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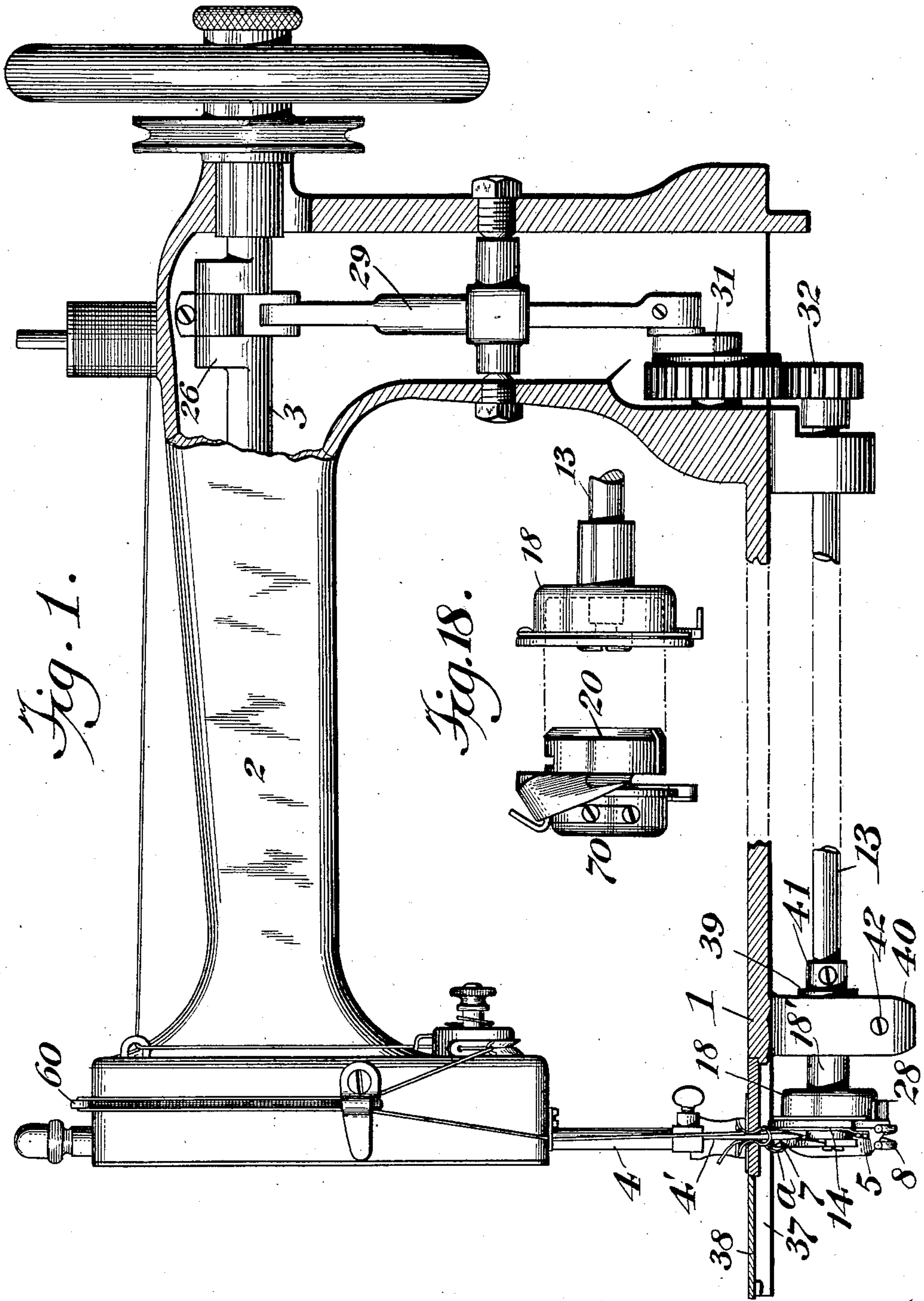
PATENTED AUG. 13, 1907.

W. M. AMMERMAN.

