No. 814,025. PATENTED MAR. 6, 1906.

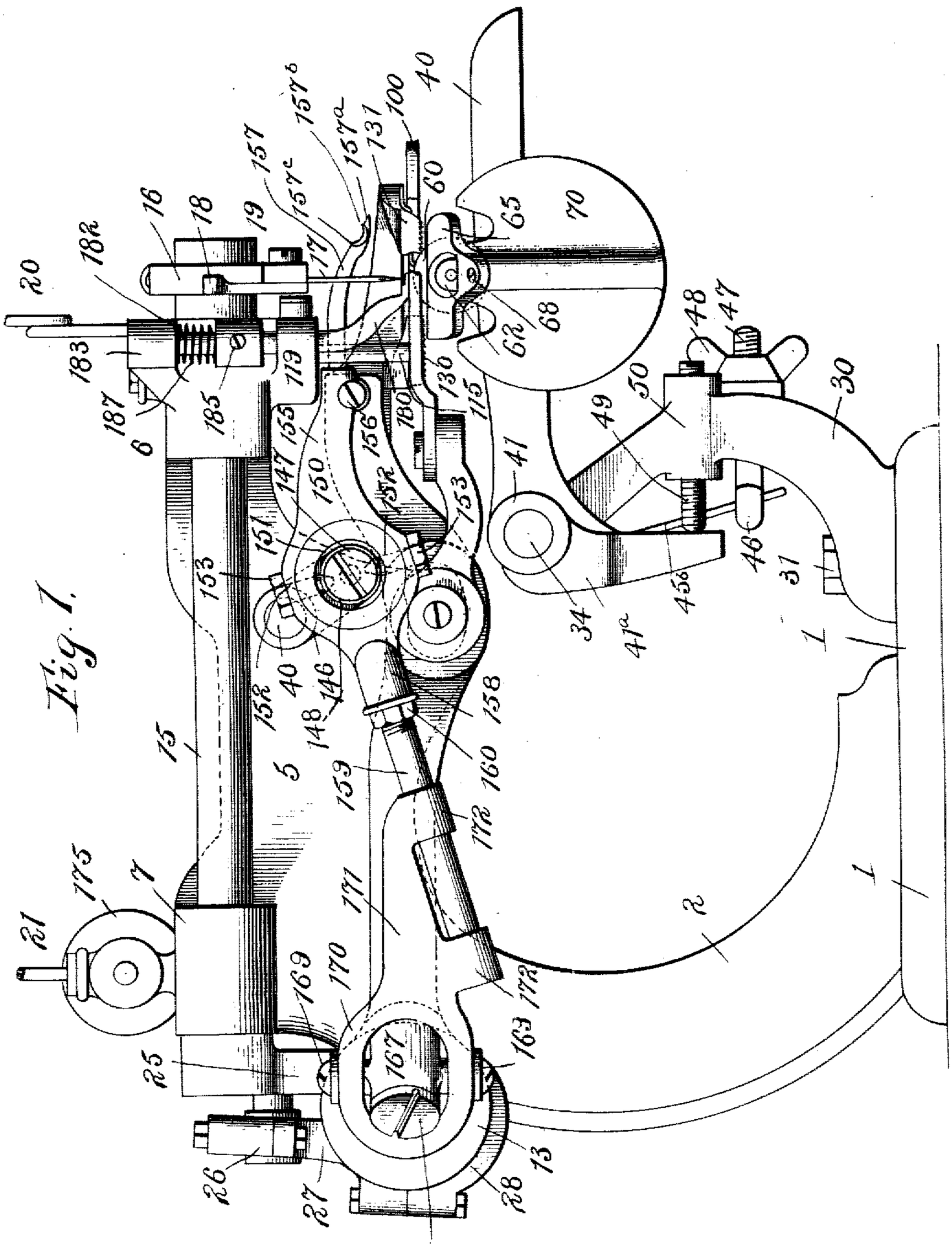
C. A. DEARBORN.

SEWING MACHINE.

APPLICATION FILED JULY 21, 1904.

4 SHEETS—SHEET 1.

Fig. 1.




Witnesses
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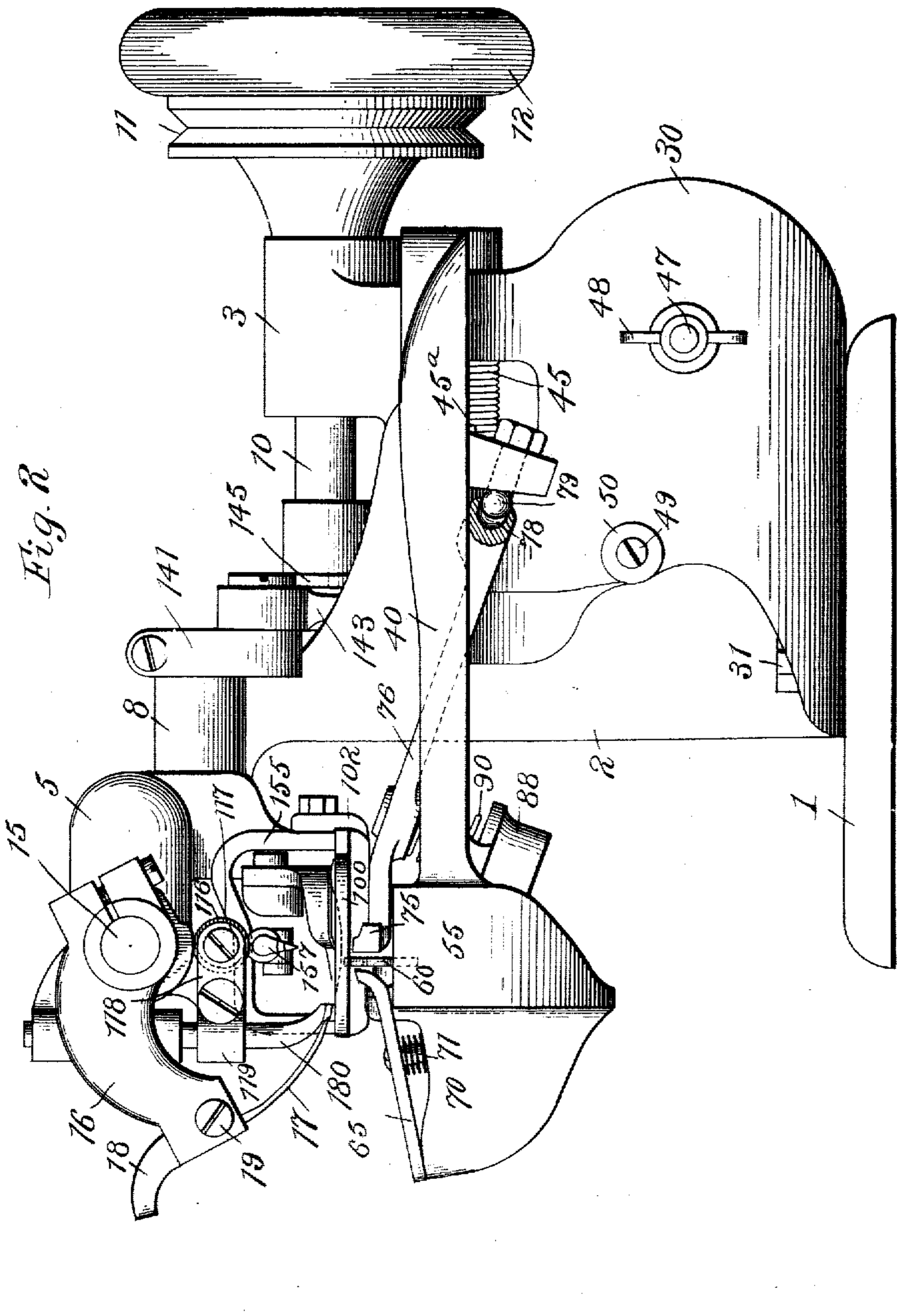
Fig. 2.

