

No. 705,325.

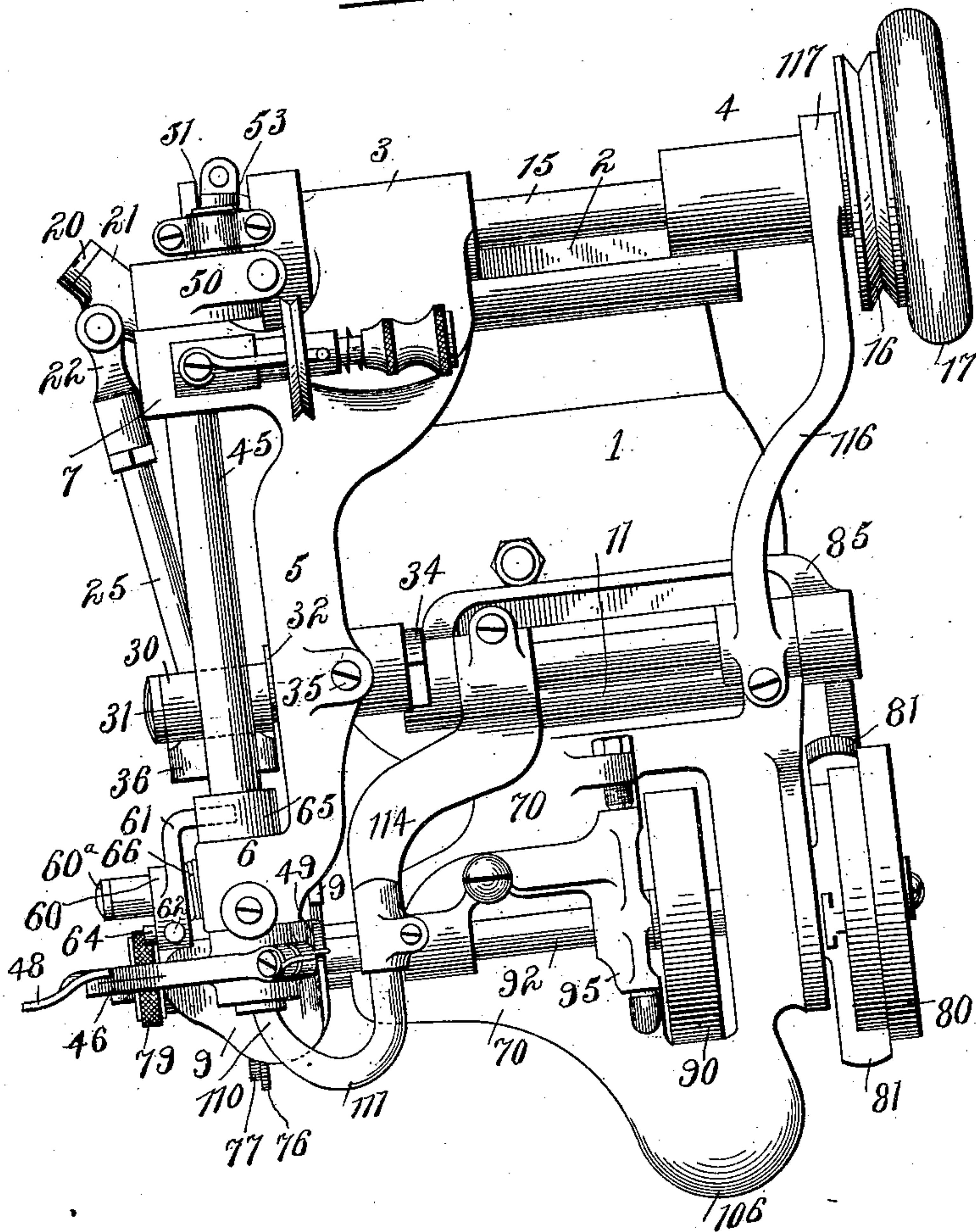
C. A. DEARBORN.
BLINDSTITCH SEWING MACHINE.
(Application filed Nov. 26, 1900.)

Patented July 22, 1902.

3 Sheets—Sheet 1.

(No Model.)

Fig. 1.



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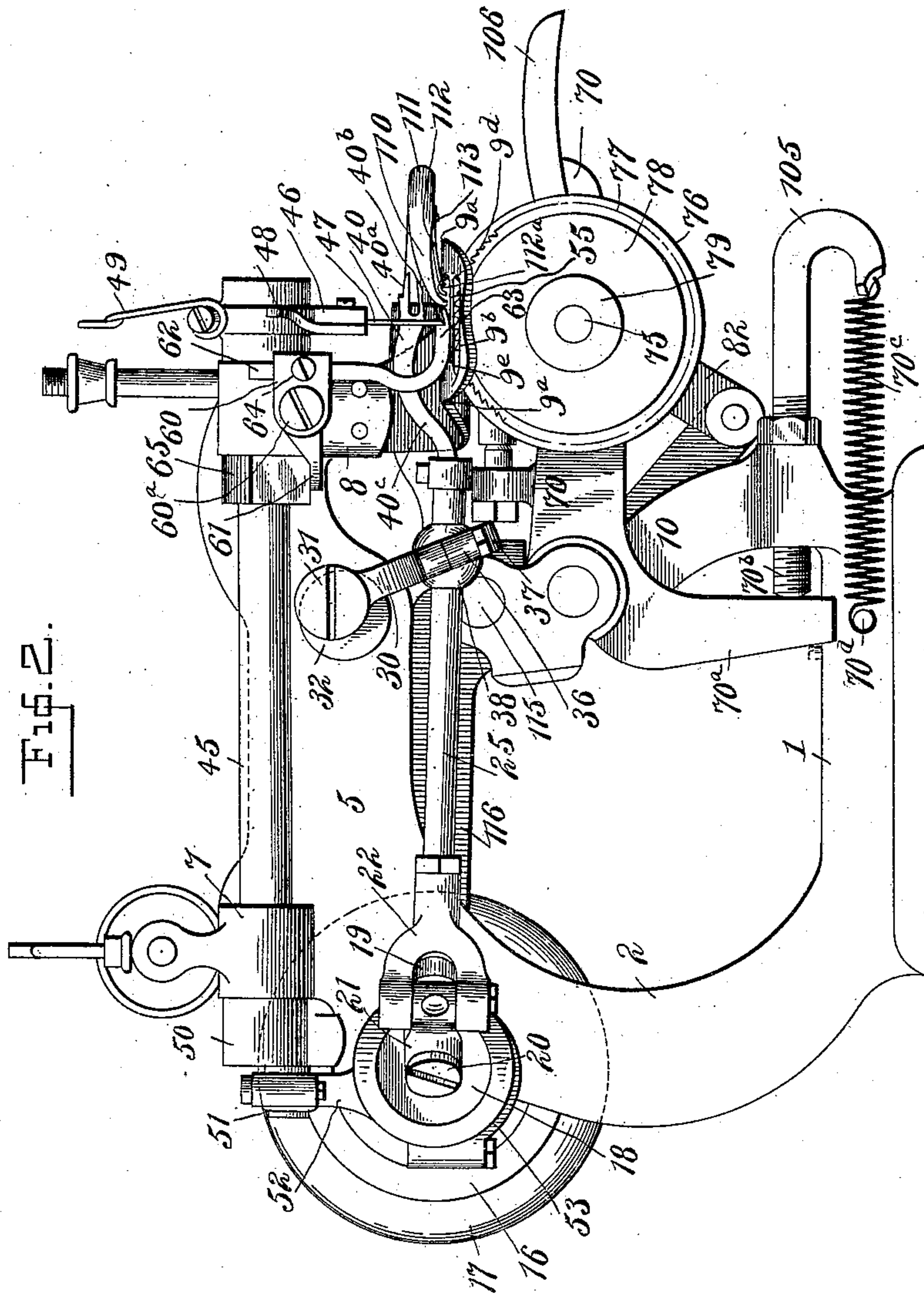
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3 Sheets—Sheet 2.



