

M. HEMLEB.
HEMSTITCH SEWING MACHINE.
APPLICATION FILED DEC. 20, 1907.

955,963.

Patented Apr. 26, 1910.

3 SHEETS—SHEET 2.

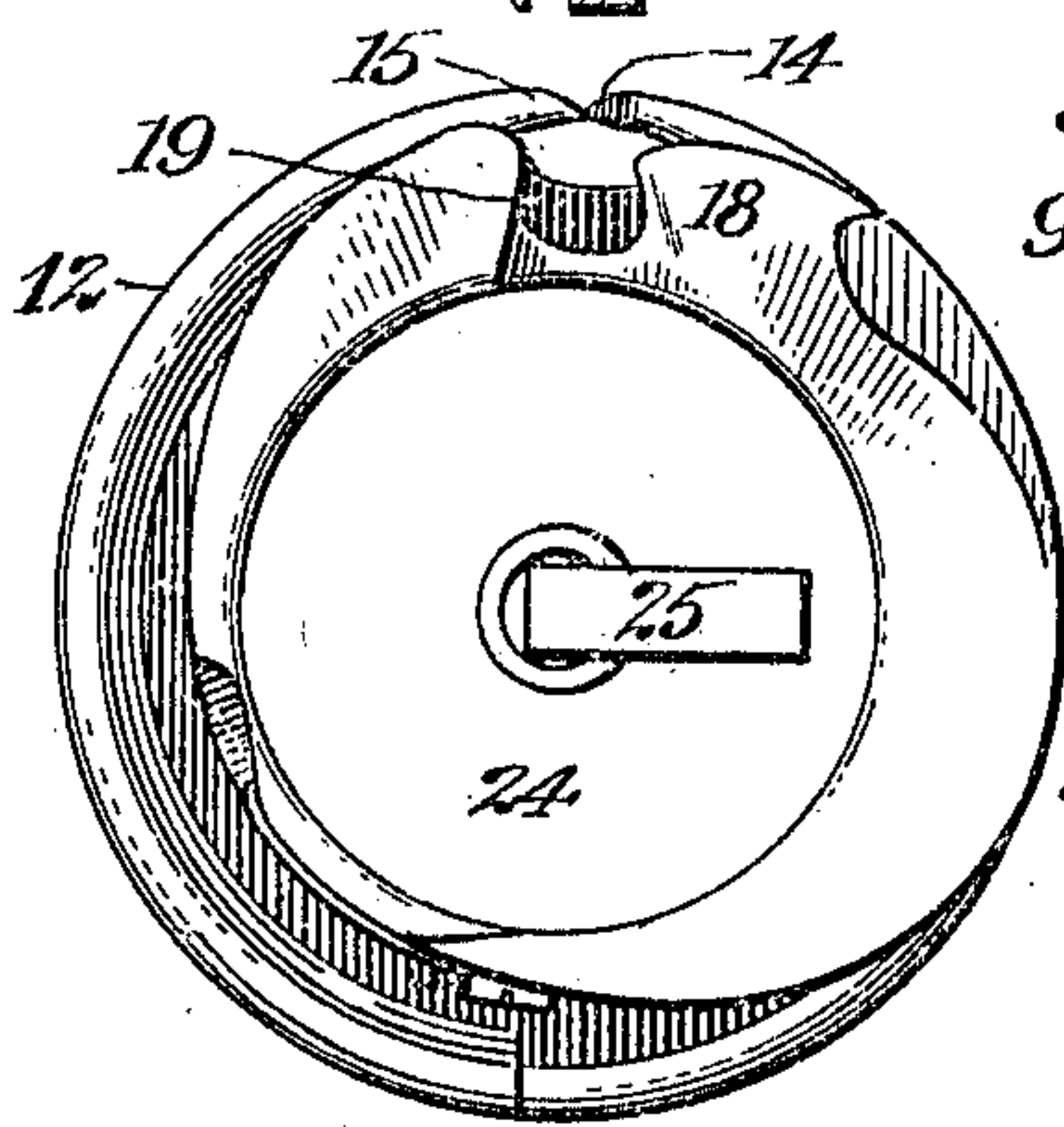
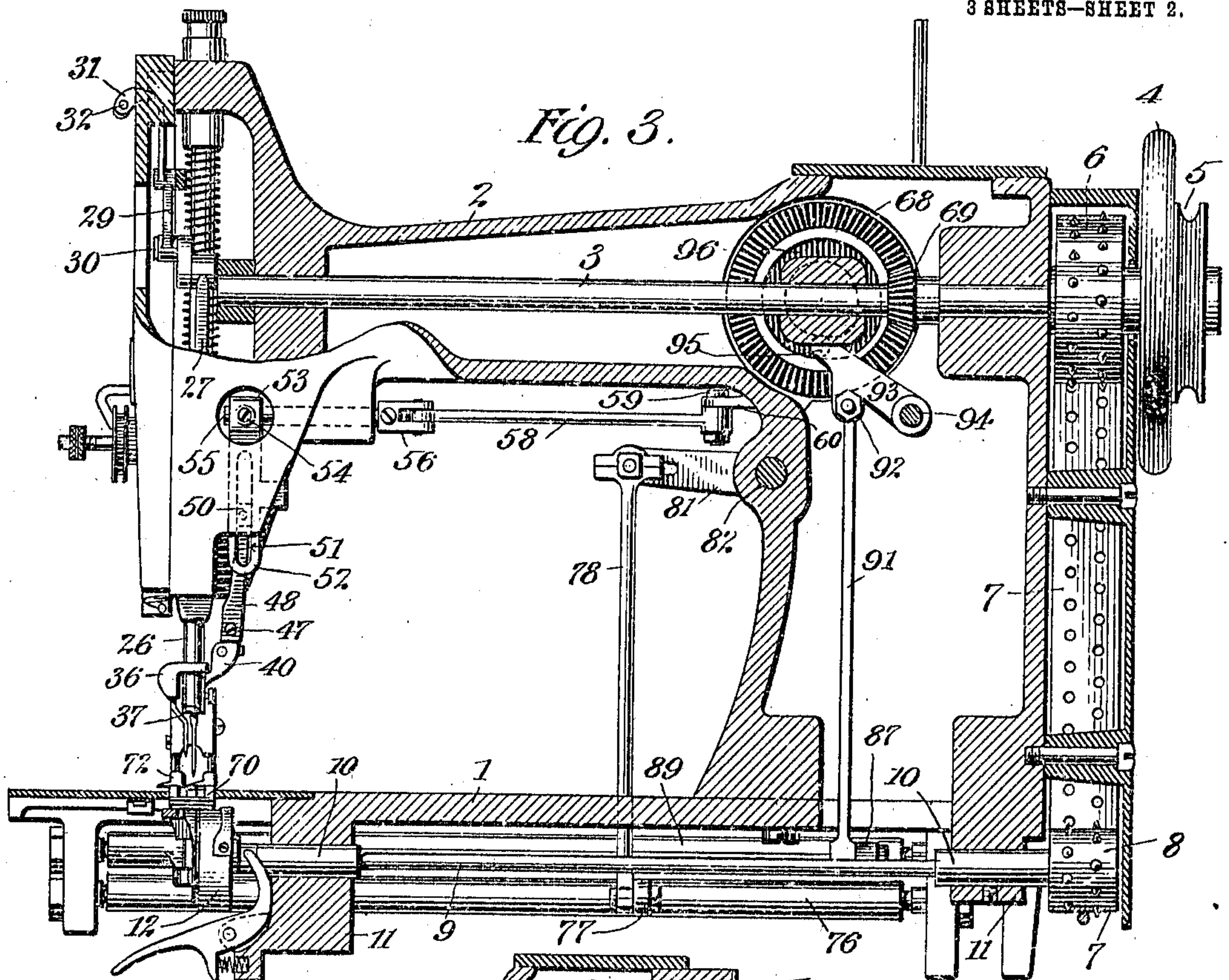


