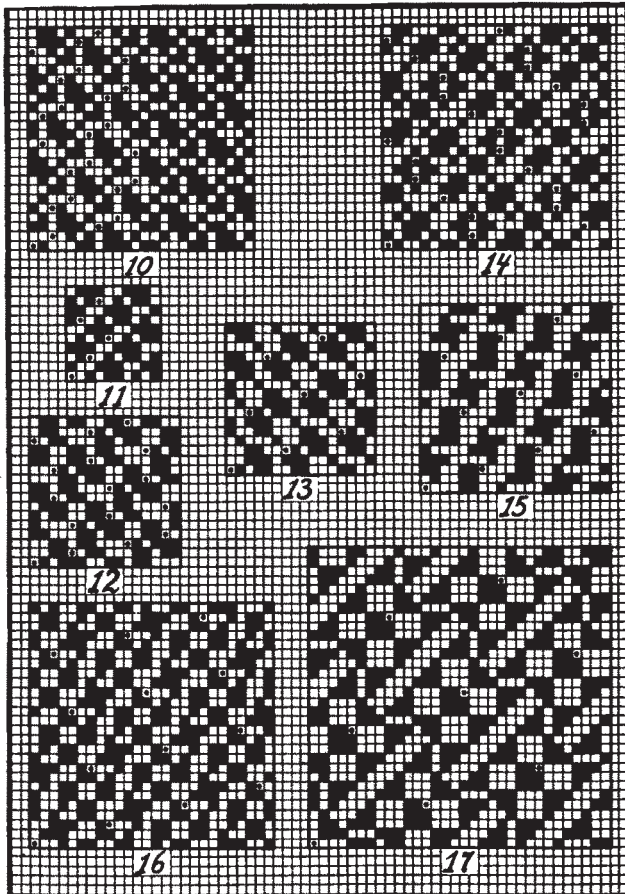


Weave Fig. 12 has for its foundation the 8 x 16 double satin, using the latter for every other vertical row of squares of the crepé weave plan only, producing in turn, by adding the proper small figure effect between the original satin spots, a crepé weave repeating on 16 x 16.

Weave Fig. 13 has for its foundation the 8-harness satin, using every other warp-thread and pick in the plan of the crepé weave only. Repeat 16 x 16

Fig. 14 shows us a crepé weave repeating on 24 x 24, having for its foundation the 8-harness double



satin, whose counter 3 first by adding one repeat (8) was raised to 11; this number was then divided into 3, 4 and 4, resulting in a double satin, repeating on 8 warp-threads and 24 picks. In order to balance the effect of the resulting crepé weave, *i. e.*, have repeat of warp and filling the same; we used only every third row of warp squares on the crepé weave plan for inserting the foundation satin.

Weave Fig. 15 has for its foundation the 10-harness satin. Using the latter for every other warp-thread and pick in the construction of the crepé weave, results in a repeat for the latter of 20 x 20.

Weave Fig. 16 shows the treatment of the 13-harness satin, resulting in a crepé weave repeating on 26 x 26.

Crepé weave Fig. 17, repeating on 32 x 32, has for its foundation the 8-harness satin, using every fourth warp-thread and pick only of the crepé weave plan for said foundation satin.

(To be continued.)

PILE FABRICS PRODUCED BY AN EXTRA WARP.

Two kinds of warps are necessary to the production of these fabrics. One warp, the *ground-warp*, produces, with the filling, the ground or body of the fabric, while a second warp, known as the *pile-warp*, produces the face of the cloth.

In any warp-pile fabric, from the common velvet to the most complicated Astrakan cloth, Brussels, Wilton or tapestry carpet, the method of entwining the ground structure is of a very simple character (either common plain, basket, or a twill of short repeat), while the interlacing of the pile-warp into the ground cloth is of a more complicated nature.

In all warp-pile fabrics two methods of producing the pile are essential. Either the pile is left uncut, which is technically known as the *terry pile*, or the pile is cut, known technically as the *velvet pile*.

In addition to these two principles for producing the warp-pile, an endless variety of effects and combinations are produced by using various color combinations for each kind, again varying the height of the pile, combining cut and uncut (velvet and terry effects) pile for forming additional designs in one fabric, etc., etc.