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3 Sheets—Sheet 3.

Fig. 3.

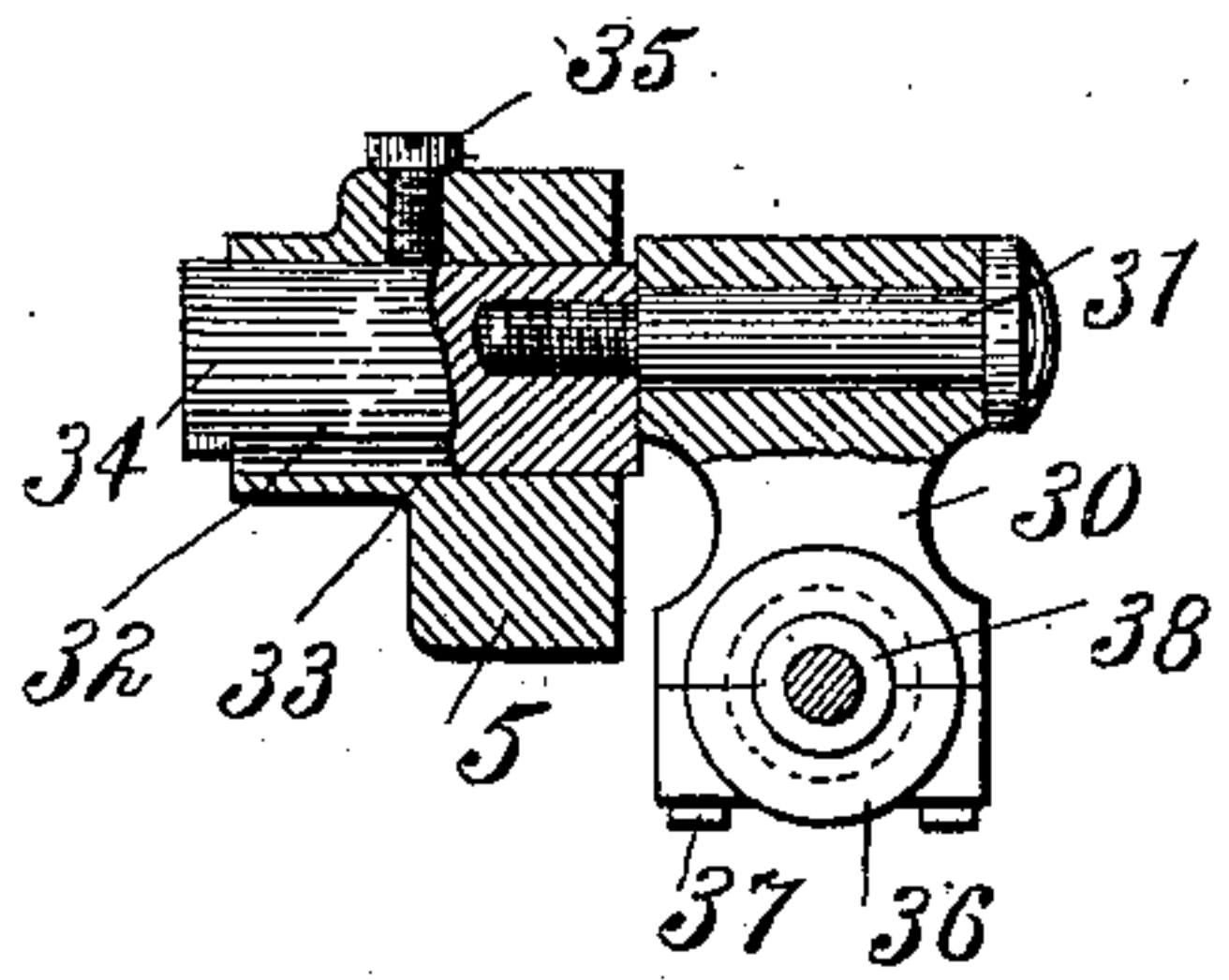


Fig. 4.