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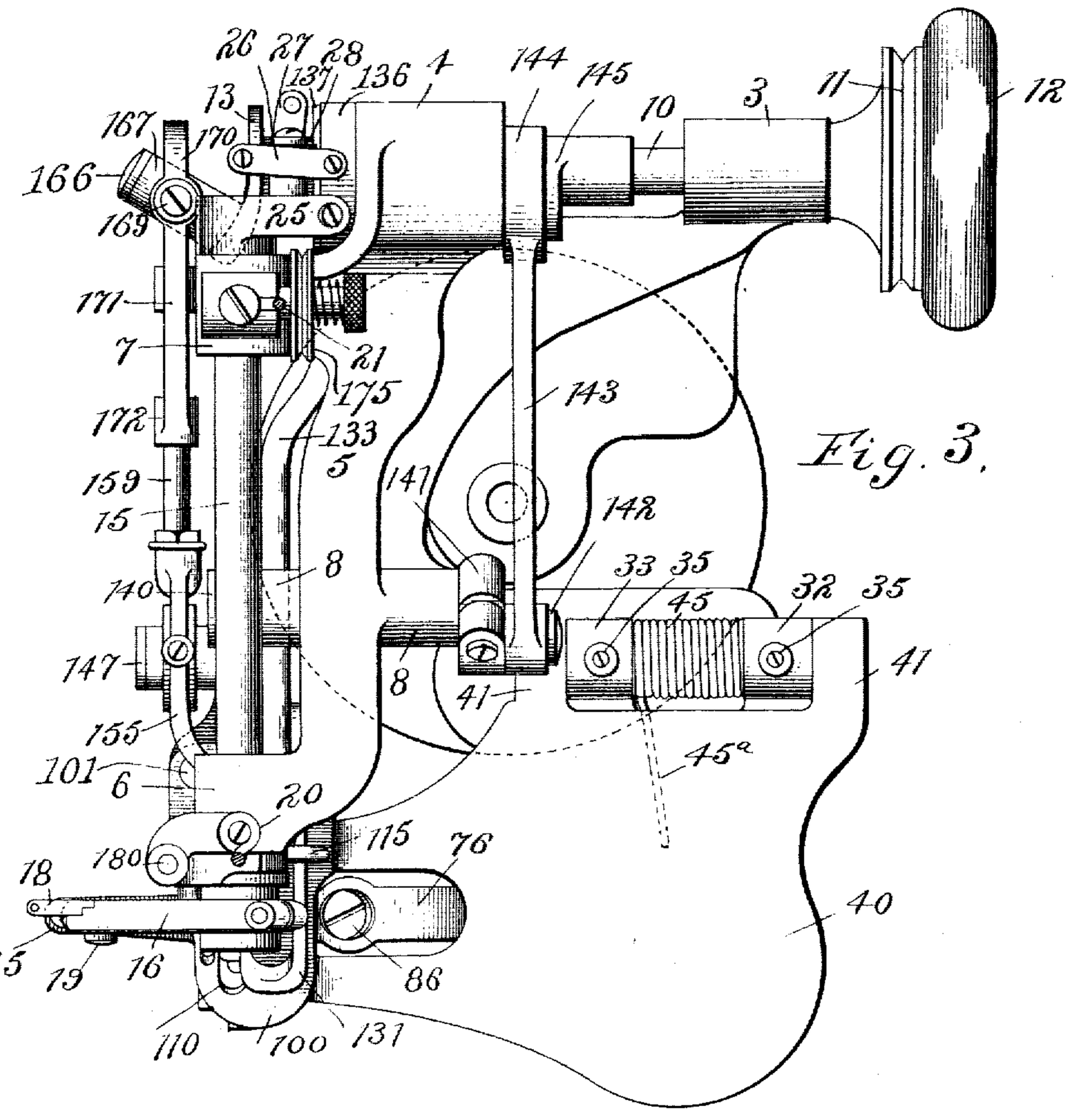


Fig. 3.

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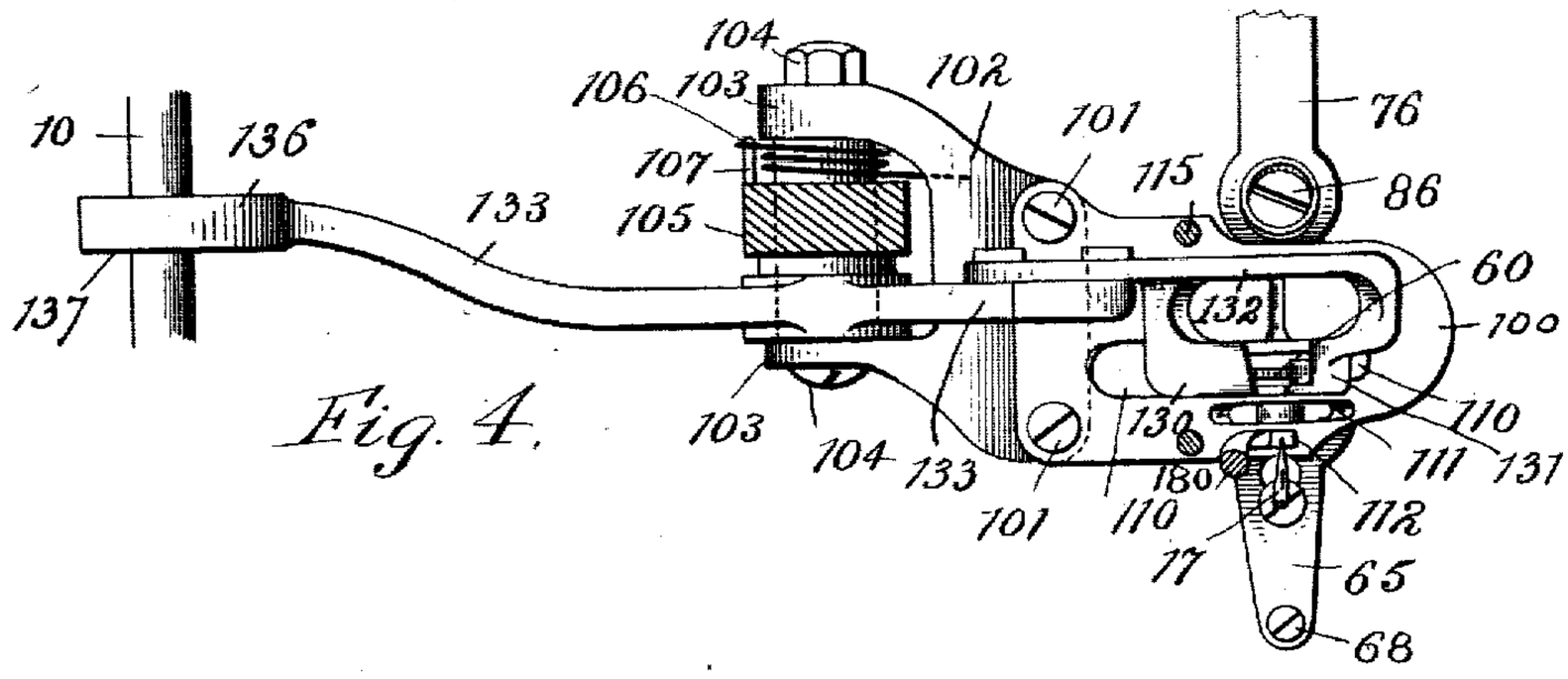



Fig. 4.

