Sept. 2, 1952 P. J. ST. JEAN ET AL 2,609,004

MACHINE FOR WEAVING LOOPS INTO FABRICS

Filed April 6, 1950 6 Sheets-Sheet 1

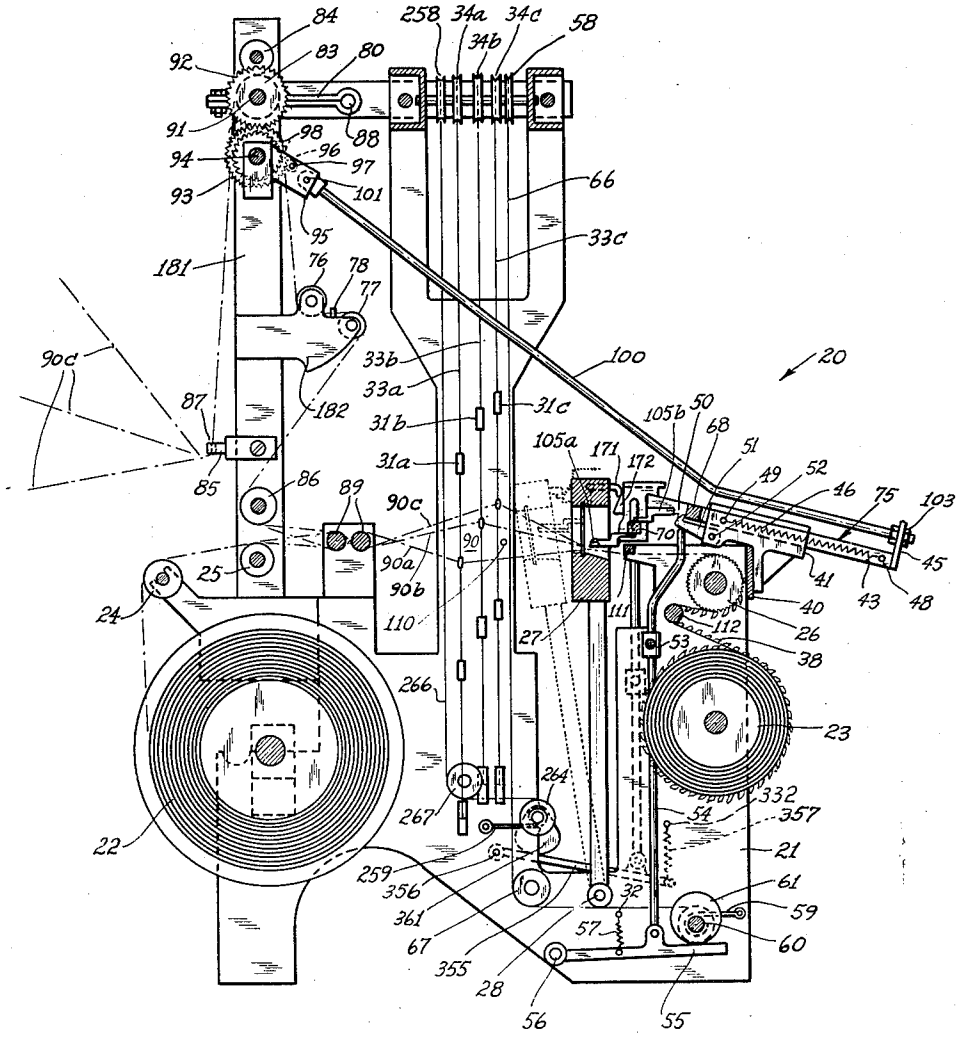


FIG. 1

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MACHINE FOR WEAVING LOOPS INTO FABRICS

