WEAVING.—No. XXI.

CROSS WEAVING.

Previous to the successful application of Jacquard apparatus to lace machinery, gauze and net weaving was much practised, but at the present time that class of weaving is but rarely used. Still, although it has been almost superseded, there are circumstances which occasionally arise when it is capable of being used to great advantage, and when employed as a ground for figured weaving very beautiful fabrics can be produced, and it may at any time be brought again into use.

Adopted to prevent its ravelling out in washing, and of any breadth not exceeding 10 inches. As no drawing accompanies the specification, the description is not very clear, but it does not appear that cross weaving, or gauze, was used as at the present time. Cross weaving, as its name implies, enables the weaver to twist the warp threads more or less around each other, after the manner of lace, but more limited in extent.

Fig. 197 represents four kinds of gauze. The warp threads of the first are marked z and c. The threads a w will be observed to twist alternately from one side of the threads e c to the other, and at each crossing they are held in position by means of the weft threads w w which intersect them at the crossings.

In the second example the same process is gone through, but with this difference, every alternate thread twists the reverse way. This, however, is merely a matter of arranging the harness. The third shows the thread a exactly the same as in the first, but in this case instead of its twisting around one thread only it twists round three, as will be seen on referring to the figure.

Now in each of the cases shown the cross thread, or “whip” as it is called, merely twists half round the adjoining thread or threads, and not a whole turn. But in the first example the threads are shown to make a complete turn or twist round each other, and are held in that position by the weft threads w w as in the former instances.

The principle upon which the cross or twist depends will be best shown by means of the diagrams, Figs. 198, 199, and 200. The numbers and letters refer to the same parts in each figure.

In Fig. 198 six warp threads only are shown numbered 1 to 6. The threads 1, 3, 5 are passed through mails in the leases of the handle R, and thence through loops called “doups” fixed to a handle, as shown at D. These doups will be noticed to pass beneath the threads 2, 4, 6.

The warp threads pass forward through the reed R, and thence to the cloth beam, which, however, it is not necessary to show. By this arrangement the threads 1, 3, 5 are passed through two eyes, but the threads 2, 4, 6 are passed through none whatever, and are merely held in position by the lease or cross e e and the reed R.

Fig. 198 shows the warp at rest, or in its normal position. Fig. 199 shows the handle H raised, and the weft thread l passed through the shed formed by the handle. Fig. 200 shows the handle H lowered to its first position and the deep handle raised.

Now it will be observed in Fig. 200 that the doups have drawn the threads 1, 3, 5 underneath the adjoining threads 2, 4, 6, and consequently effect a half twisting of the threads, as may be seen at c. This, therefore, is the simple process of cross weaving, and we have now to follow it through various modifications, but still dependent upon the principle shown.

Figs. 201, 202, and 203 show how the threads are made to twist completely, or a whole turn, round each other. It is effected by carrying the doup not only under the thread l, but over it, and then to clip it. In this case headers are shown at h, in each of the figures through which the warp and doup threads pass. But heads are not used now, having been dispensed with many years ago. Still,
they had certain advantages, and it may be as well not to omit showing them in this instance, although the complete twisting of the threads as shown can be effected just the same without the beads on the doops.

As in the case of the half twisting of the threads last shown the complete twisting is accomplished by first raising the headle S and then the dop headle D and the twisting so effected is held in position by the welt thread shown at A D and E.

have no strain or tension upon them similar to an ordinary headle, which is provided with a shaft at the bottom as well as the top of the leashes. Certainly when the beads were used they gave a slight amount of tension to the doops, but to overcome the difficulty in order to work the loom as fast as this kind of weaving will allow, a plan is adopted of using an additional headle merely for the purpose of supporting and guiding the dop leas, and has nothing to do with the twisting of threads. Let Fig. 204 show how this is accomplished in the Jacquard loom, the principle of the action of Figs. 204 to 206 may be easily understood, for gaume work is accomplished in the Jacquard in a peculiarly simple and ingenious manner.

Fig. 207 may represent a plan of a portion of gaume as it would appear in the loom. At A B and C three different kinds of twisting are shown. In the first instance the whip thread is twisted half round the two adjoining threads and only one shoot of the weft is made. At B the whip thread is retained in its position while two shoots of weft are inserted, and at C three shoots are passed through before the whip thread returns to its normal position.

By describing how this is accomplished in the Jacquard loom, the principle of the action of Figs. 204 to 206 may be easily understood, for gaume work is accomplished in the Jacquard in a peculiarly simple and ingenious manner.

In this instance both warp threads pass through an eye each, and not as in the former instance. R R represents two of the dentse of the ree, and it may be here noticed that all such threads in gaume weaving intended to cross each other must pass through the same opening in the reed, otherwise they would not be twisted. The distance between the dent or teeth of the reed in practice may be one-thirty-fifth or one-fourteenth of an inch only, although we are compelled to show them many times that distance apart. Therefore, when it is remembered that the threads lie so near together, the working of the dop leas will be better understood.

