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METHOD OF WEAVING WARP PILE FABRICS

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Fig. 1.

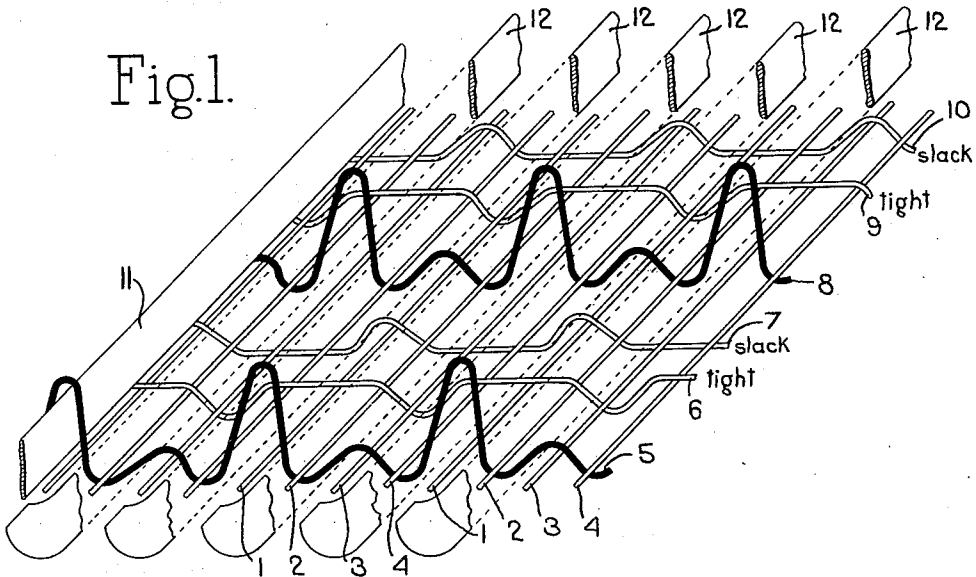


Fig. 2.

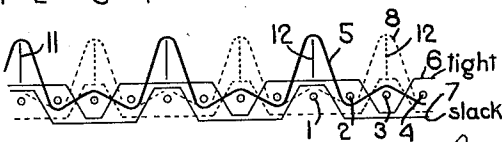


Fig. 3.

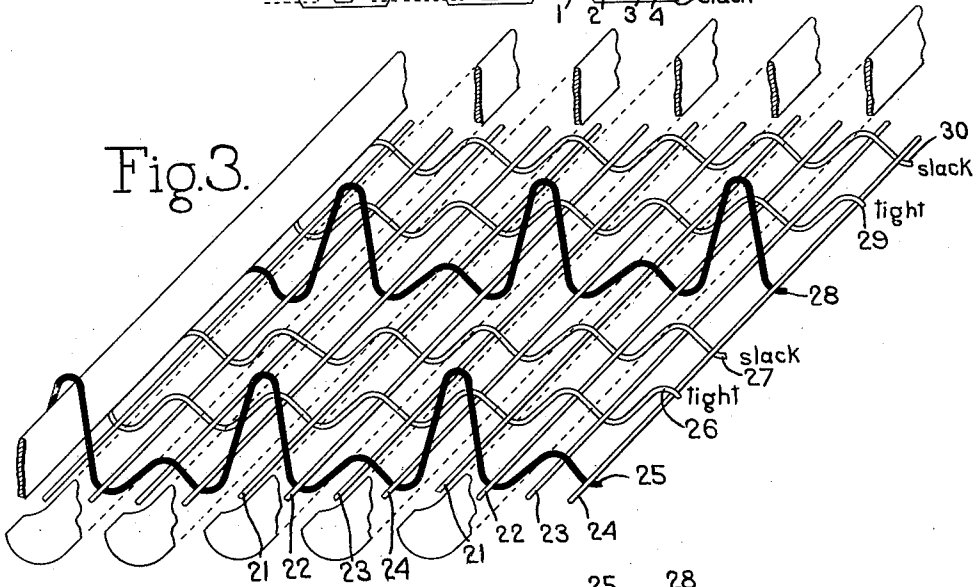
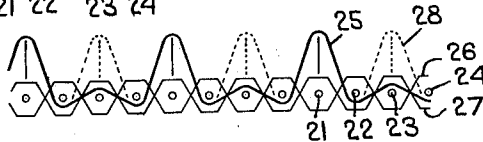


Fig. 4.



