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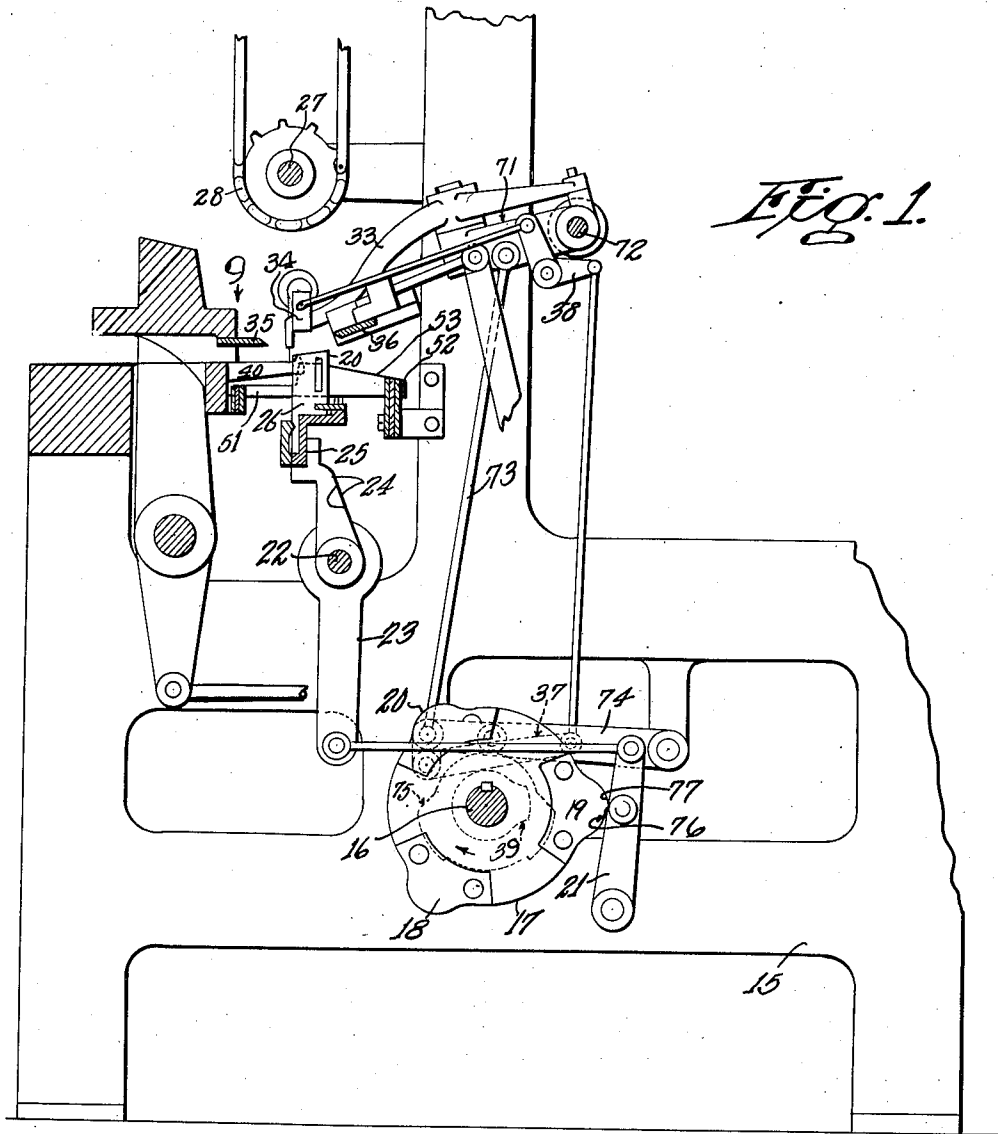
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2,021,431

