No. 679,553. Patented July 30, 1901.

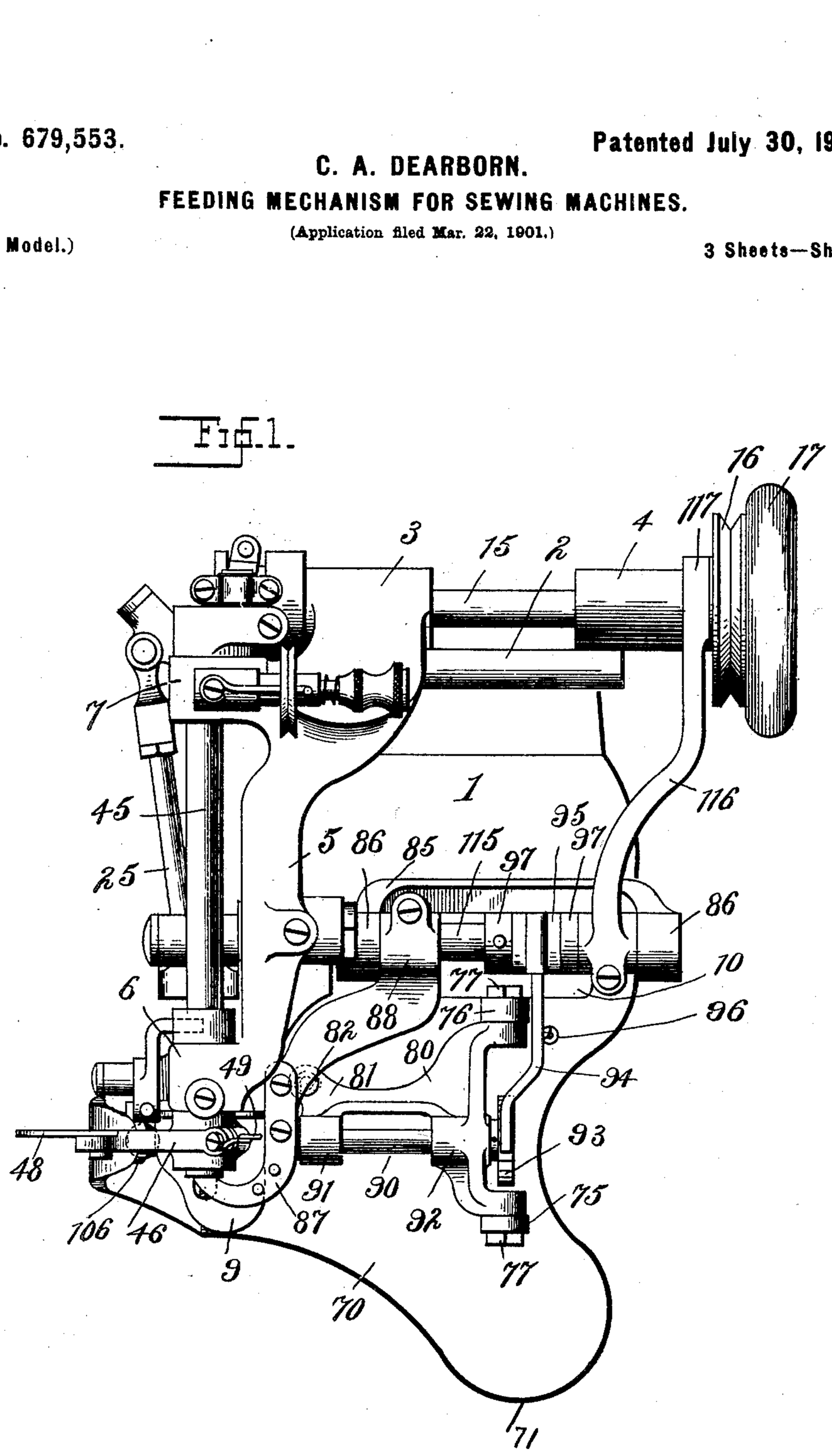
C. A. DEARBORN.