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METHOD OF WEAVING WARP PILE FABRICS

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5 Claims. (Cl. 139—402)

This invention relates to a novel construction of a warp pile fabric and to the method of weaving or making the same.

The object of the invention is to produce a warp pile fabric in which the pile shall be of the "fast" type, that is, shall interlock with the ground of the fabric so that the pile loops shall maintain their position and so that the pile shall not be pushed out or withdrawn from the ground if the pile loops are cut, to produce such a fabric with a close and compact pile face, and to produce such a fabric economically and rapidly.

Warp pile fabrics have long been woven in various ways and with the threads or yarns composing them made of various fibres but the operation is at best a relatively slow one and such fabrics are relatively expensive. The present invention is the result of long study and experiment and involves the coordination of principles and factors heretofore individually applied in the weaving art but never before brought together.

In this invention the pile loops are formed over pile wires of the usual type inserted transversely of the loom. These pile wires may be of the plain or knife type according as the loops are to be left uncut or are to be cut and these pile wires are inserted simultaneously with alternate picks of filling forming the ground. This greatly increases the speed of production over that usually existing when the pile wires are inserted in independent sheds formed between the insertion of successive picks of filling.

In this invention further, by reason of the insertion of the pile wire simultaneously with each alternate pick, it is possible to form the fast pile weave with the W's interlocked with the minimum number of picks of filling, that is, with each W extending under one, over the next, and under the next pick of filling.

In this invention also two sets of ground warp ends are employed, one set being under a relatively tight tension and the other set under a relatively slack tension. This, in conjunction with the structural formation secured by the simultaneous insertion of the loop forming pile wire and pick of filling and in conjunction with the W's of the pile interlocked with three picks of filling, enables those picks of filling which are inserted without the accompanying insertion of a pile wire to be crowded up close to the preceding pick, thus enabling the pile face to be close and compact.

The various features of the invention will be further disclosed in the accompanying description and drawing and set forth in the claims.

The drawing illustrates two preferred forms of fabric embodying the invention with the various threads or yarns shown widely separated and to a large extent conventionally.

In the drawing:

Fig. 1 is a perspective view of a section of fabric embodying the invention with pile wires shown partially broken away.

Fig. 2 is a view in end elevation of the construction shown in Fig. 1.

Fig. 3 is a view similar to Fig. 1 of another form of fabric embodying the invention and Fig. 4 is a view in end elevation of this second form.

In the construction shown in Figs. 1 and 2, the picks of filling are arranged in repeats of four as indicated at 1, 2, 3, and 4, while the warp ends are arranged in repeats of two groups with the first group consisting of the pile warp end 5 and the ground warp ends 6 and 7 and with the second group consisting of the pile warp end 8 and the ground warp ends 9 and 10.

In the weaving operation the pile warp ends as usual are maintained under lesser tension than the ground warp ends and in this invention one set of ground warp ends, in this case the ends 6 and 9, are maintained relatively tight by the tension applied to them while the other set, in this case the warp ends 7 and 10, are maintained relatively slack by the tension.

In the weaving of the fabric a pile wire which may be a plain wire, such as 11, or a knife wire, such as 12, is inserted simultaneously with the picks of filling 1 and 3.

Since it is practically impossible to show the final position of the various elements of the fabric and difficult even to illustrate the fabric during its formation other than diagrammatically, the invention will best be understood by following through the formation of the successive sheds. First, a double shed is formed with its upper plane consisting of the pile warp ends 5, its mid plane of the pile warp ends 8 and of the ground warp ends 6 and 7, and its lower plane of the ground warp ends 9 and 10. The pick of filling 1 is then inserted into the lower half of this shed and simultaneously the pile wire is inserted into the upper half and then the pick of filling and pile wire are beaten in as usual. Second, a single shed is formed having its upper plane consisting of the tight ground warp ends 6 and 9 and its lower plane consisting of the pile warp ends 5 and 8 and the slack ground warp ends 7 and 10. The pick of filling 2 is then inserted and beaten in in the usual way. Third, a double shed is formed with its

