

June 14, 1932.

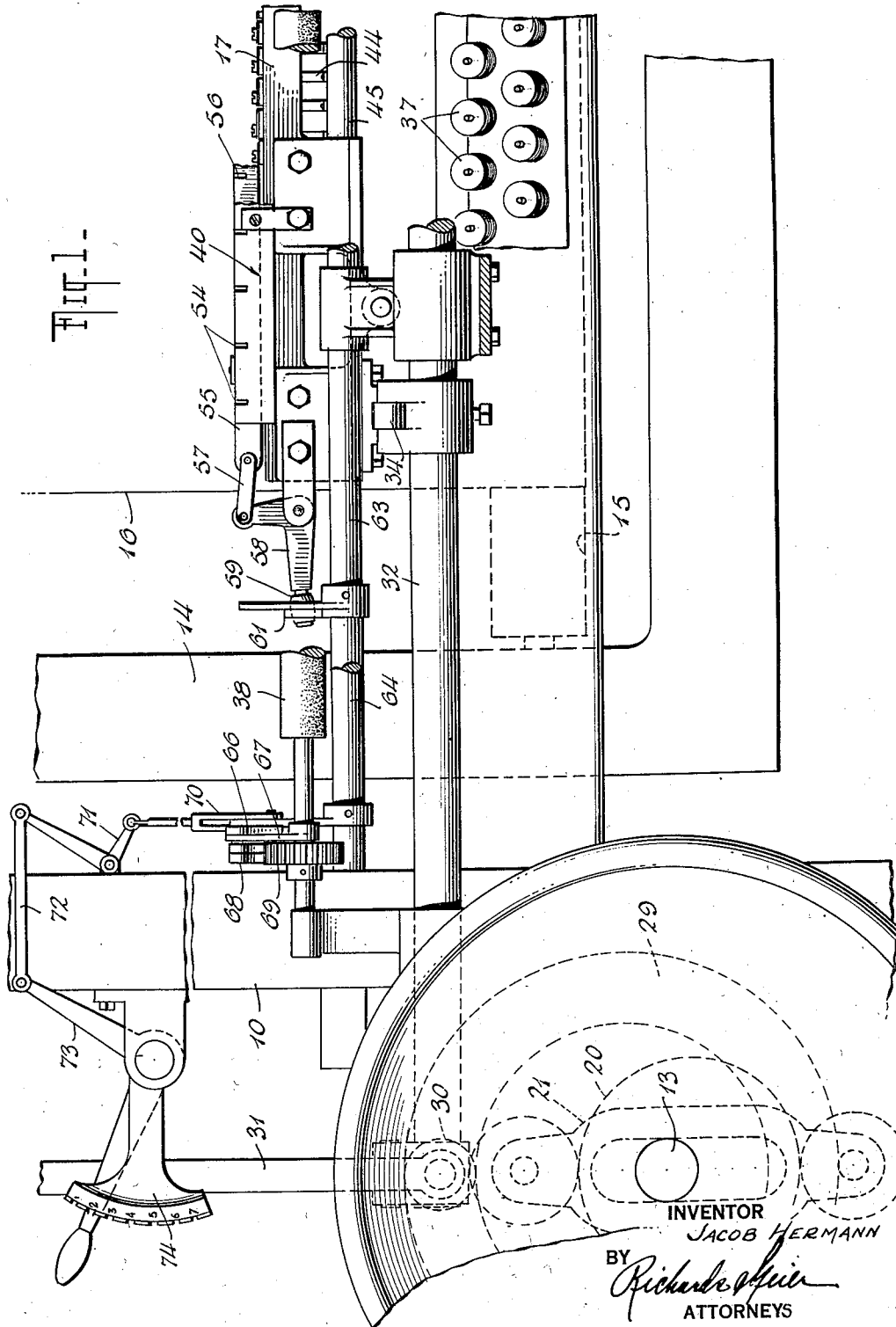
J. HERMANN

1,863,049

MACHINE FOR MAKING PILE FABRICS