FEEDING MECHANISM FOR SEWING MACHINES.

(Application filed Mar. 22, 1901.)

(No Model.) 3 Sheets—Sheet 1.

Fig. 1.



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(No Model.) 3 Sheets—Sheet 2.

Fig. 2.

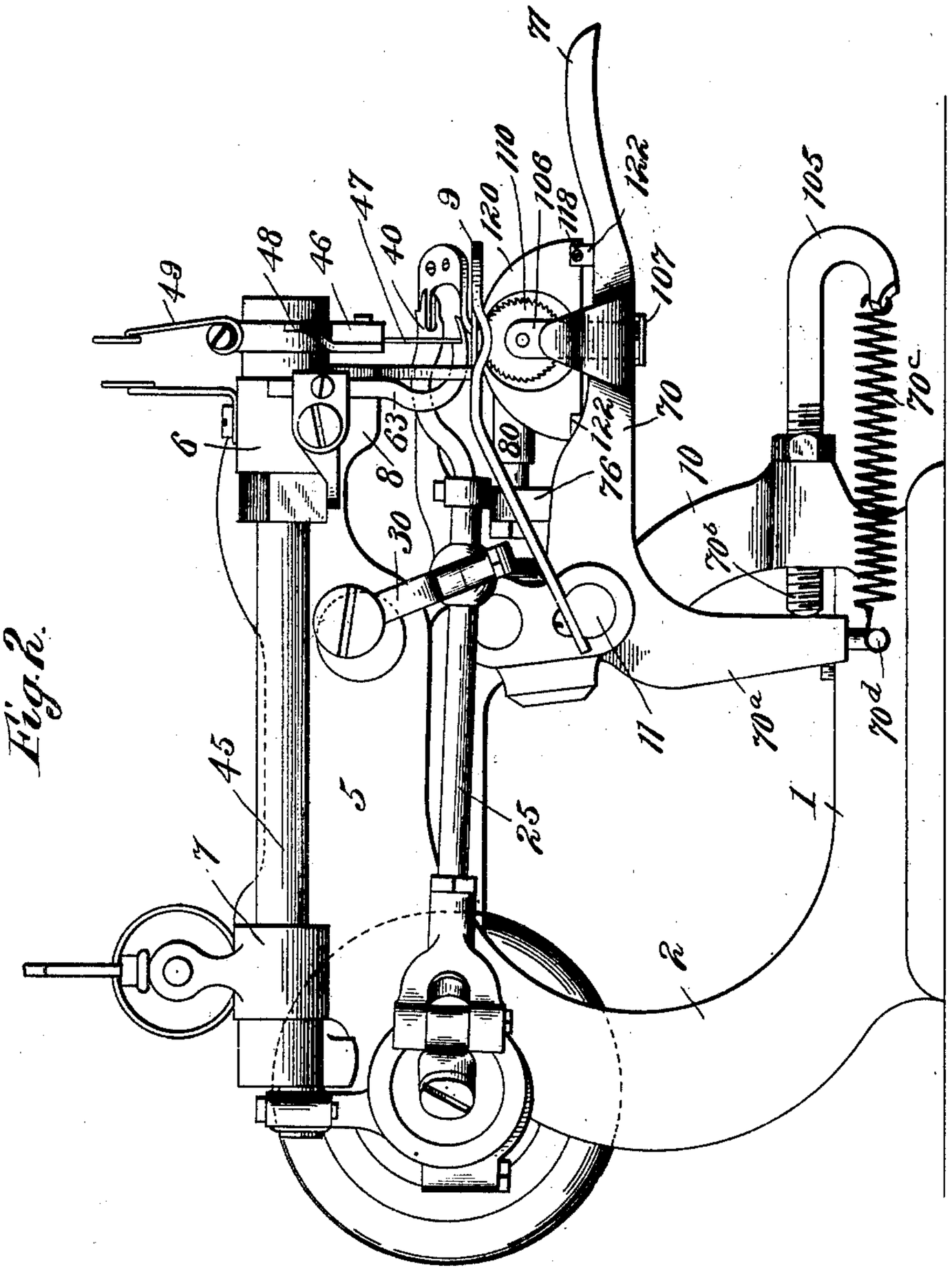

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Fig. 3.