STITCH FORMING MECHANISM FOR SEWING MACHINES.

APPLICATION FILED OCT. 22, 1904.

5 SHEETS—SHEET 1.



Witnesses
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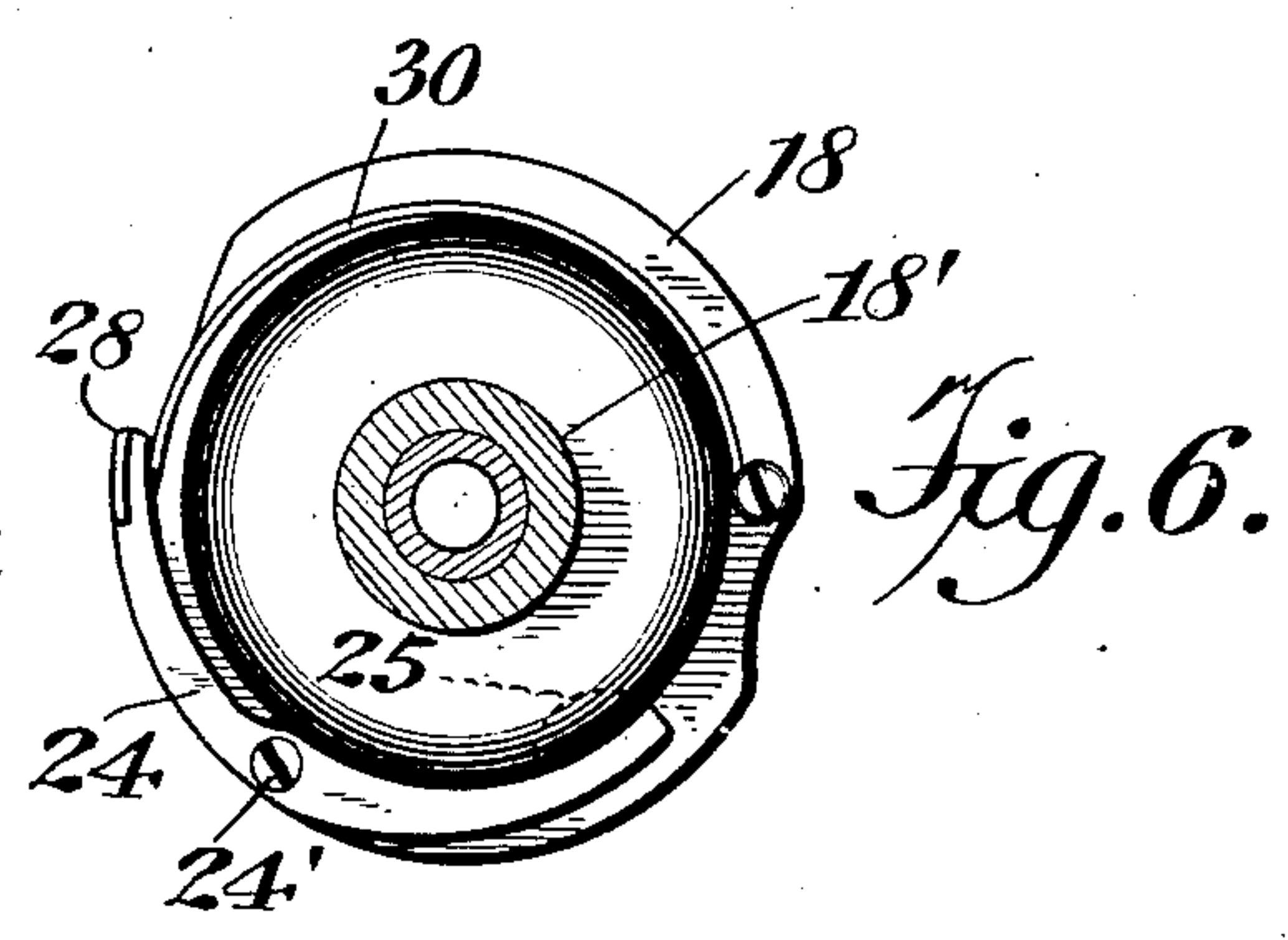
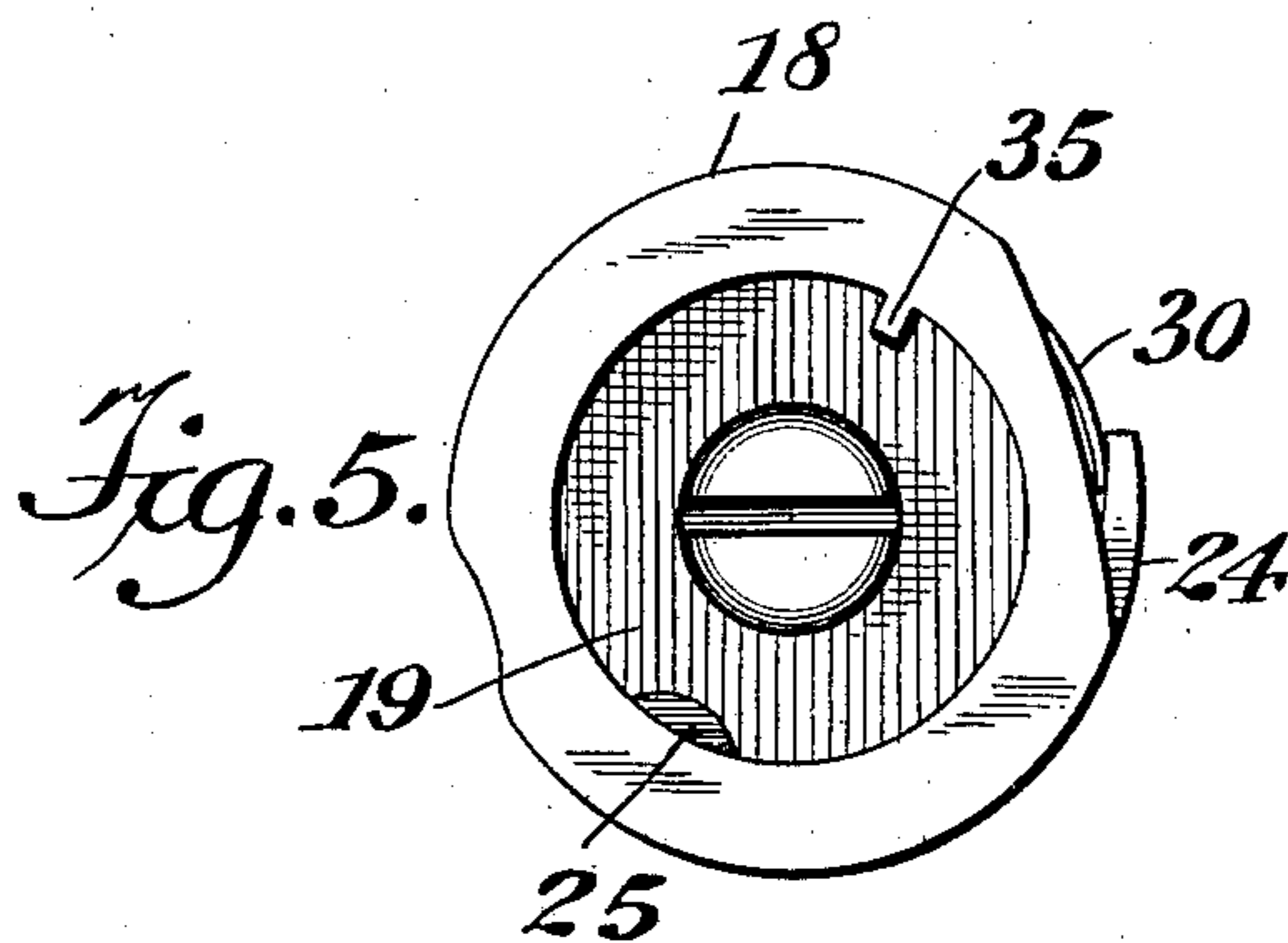
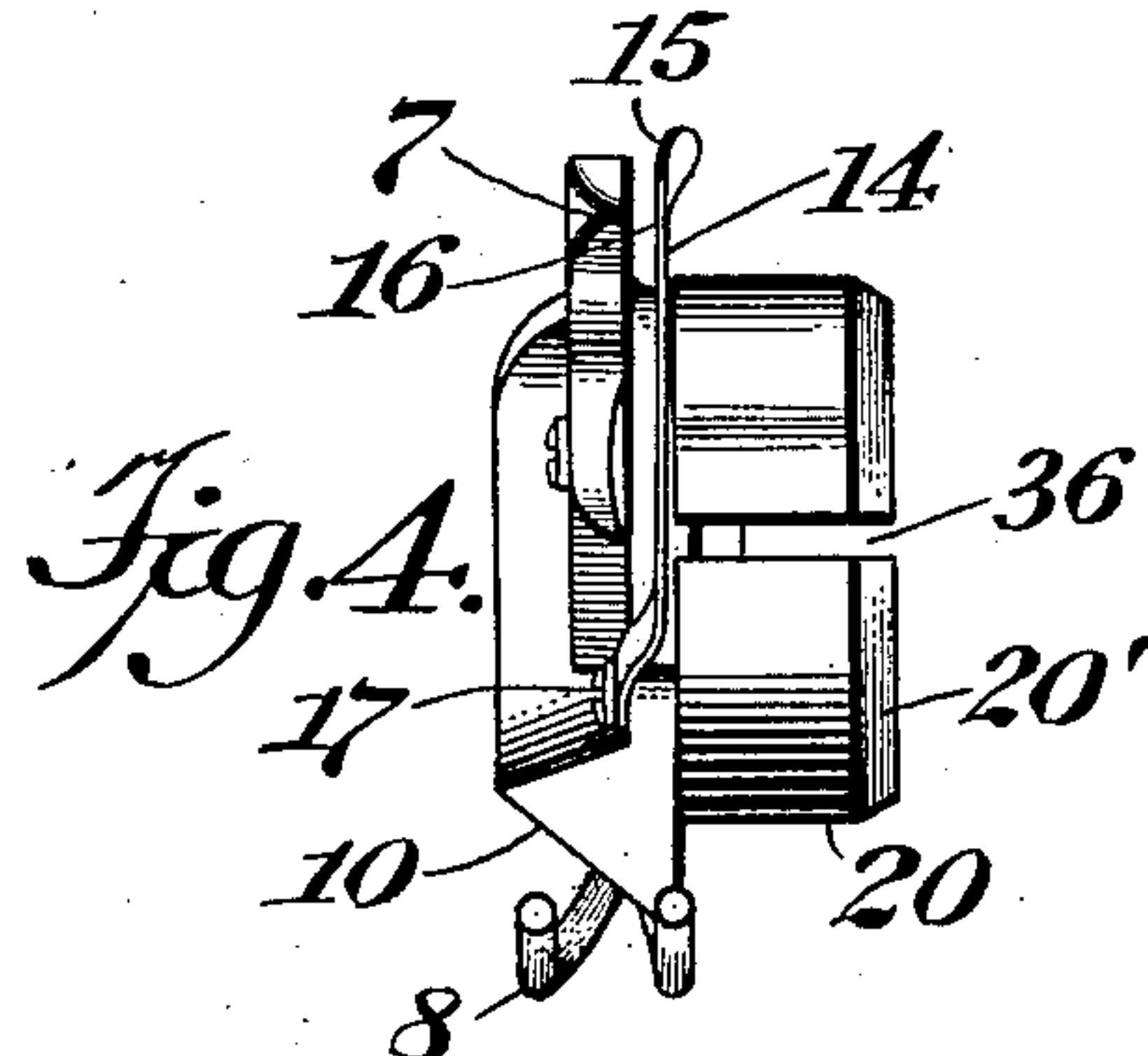
