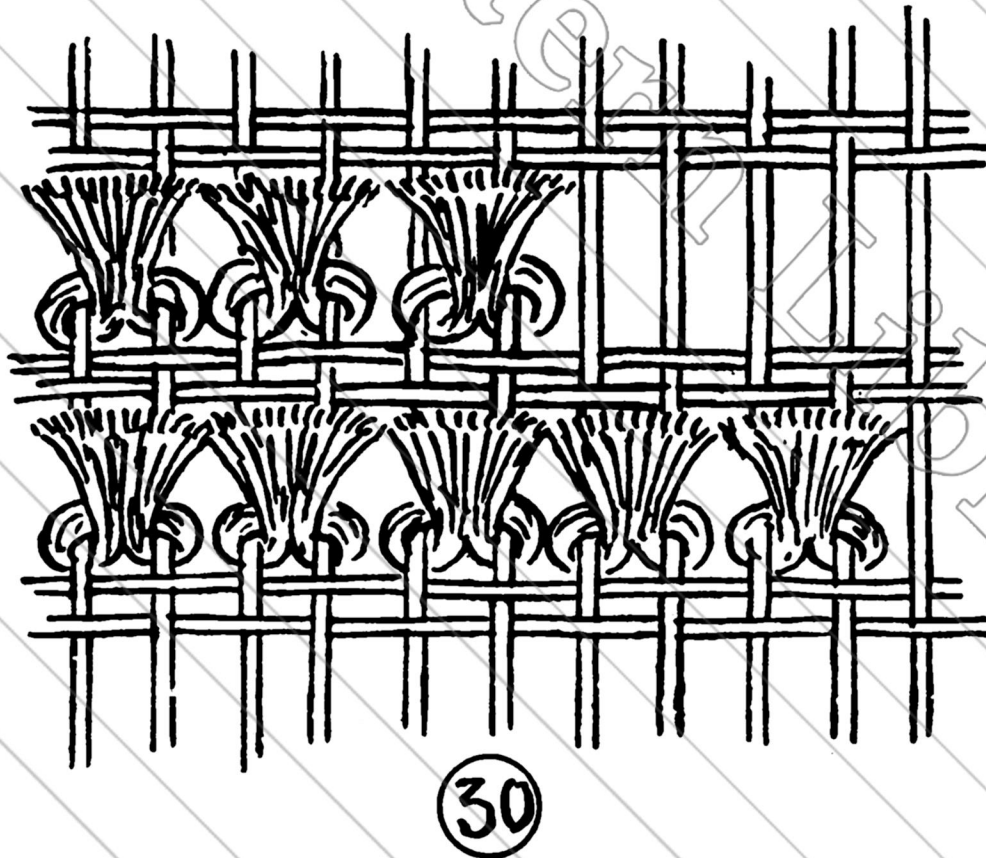
whether it be a little panel inset on a plain ground, or a whole rug or carpet.

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.

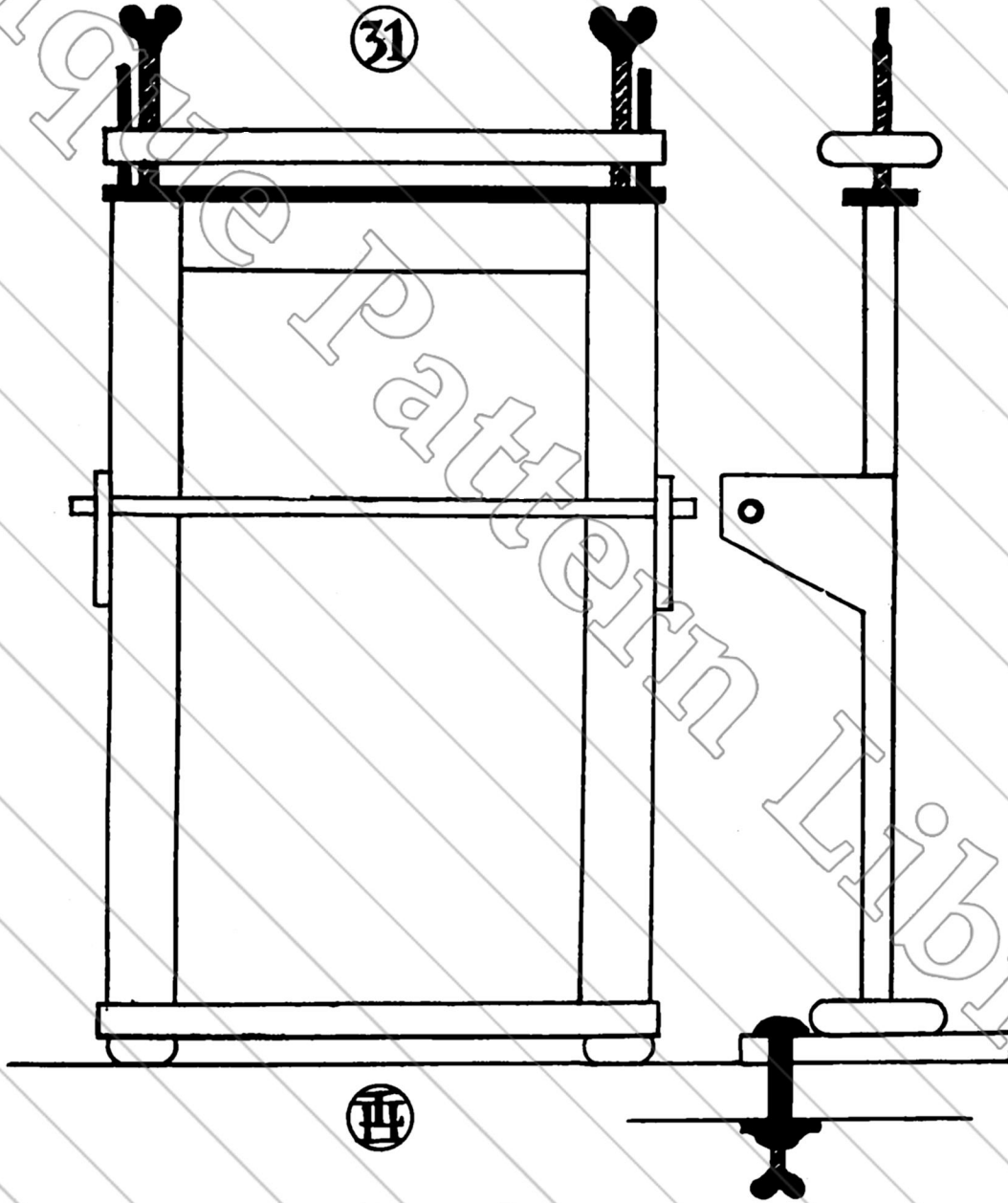
All the instructions given for tapestry weaving in previous chapters will apply to this table loom.