Filed Dec. 16, 1929

4 Sheets-Sheet 1



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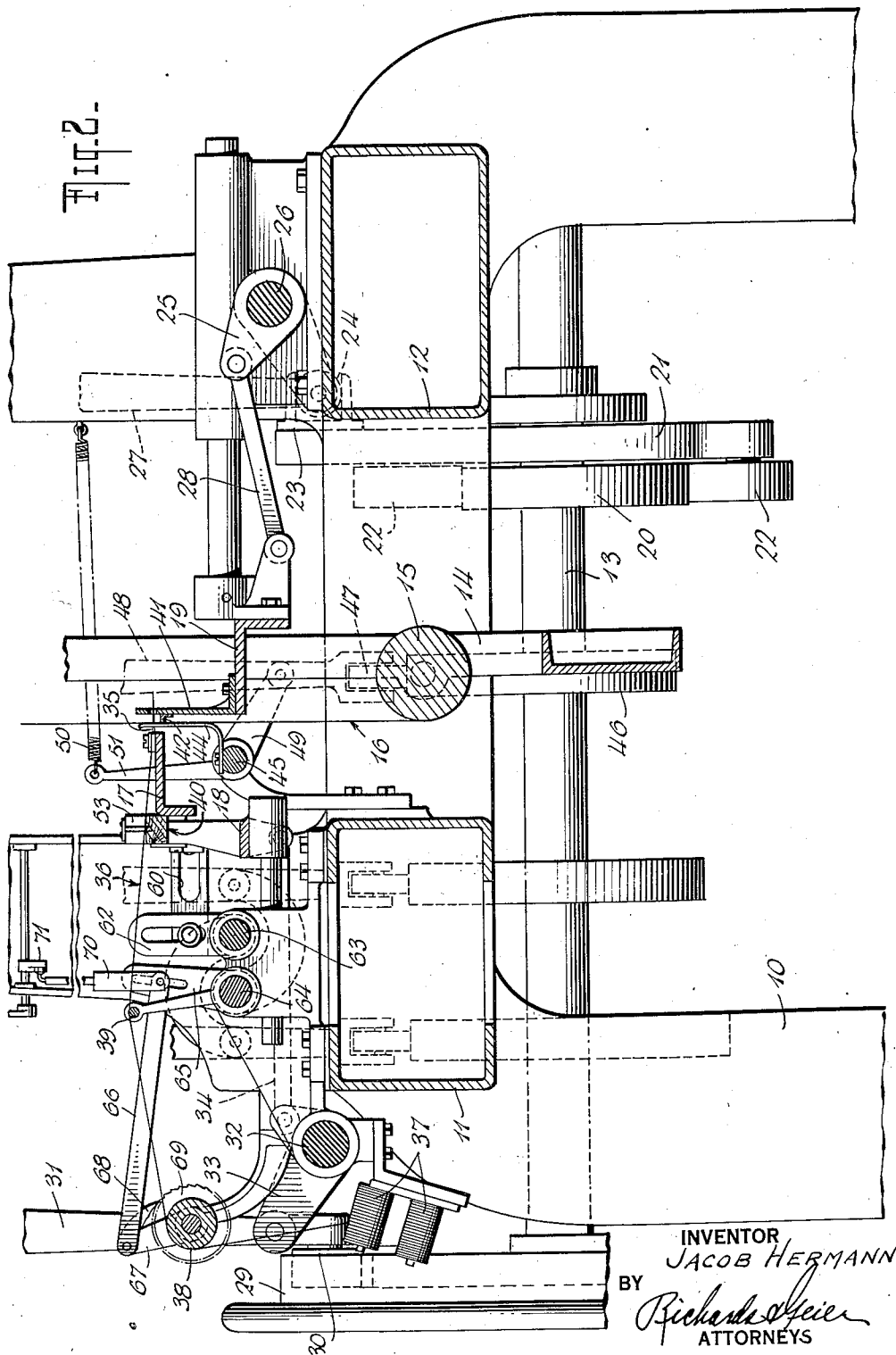
