July 26, 1960 M. W. WORTH 2,946,355

AXMINSTER PILE FABRIC

Filed Jan. 27, 1959 5 Sheets-Sheet 1

FIG. 1.

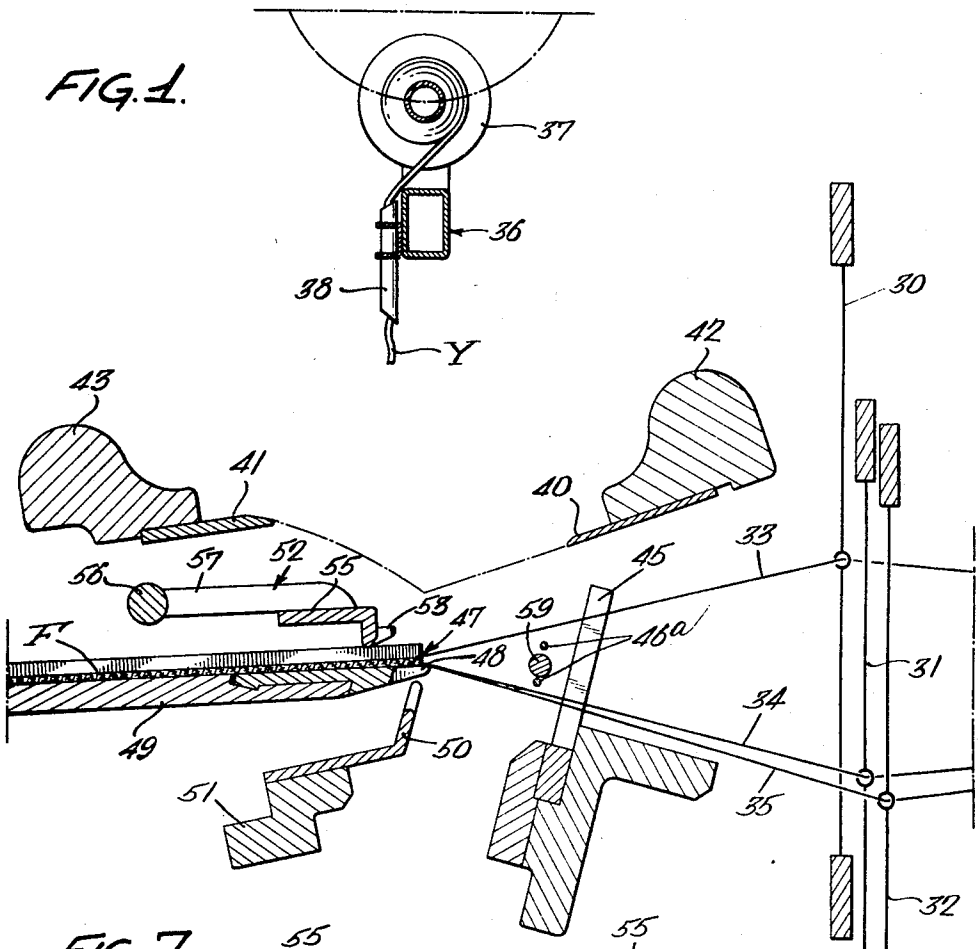


FIG. 7.

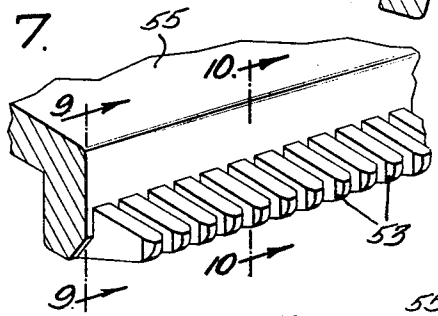


FIG. 9.

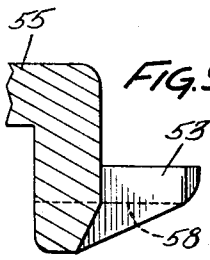


FIG. 8.

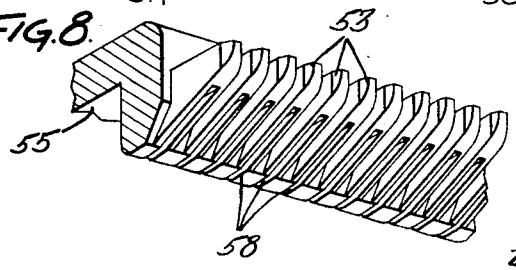
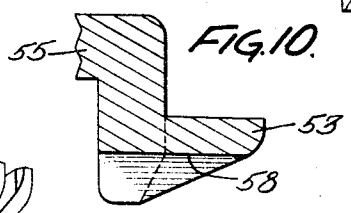


FIG. 10.



