Nov. 27, 1934. R. LORTHIOIS 1,982,171

WARP PILE FABRIC

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Fig. 1

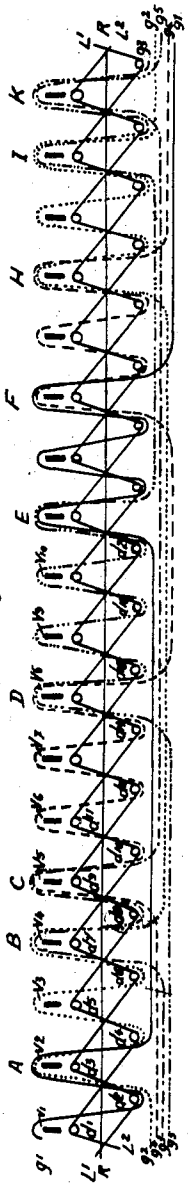


Fig. 3

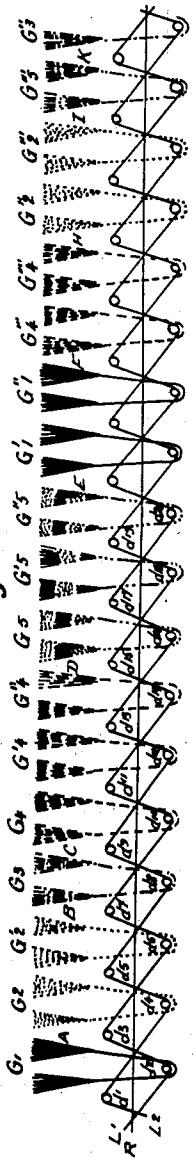
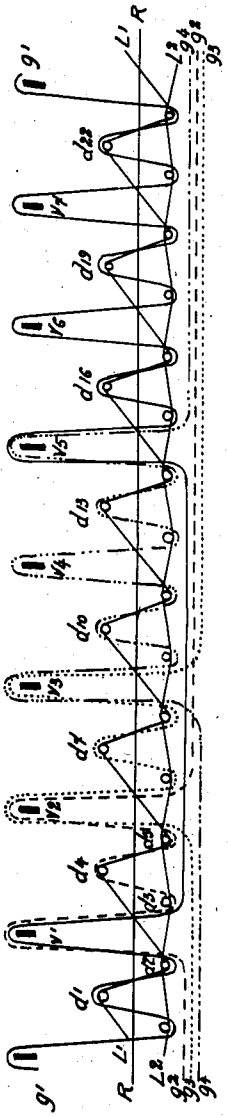


Fig. 5



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Fig. 2

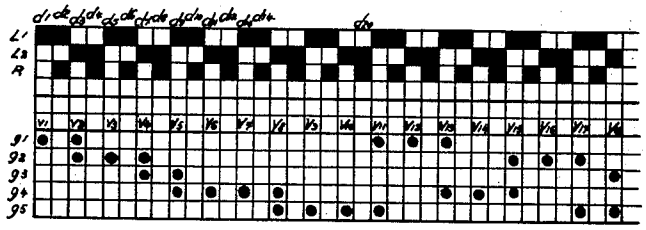


Fig. 6

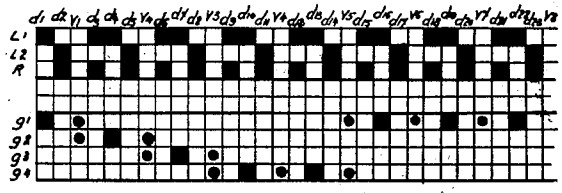
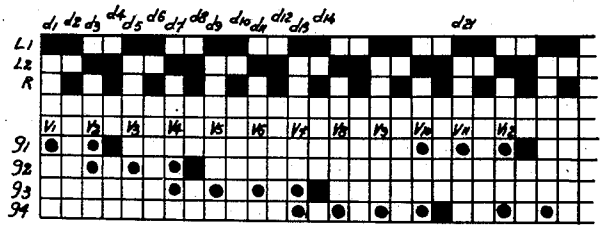


