Aug. 16, 1949. H. W. DAY 2,479,478

METHOD OF PRODUCING PILE FABRIC WITH CUT PILE OF AN UNIQUE CHARACTER

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Fig. 1.

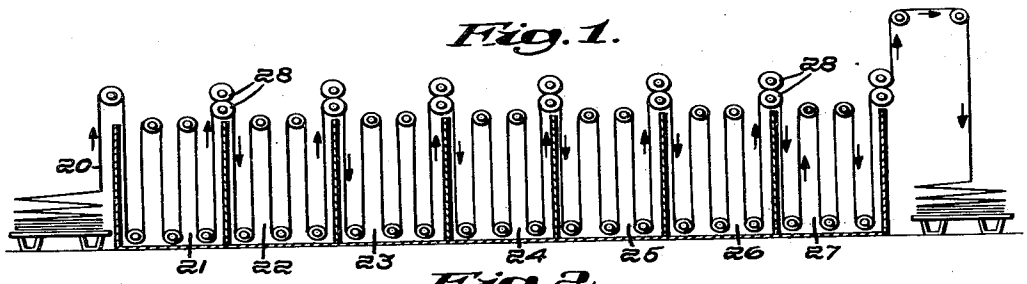


Fig. 2.

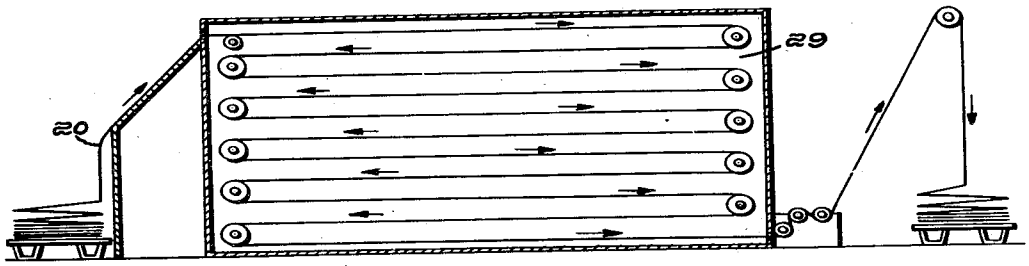
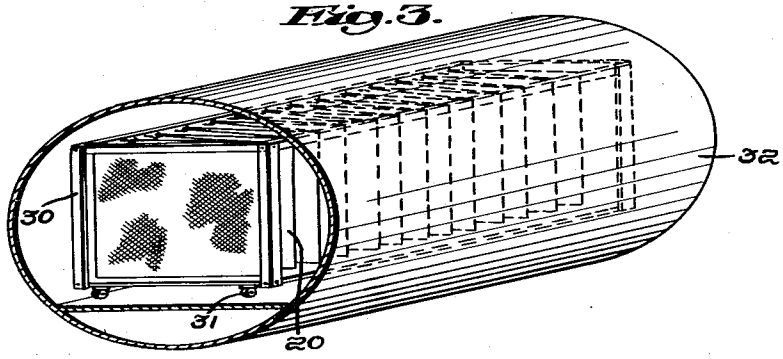


Fig. 3.



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Fig. 4.

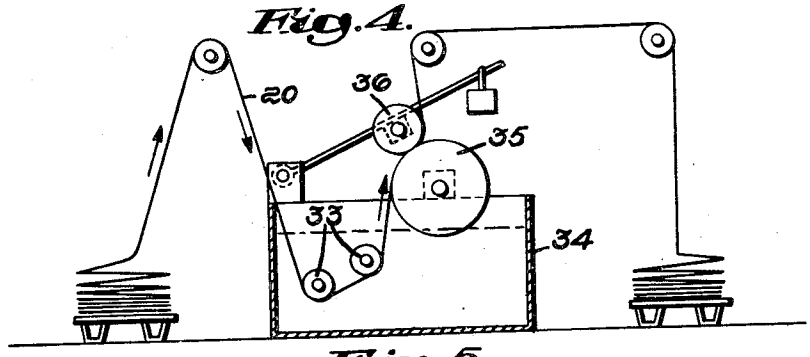


Fig. 5.