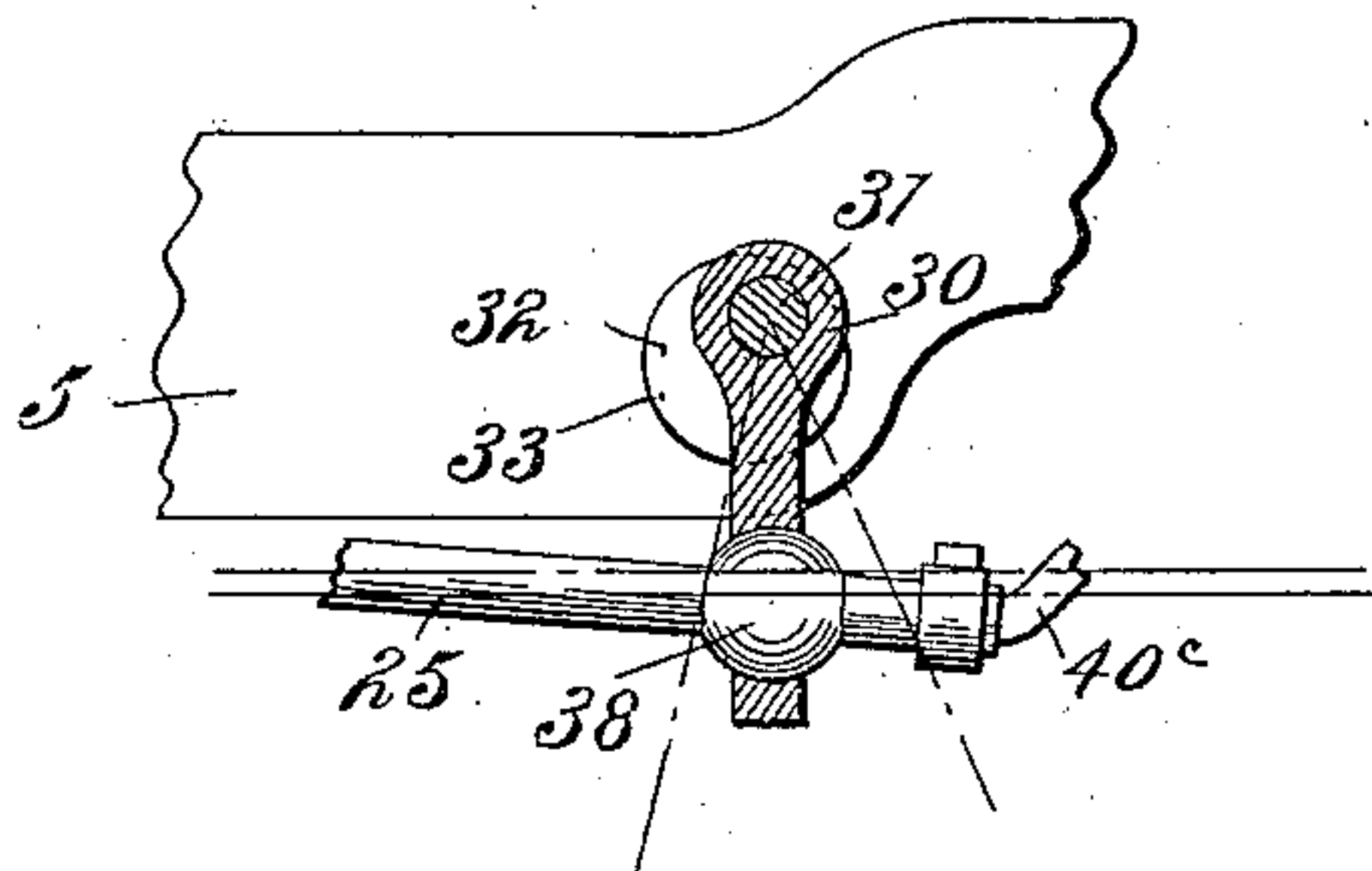


Fig. 5.