Fig. 8



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Fig. 4

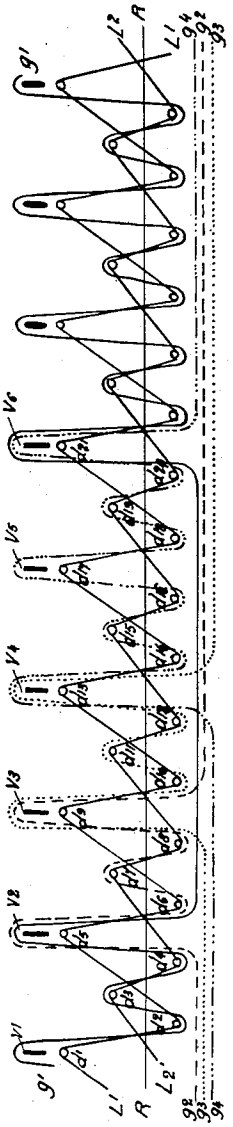
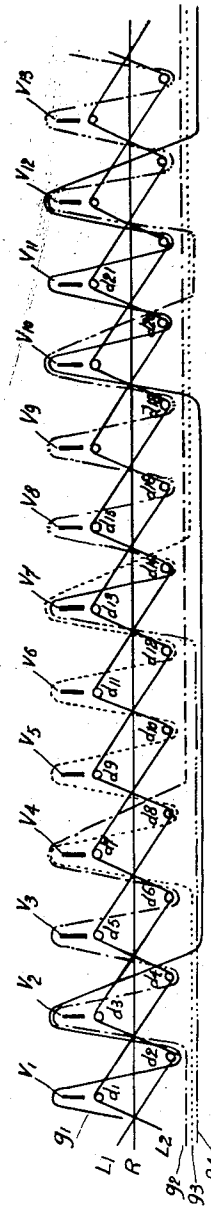


Fig. 7



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UNITED STATES PATENT OFFICE

1,982,171

WARP PILE FABRIC

Robert Lorthiois, Tourcoing, France

Application July 7, 1932, Serial No. 621,252
In France August 27, 1931

3 Claims. (Cl. 139—406)

The invention relates to the manufacture of warp pile fabrics on velvet looms, or looms for weaving with pile wires, and particularly carpets imitating oriental carpets, both in appearance and in texture, and in which the warp pile threads form a design upon the backing by the appearance on this side of one or more loops formed by the threads each time they make a tuft constituting a point in the design on the face of the fabric.

The object of the invention is to facilitate the removal of the inactive portions of the pile threads, that is to say the portions which have not participated in the formation of the pattern or design, while avoiding the difficulty in finding them and removing all danger of damaging the face side of the fabric. Moreover it can be employed perfectly well in the manufacture of carpets containing any number of wefts, however closely arranged they may be, while at the same time it has the advantage of simplifying the working of the loom. It dispenses with the operation of the harness board or bottom board, which becomes superfluous. It considerably reduces the fatigue of the loom in view of the fact that the latter has only to put into movement a small number of threads at a given moment, in view of the absolute immobility of the threads of the creels which do not participate in the formation of the design (for example in the case of a carpet employing five creels, the threads of three creels out of the five are absolutely stationary, and for the greater part of the time the threads of one creel only are in movement). This permits speeds to be obtained which have hitherto been unknown in this type of manufacture, and this leads to an increase in the productive capacity of the velvet looms employed.

These advantages are obtained by means of the method forming the subject of the invention, which is characterized essentially by the fact that, all the portions of pile warp threads which do not participate as such in the formation of the design are allowed to float below the ground fabric of the carpet beneath the backing.

This method will be more clearly understood from the following description of weaving diagrams given by way of example of nonlimiting embodiments, and illustrated in the accompanying drawings, to which reference will be made.

Figure 1 shows the method according to the invention of weaving the pile warp threads during the formation of a single weft carpet employing five creels, that is to say requiring for its formation five creels of bobbins of the same coloured threads or even of different coloured threads.

Figure 2 shows a corresponding weaving diagram. In this figure the black squares indicate the lifting of the thread (creel thread or binding or stuffing thread) above the weft. The squares marked with a round black point indicate the lifting of a pile thread above a pile wire. Finally the blank squares indicate that the thread considered passes below the weft.

Figure 3 is a similar view to Figure 1, showing the carpet after the cutting of the loops passing over the pile wires and the formation of the pile tufts, the inactive portions of the pile threads being eliminated either by falling naturally from the fabric or, when necessary, by brushing the reverse side of the fabric.

Figure 4 is a similar view to Figure 1, showing the mode of working according to the invention for the warp pile threads when making a single weft carpet employing four creels, each point on the face side corresponding to two points on the reverse side.

Figure 5 is a similar view to Figure 4 for the case of weaving a double weft carpet employing four creels and having a lost pick (that is to say no weft pick at the moment of passage of pile wire).

Figure 6 shows the weaving diagram for this last manufacture.

Figure 7 illustrates an improved modification of the mode of controlling the warp pile threads during the formation of a four-grills carpet having a simple weft.

Figure 8 represents the corresponding weaving diagram.

In these figures, L_1 and L_2 are the binding warps, R the stuffing warp or warps of the canvas of the carpet; d are the weft threads, v the pile wires and g the pile warps; G are the pile tufts.