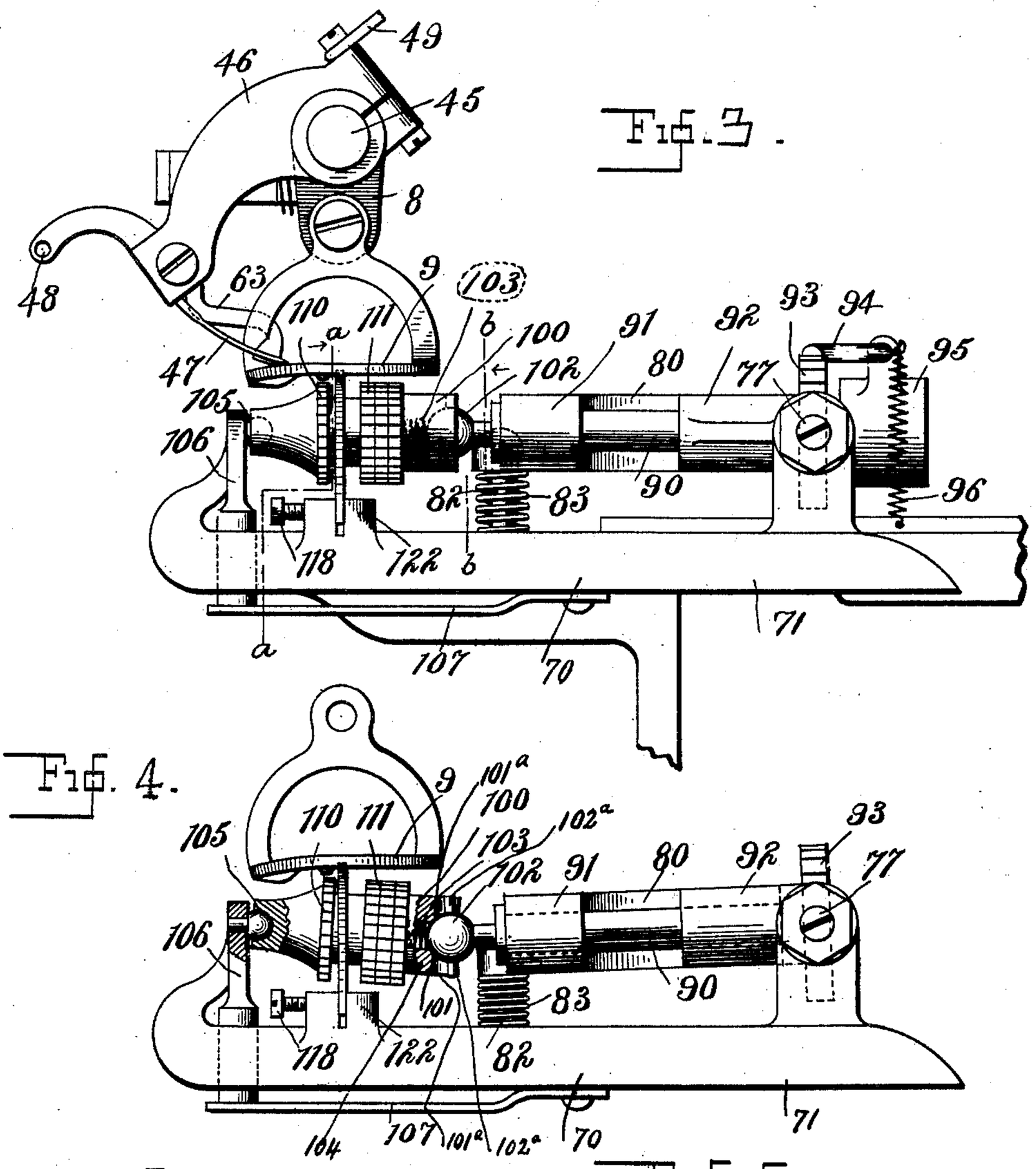


Fig. 4.