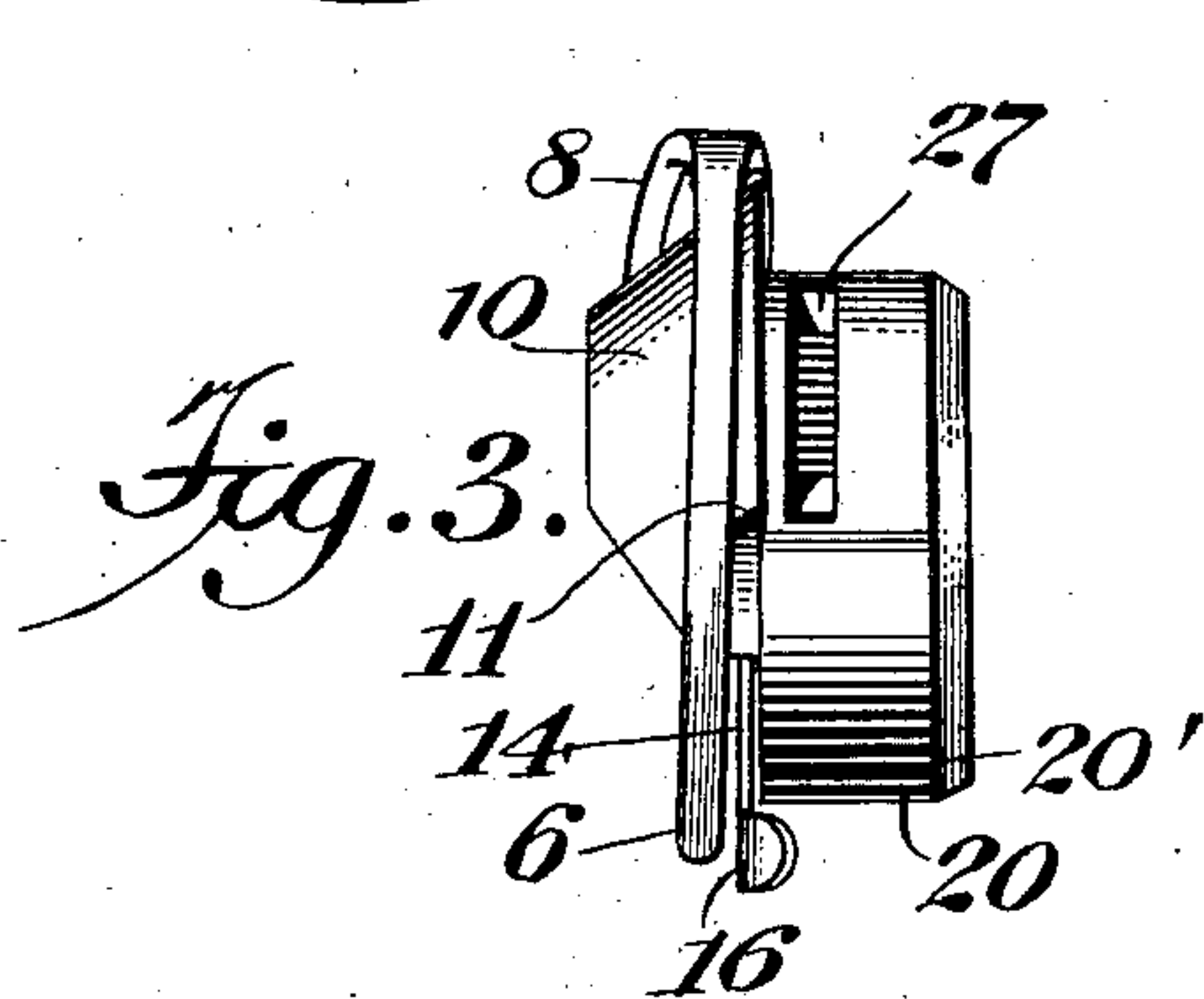
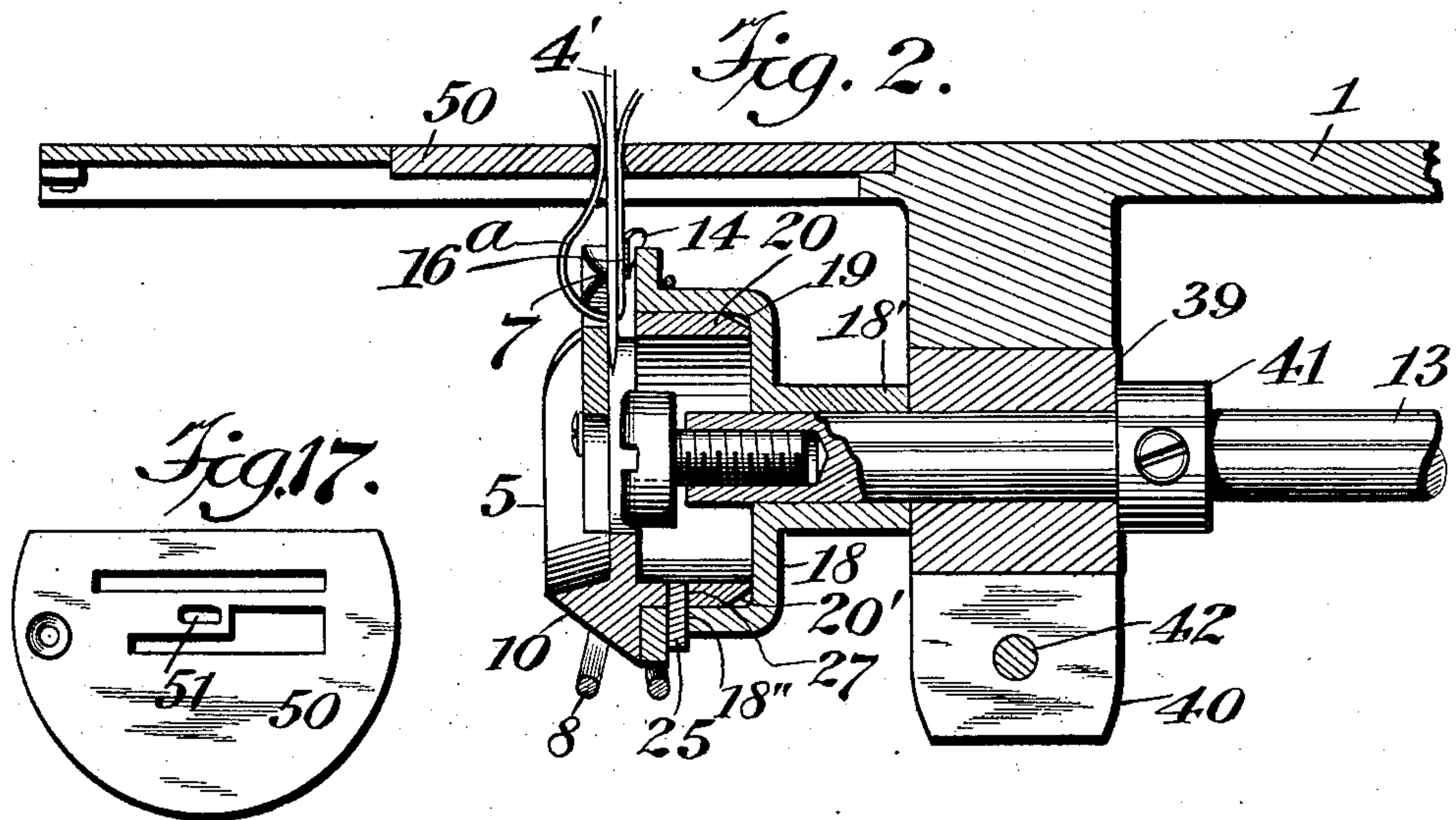
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5 SHEETS—SHEET 2.