The formation of single weft carpets employing five creels will be described in detail with reference to Figures 1, 2 and 3. The other weaves represented can be deduced therefrom without any difficulty.

The threads of the creel g_1, which are brought into the design formation by the Jacquard, pass above the pile wire v_1 and the weft thread d_1, and then below the weft d_2, in order to form their back points; they then pass over the pile wire v_2 and over the weft d_3 in order to form their face points. At this moment the threads of this creel are no longer required to assist in forming the design, and they descend below the weft d_4 in order to

remain completely outside the carpet, until they are again introduced into it at the weft d_{20}.

The threads of the creel g_2 which have to replace the above threads in order to continue the design have been brought into action by a suitable perforation of the card, at the exact moment when the threads of the creel g_1 terminate their design point, and the threads of the creel g_2 pass above the pile wire v_2 and the weft d_3 together with the threads of the creel g_1.

The threads of the creel g_2 then form alternately their face points and back points, and pass above the pile wires v_3 and v_4 and below the wefts d_4 and d_6. At this moment their design point finishes and they pass below the weft d_8 and remain outside the carpet below the canvas.

The threads of the creel g_3 which have to replace them will enter into the formation of the carpet under the action of the Jacquard, and will pass above the pile wire v_4 at the same time as the threads of the creel g_2, and they will form the design as far as the point C.

At this point they are themselves replaced by the threads of the creel g_4 which pass at the same time as the threads of the creel g_3 above the pile wire v_5, and from this moment form the design on the face side and on the reverse side as far as D, where the threads of the creel g_5 are themselves brought into action to replace those of the creel g_4 etc.

It is seen that the threads of the creel g_1 terminating the work at A, and only returning into the design at E after having floated below the canvas will be suppressed between A and E. They again leave the design at F, where they disappear from the carpet in order to float below the canvas.

The threads g_2 replacing the threads g_1 have been previously eliminated at A, and continue to work in the period comprised between A and B, after which they disappear from the carpet between B and H, where they are again called upon to form the design as far as I, after which they disappear.

The threads g_3 which were inactive before B, enter into the design from B to C and then disappear as far as K where they again enter into the formation of the design.

The threads g_4 eliminated from the carpet before C form the design between C and D, are eliminated between D and F, work from F to H, and leave the carpet after H.

Finally, the threads g_5 enter into the formation of the design between D and E and between I and K, replacing the threads g_4 at D, and replacing the threads g_2 at I, but they are eliminated before D and then between E and I and then after K.

These inactive portions of threads will all be eliminated after weaving, by simply cutting them and then brushing the reverse side of the fabric, thus avoiding any damage and disarrangement of the face side.

Figure 3 shows the active sections of the different pile threads according to the diagram or arrangement shown in Figure 1.

The threads of the creel g_1, after forming their back point below the weft d_2, terminate their design with the right hand part of the tuft G_1.

The pile wire v_2 has cut the layer of threads of this creel at the point A and has formed this half tuft, and at the same time has liberated the threads of this creel, which no longer participate in the design beyond the point A.

At the same time as the threads of the creel g_1, after the weft pick d_2, the Jacquard has brought into action the threads of the creel g_2 which, after the passage of the pile wire v_2 have been liberated in the part before A and have formed the left hand portion of the tuft G_2. They continue to work and form the right hand half tuft of G_2 and the left hand half tuft of G'_2 after the passage of the pile wire v_3, and they again leave the carpet after having formed the right hand half tuft of G_2 after the passage of the pile wire v_4 at the point B, and they are eliminated over the portion B to H.

The threads of the creel g_3 succeed them beyond the weft d_6. The passage of the pile wire v_4 liberates the whole of their part previous to B and forms the left hand tuft of G_3. After the passage of the pile wire v_5 they form the right hand part of G_3 at C and are eliminated from C to K.

The threads of the creel g_4 form the half tufts and tufts G_4, G'_4, G''_4 and are eliminated after the formation of the right hand half tuft of G''_4 between D and F.

The threads of the creel g_5 form the half tufts and tufts G_5, G'_5, G''_5 and are eliminated from the point E to the point I.

The threads of the creel g_1 succeed them from E to F in the same manner, since the threads of the creel g_4 again appear between F and H, in order to be replaced by those of g_2 between H and I, and then by those of g_3 after K etc.

It goes without saying that a mode of working such as that described in the most general case of an arrangement employing five creels can be applied in the same manner to arrangements employing two, three or four creels in simple weft and in double weft or multiple weft working. This is shown in Figures 4, 5 and 6.

The applicant has found that, in certain modes of carrying the method into practice, the elimination of the inoperative parts of the pile threads may become a delicate operation, on account of the crossing which occurred at certain points on the reverse side between the pile warp to be eliminated and the pile warp which has to remain in the carpet.