METHOD OF AND APPARATUS FOR WEAVING TUFTED FABRICS

Filed Jan. 26, 1933

2 Sheets-Sheet 1



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METHOD OF AND APPARATUS FOR WEAVING TUFTED FABRICS

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2 Sheets-Sheet 2

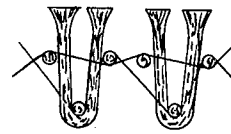
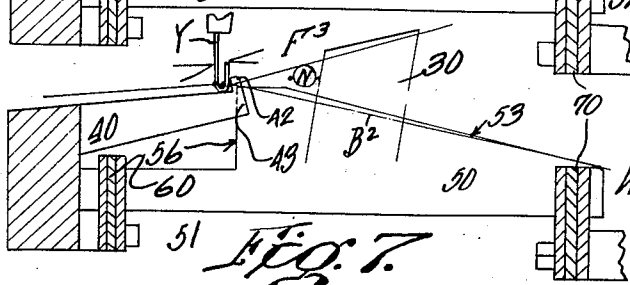
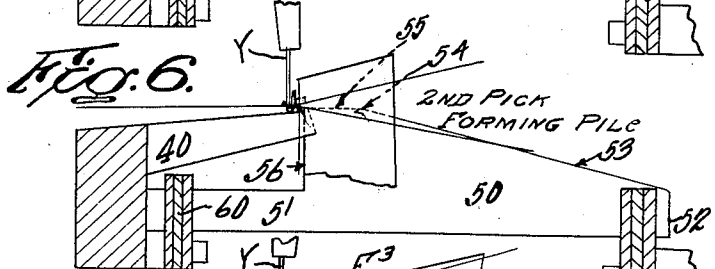
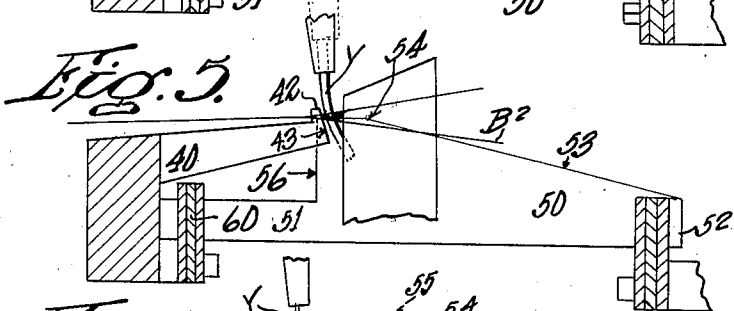
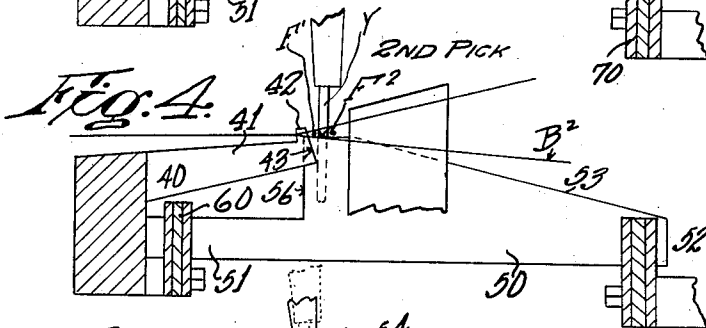
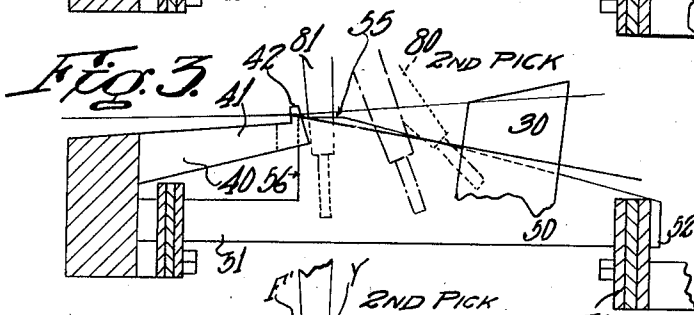
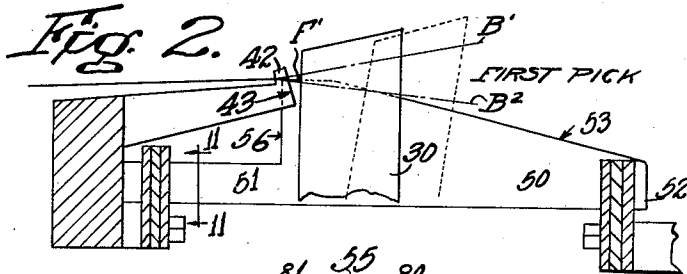


Fig. 8.

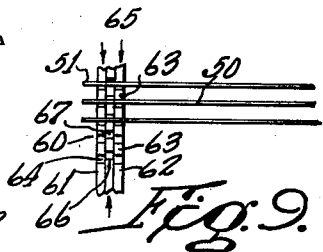


Fig. 10.