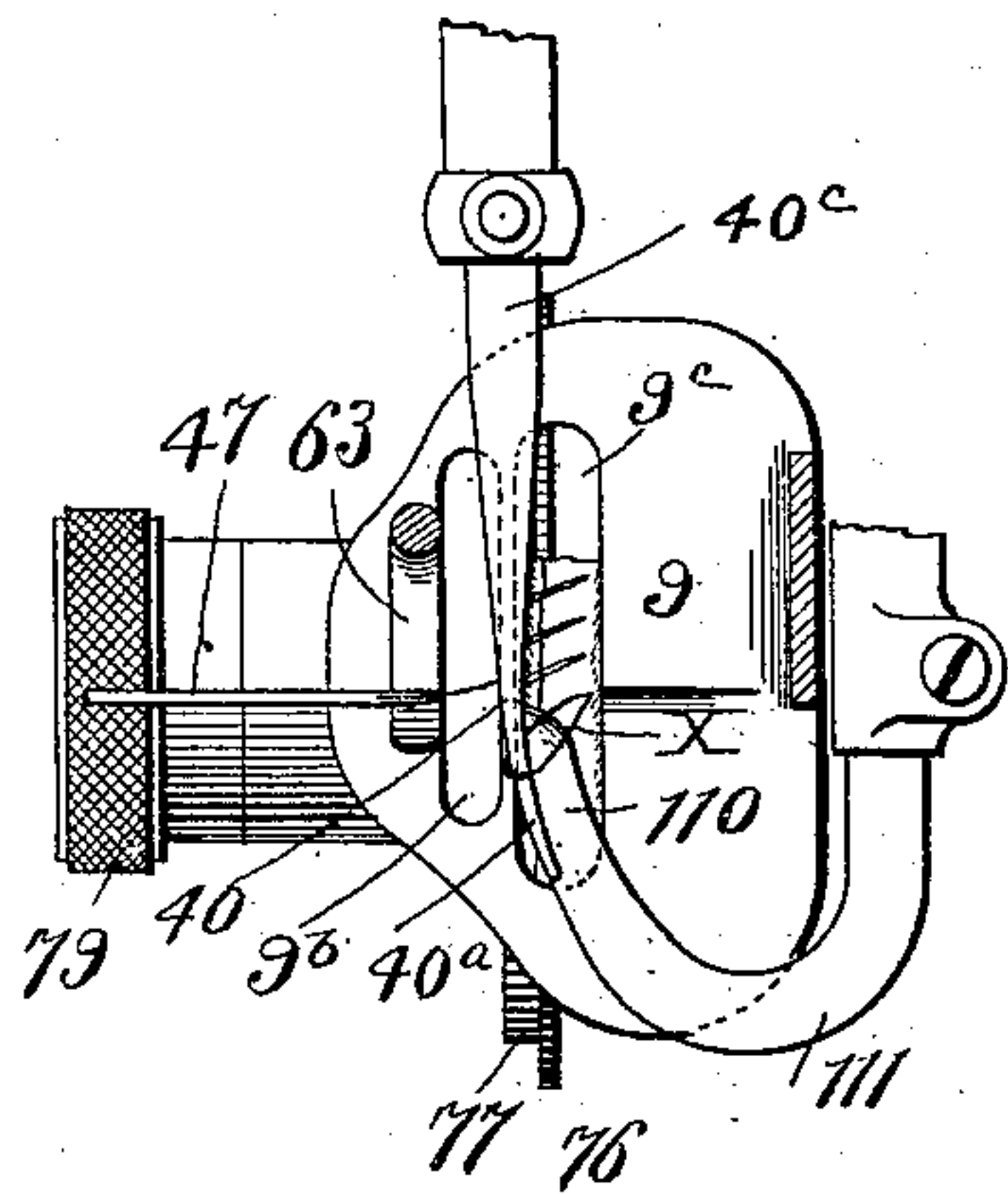


Fig. 6.

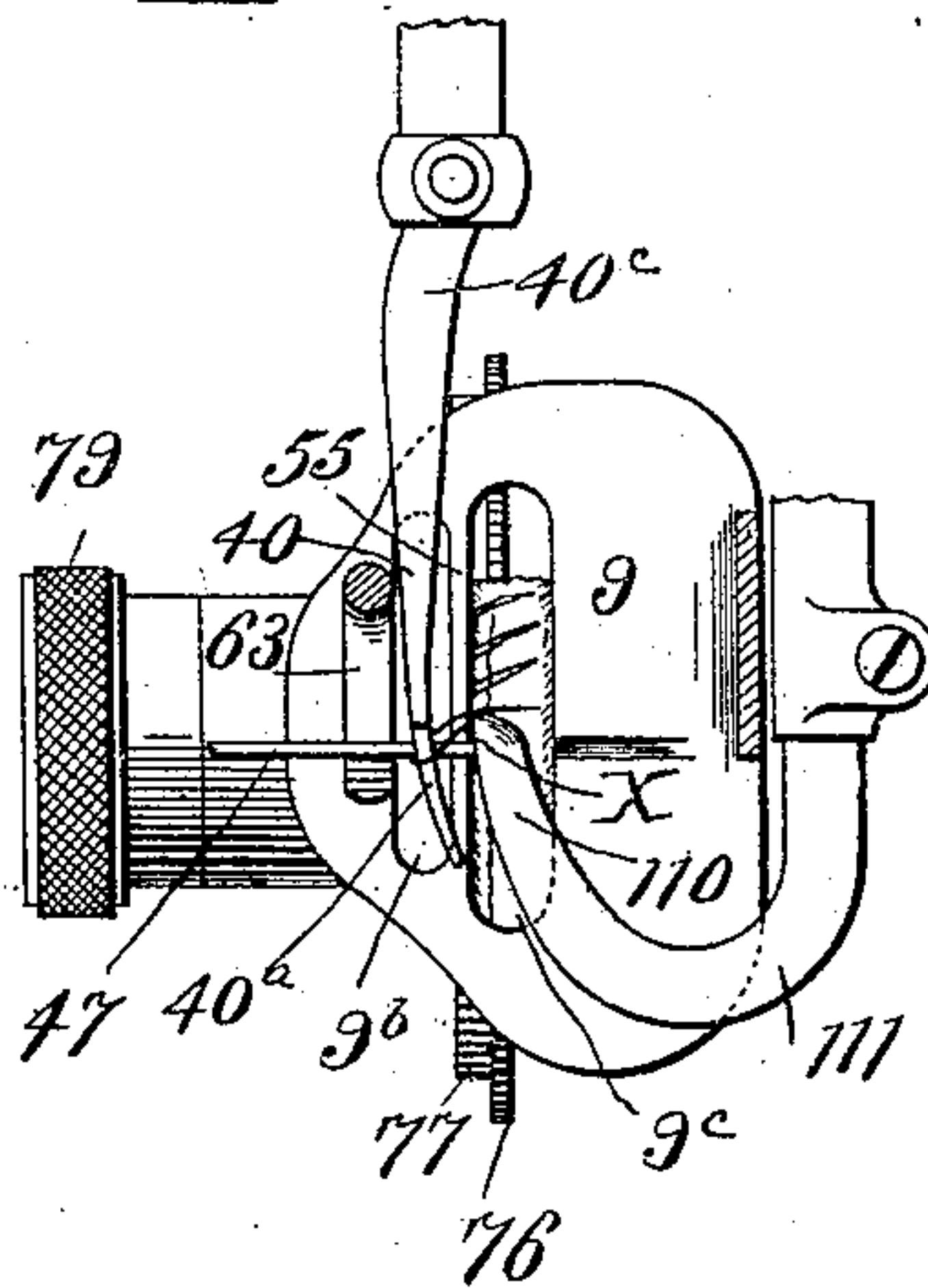
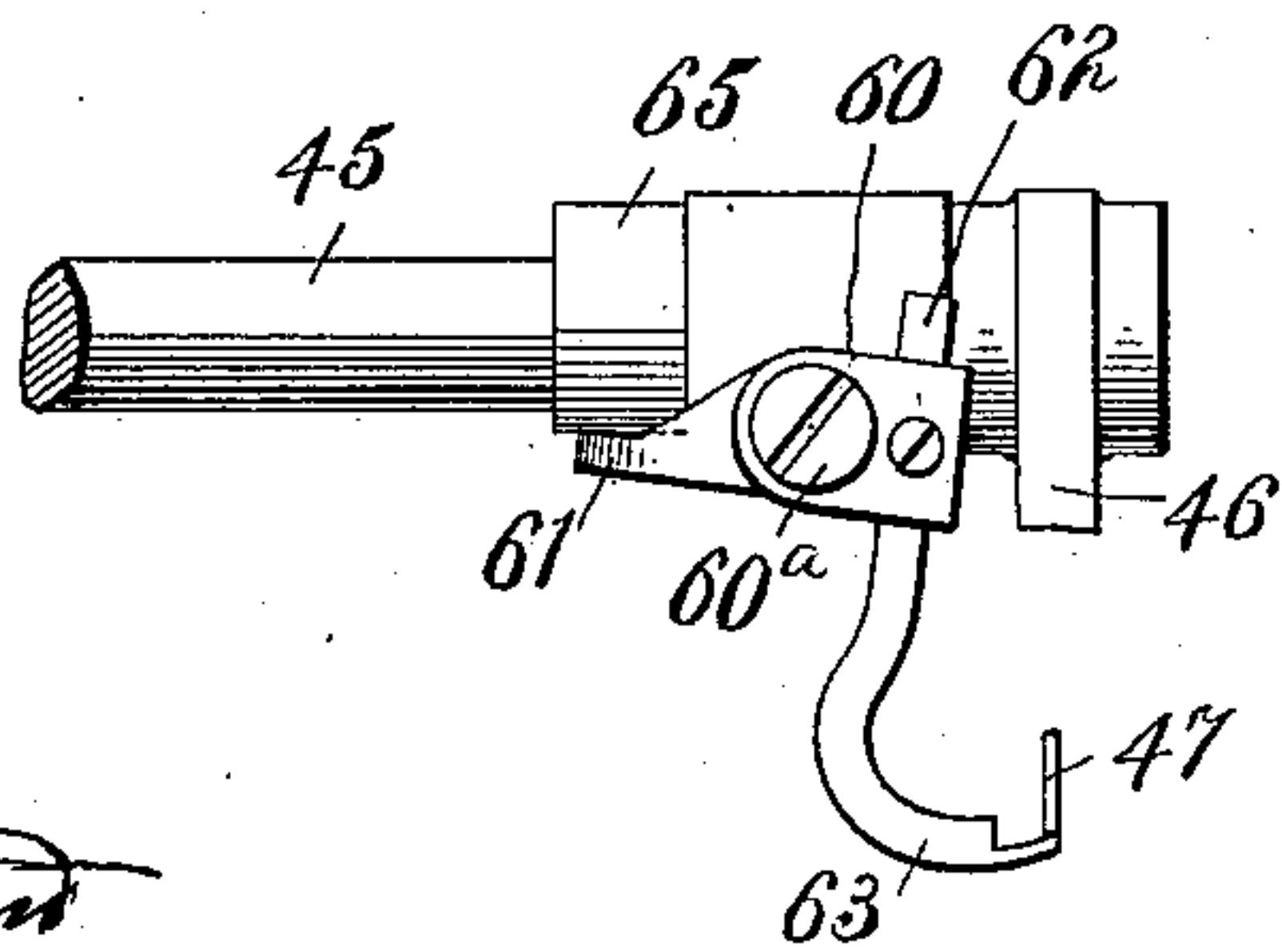