Fig. 5.

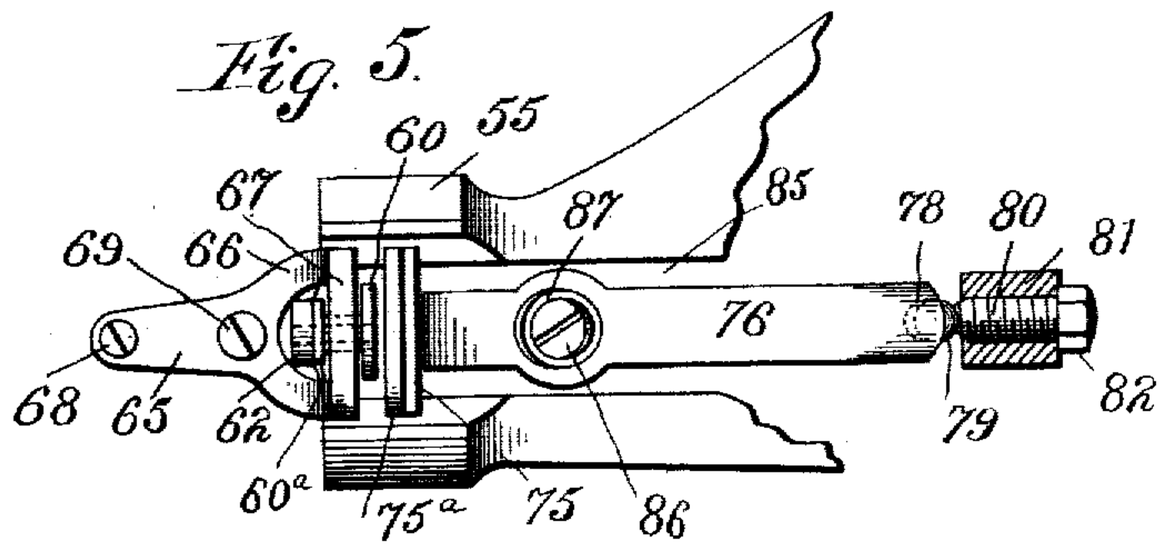



Fig. 6.

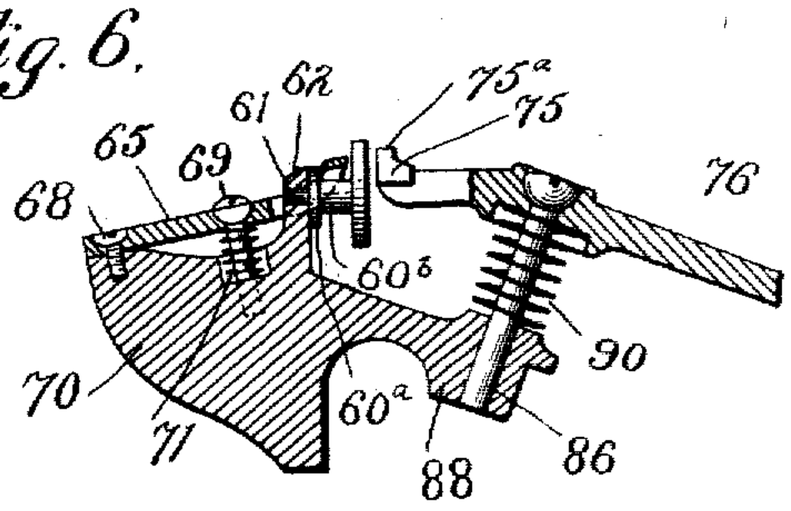



Fig. 7.

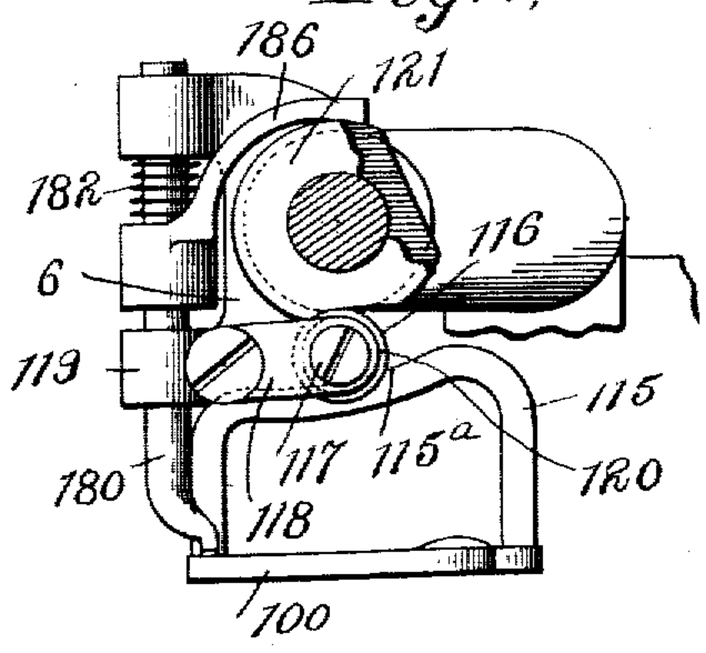
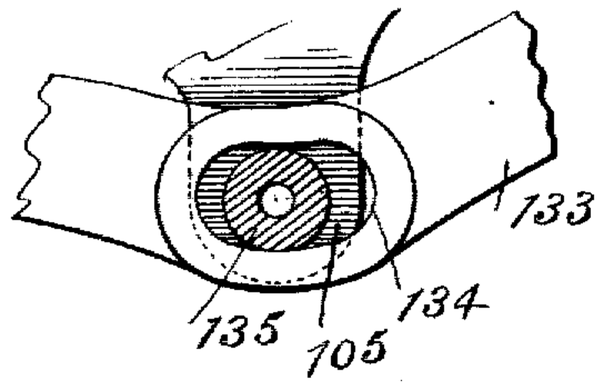



Fig. 8.

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# UNITED STATES PATENT OFFICE.

CHARLES A. DEARBORN, OF NEW YORK, N. Y.

## SEWING-MACHINE.

No. 814,025. Specification of Letters Patent. Patented March 6, 1906.

Application filed July 21, 1904. Serial No. 217,474.

*To all whom it may concern:*

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

The present invention relates to improvements in the type of sewing-machines for overseaming blindstitch work, such type of machine being illustrated in Patents No. 639,669, dated December 19, 1899; No. 679,553, dated July 30, 1901; No. 705,325, dated July 22, 1902, and No. 705,326, dated July 22, 1902, heretofore granted to me.

The object of the present invention is to improve the construction and operation of this type of machine with a view to increasing the accuracy of the work and speed of the machine.