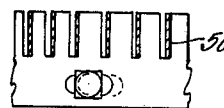


Fig. 11.

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UNITED STATES PATENT OFFICE

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METHOD OF AND APPARATUS FOR
WEAVING TUFTED FABRICS

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11 Claims. (Cl. 139—8)

This invention relates to improvements in the method of operating Axminster looms and it is the general object of the invention to provide improved means and method for weaving a pile fabric having the pattern on the back.

It is desirable to have pile fabrics with the pattern on the back soft enough to be folded without cracking, and this may be accomplished by the use of cotton weft. There is a tendency, however, for the cotton to contract, and some form of spacing device, such as a notched nose board, must be employed to hold the fabric and binder warps properly spaced in order to insure correct entry of the tuft tubes of the tube frame between the binders. The tufts are formed by hooks on the teeth of the nose board and are curved upwardly during the tuft forming operation by the hooks.

In an application filed jointly by Dacey and myself, Serial No. 575,190, movable spacer plates are located under the shed and co-act with the reed dents to guide the tuft yarns. It is an important object of my present invention to provide yarn guides or spacer plates which are fixed with respect to the loom and extend through the reed. The spacer plates are preferably made with a downwardly and rearwardly inclined upper surface to provide clearance for the weft laying needle.

It is a further object of my invention to insure tight binding of the tuft yarns at the time the tube frame is raised on the pulling-off motion. This result I accomplish by producing a dwell in the forward beat of the lay on the tuft forming stroke of the loom, the lay being held temporarily in such position as will force the tuft yarns and the picks of filling against the rear faces of the nose board teeth during the upward pulling-off motion of the tube frame. The warps may be in closed shed position at this time so as to cause still further binding of the filling and tuft yarns, although this is not essential, inasmuch as the reed can exert sufficient force to hold the tuft yarns from rising when the tube frame pulls off.

It is another object of my invention to provide a two-part holding rack for positioning the yarn guides, the rack parts each having teeth or notches therein through which the plates or guides extend, and one of the parts forcing the plates against the teeth of the other part. In this way I dispense with the necessity of having a rack provided with very narrow accurately milled slots or notches.

With these and other objects in view which

will appear as the description proceeds, my 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 my invention is set forth,

Fig. 1 is a vertical section through a portion of an Axminster loom having my invention applied thereto,

Figs. 2 to 7 are diagrammatic views showing certain parts of the loom in different positions,

Fig. 8 is a diagram of the weave such as can be woven by the use of my invention,

Fig. 9 is a detailed top plan view in the direction of arrow 9, Fig. 1, showing the forward two-part rack,

Fig. 10 is a plan view of certain of the structure shown in Fig. 1, and

Fig. 11 is a vertical section on line 11—11 of Fig. 2.

Referring to the drawings, I have shown the loom frame 15 having a cam shaft 16 to which is secured a cam plate 17. The latter has secured thereto a low cam 18, a modified cam 19, and a regular cam 20 which co-act with a cam lever 21 in the order named. A lay shaft 22 has depending therefrom a power arm 23 operatively connected to the lever 21, and there is upstanding from and secured to shaft 22, arms 24 on which is mounted a lay beam 25. The latter has a reed 26 provided with reed dents 30.

A tube frame pull-over shaft 27 is journaled in the loom frame above the cloth and is driven to give a transporting chain 28 a step by step movement. As is usual, the chain carries tube frames which are brought one at a time to a position where they can be transferred from the chain to tuft forming position.

The devices for carrying the tube frame toward the cloth include a lever 33 having a clutch 34. This lever is movable in a vertical plane to carry the tube frame to and from the cloth, and is also adapted for movement in a horizontal direction to effect release of the tube frame from the chain. Front and back knives 35 and 36, respectively, may be employed and are caused to approach each other at the correct time to sever the tuft from the yarns of the tube frame.

The present invention relates more particularly to the so-called Smith type of Axminster loom wherein the tube frames, after being released from the transporting chains, are so moved as to cause the tuft tubes to extend rearwardly almost in a horizontal direction, after which the tube frame is rolled to wipe the yarn tubes and

their yarns down between the binder threads. The yarn tubes then move to assume a more nearly vertical position. During the latter part of this movement the tube frame is raised so as to draw off enough yarn for the next row of tufts to be formed by the tube frame. A lever 37 and bell crank lever 38 are rocked by a cam 39 to cause the rolling of the tube frame through appropriate linkage in the usual manner.