Fig. 7.



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UNITED STATES PATENT OFFICE.

CHARLES A. DEARBORN, OF NEW YORK, N. Y., ASSIGNOR, BY MESNE ASSIGNMENTS, TO FREDERICK W. LORCH.

BLIND-STITCH SEWING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 705,325, dated July 22, 1902.

Original application filed March 21, 1900, Serial No. 9,500. Divided and this application filed November 26, 1900. Serial No. 37,745. (No model.)

To all whom it may concern:

Be it known that I, CHARLES A. DEARBORN, a citizen of the United States, residing at New York, in the county and State of New York, have invented certain new and useful Improvements in Blind-Stitch Sewing-Machines, of which the following is a specification.

My present invention relates to improvements in stitch-forming mechanism for sewing-machines, which are particularly applicable to the style of sewing-machines for blindstitching set forth in Letters Patent No. 639,669, granted to me December 19, 1899, and my present application is a division of my original application, Serial No. 9,500, which was filed in the Patent Office March 21, 1900.

In practically developing the machine covered by my above-named patent I encountered several difficulties more or less serious to the proper operation of the machine, and my present improvements have been devised for the purpose of overcoming these difficulties. The machine of my said patent embodies a suitable feed mechanism, a rigid presser-foot, a needle reciprocating transversely to the path of the work, and a looper coöperating with the needle and provided with suitable operating mechanism to cause it to first move forwardly at one side of the line of stitching to take a loop from the needle above the work, then axially to carry the looper across the line of stitching, then rearwardly above the work to enable the looper to present the loop to the needle, and finally a second axial or rocking movement to carry the looper back across the line of stitching to its first position. The feed mechanism of this patented machine comprises, essentially, a rotary cylinder having two serrated portions and a ridge-forming rib between the serrated portions and means for giving the feed-cylinder an intermittent rotary motion. The feed mechanism is mounted upon a spring-sustained frame, the spring of which holds the feed-cylinder into working relation with the work under the stationary presser-foot, forms a ridge in the work for the penetration of the needle, and allows the feed mechanism to yield sufficiently to accommodate the thickness of the material being operated upon.

Some of the features of my above-named original application, Serial No. 9,500, (of which my present application is a division,) are illustrated and described in a general way in my present divisional application, but they do not form an essential part of my present invention and are set forth only for the purpose of giving a proper understanding of the machine in connection with which my present improvements are explained. The looper in said patented machine is journaled in a pivotally-mounted sleeve or bearing, so as to slide longitudinally and oscillate therein and have a vertical rocking motion upon the pivot of the bearing-sleeve during its forward and backward movements under the action of its operating crank mechanism. This is not a satisfactory construction for commercial machines, the principal objection to it being that the looper has too great a vertical throw when it is in its forward position. In the machine of my present application I have avoided this objectionable feature of the looper stitch-forming mechanism by arranging a swinging bearing for the looper-rod. A rock-arm is journaled upon the machine-frame, so as to be capable of movement toward and away from the path of the needle, the looper-rod having universal-joint connection with the free end of the rock-arm. In this construction the looper is at a fixed distance in front of its swinging bearing at all of its positions, and the movements of the bearing toward and away from the path of the needle assist in causing the looper to rise and fall during its axial movements to properly coöperate with the needle and without interfering with the presser-foot, the work, or the feed mechanism.