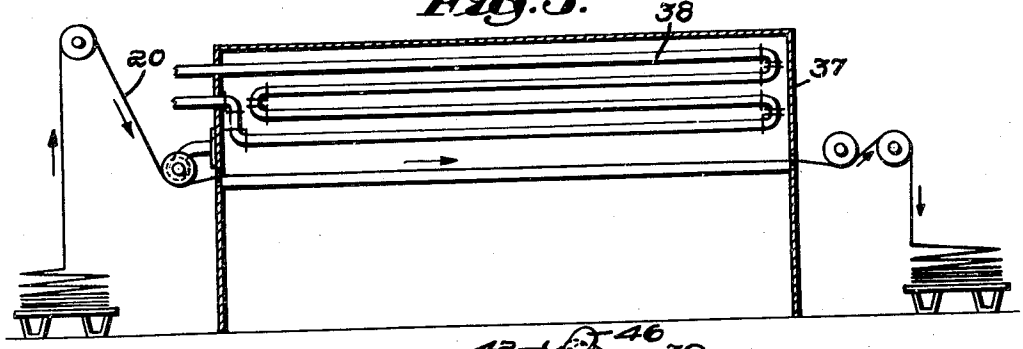
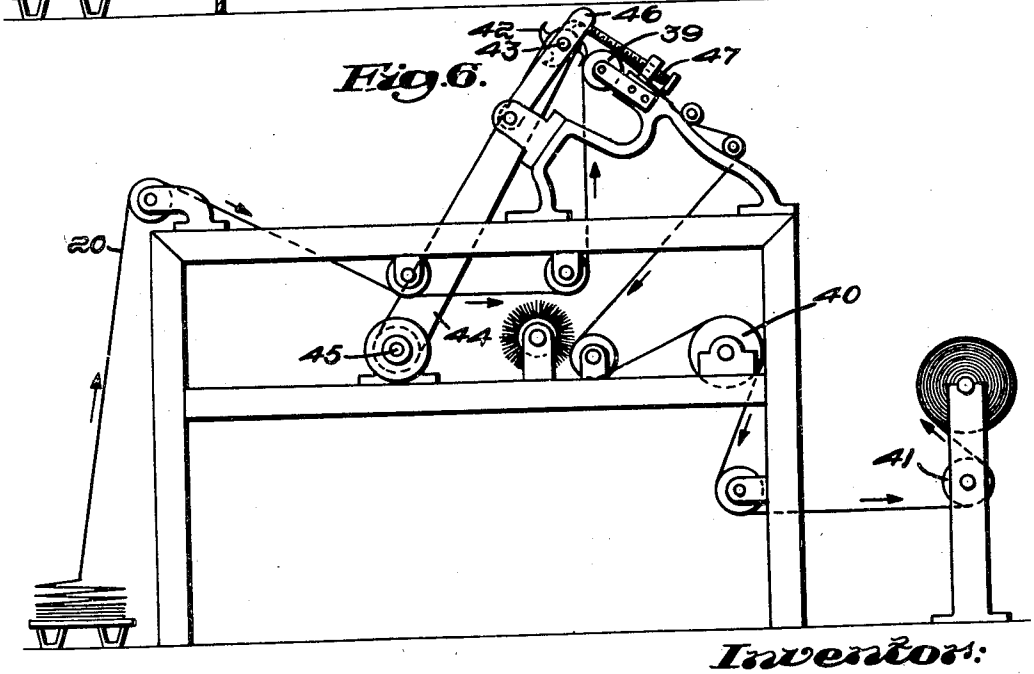


Fig. 6.



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METHOD OF PRODUCING PILE FABRIC WITH CUT PILE OF AN UNIQUE CHARACTER

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Fig. 7.

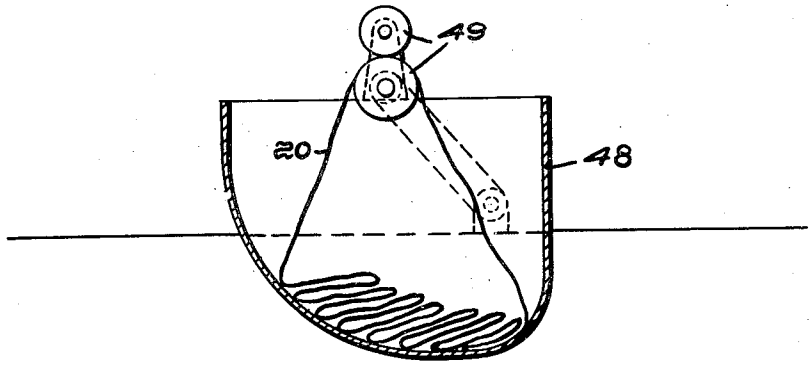


Fig. 8.