But notwithstanding the apparent simplicity of the operation of gaume weaving, as above represented, there would be found in practice a difficulty in keeping the doops in order, for, as shown, they hang loosely from the headle, shaft, or latch, and represent an ordinary headle with eye at E. Then the dop leas D is shown to pass through the eye in such a manner that it cannot be separated from the headle. Now the warp thread D, shown in section, is held by the dop against the side of the eye, but the dop cannot draw the thread any further, although the warp thread, when the dop is slackened, may be moved to some distance from the eye. Fig. 205 shows a set of doops attached to the lower shafts of the loom, so that rising and falling sheds may be used as in plain weaving. Fig. 206 represents the dop for effecting a complete twist to the warp threads when attached to a clasp leas. In each instance the doops are arranged upon a shaft, and it follows that the whole of them must work at one time, consequently nothing but plain gaume either in continuous or broken lengths could be woven, but in weaving gaume in connexion with figured work, it is necessary that any single
doup, or any assortment of them, or the whole of them, may be brought into use whenever required, otherwise figured gaume could not be produced.

In Fig. 206 the dop leas D does not clas the eye at E, as in Figs. 204 and 205, consequently the warp thread break to which it is connected, the dop would become loose from the standard, and would have to be replaced. This, however, was the plan used before the method of clamping them was adopted.
under one thread only, but two, four, or six threads may be used, and the warp thread itself may be composed of two threads. In the figure we have shown that there is only one warp thread to two wavy threads.

Figs. 308, 309, and 310 represent a diagram of a front elevation of the harness shown on plan at H, H, Fig. 207, and Fig. 211 represents a side elevation of the same. In all five figures the same numbers and letters refer to the same parts.

Fig. 308 represents two ordinary Jacquard leashes with mails and warp threads, &c., and s is one of a similar kind, but being connected with the doup a, which is the warp thread which is to be twisted around the others by means of the doup a. The doup is attached to a "dead" leash d as shown, and this dead leash is attached to a whisp lash at e. This whip lash is called the "standard," and the whip thread not only passes through the mail or eye in it at e, but through the doup also. See Fig. 311.

The leash p corresponds to the additional handle previously referred to, to support the doup, and it will be seen in the figures that the doup passes through the mail in a similar manner to that described in Figs. 304 and 305.

Now Fig. 308 shows the three warp threads in their normal position, governed by the leashes as h and e. These leashes can be raised in any order required for figured or figured weaving; but whenever the leash h is raised, it draws with it the whip thread as shown at Fig. 310.

The mails s and e are employed much closer together than we show them, consequently the effect of the dead leash d is not so apparent. But it will be seen that it effectually holds the doup in position, and by being connected to the standard leash at e, whenever the standard is raised, the dead leash is raised also, otherwise the whip thread would be strained by the tension of the doup. See Fig. 306.

In plan 207 the warp threads are numbered in each other. The whip thread is usually made stronger than the other threads, or may be doubled, so as to counteract the strain of the threads round which it is twisted. When four or six threads are used, the warp threads are carried extra, and requires considerable judgment in their use.

The application of guaze to the formation of selvages may now be readily understood. When the cloth is being woven the place where it is intended to be cut has had no threads passed through the reed, in other words one of the dents, or spaces, has been left empty. On each side of this empty dent guaze threads are used to form the selvages.

Fig. 312 represents a portion of plain cloth woven showing the guaze selvages with the whip threads s. At a portion of the cloth is shown cut, and it may be readily imagined that when the threads are cut with a straight and compactly together, that a very serviceable substitute for a genuine selvage can be made, and by this means narrow strips, such as velvet ribbons and scarves, can be woven at much less expense than where they have to be woven in separate pieces.

Net weaving is an extension of the same kind as guaze weaving, and, therefore, more complicated. In fact the whip thread is made to pass over much wider distances than in guaze weaving, where it is confined to the end of one dent only. To accomplish this effect the whip doupes are placed in front of the reed, and not at the back, as in guaze, consequently they form a more complicated harness apparently impossible to use. To give an idea of this class of work, which is now perhaps completely superseded by lace-work, Figs. 313 and 314 show an elevation and plan of a fair specimen of net-work. The reed R R, Fig. 207, shows the set of three threads passing through each space, otherwise, as before observed, they could not be twisted round the others by means of the doup a.

In all classes of guaze weaving it is evident that those threads which are twisted round the others must be used in greater or less lengths according to the amount of twisting. In arranging the loom, therefore, means must be provided accordingly for separate bobbin or small warp beams to be used. This matter was alluded to in the description of the damask loom, Fig. 196, and we shall now show how these small warp bobbins or beams are weighted so as to throw a constant tension upon the threads, and allow of various lengths of thread being used.

There are several ways in which this can be effected, but we shall show three only, viz., Figs. 315, 316, and 317. In each figure a front and an end view is shown.

Fig. 315 shows the plan adopted in the loom Fig. 196, where each bobbin is provided with a groove round which is wound a cord to which a weight w is attached. When the warp thread e is unwound it draws the weight w upwards, until it falls over the top of the pulley and remains in its former position, which is shown at w and w'. The weight thereby always causes a strain upon the warp thread, and the plan is a very effectual one. The bobbin is supported on the spindle s, which is of wire and is passed through the bobbin.

In Fig. 316 the bobbin, instead of being carried over the top of a pulley, the cord slips off the end of the spindle, as at c. This plan also causes a constant tension upon the thread e.

The plan, Fig. 217, is more adapted for coarse or stronger threads, such as are used in carpet weaving. In this case the weight is attached to a hook which rests upon the bobbin at w, and the warp thread e being passed over it cannot be unwound without a constant friction and back strain to take up the slack after each movement of the harness.