Moreover, the reverse side of the carpet is given an irregular appearance, on account of the difference in size of the loops on the reverse side, since those beneath which no pile thread has become caught by crossing the said threads, are necessarily smaller than those which have been formed around a pile thread which has to be eliminated.

This peculiarity, which is designated by the name "bubbling", gives the carpet an appearance which presents no disadvantage and is even sought in the case of certain oriental carpets of the so-called "primitive" kind, but which must on the contrary be avoided in the case of certain other types of oriental carpets.

The foregoing will more easily be understood by referring to Figure 1 of the accompanying drawings. It will be seen from an examination of this figure that, for example, the elimination of the portion of the thread g_1 comprised between the pile wires v_2 and v_{11} can present certain difficulties on account of the fact that the thread g_1 which has left the design, passes beneath the weft d_4 at the same time as the thread g_2 which has just entered the design, so that these threads of necessity cross.

It also follows that a "bubbling" of the loop of the thread g_2 can occur beneath the weft d_4 (which follows the operation of the pile wire v_2 corresponding to the simultaneous lifting of the

two pile warps g_1 and g_2) after the elimination of the inactive portion of the thread g_1 comprised between the pile wires v_2 and v_{11}.

The same objectionable effects may occur beneath the wefts d_8, d_{10}, d_{16} etc. (which follow respectively the passage of the pile wires v_4, v_5, v_8 etc. corresponding to the simultaneous lifting of two warp pile threads). On the contrary, the difficulty of eliminating the inactive pile thread and the formation of a "bubble" cannot occur beneath the wefts d_2, d_6, d_{14}, d_{20} etc.

The object of the method of weaving shown in Figures 7 and 8 is to remove the above described objections and, with this object in view, it relates to a mode of operation which is characterized by the feature that the warp pile thread which has terminated its design is separated from that which has just commenced the design, after the passage of each of the pile wires corresponding to the simultaneous lifting of two warp pile threads.

From an examination of Figures 7 and 8 it will be seen that, according to this mode of working, after the passage of the pile wires v_2, v_4, v_7 etc. which correspond to the simultaneous lifting of two pile warps (g_1 and g_2), (g_2 and g_3), (g_3 and g_4) etc., the warps which have completed their design are separated from those which have just commenced the design. This separation is effected after the passage of the pile wire v_2, for example, by making the warps g_1 pass over the weft d_4 while the warps g_2 pass below.

In this way therefore the two kinds of warps, those which have completed their design and those which have just commenced their design, are entirely prevented from crossing beneath the wefts d_4, d_8, d_{14} etc. Consequently, any difficulty in eliminating the inactive portions of the pile warps is avoided and at the same time any bubbling of the pile warp loops on the back face is avoided on account of the fact that the back points are always formed by a single thread.

It will also be clearly seen that there is no disadvantage in making the warps which are about to commence their design pass beneath the wefts d_2, d_6, d_{12} etc. together with those which are about to complete their design.

This new mode of working, while permitting the harness board or the bottom board to be dispensed with, necessitates the presence of a backing card for lifting the warps which have completed their design above the wefts d_4, d_8, d_{14} etc. after the passage of the pile wires v_2, v_4, v_7 etc.

It goes without saying that the various modes of binding or weaving the stuffing or wadding threads do not vary in any way the principle of the invention.

Finally it is also clearly understood that, without going outside the scope of the invention, modifications and improvements of details may be imagined in practice, while equivalent means may be employed.

I claim:

1. A method for the production of back patterned warp pile fabrics, which consists in weaving into the weft of the fabric that part of the pile warp threads required for the pattern of the fabric, floating beneath the body of the fabric that part of the pile warp threads excluded from the pattern, leading the pile warp threads to reenter the fabric one or more times according to the requirements of the pattern, first over a pile wire (top shed) and then around the foundation weft shot between said pile wire and the next following pile wire, then leading said threads over the next following pile wire, returning said threads to float below the foundation fabric, and finally removing from the under side of the body of the fabric the floating part of the pile warp threads.

2. A method according to claim 1 for the manufacture of a double weft carpet characterized by the feature that the pile warps required in the formation of the pattern are led one or more times in succession first above a pile wire then below a backing weft of the fabric foundation, then over a face weft of the foundation, then below a backing weft and finally over the next following pile wire and back to the floating position below the fabric foundation.

3. A method according to claim 1, characterized by the feature that when two pile warps pass over a pile wire simultaneously the pile warp entering the pattern continues the weave by passing below and round the corresponding backing weft of the fabric foundation while the pile warp leaving the design passes over this weft to return to the floating position below the fabric foundation.

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