In machines covered by my above-named patents the feeding mechanism is in the form of intermittently-actuated rotating feed-rolls mounted upon a spring-sustained work support or frame and engaging the work from beneath and holding it up against a rigid presser-foot in proper position for the action of the stitch-forming mechanism. In one of the old forms of my machine I have also employed an auxiliary reciprocating feed mechanism engaging the work from above to coöperate with and supplement the action of the under roller feed mechanism referred to. These old forms of feeding mechanism are extremely complicated and expensive to manufacture, and the location of the operating parts necessarily presents objectionable obstructions above the plane of the work-support which interfere with the convenient manipulation of the work. The improved machine overcomes these objections, as hereinafter explained.

In the old forms of my machine the needle operating transversely of the line of feed penetrates successive parts of the work which passes over a ridge-forming rib, (also mounted upon the spring-sustained work support or frame,) which in some cases is a part of one of the rotary feed-rolls and in other cases is an independent part projecting between the feed-rolls into engagement with the under surface of the work. The looper, which coöperates with the needle in the old forms of my machine, is arranged to be actuated from the rear end of the looper-rod by an eccentric universal crank mechanism, which imparts to the looper a forward motion on one side of the line of stitching, an axial motion to throw it to the other side of the line of stitching, a rearward motion on the other side of the line of stitching, and finally a second axial motion to throw it back to the position of starting, the looper taking the loop from the needle on one side of the line of stitching and giving up the loop to the needle on the other side of the line of stitching.

In the new form of machine which I desire to protect in the present case I have embodied numerous improvements in several essential parts of a blindstitch sewing-machine of the type referred to.

I have discarded the rotary under-feed rolls of the old form of my machine and have substituted therefor two independently-mounted universally-movable work-supporting plates, which are mounted upon the usual spring-sustained work-supporting frame and are arranged with their work-engaging ribs upon opposite sides of a small freely-journaled rotary ridge-forming disk. One of these universally-movable work-supporting plates is capable of greater yielding motion than the other for the purpose of properly supporting the hem side of the work to be operated upon. These independent universally-movable work-supporting plates effectively support the work upon opposite sides of the ridge-forming disk to insure the accurate penetration of the needle at both sides of the ridge formed in the work by said disk, thereby insuring the sewing together of the two edges of the work from end to end of the line of stitching and further insuring uniformity in the appearance of the work. To accommodate the freely-journaled ridge-forming disk and the independently-yielding work-supporting plates on opposite sides of the disk, I form the spring-sustained work support or frame in the shape of a horn at the left-hand side of the machine. This horn shape is also convenient for the insertion, removal, and operation of the work being stitched.

In place of the rigid presser-foot, which has heretofore been universally used on my blind-stitch sewing-machines, as shown in my above-named patents, I provide in my improved machine an intermittently-movable presser-foot which automatically raises slightly from the work to free the work for each feeding-stroke of the feeding-dogs and also automatically returns into engagement

with the upper face of the work immediately after each feeding-stroke, just as the needle is about to penetrate the material, so as to hold the work firmly and accurately while the needle is passing through it. This presser-foot is preferably pivoted at its rear end so as to project over into position above the yielding work-supporting plates and is provided with a suitable spring which automatically raises it as the feeding-dogs start to act. A suitable cam mechanism engages a part projecting from the presser-foot for controlling or timing this upward or releasing action and forcibly moving the presser-foot downwardly against the tendency of its spring into engagement with the work at the completion of the feeding-stroke and just prior to the penetration of the needle.

As stated above, the old form of under-feed-roller mechanism is done away with in the improved machine, and in place of such feeding mechanism I employ in the new machine an effective reciprocating upper-feed device, preferably in the form of a two-part serrated feed-dog, the two parts being arranged end to end parallel with the line of feed with a small space separating them to allow for the operation of the needle. This two-part feed-dog is mounted upon a reciprocatory arm or bar actuated at its rear end by an eccentric upon the main driving-shaft of the machine and supported between its ends by a pin or stud which passes through an elongated journal-opening having a peculiar cam-shaped wall so arranged that in combination with the actuating-eccentric it will cause the feed-dog to have an effective horizontal feeding-stroke in engagement with the work and a return movement disengaged from the work. The omission of the complicated under-feed mechanism of the old machine and the employment of the simple reciprocatory feed-dog which is supported from the machine-arm above the plane of feed greatly simplify the machine and materially increase the scope of its work.

The looping mechanism of my improved machine accomplishes the same purposes as the looping mechanism in the old forms of the machine, but is of a greatly changed and improved construction. The improved looper is formed with a single prong or finger having the necessary shoulders for engaging and carrying the loop to take the loop off of the needle at one side of the line of stitching and carrying it over to the other side of the line of stitching and deliver it again to the needle. The looper is adjustably mounted in the forward end of the looper-bar, which is formed between its ends with a journal-opening loosely inclosing a journal-sleeve upon which the looper moves. This journal-sleeve is freely journaled upon a stud projecting laterally from the free end of a suspended rock-arm, which rock-arm is keyed to the end of a rock-shaft suitably journaled in the machine-arm and having a connected rock-arm and link at its opposite end, which link extends rearwardly to the main driving-shaft and engages an actuating-eccentric upon said shaft by which the suspended rock-arm supporting the journal-sleeve is given a to-and-fro rocking motion for carrying the looper forward and back toward and away from the path of the needle. The looper-bar has two diametrically opposite center screws which pass through the walls of the journal-opening and are journaled in diametrically opposite sockets formed in the sleeve. By reason of this connection of the looper-bar with the sleeve journaled upon the rock-arm it is possible for the looper to rotate in a vertical plane or move on its pivots in a transverse plane, so that the looper can move toward and away from the work and transversely to the line of stitching. Unlike the looper mechanism in the old form of my machine the forward and back movements of the looper are caused by the movement of the suspended rock-arm, which is actuated by the independent eccentric mechanism just referred to. This suspended rock-arm also gives the looper a slight rise and fall in moving forward and backward. For increasing the rise and fall of the looper at the end of its forward and back strokes and to move the looper from one side of the line of stitching to the other side of the line of stitching I provide an eccentric universal crank mechanism upon the main driving-shaft which actuates a laterally-swinging floating bearing with which the rear end of the looper-rod has a free rotary and sliding engagement. This eccentric crank mechanism is similar to the same mechanism employed in the old forms of my machine; but in place of directly and positively connecting the rear end of the looper-rod with the said crank mechanism I have provided in the new machine a universally-jointed laterally-swinging floating-bearing frame having a loop at its rear end through which center screws pass and engage the sleeve journaled upon the eccentric-inclined crank-pin, said floating-bearing frame being formed upon its lower edge with two alined socket-bearings in which the cylindrical rear extension of the looper is freely journaled so as to have free rotary and longitudinal movements therein. By reason of this construction it will be observed that the forward and back movements of the looper are caused entirely by the suspended rock-arm, the looper-rod riding freely in the floating bearing of the guiding-crank mechanism just described, while the inward and outward vibrations of the said floating bearing produced by the rotation of said inclined crank-pin cause the looper to move from one side of the line of stitching to the other.

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 side elevation of my improved sewing-machine. Fig. 2 is a front elevation of the same. Fig. 3 is a top plan view of the same. Fig. 4 is a detail sectional plan view of parts of the work supporting and feeding mechanisms. Fig. 5 is a similar view of the work-supporting mechanism, the presser-foot and feeding mechanism being omitted for the sake of clearness. Fig. 6 is a detail vertical transverse sectional view of the same mechanism shown in Fig. 5. Fig. 7 is a detail sectional front elevation showing the mechanism for controlling the movements of the presser-foot and the needle-guide. Fig. 8 is a detail sectional elevation showing the support for the feeding-bar.

