WEAVING.—No. XI.

DIAPER WEAVING.

The second class of weaving, according to the order into which we have divided the subject, consists in using two or more "divisions," or sets of harness. These are so arranged that any of the sets or "divisions" when used govern and alter the action of the remaining sets. This system is known as diaper weaving, and by its means very extensive designs may be woven for the purpose of tablecloths, shawls, &c. Figs. 96 and 97 represent a plan and section of a diaper harness in two divisions only, with the warp and a simple diaper pattern woven. The same pattern or design is also shown in Fig. 98.

In order to weave the pattern, as shown in Figs. 98 and 99, the threads must be worked in the consecutive order from 1 to 98, as shown at T, Fig. 101. It will be noticed that the threads in division A are first used, then those in division B, and so on to the completion of the pattern. But it must be observed that although the heads must be raised in the consecutive order shown, still the weaver would deviate from that order to suit the alternate action of his feet, as before explained. Figs. 98 and 99 show the parts of the pattern effected by each of the divisions, or sets of threads A and B, and the numbers of each of the threads are given as they are shown at Fig. 101.

In other words, the eight heads forming the harness are divided in two divisions, and are connected to two divisions of threads. If the division A of the threads only is used, it will weave the cloth in two stripes formed by two different twills or satins, as may be desired, and all the heads would be employed. On the other hand, if the threads B are used, they—being connected to the same heads, but in a different order—can be used to weave a reverse satin twill, &c., as may be desired, by using the same heads as the threads A. The chequer or diaper pattern, therefore, is produced by changing or working at intervals each set of threads in any order desired, or extent of interval between each change. If in regular and equivalent intervals a plain check would be woven, or plain, or stripes may be woven instead.

When this method is clearly understood it will be seen that it affords very extensive means for the production of large patterns. The example above given is for two divisions only; but the heads may be made in six or seven divisions, and their efficiency is thereby increased in far greater proportion than to the number of divisions used. Thus the efficiency of a harness with seven divisions would be vastly greater in effect than two divisions only.

It will therefore not be difficult to imagine that this system may be extended to the production of patterns such as shown at Fig. 102. In this figure, each square does not represent a separate thread, as was explained in the case of Fig. 98, but rather any requisite number, according to the size and kind of pattern to be woven.

Figs. 103 and 104 represent a common arrangement breaking up into smaller divisions the squares as shown in Fig. 102. The black squares in that figure would not, necessarily, represent a different colour, but a different kind of twill. Different colours are, however, often used in the warp and weft, and these can be varied at pleasure, independently of the form of the figure woven; but different colours have not to be considered at present, as they in no way affect the subject with which we are dealing.

It will be evident that in the use of several divisions with four or five threads in each would be almost impracticable for the weaver to work, consequently a plan has been devised whereby the use of one set of threads only is required, the different divisions being thrown in and out of action by a separate contrivance, and it is here that we again find resort to complicated but ingenious arrangements to overcome difficulties. In the matter to which we are now referring the desired end is obtained by using one set of foot threads only, and substituting for the other threads auxiliary levers which can, each set, be thrown in or out of action by a separate contrivance. By so doing the weaver may have command over six or more divisions or series of levers, and still only use one set of threads. In other words, he substitutes for the various divisions of threads (excepting one set) a number of levers, or sets of levers, corresponding to the divisions of the threads, and by throwing in or out of action, by means of connecting cords, any of these divisions or sets, he avoids the use of more threads than are required for one set only.

This plan is ingeniously carried out as follows:—Fig. 105 is a front view of the mounting of a loom, C being the top castle, and H the head, 20 in number in this instance, or four sets of a five-leaved twill. B is a set of couplers, one for each leaf connected to it by the cords A, which are rising cords to raise the leaves—its being simply a rising shed. The ends of the couplers are seen at C, Fig. 105. There is another set of couplers shown at D, Fig. 105, equal in number to the former, and to which they are connected for the purpose of raising the opposite ends of the leaves by the cords E. In this case the leathers are not placed below the leathers but above them, as shown at A, 1, 2, 3, 4, 5, or one for each leaf of the twill, a side view of which is shown at A, Fig. 106. Each of these leaves is connected to a thread below by means of the cords A, X, Fig. 105, which pass through the warp, and are
hold in position by being passed through holes in
the board a. The weights a and v are the ordinary
weights for sinking the leaves after they have been
raised.

The plan Fig. 100 shows the connexion between
the couppers c and the marches or levers A. The
crosses x in the plan represent where the tight
cords p p are tied to the levers A. Fig. 105, and the
circles denote the slack ends which are tied to
the rings a a. Where the squares are blank there is
no necessity for any cords.

Now it will be seen that there is one coupper in
each set connected to each lever A by a tight
cord, while one coupper of each set has no connexion
whatever with the levers, also there are three
couppers of each set that are tied to the rings a a a.

From these rings cords pass down through the
levers A and up through the box β, where they
are tied to another set of levers, the ends of
which appear as α. These levers are again con-
ected to another set at γ, to which the handles
f f are appended. Fig. 107 is a plan of the box γ.

On the cords by which the handles are suspended
are knots, and these cords pass down through the
board K, Fig. 106; when the handles are drawn
they are prevented from returning by their being
placed in a narrow cut in the board through which
the knots cannot pass, as shown in Fig. 108.

If all the handles are disengaged from the board
K, and any of the treadles T be pressed, a twill will
be produced of one thread raised and four sunk, for
the couppers which are connected by the slack cords
and those which have no cords will not be affected
by the levers A.

Also, if all the handles were drawn down, and the
knots held in the slots of the box K, it is evident
that all the connecting cords would become tight,
and when the treadles T were worked over all the
couppers in the mounting would be sunk, and their
respective levers raised, excepting those that
have no connexion with the levers A, and in this
case a twill would be woven with four threads raised
and one sunk, which is the reverse of the other, as
shown in Fig. 104 as compared with Fig. 103.

It will, therefore, be evident that if any one or
two of the handles be lowered the sets of leaves to
which they are connected will produce a twill the
reverse of those which are left up, and by this means
a great variety of patterns can be woven by using
one set of treadles only, these treadles governing
the twenty leaves by the means of throwing in and
out of connexion the separate divisions of the harness
as described.

In the plan shown by Fig. 102 the use of spaces
instead of lines shows the advantage of being able to
use with clearness crosses, circles, or other figures,
as may be desired by the designer and weaver, and
by this means little difficulty is encountered in rep-
resenting the arrangements required.

In the construction of all the healds we have
hitherto shown, they are formed by stretching the
leashes between two laths. This system does not
admit of a large number being used in a loom,
although by placing them in two or three tiers, as
shown in section by Figs. 110 and 111, as many as
80 or 90 may be used, for the laths need not be more
than 6 in. thick. But this number is quite inade-
quate to the quantity required in figure weaving,
where the numbers usually amount to 300, 400, 600,
or 900, and upwards. Therefore, in forming the
healds the laths are entirely dispensed with, and
single leashes, or several tied together forming a
heald, are used instead. Small weights, called
"lingos," made of iron or lead wire, are attached to
the end of each leash, and the leashes are held in
position in the loom by being passed through holes
in a board, sometimes, as in power looms, made in
one piece, and in hand looms formed of thin slips
inserted in a frame, similar to a school slate, except-
ing that there are a number of slips. This is called
the coumer board. These healds will be explained
as we proceed, for it is upon the advantages they
give of being placed in any desired order that a
great deal of the power of the loom depends, as
will be described in future articles.