Inventor:
Maurice W. Worth
by Hyde & Ballard Atty.

July 26, 1960 M. W. WORTH 2,946,355

AXMINSTER PILE FABRIC

Filed Jan. 27, 1959 5 Sheets-Sheet 2

FIG. 20.

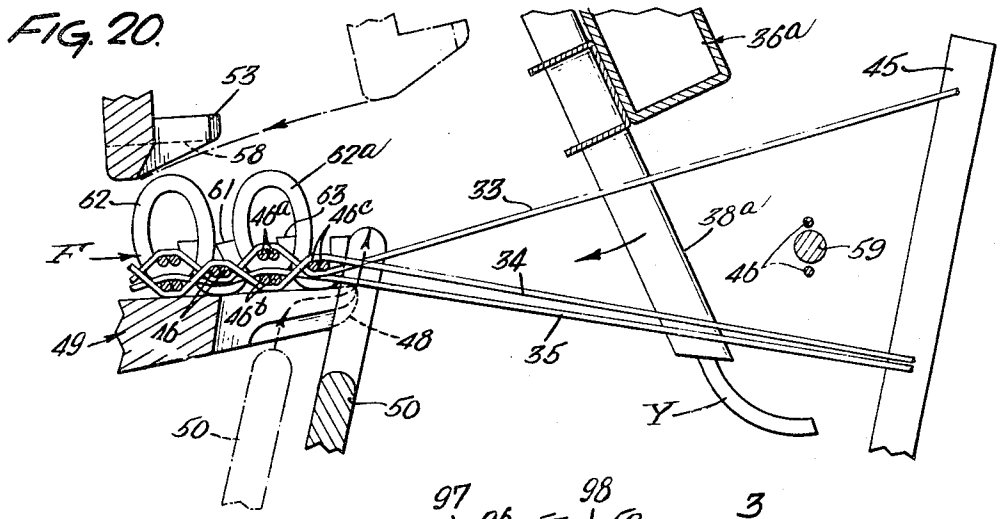


FIG. 2.

