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H. J. WINTERS ET AL

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TUFT FABRIC FORMING LOOM AND METHOD OF FORMING TUFT

Original Filed Nov. 16, 1931 2 Sheets-Sheet 1

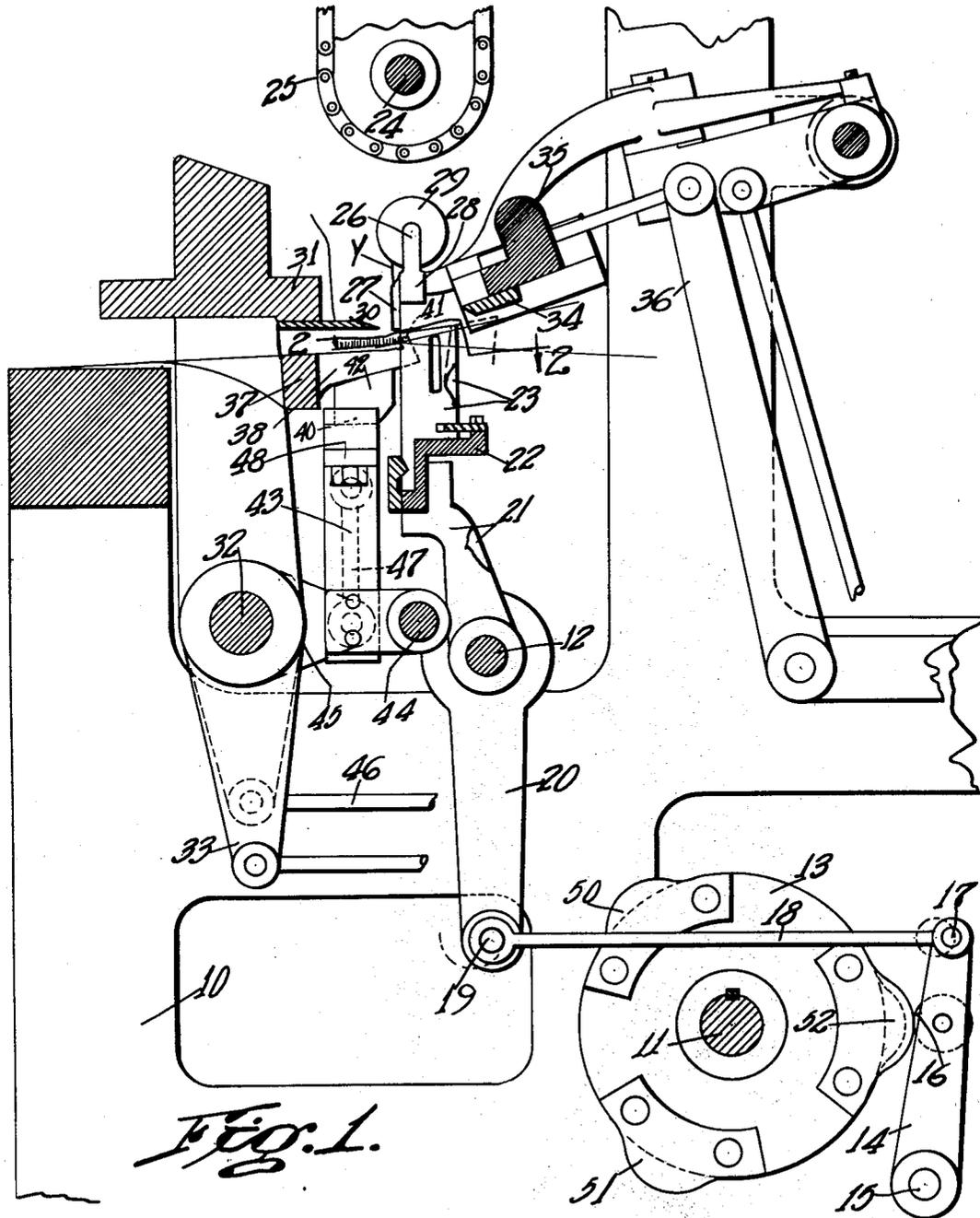


Fig. 1.

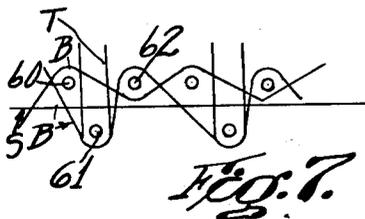


Fig. 7.

