The repeat of weave is:

24 warp threads plain weave,
12 warp-threads 6-leaf warp satin.

—

36 warp-threads in repeat.

25 picks plain weave,
11 picks 6-leaf satin filling effect.

—

36 picks in repeat.

The change of one end difference between warp and filling satin effect had to be made to produce the perfect cut-off of the end-threads, *i. e.,* where the different weaves join. The weave in question, by means of fancy draw, calls for 12-harness, *i. e.,* 6-harness for the warp satin stripe, and 6-harness for the filling satin and plain weave part.

GAUZE OR LENO WEAVING.

Gauze, also called Leno, is the name given to a variety of fabrics characterized by their openwork effect, somewhat resembling lace. In these fabrics the warp-threads, in addition to interlacing with the filling-threads, are twisted with threads of their own system.

Gauze weaving is also practiced in connection with regular weaving to produce fancy effects, portions of the repeat of the design being then interlaced with gauze, the others by means of regular weaving.

In gauze we find two distinct divisions of warp-threads, *viz:* the *standard* and the *douping* warp-threads, the latter, during weaving, twisting around the former. The douping warp-threads are also known as *whip-threads,* on account of their twisting (whipping) around their mate warp-threads.

Fig. 1 shows the structure of plain gauze. Threads indicated by *a* (shown in outlines) represent the standard-threads, whereas, threads marked *b* (shown in black) illustrate the whip-threads.

For the reason that we deal with two systems of warp-threads in gauze weaving, we must use two systems, or sets of harness for operating the warp-

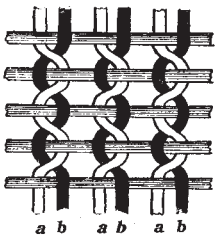

Fig. 1

threads. One set of the harness is known as the *ground-harness* (which we will indicate in our diagrams of drawing-in drafts by *A*) and the other as the *douping-harness* (which we will indicate by *B*).

We will now give an explanation of the douping-harness.

Two methods of working with douping-harnesses are in use. When placing the doup at the lower side they are then known as *Bottom Doups,* and the cloth is then woven "wrong side up" in the loom. When the doup is placed at the upper or top side they are then known as *"Top Doups,"* and the cloth is then woven "face up" on the loom. Bottom Doups are the ones mostly used, although Top Doups have their advantage, among which are that the fabric is woven right side up in the loom, hence any mistakes are readily noticed; again, broken doups are easier replaced.

Fig. 2

We will consider Bottom Doups used in our article.

Fig. 2 shows a specimen of a complete doup. In the same, we find at the left a twine heddle, similar to heddles used in regular weaving, and which is known in gauze weaving as the *full-heddle.* To this heddle, at the right, the doup is adjusted. The same consists of a smooth, strong linen or silk thread which is passed through the upper loop of the full-heddle, and back through its eye, being in turn secured to the bottom rod of the harness frame. This arrangement connects the doup (movable) to the full-heddle. It shows the doup to be half a heddle only, hence the name *half-harness* or *skeleton-harness* for the harness frame having the doup secured to its bottom rod. Through the end of the loop of the doup (the portion shown to the left of the full-heddle in our illustration) the whip-thread is passed. (See black dot.)

Two movements of the doup and one of the full-heddle, contain the entire secret of gauze weaving. When these are understood, it becomes at once as simple as regular weaving.

In drawing-in the warp in the harness for gauze weaving, as mentioned before, we deal with two sets of harnesses, *viz.,* the ground and the doup-harness. Diagram Fig. 3 is given to illustrate the subject, *A* showing two ground-harness frames, *B* the doup-harness as is composed of its full and skeleton-harness. Warp-threads shown in outlines indicate standard-threads, the ones shown in black the whip-threads.

In gauze-weaving every warp-thread (standard as well as whip-thread) is drawn first, the same as for common weaving, in the ground-harness set (see *A*).

After the complete warp has thus been drawn-in, the threading of the doups is started, *i. e.*, each whip-thread in rotation is passed below its mate standard-thread and in turn through the loop of the doup (see *B*) as placed on the other side of the standard-thread. After all the doups are threaded, when reeding the warp, the standard and its mate whip-thread are drawn into one dent. All threads which have to twist against

Fig. 3

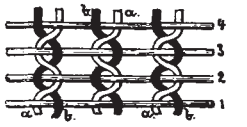

Fig. 4

each other (whether one or more of each system are used) must be drawn in one dent of the reed.