Filed April 6, 1950 6 Sheets-Sheet 2

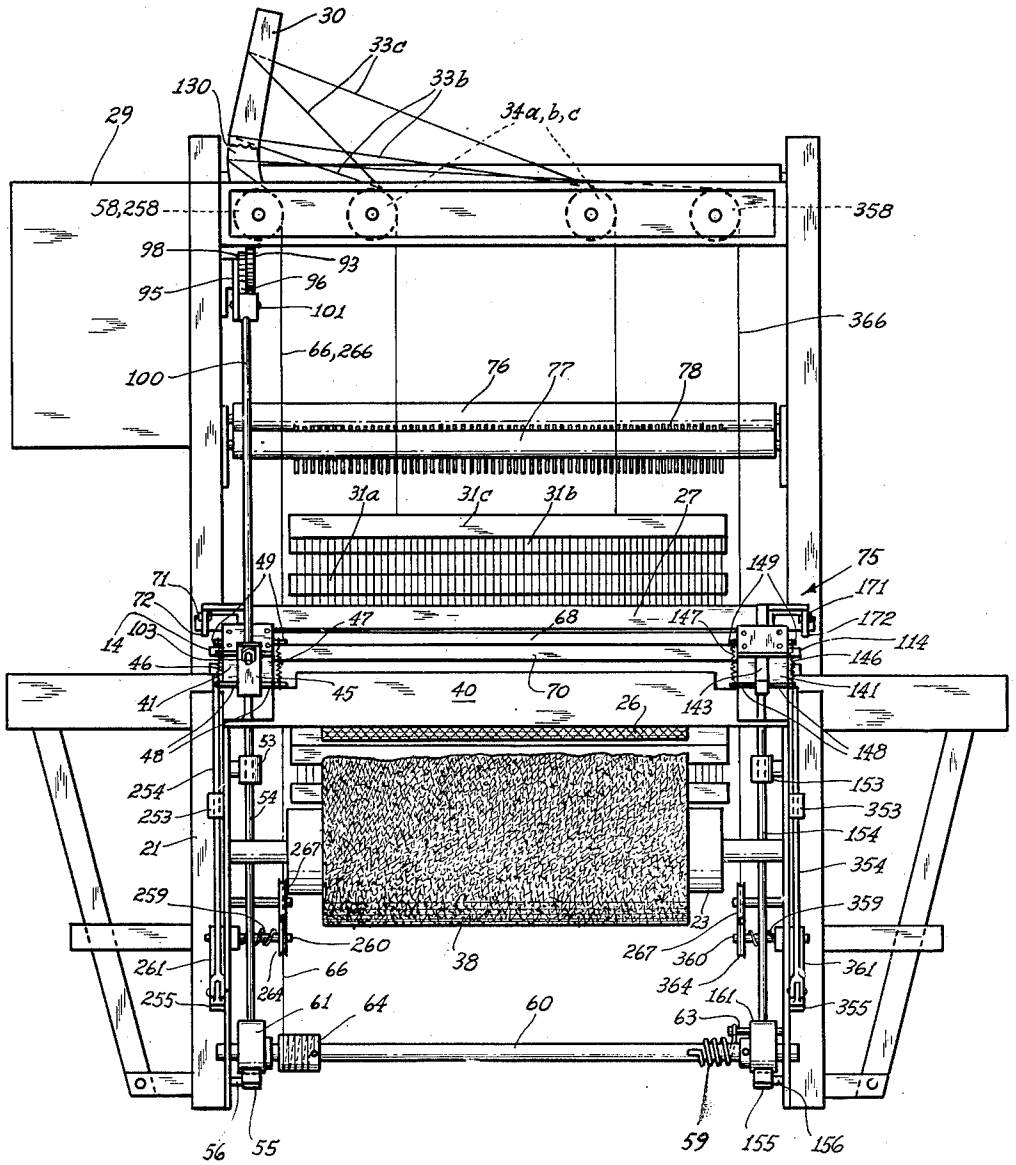


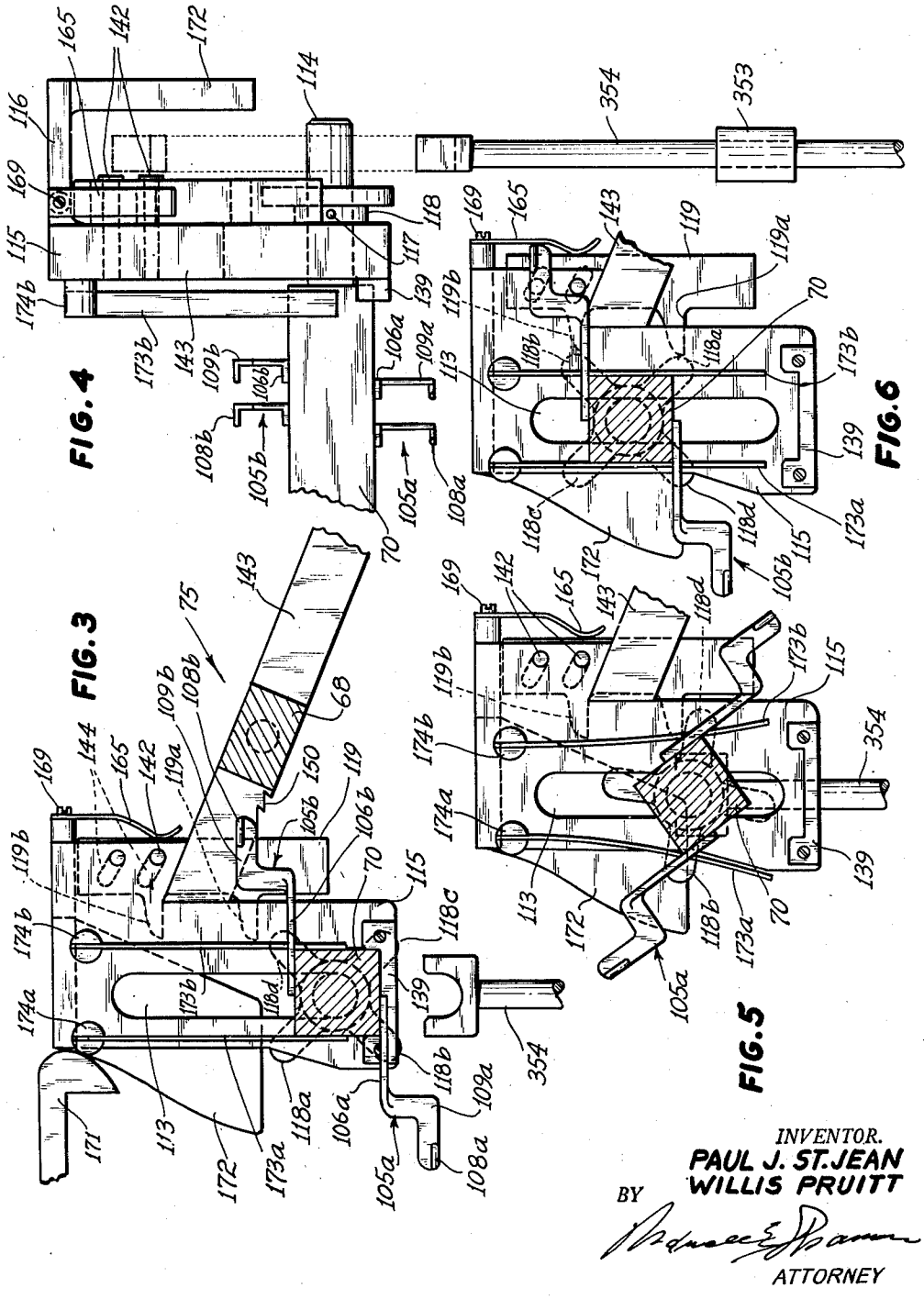
FIG. 2

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MACHINE FOR WEAVING LOOPS INTO FABRICS

Filed April 6, 1950 6 Sheets-Sheet 3



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MACHINE FOR WEAVING LOOPS INTO FABRICS

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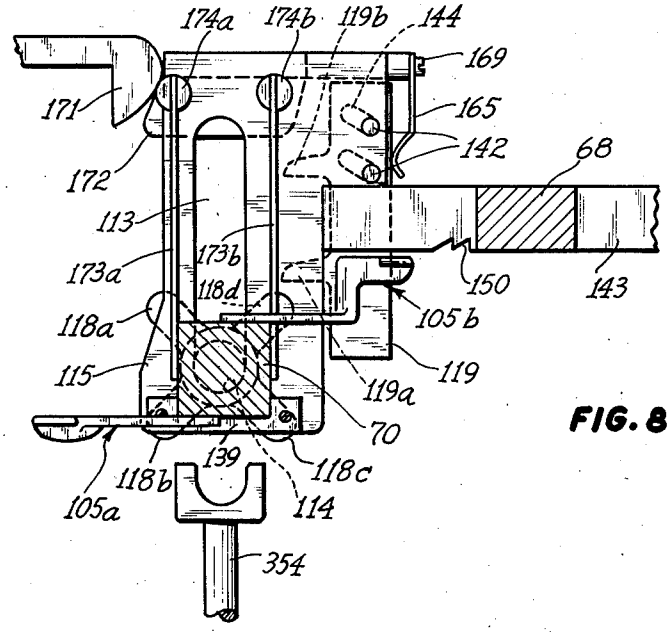