Fig. 5.

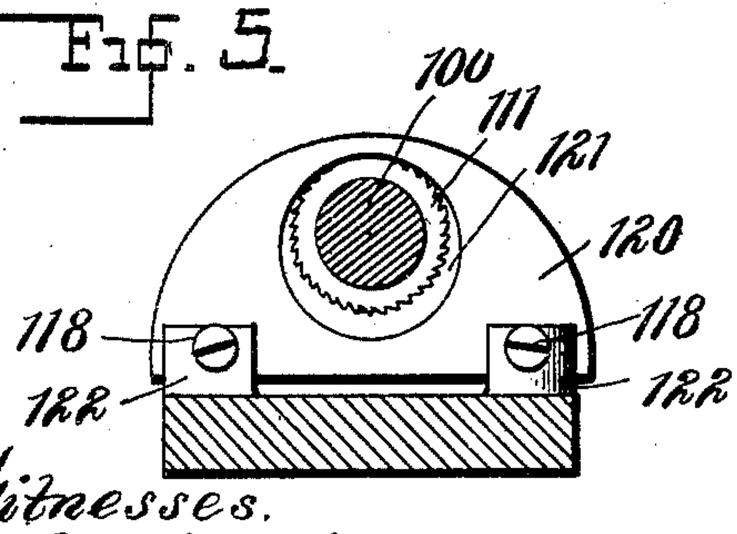
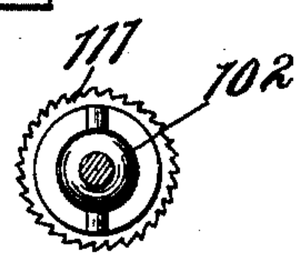


Fig. 6.



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UNITED STATES PATENT OFFICE.

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FEEDING MECHANISM FOR SEWING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 679,553, dated July 30, 1901.

Application filed March 22, 1901. Serial No. 52,375. (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 Feed Mechanism for Sewing-Machines, of which the following is a specification.

My present invention relates to improvements in the feed 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 in my pending application, Serial No. 9,500, filed March 21, 1900. In the machine covered by my original patent, No. 639,669, the feed mechanism consists, essentially, of a two-part feed-roll rigidly mounted upon a shaft and having located between the feed-roll parts a ridge-forming disk, which is also rigid upon the shaft, said feed mechanism being mounted upon a spring-sustained feed-frame and held thereby up into operative relation with a stationary presser-foot, which is suitably supported upon the arm of the machine-frame. In practically developing the machine set forth in my said patent I discovered that the feed mechanism of the said machine was defective in that the two-part feed-roll and the ridge-forming disk yielded downwardly as a whole under the action of the thickest parts of the work passing beneath the presser-foot, with the result that the thin parts of the work would not be properly held up to the action of the needle. To overcome this defect in the feed mechanism of the machine of my original patent, I produced the improved feed mechanism set forth in my above-named pending application, Serial No. 9,500, in which the feed mechanism consists of two independently-yielding feed members mounted upon a feed-frame and a ridge-forming disk carried by one of the independent feed members. This structure proved to satisfactorily solve the practical difficulty which I had encountered in the original machine and enabled me to demonstrate the practicability of my blindstitching-machine. The machine with independently-yielding feed members is satisfactory for practical purposes, because the feed members yield independently under the action of the varying thicknesses of the work passing between them and the stationary presser-foot and automatically and independently support the work on the two sides of the line of stitching, so that the sewing will always be uniform. The importance of this structure is greatest when sewing a hem upon work which has cross-seams extending at right angles to the travel of the work. In sewing a hem upon a piece of work the thickness of material on one side of the line of stitching is usually just double the thickness at the opposite side of the line of stitching. This is true whether the machine is sewing upon a plain uniform hem with the doubled or folded-over edge on one side and a single thickness of the material (the main body of the material) on the other side of the line of stitching or a hem made upon material having cross-seams. There are exceptions to this condition, however—viz., in cases where an interlining or stiffening material is inserted in the hem and where the folded-over portion of a seamed piece of goods is folded obliquely, so as not to bring the fold portion of the cross-seam directly on top of the main part of the seam.