Fig. 7.

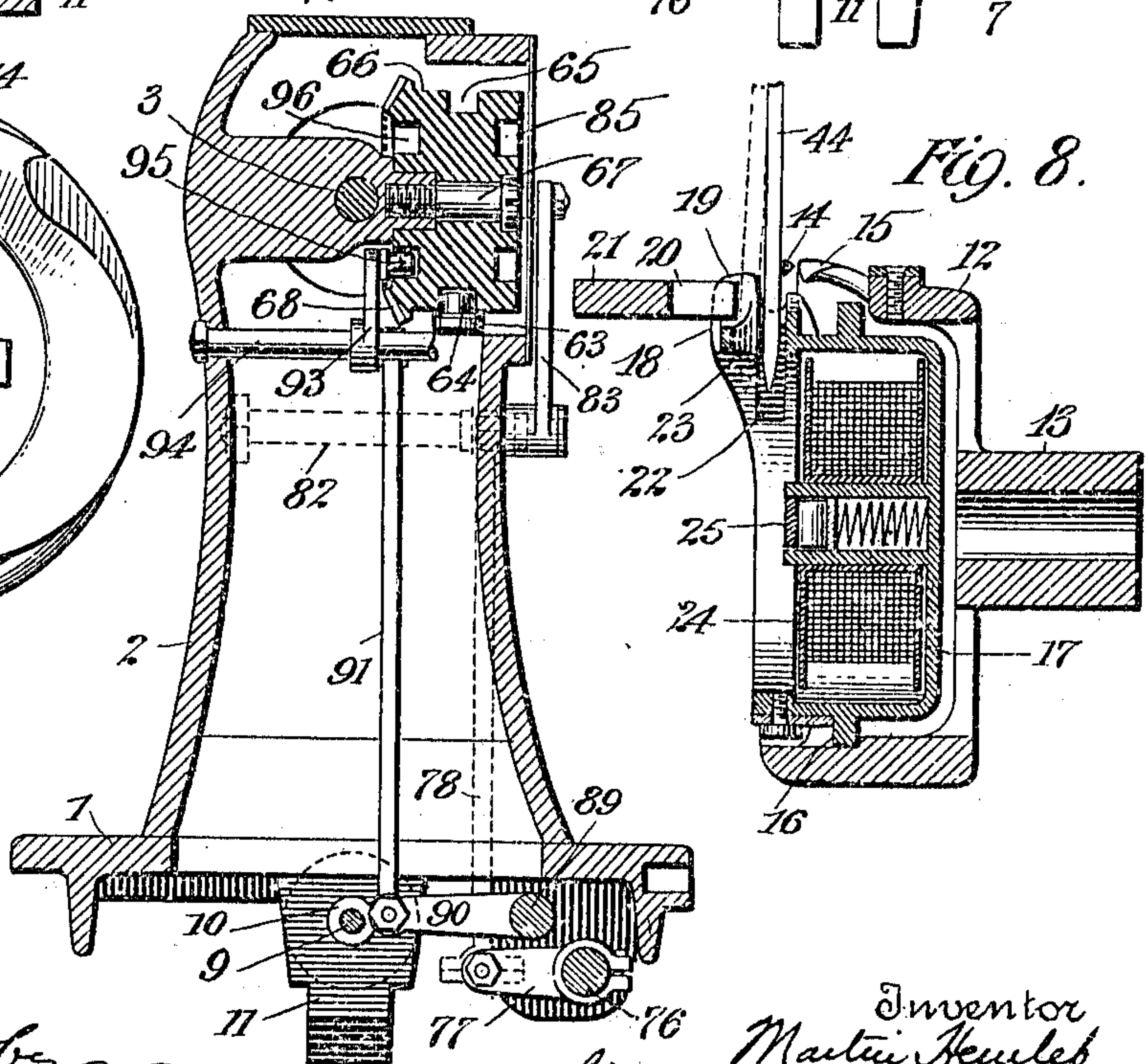


Fig. 8.

Witnesses:
Frank Ober
H. K. Krumm.

Fig. 4.