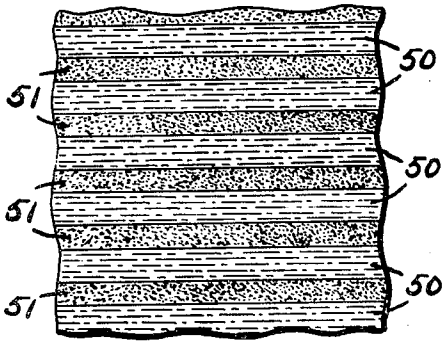


Fig. 9.

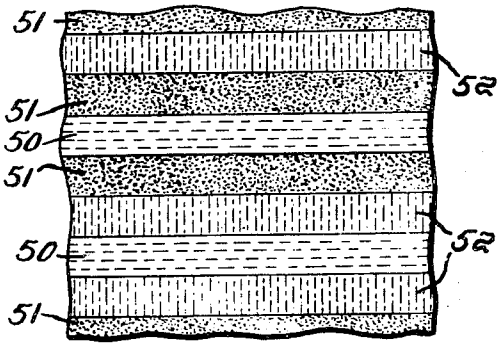
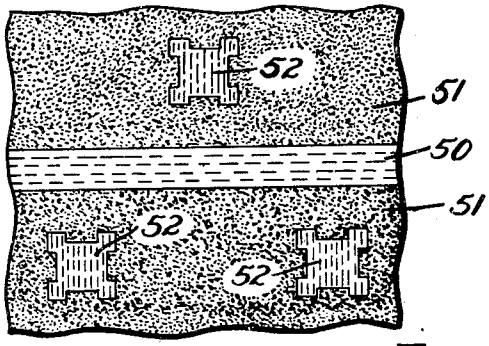


Fig. 10.



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Patented Aug. 16, 1949 2,479,478

UNITED STATES PATENT OFFICE

2,479,478

METHOD OF PRODUCING PILE FABRIC WITH CUT PILE OF AN UNIQUE CHARACTER

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Application March 30, 1948, Serial No. 17,835

9 Claims. (Cl. 26—2)

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The present invention relates to the production of pile fabric and has for its object to produce such a fabric in which there shall be areas of cut pile formed from the same yarn with the pile of one set of areas possessing a distinctive and unique character, particularly in its appearance and feel or handle contrasting with that of the pile of the other areas.

The object of the invention is further to produce a pile fabric employing a single type of pile yarn in which the cut pile shall have the appearance of being woven with two different types of yarns.

The object of the invention is further to produce a pile fabric in which at least a portion of the pile is cut pile and in which a portion of the said cut pile has the characteristics, particularly in appearance and feel or handle, of a curled yarn but without the use of such a curled yarn.

The object of the invention is further to produce a pile fabric having the foregoing characteristics in which the pile yarn is composed principally of mohair.

These and other objects and features of the invention will appear more fully from the accompanying description and drawings and will be particularly pointed out in the claims.

While the invention is not limited to a particular weave of pile fabric it is particularly useful in connection with that type in which the pile is formed from the warp. In this type it is common to form the fabric during weaving with the pile either entirely in loop form or in the form of part loop pile and part cut pile. It is also common after the weaving of such fabric with the pile in loop form to cut the loops to form cut pile. Since, however, the methods and apparatus employed for weaving pile fabric to produce a fabric with the pile either of loop form, of cut form, or any desired mixture of loop and cut pile, are well known and familiar to those skilled in the art, it is unnecessary to go into any details with respect thereto in-so-far as the present invention is concerned. The only requirement of the present invention is that the cut pile having the unique character secured by the present invention, and enabling it to produce a distinctive contrast with ordinary cut pile formed from the same yarn, must first be woven in the form of loop pile.

The invention involves a treatment of the loop pile which acts to set the twist in the yarn forming the loop so that when the loop is thereafter cut, thus forming cut pile, this cut pile has an unique, readily recognized, characteristics particularly in appearance and feel or handle, and in a general way similar to the appearance produced by a curled yarn. This unique characteristic is of a permanent nature for all practical purposes and enables striking pattern effects to be produced in the pile fabric with the employment of only one type of pile yarn.