My present invention is designed to simplify, economize, and generally improve the structure of the feed mechanism of my blindstitch sewing-machine, such improvements being arranged to take advantage of the almost universal condition of the work just spoken of.

To this end my invention consists, broadly, of a yieldingly-mounted ridge-forming rib mounted beneath the stationary presser-foot of the machine and a two-part yieldingly-mounted feed device mounted independently of the ridge-forming rib, the two parts of the feed device being rigidly united and so supported that they will engage and support the work beneath the presser-foot upon opposite sides of the ridge-forming rib and will yield unequally under the pressure of and in proportion to the varying thickness of the work upon opposite sides of the line of stitching.

More specifically, my present invention consists of a sewing-machine having a stationary presser-foot, a yieldingly-mounted ridge-forming rib mounted beneath the stationary presser-foot, and two feed-rolls mounted rig-

idly upon one section of a sectional feed-shaft, the sections of which shaft have a universal-joint connection at their contiguous ends and are pivoted or swiveled at their opposite ends, which will enable the sectional shaft to yield downwardly at its universal joint, the two sections of the shaft rotating upon centers which are in line or approximately in line. The result of this arrangement is that the feed-roll which is mounted nearer to the universal joint of the sectional shaft will have a greater movement away from the stationary presser-foot than the feed-roll which is farther from said universal joint, and as the machine is designed to have the hem or double thickness of the work supported above the roll with the greater movement while the thin portion of the work is supported above the roll having the smaller movement it will be observed that the feed mechanism will always automatically accommodate the varying thickness of the work passing over the rolls beneath the presser-foot. To further facilitate the automatic accommodation of the feed-rolls to varying thicknesses of the work, I may support the outer end of the shaft-section upon which the feed-rolls are mounted in a spring-sustained journal-post, which will have the effect of allowing that end of the shaft-section to automatically raise and lower to suit the variations in thickness of the work upon opposite sides of the line of stitching. The sectional feed-shaft is yieldingly mounted upon a yieldingly-supported feed-frame of substantially the same construction as heretofore used in my blind-stitch sewing-machines. The ridge-forming rib is mounted upon the spring-sustained feed-frame between the two feed-rolls; but, unlike the prior constructions of this feed mechanism employed by me, it is independent of the feed-rolls, so that the feed-rolls may yield under the pressure of the thickness of the work without altering the position of the feed-frame and without changing the operative position of the ridge-forming rib, which rib will, however, yield independently under the action of the thickness of work passing over it by reason of the yielding feature of the feed-frame. I prefer to have the ridge-forming rib adjustably mounted upon the feed-frame, so as to enable the regulation of its height with relation to the feed-rolls.

In my improved feed mechanism I employ a single sectional feed-shaft which is operated by means of a pawl and ratchet, which simple structure is very much more economical and generally satisfactory than the complicated arrangement of the two feed-shafts with their intermeshing gears which is employed in the machine covered by my pending application, Serial No. 9,500.

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 with more particularity in the annexed claims.