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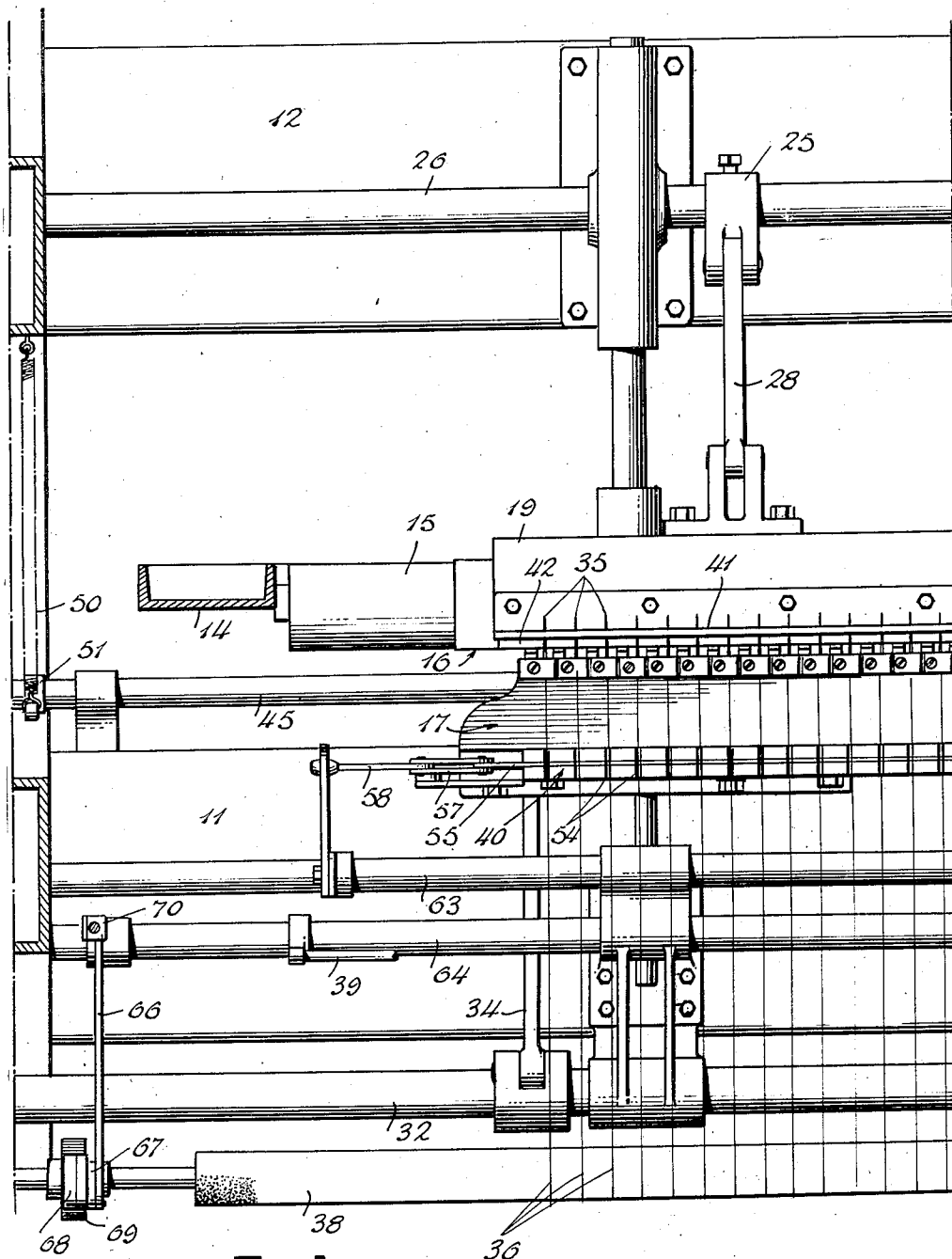


Fig. 3.