In the machine of my present application I provide a needle-guide which is capable of moving into and out of operative relation to the needle, so as to hold the needle rigid in its path until it has entered the work, when the guide recedes to get out of the way of the needle-supporting arm. By this arrangement of the needle-guide it is possible to use a relatively short and rigid needle, which is preferable to a long needle, which would have to be used if a stationary needle-guide were employed for directing the needle into the work.

Another important feature of my present application is the combination, with the needle and looper, of an upper feed device which engages the upper exposed face of the work and travels with it, and by the engagement of the lower thread of the loop (carried over the work by the looper) with its smooth properly-shaped face effects the placing of said lower thread of the loop sufficiently far in advance of the path of the needle to insure the penetration of the loop by the needle just prior to the penetration of the work in the formation of a stitch. The movement of the work under the action of the ordinary feed tends to move said lower thread of the loop into proper position for the needle to take the loop; but I have found in practice that any slight uneven places upon the goods will cause said lower thread of the loop to be retarded when drawn over the work by the looper, resulting in the dropping of a stitch. The presence of this upper feed-finger affords a smooth surface over which the said under thread of the loop slides into proper position under the action of the looper.

In order that my invention may be fully understood, I will first describe the same with reference to the accompanying drawings and afterward point out the novelty more particularly in the annexed claims.

In said drawings, Figure 1 is a plan view of a sewing-machine embodying my improvements. Fig. 2 is a side elevation of the same looking at the stitch-forming mechanism, which is at the left-hand side of the machine. Figs. 3 and 4 are detail views illustrating the swinging bearing of the looper-rod. Figs. 5 and 6 are detail sectional plan views illustrating my improved stitch-forming mechanism. Fig. 7 is a detail side elevation of my improved needle-guide, representing it withdrawn from the path of the needle-carrying arm.

The machine is built upon a base of any suitable construction, such as is shown.

1 indicates the rigid central base-frame, having an upwardly-extending rear arm or section 2, terminating in the sleeves or shaft-bearings 3 and 4, and the forwardly-extending arm 5, having journal-bearings 6 and 7 and supporting upon a lug 8 the rigid presser-foot 9. The base-frame also has a central vertically-extending broad portion 10, terminating in a sleeve 11.

15 is the main driving-shaft of the machine, journaled in the sleeves or bearings 3 4 of the base-frame and having keyed to one end a driving-pulley 16 and fly-wheel 17 and at its opposite end a crank-disk 18. Projecting at an angle of forty-five degrees from the crank-disk 18 is an arm 19, supporting a crank-pin 20, upon which is swiveled the sleeve 21, which is capable of rotating thereon.

22 is a yoke pivotally connected with the sleeve 21 and adjustably and rigidly secured to the rear end of the looper-rod 25. This

part of the machine is more fully illustrated in my above-named Patent No. 639,669.

30 is a suspended rock-arm journaled at its upper end upon a pin 31, which is eccentrically secured in a block 32, which is adjustably mounted in a suitable socket 33 of the sewing-machine arm 5. The block 32 is formed with a wrench-head 34, by means of which it can be rotated in its support for adjusting the pivot-pin 31 upwardly or downwardly with relation to the plane of feed of the work.

35 is a set-screw threaded into a suitable opening in the sewing-machine arm 5 and adapted to engage the adjustable block 32 for securing it in the desired adjusted position. The rock-arm is suspended from a point above the horizontal plane of the looper-rod.

The lower free end of the rock-arm 30 is formed with a removable bearing-yoke 36, secured to the arm by screws 37, the inner surfaces of said yoke 36 and the corresponding face of arm 30 being cut out to form a circular concave bearing or socket. The looper-rod 25 has secured to it a spherical bearing-head 38, which rests in the concave bearing or socket formed at the free end of the rock-arm 30, so as to cause the rock-arm 30 to move forwardly and backwardly upon its bearing 31 under the action of the longitudinal movement of the looper-rod 25 and at the same time allow movement between the looper-rod and rock-arm in all directions. The bearing connecting the looper-rod to the rock-arm is, in effect, a universal-joint connection. The floating bearing carried by the rock-arm 30 is raised and lowered as the looper-rod moves forwardly and backwardly.

At the forward end of the looper-rod 25 is mounted the looper proper, 40, having two fingers or prongs 40^a and 40^b and a bent stem 40^c, connecting it to the looper-rod 25. The specific construction of the looper proper is the same as described and illustrated in my above-named patent. By adjusting block 32 the looper 40 can be moved upwardly or downwardly with relation to the path of the needle to insure the passage of the needle centrally between the prongs of the looper and also the non-interference of the looper with the rest of the mechanism.

45 is the needle rock-shaft, journaled in the machine-frame bearings 6 and 7 and having rigidly mounted upon its forward end a needle-carrying rock-arm 46, in which is mounted the curved needle 47.

48 and 49 are ordinary thread-guides. Secured to the rear end of the needle rock-shaft 45 is a rock-arm 50, having universal-joint connection 51 with a link 52, which encircles an eccentric 53, mounted upon the main power-shaft 15 adjacent to the crank-disk 18. The link 52 and the eccentric 53 are formed with mated spheroidal engaging surfaces to allow free lateral play of the link. By means of the mechanism just described

the needle is given a reciprocatory motion in an arc transverse to the path of the work which is fed by the mechanism presently to be described.

5 The rigid presser-foot 9, which, as above stated, is supported from the lug 8 of the machine-frame arm 5, is formed with a central longitudinal groove 9^a in its under face and two approximately-parallel elongated open-
10 ings 9^b and 9^c, arranged upon opposite sides of the central groove.