FIG. 8

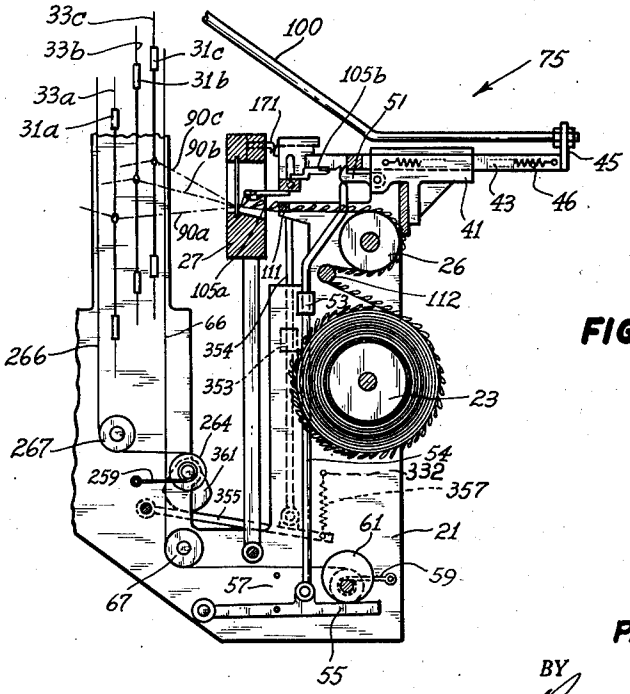


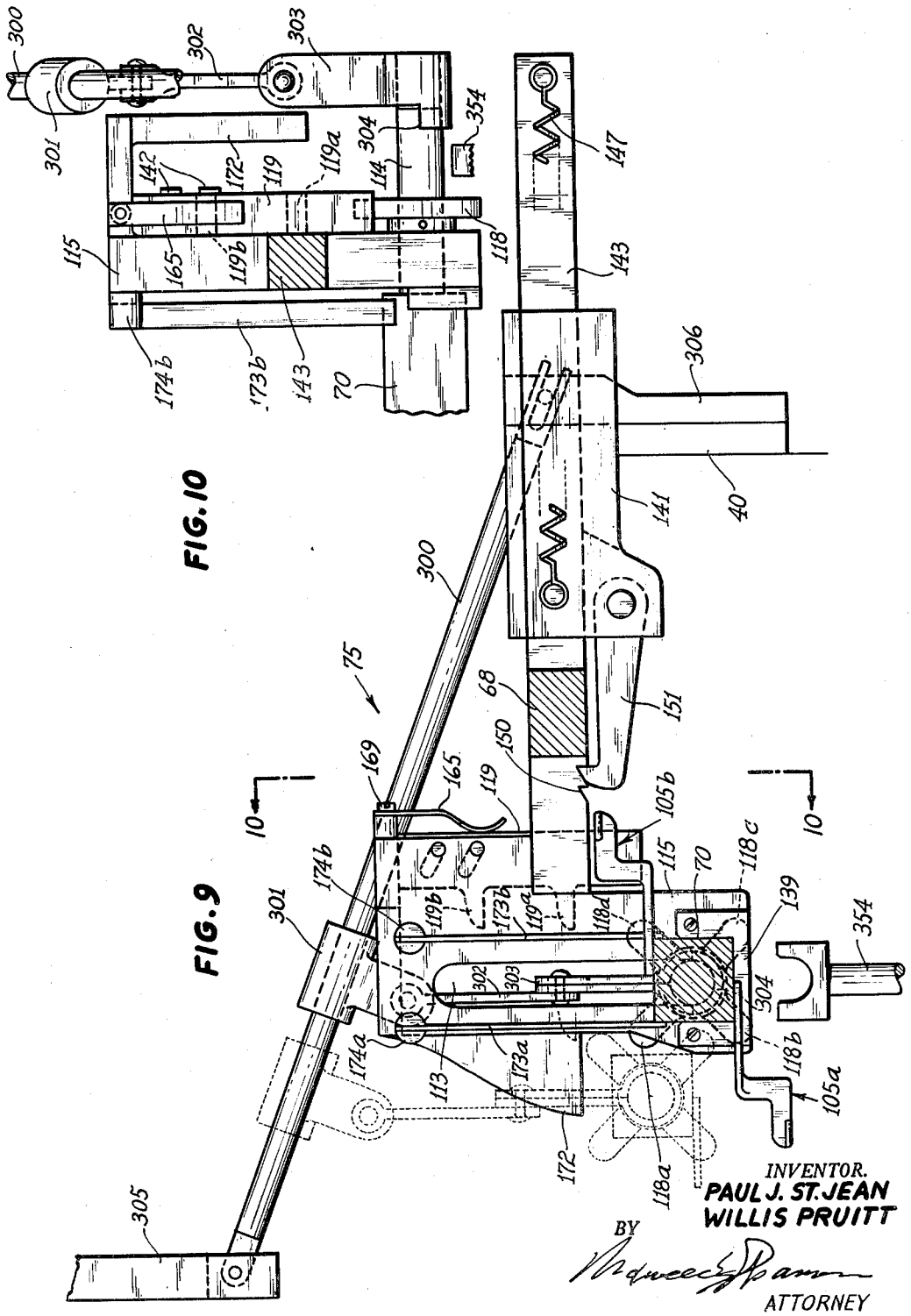
FIG. 7

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MACHINE FOR WEAVING LOOPS INTO FABRICS

Filed April 6, 1950 6 Sheets-Sheet 5



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MACHINE FOR WEAVING LOOPS INTO FABRICS