Witnesses
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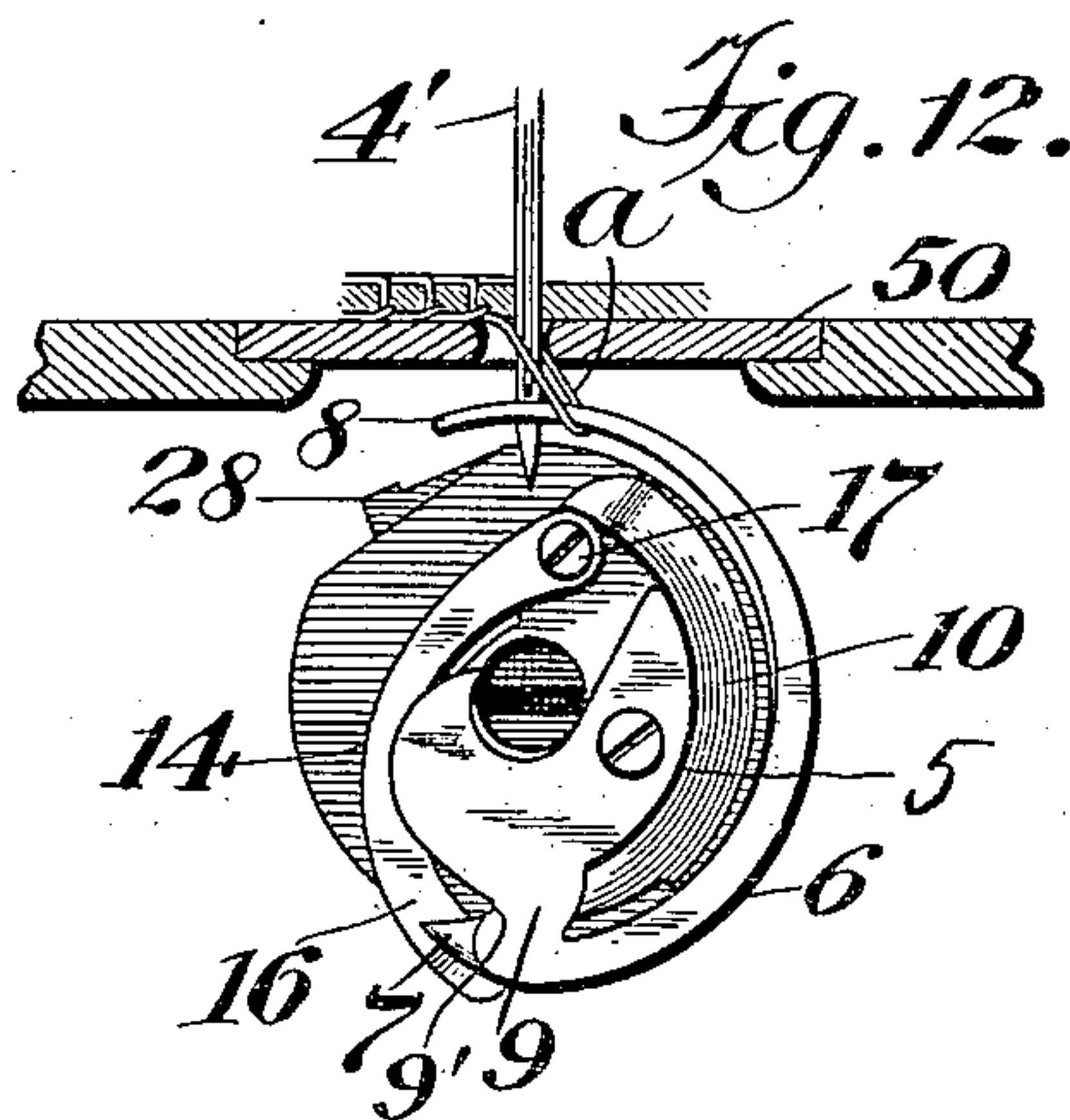
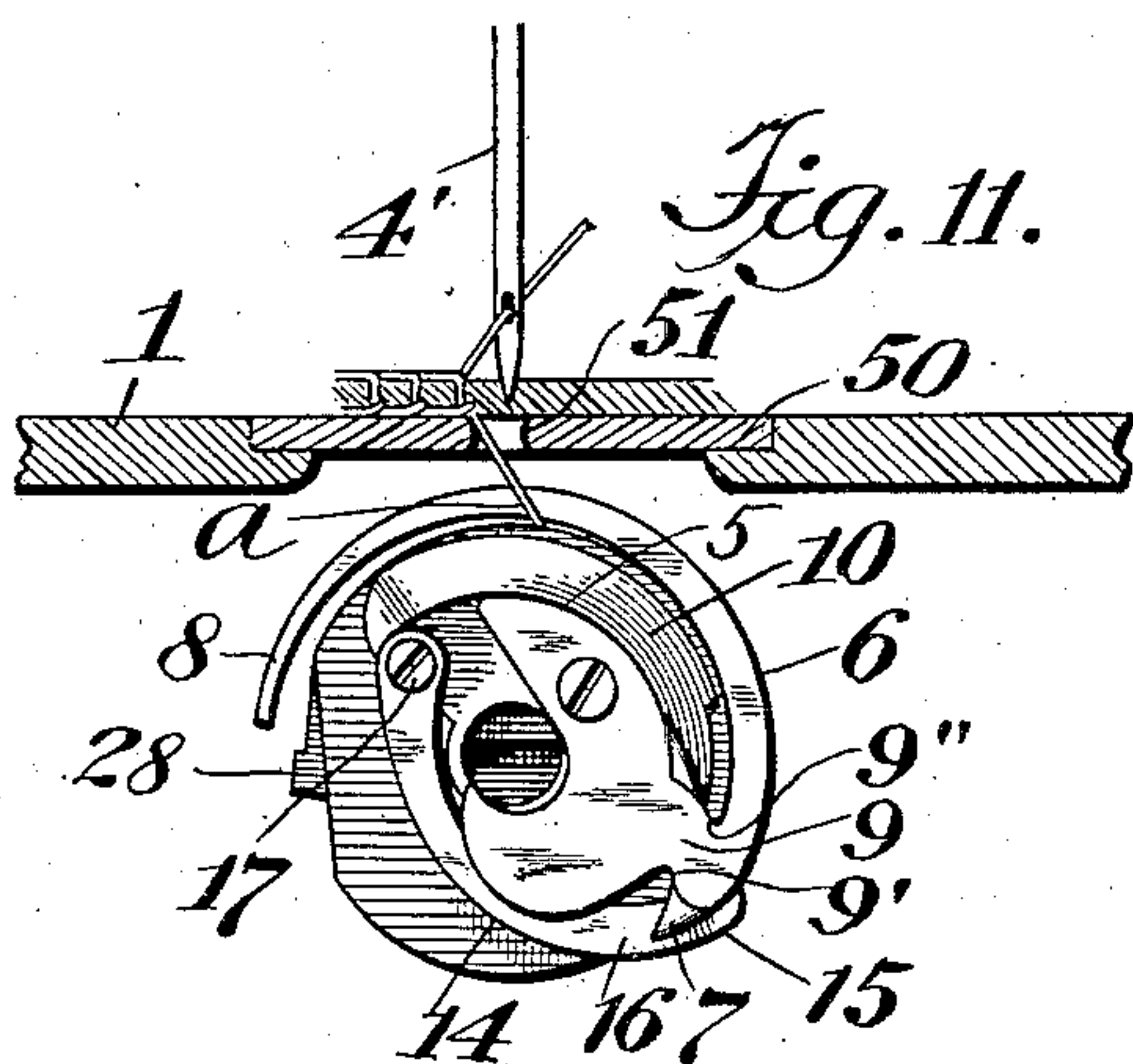