In said drawings, Figure 1 is a plan view of a blind-stitch sewing-machine having my improved feed mechanism applied thereto. Fig. 2 is a side elevation of the same. Fig. 3 is an enlarged detail front elevation showing the improved feed mechanism. Fig. 4 is a similar view having parts broken away for clearness and showing the sectional feed-shaft in depressed position. Fig. 5 is a sectional view taken on line *a a* of Fig. 3. Fig. 6 is a sectional view taken on the line *b b* of Fig. 3.

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 main 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, (not shown,) in which is mounted a journal-bar 11 for the support of the feed and operating devices presently to be explained. The presser-foot 9 has a rearwardly-extending plate 9^a, which is rigidly attached to the projecting end of the journal-bar 11 to assist in holding the presser-foot rigid.

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 suitable devices for operating the needle rock-shaft and the looper, which will be hereinafter referred to.

25 is the looper-rod, having on its forward end the looper proper, which is indicated at 40.

30 is the adjustably-mounted looper-supporting rock-arm.

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.

63 is an oscillatory needle-guide.

Journaled in the central upwardly-projecting arm 10 of the machine-frame 1 is the forwardly-extending main feed-frame 70. Any suitable adjusting device for limiting the movement of this feed-frame 70 and any suitable spring mechanism for sustaining the feed-frame in raised position may be employed; but I prefer to construct these devices as fully set forth in my above-named Patent No. 639,669, and I will now describe the same. The feed-frame 70 is formed with a downwardly-projecting arm 70^a, which engages 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, 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 insertion of the work beneath the presser-foot and over the ridge-forming rib and feed-wheels and also to allow the frame to yield sufficiently for the thickness of the material which passes through the machine over the ridge-forming rib.

The feed-frame 70 is formed with a forwardly-projecting handle 71, by which the feed-frame can be depressed for the insertion of the work between the rigid presser-foot and the lower feed mechanism. This feature is also the same as in my above-named patent and application.

75 and 76 are journal-lugs projecting from the upper face of feed-frame 70, and 80 is an auxiliary feed frame or yoke journaled upon the bearing-screws 77, threaded through the lugs 75 and 76. The auxiliary frame 80 is formed with a lug 81, through which passes a limiting-screw 82, threaded into the main feed-frame 70. A spiral spring 83 surrounds the screw 82 and by its engagement with the main feed-frame 70 and lug 81 of the auxiliary frame 80 sustains the auxiliary frame in elevated position upon the main feed-frame.

90 is one section or part of the sectional feed-shaft. The shaft-section 90 is journaled in bearings 91 and 92 of the auxiliary feed-frame 80 and has keyed to its outer end a driving-ratchet 93, with which engages a horizontal reciprocating pawl 94, which is mounted in a socket of a yoke 95, loosely journaled upon the shaft 115 of the oscillatory frame of the upper feed mechanism. The yoke 95 is confined in proper position upon shaft 115 by means of collars 97, secured to the shaft upon opposite sides of the yoke. A spring 96 connects the pawl 94 with the main feed-frame 70 to hold it yieldingly to its work.

The inner end of the shaft-section 90 is connected with the adjacent end of a shorter shaft-section 100 by means of a universal-joint driving connection. A ball 102 is formed on the end of the shaft-section 90, and diametrically opposite pins or lugs 102^a project from the ball 102 at right angles to the shaft-section 90. The adjacent end of the shaft-section 100 has formed in it a hemispherical socket 101, with diametrically opposite recesses or notches 101^a extending from it. The ball 102 fits snugly in socket 101, and the pins or lugs 102^a engage the recesses or notches 101^a, a small spiral spring 103 being mounted in a cavity 104 in the shaft-section 100, so as to engage with the ball 102 and assist in maintaining the parts in proper relation. The pins 102^a, engaging notches 101^a, cause the shaft-section 100 to rotate with shaft-section 90, and the ball and socket allow the shaft-sections to yield downwardly while they are rotating. The outer end of the shaft-section 100 has ball-and-socket bearing 105, with a vertically-movable support 106, which has suitable bearing upon the feed-frame 70 and is held yieldingly in raised position by any suitable spring mechanism—such, for instance, as the spring 107. The formation of this vertically-yielding support 106 for the outer end of shaft-section 100 may be changed to suit the varying requirements, and in fact on certain classes of work it may be found unnecessary to have the support 106 yield with relation to the feed-frame.