Ground-warp and pile-warp are independent in their operation on the loom, therefore each must be wound on a separate beam, since a different tension and let-off is required for each.

In fabrics of a fancy character one beam for the pile-warp will not be sufficient, and the number must be increased for some fabrics to a great extent, in fact in such fabrics as Brussels or Wilton carpets it must be increased to one miniature beam for each individual pile warp-thread.

Structure of Warp Pile Fabrics.

Warp-pile fabrics are constructed by raising the pile-warps from the ground cloth over a wire and then interlacing the same into the cloth again. The entire pile-warp may be raised over the wire on a pick, or part of it only. In every case we must be careful to arrange the binding so as to secure the pile proper to the ground cloth. In case we want to raise only a part of the pile-warp at one pick we must, in addition to the binding, arrange the distribution according to the effect required.

Terry and Velvet Pile.

In all warp-pile fabrics the same kind of warp yarn may be employed to produce the pile for either the terry or the velvet effect; but it will be necessary to



Fig. 1



Fig. 2

use different wires if the fabric is to be woven on a power loom. The terry pile is produced by using a plain wire, as illustrated in Fig. 1, which, when drawn out, leaves the loop intact.

If velvet pile is desired, we must use wires of a style similar to that illustrated in Fig. 2, being a wire which has a knife attached to its extreme end. This

cuts its way through the respective row of pile loops as formed over it, when the wire is pulled out.

Formerly all pile fabrics were woven on hand looms, and there are at present any number of the more

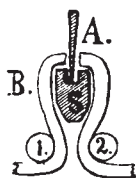


Fig. 3

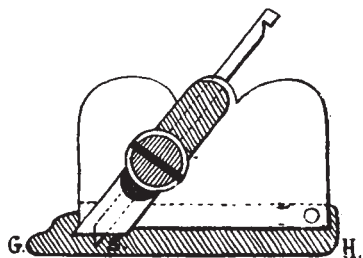


Fig. 4

intricate fabric structures yet woven on these looms. The principle of forming the fabric structure is identical for both looms, the difference being in the cutting of the pile on the loom and when in connection with hand looms, a wire provided with a groove for inserting a cutting device, called a *trevette*, is required when dealing with cut loops. The same wires, or wires minus a groove are used for terry loops.

Fig. 3 is a section illustrating the cutting of a warp pile loop, viz:

A The knife of the trevette.

B Pile warp-thread interlaced to the ground body structure by means of picks 1 and 2.

S The grooved wire.

Providing terry or uncut pile is desired, the pile warp-thread is simply woven over the wire S (or a similar wire—not grooved) which after a sufficient number of these wires are inserted, in order to hold the loops of pile-warp intact, is then pulled out and in turn again inserted, *i. e.*, used in the formation of a new row of loops. The same procedure is observed in connection with cut or velvet pile fabrics, since other-

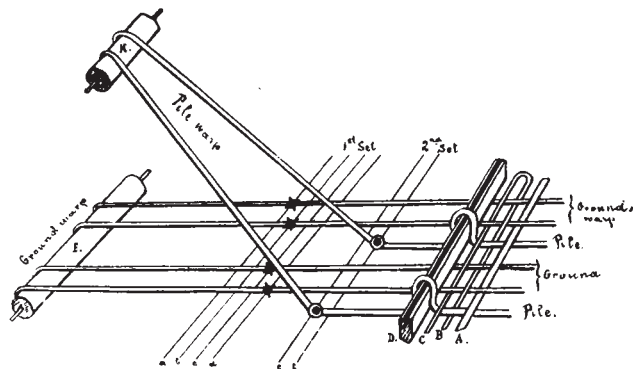


Fig. 5

wise the pile-warp would pull out of the fabric structure.

Thus it will be seen that the production of velvet or terry pile is produced by respectively either cutting or not cutting the pile loops as formed over the wires.

The trevette as used by the hand loom weaver is a frame having a knife fixed in it for cutting the pile. Fig. 4 shows the device in its side elevation; G — H is a back-rest for keeping the trevette in close proximity to the wire, to securely guide the blade S of the knife, in the groove of the wire to be cut. This cutting

of the loops must be done quickly in order to produce a smooth even pile.

Formation of Loop in Loom.

Fig. 5 is a diagrammatical view illustrating the subject.