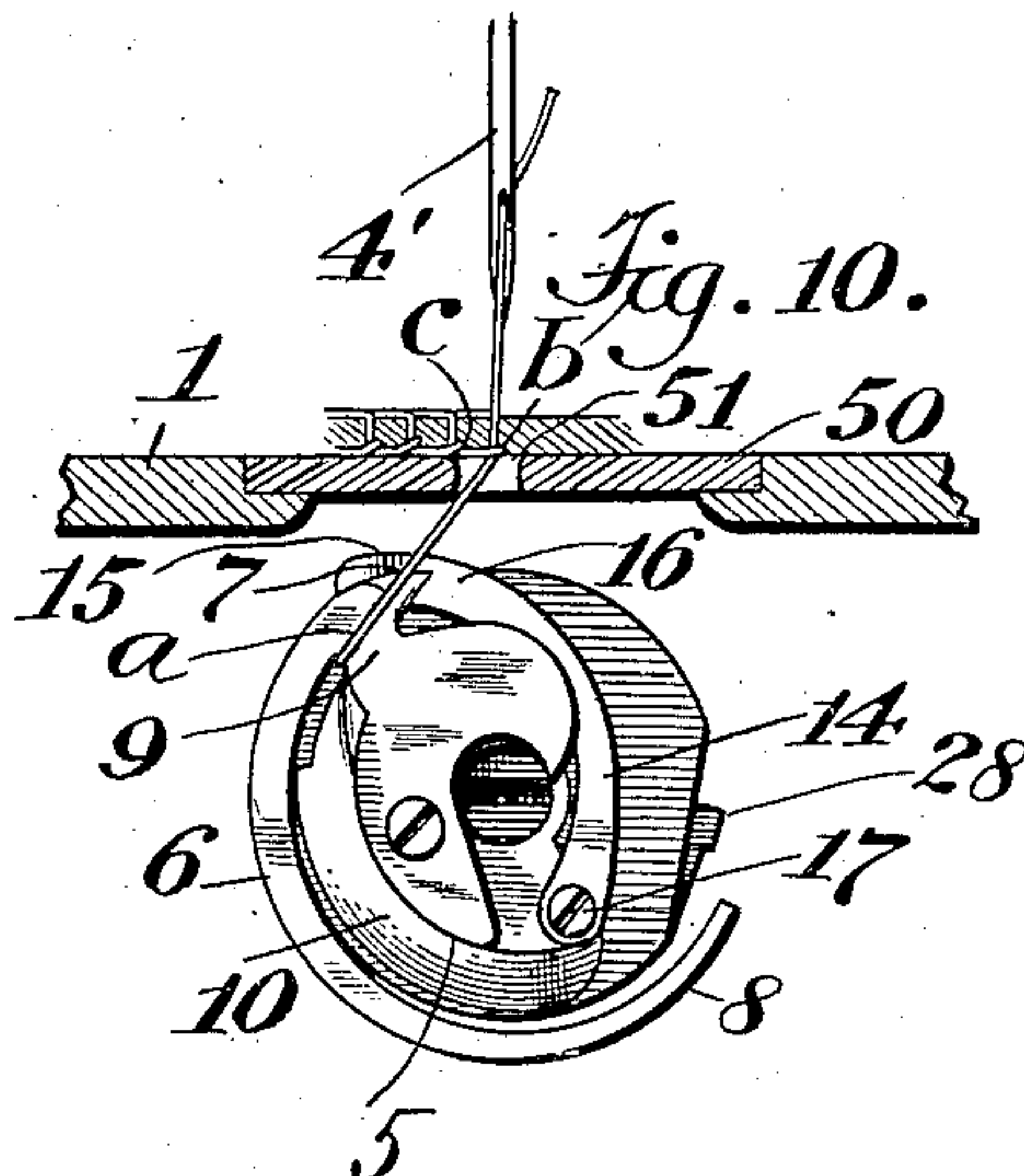
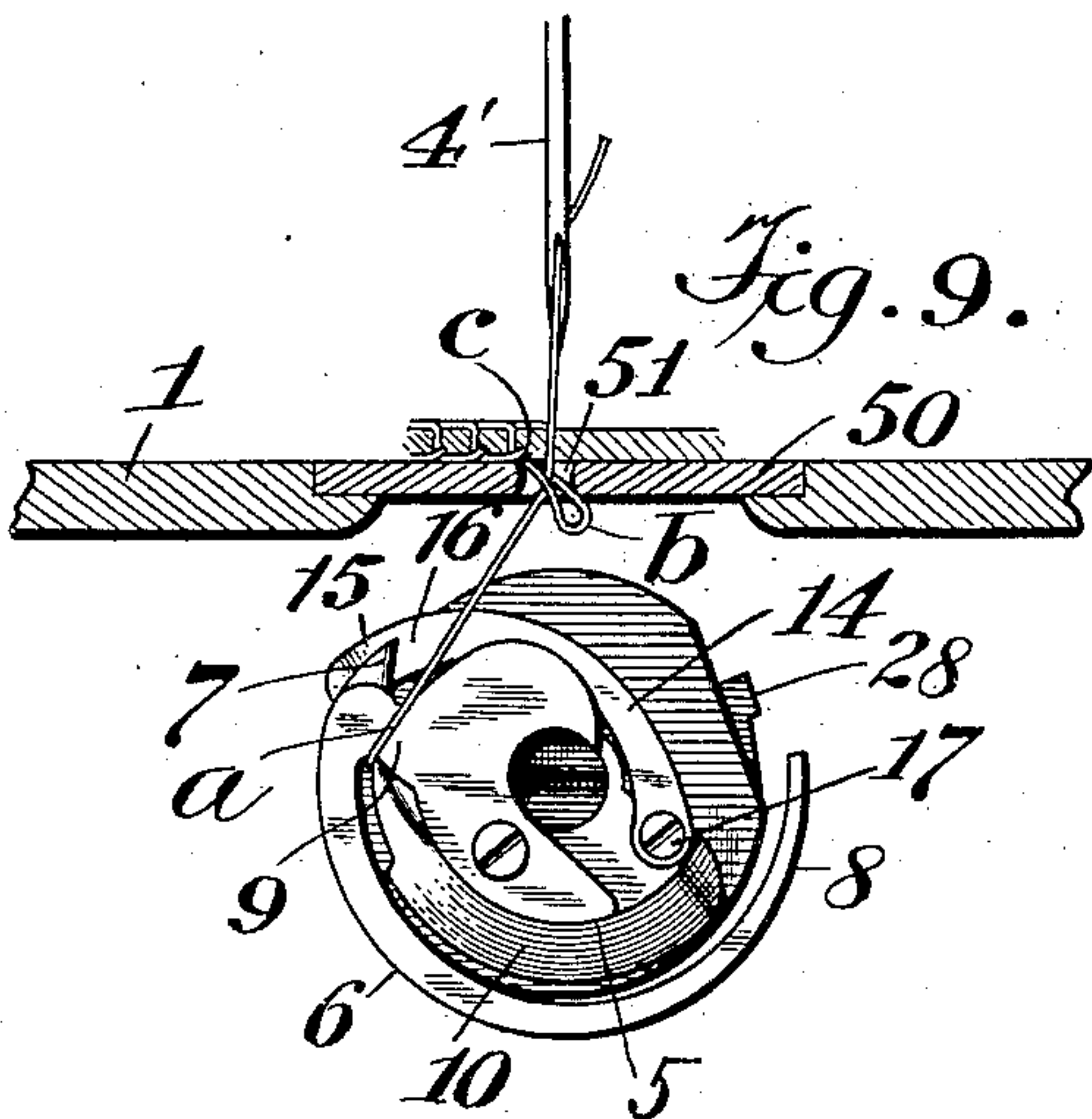
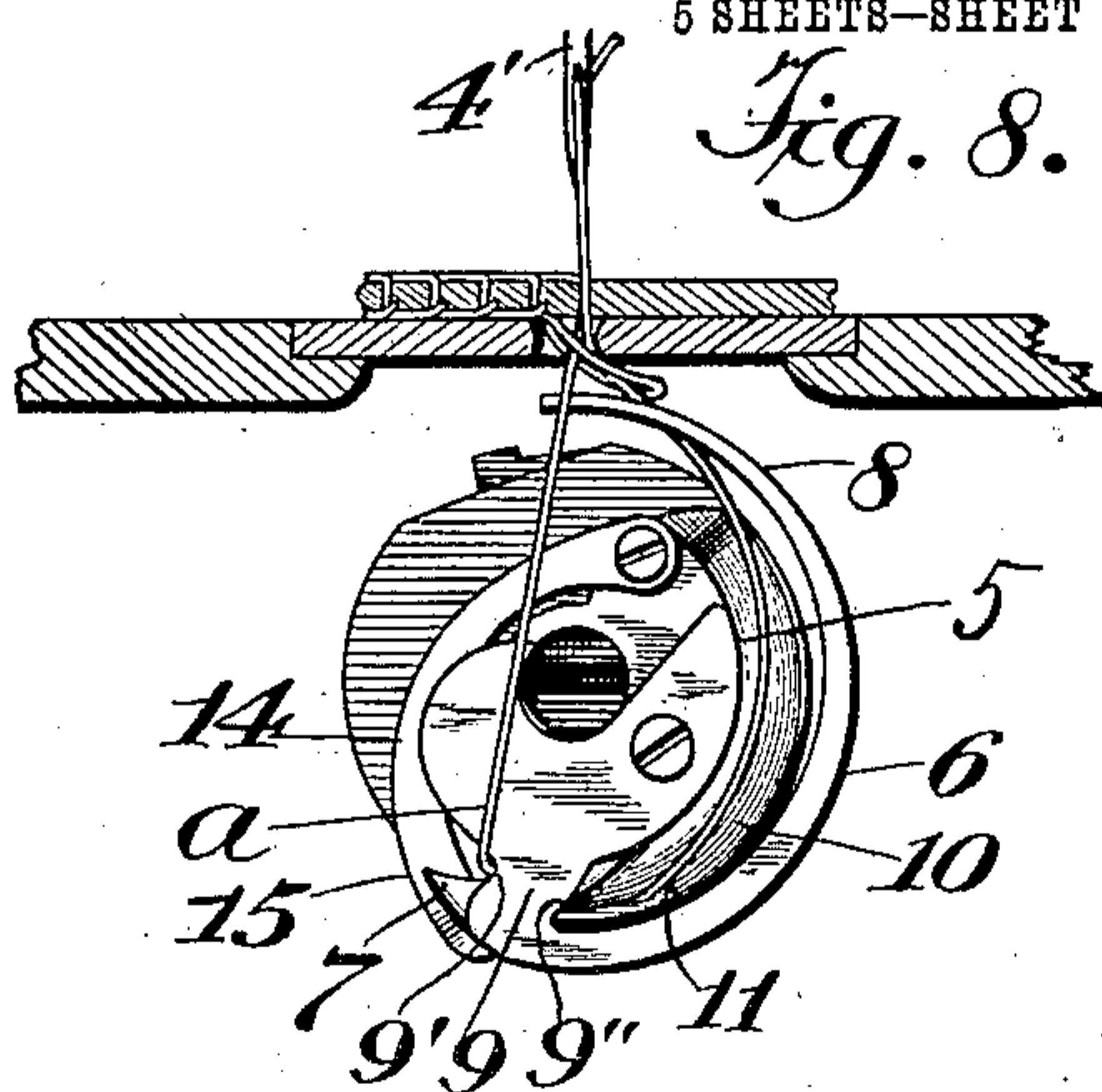