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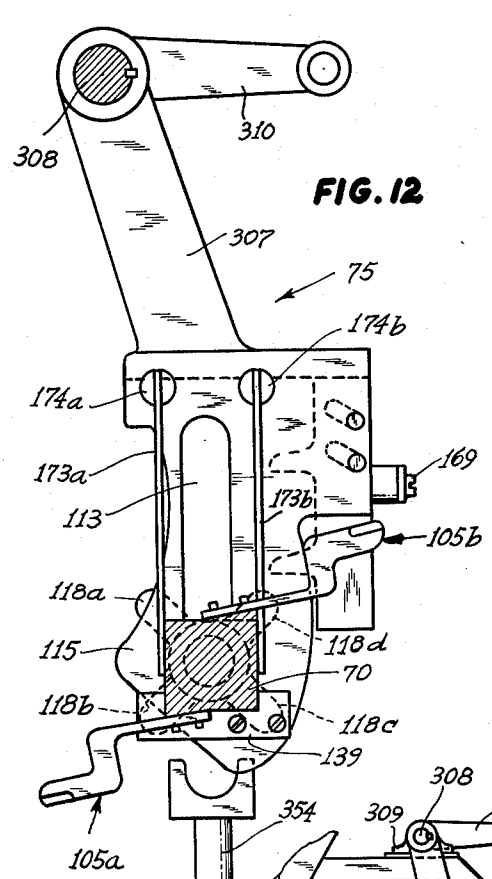


FIG. 12

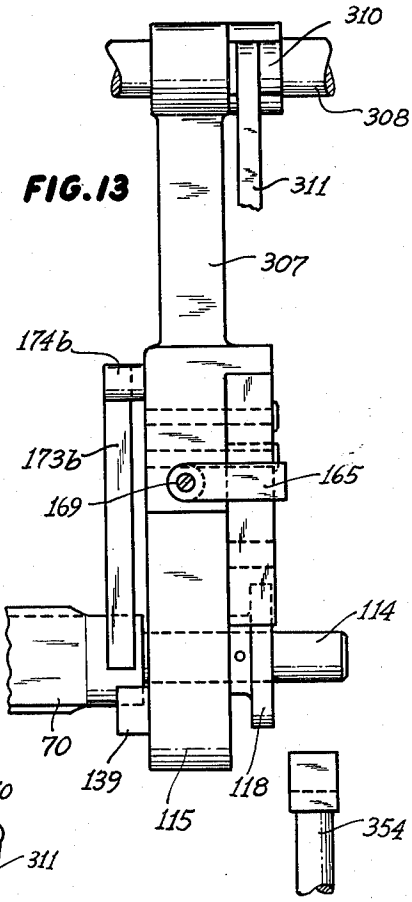


FIG. 13

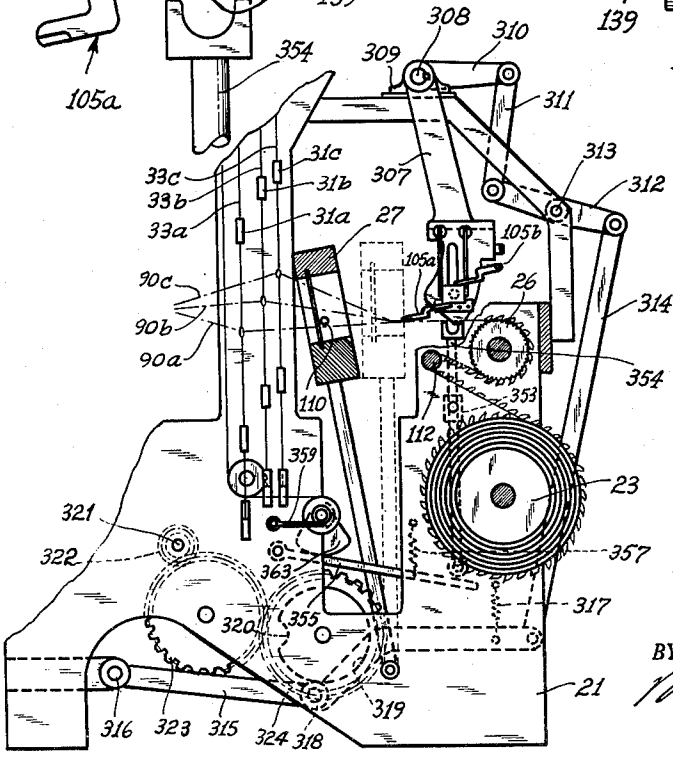


FIG. 11

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Patented Sept. 2, 1952 2,609,004

UNITED STATES PATENT OFFICE

2,609,004

MACHINE FOR WEAVING LOOPS INTO FABRICS

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Application April 6, 1950, Serial No. 154,402

18 Claims. (Cl. 139—38)

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The present invention relates to a machine for the weaving of terry and/or cut pile fabrics of the general character disclosed, for example, in co-pending application Serial No. 123,545, filed October 26, 1949, which has been issued as U. S. Patent No. 2,547,824 on April 3, 1951.

One of the features of the machine described and claimed in said application is the provision of a displaceable hook bar carrying a set of hooks, each of these hooks being adapted to engage and entrain a respective pile warp thread when the hook bar is reciprocated with respect to an array of warp threads designed to be woven into a fabric, thereby drawing these pile warp threads into the loops which become anchored in the fabric by the continuous weaving operation and which may be cut or left uncut depending upon the character of cloth desired.

One of the principal objects of the present invention is to increase the number and variety of patterns which may be produced with a machine of the character set forth above.

Another object of this invention is to provide an improvement whereby different types of loops may be selectively produced without interrupting the operation of the machine.

A further object of the invention is to provide an improvement whereby successive rows of loops may be formed wherein the position of the loops varies for different rows.

Still another object of the instant invention is to provide, in a machine as set forth above, automatic means for periodically varying the length, position and/or character (cut or uncut) of the loops extending in rows across the fabric.

Yet a further object resides in the provision of a novel type of hook support utilizable for the production of patterns in which rows of loops of different description and/or position alternate at regular or irregular intervals, or for switching from one type of pattern to another (for example, from a pattern composed of rows of long loops to one composed of rows of short loops or vice versa) during continuous operation of the machine.

According to a feature of the present invention there is provided, as part of a reciprocable carriage, a rotatably journaled hook supporting member having secured thereto a plurality of sets of hooks extending in different directions, and means for rotating the hook supporting member either manually when desired or automatically at a predetermined stage or stages of operation, through an angle such as to place one set of hooks in an operative position previously occupied by another set of hooks.