INVENTORS
HARRY J. WINTERS
EVERETT E. CLARK

Southgate Hoy & Hawley
ATTORNEYS

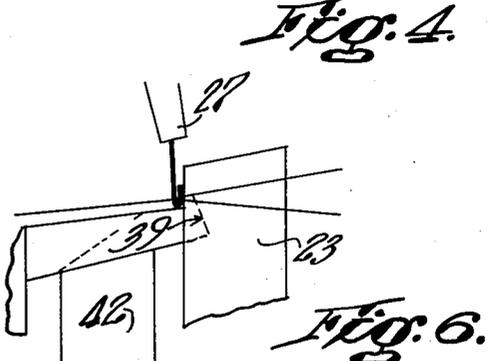
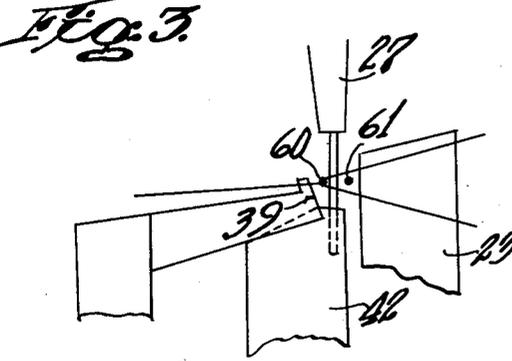
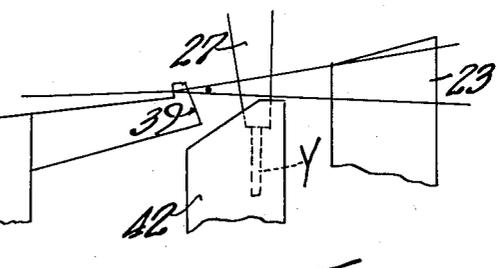
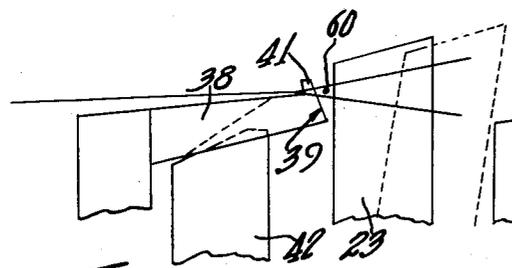
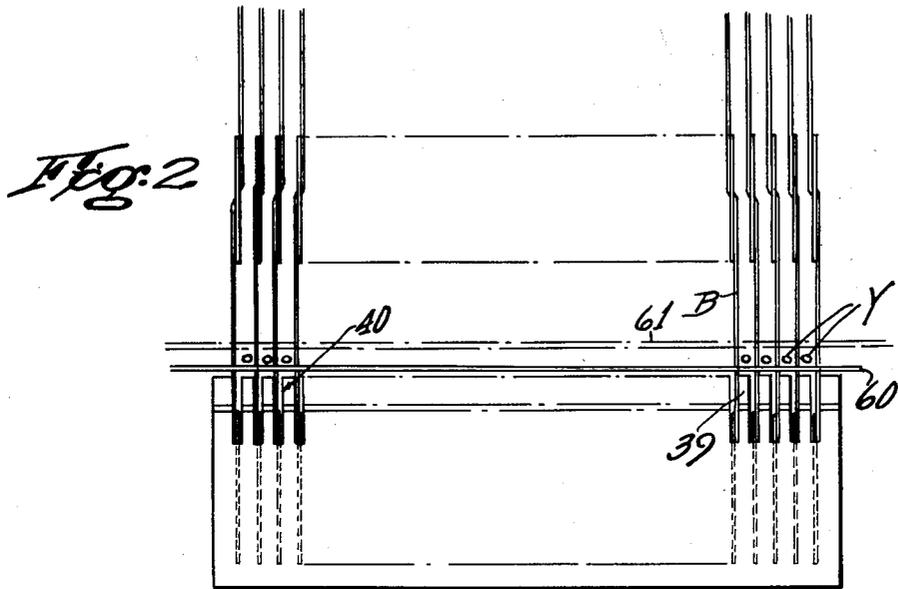
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INVENTORS
HARRY J. WINTERS
EVERETT E. CLARK
Southgate Forge Hanley
ATTORNEYS

UNITED STATES PATENT OFFICE

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TUFT FABRIC FORMING LOOM AND METHOD OF FORMING TUFT

Harry J. Winters and Everett E. Clark, Worcester,
Mass., assignors to Crompton & Knowles Loom
Works, Worcester, Mass., a corporation of Mas-
sachusetts

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8 Claims. (Cl. 139—8)

This invention relates to looms and a method for weaving tufted fabrics more particularly where the pattern appears on the back of the cloth, and it is the general object of the invention to improve the control of the tuft yarns as they are acted upon to form a tuft.