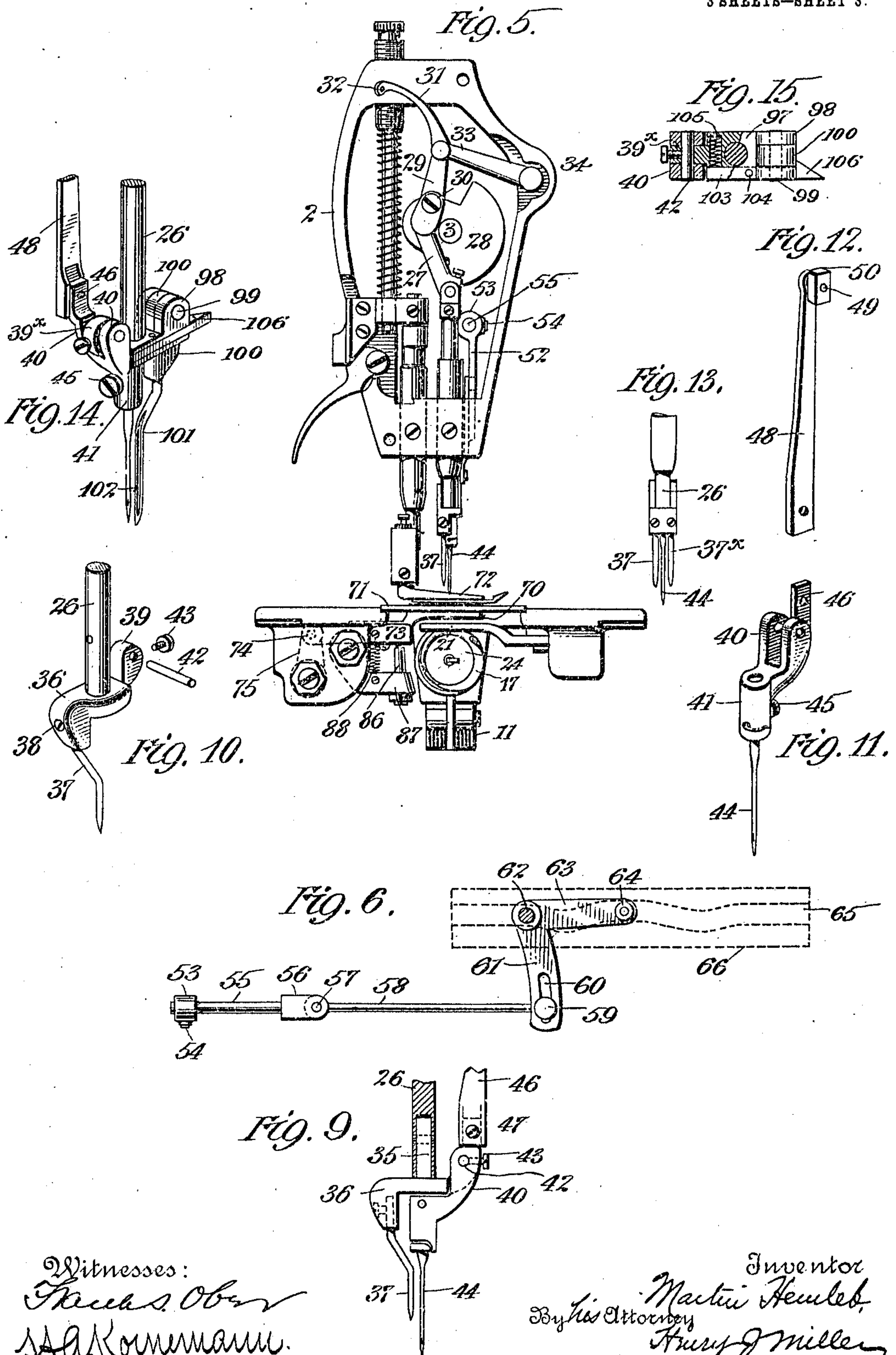
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3 SHEETS—SHEET 3.