In order that the fabric may be woven with a contractible filling such as cotton, I provide the loom with a nose board 40 having a series of teeth 41 the rear of each of which is provided with an upstanding hook 42. The rear face of each tooth is downwardly and rearwardly inclined as at 43 so as to provide a face along which the shots of filling can be moved upwardly by the lay as the latter advances.

In carrying my invention into effect I provide a series of substantially flat spacer plates 50 each having a front foot 51 and a rear foot 52. The upper face of each plate is forwardly and upwardly inclined as at 53 and bends at 54 to extend forwardly as at 55 to a substantially vertical forwardly facing shoulder 56 located preferably in front of the inclined surfaces 43. The shoulder may preferably be located substantially as shown diagrammatically in Fig. 2, so that it is slightly behind the front part of the hooks 42 but sufficiently forward of the rear inclined face of the teeth so as to define with the adjacent tooth a corner for the tuft yarn. In this way the tufts are free to engage the front faces of the hooks and snap down without interference when passing over the hooks.

The bend 54 rises somewhat above the bottom binders B² to permit the shots of filling, particularly the one which is inserted immediately behind the tuft yarns, to be directed squarely against the tuft yarns. In this way I present the filling to the tuft yarn at a higher position than would be possible if reliance were had solely on the warp threads, and as a result the upward curving of the tuft of yarn is thereby improved.

One of the racks for holding the spacing plates 50 is indicated in plan view in Fig. 9. This spacing rack, designated generally at 60, is composed of two separate parts, one comprising two members 61 and 62 which may be fixed to the loom permanently in correct alignment with respect to the teeth of the nose board 40. These members have teeth 63 located between notches 64 which are aligned transversely of the rack and are preferably for manufacturing considerations somewhat wider than the thickness of the plates 50.

The second part of the rack comprises a movable element 65 provided with shoulders 66 defined by notches 67. These notches are somewhat like the notches 64 in that they are wider than the thickness of the plates 50. The gauge of the movable part with respect to the shoulders 66 is the same as the gauge of the notches on the first part, and the notches of both parts may be cut together at one operation to insure similarity of gauge.

In assembling, the fixed and movable parts are arranged so that the notches 67 align with the notches 64, after which the front feet 51 of the plates may be inserted in the notches. The movable part 65 is then drawn longitudinally so that the shoulders 66 force the feet 51 against the teeth 63. Since the latter are all uniformly spaced and of the same gauge as the teeth of

the nose board the spacer plates are correctly positioned without requiring any narrow notches the cutting of which might be attended with difficulty. The rear part of the plates can have their feet 52 held in a rack 70 similar to the one described in connection with Fig. 9.

Lever 33 is mounted on a support 71 movable vertically about a fixed axis 72 by a link 73. The latter is attached to a lever 74 which is rocked by a cam 75 fixed to the shaft 16. The lever 74 and parts thereabove may be as usual, but the cam 75 is altered slightly from the similar cam ordinarily employed.

The cam 19 has a dwell 76 and a high point 77, the effect of which is to cause a dwell in the forward beat of the lay on the tuft forming stroke of the loom, the dwell holding the reed temporarily just behind the hooks of the nose board for a purpose to be described.

The motions of the levers 21 and 74 by their respective cams is such that when the dwell 76 holds the reed stationary behind the nose board, the support 71 is raised by cam 75 to "pull-off" yarn for the next row of tufts to be formed by the same tube frame.

In operation, a shot F' of filling is laid between the binders B' and B² by needle N and is beaten up to a position immediately behind the hooks 42, as shown in Fig. 2, by low cam 18. When the lay moves back substantially to the position shown in Fig. 3 a tube frame will be manipulated as previously mentioned so that the yarn tubes will move from the dotted line position shown at 80 through the dot and dash line position to the full line position shown at 81. During this rolling of the tube frame the bottoms of the yarn tubes enter the spaces between the plates 50. Each tuft yarn Y, therefore, has its own compartment and all the yarns are held in parallelism so far as lateral position is concerned.

As the yarn tubes move forwardly they are raised to assume the position shown in Fig. 4, after which a second shot of filling F² is beaten up by the reed. The dwell 76 on cam 19 moves the reed to the position shown in Fig. 5 with the shots F' and F², together with the tufts, held tightly against the nose board. While in this position the tube frame is raised by cam 74 to "pull-off" yarn for the next row, moving from the full to the dotted line in Fig. 5. After the pull-off is completed, the point 77 advances the reed to push the tufts up the inclines 43 and to positions in front of the hooks. This places the tufts in the position shown in Fig. 6. As the tufts move over the hooks they snap down to the position shown in Fig. 6, which tightens the yarns leading to the spool S of the tube frame. The cutters then sever the tufts from the tube frame and the latter is returned to the chain.