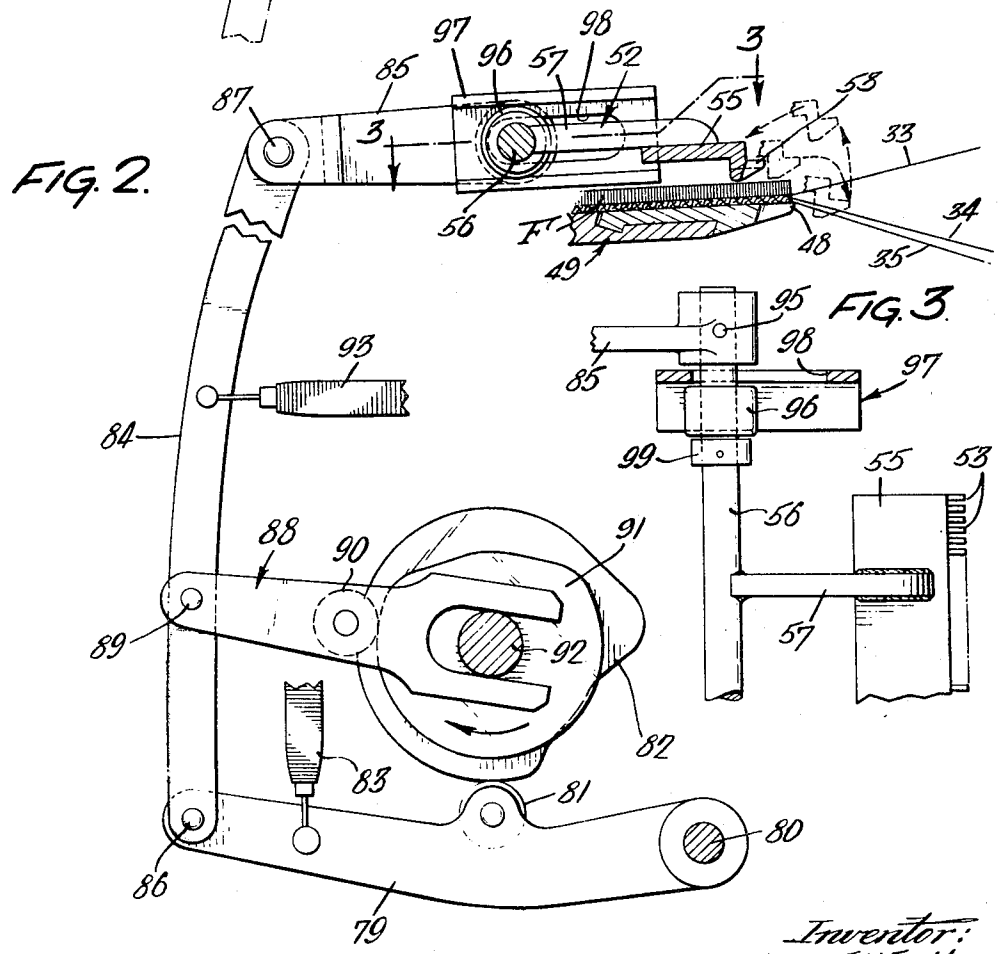


FIG. 3.

Inventor:
Maurice W. Worth
by Hyde & Ballard Atty.

July 26, 1960 M. W. WORTH 2,946,355

AXMINSTER PILE FABRIC

Filed Jan. 27, 1959 5 Sheets-Sheet 3

FIG. 4.

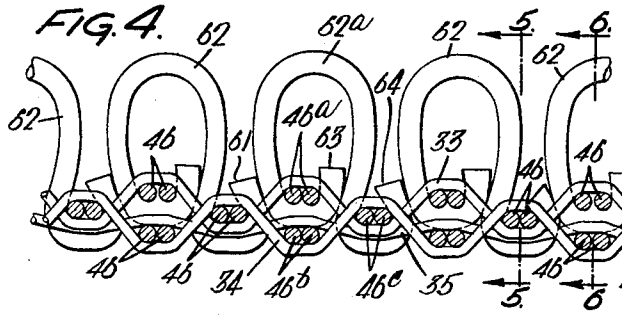


FIG. 5.

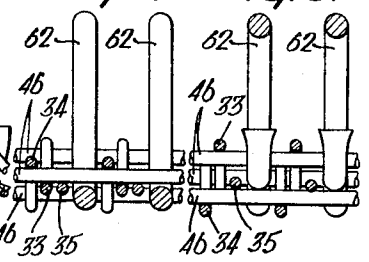


FIG. 6.

FIG. 11.

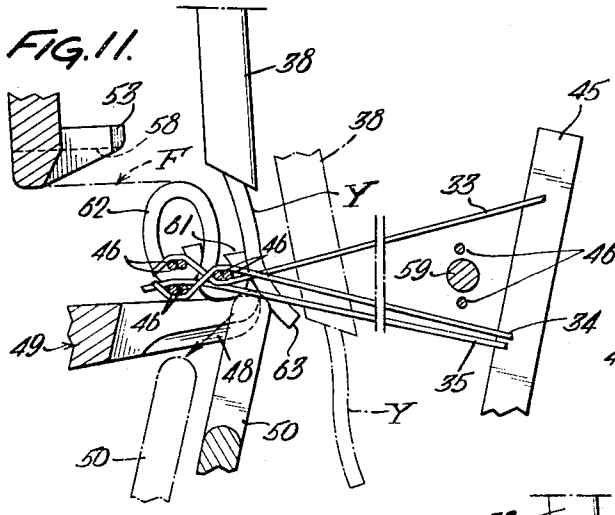


FIG. 12.

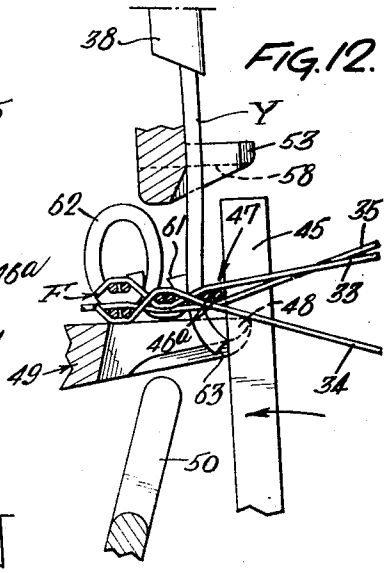


FIG. 13.