INVENTOR
JACOB HERMANN
BY
Richard Stein
ATTORNEYS

June 14, 1932.

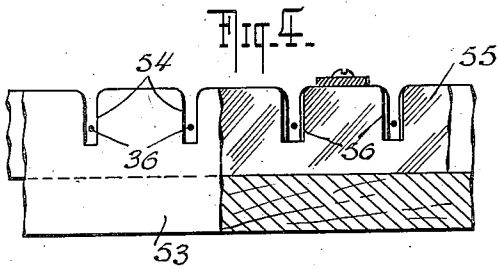
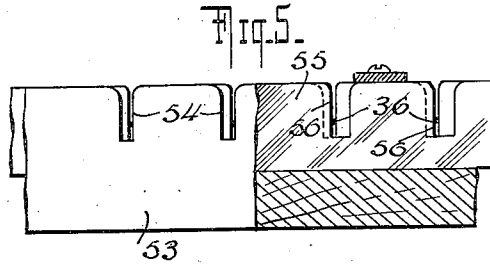
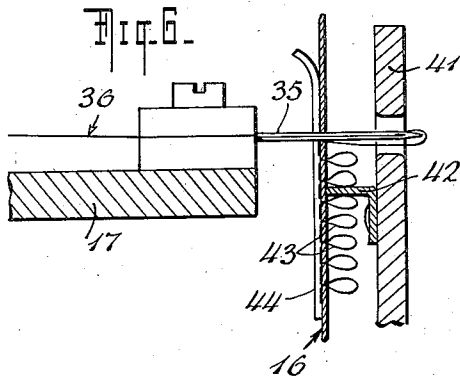
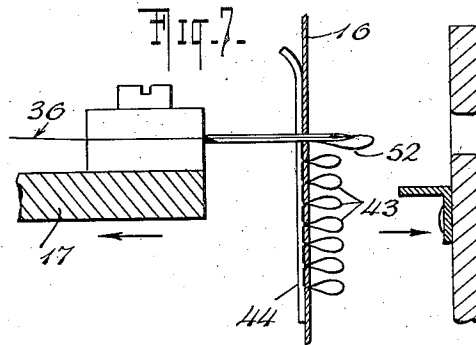
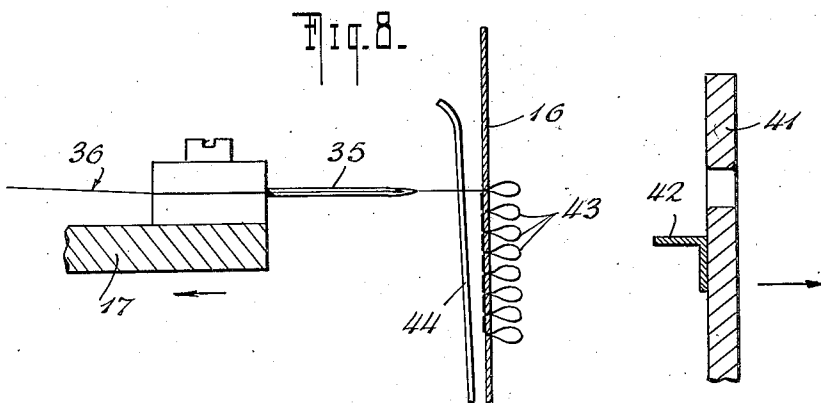
J. HERMANN

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BY

INVENTOR
JACOB HERMANN
Richard A. Guir
ATTORNEYS

UNITED STATES PATENT OFFICE

JACOB HERMANN, OF NEWTON, NEW JERSEY

MACHINE FOR MAKING PILE FABRICS

Application filed December 16, 1929. Serial No. 414,326.

This invention relates to improvements in the art of making fabrics, and has particular reference to a machine for making pile fabrics, especially of the embroidered type.