upper plane consisting of the pile warp ends 8, its mid plane of the pile warp ends 5 and of the ground warp ends 9 and 10 and its lower plane of the ground warp ends 6 and 7. The pick of filling 3 is then inserted into the lower half of this shed and simultaneously the pile wire is inserted into the upper half and then the pick of filling and pile wire are beaten in as usual. Fourth, a single shed is formed having its planes consisting of the same warp ends as the second or single shed. The pick of filling 4 is then inserted and beaten in in the usual way. It will be noted that the second and fourth picks of filling, or those running between the rows of loops formed over the pile wires, are laid in a single shed, one plane of which is formed of tight warp ends and the other plane of which is formed of slack warp ends. Hence the second and fourth picks of filling are more readily beaten in and crowded against the preceding pick than is the case with the first and third picks of filling which are inserted simultaneously with a pile wire in the respective halves of a double shed, since, it will be remembered, the pile wires remain in the fabric forward of the fell during a number of following picks and consequently so far as the beating up operation is concerned, form a part of the fabric. This crowding up against the preceding pick of the second and fourth picks of filling very materially assists in the forming of a close and compact pile face of the fabric.

In the fabric illustrated in Figs. 1 and 2, the ground warp ends weave on the three and one principle, that is, over or under three picks of filling and then under or over one pick. In the construction illustrated in Figs. 3 and 4, the ground warp ends weave on the one and one principle with the ends of each pair weaving opposite to each other and alternately over and under the picks of filling.

Again in this construction the picks of filling are arranged in repeats of four, 21, 22, 23, 24, and the warp ends as before are arranged in repeats of two groups, the first group consisting of the pile warp end 25, the ground warp end 26 maintained under a relatively tight tension, and the ground warp end 27 maintained under a relatively slack tension, while the second group consists of the pile warp end 28, the tight ground warp end 29, and the slack ground warp end 30.

In the operation of weaving this fabric, the sheds are formed as follows: First, a double shed is formed with its upper plane consisting of the pile warp ends 25, its mid plane of the pile warp ends 28 and of the slack ground warp ends 27 and 30 and its lower plane consisting of the tight ground warp ends 26 and 29. The pick of filling 21 is then inserted into the lower half of this shed and simultaneously the pile wire is inserted into the upper half and then the pick of filling and pile wire are beaten in as usual. Second, a single shed is formed having its upper plane consisting of the tight ground warp ends 26 and 29 and its lower plane consisting of the pile warp ends 25 and 28 and the slack ground warp ends 27 and 30. The pick of filling 22 is then inserted and beaten in in the usual way. Third, a double shed is formed with its upper plane consisting of the pile warp ends 28, its mid plane of the pile warp ends 25 and of the slack ground warp ends 27 and 30 and its lower plane of the tight ground warp ends 26 and 29. The pick of filling 23 is then inserted into the lower half of this shed and simultaneously the pile wire is inserted into the upper half and then

the pick of filling and pile wire are beaten in as usual. Fourth, a single shed is formed having its planes consisting of the same warp ends as the second or single shed. The pick of filling 24 is then inserted and beaten in in the usual way. Again it will be noted that the second and fourth picks of filling 22 and 24, or those running between the rows of loops formed over the pile wires, are laid in a single shed, one plane of which is formed of tight warp ends and the other plane of which is formed of slack warp ends. Hence, the second and fourth picks of filling are more readily beaten in and crowded against the preceding pick than is the case with the first and third picks of filling.

It will thus be seen that in both forms illustrated there is alternately formed a double shed and a single shed with each double shed having its upper plane consisting of a pile warp end of one group of each pair of groups forming the repeat of the warp ends, its mid plane of the pile warp end of the other group of each pair and also of two ground warp ends of each pair of groups, while its lower plane consists of the other two ground warp ends of each pair of groups and with each single shed having its upper plane consisting of all the tight ground warp ends and its lower plane consisting of all the pile warp ends and all the slack ground warp ends and that in each double shed a pile wire is inserted in the upper half and a pick of filling in the lower half simultaneously.

It will be understood that so long as the sequence of sheds is maintained, the repeat may be considered as beginning at any pick and that the same is true with respect to the warp ends, although conveniently the warp ends are divided into the groups stated because the best results are secured by each of these groups passing through a dent in the reed of the loom.