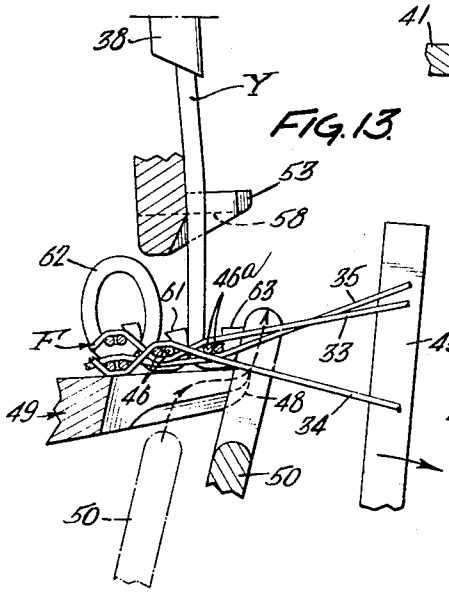
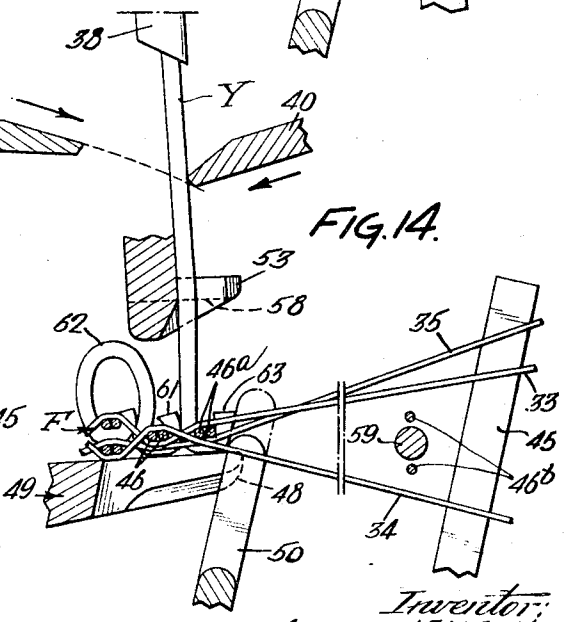


FIG. 14.



Inventor:
Maurice W. Worth
by Hyde C. Ballard Atty.

July 26, 1960 M. W. WORTH 2,946,355

AXMINSTER PILE FABRIC

Filed Jan. 27, 1959 5 Sheets-Sheet 4

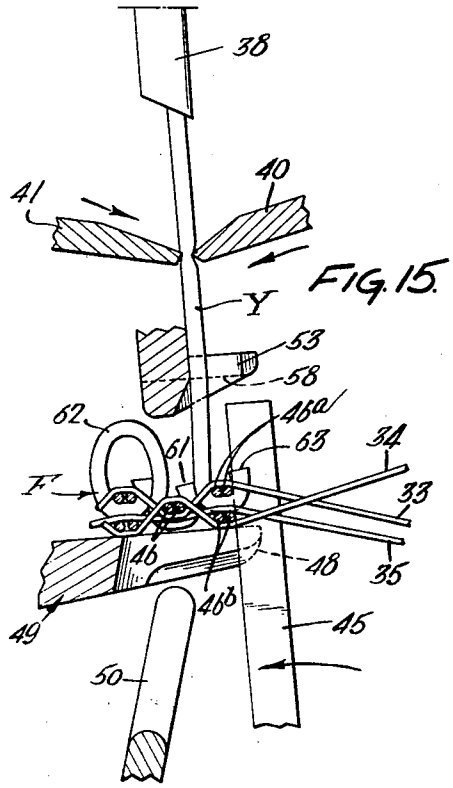


FIG. 15.

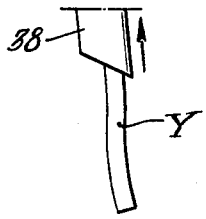


FIG. 16.

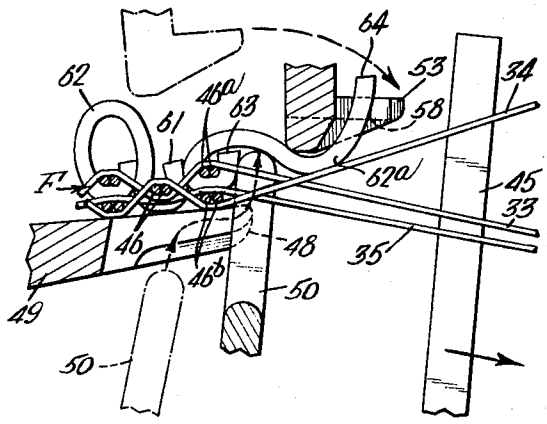


FIG. 17.