An object of the invention is to provide an improved machine in which the pile of the fabric consists of thread loops formed by the operation of a plurality of needles and in which the formation of said loops is under the control of a thread-gripping device which is automatically operated during each reciprocation of the needle bar of the machine to hold each thread while the associated needle is forming a loop.

Another object is to provide a novel means for engaging the foundation fabric, during the penetration thereof by the needles, in such manner as to prevent excessive bulging of the fabric due to the pressure of the needles thereagainst and to avoid crushing the loops which constitute the pile of the fabric.

A further object is to form a pile loop in a fabric by reciprocating a needle which is adapted to carry the thread through the fabric when the needle penetrates the latter and to hold said thread as the needle is being withdrawn from the fabric so that a portion of the thread will be left in the form of a loop on one side of the fabric after complete withdrawal of said needle.

The above and other objects will appear more clearly from the following detailed description, when taken in connection with the accompanying drawings, which illustrate a preferred embodiment of the inventive idea.

In the drawings—

Figure 1 is a partial front elevation of an embroidery machine showing the application of the invention thereto;

Figure 2 is a partial transverse section through the machine;

Figure 3 is a fragmentary top plan view;

Figure 4 is a fragmentary enlarged elevation, partly in section, of a thread-gripping device forming a part of the invention showing the elements of the device in their inoperative positions;

Figure 5 is a similar view showing the device in its operative or thread-gripping position; and

Figures 6, 7 and 8 are enlarged sectional views illustrating progressively the movements of parts of the machine relative to a foundation fabric when forming pile loops thereon.

The invention is shown in its application to an embroidery machine of a known type which comprises a main frame 10 having the longitudinally extending front and rear beams 11 and 12, and which supports the main drive shaft 13.

In approximately the longitudinal center of the machine there is mounted the fabric supporting frame 14 which extends the entire height of the machine, only the lower portion of said frame being illustrated. A roller 15 is provided on which the fabric 16 is wound, there being a similar roller at the upper end of the frame. The frame 14 is controlled in the usual manner by a jacquard or other suitable mechanism (not shown) for movements in vertical, horizontal and oblique directions relative to the needle bar 17. The machine further comprises the front and rear reciprocary carriages, generally indicated by the numerals 18 and 19 and supported, respectively, by the front and rear beams 11 and 12. The reciprocating movements of the rear carriage 19 are controlled from the main drive shaft 13 and a cam 20 thereon which is designed to vertically reciprocate a yoke member 21 having upper and lower rollers 22 engageable with the surface of said cam. The upper end of the yoke 21 is provided with a bifurcated bracket which receives in the bifurcation thereof a bar 24 connected to one end of a crank arm 25 mounted upon the rocking shaft 26. The bar 24 is joined, through the connecting member 27, to the other superposed carriages (not shown) of the machine which are duplicates of the one illustrated in the drawings. The crank arm 25 is connected to the rear carriage 19 by a link 28 so that as said crank arm is oscillated under the influence of the vertical movements of the yoke 21 a reciprocary movement is imparted to said carriage and also through the connection 27 to the other superposed rear carriages.

The reciprocary movements of the front

carriage, which are in opposite directions to those of the rear carriage, are controlled through the medium of a cam wheel 29 mounted upon the front end of the main shaft 13 and operating a roller 30 carried by the lower end of a connecting member 31 similar to the member 27 and adapted to control the movements of the superposed front carriages of the machine. A rocking shaft 32 supported by the beam 11 is connected to the member 31 by a bell-crank 33 so as to oscillate said shaft in accordance with the vertical movements of the member 31, and said bell-crank is joined to the front carriage 18 through a link 34 to impart reciprocations to said carriage as the bell-crank 33 is rocked. Thus it will be seen that the two carriages 18 and 19 will be moved toward and away from each other and relative to the foundation fabric 16 which is only moved in a vertical plane.