In Axminster looms the tube frames having variously colored tuft yarns are presented to cloth forming position one at a time with their yarns projecting through small tubes. The yarns and their tubes project through the top and bottom sheds defined by the binder warps and in certain forms of Axminster looms may be beaten into the fell of the cloth by moving over inclined surfaces terminating in hooks. Since the binders pass through notches between the hooks, there is likelihood that the tuft yarns will enter these notches to be caught between the hooks and binder threads. It is an important object of our present invention to arrange the beating-up of the picks of filling so that there will be a pick in front of the tuft yarns to prevent them from entering the notch. The effect of this pick is also to cause textile fibrous surfaces to engage the front as well as the rear of the tufts, thereby considerably increasing the frictional engagement with the color yarns so that the latter must move without appreciable relative displacement with respect to the ground fabric.

In the form of hook employed in connection with our invention the under side of the tuft yarn slides up an inclined surface when moved forwardly by the reed and then snaps down quickly in front of the hook. The tuft yarn is forced against the upper edge of the hooking surface and would tend to remain in this position unless acted upon by some force to move down with the ground fabric to the normal position. By placing the pick of filling in front of the tuft and keeping it behind the inclined surfaces until the tuft is to be moved forwardly, we provide additional frictional surface which tends to draw or drag the tuft yarns down along the upper edge of the hooking surface when the fell is pushed to its extreme forward position by the reed. In this way I maintain the free end of the color yarn in its proper position without letting the same become unduly lengthened with resultant waste after the cutting operation. This preservation of the color yarn in its proper length is also assisted during the upward movement along the inclined surface behind the hooks by the fact that the color yarn is pinched between two picks of filling one in front of and

the other behind it during the upward and forward movement.

With these and other objects in view which will appear as the description proceeds, our invention resides in the combination and arrangement of parts hereinafter described and set forth in the claims.

In the accompanying drawings, wherein a convenient embodiment of our invention is set forth,

Fig. 1 is a vertical section taken through the loom in a direction perpendicular to the lay,

Fig. 2 is a top plan view taken along line 2—2 of Fig. 1,

Figs. 3, 4, 5 and 6 are diagrammatic views showing successive positions assumed by certain parts of the loom in the formation of a row of tufts, and

Fig. 7 is a diagrammatic view of the weave.

Referring particularly to Fig. 1, we have shown a loom frame 10 having a cam shaft 11 and a lay shaft 12. A cam tappet spider 13 rotates with shaft 11 and makes a complete revolution for each row of tufts, which, in the present instance, requires three picks of the loom. A cam lever 14 moves about a fixed pivot and has a roll 16 by means of which it may be oscillated. The upper end of the lever is pivotally connected as at 17 to a horizontal pull rod 18 the forward end of which is connected as at 19 to a lay actuating arm 20. The latter is rigid with upwardly projecting arms 21 which support the lay beam 22, as set forth in Fig. 1. The lay is provided with a plurality of reed dents 23 which are spaced apart a distance determined by the number of tufts per inch across the fabric. The reed in effect is a plurality of horizontally spaced substantially parallel vertical thin plates between which extend the binder and stuffer yarns.

A pull-over shaft 24 advances a transporting chain 25 to present a different tube frame each time a new row of tufts is to be formed. Each tube frame 26 is supplied with a series of small yarn tubes 27 supported by a tubular or other bar 28 extending across the loom. One or more spools 29 supply the color yarn Y which extends through the yarn tubes in the usual manner.

A front knife blade 30 is carried by a frame 31 movable about shaft 32 by lever 33. A back knife blade 34 is carried by a sliding frame 35 and is actuated through a lever 36 to move forwardly for the purpose of severing the tufts from the tube frames after the latter have been lifted to complete the drawing-off operation.