Witnesses:
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UNITED STATES PATENT OFFICE.

MARTIN HEMLEB, OF ELIZABETH, NEW JERSEY, ASSIGNOR TO THE SINGER MANUFACTURING COMPANY, A CORPORATION OF NEW JERSEY.

HEMSTITCH SEWING-MACHINE.

955,963.

Specification of Letters Patent.

Patented Apr. 26, 1910.

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To all whom it may concern:

Be it known that I, MARTIN HEMLEB, a citizen of the United States, residing at Elizabeth, in the county of Union and State of New Jersey, have invented certain new and useful Improvements in Hemstitch Sewing-Machines, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention has for its object to produce a hemstitching sewing machine capable of operation at the high speeds now attained by certain of the straight-ahead stitching machines at present in use for certain classes of work permitting the easy handling of the goods for such rapid production. Among the requisites of such a machine are notably simplicity of construction and communication of the movements of the several operative members directly from the main-shaft receiving its actuation from the source of power.

To this end the present invention is embodied in a machine having a frame composed of a bed-plate and an overhanging bracket-arm in which is journaled the main-shaft having a perforated belt and pin-wheel driving connection with the loop-taker shaft journaled beneath the bed-plate and having fixed upon its forward end a multi-rotation hook, the path of circular movement of whose beak is in a plane parallel with the path of reciprocation of the needle operatively connected with the forward end of the main-shaft. The movements of the needle and feeding mechanism characterizing this class of machine are derived from a cam-cylinder mounted for rotation upon a transverse axis in the bracket-arm and geared to the main-shaft so as to move at one-third the speed of the latter. The needle-bar carries a rigidly mounted awl adapted to penetrate the material of the hem, and the needle is mounted in a vibrating needle-clamp operatively connected with the cam-cylinder to cause the needle to make two descents in succession with its point in line with the awl and to move laterally while in the goods toward the path of movement of the loop-taker beak to offer its loops to the loop-taker, and to make a subsequent descent through the hem parallel with the awl and adjacent the path of movement of the loop-taker beak in the production of a succeeding stitch; the rising and falling and to-and-fro

feeding movements being imparted to the feed-dog from the cam-cylinder to give the usual advancing and receding movements to the goods in coöperation with the vertical reciprocatory and lateral movements of the needle in producing the wellknown hemstitch figure.

To insure the requisite simplicity of construction of the most rapidly moving operative parts of the machine, it is of importance that the loop-taker should receive its multi-rotations directly from the lower shaft and should be disposed with its face parallel with the needle reciprocations to insure such direct connection; and also that the loop-taker should have a fixed or axially stationary working position and should not be required to follow the lateral movements of the needle in coöperation therewith. This arrangement of the loop-taker relative to the path of needle reciprocation is believed to be new in hemstitching machines in the present improvement, and it is believed that the same is a very important element in the construction of a hemstitching machine adapted to the requirements of high-speed machines of the present time.