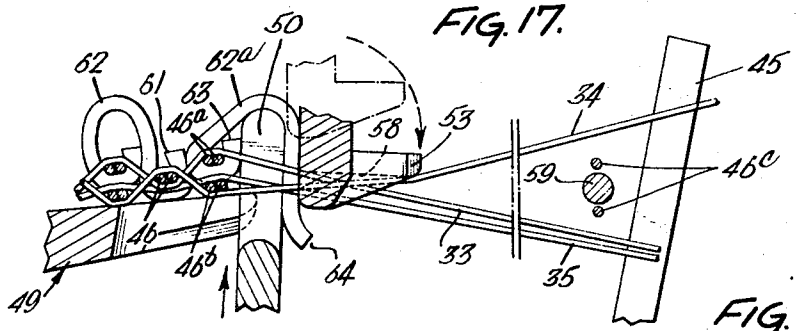


FIG. 18.

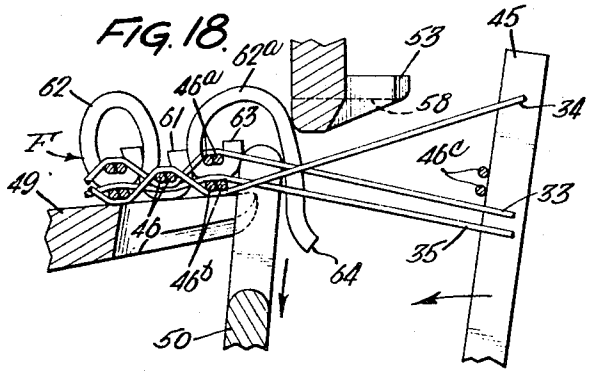
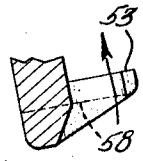
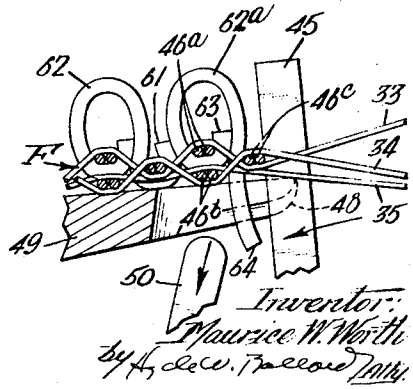


FIG. 19.





Inventor:
Maurice W. Worth
by Hyde, Baldwin & Baldwin
Attys.

July 26, 1960 M. W. WORTH 2,946,355

AXMINSTER PILE FABRIC

Filed Jan. 27, 1959 5 Sheets-Sheet 5

FIG. 21

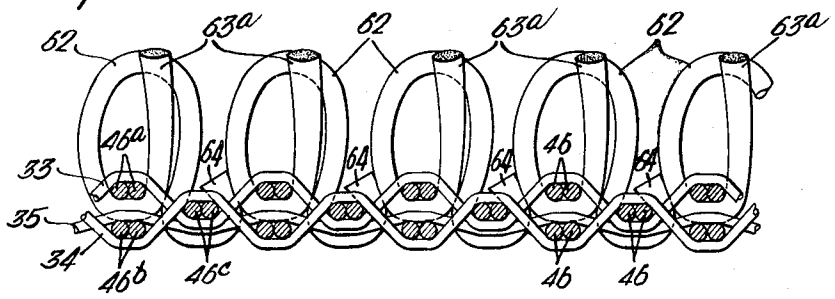


FIG. 22.