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The above and other objects and features of the invention will become apparent from the following description, reference being had to the accompanying drawing in which:

Fig. 1 is a side elevation of a machine or loom according to the invention, with part of the loom frame removed to expose the mechanism;

Fig. 2 is a front elevation of the machine shown in Fig. 1;

Fig. 3 is an enlarged cross sectional view of the hook supporting member and adjacent elements;

Fig. 4 is a front view of the elements shown in Fig. 3;

Figs. 5 and 6 are views similar to Fig. 3, showing different positions of the hook supporting member and illustrating the mode of rotating same;

Fig. 7 is a fragmentary side elevation, similar to Fig. 1, of a somewhat modified machine according to the invention;

Fig. 8 is a cross sectional view, similar to Fig. 3, of the hook supporting member of the machine shown in Fig. 7;

Fig. 9 is a view analogous to Figs. 3 and 8, showing the hook supporting element of the invention incorporated in still another type of loom;

Fig. 10 is a section on the line 10—10 of Fig. 9;

Fig. 11 is a view similar to Fig. 7, showing yet a further modification;

Fig. 12 is a cross sectional view, on a larger scale, of the hook supporting member and adjacent elements of the machine shown in Fig. 11; and

Fig. 13 is a front view of the elements shown in Fig. 12.

Referring first to Figs. 1 through 6 and particularly to Figs. 1 and 2 showing the general organization of a machine according to the invention, there is provided a machine **20** comprising a frame **21** whereon are supported the various elements of a conventional horizontal loom of the Northrop type, including the warp beam **22**, the take-up roll **23**, guide rollers **24**, **25**, feed roller **26**, the lay **27** pivoted at **28**, a set of dobbies **29** co-operating with harness levers **30** for selectively operating various harnesses such as shown at **31***a*, **31***b*, **31***c*, these harnesses being controllable through wires **33***a*, **33***b*, **33***c* passing over rollers **34***a*, **34***b*, **34***c*, and a motor (not shown) which actuates all of these elements in a manner not further described because well known per se. Weft threads, supplied from suitable spools (not shown), form fillings **110** in the shed **90** which in turn is formed by two sets of ground warp threads **90***a* and **90***b* as well as a set of pile warp threads **90***c*. Ground warp threads **90***a* and **90***b*

pass from the beam 22 over guide rollers 24, 25, around rails 89, through the heddles of harnesses 31a, 31b, respectively, through the reed of the lay 27 and, after having been turned into a fabric 38, around guide bar 111, feed roller 26 and deflection roller 112 to the take-up roll 23. The pile warp threads 90c, which may be somewhat heavier than the ground warp and which are supplied by separate spools or the like, not shown, pass through respective apertures 87 of a guide plate 85, enter thereupon between a feed roller 83 and a presser roller 84 co-operating therewith, thence pass around a pair of rollers 76 and 77, which cause them to travel along a short horizontal run on which they traverse the eyes of individual riders 78 forming part of a stop-motion arrangement, and after passing around a roller 86 and guide rails 89 enter the heddles of harness 31c. Rollers 83, 84 and 86 as well as guide plate 85 are supported on a pair of uprights rising from the rear of frame 21, one of which is shown at 181, these uprights in turn carrying brackets such as 182 wherein the rollers 76 and 77 are journaled.

Secured to the frame 21 adjacent the ends of its breast beam 40 are a pair of slide boxes 41, 141 within which move the slides 43, 143, respectively. Extending from the ends of slides 43, 143 are pins 48, 148, respectively, while from each box 41, 141 there project two pins 49, 149, there being associated with each slide a pair of contracting springs 46, 47 and 146, 147, respectively, having their ends anchored to pins 48, 49 and to pins 148, 149, respectively. Also secured to the end of slide 43 is an anchor plate 45. The tendency of springs 46, 47 and 146, 147 is to displace the slides rearwardly from the position shown in the drawing. These slides, which together with a cross beam 68 bridged across the rear ends of the slides form a reciprocable carriage 75, are tilted toward the horizontal so as to be reciprocable in an inclined plane enclosing a small angle with the plane of the pile warp threads 90c when the harness 31c is in its top position as shown, the arrangement being similar to the one disclosed in co-pending application Serial No. 141,476, filed January 31, 1950.

Each slide 43, 143 is provided at the underside of its rear extremity with a set of sawteeth 50, 150 (Fig. 3) co-operating with a dog such as 51 (Fig. 1), the latter being pivoted to the box 41 at 52. Vertical rods 54, 154, slidably guided in sleeves 53, 153, respectively, which are secured to the frame 21, are respectively aligned with the dog 51 associated with the teeth 50 and with its companion dog 151 associated with the teeth 150 of slide 143, each of these rods having a lower end pivoted to a respective lever 55, 155 rotatably held in the frame 21 by a stud 56, 156. A spring such as 57, anchored to the frame 21 at 32, tends to maintain the forward end of lever 55 and, with it, the rod 54 in a raised position in which the top of the rod abuts the dog 51, thereby positively maintaining the latter engaged with a tooth 50 after the slide 43, in a manner subsequently described, has been brought into its retracted position, Fig. 1, against the action of springs 46, 47; it will be understood that lever 155 and rod 154 are similarly spring-biased to maintain the dog 151 in engagement with the teeth 150 of slide 143.

The rods 54, 154 are adapted to be periodically depressed against the action of their biasing springs, such as 57, by means of cams 61, 161 mounted on a shaft 60, these cams co-operating with the levers 55, 155, respectively. Motion is imparted to the shaft 60 by means of a cylinder or sheave 64 keyed thereto and having the end of a wire 66 wrapped around it; this wire passes around a guide roller 67 as well as a guide roller 58 and is tensioned at intervals by a dobby-operated harness lever 130. A torsion spring 59, wrapped around the shaft 60 and anchored to the frame 21 at 63, tends to restore the cams 61, 161 to the position illustrated in Fig. 1 after they have been displaced therefrom by the action of harness lever 130 and wire 66.

Mounted on the shaft 91 of feed roller 83 is a gear 92 which meshes with another gear 95 mounted on a stud shaft 94. A plate 95, loosely pivoted on the stud shaft 94, carries a pawl 96 which is pivoted to the plate at 97. Pawl 96 co-operates with a ratchet 98, fixed to the stud shaft 94 so as to be rigid with gear 93, and is held in contact with the teeth of the ratchet by means of a suitable spring (not shown). The end of roller 83 opposite gear 92 is embraced by the jaws of a brake member 80 which is pivoted to the frame 21 at 88 and frictionally engages the roller 83 to prevent overrunning and maintain the threads 90c at a certain tension.