The cloth board 37 is provided with a series of spaced teeth 38 the rear ends of which are inclined upwardly and forwardly, as at 39, said teeth being separated by notches 40 which register with and receive the plates or dents of the reed 23. The cloth board is fixed with respect to the loom and said teeth are provided with upwardly extending hooks 41 formed substantially as shown in Fig. 1.

A guide rack 42 comprises a plurality of horizontally spaced substantially parallel vertical plates which are preferably in alignment with the dents of the reed to define guide aisles for the color yarn. These plates can be received by the notches 40 of the cloth board and are mounted on a rocking structure designated generally at 43. The latter is pivoted about a shaft 44 by means of a lever 45 receiving rocking movement from an operating rod 46. One or more upright links 47 may be interposed between the rocking member 45 and the bar 48 which supports the rack 42. The matter thus far described forms no part of our present invention, the tube frames and transporting chain, knives, and the greater part of the lay structure being old.

Our invention relates more particularly to means for insuring proper movement of the color yarns during tuft forming operations, and in carrying our invention into effect we provide mechanism for varying the amount of forward beat of the reed. To this end we provide the spider 13 with cam tappets 50, 51 and 52, respectively, each of which at some time during the revolution of shaft 11 will engage the roll 16 to oscillate the lay structure. One of the tappets 50 is smaller than the others so as to give the reed a short forward beat, the other two tappets 51 and 52 being of the usual height and moving the reed to its full forward position.

Fig. 7 shows a fabric such as may be woven according to our invention, comprising tuft yarns T and filling threads, the latter being arranged in groups of three, one group for each row of tufts. The first pick 60 is above the stuffers S, while the second pick 61 is below, but both of these picks lie in the same shed defined by binders B and B'. The tuft goes around the second pick 61 beneath the binders so as to produce a fabric having its pattern appearing on the back. The third pick 62 lies in a separate shed and is above the stuffer. It will be seen that the fabric which is produced according to our invention has the tuft extending entirely through the ground weave and appearing beneath the bottom pick, the three shots of filling preferably being divided so that the first two lie in one shed and the last in the second shed.

Referring more particularly to Fig. 3, it is assumed that the needle has laid the first shot of filling 60. The reed dents 23 advance this shot to a position behind the inclined faces 39 of the teeth 38, leaving the filling in the position shown in Fig. 3. This result is accomplished by having the low cam tappet 50 operate the lever 14. The reed then moves back to the position shown in Fig. 4, and the tube frame is dipped down through the binders. As the frame rocks forwardly, the rack 42 will move back to receive the yarn tubes 27 and the color yarns Y. Continued operation of the loom moves the parts to the position shown in Fig. 5 with both the reed and rack advanced, with the second pick of filling 61 behind the tuft yarns. On this beat of the lay, however, both picks 60 and 61 will be forced upwardly over the inclined surfaces 39 by the reed dents, and the

latter will move forwardly to the position shown in Fig. 6 to enable both picks of filling, together with the color yarn, to snap down in front of the hooks 41. The tube frame is then raised to draw off yarn for the next row of tufts, and the cutters operate in substantially the ordinary manner to sever the tufts.

Reference to Fig. 2 shows the relation sustained by the several parts during the beating-up of the second pick of filling. The first pick 60 is shown as lying behind the inclined surfaces 39 and extending across the several binder threads B and B' in front of the color yarns Y. Behind the latter lies the second pick of filling 61 designated in dot and dash lines. It will be seen from this figure that each color yarn lies within a square or rectangle defined on all sides by threads, either warp or filling. It is for this reason that the color yarns are directed in their forward upward movement over the surfaces 39 and are prevented from being caught in the notches 40 lying between the hooks. Because of the fact that the forward part of the color yarn is bound tightly between the first and second picks, it is found that the free rear ends of the yarns, downward motion of which is resisted to some extent by the forward corners of the hooks 41, are bound tightly around the bottom or second pick 61.

The invention set forth herein has been developed in connection with the production of a fabric having the pattern appearing on the back, but the method and structure shown are not limited to a fabric of this type, since the manner in which the first pick of a tuft forming cycle is controlled is independent of whether the tuft lies around a pick of filling above or below the stuffers.