In adapting the present improvement to the Singer high-speed machine, it was found that the projection upon the bobbin-case for engaging with its holding finger was of such character as to prevent the lateral movement of the needle in a direction transversely of the face of the bobbin-case, but by forming a slot or recess therein to afford clearance for the needle in such lateral movements, this interference was obviated and the loop-taker was adapted to coöperate with the needle in this new relation.

The invention will be understood by reference to the accompanying drawings in which—

Figure 1 is a rear elevation of the machine with the cap for the cam cavity removed to expose the cam-cylinder, and Fig. 2 is a bottom plan view of the machine. Fig. 3 is a front elevation of the machine, partly in section at the axis of the main-shaft, and Fig. 4 is a vertical section upon the axis of the cam-cylinder, looking forwardly. Fig. 5 is a front elevation of the machine with the face plate removed. Fig. 6 is a detached plan view of a portion of the needle actuating mechanism, showing in dotted lines a development of the actuating cam. Fig.

7 is a face view and Fig. 8 a longitudinal sectional view, upon an enlarged scale, of the loop-taker comprising a rotary hook and thread-case journaled therein. Fig. 9 is a detached elevation, partly in section, of the lower end of the needle-bar, carrying the needle and awl clamps, Fig. 10 a perspective view of the awl clamp, Fig. 11 a similar view of the needle-clamp, and Fig. 12 a perspective view of the needle vibrating lever. Fig. 13 is an elevation of the lower end of the needle-bar representing, similarly to Fig. 5, a modification comprising awls both in advance and rearward of the needle. Fig. 14 is a perspective view of the lower end of the needle-bar with the needle and plunger clamps, disclosing still another modification comprising a laterally grooved plunger adapted to house the point of the needle in its descent off the hem, and Fig. 15 is an enlarged sectional plan view of the same showing the latch for the pivoted plunger clamp.

The machine is represented in the accompanying drawings constructed with a frame composed of the bed-plate 1 and overhanging bracket-arm 2 in which latter is journaled the main-shaft 3 having at its rearward end the usual balance wheel 4 and belt-pulley 5 and adjacent the same the pin-pulley 6 connected by means of the perforated belt 7 with the smaller pin-pulley 8 upon the rearward end of the loop-taker shaft 9, journaled in bushings 10 mounted in depending bearing brackets 11 of the bed-plate, as in the United States Patent No. 862,240, dated August 6, 1907.

The loop-taker is herein represented as comprising a cup-shaped hook 12 having a hub 13 fixed upon the forward end of the shaft 9 and provided with the loop-seizing beak 14 and loop-detaining horn 15 opposed to but spaced slightly from the same, the hook having an annular seat upon which rests the bearing rib 16 of the cup-shaped thread-case 17 formed in the upper portion of its outer face with a lug 18 having a notch 19 to receive the lateral finger 20 of a holding arm 21 fixed to a stationary portion of the bed-plate. The lug 18 is formed adjacent the path of movement of the loop-taker beak 14 with the usual needle clearance slot 22 having a forwardly extending needle clearance cut 23 to accommodate the needle in its two lateral positions, as represented in full and dotted lines in Fig. 8. The thread case is provided with the usual bobbin 24 carrying the mass of lower thread and secured therein by means of a latch lever 25 in a manner wellknown.

The vertically reciprocating needle-bar 26 is journaled in the head of the bracket-arm 2 in the usual manner, and is pivotally connected at the upper end with one end of the pitman 27 having its opposite end connected

with the usual crank-pin upon the disk 28 fixed upon the forward end of the main-shaft 3. The angular take-up lever is of the Singer type having one of its arms 29 pivotally connected with a crank-pin 30 offset from the needle-actuating crank-pin upon the crank disk 28 and having its other arm 31 formed with the usual thread-eye 32 and pivotally connected at the junction of its arms with one end of a swinging lever 33 having a fixed fulcrum at 34.