While the parts move from the position shown in Fig. 4 to that shown in Fig. 6 the tuft yarns are curved rearwardly as suggested in Fig. 5 to lie between the reed dents. As soon as the shots of filling and tufts get to a position in front of the hooks 42 the fabric, which is raised slightly as the tufts go over the hooks, snaps down, thus causing the rear part of the tuft to be curved upwardly by the front of the hooks.

A shot of filling F³ is then laid and beaten up by cam patch 20 to a point in front of the hooks, thus completing the three pick cycle. As the shot F² advances, it passes over the bend 54 and thereafter moves forwardly along a substantially horizontal line, striking the tuft yarns in a perpendicular direction.

From the foregoing it will be seen that I have provided simple means for aligning the tuft yarns in an Axminster loom including fixed plates located for the most part below the binder threads so as to provide ample clearance for a rolling motion of the tube frame above said plates. It will further be seen that simple means are provided for correctly spacing these plates by means of holding devices arranged preferably in pairs wherein one part of each pair holds the spacer plates against the other part. Another important feature relates to the method of manipulating the yarn tufts wherein the pulling-off operation is accomplished before the tuft yarns are pushed over the hooks to the fell of the fabric. The means for accomplishing this procedure requires but a slight alteration in existing parts of Axminster looms of the Smith type, including a dwell on one of the cams so timed with respect to the lifting of the tube frame that the so-called "pulling-off" may be accomplished while the reed is forcing the tuft yarns and shots of filling against the back of the inclined surfaces 43. The slight downward movement of the tuft yarns after they pass over the hooks and before cutting will serve to tighten said yarns so as to define a sharp pattern on the back of the fabric. This tightening of the yarns will also facilitate cutting of the tufts free from the tube frame.

Having thus described my 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 I do not wish to be limited to the details herein disclosed, but what I claim is:

1. The method of weaving a pile fabric in a loom having a tube frame with tuft forming yarns, and binder warps, and having a nose board provided with hooks, the method consisting in beating a shot of filling to a position behind the hooks, and retaining it in such position temporarily, inserting the tube frame between the binders to cause the tuft forming yarns to lie between the binders and behind said pick of filling, laying a second pick of filling behind the tuft yarns, moving both picks of filling and the color yarns to a position behind the hooks with said picks of filling in close holding relationship with the color yarns, lifting the tube frame to pull off yarn for the next row of tufts to be laid by the tube frame, thereafter moving the picks of filling and color yarns over the hooks, and subsequently cutting the color yarns from the tube frame.

2. The method of weaving a pile fabric in a loom having a tube frame with tuft yarns, and binder warps, and having a nose board provided with hooks, the process consisting in laying a pick of filling, moving the tube frame to place the tuft yarns between the binders and behind said pick of filling, inserting a second pick of filling behind the tuft yarns, forcing said picks and color yarns tightly against the back of the hooks and holding them in such position temporarily, lifting the tube frame to pull off yarn for the next row of tufts to be laid by the tube frame, moving the picks of filling and tuft yarns over the hooks to a position in front of the latter, and thereafter cutting the tuft yarns from the tube frame.

3. The method of weaving a pile fabric in a loom having a tube frame with tuft yarns, and binder warps, and having a nose board provided with hooks, the method consisting in moving the tube frame so as to place the tuft yarns thereof between the binders, moving the tuft yarns to a position behind the hooks and temporarily hold-

ing the tuft yarn in said position, raising the tube frame to pull off yarn for the next row of tufts to be laid by the tube frame, thereafter moving the tufts over the hooks to positions in front of the latter, and then cutting the tufts from the tube frame.

4. The method of weaving a pile fabric in a loom having a tube frame with tuft yarns, and binder warps, and having a nose board provided with hooks, the process consisting in moving the tube frame to place the tuft yarns thereof between the binder threads, moving the tuft yarns to a position behind the hooks, holding the tuft yarns temporarily in said position, raising the tube frame to pull off yarn for the next row of tufts to be laid by said frame, thereafter forcing the tuft yarns over the hooks to lift the fabric from normal down position, and moving said tufts to a position in front of the hooks to permit the fabric to move down again to normal position, thus tightening the tufts, and thereafter cutting the tufts from the tube frame.