The main frame of the machine is formed of a single casting comprising a rigid central base 1, the upwardly-extending rear arm 2, terminating in the sleeves or shaft-bearing 3 4, and a forwardly-extending arm 5, having the needle-shaft bearings 6 7 and the looper rock-shaft bearing 8.

10 is the main driving-shaft of the machine journaled in the sleeves or bearings 3 4 of the rear arm 2 and having keyed to one end a driving-pulley 11 and fly-wheel 12 and at its opposite end a crank-disk 13, hereinafter referred to.

15 is the forwardly-extending needle rock-shaft journaled in the bearings 6 and 7 and having rigidly mounted upon its forward end a needle-carrying rock-arm 16, in which is mounted a curved needle 17.

18 is the usual thread-guide and needle-clamp mounted upon the rock-arm 16 by means of the set-screw 19.

20 and 21 are ordinary thread-guides.

Secured to the rear end of the needle rock-shaft 15 is a rock-arm 25, having universal-joint connection 26 with a link 27, which encircles an eccentric 28, mounted upon the main power-shaft 10 just inside of the crank-disk 13. The link 27 and the eccentric 28 are formed with spheroidal engaging surfaces to allow free lateral play of the link in the transmission of the rotary motion of the main shaft 10 into the oscillatory motion of the needle-shaft 15. By this needle-operating mechanism (which is the same as in the prior patents) the needle is given a reciprocatory motion in an arc transverse to the path of the work which is passed through the machine by the mechanisms now to be described.

Projecting up from the forward edge of the base 1 is an auxiliary arm 30, which is rigidly and adjustably secured to the base by means of set-screws or bolts 31. The auxiliary arm 30 is formed at its upper end with two sleeves 32 and 33, in which is mounted a pivot-shaft 34, projecting a little beyond each of the sleeves 32 and 33. Set-screws 35 pass through the sleeves 32 and 33 and engage the pivot-shaft 34 for holding it rigidly in position.

40 is a horizontal forwardly-extending spring-sustained work-supporting frame. This frame 40 has the rearwardly-presented integral journal-sleeves 41, which are journaled upon the projecting ends of the pivot-shaft 34 and rest snugly against the frame-sleeves 32 and 33, by which the work-support 40 is accurately held in position, said support being allowed to move vertically upon its pivot. Surrounding the pivot-shaft 34 between the sleeves 32 and 33 is a torsion-spring 45, one end $45^a$ of which is extended beneath the work-supporting plate 40 to hold said plate upward with a yielding pressure, while the other end $45^b$ of said spring is extended down behind the auxiliary frame-arm 30 and is engaged by a hook 46, formed on the rear end of a threaded rod 47, which passes freely through an opening formed in the arm 30 and is engaged at its forward threaded end by a butterfly-nut 48, by which the tension of the spring 45 can be increased or decreased at will. The work-support 40 is also formed with an integral downwardly-projecting arm $41^a$, extending below the left-hand bearing 41 in position to engage an adjustable stop in the form of a screw 49, which is threaded through an integral post 50 of the auxiliary arm 30. By adjusting the screw-stop 49 the limit of the normally raised position of the work-supporting plate 40 under the action of the spring 45 can be adjusted to a nicety.

The work-supporting plate 40 is extended to the left (viewing the machine from the front, as shown at Fig. 2) into a work-supporting horn 55 of approximately cylindrical shape, which horn 55 is cut out upon its upper face to receive the ridge-forming disk and the independently-yielding work-supporting plates, which will now be explained.

60 is the ridge-forming disk freely journaled upon a pin 61, projecting through the integral lug 62 of the work-supporting horn 55. The disk 60 has formed integral with it a laterally-projecting hub $60^a$, in which is cut an annular groove $60^b$, the hub operating in close contact with the supporting-lug 62 of the horn and forming a substantial bearing for accurately maintaining the rotary disk 60 in operative position. This ridge-forming disk 60 is a simple disk of hardened steel, which is capable of freely rotating upon its journal-support as the work passes over it under the action of the feeding mechanism. The journal-pin 61 of the ridge-forming disk 60 is arranged in the same vertical plane as the needle, so that the needle will pass through the work just above the highest

point of the periphery of disk 60. This rotary ridge-forming disk 60 is important, because it constantly presents a new part of its periphery under the needle, and thereby distributes the wear and avoids the formation of grooves in its working edges.

There are two independent universally-movable work-supporting plates which engage and support the work from beneath upon opposite sides of the freely-journaled ridge-forming disk 60 just referred to. The outer one of these work-supporting plates comprises an arm 65, formed with an inwardly-presented yoke-shaped head or widened portion 66, having a work-supporting rib 67. The arm 65 is formed with openings through it to receive the retaining-screws 68 and 69, which are formed with spheroidal heads. The openings through the arm 65 are countersunk with spheroidal recesses to receive the heads of said screws and are enlarged to loosely inclose the screws, so as to allow the work-supporting plate to rock on its longitudinal axis to a limited extent. The screws 68 and 69 are threaded into the integral projection 70 of the work-supporting horn 55, and confined upon screw 69 between the projection 70 and the arm 65 is an expansion-spring 71, which retains the work-supporting rib 67 in its raised position with a yielding pressure. The work-supporting rib 67 at the inner end of the arm 65 is beveled outwardly slightly with its highest edge presented inwardly adjacent to the line of stitching. When the work-supporting plate 65 66 is depressed by the passage of the work over it, the central portion of the beveled rib 67 of the plate is depressed into the annular groove of the hub $60^a$. The yoke shape of the plate 65 66 is for the purpose of fitting around by 62, and thereby allow rib 67 to be depressed.

75 is the inner or main work-supporting plate formed integral with its supporting-arm 76. This inner work-supporting plate 75 is formed with a beveled work-supporting rib $75^a$ with its highest edge adjacent to the line of stitching and arranged to fit up into the main opening of the presser-foot hereinafter referred to. The right-hand or lower end of the arm 76 is formed with a spherical socket 78, which rests over the spherical head 79 of an adjustable thrust-bearing in the form of a screw 80, which is threaded through the lug 81, formed integral with and projecting beneath the work-supporting plate 40, a nut 82 being threaded upon the outer end of the screw 80 for locking it in the desired adjusted position. The work-supporting plate 40 is formed with a slot 85, extending through it adjacent to the cylindrical horn 55 to allow the arm 76 to pass from beneath through the work-supporting plate 40, as shown. The cylindrical horn 55 is cut away, as above stated, to allow room for the depression of the work-supporting plate 75. A screw 86 passes through an opening 87, formed in arm 76, and is threaded into the integral lug 88 beneath the horn 55, said screw 86 having a spheroidal head which engages the spheroidal enlargement or socket formed at the outer end of the opening 87 through the arm 76, so as to allow (with the ball-and-socket joint at the end of arm 76) the work-supporting plate to rock laterally upon its longitudinal axis. A stiff spring 90 is confined upon the screw 86 between the lug 88 and the arm 76 for sustaining the work-supporting plate 75 in elevated position in engagement with the presser-foot.

The operation of these parts will be hereinafter more fully explained after the complete description of the machine.