Two systems of warp are shown, each coming from its own warp-beam, *viz*:

Ground warp from beam E.

Pile warp from beam K.

The ground warp is shown drawn on the four harness of the 1st set: a, b, c and d.

The pile-warp is drawn on the two harness of the 2nd set: e and f.

A, B and C shows three ground picks, the first one being of a heavier count of yarn, indicating that the woven fabric refers to two shuttle work.

D shows the pile wire, inserted for the formation of the loop, *i. e.*, taking the place of the fourth pick in

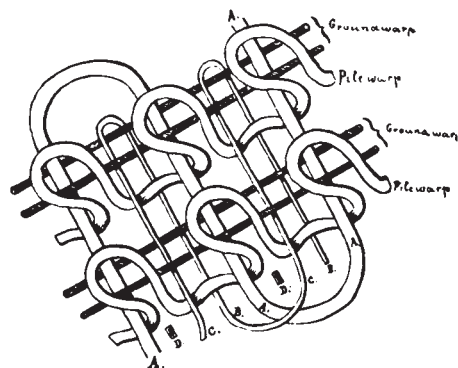


Fig. 7

weaving. 3 warp-threads and 4 picks form the repeat of pattern, the former interlacing with the latter as shown in weave-plan Fig. 6.

Fig. 7 is a diagram in perspective, showing the interlacing of ground and pile warp with the filling according to weave-plan Fig. 6; letters of references A, B, C, and D being selected to indicate corresponding picks in Figs. 5 and 6.

The loops of the pile-warp in diagrams Fig. 5 and Fig. 7 are shown not cut, *i. e.*, showing terry pile. Both diagrams illustrate a principle most frequently observed, *i. e.*, to have the pile warp in the lower shed, both in the pick preceding the wire as well as the one following. This method has a strong tendency to drive the wires into position as well as to keep them there. In some fabrics this method is changed with respect to the pick preceding the wire, but in whatever warp pile fabric to be constructed by means of wires, the pick following the insertion of the wire must have all pile warp-threads, raised as before over the wire, down.

We will now give a short sketch of the method of operation on the hand loom when weaving warp pile fabrics, thus illustrating also a like principle for weaving the same fabrics on the power loom. After the weaver has interlaced the required number of ground picks between the threads of the combined warps, a shed is formed either by raising the entire pile warp-threads in the upper part of the shed and forming the lower part of the shed by means of the ground warp,

or by raising only a part of the pile warp, in this pick, forming the lower part of the shed by the entire ground warp and also the remaining part of the pile warp. This shed remains formed until the wire has been passed through, extending on each end several inches outside the selvage threads. Towards this wire so inserted the reed is brought with considerable force, and pushes the wire close towards the previously interwoven ground picks. The shape of these wires is of such a form that, by arranging the latter so that the reed when pressing towards the interlaced part of the fabric comes in contact with the grooved edge, the wire is caused to stand on its lower edge. In this upright position it is maintained by pressing the reed towards the wire until a new shed (ground pick) is formed, in which the filling for the ground cloth is inserted by means of a common shettle as is done in the ground pick preceding the insertion of the wire.

By this method of fastening the pile warp over its respective wire to the ground cloth, the latter is also

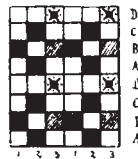


Fig. 8

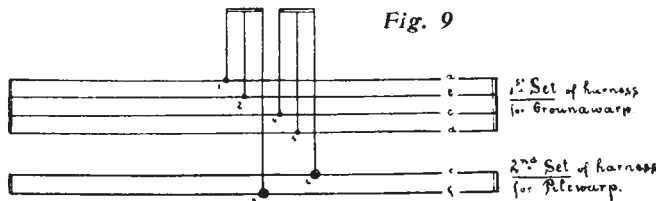


Fig. 9

securely fastened to it, and, if an uncut pile effect is desired, requires some effort to liberate it. After inserting the required number of ground picks the process of inserting the wires is repeated, several wires always being retained in the fabric to keep the pile-threads from pulling out of the texture, which would destroy the face. From 6 to 12 wires, according to the material and the method of interlacing the ground cloth, as also the closeness of texture, are required to remain in the fabric to prevent any possible trouble, as pointed out. The last wire liberated is always the next to be inserted.