5. The method of weaving a pile fabric in a loom having a tube frame with tuft yarns, and binder warps, and having a nose board provided with hooks, the process consisting in laying a shot of filling between the binders and moving the same to a position behind the hooks, moving the tube frame to place the tuft yarns between the binders and behind said pick of filling, laying a second pick of filling and moving the same forwardly against the tuft yarns to force the latter against the first pick of filling and also force said first pick of filling against the hooks when the cloth is in normal down position, pulling off enough yarn on the tube frame for the next row of tufts to be laid by said frame, thereafter moving the picks of filling and color yarn up and over the hooks to raise the cloth temporarily and to a position in front of the hooks, to permit the cloth to move back to normal downward position to tension the tuft yarns, and thereafter cutting the tufts from the tube frame.

6. In an Axminster loom operating with binder warps and a tube frame having tuft yarns, means to move the tube frame to place the tuft yarns between the binder warps, means to lay a shot of filling, a reed to move the tuft yarns and shot of filling forwardly, a nose board having a plurality of hooks toward which the reed moves the tuft yarns, means to hold the reed in position to force the filling against the tuft yarns, means to raise the tube frame to pull off color yarn for the next row of tufts to be laid by the frame, means thereafter operative to move the reed forwardly to cause the tuft yarns and filling to move over the hooks to positions in front of the latter, and cutting devices operative when the tufts have been moved to positions in front of the hooks to cut said tufts from the tube frame.

7. In an Axminster loom operating with binder warps and a tube frame having yarn tubes, a reed, weft laying means to lay a pick of filling, means to operate the reed to move said pick of filling to a given position, a nose board located in front of said given position and having hooks, a tube frame movable to project tuft yarns between the binders and behind said pick of filling, said weft laying means movable to lay another shot of filling behind the tuft yarns, a cam having a dwell and a tuft forming part, the dwell to be operatively connected to the reed to advance the second pick of filling and tuft yarns against the first mentioned pick of filling behind the nose board and hold the same temporarily in such po-

sition, and mechanism to lift the tube frame to pull off the yarn for the next row of tufts, the tuft forming part of the cam effective thereafter to move said picks of filling and tuft yarns over the hooks of the nose board.

5 8. In an Axminster loom operating with binder warps, a tube frame having yarn tubes from which tuft yarns project, weft laying means, a nose board having hooks, means to force two
10 picks of filling with the tuft yarns in the tube frame between them against the rear of the hooks and hold them in such position for a given interval, means to raise the tube frame to pull
15 off yarn for the next row of tufts during said interval, and means operative at the end of said interval to move the picks of filling and tuft yarns over the hooks of the nose board to a position in front of said hooks.

9. In an Axminster loom operating with binder
20 warps, a nose board having hooks, a set of parallel spaced vertical fixed plates located intermediate of the hooks and substantially below the warps, a tube frame having tuft tubes and yarns projecting therefrom to pass between the plates
25 and align the yarns with the hooks, means to raise the tube frame while the tuft yarns are attached thereto to pull off yarn for the next row of tufts, and means to hold the tuft yarns against
30 the rear of the hooks and between the plates during the raising of the tube frame and to thereafter

move the tuft yarns to positions in front of the hooks to form tufts.

10. In an Axminster loom operating with binder warps, a set of parallel spaced vertical fixed plates between the binder warps, said plates being located substantially below the binder
5 warps, a nose board having tuft forming hooks located between the plates, a tube frame having yarn tubes and yarns projecting therefrom, a tube frame transporting chain, said chain located
10 above the plates, means to move the tube frame from the chain to tuft forming position immediately over the plates to cause the yarn tubes to align with the hooks and pass downwardly between the spacing plates, and a reed movable between the plates and hooks to advance the tuft
15 yarns over the hooks to form tufts.

11. In an Axminster loom operating with warps, a plurality of fixed vertical spacer plates located between the warps, and holding means
20 for the plates, said holding means comprising two coacting separate parts each having notches wider than the thickness of the plates and teeth between the notches, one of said parts fixed with respect to the loom and having the teeth there-
25 of located in predetermined position with respect to the desired location of the plates, and the other part having the teeth thereof in engagement with the plates to force the latter against the teeth of the first-named part.

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