55 is a spring-tongue rigidly secured to a lug 9^d of the presser-foot and extending under another similar lug 9^e. This spring-tongue
15 55 is capable of yielding but slightly, it being confined in its spring action by the lugs 9^d and 9^e.

The structure of the rigid presser-foot 9 and spring-tongue 55, mounted thereon, do not
20 form any part of the invention claimed in my present case, and I have therefore not attempted to fully illustrate these features. A more complete understanding of these features may be had by referring to my above-named original application, Serial No. 9,500,
25 or to British Patent No. 19,556 of 1900, granted to me for the same invention.

In order to permit the use of a short needle in my machine and obviate the necessity of
30 using the objectionable long needle, I provide a needle-guide which normally engages the needle to insure its proper engagement with the work and which intermittently moves away from the path of the needle to avoid in-
35 terference with the needle-supporting arm.

60 is a short rock-arm journaled to the sewing-machine arm 5 at 60^a, and 62 is the shank of the needle-guide 63, which is vertically adjustable in the rock-arm 60 and secured in
40 any desired position therein by means of a set-screw 64. The rock-arm 60 has a rearwardly-extending heel 61, which is engaged by a cam 65, keyed to the needle rock-shaft 45. A spiral spring 66 surrounds the journal 61 and engages at its opposite ends the rock-arm 60 and machine-arm 5, giving the needle-guide a spring tendency to move away from the needle and out of the path of the
50 needle. The action of the cam 65 upon the heel of the rock-arm 60 intermittently moves the needle-guide into operative relation to the needle.

Journaled in the bearing 11 upon the central upwardly-projecting arm 10 of the machine-frame is the forwardly-extending main
55 feed-frame 70.

75 is the main feed-shaft, journaled in the pivot feed-frame 70 and carrying at its outer end a cloth-supporting ridge-forming disk 76 and a serrated main feed wheel or roll 77. The disk 76 and feed-wheel 77 are rigidly secured upon the shaft 75 by means of a suitable collar 78 and screw-nut 79. The disk 76 has a slightly greater diameter than the feed-
60 wheel 77, so as to project circumferentially a little beyond the feed-wheel 77 and form a rib or ridge in the work by pressing it up into

the opening of the rigid presser-foot. The size of the ridge-forming disk 76 with relation to the size of feed-wheel 77 will in practice be varied to suit different thicknesses of
70 work to be sewed. Keyed to the opposite end of the feed-shaft 75 is a clutch-wheel 80, with which engage the frictional feed-dogs 81, mounted upon an oscillatory frame 82, which
75 has a rocking motion imparted to it by any suitable mechanism to cause the intermittent rotation of the ridge-forming disk 76 and feed-wheel 77.

The feed wheel or roll 77, just described, 80 constitutes one of the yieldingly-supported lower feed members of my machine. The other yieldingly-supported lower feed member (not shown) is mounted upon auxiliary feed-shaft 92, which is journaled in auxiliary
85 frame 95 and is driven by an internal gear 90, keyed to shaft 75. The auxiliary lower feed member rests alongside the ridge-forming rib 76 under the presser-foot. The structure of this divided under feed is fully described and
90 illustrated in my above-named original application, Serial No. 9,500, and I will not describe the same in detail in my present case.

The main feed-frame 70 is formed with a downwardly-projecting arm 70^a, which en-
95 gages a limiting screw or stop 70^b, mounted in the part 10 of the machine-frame.

70^c is a spiral spring engaging a lug 70^d on the arm 70^a and having its opposite end attached to an adjustable curved arm 105,
100 mounted in the part 10 of the machine-frame. The purpose of the spring just described is to yieldingly support the feed-frame 70 normally in raised position and at the same time allow said frame to be depressed for the in-
105 sertion of the work beneath the presser-foot and also to allow the frame to yield sufficiently for the thickness of the material which is passing through the machine.

106 is a forwardly-projecting handle by
110 which the feed-frame can be depressed for the insertion of the work between the rigid presser-foot and lower feed mechanism.

In addition to the two-part under feeding mechanism to which I have just referred I
115 provide an upper feed device which is adapted to engage the upper exposed face of the work within the opening of the rigid presser-foot. This upper feed device comprises a feed-finger proper, 110, having a serrated or
120 pointed engaging end and a smooth curved upper face, and it is formed upon a curved supporting-shank 111. Adjustably attached to the feed-finger 110 and extending under it in the direction of feed of the work is an auxil-
125 iary spring-finger 112, formed with a transverse needle guide or gate 112^a and adapted to engage the work adjacent to the path of the needle and above the ridge-forming rib of the disk 76, the needle passing through said
130 guide or gate 112^a into the material.

113 is a set-screw adjustably securing said spring-finger 112 to the feed-finger 110.

The feed-finger 110 and spring-finger 112

serve two important purposes. In the first place, the spring-finger 112 confines the ridge of the work above the ridge-forming rib and insures a uniform penetration of the material by the needle, a function which I have found practically necessary in producing uniform blindstitching. In the second place, the feed-finger 110 and spring-finger 112 moving with the work up to the moment of penetration of the work by the needle effects the placing of the lower thread of the loop (on the looper) sufficiently far in advance of the path of the needle to insure the penetration of the loop by the needle just prior to the penetration of the work. The movement of the work under the action of the feed tends to move said lower thread of the loop into proper position for the needle to take the loop; but I have found in practice that any slight uneven places upon the goods will cause the said lower thread of the loop to be retarded when drawn over the work by the looper, and the presence of the said feed-finger 110 affords a smooth surface for the said under thread of the loop to be drawn over into proper position by the action of the looper.

The shank 111 of the upper feed-finger is adjustably mounted in a socket formed in the forward end of a rock-arm 114, which is rigidly secured to a rock-shaft 115, journaled to the upper free end of the approximately vertical rocking frame 85. A link rock-arm 116 is rigidly secured to the rock-shaft 115 and extends rearwardly to the main driving-shaft 15 of the machine and terminates in a yoke 117, which encircles an eccentric upon shaft 15.