Velvet and Plush Fabrics.

These fabrics are constructed with two kinds of warps. The ground-warp interlaces with the filling on plain, rib, basket, or a 3, 4, 5, 6 harness twill; whereas the pile-warp forms the face, through interlacing with the ground cloth after, or before and after, raising for the wire.

The ground-warp is woven with a tight tension, while the pile-warp is arranged to take-up easily. The name of the fabric indicates the *cut* character for the pile. As previously mentioned, two beams are necessary, the beam for carrying the ground-warp, and the beam for carrying the pile-warp. The pile beam must be situated in a higher position (in the rear of the loom) than the beam carrying the ground-warp, so that the pile-threads will run in an oblique direction towards

the harness. The proportion of pile and ground-warp as well as the height of texture, and threads per dent, vary for the different qualities.



Fig. 11

Arrangements most frequently used are:

- 2 ends ground to alternate with 1 end pile;
- 2 ends ground to alternate with 2 ends pile;
- 2 ground, 1 pile, 1 ground, 1 pile;
- 1 ground, 1 pile, 1 ground, 2 pile;
- 1 ground, 2 pile, 2 ground, 2 pile;
- 2 ground, 1 pile, 2 ground, 2 pile, etc.

The ground-warp and pile-warp are each put on a separate set of harness, generally using four successive harnesses for drawing in the ground-warp, and two harnesses for the pile-warp. For example:

Fig. 8 represents a common velvet weave in which 2 ground warp-threads alternate with 1 end pile-warp. Filling: 3 picks, ground (A, B, C) to alternate with 1 wire (D).

Fig. 9 illustrates the drawing-in draft with two sets of harness, viz: harness a, b, c, d, for the ground-warp, and harness e and f for the pile warp.

Technically, velvet fabrics are classified as two-pick velvet, three-pick velvet, etc., which means that in the two-pick velvet we use two ground-picks between each insertion of the wire, and in the three-pick velvet, three successive ground picks, and so on.

Fig. 10 illustrates one of the plainest of the velvet weaves, technically known as the common two-pick velvet weave, illustrating the following arrangement for each pick:

- Pick 1: raise ground warp-thread 1 and the pile.
- “ 2: “ the pile (wire).
- “ 3: “ ground warp-thread 2.
- Repeat: 3 warp-threads and 3 picks.

Warp: 2 ground-threads to alternate with one pile-thread (this pile can also be a two-fold or a three-fold thread).

Filling: 2 ground-picks to alternate with one wire.



Fig. 13

Fig. 11 represents the section of a fabric interlaced with this weave.

Fig. 12 shows another frequently used velvet weave, which has for the interlacing of the ground cloth the common 2 by 4 rib-weave.

In this weave we find the ground-picks preceding the pick for inserting the wire, as well as the ground-pick following the latter, call for the raising of the same ground warp-threads (two picks in a shed in the common rib-weave).

Fig. 13 illustrates the section of a fabric interlaced with weave Fig. 12, showing that on:

- Pick 1: raise ground 1 and pile.
 - " 2: " pile (wire).
 - " 3: " ground 1.
 - " 4: " ground 2 and pile.
 - " 5: " pile (wire).
 - " 6: " ground 2.
- Repeat: 3 warp-threads and 6 picks.



Fig. 15

Warp: 2 ground, 1 pile (which can also be a two-fold or three-fold thread).

Filling: 2 ground, one wire.

Fig. 14 is the common 3-pick velvet weave, which has for its interlacing of the ground the plain weave.

Repeat: 3 warp-threads and 8 picks.

Warp: 2 ground 1 pile (which can also be a two-fold or three-fold thread).

Filling: 3 ground one wire:

- Pick 1: raise ground 1 (Ground-pick 1).
- " 2: " pile for inserting wire.
- " 3: " ground 2 (Ground-pick 2).
- " 4: " ground 1 and pile. (Ground-pick 3).
- " 5: " ground 2 (Ground-pick 4).
- " 6: " pile for inserting wire.
- " 7: " ground 1 (Ground-pick 5).
- " 8: " ground 2 and pile (Ground-pick 6).