The needle bar 17, carried by the front carriage 18, extends longitudinally of the machine and supports a row of needles 35 each having a thread 36 connected thereto which is fed to the needle from a bobbin 37 mounted upon the front of the machine. Each thread is led over a step-by-step actuated feed roller 38 of a feeding device to be later described, then over a tension bar 39 and through a thread-gripping device 40, forming a part of the present invention, to one of the needles 35.

Upon the rearward movement of the front carriage and simultaneous forward movement of the rear carriage, each needle 35 penetrates the fabric 16, as shown in Figures 2 and 6 and carries therewith the thread 36, said fabric having been previously moved, that is, while the carriages are separated, by the jacquard or similar mechanism controlling the frame 14. During the aforesaid rearward movement of the carriage 18 the thread-feeding roller 38 is stepped to feed a definite length of thread rearwardly through the gripping device which, at this time, is inoperative to hold the thread.

The movements of the carriages toward each other are so timed by their respective cams 20 and 29 that, when the needles are about to penetrate the fabric 16, the rear carriage has reached its forward position wherein a plate 41 carried thereby is in juxtaposition to the fabric. This plate carries a presser element 42 in the form of an angle bar which presents to the fabric only an edge thereof adapted to engage the foundation fabric between the pile loops 43, or at least a great majority thereof, thereby to prevent crushing of the formed loops as would occur with presser elements which are at present employed on machines of this character. The engagement of the element 42 with said fabric prevents a rearward bulging of the latter due to the pressure of the needles 35 thereagainst.

A second presser member, comprising a plurality of fingers 44, is mounted in front of the fabric 16 and is adapted to engage the fabric, during the withdrawal of the needles therefrom at the beginning of the forward movement of the carriage 18, so as to prevent bulging of said fabric. Said fingers 44 are supported on an oscillatory shaft 45 carried by the beam 11 and said shaft is rocked to disengage the fingers from the fabric while the carriages are being separated so as to permit the fabric to be moved to its next position by the jacquard mechanism preparatory to the following operation of the needle bar. The rocking of the shaft 45 is controlled by a cam 46 on the shaft 13 which engages a roller 47 carried by the vertically movable connecting member 48 joined to the other presser members 44 associated with the superposed rows of needles. This connection is established to each of the shafts 45 by a crank arm 49 so that upward movement of the member 48 will cause the fingers to be rocked away from the fabric as shown in Figure 8. This movement is against the action of a spring 50 connected to the arm 51 on the shaft 45 and when the roller 47 passes from the high portion of the cam 46 said spring operates to rock said shaft in the opposite direction to again move the fingers 44 toward the fabric.

Returning now to the stage of the operation where the carriages 18 and 19 begin their movements away from the fabric, that is after the penetration of the latter by the needles and at the beginning of the withdrawal of said needles, it is at this point that the gripping device 40 becomes effective to hold the various threads so that as the needles are withdrawn they will each begin the formation of a loop as indicated at 52 in Figure 7. This loop is completed after the parts have reached the position of Figure 8 and the device 40 is then operated to release the threads preparatory to the next feeding operation by the roller 38.

The gripping device 40, supported by the carriage 18 forwardly of the needle bar and coextensive therewith, comprises a channeled supporting member 53, the opposed walls of which are provided with aligned openings or slots 54 through which the threads 36 are passed. In the channel of said member there is mounted for reciprocation a slide 55, which is also provided at intervals with openings or slots 56 adapted to alternately align and move partially out of registration with the slots 54 as the slide is reciprocated. When the various slots are aligned, as shown in Figure 4, the threads are free to pass through and the device is inoperative, but when the slide is moved to the position shown in Figure 5, the thread passing through each group of slots 54 and 56 is gripped between opposed edges of said slots, this gripping action occurring during the withdrawal

movement of the carriage 18. To oscillate the slide 55, one end thereof (Figure 1) is connected, by a link 57 to a bell-crank 58 having a roller 59 at one end. This roller moves in the slot 60 (Figure 2) of an arm 61 which is adapted to be rocked in a vertical plane to similarly effect the bell-crank 58 and thus move the slide. The arm 61 is actuated by a crank 62 mounted upon the shaft 63 which is rocked from the main shaft 13 as indicated, the timing being such that the arm 61 is moved downwardly as the carriage moves forwardly.