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In carrying out the method of treatment it is desirable to use various machines all of which may be of a standard type and these are, therefore, illustrated diagrammatically in the drawings, in which,

Fig. 1 represents an apparatus for washing the woven pile fabric;

Fig. 2 an apparatus for drying the pile fabric;

Fig. 3 is a perspective view of a chamber and a truck on which the pile fabric is mounted and by means of which the fabric is subjected to superheated steam;

Fig. 4 is an apparatus for subjecting the pile fabric to paste so as to soak the loops with the paste;

Fig. 5 is an apparatus for drying the pasted fabric in stretched form;

Fig. 6 is a simple form of apparatus for cutting the pasted and dried loops of the fabric;

Fig. 7 is an apparatus for washing out the paste; and,

Figs. 8, 9, and 10 illustrate in plan view types of contrasting effects which may be produced by the employment of the present invention.

After the pile fabric has been woven by any of the usual methods, with the pile partially in cut and partially in loop form, it is first scoured in a soap solution to remove waste dirt and animal oils and for that purpose an apparatus such as illustrated in Fig. 1 may be employed. The pile fabric **20** is passed successively through tanks **21**, **22**, and **23**, containing a suitable soap solution, then through tanks **24** and **25** containing warm water, and finally through tanks **26** and **27** containing cold water, with the fabric each time it passes from one tank to another being subjected to the action of squeeze or wringer rolls **28**.

The fabric is then thoroughly dried, for example, by an apparatus such as shown in Fig. 2, where the fabric is led back and forth through a chamber **29** to which hot air is supplied. This is an ordinary type of drier and the temperature of the air should be on the order of 250° F. and the fabric subjected to the action of the chamber for a period on the order of ten minutes. During the passage of the fabric through this drying chamber it is held by ordinary tentering apparatus so as not to shrink in width during drying.

The fabric is now subjected to superheated steam so as to set the twist in the yarn of the loop pile. For this purpose an apparatus, such as illustrated in Fig. 3, may be employed. The fabric 20 is shown as looped back and forth on a rack 30 mounted on rollers 31 to form a truck. This truck, with the fabric thereon, is then slid into the chamber 32 both ends of which are then closed. Superheated steam is then admitted to the chamber and comes into contact with all parts of the fabric, the open folds of the fabric on the rack insuring this. The temperature or pressure of the superheated steam and the period of treatment must be such as to set the twist in the yarn of the loop pile and this will depend somewhat upon the type of the fibre or mixture of fibre of which the yarn is composed. But no difficulty will be found in determining these factors particularly since there may be in each case a considerable spread between the limits without injury to the yarn. But in any case the pressure of the superheated steam must be sufficiently high and must be maintained for a sufficient period to effect the setting of the twist. The invention has produced highly satisfactory results with the standard type of pile fabric such as employed for upholstery in which the pile yarn was composed principally of mohair. In such case a pressure of the superheated steam on the order of seven pounds and a treatment therewith for a period on the order of ninety minutes has been found best to effect the setting of the twist.

The loops must now be cut to form the cut pile having the unique character effected by this invention and this cutting must be effected in such a manner as not to disturb the set of the twist in the yarn and in such a manner as not to pull out the fibres of the yarn and roughen up the yarn. Preferably also where the particular fabric contains areas of cut pile formed during the weaving operation and with which a desired contrast is to be secured, it is desirable that the cutting operation shall leave the cut pile at the same height as the previously cut pile. While, therefore, in its broader aspects the invention is not restricted to the method of cutting an important and subsidiary feature involves the pasting and drying of the loops and the cutting of the loops centrally of the bights and this method is found best to insure the maintenance of the set of the twist, to prevent the yarn being roughened up, to prevent fibres from being withdrawn from the pile, and to insure the cut pile to be of the maximum height.

In order to secure the best results in this method of cutting the loops the loops are soaked with paste and dried, the loops then cut and the paste washed out. Simple forms of apparatus for carrying out these preferred steps in the method are illustrated in Figs. 4, 5, 6, and 7. The paste may be of any suitable character that may be readily dried leaving the loops stiff and then readily removed by a washing operation. Fig. 4 illustrates an apparatus for applying the paste in which the fabric 20 is led beneath rollers 33 through the paste contained in a tank 34 and thence out between suitable squeeze rolls 35 and 36. The loops are thus thoroughly soaked with paste since the entire fabric is soaked, which is the simpest method of soaking the loops. The fabric is then thoroughly dried in an ordinary tenter drier so as to be held in stretched condition during the drying. Such an apparatus is illustrated in Fig. 5 consisting simply of a chamber 37 heated by steam pipes 38 through which

the fabric is passed, held stretched by the usual tenter.