100 is the presser-foot, removably secured by screws 101 to the forward web portion of a yoke 102, which is formed with rearwardly-presented lugs 103, which are pivoted upon set-screws 104, mounted in the downwardly-projecting lug 105, formed integral with the machine-arm 5. 106 is a torsional spring coiled around a reduced portion or hub of the lug 105 and engaging at one end a pin 107, projecting from lug 105, and at its other end beneath the rocking yoke 102, thereby giving the presser-foot a spring tendency to rise away from the work-supporting plate just described.

The presser-foot is formed with a main longitudinal slot 110, through which the ridge of the work is pressed by the work-supporting plates and ridge-forming disk for the operation of the feed and needle and an auxiliary longitudinal groove 111 to allow for the movement of the looper in moving rearwardly to deliver the loop to the needle. The presser-foot plate also has a transverse needle-groove cut in its upper face and a small perforation 112 to allow for the depression of the needle-guide 180 when the needle penetrates the goods and also to receive the lower end of the needle-guide and allow for the elevation of the presser-foot during the feeding-stroke.

The spring 106, acting upon the pivotally-mounted presser-foot, normally tends to raise the presser-foot away from the work-support. To force the presser-foot down against the work on the supporting-plates and disk, I provide a yoke 115, projecting from the upper face of the presser-foot and formed with a central dip or depression at $115^a$, which yoke is engaged by a grooved antifriction-roller 116, mounted upon a pin 117, projecting from a short rock-arm 118, journaled upon a lug 119, projecting beneath and formed integral with the bearing 6 on the arm 5. The pin 117 also carries an antifriction-roller 120, which runs upon the periphery of a cam 121, keyed to the forward end of the needle rock-shaft 15, between the

bearing 6 and the needle-carrying rock-arm 16. This cam 121 is so positioned upon the needle rock-shaft that the high portion of the cam will depress rock-arm 118 and through it the presser-foot just prior to the penetration of the needle into the work, and the low portion of the cam will allow the presser-foot to be raised by the action of its spring just at the commencement of the feeding-stroke of the feeding-dog presently to be described.

In place of the under roller-feed mechanism heretofore employed in my machine I have arranged an effective reciprocating feeding device which engages the work upon its upper face. This device will now be described.

I employ a two-part feed-dog 130 131, each part of which is formed with two parallel rows of serrations or teeth on its under surface and arranged to engage the work in front and in rear of the path of the needle. This two-part feed-dog is preferably formed integral with and projects laterally from a supporting-arm 132, which is secured, by means of screws, to the forward end of a longitudinally-movable rocking arm or bar 133. This arm or bar 133 is formed between its ends with an elongated slot or opening 134, inclined slightly from the horizontal. An antifriction-roller 135 is supported upon one of the set-screws 104 from the machine-frame lug 105 and engages in the inclined elongated slot or opening 134 for supporting the arm or bar 133, with the feed-dog in operative position. The rear end or bar 133 is formed with a yoke 136, which embraces an eccentric 137, keyed to the main driving-shaft 10 of the machine by which the feed mechanism is operated. This eccentric will cause the arm or bar 133 to reciprocate forwardly and backwardly and rock slightly upon its pivot-roller 135 to raise and lower the feed-dog. The inclined slot 134, moving over the antifriction-roller 135 during the reciprocation of arm or bar 133, serves to counteract the lifting of the dog on its feeding-stroke and increasing the lifting action on its return stroke. The movement of the feed-dog under the action of the eccentric, as modified by the inclined slot and roller-support, will be a feeding-stroke in a straight line in a horizontal plane and a return stroke in an arc. The two rows of teeth upon the feed-dog 130 and 131 engage the work in slot 110 of the presser-foot directly above the ribs 67 and $75^a$ of the independently-yielding work-supporting plates above referred to.

It will be observed that the presser-foot and operating mechanism and the feed-dog and operating mechanism are mounted upon the machine-arm 5 above the work-supporting frame and as compactly as possible in or adjacent to the vertical plane of the line of feed, so that the feed-frame is entirely free and unobstructed. This arrangement, together with the omission of the complicated under-feed mechanism of the old forms of my machine, greatly increase the scope of the improved machine and facilitates the convenient and rapid manipulation of the work which is produced. This simplicity and compactness of the structure by which the cost of manufacture is reduced and the quality and quantity of work increased is one of the most important features of my present invention.

Freely journaled in the bearing 8 of the machine-arm 5 is a rock-shaft 140, carrying at its inner end a depending rock-arm 141, to the lower end of which is pivoted at 142 the forward end of the link 143, which is formed at its rear end with a yoke 144, embracing an eccentric 145, keyed to the main shaft 10. At the outer end of the rock-shaft 140 is keyed the depending rock-arm 146, upon which the looper is journaled and by which the looper is operated.

The rock-arm 146 carries at its lower end an outwardly-projecting journal-stud 147, which preferably has a threaded inner end to provide a convenient means for attaching it to the rock-arm. Freely-journaled upon the stud 147 is a journal-sleeve 148, which is confined upon the stud between the rock-arm 146 and the head of the stud.

150 is the main body portion of the looper-rod. This body portion 150 is formed with a central circular opening 151, which loosely surrounds the bearing-sleeve 148. The looper-rod body is pivotally mounted upon said sleeve by means of the diametrically opposite cone-pointed center screws 152, which are threaded through the lower and upper walls of the central portion of the looper-rod body 150 and are seated in diametrically opposite cone-shaped recesses formed in the journal-sleeve 148. These center screws 152 are preferably provided at their outer ends with small lock-nuts 153 for securing them in the desired adjusted position in engagement with the sleeve 148. By reason of the pivotal connection between the looper-rod body 150 and the journal-sleeve 148 it will be observed that the looper can be rocked upon its pivots in an approximately horizontal plane in addition to its vertical oscillatory movements upon the journal-stud 147, as just described.

The looper-rod body portion 150 is also formed with an inwardly-curved forwardly-projecting arm 155, formed at its front end with a socket which receives the shank of the looper proper, 157, the looper being secured in the socket by means of set-screw 156 passing through suitably-threaded ears of the under split portion of the socket. The looper proper is formed of a single prong $157^a$, having the thread-engaging shoulder $157^b$ and a curved cut-out or depressed portion $157^c$ behind said shoulder to allow for the passage of the needle.

The looper-rod body portion 150 is also formed with a rearwardly-presented socket-arm 158, into the socket of which is threaded the forward end of the tail-rod 159. A locking-nut 160 is also threaded upon said tail-rod 159 to clamp it in position upon the body portion.

As above explained, a crank-disk 13 is mounted upon the end of the driving-shaft 10. This crank-disk 13 has projecting from it at an angle of about forty-five degrees an arm 165, which supports a crank-pin 166, extending at right angles from the arm 165. Journaled upon the crank-pin 166 is a sleeve 167, having diametrically opposite cone-shaped bearing-sockets, in which are seated the cone-pointed center screws 169, which are threaded through the side walls of the loop or yoke 170 for pivotally connecting said yoke with the journal-sleeve 167. The loop or yoke 170 has formed integral with it and extending forwardly from it adjacent to its lower edge a bracket-arm 171, formed with the integral journal-sockets 172, in which the guiding tail-rod of the looper is freely journaled, so as to reciprocate longitudinally and oscillate therein. The integral yoke 170, bracket-arm 171, and bearing-sockets 172 constitute what I term a "floating bearing" for imparting the lateral and a part of the vertical movements to the looper proper, said floating bearing being operated by the universal-joint connection and crank-pin above referred to.