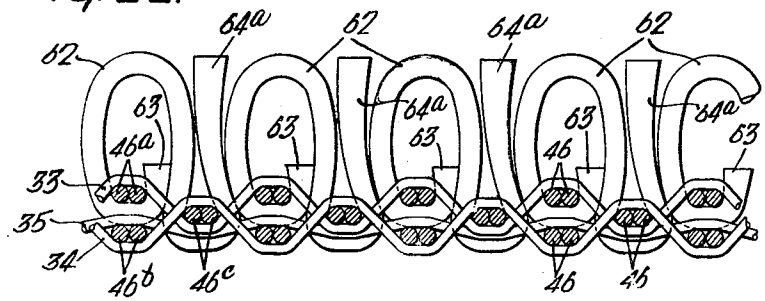
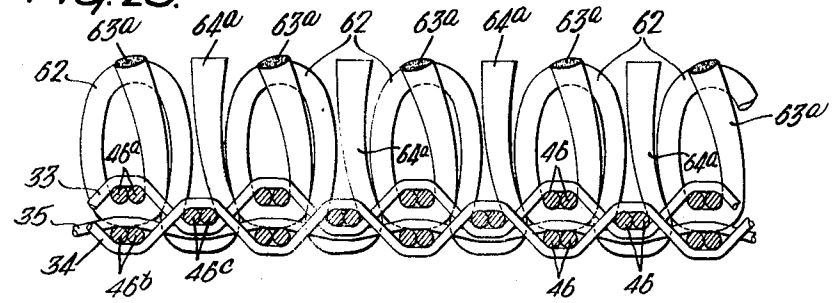


FIG. 23.



Inventor:
Maurice W. Worth
by Hyde W. Ballard
Atty.

United States Patent Office 2,946,355 Patented July 26, 1960

2,946,355

AXMINSTER PILE FABRIC

Maurice W. Worth, Glasgow, Va., assignor to James Lees and Sons Company, Bridgeport, Pa., a corporation of Pennsylvania

Filed Jan. 27, 1959, Ser. No. 789,435

7 Claims. (Cl. 139—401)

This invention relates to the provision of a novel Axminster-type pile fabric and particularly to such a fabric having both cut and uncut pile projections.

This application is a continuation-in-part of my co-pending application Serial No. 782,972, filed December 24, 1958.

The conventional Axminster loom as such is incapable of producing an uncut or loop pile face. Previous attempts to modify an Axminster loom to produce an uncut pile have met with varying degrees of success. One example of such a modification is Eisler and Moxley Patent No. 2,715,918. The present invention, however, is a radically different approach from all previously known devices in that it does not employ a pile forming wire of any sort nor does it use individual hooks to hold up the pile.

A still further object of the invention is to provide a novel uncut Axminster pile fabric.

And a still further object of the invention is to provide a loop pile Axminster fabric in which one end of each loop extremity is tied in between superimposed top and bottom shots and the other end is tied in under the next succeeding single shot.

Further objects will be apparent from the specification and drawings in which:

Fig. 1 is a schematic sectional view of an Axminster loom constructed in accordance with the present invention,

Fig. 2 is a sectional detail showing the actuating mechanism for the improved upper comb,

Fig. 3 is a fragmentary detail as seen at 3—3 of Fig. 2,

Fig. 4 is a weave diagram of a warpwise section of a fabric produced on my improved loom,

Fig. 5 is a weftwise section of the fabric as seen at 5—5 of Fig. 4,

Fig. 6 is a weftwise section of the fabric as seen at 6—6 of Fig. 4,

Fig. 7 is a perspective showing the front and upper surfaces of the upper comb,

Fig. 8 is a perspective showing the front and bottom surfaces of the upper comb of Fig. 7,

Fig. 9 is a fragmentary sectional detail as seen at 9—9 of Fig. 7,

Fig. 10 is a fragmentary sectional detail as seen at 10—10 of Fig. 7,

Figs. 11–20 show diagrammatically the weaving of the fabric in accordance with the present invention together with the structural relationship of the various parts of the modified Axminster loom,

Fig. 21 is a warpwise section of the fabric shown in Fig. 4 but with the leading pile ends extending to a greater height,

Fig. 22 is a warpwise section of the fabric shown in Fig. 4 but with the trailing pile ends extending to a greater height, and

Fig. 23 is a view similar to Figs. 21 and 22 but with both the leading and trailing ends extending to greater heights to produce a cut and uncut pile effect.

The invention comprises essentially the provision of an upper comb which is positioned immediately above the woven fabric as it passes over the breast beam. The comb advances to fold over severed pile ends down into the fell and around the lower comb which raises the cut pile projections to form loops. The lower comb wipes up the end of each projection to securely tie in under the next filling weft or shot. The invention also includes the novel steps of producing an Axminster loop pile fabric having the pile extremities wiped up into the ground fabric which in turn produces a new and different product with a heavy, reinforced backing.