The operation of the machine will be clear with but slight further explanation. The machine is primarily intended to accomplish overseaming-blindstitching, which is useful in seaming the lower edges of trousers-legs, skirts, and other garments. The material to be sewed is folded at one edge to form the hem of the desired depth and by depressing the feed-frame is inserted in the machine between the under feed devices and presser-foot, the turned-up portion or hem of the material (the double thickness) being placed to the right just over the auxiliary feed device.

When the feed-frame is released, it returns to its normal raised position and forces the main and auxiliary under feed devices and the ridge-forming disk or plate up into engagement with the work, said ridge-forming disk 76 pressing a ridge or rib of the work up into one of the openings of the presser-foot alongside of the spring-tongue 55, which latter holds the material to the action of the main under feed-wheel 77. The upper feed-finger 110 (on its forward stroke) and spring-finger 112 engage the work over the ridge-forming rib 76, and the inner edge of the rigid presser-foot forces the work down into engagement with the auxiliary under feed-roll, thereby forming an abrupt edge of the rib or ridge in the work to cause the needle

to emerge from the work just above the thin inner edge of the presser-foot. At the moment the needle starts to penetrate the rib or ridge in the work the feed devices are at rest. The needle penetrates the ridge of the work transversely of the direction of feed and moves to the right until its point is a sufficient distance from the work-ridge to form a loop of the needle-thread sufficiently large for the looper to take. Just as the needle starts to return (forming on the upper side of the needle an arc or loop X in the thread from the needle-eye to the work-ridge, as usual) the looper is on its forward stroke, with its two prongs or fingers in the same horizontal plane, the two prongs or fingers of the looper passing into engagement with and taking the loop and moving axially with it to carry it to the needle side of the work-ridge as the needle completes its return movement. When the needle has completed its return movement and is about to start forward on another stroke, the looper is beginning its backward stroke, with both of its prongs or fingers in the same vertical plane holding the thread-loop open for the entrance of the needle. Just as the needle is about to enter the thread-loop the lower thread of the loop comes into contact with the upper smooth curved face of the upper feed-finger 110 and slides forwardly thereon to get in front of the needle to insure the needle taking the loop. The needle then passes through the thread-loop into the guide or gate 112^a of spring-finger 112 and penetrates the work-ridge above the disk 76, the finger 112 holding the ridge of work firmly down upon the disk to insure the penetration of the needle at the proper depth to make a blind stitch. The needle-guide 63 is in position to guide the needle during the greater part of its stroke, receding just in time to get out of the way of the needle-supporting arm on the forward stroke of the needle after the needle has penetrated the work and coming back into operative position on the return stroke of the needle just after the needle-supporting arm has moved back out of its way and before the needle has been entirely withdrawn from the work.

The upper feed-finger has a forward movement in an approximately straight line, then an upward and rearward movement above the work, and a downward movement into engagement with the work for another forward feeding stroke, the movements of the upper feeding-finger describing an ellipse flattened on its lower side.

Having thus described my invention, what I claim as new therein, and desire to secure by Letters Patent, is—

1. In a sewing-machine, the combination of a reciprocatory needle, suitable feed mechanism, and means for operating the needle and feed, with a looper-rod carrying a looper which coöperates with the needle, means for imparting a longitudinal reciprocatory move-

ment and an axial oscillatory movement to said looper-rod, a suspended rock-arm supported at a point above the horizontal plane of the looper-rod and capable of swinging toward and away from the path of the needle under the action of the looper-rod, and a universal-joint bearing connecting the looper-rod with the lower end of said rock-arm, substantially as set forth.

2. In a sewing-machine, the combination of a reciprocatory needle, suitable feed mechanism, and means for operating the needle and feed, with a looper-rod carrying a looper which coöperates with the needle, means for imparting a longitudinal reciprocatory movement and an axial oscillatory movement to said looper-rod, a rock-arm journaled upon the machine-frame and capable of swinging toward and away from the path of the needle, means for adjusting the journal of said rock-arm, and a universal-joint bearing connecting the looper-rod with said rock-arm, substantially as set forth.

3. In a sewing-machine, the combination of suitable feed mechanism, a reciprocatory needle arranged to reciprocate transversely to the line of feed, and means for operating the needle and feed, with a looper-rod arranged with its longitudinal axis approximately parallel with the line of feed, a looper carried by the looper-rod and adapted to coöperate with the needle, means for imparting a longitudinal movement and an axial oscillatory movement to said looper-rod, a rock-arm suspended from a point above the horizontal plane of the looper-rod and capable of swinging toward and away from the path of the needle under the action of the looper-rod, and a universal-joint bearing connecting the looper-rod with the lower end of said rock-arm, substantially as set forth.

4. In a sewing-machine, the combination of suitable feed mechanism, a needle arranged to reciprocate transversely to the line of feed, and means for operating the needle and feed, with a looper-rod carrying at its forward end

a looper which coöperates with said needle, an eccentric rotating device having a double-joint connection with the rear end of said looper-rod for operating it, a rock-arm suspended from a point above the horizontal plane of the looper-rod and capable of swinging toward and away from the path of the needle under the action of the looper-rod, and a universal-joint bearing connecting the looper-rod with the lower end of said rock-arm, substantially as set forth.

5. In a sewing-machine, the combination of suitable feed mechanism, with suitable stitch-forming mechanism including a needle rock-shaft, means for operating the rock-shaft, a rock-arm upon said rock-shaft, a needle mounted upon said rock-arm, an oscillatory needle-guide, and means operated by the needle rock-shaft for moving the needle-guide into and out of operative relation with the needle, substantially as set forth.

6. In a sewing-machine, the combination of suitable work-feeding mechanism, a needle, and a looper, with a loop-guiding part supported above the work adjacent to the path of the needle and adapted to engage the lower thread of the loop which is thrown over by the looper and cause said lower thread to move forward of the path of the needle and thereby insure the passage of the needle through the loop, substantially as set forth.

7. In a sewing-machine, the combination of a reciprocatory needle, and a combined reciprocatory and oscillatory looper, with a feed-finger engaging the work upon its exposed surface adjacent to the path of the needle and having a loop-guiding upper surface over which the lower thread of the loop upon the looper slides to a position in front of the path of the needle, thereby insuring the passage of the needle through the loop, substantially as set forth.

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