175 is the usual thread-tension device.

180 is a vertically-movable needle-guide formed with an inwardly and forwardly curved finger having a needle-groove in its face. The lower end of this needle-guide rests directly above the opening 112 in the presser-foot and is adapted to intermittently rise and fall into guiding contact with the needle and away from the needle. This needle-guide has an upwardly-projecting guide-stem 182, which is supported in the integral socket-bearing lugs 183 of the sewing-machine arm and carries an inwardly-curved arm 184, secured to it by screw 185 and projecting over above a controlling-cam 186, which is keyed to the needle rock-shaft 15 and formed integral with the cam 121, above referred to, which controls the elevation of the presser-foot. The spiral spring 187 is confined between the hub of arm 184 and the upper bearing 183 to give the needle-guide 180 a normal tendency to move downwardly and holding the arm 184 in contact with the controlling-cam 186.

The operation of the improved machine may be briefly described as follows: The machine is primarily intended to accomplish what is known as "overseaming blindstitching-work," which style of stitching is most commonly employed in seaming the lower edges of trousers-legs, skirts, and other garments of tubular form. The material to be sewed is first folded at one edge to form a hem of the desired depth and by depressing the spring-sustained work-supporting frame is then inserted in the machine above the work-supporting ribs 67 75ª and the ridge-forming disk 60, the turned-up portion or hem of the material—that is, the double thickness of the work—being placed to the right just above the work-supporting plate 75. When the pressure is removed from the work-supporting frame, said frame returns to its normal horizontal or raised position and causes the ribs 67 and 75ª of the yielding work-supporting plates and the freely-journaled ridge-forming rib 60 to force a ridge of the material up into the main longitudinal slot 110 of the presser-foot, the disk 60, which engages the work directly beneath the turned-over edge of the hem, forcing the material directly above it slightly beyond the parts of the material supported by the yielding plates. The needle oscillating transversely of the line of feed penetrates the raised portion or ridge of the material just above the rib 67 at one side and passes through the material supported on the ridge-forming disk 60 and emerges at a point just above the rib 75ª and carries the loop of the thread to the right of the point from which the needle emerges. As the needle starts to return through the material the looper, moving forward on the right-hand side of the line of stitching, takes the loop from the needle and, while the needle is completing its return movement in withdrawing from the material, carries the loop across the line of stitching to the left and starts to recede and move downwardly to present the loop in open position directly in the path of the needle, which at the proper moment again moves forwardly, entering the loop and again piercing the material, as just explained, for another stitch, which is accomplished in the same manner. While the looper is moving across the line of stitching from right to left to present the loop to the needle, the presser-foot is raised from the work-supporting plates and the feed-dog is given its feeding stroke, the material being freed from the pressure of the presser-foot during the time that the feed-dog is making its active stroke. Immediately after the completion of the working stroke of the feed-dog the presser-foot is again clamped securely upon the material to hold it firmly while the needle penetrates the work. After the looper has delivered the loop to the needle it is moved from the left-hand side of the line of stitching over to the right-hand side of the line of stitching in readiness for another forward stroke, as explained, and during this same time the feed-dog is making its return stroke out of engagement with the work in readiness for another feeding stroke. As the needle starts forward to penetrate the material the needle-guide is

raised by its cam, so that the grooved guiding-finger engages and guides the needle until its point has completely penetrated the work, when the needle-guide is automatically lowered out of contact with the needle by the action of its spring when released by the cam to allow the needle rock-arm to accomplish its full upward stroke. In the passage of the work through the machine the yielding work-supporting plates 67 and 75 will effectively support the work upon opposite sides of the line of stitching, which is defined by the freely-journaled ridge-forming disk 60. Any inequalities in the thickness of the work—as, for instance, in crossing seams—will be accurately accommodated by the yielding plates, with the result that the needle will penetrate the work uniformly, catching the material at a sufficient depth for each stitch to effectively sew the two parts of the material together. The appearance of the work produced by this machine with the independently-yielding supporting-plates and freely-journaled ridge-forming disk will be uniform throughout. The freely-journaled ridge-forming disk of small diameter affords an effective means for projecting a ridge of the material into the path of the needle, and as the disk rotates freely as the material passes over it it will be clear that a new part of the periphery of the disk will be presented beneath the needle for every stroke of the needle, thereby avoiding the unequal wear of the disk, which with the employment of the forms of ridge-forming ribs heretofore used has resulted in the formation of grooves in the rib and the consequent improper stitching of the machine.

As stated above, the forward and backward movements of the looper and partly its vertical vibration are caused by the oscillations of the suspended rock-arm on which the looper-body is journaled, while the transverse movements of the looper from one side of the line of stitching to the other, and partly the vertical vibrations are caused by the laterally-swinging floating bearing actuated by the eccentric crank mechanism.

The simplicity of the feed device is an important feature of my present machine, the construction being such that the equivalent of the four-part feed motion is accomplished from a single eccentric, the roller and inclined slot-support of the feed-bar counteracting the vertical movement of the feed-dog on its feeding stroke to maintain it in effective engagement with the material and the same support exaggerating the raising of the feed-dog away from the material on the return inactive stroke.

The specific improvements in the feed mechanism and in the stitch-forming mechanism described and illustrated in the present case are fully claimed in my copending divisional applications serially numbered 226,547 and 226,548, both filed on the 29th of September, 1904.

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

1. In a blindstitch sewing-machine, the combination of suitable stitch-forming mechanism, a presser-foot, a work-supporting frame, and a pair of independently-yielding work-supporting plates mounted upon said frame beneath the presser-foot, the effective work-engaging portions of said plates being presented upon opposite sides of and parallel with the line of stitching.

2. In a blindstitch sewing-machine, the combination of suitable stitch-forming mechanism, a presser-foot, a feeding device, a work-supporting frame, and two independently-yielding work-supporting plates mounted upon said frame beneath the presser-foot and extending oppositely from the line of stitching and inclining downwardly from the plane of feed, each plate being formed with a horizontal work-engaging rib adjacent to and parallel with the line of stitching.

3. In a blindstitch sewing-machine, the combination of suitable stitch-forming mechanism, a presser-foot, a work-supporting frame, and two approximately horizontal independently-yielding work-supporting ribs mounted upon said frame and presented thereby beneath the presser-foot one upon each side of the line of stitching, substantially as set forth.

4. In a blindstitch sewing-machine, the combination of suitable stitch-forming mechanism, a presser-foot, a work-supporting frame, and two yielding work-supporting ribs mounted independently upon said frame and presented thereby in horizontal position beneath the presser-foot one upon each side of the line of stitching and both parallel with the line of stitching, each of said ribs being capable of moving bodily away from the presser-foot and rocking longitudinally of the machine under the action of the material passing through the machine, substantially as set forth.

5. In a blindstitch sewing-machine, the combination of suitable stitch-forming mechanism, a slotted presser-foot, a work-supporting frame, a freely-journaled ridge-forming disk mounted upon said frame and presented thereby beneath the presser-foot in position to force a ridge of material through the slot of the presser-foot, and yielding devices mounted upon the work-supporting frame independent of the ridge-forming disk and of each other, said devices supporting the material upon opposite sides of said disk, substantially as set forth.