Pivotally secured to the plate 95, by means of a pin 101, is a bent rod 100 having its other extremity fixed by a nut 103 to the bracket 45 on slide 43. It will thus be seen that forward displacement of the carriage 75, resulting in a displacement of rod 100 to the right (as viewed in Fig. 1), will swing the plate 95 counter-clockwise around the stud shaft 94, thereby imparting a similar movement to the ratchet 98 and to the gear 93, this in turn resulting in a clockwise rotation of gear 92 and a like movement of roller 83.

As best seen in Fig. 2, the lay 27 is formed at each end with an extension carrying a respective lug or bumper 71, 171. The rear end of each slide 43, 143 forms a support for a hook bar 70 which is rotatably journaled therein as more fully described hereinafter in connection with Figs. 3–6; these rear ends of the slides 43, 143 also support a pair of bumper cams 72, 172 respectively aligned and co-operating with bumpers 71, 171.

Turning now to Figs. 3, 4, 5 and 6, there is shown one end of the hook bar 70 (the right-hand end thereof as viewed in Fig. 2) provided with a gudgeon 114 which passes through a slot 113 provided in the enlarged end 115 of the slide 143, this end being also formed with a projection 116 from which depends the bumper cam 172. Fixed to the gudgeon 114, by means of a set screw 117, is a sprocket 118 having four teeth 118a, 118b, 118c and 118d. These teeth are adapted to co-operate with fingers 119a, 119b projecting from a plate 119, the latter being secured to the end 115 by means of bolts 142 passing through elongated holes 144 in the plate 119; a spring 165, secured to the projection 116 at 169, bears upon the plate 119 so as to tend to maintain the latter in the position shown in Figs. 3 and 5, with its fingers 119a, 119b projecting into the path of teeth 118a—118d. A pair of depending spring arms 173a, 173b, fastened to the end 115 by means of studs 174a, 174b, straddle the hook bar 70, which is of square cross section, so as to tend to index the same in one of four predetermined angular positions spaced 90° apart, two of these stable positions being shown in Figs. 3 and 6, respectively.

The hook bar 70 forms a support for two sets of hooks generally indicated at 105a, 105b, respectively, facing in opposite directions, the shanks 106a, 106b of these hooks being secured to oppo-

site faces of the hook bar. These shanks 106a, 106b terminate in offset, fin-shaped portions 109a, 109b lying in a vertical plane, thus in a plane transverse to the axis of hook bar 70, the end of each fin portion 109a, 109b being provided with a short bill 108a, 108b, respectively, which lie in planes parallel to each other and to the axis of the bar. Normally the hook bar 70 is indexed by the springs 173a, 173b in one of its pair of stable positions in which the bill portions 108a, 108b lie in horizontal planes, as shown in Fig. 3, with the hook bar 70 securely held against angular displacement by means of a saddle member 139 rigid with the end element 115 (see Fig. 3).

Associated with the two gudgeons 14, 114 (see also Fig. 2), projecting from the two ends of the hook bar 70, are a pair of vertical rods 254, 354 which are slidably guided in sleeves 253, 353 externally secured to the frame 21. These rods have bifurcate upper ends, as clearly shown in Fig. 3, which serve to engage the gudgeons 14, 114, respectively when the rods are raised from their normal position (solid lines, Figs. 3 and 4) into an off-normal position (dot-dash lines, Fig. 4) by mechanism about to be described. The lower end of each of these rods is linked to a lever 255, 355, respectively, pivoted to the frame 21 as indicated for the lever 355 at 356 (Fig. 1). Springs, such as spring 357 anchored to frame 21 at 332, tend to swing these levers counter-clockwise (as viewed in Fig. 1), thereby raising the rods 254, 354, yet this movement is normally opposed by a pair of associated cams 261, 361 fastened to shafts 260, 360 which pass through the frame 21 and carry sheaves 264, 364 on their inner ends. Wires 266, 366, passing around rollers 267, 367 and 258, 358, engage the sheaves 264, 364 and are controlled by a dobby-operated harness lever (not shown) in substantially the same manner as is the wire 66 by harness lever 130, for the purpose of rotating the cams 261, 361 at predetermined intervals from their lowermost position which they normally occupy (see Fig. 1) and into which they are urged by torsion spring 259, 359.

The machine just described operates as follows:

At regular intervals, say, after each fourth traverse of the shuttle (not shown), the wire 66 is tensioned and causes the shaft 60, together with the cams 61, 161, to rotate counter-clockwise (as viewed in Fig. 1). The levers 55, 155 are thus depressed and lower the rods 54, 154 so as to withdraw their ends from the dogs 51, 151 engaging the teeth 50, 150 of the slides 43, 143. When the lay 27 swings from its rearward position (dotted lines, Fig. 1) into its forward position (solid lines), its lugs 71, 171 strike the bumper cams 72, 172 of the carriage 75, there resulting a slight forward displacement of the slides 41, 141 which allows the dogs to become disengaged from the teeth thereof and to drop upon the extremities of the rods 54, 154, thereby releasing the carriage 75 for movement toward the harnesses as the lay subsequently recedes. As the carriage follows the rearward swing of the lay, by virtue of the action of springs 46, 47 and 146, 147, it ascends an inclined plane (determined by the position of the boxes 41, 141) until its rearwardly positioned hooks, assumed to be the hooks 105a in accordance with the showing of Figs. 1 and 3, engage respective ones of the pile warp threads 90c which have been presented to these hooks through the timely operation of harness 31c which has risen into a position higher than that attainable by the other two harnesses.

When the lay 27 again moves to the fore, it restores the carriage 75 to its normal position, at the same time causing the bill portions 108a of hooks 105a to entrain the threads 90c engaged thereby and to draw them into loops. The rods 54, 154 have risen just before the carriage 75 reaches its home position, thus causing the dogs 51, 151 to re-engage the teeth 50, 150 and lock the carriage in its inoperative position. In the course of the following cycles of operation, the loops so formed are firmly anchored in the body of the fabric 38 by the successive traverses of the shuttle and reciprocations of the lay, acting in the conventional manner.