Mounted upon the shaft-section 100 are the two feed-rolls 110 and 111, the roll 111 being preferably a wider roll than the one 110, as it is in the position to operate upon the thicker and more irregular parts of the work. By reason of the structure and arrangement of the sectional drive-shaft of the feed-rolls it will be observed that the feed-roll 111 (over which the greater thickness of work passes) will have a greater movement away from the stationary presser-foot than the feed-roll 110, because the shaft-section 100, which supports the feed-roll, moves downwardly upon the ball-and-socket joint 105 at the outer end of the shaft-section.

120 is the ridge-forming rib, which is shown of semicircular form with a central opening 121 for the feed-shaft section 100 to extend through. The ridge-forming rib 120 is adjustably mounted in the slotted lugs 122 of the feed-frame 70 and is held in the desired adjusted position therein by means of set-screws 118. By this means the height of the ridge-forming rib upon the feed-frame and with relation to the feed-rolls may be regulated to a nicety. This adjustment enables the operator to readily adapt his machine to different grades of work.

85 is a rocking frame suitably journaled upon the portion 10 of the machine-frame and having journaled in bearings 86 (in its upper free end) the rock-shaft 115. A link rock-arm 116 is 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 (not shown) on the shaft by which frame 85 is rocked.

87 is the upper feed finger or hook, mounted on an arm 88, which is rigidly secured to the rock-shaft 115. The feed-hook 87 engages the upper surface of the work, which is exposed by the opening in the presser-foot 9.

The operation of the machine will be clear with but slight explanation. The feed-frame 70 is depressed to allow the insertion of the work between the stationary presser-foot 9 and the feed-rolls 110 111 and ridge-forming rib 120. The yielding of feed-frame 70 allows the ridge-forming rib 120 to accommodate itself to the thickness of goods between it and the presser-foot. The spring 83 holds the sectional feed-shaft 90 100 upwardly with a yielding pressure and allows the feed-rolls 110 and 111 to yield sufficiently to accommodate the different thicknesses of the work between them and the presser-foot. As the

shaft-section 100 is swiveled at 105, it will be clear that it will move downwardly on that center, causing the feed-roll 111 to move about twice as far as the feed-roll 110. This is to accommodate the usual condition of the work, in which the thickness above feed-roll 111 is about twice that above feed-roll 110. If for any reason the difference in thickness of the part of the work is not in this proportion, the spring-supported bearing for the outer end of the shaft-section 100 will automatically move up or down to cause the two rolls to effectively engage the work upon both sides of the line of stitching. The spring-supported bearing 105 and the spring 83 by acting upwardly upon the opposite ends of the shaft-section 100 hold the feed-rolls to their work and allow them to yield to accommodate all inequalities in the work passing over them. The shaft-section 100 is driven by shaft-section 90, as above explained.

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

1. In a sewing-machine, the combination of suitable stitch-forming mechanism, with a stationary presser-foot, a yieldingly-mounted ridge-forming rib supported beneath the presser-foot, and a two-part yieldingly-mounted feed device mounted independently of the ridge-forming rib, the two parts of the feed device being rigidly united and adapted to engage the work beneath the presser-foot and upon opposite sides of the ridge-forming rib, substantially as set forth.

2. In a sewing-machine, the combination of suitable stitch-forming mechanism, with a stationary presser-foot, a yieldingly-mounted feed-frame, a ridge-forming rib adjustably mounted in said feed-frame and adapted to engage the work beneath the presser-foot, and a feed device yieldingly mounted upon said feed-frame and independent of the ridge-forming rib, substantially as set forth.