6. In a blindstitch sewing-machine, the combination of suitable stitch-forming mechanism, a presser-foot, a work-supporting

frame, a freely-journaled ridge-forming disk mounted upon said frame, and a pair of yielding work-supporting plates mounted upon said frame upon opposite sides of said disk and independently of the disk and of each other, said frame presenting said disk and said plates beneath the presser-foot, substantially as set forth.

7. In a blindstitch sewing-machine, the combination of suitable stitch-forming mechanism, a presser-foot, a work-supporting frame, a ridge-forming disk freely journaled upon said frame, and two yielding normally horizontal work-supporting ribs mounted independently upon said frame one upon each side of said ridge-forming disk in parallel vertical planes, each of said ribs being capable of yielding bodily away from the presser-foot and rocking longitudinally of the machine under the action of the passing material, substantially as set forth.

8. In a blindstitch sewing-machine, the combination of suitable stitch-forming mechanism, a presser-foot, a work-supporting frame, and two spring-sustained work-supporting plates mounted independently upon said frame upon opposite sides of the line of stitching, each of said plates extending laterally from the line of stitching and being capable of yielding bodily away from the presser-foot and rocking upon its longitudinal axis under the action of the material passing through the machine, substantially as set forth.

9. In a blindstitch sewing-machine, the combination of suitable stitch-forming mechanism, a presser-foot, a work-supporting frame, and two work-supporting plates mounted upon said frame upon opposite sides of the line of stitching, each of said plates extending laterally from the line of stitching and being formed with a horizontally-presented raised rib which is capable of moving bodily away from the presser-foot and rocking upon the longitudinal axis of the plate, substantially as and for the purpose set forth.

10. In a blindstitch sewing-machine, the combination of suitable stitch-forming mechanism, a presser-foot, a work-supporting frame, and two work-supporting plates mounted upon said frame upon opposite sides of the line of stitching in planes inclined to the horizontal, the highest parts of said plates being formed into horizontal ribs arranged adjacent to and parallel with the line of stitching and capable of moving bodily away from the presser-foot and rocking longitudinal of the machine, substantially as and for the purpose set forth.

11. In a blindstitch sewing-machine, the combination of suitable stitch-forming mechanism, a presser-foot, a work-supporting frame, yieldingly-mounted work-supporting plates arranged upon said frame upon opposite sides of the line of stitching, a screw passing through each of said plates into the supporting-frame and formed with a spheroidal head, and an expansion-spring upon each of said screws between the plate and the supporting-frame, substantially as set forth.

12. In a blindstitch sewing-machine, the combination of suitable stitch-forming mechanism, a presser-foot, a work-supporting frame, two yieldingly-mounted inclined work-supporting plates arranged upon said frame upon opposite sides of the line of stitching, each of said plates being formed with a horizontally-presented work-supporting rib adjacent to the line of stitching, screws or pins one of which passes loosely through each of said plates and is secured in the supporting-frame spheroidal engaging surfaces formed on the heads of said screws or pins and in said plates, and an expansion-spring upon each of said screws between the plate and the supporting-frame, substantially as set forth.

13. In a blindstitch sewing-machine, the combination of suitable stitch-forming mechanism, a presser-foot, a work-supporting frame presented beneath the presser-foot, a yielding work-supporting plate mounted upon said frame, a universal bearing connecting one end of said plate with said frame, a screw passing through said plate into the frame and formed with a spheroidal head, and an expansion-spring confined upon said screw between the plate and said frame, substantially as set forth.

14. In a blindstitch sewing-machine, the combination of suitable stitch-forming mechanism, a presser-foot, a work-supporting frame presented beneath the presser-foot, a yielding work-supporting plate mounted upon said frame and formed with a rib at the inner end adjacent to and parallel with the line of stitching, a universal bearing connecting the outer end of said plate with said frame, a screw passing through said plate into the frame and formed with a spheroidal head, a spheroidal socket in the plate in which said head is seated, and an expansion-spring confined upon said screw between the plate and said frame, substantially as set forth.

15. In a blindstitch sewing-machine, the combination of suitable stitch-forming mechanism, a presser-foot, a work-supporting frame presented beneath the presser-foot and formed with a laterally-extending slot, a yielding work-supporting plate mounted upon said frame and projecting through said slot, a horizontal rib formed on the inner end of said plate and extending horizontally parallel with the line of stitching, a universal bearing connecting the outer end of said plate beneath said frame, a screw passing through said plate into the frame and formed with a spheroidal head engaging a corresponding socket in the plate, and an expansion-spring confined upon said screw between the plate and said frame, substantially as set forth.

16. In a blindstitch sewing-machine, the combination with suitable stitch-forming mechanism, a presser-foot, a spring-sustained work-supporting frame formed with a laterally-projecting horn, a ridge-forming disk freely journaled upon a lug of said horn, yielding supporting-plates mounted upon said frame upon opposite sides of said ridge-forming disk, and springs confined between said work-supporting plates, and frame, substantially as set forth.

17. In a blindstitch sewing-machine, the combination with suitable stitch-forming mechanism, a presser-foot, a spring-sustained work-supporting frame formed with a laterally-projecting horn, a ridge-forming disk freely journaled upon a lug of said horn, yielding supporting-plates mounted upon said frame and extending laterally upon opposite sides of said ridge-forming disk, ribs upon said plates arranged adjacent to said disk parallel with the line of stitching, and springs confined between said work-supporting plates and frame, substantially as set forth.

18. In a blindstitch sewing-machine, the combination with suitable stitch-forming mechanism, a work-supporting frame carrying suitable work-engaging ribs, a presser-foot pivotally mounted upon the machine-frame, a spring arranged to move the presser-foot away from the work-supporting ribs, and a cam arranged to force the presser-foot down into engagement with the material supported upon said ribs, substantially as set forth.

19. In a blindstitch sewing-machine, the combination with suitable stitch-forming mechanism, a work-supporting frame, a presser-foot pivotally mounted upon the machine-frame, a spring engaging the presser-foot and adapted to move it away from the work-supporting frame, a yoke projecting from the presser-foot, means operating upon the yoke adapted to force the presser-foot down into engagement with the material above said frame and time the movement of the presser-foot away from the frame, substantially as set forth.

20. In a blindstitch sewing-machine, the combination with suitable stitch-forming mechanism, a work-supporting frame, a presser-foot pivotally mounted upon the machine-frame, a spring arranged to move the presser-foot away from the work-supporting frame, a yoke or projection extending from the presser-foot, a rock-arm carrying a stud which engages said yoke, an antifriction-roller journaled upon said rock-arm, and an oscillatory cam engaging said antifriction-roller and adapted to force the presser-foot down into engagement with the material above said frame and time the movement of the presser-foot away from the frame, substantially as set forth.

21. In a blindstitch sewing-machine, the combination with suitable stitch-forming mechanism and a presser-foot, of a work-supporting frame, an approximately horizontal yielding work-engaging rib mounted upon said frame beneath the presser-foot and capable of moving bodily away from the presser foot and of rocking longitudinally of the machine under the action of the passing material, and a reciprocating feed-dog engaging the work above said rib, substantially as set forth.

22. In a blindstitch sewing-machine, the combination with suitable stitch-forming mechanism, and a presser-foot, of a work-supporting frame, two horizontally-presented yielding independent work-engaging ribs mounted upon said frame upon opposite sides of the line of stitching, and a reciprocating feed-dog having two rows of serrations or teeth engaging the work above said yielding ribs, substantially as set forth.

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