The fabric with the loops thus stiffened with the paste and dried is ready to be cut and an apparatus of the type illustrated in Fig. 6 is preferably employed. The apparatus thus illustrated is a simplified form of that disclosed in the patent to Knowlton No. 701,578 June 3, 1902. In such a machine the fabric 20 is guided over a roller 39 with its back to the roller and with the fabric held under tension and is drawn through the machine by power applied to one or more of the rollers, such as 40 and 41. The loops are cut by a gang of rotating cutters, such as the four-bladed cutters 42, mounted on the shaft 43 and driven by the belt 44 from the power driven shaft 45. The support 46 for the shaft 43 is accurately adjustable toward and from the roll 39 by the set screw 47 so that the cutters may be set to enter the bights of the loops and split the loops centrally of the bights without injury to the ground or base of the fabric.

After the loops have thus been cut the paste is removed from the fabric, and consequently from the loops ,by washing, and for that purpose an apparatus may be employed such as shown in Fig. 7 where one or more pieces of the fabric 20 secured in endless form are repeatedly passed through a bath of water, or other paste-removing liquid, in a tank 48 with the fabric at each passage passing between squeeze rolls 49.

The fabric may be now dyed, dried, sheared, or otherwise finished by any of the usual methods.

The treatment of the loops as thus set forth results in the formation of cut pile which is of an unique character and which distinctly contrasts with any pile of the same yarn cut during the weaving operation and, with the loops cut centrally of the bights as preferred, the pile thus formed remains of the same height as any cut pile formed during the weaving operation.

It is thus possible to produce in a pile fabric by means of this invention a wide variety of pattern effects while maintaining the same yarn throughout in the formation of the pile. Thus the finished fabric may present distinctive contrasting areas of cut pile, such for example as illustrated in Fig. 8, in which the areas 50 have been cut during the weaving operation, as for example by the use of knife pile wires operating weftwise or transversely of the loom, and in which the areas 51 are produced by the method of this invention. So again distinctive contrasting areas of pile cut during the weaving, of loop pile and of pile having the unique character produced by this invention may be formed in a fabric, as illustrated in Fig. 9, where the areas 50 have been cut during the weaving, the areas 52 are loop pile and 51 cut pile formed in accordance with this invention.

The shape and location of the distinctive contrasting areas of the pile may be obtained by any suitable means either during the weaving or after the weaving of the fabric. A simple method for securing a variety of three distinctive contrasting pattern areas is to depress predetermined areas of the loops after the loops have been pasted and dried, as previously described, thus leaving predetermined defined areas of upstanding loops which alone are rigid and cut by the knives in the cutting operation. Such a typical pattern effect is illustrated in Fig. 10 where it is assumed that the area 50 has been cut during the weaving operation, that after the loops have been pasted

and dried the pattern areas 52 have been depressed leaving the remaining portion 51 with the loops upstanding so that when the fabric passes through the cutting operation the loops in the area 51 are cut and when the fabric is finished the result is that the area 51 is of cut pile having the unique character of this invention, the area 50 is of cut pile cut during the weaving, while the areas 52 are of loop pile.

The illustrations are sufficient to indicate a wide variety of effects which may be produced but all are based upon the principle that the twist in the yarn of certain of the loops has been permanently set by the superheated steam treatment with the result that when the loops are thereafter cut the cut pile thus formed has an unique distinctive character different from that which it otherwise would have.

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

1. The method of producing pile fabric with areas of distinctive contrasting pile which consists in weaving and cutting pile to form a pile fabric having cut pile and loop pile areas formed from the same yarn, in subjecting the said fabric to steam at a temperature and for a period sufficient to set the twist in the yarn of the loop pile, and thereafter cutting at least a portion of the loops to cause the cut pile thus formed to possess a distinctive character contrasting with that of the previously cut pile.