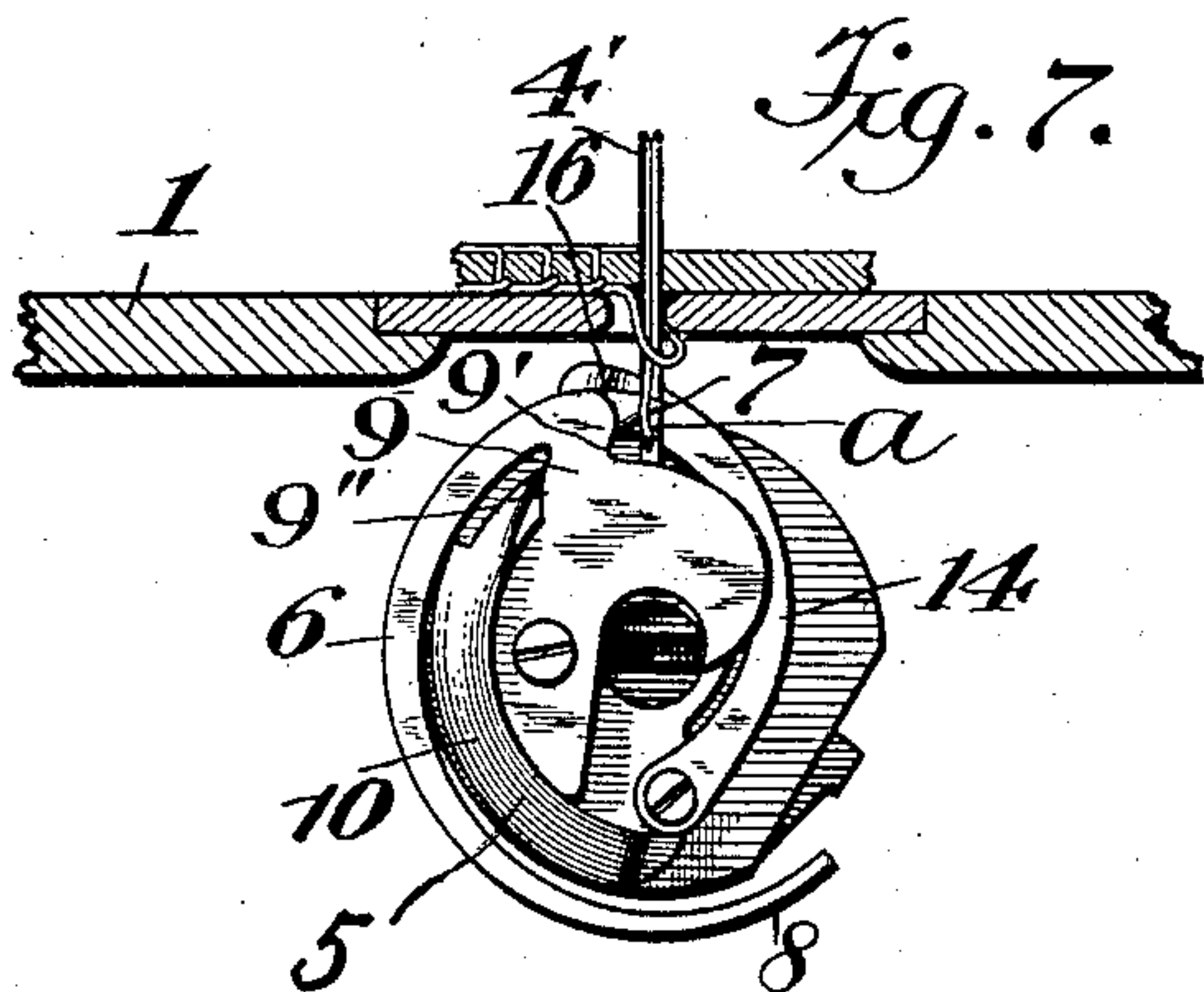
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5 SHEETS—SHEET 3.



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