When the carriage was first moved backwards by the action of springs 46, 47, 146, 147, the rod 100 was displaced to the left (as viewed in Fig. 1), resulting in a clockwise rotation of plate 95 around the stud shaft 94 which caused the pawl 96 to pass ineffectively over the teeth of the ratchet 98. Thereafter, as the carriage 75 returns to its normal position at the front of the loom, the pawl 96 rotates the feed roller 84 through an angle sufficient to supply the extra length of thread required by the loop formation, thereby substantially maintaining constant the tension of the pile warp threads 90c. Between movements of the hook bar, i. e. when no loops are being formed, the feeding movement of the fabric 38 (due to rotation of rollers 26 and 23) also entrains the pile warp threads, causing roller 83 to rotate in such sense that ratchet 98 passes unhindered under the tip of pawl 96.

As long as the harness lever controlling the wires 266, 366 remains unoperated, no change will occur in the mode of operation described, and rows of loops will be formed at regular intervals in essentially the same manner as set forth in application Serial No. 141,476. Let us assume, now, that it is desired to change the character of the rows by substituting the hooks 105b for the hooks 105a. The wires 266, 366 are then tensioned (in the arrangement described by the provision of suitable pegs in the dobby chain) and the cams 261, 361 are rotated to allow the rods 254, 354 to rise, thus raising the gudgeons 14, 114 in their associated slots (such as 113) and lifting the hook bar 70. As will be apparent from Figs. 3 and 5, such a lifting of the hook bar brings one of the teeth of sprocket 118, in this case the tooth 118d, into contact with the lower finger 119a of plate 119, thus causing the hook bar 70 to be swung clockwise about its axis, spreading the springs 173a, 173b as it does so. The restoring force of these springs insures, after the hook bar 70 has risen past the finger 119a, that the sprocket 118 rotates through a full 90°, whereby the next sprocket tooth (118a) will be placed in the path of upper finger 119b before the gudgeon 114 reaches the peak of its travel. Hook bar 70 is thus rotated through another quarter of a circle, being thereafter maintained by the springs 173a, 173b in a position 180° away from its starting position. The bar 70 remains in this position, as shown in Fig. 6, when descending under its own weight during the subsequent downward movement of the rods 254, 354, the teeth 118a, 118b camming aside the plate 119 against the action of the relatively weak spring 165 as they pass the fingers 119a, 119b.

When the hook bar 70 reaches the bottom of its stroke, it is guided by the spring 173a, 173b into the saddle 139 which thereupon again prevents angular displacement. The positions of hooks 105a and 105b are now interchanged, it being understood that the operation just described took place with the carriage 75 locked in home posi-

tion between successive reciprocations so that the next loop drawing movement of the carriage will find the hooks 105b in place for engagement of the pile warp threads 90c.

The rows of loops adapted to be formed by the hooks 105b may differ from that produceable by the hooks 105a in various respects. If the hooks 105a, 105b are of different length, the loops will be distinguishable by their size. It may be mentioned that, if there is a marked difference in length between the two sets of hooks, it may be desirable to adjust the feed mechanism 83, 95, 98, 100 so as to cause the pile warp threads to be slackened sufficiently to enable the formation of the longer loops without excessive tension, and to supplement this mechanism with a tension roller or the like for the purpose of taking up the excess slack during formation of short loops, this slack being then absorbed by the advancing fabric. For a more detailed description of such a tension roller, reference is made to co-pending application Serial No. 154,403, filed April 6, 1950, now abandoned. Again, as shown in Fig. 4, the hooks 105a and 105b may be relatively staggered on the hook bar 70; this will give rise to rows of loops in which the loops are laterally offset with respect to the loops of other rows. In such a case it may be advantageous to lead the threads opposite hooks 105a and the threads opposite hooks 105b over separate tension rollers for the purpose of absorbing the slack created by the non-entrainment of one or the other set of threads. Finally, the hook of one set may be provided with cutting blades for cutting open the loops after their formation, or one or both sets may be selectively interspersed with hooks of this type, such hooks having been described in great detail in co-pending application Serial No. 129,573, filed November 26, 1949.

The arrangement of Figs. 7 and 8 is similar to the one previously described and the same reference numerals have been used to denote corresponding elements. The carriage 75 has been modified, however, by disposing the box 41 and the slide 43 horizontally in the manner shown in application Ser. No. 123,545, now Patent No. 2,547,824, referred to above. Also, the hooks 105a have been given a form different from that of hooks 105b, so that the loops drawn by the former will be longer (as will be apparent from Fig. 7). It will further be noted that the bumpers 72 (not shown in Figs. 7, 8) and 172 have been shortened, in view of the fact that the relative position between these bumpers and lugs 71, 171 changes less in the arrangement now referred to.

The arrangement shown in Figs. 9 and 10 embodies the invention in a machine of the character disclosed in copending application Ser. No. 123,544, filed October 26, 1949, now Patent No. 2,574,108. As described in that application, the hook bar is horizontally entrained by the reciprocating carriage 75 but is displaceable perpendicular thereto, being guided along an inclined path by a pair of guide rods along which there are slidably displaceable a pair of riders or sleeves connected with the hook bar. Figs. 9 and 10 show one such guide rod, designated 300, on which there is slidable a rider 301 from which depends a link 302, the latter being connected with a hanger 303 forming an arcuate rest 304 for the end of gudgeon 114. The box 141 and the slide 143 are horizontally disposed, similar to Figs. 7 and 8, but the end member 115 has been enlarged to allow for a lengthening of slot 113 and for a deepening of saddle 139 in order to insure that the hook bar 70 remains engaged by this saddle and its teeth 118a—118d remain clear of the finger 119a when the rider 301 ascends the rod 300 during rearward displacement of the carriage 75; this is indicated in dotted lines in Fig. 9, showing the extreme operative position of the carriage and of the hook bar. The rod 300 is anchored to a depending bracket 305, which may be vertically displaceable to allow for a limited adjustment of the inclination of the rod, and also to a post 306 rising from the breast beam 40. When the slide 143 is in its home position (teeth 150 engaged by dog 151), a rise of the rod 354 will operate to lift the gudgeon 114 off its rest 304 and thereafter to bring the teeth of sprocket 118 into engagement with the fingers 119a, 119b of plate 119, thus effecting rotation of the hook bar 70 as previously described.