The lower end of the needle-bar is formed with a socket to receive the shank 35 of the awl-clamp 36 provided with a socket to receive the shank of the awl 37 secured therein by means of the set-screw 38, and provided with a lateral lug 39 oppositely disposed from the awl socket in respect of the shank 35 embraced by the upper and laterally extending forked lug 40 of the needle-clamp 41 pivotally secured thereto by means of the fulcrum-pin 42 secured in position by a set-screw 43 tapped into the lug 39. The shank of the needle 44 is secured within the usual socket in the needle-clamp by means of the set-screw 45. The lug 40 is provided with a perforated ear 46 to which is secured by means of a fastening screw 47 the upwardly extending lever 48 carrying at its upper end a fulcrum-pin 49 upon which is mounted a slide-block 50 entering a vertical slot 51 in a rigid arm 52 having at its upper end a collar 53 secured by means of a set-screw 54 to the forward end of a reciprocating rod 55 journaled in the head of the bracket-arm beneath and parallel with the main-shaft and having at its rearward end a fork 56 pivotally connected by means of a pin 57 to one end of the link 58 whose opposite end is adjustably secured by means of a clamp-screw 59 entering a segmental slot 60 in one arm 61 of a bellcrank lever having a fixed fulcrum 62 in the under side of the bracket-arm and whose other arm 63 carries a roller-stud 64 entering the peripheral groove 65 of the cam-cylinder 66. The cam-cylinder is shown mounted upon a screw-stud 67 tapped into one of the rearward bearings of the main-shaft transversely of the latter, and is shown formed with an integral bevel gear 68 meshing with a bevel pinion 69 of one-third its size fixed upon the main-shaft and adapted to transmit motion to the cam-cylinder at one-third the speed of the main-shaft. The rocking of the bellcrank 61, 63 by means of the cam 66 serves to reciprocate the rod 58 and the guide-arm 52 depending therefrom which causes the vibration of the lever 48 and the lateral movement of the needle around its fulcrum point 42 of the needle-bar.

The feeding mechanism, which operates to advance the work in a direction parallel with the face of the loop-taker and transversely of the plane of lateral movement of the

needle, is of the general type represented in my Patent No. 863,533, dated August 13, 1907, excepting that it is actuated from the cam-cylinder 66 instead of from the main-shaft. As herein represented, it consists of the feed-dog 70 operating through the usual apertures in the throat-plate 71 in opposition to the compound presser-foot 72, the feed-dog being mounted upon the forward end of the feed-bar 73 pivotally connected at its rearward end by means of the pin 74 to the upwardly extending arms 75 upon the forward end of the feed-actuating rock-shaft 76 having rearwardly thereof the lateral crank-arm 77 pivotally connected to the lower end of a rod 78 attached at its upper end by means of the pivotal pin 79 adjustably in a slot 80 in the lateral arm 81 of a bellcrank lever having a fixed fulcrum at 82, with its upwardly extending other arm 83 provided with a roller-stud 84 entering the cam-groove 85 in the rearward face of the cam-cylinder 66. By changing the adjustment of the pivotal pin 79 within its slot 80 the degree of oscillation of the feed-actuating rock-shaft 76, and hence the extent of feeding movement of the feed-dog, may be adjusted, as will be readily understood.

As in the Patent No. 863,533, before mentioned, the free end of the feed-lever 73 is supported by means of a link 86 which is in turn sustained within a suitable bearing formed therefor in the outer end of a rigid arm 87 yieldingly connected with the feed-bar by means of a spring 88 and fixed upon the forward end of the feed-lifting rock-shaft 89 having at its opposite end a lateral arm 90 to which is connected the lower end of a link 91 having its upper end pivotally connected to a depending ear 92 of the swinging lever 93 fulcrumed upon the fixed transverse pin or shaft 94 and carrying at its opposite end a roller-stud 95 entering a cam-groove 96 in the forward face of the cam-cylinder 66. It will thus be seen that by means of the cam-cylinder 66 a falling and rising movement may be imparted to the feed-dog through the vibrating arm 87, once for each cycle of operation of the machine, determined by a complete rotation of the cam 66.

As will be observed, the function of the cam 66 of the present improvement is substantially the same as that of the cam-wheel disclosed in the Patent No. 635,673, issued October 24, 1889, to me jointly with Philip Diehl, in that it effects the lateral jogging movements of the needle and the feeding and rising and falling movements of the feed-dog in imparting the requisite relative movements of the stitch-forming mechanism and the work in producing the well-known hemstitch pattern.

As the body of the loop-taker remains during all stages of the cycle of operation

of the machine in precisely the same position in relation to the stationary parts of the machine, while its beak moves in a circular path in a vertical plane perpendicular to the plane of vertical and lateral movement of the needle, and has therefore what I have for convenience termed a "stationary working position," it is evident that the presentation of the needle-thread loops for seizure by the loop-taker beak must be invariably at the same point; and this is accomplished in connection with the descents of the needle off the hem, as represented by dotted lines in Fig. 8, by shifting the needle inwardly toward the plane of movement of the loop-taker beak while in the goods preparatory to its ascent to throw-out its thread-loops, so that the needle in commencing its ascent invariably assumes the full-line position represented in Fig. 8. The lateral movement of the needle while in the goods is produced by the suitable shaping of the cam-groove 65 of the cylinder 66 which controls the mechanism for imparting the other lateral movements to the needle.