Referring now more particularly to the drawings, the pertinent parts of an Axminster loom are illustrated in Fig. 1 and comprise harness frames **30, 31,** and **32** which control chain warps **33, 34** and stuffer warp **35** respectively. The pile yarns Y are supplied from a tube frame **36** and feed from spool **37** through tuft tubes **38** as in the customary Axminster loom. Successive tube frames are removed from the chain and dipped into the shed to present the several yarn ends Y to the weaving apparatus. The operation of the Axminster chains and tube frames is well known and need not be described herein. Likewise, following conventional Axminster practice, a pair of knives or blades **40** and **41** are positioned to sever a controlled length of yarn Y from the tube frames. Blade **40** may be considered a gauging blade and is secured to the knife stock **42**. Blade **41** is secured to knife stock **43** and cooperates with the blade **40** to sever all of the yarns supplied to the fabric from tube frame **36**. My modified loom is also provided with the conventional reed **45** which beats up the various filling shots **46** into the fell **47** of the fabric F which passes over the tip **48** of the breast plate **49**. The lower comb **50** is mounted on a movable support **51** and serves to wipe up the cut ends or extremities of the pile as will be described more fully hereinafter. An upper comb assembly **52** is provided with a series of teeth or tines **53** which cooperate with the lower comb **50** to weave the fabric shown in Figure 4. Upper comb **52** comprises a series of bifurcated, generally triangular teeth **53** which are secured to or are formed integrally with comb body **55** (Figs. 7 and 8) in turn mounted on a shaft **56** by brackets **57, 57**. The lower edges of the teeth **53** are beveled or tapered, as shown clearly in Figs. 7 and 8, and each of the teeth is bifurcated at **58** to accommodate the warps **33, 34,** and **35**.

In the weaving cycle, the knives are opened, as shown in Fig. 1, and a needle **59** is inserted into the shed formed by chain warps **33** and **34** and stuffer warp **35** to place a shot of filling **46***a* in front of the reed **45**. The other elements are generally retracted as seen in this position. Figure 11 illustrates the final step in the tying in of the trailing end **61** of the previously formed loop **62**. This end **61** is wiped up and around the filling shot **46** by means of the comb **50**. The leading leg or end of the succeeding loop is then inserted by means of tuft tube **38** to the position shown in Fig. 11. The broken lines show the maximum penetration of the tuft tube **38** and the yarn ends Y. In the next step the reed **45** beats up the filling shot **46***a* against the lower portion of each yarn Y shown in Fig. 12. Meanwhile, however, the lower comb **50** has withdrawn to a position below the tip **48** of the breast plate. The lower comb **50** elevates, as shown in Figs. 13 and 14, to wipe up the leading end **63** of yarn Y and tie it in around top shot **46***a*. Concurrently, the upper comb **53** is advanced to engage all of the yarns Y which are now drawn from the spool **37** when the tube frame **38** elevates. At this time the bottom shot **46***b* is inserted by needle **59** as shown in Fig. 14. With the comb **50** still in clamping position, the knives **40** and **41** converge to sever all of the yarn ends Y, as shown in Fig.

15. After the ends are cut, the upper comb 53 is moved rearwardly to wipe the ends Y downwardly and around the comb 50 and shot 46*a*. The arrows in Figs. 16 and 17 indicate the path of movement of the upper comb 53 for this purpose. With the comb 53 in its holding position, comb 50 elevates, as shown in Fig. 17, to form the loops 62*a* which are of constant and equal height, by brushing or wiping up the bite of the pile yarns against the back surfaces of upper comb body 55. During this operation the comb 50 securely clamps the leading end 63 against the preceding shot 46*a*. Meanwhile, a third filling weft 46*c* has been inserted by needle 59 in front of reed 45 with the chain warps 33 and 34 reversed. The stuffer warp 35, however, remains below filling weft 46*c* as shown in Figs. 17 and 18. The comb 50 then withdraws and the shot 46*c* is beaten up by reed 45, as shown in Fig. 19. Comb 50 then elevates to wipe up the trailing end 64 of loops 62*a* around shot 46*c* (Fig. 20), thus completing the formation of this row of loops. It will be seen that the leading end 63 of each loop is tied in under a top shot 46*a* and over a bottom shot 46*b* both of which are inserted without a reversal of the harness frames 30 and 31. Harness frame 32 for the stuffer, however, is reversed, so that the stuffer runs between the shots 46*a* and 46*b*. Before the insertion of the third shot 46*c*, however, the chain harness frames 30 and 31 reverse so that the chain warps are on opposite sides of the third shot. This shedding of the chain warps is shown clearly in Fig. 20. After the trailing end 64 of loops 62*a* have been wiped up, the next yarn end from succeeding tuft tubes 38*a* and tube frame 36*a* is wiped down into and through the warp sheds and in advance of the first shot 46 which has been inserted in front of reed 45. The cycle then repeats to provide a three-shot loop pile Axminster fabric.