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

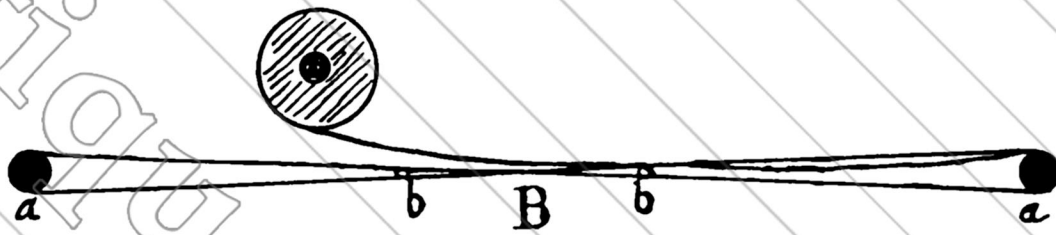
PLATE VII.



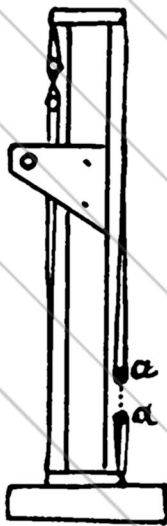
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TAPESTRY TABLE LOOM



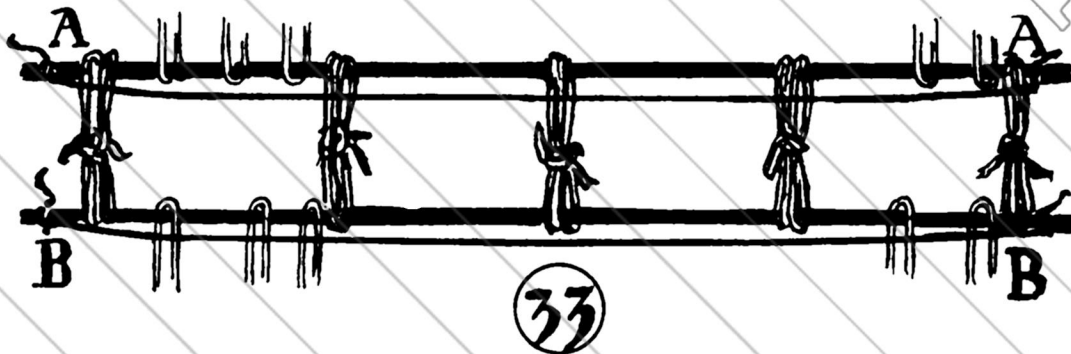
A



32

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).



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.

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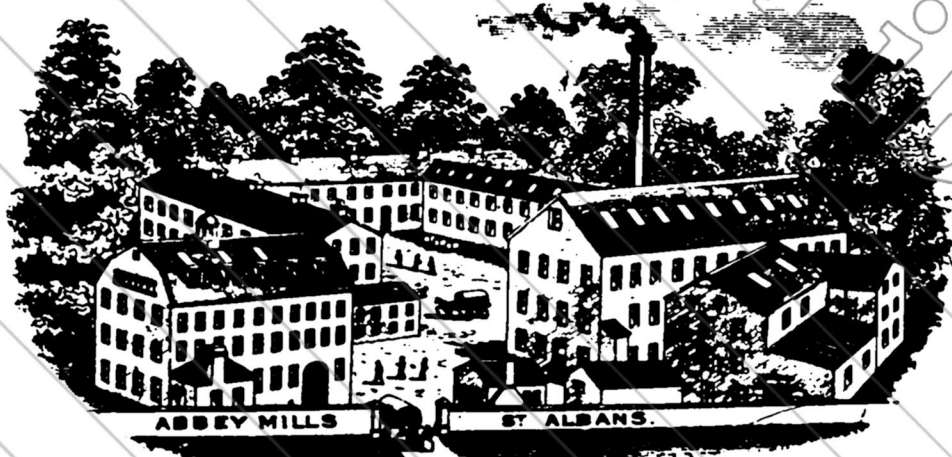
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