As before indicated, the loop-taker derives from its actuating mechanism a plurality of rotations for each reciprocation of the needle, and I have therefore for convenience designated this member so actuated as a "multi-rotation" loop-taker.

In some classes of work it has been found that the enlargement of the needle puncture rearwardly of the needle, as represented in Figs. 5 and 9 is sufficient, the awl being made shorter than the needle and only of sufficient length to penetrate the fabric to perform its usual function, but in certain other cases it has been found desirable to provide the awl-clamp with an additional socket to receive a second awl 37* in advance of the needle 44, as represented in Fig. 13.

In cases wherein awls are provided forwardly or rearwardly of the needle in relation to the direction of feed, it is evident that the machine is adapted only for the production of straight hemstitch seams or those of very gradual curvature, but by employing a grooved plunger, as in Figs. 14 and 15, the machine is adapted for production of curved hemstitch seams in which the needle punctures are successively entered and enlarged with somewhat more precision than with the awls previously referred to. In these figures, the needle-bar 26 is shown provided with a rigid carrier-plate 97, which may be secured to its lower end similarly to the awl-clamp 36, the carrier-plate being provided with the lug 39* to which is pivotally attached by means of the pin 42 the forked lug 40 of the needle-clamp 41, and with the spaced lugs 98 to which is pivotally attached by means of the pin 99 the plunger clamp 100 having a socket in which is secured by the usual means the

plunger 101 having the lateral groove 102 upon the side adjacent the needle and of sufficient length to house the needle point when the needle is thrown toward the plunger preparatory to penetrating the fabric off the hem. The plunger clamp is pivotally connected with the needle-bar through the carrier-plate 97 in order that the plunger may be thrown outwardly away from the needle for convenience in threading, and the plunger-clamp 100 is locked in its operative parallel relation to the needle-bar by means of the latch-lever 103 mounted upon the vertical fulcrum-pin 104 and having one end pressed outwardly by means of a spring 105 disposed within a transverse socket in the plate 97, the other end of the latch lever having a hook 106 engaging the outer edge of the upwardly projecting ear of the clamp 100 through which the pivotal pin 99 passes.

As shown in Fig. 15, the upwardly extending ear of the plunger-clamp, which is embraced by and pivotally connected with the lugs 98 by means of the fulcrum-pin 99, is normally securely locked slightly below the fulcrum-pin between the inner end of the notch therefor intermediate said lugs and the hook 106 of the latch-lever 103, but when the hooked end of such lever is pressed aside by the operator out of engagement with the edge of such ear of the plunger-clamp, the clamp may be readily swung outwardly away from the needle so as to provide a clear space adjacent the latter for purposes of threading. After the needle is threaded, the plunger-clamp is swung backwardly into its notch in the carrier-plate 97 by the operator into initial position in which it is again locked by the spring-pressed latch 106.

It will be observed that one of the distinguishing characteristics of the present improvement is that of effectiveness of operation with the least possible number of parts, the cam running at comparatively slow speed and actuating only such parts as are necessarily actuated with less frequency than the stitch productions of the group composing the hemstitch figure, while the stitch-forming devices are of a type and construction and arrangement favorable in the greatest degree to the attainment of high speeds with a minimum wear of parts and maximum durability.

Having thus set forth the nature of the invention, what I claim herein is:—

1. In a hemstitch sewing machine, the combination with the main-shaft, of a loop-taker shaft parallel therewith and fixed against axial movement relative thereto; means for transmitting multi-rotations to the loop-taker shaft from the main-shaft, a rotary loop-taker fixed upon the loop-taker shaft, a rectilinearly reciprocating needle-

bar operatively connected with the main-shaft, a needle and an awl or plunger carried by and reciprocating with said needle-bar, a cam connected with and driven by the main-shaft independently of the loop-taker shaft, means connected with and actuated by said cam whereby lateral jogging movements transversely of the plane of rotation of the loop-taker are imparted to the needle, feeding mechanism operative in a direction parallel with the plane of rotation of the loop-taker, and operative connections between said cam and the feeding mechanism for imparting to the latter its operative movements.

2. A hemstitch sewing machine comprising a frame including a bed-plate and an overhanging bracket-arm, a main-shaft journaled in fixed bearings in said bracket-arm, a loop-taker shaft having bearings beneath the bed-plate and fixed against axial movement, a larger pulley mounted directly upon the main-shaft and a smaller pulley mounted directly upon the loop-taker shaft, a belt embracing said pulleys and communicating through the same a plurality of rotations to the loop-taker shaft for each rotation of the main-shaft, a rectilinearly reciprocating needle-bar mounted in fixed bearings and operative connections between the same and the main-shaft, a needle mounted for lateral movement upon said needle-bar and partaking of its reciprocating movements, a loop-taker driven directly by the loop-taker shaft, and means connected with the main-shaft and independent of its driving connection with the loop-taker shaft, whereby the needle is given lateral movements toward and from the loop-taker.