Doup shown in Fig. 2 is what we call a right-hand doup, *i. e.*, the doup is situated to the right of the full-heddle. Doup required for drawing-in draft Fig. 3 is a left-hand doup, *i. e.*, doup shown in Fig. 2 turned around, presenting the skeleton-harness to the left of the full-harness in a similar positioned diagram.

Now let us examine the first movement of the doup and its full-heddle, and this with reference to the ground-harness set.

Suppose we lift the skeleton-harness and so permit the doup to get loose. This will then free the whip-thread from the doup, permitting it to be operated on, as in common weaving, by means of the ground-harness. The whip-thread will in this instance return to its regular position near one side of the standard-warp, as regulated by the drawing-in of the warp in the ground-harness set (to the right-hand side in draft Fig. 3). Suppose we raise this ground-harness (harness 2 in draft quoted) and insert a pick in the shed thus formed. During this process the doup will raise, but out of action, behind the reed. Having thus in-

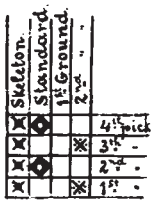

Fig. 5

serted pick number one, after dropping skeleton and ground-harness 2, let us next raise the full, and the skeleton-harness, *i. e.*, the doup-harness *B* complete, leaving the ground-harness set undisturbed. This movement of the harnesses compels the whip-thread to raise, close to the eye of the full-heddle, drawing the whip-thread below the standard-thread and raising the former on the opposite side of the standard-thread, as done in the previous pick. During this second pick the doup will be in a position parallel to the full-heddle, whereas the whip-thread will be crossed behind the reed, between the doup and ground-harness sets.

This crossing and raising of the whip-thread to full height of the shed, in such a short space, will in turn put a great amount of tension on the thread and therefore necessitate two special arrangements in the method of operation, which we will mention briefly.

(1) We must have sufficient space between ground (*A*) and doup (*B*) sets of harness.

(2) We must arrange in rear of ground-harness set, near the whip-roll, a rod, extending the full width of the warp, technically known as *Slackener*. All the whip-threads required to doup uniformly (at the same picks) throughout the repeat of the pattern, are passed over this slackener, which is situated above the regular warp-line as running from the whip-roll towards the ground-harness.

On the first pick previously referred to, this slackener will remain undisturbed, since then no strain is required on the whip-thread, whereas on the second pick referred to, *i. e.*, the twist or douping pick, this slackener is automatically lowered so as to bring the whip-threads nearly in the regular warp line in rear of harness. This will slacken the whip-threads in back of the harness, allowing them in turn to ease up in front, *i. e.*, where required to cross around the standard-thread and being raised by the doup on the opposite side of said standard-thread to form the upper part of the shed. This slackener for gauze weaving is also known as *easer*, a word readily explained by its action: to make the raising of the whip-thread, by means of the doup, easier on the yarn.

We will next turn our attention to the designing of various gauze fabrics, and commence with the plain gauze, as illustrated in Fig. 4. In plain gauze all the warp-threads work in pairs, 1 end whip and 1 end standard. The entire warp is drawn first in the harness similar to any other warp. Afterwards each whip-thread, taken in rotation, is passed below its mate standard-thread and drawn into its mate doup.

Diagram Fig. 3 illustrates the plan of drawing-in ground-harness and threading the doup for producing a piece of plain gauze, as shown in Fig. 4. In the former,

A represents the set of ground-harness (2-harness).

B represents the douping set. (Standard and skeleton.)

Standard-threads are illustrated in outlines.

Whip-threads are shown in black.

Examining fabric sketch Fig. 4, we find pick 1 requiring the whip-threads raised in proper position, as placed by the ground-harness (to the right of the standard-thread) therefore this pick will require the raising of ground-harness 2 and the skeleton-harness, hence raising the doup to permit common weaving by means of the set of ground-harness. Pick 2 calls for the raising of the whip-thread to the opposite position of that of pick 1 (to the left side of the standard-thread) therefore we must doup on this pick by raising the standard and the skeleton-harness, or, in the present example, the entire douping set. Pick 3 is the same as pick 1; pick 4 is the same as pick 2; hence two picks repeat of pattern. Fig. 5 shows the plan for the harness chain thus explained.

In fabric shown in Fig. 4, we find every pair of warp-threads (1 standard and 1 whip) to twist in the same direction, the crossing of the whip-threads in its drawing-in draft (Fig. 3) being arranged from right to left. The doup used in this instance is known as a left-hand doup.