A slight variation in the fabric is illustrated in Figs. 21–23 wherein the lengths of the leading and trailing ends may be individually or collectively increased to provide a different surface pile effect, namely, a cut and uncut. Where the leading ends 63*a*, 63*a* (Fig. 21) are extended, they may be brought up into the face of the fabric to substantially the same height as loops 62. Conversely, the trailing ends 64*a*, 64*a* may be extended to create a somewhat similar effect as shown in Fig. 22. A very desirable cut and uncut appearance is produced when both the leading ends 63*a*, 63*a* and the trailing ends 64*a*, 64*a* are carried upwardly to approximately the same height as loop 62. This variation is shown in Fig. 23.

Figures 2 and 3 indicate the details of the mechanism of the upper comb assembly 52. A rocker arm 79 is journaled on shaft 80 and is controlled by a cam follower 81 in contact with cam 82. Spring 83 maintains contact between cam follower 81 and cam 82. Link 84 connects the end of arm 79 to connecting rods 85 by means of pins 86 and 87. This linkage controls both the horizontal and vertical movement of the comb 53. Horizontal movement of the comb is controlled by means of an interconnecting link 88 secured to link 84 by pin 89 and having a cam follower 90 engaging the surface of cam 91. The opposite end of link 88 is bifurcated and engages the cam shaft 92, thereby maintaining the radial position of the link. Spring 93 urges the cam follower 90 against cam 91. Rods 85 are pinned to shaft 56 at 95 and rollers 96, 96 support shaft 56 on guide elements 97, 97 having the form of angle irons. One web of the angle iron is slotted at 98 to permit linear movement of the shaft 56 substantially parallel to the plane of fabric F. The rollers 96 are retained axially on the shaft by means of collars 99. The legs or brackets 57 support the comb body 55 and are secured integrally to the comb and the shaft 56 by any suitable manner such as welding. It will thus be apparent that the path of comb 53 represents a compound path having both linear and arcuate components effected by the joint action of the cams 82 and 91.

The addition of an upper comb having the above described function of wiping severed pile ends held in one extremity around an elevated lower comb so that a succeeding filling weft is capable of binding in the wiped down ends represents novel construction in an Axminster loom.

From the standpoint of the fabric woven, it is possible to produce a loop pile Axminster fabric in which the pile loop extremities actually are tied in under warpwise spaced wefts and project upwardly. Such construction in a fabric is also very unique because the conventional loop pile fabric does not consist of individual loops having severed ends. The operation of the mechanism is positive and permits the relatively high speed production of a loop pile Axminster fabric without the use of pile wires and without major rebuilding of the conventional Axminster loom.

Having thus described my invention, I claim:

1. A loop pile Axminster fabric comprising a plurality of double filling wefts, rows of loop pile projections secured under and around some of said filling wefts, the leading end of each loop projection being secured under a double filling weft and enclosed within the loop, and the trailing end of each loop being wrapped in the same direction around a succeeding filling weft.

2. A three-shot Axminster fabric in accordance with claim 1 in which each leading loop extremity is tied in under a top filling weft and between an aligned bottom filling weft, and the trailing extremity of each loop is tied in under a third double filling weft.

3. A fabric in accordance with claim 2 having a stuffer running between the first and second double filling wefts.

4. An Axminster fabric in accordance with claim 1 in which the leading tuft legs extend substantially as high as the pile loops.

5. An Axminster fabric in accordance with claim 1 in which the trailing tuft legs extend substantially as high as the pile loops.

6. An Axminster fabric in accordance with claim 1 in which both the leading and trailing legs extend substantially as high as the pile loops.

7. A three-shot Axminster fabric in accordance with claim 1 in which both the leading and trailing tuft legs extend substantially as high as the pile loops.

References Cited in the file of this patent

UNITED STATES PATENTS

423,659	Bollentin	Mar. 18, 1890
1,739,181	Robertson	Dec. 10, 1929
2,063,853	Rice et al.	Dec. 8, 1936
2,571,860	Gebert et al.	Oct. 16, 1951
2,715,918	Eisler et al.	Aug. 23, 1955
2,860,669	Moberg	Nov. 18, 1958