2. The method of producing pile fabric in which the pile is composed principally of mohair with areas of distinctive contrasting pile which consists in weaving and cutting pile to form a pile fabric having cut pile and loop pile areas formed from the same yarn, in subjecting the said fabric to superheated steam at a pressure on the order of 7 pounds for a period on the order of 90 minutes to set the twist in the yarn of the loop pile, and thereafter cutting at least a portion of the loops to cause the cut pile thus formed to possess a distinctive character contrasting with that of the previously cut pile.

3. The method of producing pile fabric with areas of distinctive contrasting pile which consists in weaving and cutting pile to form a pile fabric having cut pile and loop pile areas formed from the same yarn, in subjecting the said fabric to steam at a temperature and for a period sufficient to set the twist in the yarn of the loop pile, and thereafter splitting centrally of the bights at least a portion of the loops to cause the cut pile thus formed to be of the same height as and to possess a distinctive character contrasting with that of the pile cut during weaving.

4. The method of producing pile fabric in which the pile is composed principally of mohair with areas of distinctive contrasting pile which consists in weaving and cutting pile to form a pale fabric having cut pile and loop pile areas formed from the same yarn, in subjecting the said fabric to superheated steam at a pressure on the order of 7 pounds for a period on the order of 90 minutes to set the twist in the yarn of the loop pile and thereafter splitting centrally of the bights at least a portion of the loops to cause the cut pile thus formed to be of the same height as and to possess a distinctive character contrasting with that of the pile cut during weaving.

5. The method of producing distinctive contrasting pattern areas of cut pile in a pile fabric, which consists in subjecting a pile fabric woven partially of cut pile and partially of loop pile formed from the same yarn to steam at a temperature and for a period sufficient to set the twist in the yarn of the loop pile and thereafter cutting the pile loops of desired pattern areas to cause the cut pile thus formed in the said areas to process a distinctive character contrasting with that of the cut pile formed during weaving

6. A method of producing distinctive contrasting pattern areas of cut pile in a pile fabric, which consists in subjecting a pile fabric woven partially of cut pile and partially of loop pile formed from the same yarn and in which the pile yarn is composed principally of mohair to steam at a temperature and for a period sufficient to set the twist in the yarn of the loop pile and thereafter splitting centrally of the bights the pile loops of desired pattern areas to cause the cut pile thus formed in said areas to possess a distinctive character contrasting with that of the cut pile in the areas formed during weaving.

7. A method of producing distinctive contrasting pattern areas of cut pile in a pile fabric, which consists in subjecting a pile fabric woven partially of cut pile and partially of loop pile formed from the same yarn and in which the pile yarn is composed principally of mohair to superheated steam at a pressure on the order of 7 pounds for a period on the order of 90 minutes to set the twist in the pile yarn and thereafter splitting centrally of the bights the pile loops of desired pattern areas to cause the cut pile thus formed in said areas to possess a distinctive character contrasting with that of the cut pile in the areas formed during weaving.

8. The method of producing a distinctive character of cut pile in a pile fabric woven in part with loop pile and in part with cut pile formed from the same yarn which consists in subjecting the fabric to steam at a temperature and for a period sufficient to set the twist in the yarn of the loop pile, soaking the loops with paste, drying the fabric while held against shrinkage, splitting at least a portion of the loops centrally of the bights, and washing out the paste to cause the cut pile thus formed to possess an unique character contrasting with that of the cut pile formed during weaving.

9. The method of producing a distinctive character of cut pile in a pile fabric woven in part with loop pile and in part with cut pile formed from the same yarn which consists in subjecting the fabric to steam at a temperature and for a period sufficient to set the twist in the yarn of the loop pile, soaking the loops with paste, drying the fabric while held against shrinkage, depressing predetermined areas of the pasted loops, splitting the remaining upstanding pasted loops centrally of the bights, and washing out the paste to cause the cut pile thus formed to possess an unique character contrasting with that of the cut pile formed during weaving.

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The following references are of record in the file of this patent:

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Certificate of Correction

Patent No. 2,479,478 August 16, 1949

HARLAND W. DAY

It is hereby certified that errors appear in the printed specification of the above numbered patent requiring correction as follows:

Column 5, line 62, for the word "pale" read *pile*; column 6, line 7, for "process" read *possess*;

and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 3rd day of January, A. D. 1950.

[SEAL]

THOMAS F. MURPHY,
Assistant Commissioner of Patents.