Figs. 11, 12 and 13 show the invention applied to a machine of the character disclosed in copending application Serial No. 136,043, filed December 30, 1949. Here the slotted member 115, forming a housing for the gudgeon 114, is secured to the lower end of a swinging arm 307 keyed to a shaft 308 which is held in a bearing 309. Keyed to the same shaft 308 is a lever 310 which, via a link 311, is connected with an oscillating lever is pivotally linked at its ends to the lever 312 312 pivoted to the frame 21 at 313. An arm 314 is pivotally linked at its ends to the lever 312 and to a lever 315 which is pivoted to the frame 21 at 316. Lever 315 is urged upwardly by a spring 317 and carries a cam follower 318 riding the periphery of a cam 319, the latter having a notch 320 and being continuously rotated from a timing shaft 321 by means of gears 322, 323 and 324. The shaft 321 is preferably part of the mechanism for rocking the lay 27, thus insuring synchronism between the movements of the lay and the arm 307 which here is an element of the carriage 75. It will be seen that once during each revolution of the cam 319, i. e. when the notch 320 reaches the follower 318, the spring 317 is permitted to raise the lever 315, thus causing the arm 307 to swing inwardly toward the pile warp threads 90c which are thereupon engaged by respective hooks 105a or 105b, depending upon the position of the hook bar 70; it will also be noted that the cross section of hook bar 70 has been modified slightly (except at its ends) to position the hooks 105a, 106a horizontally when the arm 308 has moved to the rear.

Although various forms of the invention have been specifically shown and described, it should be understood that the invention is not limited to these embodiments but is, on the contrary, capable of numerous modifications and adaptations without exceeding the scope of the appended claims.

What is claimed is:

1. In a machine for weaving a fabric with loops thereon, in combination, a support, a plurality of sets of hooks on said support, one of said sets of hooks occupying an operative position, and mechanism selectively operable to transfer said one set to an inoperative position and to place another of said sets in said operative position.

2. In a machine for weaving a fabric with loops thereon, in combination, a reciprocable carriage, a plurality of sets of hooks on said carriage, one of said sets of hooks occupying an operative position, first mechanism for selectively reciprocating said carriage, and second mech-

anism operable independently of said first mechanism to transfer said one set to an inoperative position and to place another of said sets in said operative position.

3. The combination according to claim 2, comprising control means for actuating said second mechanism during a period of inactivity of said first mechanism.

4. In a machine for weaving a fabric with loops thereon, in combination, a support, a hook supporting member displaceably positioned on said support, a plurality of sets of hooks on said hook supporting member, one of said sets of hooks occupying an operative position, and mechanism selectively operable to transfer said one set to an inoperative position and to place another of said sets in said operative position by displacing said hook supporting member relative to said support.

5. In a machine for weaving a fabric with loops thereon, in combination, a reciprocable carriage, a hook supporting member displaceably positioned on said carriage, a plurality of sets of hooks on said hook supporting member, one of said sets of hooks occupying an operative position, first mechanism for selectively reciprocating said carriage, and second mechanism operable independently of said first mechanism to transfer said one set to an inoperative position and to place another of said sets in said operative position by displacing said hook supporting member relative to said carriage.

6. In a machine for weaving a fabric with loops thereon, in combination, a support, a hook bar rotatably mounted on said support, a plurality of sets of hooks on said hook bar, said sets of hooks extending in different directions from the axis of said hook bar, and mechanism selectively operable to rotate said hook bar through an angle such as to place one of said sets of hooks in a position previously occupied by another of said sets.

7. The combination according to claim 6 wherein said support is provided with a pair of housings with slots therein, said hook bar having two extremities extending through said slots of said housings, respectively, said mechanism comprising a first projection extending from said hook bar, a second projection secured to said support, and actuating means operable to displace said extremities in said slots, thereby bringing said first projection into engagement with said second projection, said two projections co-operating to rotate said hook bar.

8. The combination according to claim 7, comprising spring means tending to maintain said hook bar in any one of a plurality of stable angular positions.

9. The combination according to claim 8 wherein said hook bar is of rectangular cross section, said spring means comprising a pair of spring arms flanking said hook bar and bearing upon opposite sides thereof.

10. The combination according to claim 6 wherein said hook bar is radially displaceable from a normal position, said mechanism being operative to radially displace said hook bar from said normal position prior to rotating said hook bar, said support being provided with retaining means effective in said normal position to prevent rotation of said hook bar.

11. The combination according to claim 10 wherein said hook bar is of angular cross section and terminates in a pair of round gudgeons, said support being provided with a pair of housings having slots respectively receiving said gudgeons, said hook bar being in its normal position with said gudgeons adjacent one end of said slots, said mechanism being operable to displace said gudgeons toward the other end of said slots.

12. The combination according to claim 11 wherein said mechanism comprises a sprocket secured to and displaceable with said hook bar, and finger means extending from said support into the path of displacement of the teeth of said sprocket.

13. In a machine for weaving a fabric with loops thereon, in combination, a reciprocable carriage, first mechanism for displacing said carriage from a home position, a hook bar rotatably mounted on said carriage, a plurality of sets of hooks on said hook bar, said sets of hooks extending in different directions from the axis of said hook bar with one of said sets of hooks pointing in the general direction of displacement of said carriage from said home position, and second mechanism operable independently of said first mechanism to rotate said hook bar through an angle such as to place another of said sets of hooks in the position previously occupied by said one set of hooks.

14. The combination according to claim 13 wherein said carriage is provided with mounting means for said hook bar allowing for a radial displacement of said hook bar in a direction substantially perpendicular to the direction of reciprocation of said carriage, said second mechanism comprising actuating means positioned to engage said hook bar in the home position of said carriage for displacement of said hook bar in said perpendicular direction.

15. The combination according to claim 14 wherein said mounting means allows for a substantially vertical displacement of said hook bar between a lower and an upper position, said mounting means being provided with retaining means preventing rotation of said hook bar in said lower position.

16. The combination according to claim 13 wherein said sets of hooks differ in the positioning of the hooks of each set along said hook bar.

17. The combination according to claim 13 wherein said sets of hooks differ in the effective lengths of the hooks thereof.

18. The combination according to claim 13 wherein said sets of hooks differ in the form of said hooks.

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No references cited.