The thread-feeding mechanism, including the roller 38, is also controlled from the shaft 13 which rocks the shaft 64, as indicated. The latter shaft carries a crank 65 having one end of a link 66 slidably connected therewith, said end being adjustable relative to the crank to vary the throw of the link and consequently regulate the amount of each rotative movement of the roller 38. The opposite end of the link 66 is connected to an arm 67 pivoted on the roller 38 and said arm carries two pawls 68 engageable with the ratchet 69 on said roller. Said pawls are offset slightly to each other so that if one does not engage a tooth of the ratchet the other will, thus insuring proper stepping of the roller 38.

To vary the throw of the link 66 so as to regulate the amount of thread advanced toward the needle bar 17 by the feeding mechanism, the end of said link joined to the arm 65 is supported by a hanger 70 pivoted at its upper end to a bell-crank 71 carried by the frame of the machine. This bell-crank is connected, through the link 72 to a second bell-crank 73, one end of which terminates in a handle which is associated with a graduated segment 74 having indicia thereon to indicate the proper position of the handle for a certain predetermined length of thread to be advanced over the roller 38. Thus, by adjusting the handle of the crank 73, the hanger 70 may be raised or lowered to change the relative position of the link 66 to the crank 65 and thereby control the amount of movement of said link.

What is claimed is:

1. In a machine for making pile fabrics, front and rear carriages, means to reciprocate said carriages in opposite directions relative to a foundation fabric interposed therebetween, a needle bar carried by one of said carriages the needles of which are operable to form pile loops in said fabric, and a presser plate on the other carriage engaging said fabric during the penetration thereof by said needles.

2. In a machine for making pile fabrics, front and rear carriages, means to reciprocate said carriages in opposite directions relative to a foundation fabric interposed therebetween, a needle bar carried by one of said

carriages the needles of which are operable to form pile loops in said fabric, and a presser plate on the other carriage having an edge engageable with said fabric between the pile loops thereon while said needles are penetrating said fabric.

3. In a machine for making pile fabrics, front and rear carriages, means to reciprocate said carriages in opposite directions relative to a foundation fabric interposed therebetween, a needle bar carried by one of said carriages the needles of which are operable to form pile loops in said fabric, and means on the other carriage operable, during the penetration of the fabric by said needles to engage said fabric between the pile loops formed thereon.

4. In a machine for making pile fabrics, front and rear carriages, means to reciprocate said carriages in opposite directions relative to a foundation fabric interposed therebetween, a needle bar carried by one of said carriages the needles of which are operable to form pile loops in said fabric, and a presser element on the other carriage presenting an edge to the pile side of the fabric and engageable between loops of said pile adjacent the points of penetration of the fabric by said needles.

5. In a machine for making pile fabrics, a reciprocatory needle bar, a roller over which threads are fed to the needles of said bar, an intermittently operated mechanism movable upon each reciprocation of said needle bar to step said roller a partial revolution, and means to vary the movement of said mechanism whereby to regulate the amount of each partial revolution of said roller.

6. In a machine for making pile fabrics, a reciprocatory needle bar, a roller over which threads are fed to the needles of said bar, a pawl and ratchet for rotating said roller, an oscillatory member, and a link connection between the latter member and said pawl.

7. In a machine for making pile fabrics, a reciprocatory needle bar, a roller over which threads are fed to the needles of said bar, a pawl and ratchet for rotating said roller, an oscillatory member, a link connection between the latter member and said pawl, and means to regulate the amount of movement of said link connection by said oscillatory member.

In testimony whereof I have affixed my signature.

JACOB HERMANN.