3. In a sewing-machine, the combination of suitable stitch-forming mechanism, with a rigid presser-foot, a ridge-forming rib adapted to engage the work beneath the presser-foot, a feed-shaft adapted to yield downwardly at one end, and a two-part feed-roll mounted rigidly upon the feed-shaft, the two parts of the feed-roll being adapted to engage the work beneath the presser-foot upon opposite sides of the ridge-forming rib, substantially as set forth.

4. In a sewing-machine, the combination of suitable stitch-forming mechanism, a rigid presser-foot, a yieldingly-mounted ridge-forming rib, a feed-shaft pivoted and journaled at or near one end independently of the ridge-forming rib, a two-part feed-roll rigidly mounted upon said feed-shaft, the two parts of the feed-roll being adapted to engage the work beneath the presser-foot upon opposite sides of the ridge-forming rib, and a yielding support for the opposite end of said feed-shaft, substantially as set forth.

5. In a sewing-machine, the combination of suitable stitch-forming mechanism, a rigid presser-foot, a feed-frame, a ridge-forming rib, a feed-shaft pivoted at or near one end in the feed-frame, feed-rolls rigidly mounted upon said shaft and adapted to engage the work beneath the presser-foot upon opposite sides of the ridge-forming rib, and means for operating said feed-shaft, one of said feed-rolls being at a greater distance from the pivot of the shaft than the other, substantially as set forth.

6. In a sewing-machine, the combination of suitable stitch-forming mechanism, with a stationary presser-foot, a ridge-forming rib, a feed-shaft, independent spring-supports for the opposite ends of said feed-shaft, and a feed-roll mounted upon said feed-shaft and adapted to engage the work beneath the presser-foot, substantially as set forth.

7. In a sewing-machine, the combination of suitable stitch-forming mechanism, and a stationary presser-foot, with a ridge-forming rib, a sectional feed-shaft, the sections of which are connected by a universal joint, means for driving said shaft, a feed-roll rigidly mounted upon one section of said shaft, and a yielding support for said sectional shaft, substantially as set forth.

8. In a sewing-machine, the combination of suitable stitch-forming mechanism, and a stationary presser-foot, with a ridge-forming rib, a sectional feed-shaft, the sections of which are connected by a universal joint, means for driving said shaft, pivot-supports for the outer ends of said shaft-sections, a spring-support for the connected ends of said shaft-sections, and a feed-roll mounted upon one of the shaft-sections, substantially as set forth.

9. In a sewing-machine, the combination of suitable stitch-forming mechanism, and a stationary presser-foot, with a ridge-forming rib, a sectional feed-shaft, the sections of which are connected by a universal joint, a pivoted frame or support in which one of said shaft-sections is journaled, a yieldingly-mounted support in which the outer end of the other shaft-section is swiveled, a spring yieldingly sustaining the inner jointed ends of said shaft-sections, a feed-roll mounted upon one of said shaft-sections, and means for operating said sectional shaft, substantially as set forth.

10. In a sewing-machine, the combination of suitable stitch-forming mechanism, and a stationary presser-foot, with a yieldingly-mounted ridge-forming rib, a yieldingly-mounted feed-shaft independent of the ridge-forming rib, a feed-roll mounted upon the yielding feed-shaft, a ratchet-wheel mounted upon said shaft, and a reciprocatory pawl engaging said ratchet, substantially as set forth.

11. In a sewing-machine, the combination of suitable stitch-forming mechanism, and a stationary presser-foot, with a spring-sustained main feed-frame, a ridge-forming rib mounted upon the main feed-frame, an auxiliary feed frame or yoke journaled adjacent

to one end upon the main feed-frame, a sectional feed-shaft, one section of which is journaled in the auxiliary feed frame or yoke, a universal joint connecting the shaft-sections, a bearing in which the outer end of the other section is swiveled, a two-part feed-roll mounted upon said other shaft-section, and means for driving said sectional feed-shaft, substantially as set forth.

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