The pile warp ends need not be under a lesser tension than the slack ground warp ends, but both are under a markedly less tension than the tight warp ends.

The invention thus produces a fast warp pile fabric with a very full, compact, and rich face of pile in a most rapid and economical manner.

Having thus described the invention, what is claimed as new, and desired to be secured by Letters Patent, is:

1. The method of weaving a fast warp pile fabric which comprises arranging the warp ends in pairs of groups with each group consisting of a pile warp end and two ground warp ends, maintaining a relatively heavy tension on one ground warp end and a relatively light tension on the other ground warp end and the pile warp end of each group, forming alternately a double shed and a single shed with each double shed having its upper plane consisting of a pile warp end of one group of each pair, its mid plane of the pile warp end of the other group of each pair and of two ground warp ends of each pair and its lower plane of the other two ground warp ends of each pair, each single shed having its upper plane consisting of the tight ground warp ends and its lower plane of the pile and slack ground warp ends, inserting a pile wire in the upper shed and a pick of filling in the lower shed of each double shed and inserting a pick of filling in each single shed.

2. The method of weaving a fast warp pile fabric which comprises arranging the warp ends in pairs of groups with each group consisting of a pile warp end and two ground warp ends, maintaining a relatively heavy tension on one ground

warp end and a relatively light tension on the other ground warp end and the pile warp end of each group, forming alternately a double shed and a single shed with each double shed having its upper plane consisting of a pile warp end of one group of each pair, its mid plane of the pile warp end of the other group of each pair and of the two ground warp ends of one group of each pair and its lower plane of the two ground warp ends of the other group of each pair, each single shed having its upper plane consisting of the tight ground warp ends and its lower plane of the pile and slack ground warp ends, inserting a pile wire in the upper shed and a pick of filling in the lower shed of each double shed and inserting a pick of filling in each single shed.

3. The method of weaving a fast warp pile fabric which comprises arranging the warp ends in pairs of groups with each group consisting of a pile warp end and two ground warp ends, maintaining a relatively heavy tension on one ground warp end and a relatively light tension on the other ground warp end and the pile warp end of each group, forming alternately a double shed and a single shed with each double shed having its upper plane consisting of a pile warp end of one group of each pair, its mid plane of the pile warp end of the other group of each pair and of two ground warp ends of each pair and its lower plane of the other two ground warp ends of each pair with each double shed having the warp ends in each of its planes from a different group of each pair than that in the preceding double shed, each single shed having its upper plane consisting of the tight ground warp ends and its lower plane of the pile and slack ground warp ends, inserting a pile wire in the upper shed and a pick of filling in the lower shed of each double shed and inserting a pick of filling in each single shed.

4. The method of weaving a fast warp pile fabric which comprises arranging the warp ends in pairs of groups with each group consisting of a

pile warp end and two ground warp ends, maintaining a relatively heavy tension on one ground warp end and a relatively light tension on the other ground warp end and the pile warp end of each group, forming alternately a double shed and a single shed with each double shed having its upper plane consisting of a pile warp end of one group of each pair, its mid plane of the pile warp end of the other group of each pair and of the slack ground warp ends and its lower plane of the tight ground warp ends, each single shed having its upper plane consisting of the tight ground warp ends and its lower plane of the pile and slack ground warp ends, inserting a pile wire in the upper shed and a pick of filling in the lower shed of each double shed and inserting a pick of filling in each single shed.

5. The method of weaving a fast warp pile fabric which comprises arranging the warp ends in pairs of groups with each group consisting of a pile warp end and two ground warp ends, maintaining a relatively heavy tension on one ground warp end and a relatively light tension on the other ground warp end and the pile warp end of each group, forming alternately a double shed and a single shed with each double shed having its upper plane consisting of a pile warp end of one group of each pair, its mid plane of the pile warp end of the other group of each pair and the slack ground warp ends and its lower plane of the tight ground warp ends with each double shed having the pile warp ends in its upper and mid planes from a different group of each pair than that in the preceding double shed, each single shed having its upper plane consisting of the tight ground warp ends and its lower plane of the pile and slack ground warp ends, inserting a pile wire in the upper shed and a pick of filling in the lower shed of each double shed and inserting a pick of filling in each single shed.

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