The section of a fabric interlaced with this weave, (see diagram Fig. 15) explains the advantages of this weave over the preceding ones, in that it more securely fastens the pile to the ground structure, every pile warp-thread being interlaced by $\frac{1}{1} \frac{1}{1}$ before it is raised for inserting the wire. Therefore fabrics produced with this weave will be more durable than fabrics interlaced with weaves Figs. 10 and 12; of course,



Fig. 17

by using the texture and size of yarn alike in all three examples, the fabric as produced with weave Fig. 14 will be less dense, in appearance of its face, than the others.

Fig. 16 represents another 3-pick velvet weave, and Fig. 17 its fabric section. Letters of reference in weave and section are used to correspond. Two loops formed by the insertion of the wires are shown as cut, one not cut.

Repeat: 3 warp-threads and 4 picks.

Warp: 2 ends ground, 1 end pile.

Filling: 3 picks ground, one wire. Picks marked 1, 3, 4, are ground picks. Pick 2 (= D) is the pick for inserting the wire.

If using a twill weave for interlacing the ground-cloth in a velvet fabric, we generally use not less than three successive ground picks to alternate with one wire; less ground picks would result in a texture not sufficiently strong to resist the pulling out of the pile by the wear the fabric is put to.

Fig. 18 shows a weave for a pile fabric having the 4 up 2 down, 6-harness twill for the interlacing of the ground structure.

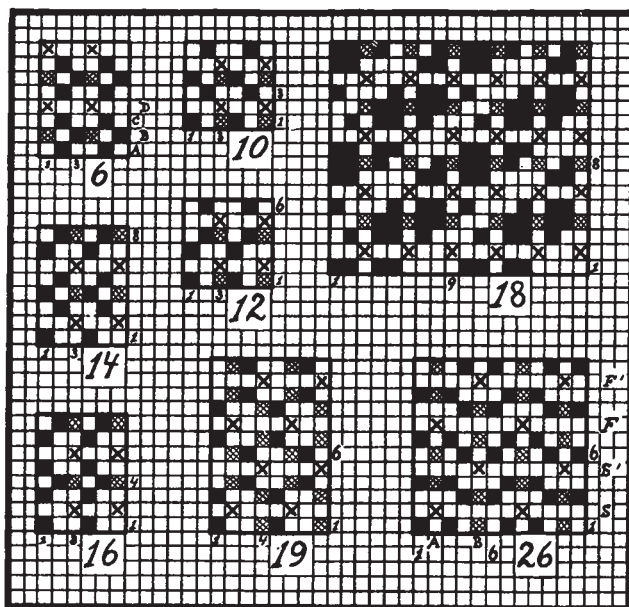
Repeat: 9 warp-threads and 8 picks.

Warp: 2 ground, 1 pile.

Filling: 3 ground, 1 wire.

The method of interlacing the pile warp to the ground cloth is, in the present example, equal to the one illustrated in section Fig. 17. In place of one pile thread we can also use a two-fold or three-fold thread.

In the manufacture of velvets and plushes, in which no dense pile is required, also in fabrics in which the material used is rough or too close set, and so liable to choke between the raising and lowering of the entire



pile warp or vice versa the entire ground warp, we raise on every successive pile pick only each alternate pile warp-thread. The proportion of pile warp and ground warp in these fabrics is generally equal; one end ground to alternate with one end pile.

Weave Fig. 19 is given to explain the subject.

Repeat: 4 warp-threads and 6 picks (4 ground, 2 wires).

Warp: 1 ground, 1 pile.

Filling: 2 picks ground, one wire.

Fig. 20 represents a section of a fabric interlaced with weave Fig. 19. One pile warp-thread, indicated

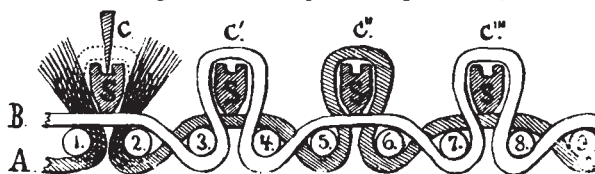


Fig. 20.

as A, is shown shaded and situated behind pile-thread B, which is shown in outlines. S represents the section of a wire as used in hand looms, but which will also demonstrate the section of wire as used in power looms. C represents the section of the knife in the trevette. The first loop is shown as cut, the other three as uncut.

(To be continued.)