From the foregoing it will be seen that we have provided a simple method and means for controlling the color yarns in an Axminster loom, including a controller for the reed dents wherein the latter leave a pick of filling behind the cloth board hooks on that beat of the lay preceding tuft formation, and that this pick and the next pick laid behind the color yarns are both moved over the hooks and into the fell of the cloth on the same or second beat of the loom. The third pick 62 may be laid by one of the high tappets on the spider 13 so as to be pushed over the hooks, but this feature forms no part of our present invention. It will also be seen that the filling and warp threads are so formed as to define inclosures for the tuft yarn before the latter are pushed over the hooks, the effect of this relation being to grip the color yarns frictionally on all sides so that movements thereof can be precisely determined. The pick lying in front of the tufts prevents the latter from entering the spaces or notches 40 between the hooks and also prevents slipping or sliding of the color yarn around the second pick when the tufts and both shots are moving down in front of the hooks 41.

Having thus described our invention it will be seen that changes and modifications may be made therein by those skilled in the art without departing from the spirit and scope of the invention and we do not wish to be limited to the details herein disclosed, but what we claim is:

1. The method of forming tufted pile fabrics in a loom having a series of hooks with upwardly and forwardly inclined faces which consists in the following steps: beating a pick of filling to a position behind said hooks, bending tuft yarns around a second pick of filling behind the hooks;

and beating both picks of filling and the tuft yarns at the same time up the surfaces and to a position in front of the hooks.

2. The method of forming tufted pile fabrics in a loom having a series of hooks with upwardly and forwardly inclined faces which consists in the following steps: separating binder threads to form a shed, inserting a pick of filling in the shed and beating the same to a position behind the hooks, bending color tuft yarns around a second pick of filling inserted in the same shed, and moving both picks of filling together with the color yarns up inclined surfaces to a position in front of the hooks all on one beat of the loom.

3. The method of forming tufted pile fabrics in a loom having a series of hooks with upwardly and forwardly inclined faces which consists in the following steps: providing a shed defined by binders and stuffer yarns, laying one pick of filling above the stuffer yarns and beneath one set of binders, beating said pick of filling to a position behind the hooks, laying a second pick of filling beneath the stuffers, and said binders, bending color tuft yarns around the second pick of filling, and moving both picks of filling and the tuft yarns over the hooks to a position in front of the latter on that beat of the loom on which the second pick of filling is laid.

4. The method of forming tufted pile fabrics in a loom having a series of hooks with upwardly and forwardly inclined faces which consists in the following steps: forming a series of rectangular tuft yarns receiving spaces of textile threads behind the hooks and placing the color yarns in said spaces, and thereafter moving the space forming threads transverse of the fabric together with the color yarns forwardly to a position in front of the hooks.

5. The method of forming tufted pile fabrics in a loom having a series of hooks with upwardly and forwardly inclined faces which consists in the following steps: providing a series of color yarns, inclosing each color yarn on all sides with

textile yarns, and moving these yarns transverse of the fabric together with the tufts to a position in front of the hooks all on the same beat of the loom.

6. The method of forming tufted pile fabrics in a loom having a series of hooks with upwardly and forwardly inclined faces which consists in the following steps: providing substantially rectangular spaces for the color yarns the sides of which parallel to the length of the cloth are defined by binder warps and the sides of which transverse of the fabric are defined by spaced picks of filling, inserting color yarns between the binders so as to lie between the picks of filling while the latter are behind the hooks, and subsequently moving the picks of filling and color yarns to a position in front of the hooks all on the same beat of the loom.

7. In a tuft fabric forming loom having a series of spaced hooks provided with upwardly and forwardly inclined surfaces, means to beat a pick of filling to a position behind said surfaces, means to insert a second pick of filling behind the first pick, means to bend color yarns around the second pick of filling, and means to move both picks of filling together with the bent color yarns upwardly and forwardly along said surfaces to a position in front of the hooks, all on the same beat of the loom.

8. In a tuft fabric forming loom having a series of spaced hooks provided with upwardly and forwardly inclined surfaces, a reed, operating mechanism for said reed effective to cause the reed to move a pick of filling to a position behind the said surfaces, means to bend color yarns around a second pick of filling located behind the first pick, and said mechanism being effective to give the reed a second operative movement to move both picks of filling together with the color yarns up said surfaces to a position in front of the hooks.

HARRY J. WINTERS.
EVERETT E. CLARK.

45	120
50	125
55	130
60	135
65	140
70	145
75	150