3. A hemstitch sewing machine comprising a frame including a bed-plate and an overhanging bracket-arm, a main-shaft journaled in said bracket-arm, a loop-taker shaft parallel with said main-shaft and journaled in said bed-plate, means for transmitting multi-rotations to the loop-taker shaft from the main-shaft, a rotary loop-taker mounted upon the forward end of the lower shaft and having an axially stationary working position, said loop-taker having its loop-seizing beak at its front face, a reciprocating needle-bar operatively connected with the main-shaft, an awl or plunger carried by and sustained in fixed relation to said needle-bar, a needle-clamp having a needle-socket and mounted upon said needle-bar and adapted for lateral movement thereon in a plane transversely of the path of movement of the loop-taker beak, a needle mounted in said needle-clamp and reciprocating with said needle-bar in a path in front of and adjacent to the plane of circular movement of the loop-taker beak, feeding mechanism operative in a direction parallel with the plane of movement of the loop-taker beak, a cam

connected with the main-shaft, and connections from said cam to the needle-clamp for giving the latter its lateral movements and to the feeding mechanism for imparting operative movements thereto.

4. A hemstitch sewing machine comprising a frame including a bed-plate and an overhanging bracket-arm, a main-shaft journaled in said bracket-arm, a loop-taker shaft parallel with said main-shaft and journaled in said bed-plate, a pin-pulley mounted upon the main-shaft, a smaller pin-pulley mounted upon the loop-taker shaft, a perforated non-metallic belt connecting said pin-pulleys and transmitting multi-rotations to the loop-taker shaft from the main-shaft, a rotary loop-taker mounted upon the forward end of the lower shaft and having an axially stationary working position, said loop-taker having its loop-seizing beak at its front face, a reciprocating needle-bar operatively connected with the main-shaft, an awl or plunger carried by and sustained in fixed relation to said needle-bar, a needle-clamp having a needle socket and mounted upon said needle-bar and adapted for lateral movement thereon in a plane transversely of the path of movement of the loop-taker beak, a needle mounted in said needle-clamp and reciprocating with said needle-bar in a path in front of and adjacent to the plane of circular movement of the loop-taker beak, feeding mechanism operative in a direction parallel with the plane of movement of the loop-taker beak, a cam connected with the main-shaft, and connections from said cam to the needle-clamp for giving the latter its lateral movements and to the feeding mechanism for imparting operative movements thereto.

5. A hemstitch sewing machine comprising a main-shaft, a loop-taker shaft parallel with and disposed beneath the same, operative connections between said shafts whereby the loop-taker shaft receives multi-rotations from the main-shaft, a reciprocating needle-bar operatively connected with the main-shaft, a rigid awl carried by the needle-bar, a needle mounted for lateral movement upon the needle-bar, a loop-taker fixed upon the loop-taker shaft and having a loop-seizing beak upon its front face and operating in an axially fixed working position and provided with a thread-case journaled therein, a free space being provided in advance of the circular path of movement of the loop-taker beak to afford clearance for the lateral movement of the needle toward and from the latter, feeding mechanism operative in a direction parallel with the plane of movement of the loop-taker beak and transversely of the plane of lateral movement of the needle, a cam connected with the main-shaft, and connections between said cam and the needle for giving the latter its lateral movements and between the cam and the feeding mechanism for imparting operative movements to the latter.

6. A hemstitch sewing machine comprising a main-shaft, a loop-taker shaft parallel with and disposed beneath the same, operative connections between said shafts whereby the loop-taker receives multi-rotations from the main-shaft, a reciprocating needle-bar operatively connected with the main-shaft, a rigid awl carried by the needle-bar, a needle-clamp pivotally mounted upon the needle-bar with a fulcrum-pin disposed transversely of the needle-bar and the loop-taker shaft and provided with an upwardly extending operating lever having a lateral pin, a needle mounted in said needle-clamp, a loop-taker fixed upon the loop-taker shaft and having a loop-seizing beak upon its front face operating in an axially fixed working position and provided with a thread-case journaled therein, feeding mechanism operative in a direction parallel with the plane of movement of the loop-taker beak, a cam connected with the main-shaft, a reciprocating rod disposed parallel with the main-shaft and having a depending slotted arm entered by the lateral pin of the needle-clamp operating lever, an operative connection intermediate said reciprocating rod and the said cam, and connections between said cam and the feeding mechanism for imparting operative movements to the latter.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

MARTIN HEMLEB.

Witnesses:

HENRY J. MILLER,
J. F. JAQUITH.