This crossing of the whip-threads can also be arranged in the other direction, see drawing-in draft

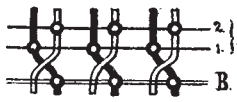

Fig. 6

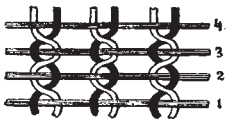

Fig. 7

Fig. 6, but this will not change the general appearance of the woven fabric, as is readily seen by consulting fabric sketch Fig. 7 and comparing it with Fig. 4. The doup used in this instance is known as a

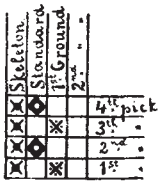

Fig. 8

right-hand doup, *i. e.,* arrangement shown in Fig. 2. Consulting drawing-in draft Fig. 6 shows the drafting of the warp in its ground-harness set to be: one whip to alternate with one standard thread, or, it is the reverse arrangement from that used in draft Fig. 3.

Fig. 8 shows us the harness chain for weaving fabric shown in Fig. 7. Compared to chain Fig. 5, it shows that ground-harness 1 is raised on picks 1 and 3 in place of ground-harness 2 as was done in chain 5. Picks 2 and 4, *i.* e., the raising of the doup (standard and skeleton-harness) is the same in both chains.

(*To be continued.*)

Raw cotton forms the bulk of Egyptian exports, the value last year reaching $121,208,510, or 84 per cent of the whole.

Chinese cotton is sold in the United States to a greater extent each year, the following statistics showing the direct receipts from China for fiscal years ended June 30:

	Pounds.	*Value.*
1906.....	360	$ 36
1907.....	764	45
1908.....	201,619	17,548
1909.....	1,452,808	139,650
1910.....	4,596,821	526,080

Danish cotton manufacturers propose to form a union at Ziel, Denmark. This union will affect 82,000 spinning spindles and 12,000 doubling spindles, with an annual consumption of 26,000 bales of cotton.

NOVELTIES IN COTTON FABRICS.

Figured Madras Shirting.

Fig. 1 shows a photographic view of the woven fabric, reproduced actual size.

Fig. 2 shows the design on point paper; one repeat in its width and one and one-half repeats in its length are given. 60 picks comprise one repeat.

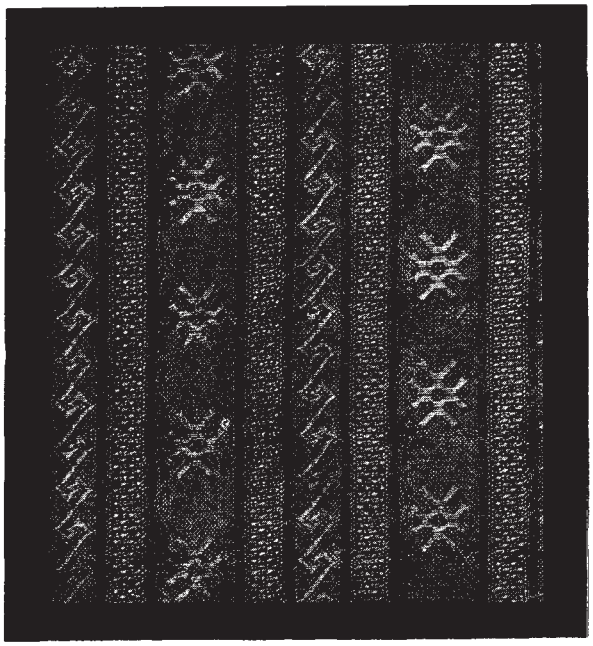

Fig. 1

Fabric sample Fig. 1 shows just one repeat of the design in its width.

Two different styles of stripe effects are worked out in the design: (*a*) Two 6-harness satin stripes (warp effect) having between them imitation gauze, and (*b*), two figure effect stripes produced by floating the filling on plain ground work. One of the effects is a "Wall of Troy" stripe, the other a "Star" effect placed after the "plain setting."

Warp: 3860 ends, all single 60's cotton, cream color.

Arrangement of stripes:

8	ends	satin
2	"	plain
12	"	imitation gauze
2	"	plain
8	"	satin
26	"	figure (wall of Troy) effect
8	"	satin
2	"	plain
12	"	imitation gauze
2	"	plain
8	"	satin
44	"	figure (Star) effect

134 ends—draw in 75 dents.

Two repeats, *i. e.,* 268 ends, drawn in 150 dents from one repeat of the design on account of the "plain setting" of the star effect.

Reed: 58 = 37½ inches exclusive selvages, or 38 inches including selvages.

Draw *satin* 4 ends, *plain* and *figured* 2 ends, in one dent.

Gauze draw 2 empty, 3 in one dent } 4 times, 2 empty

or 12 ends for 14 dents.