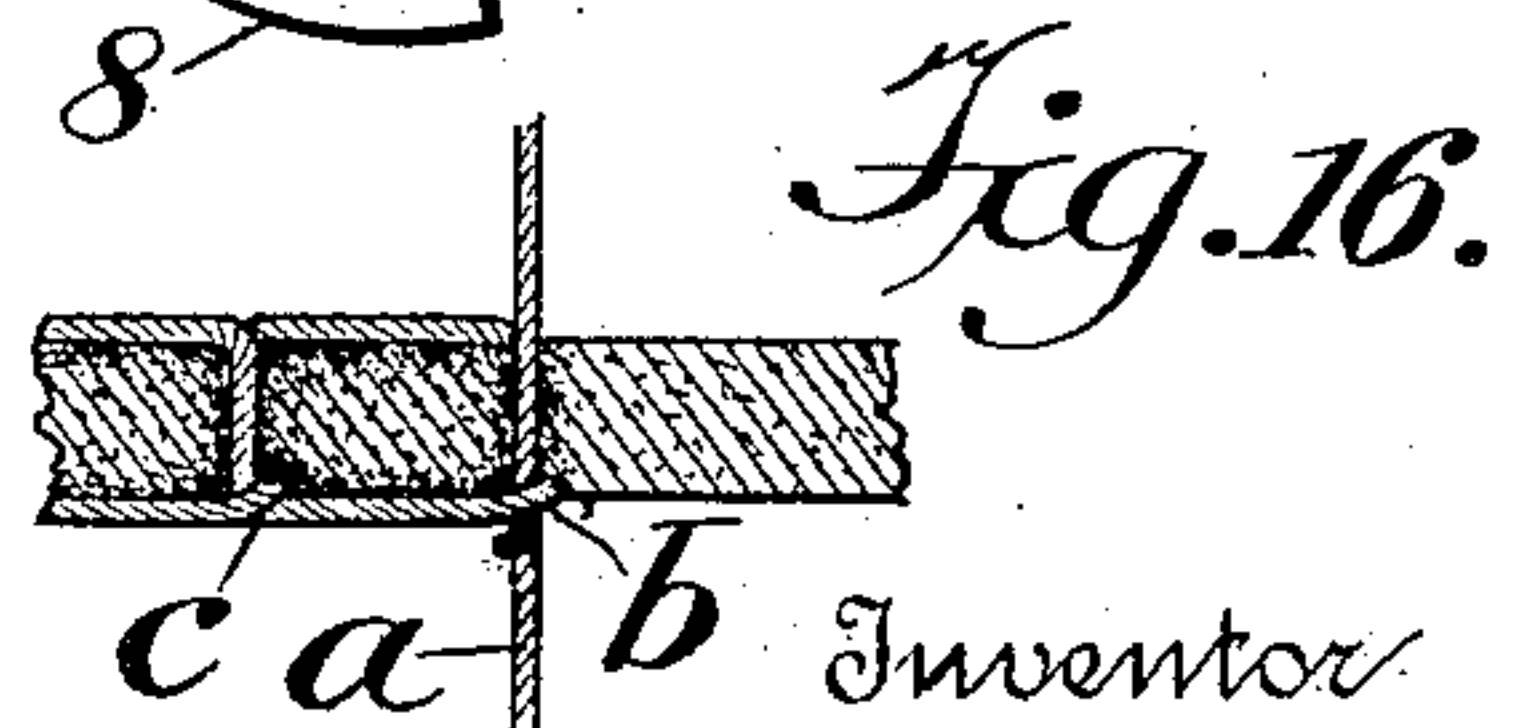
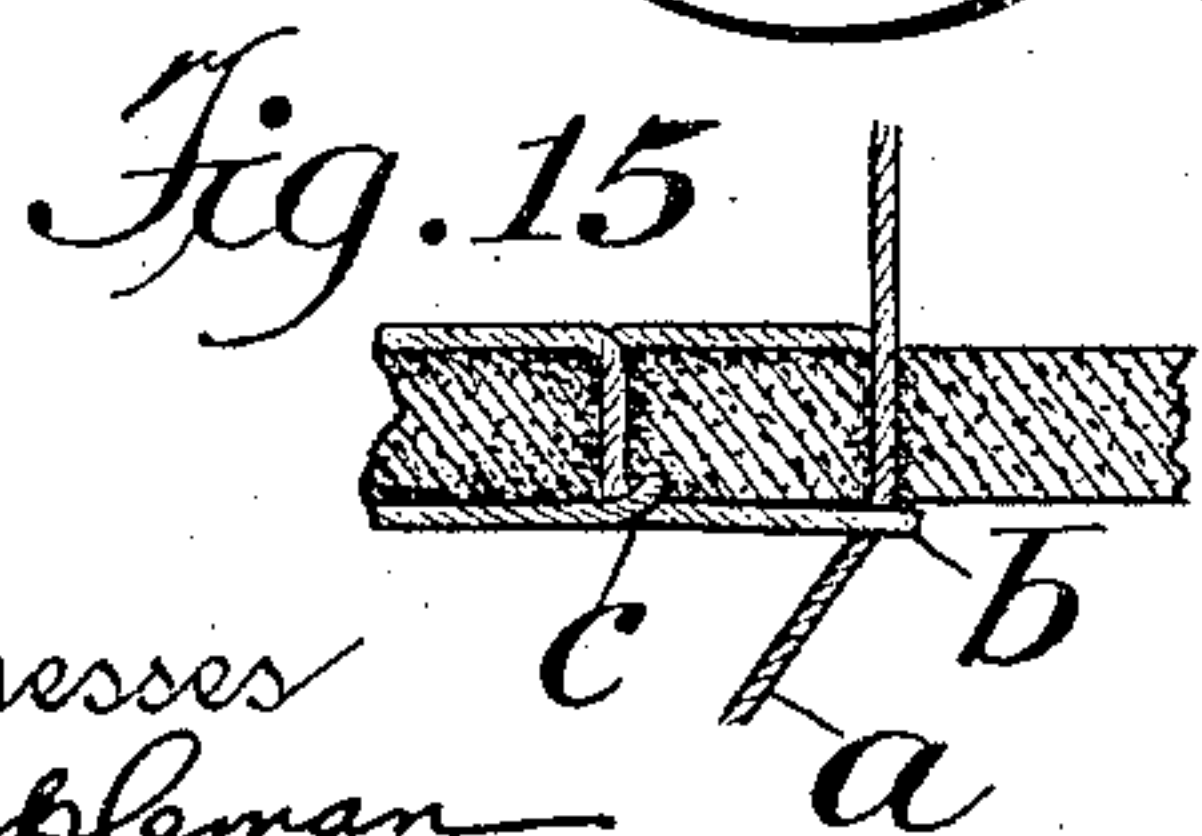
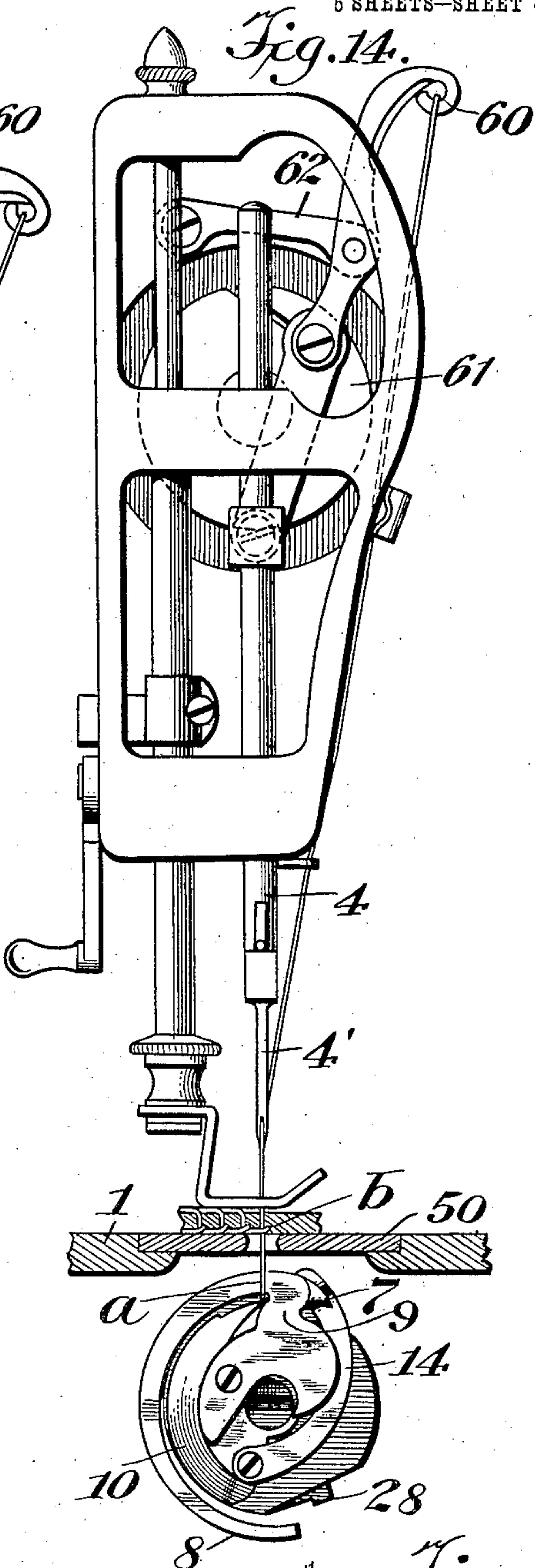
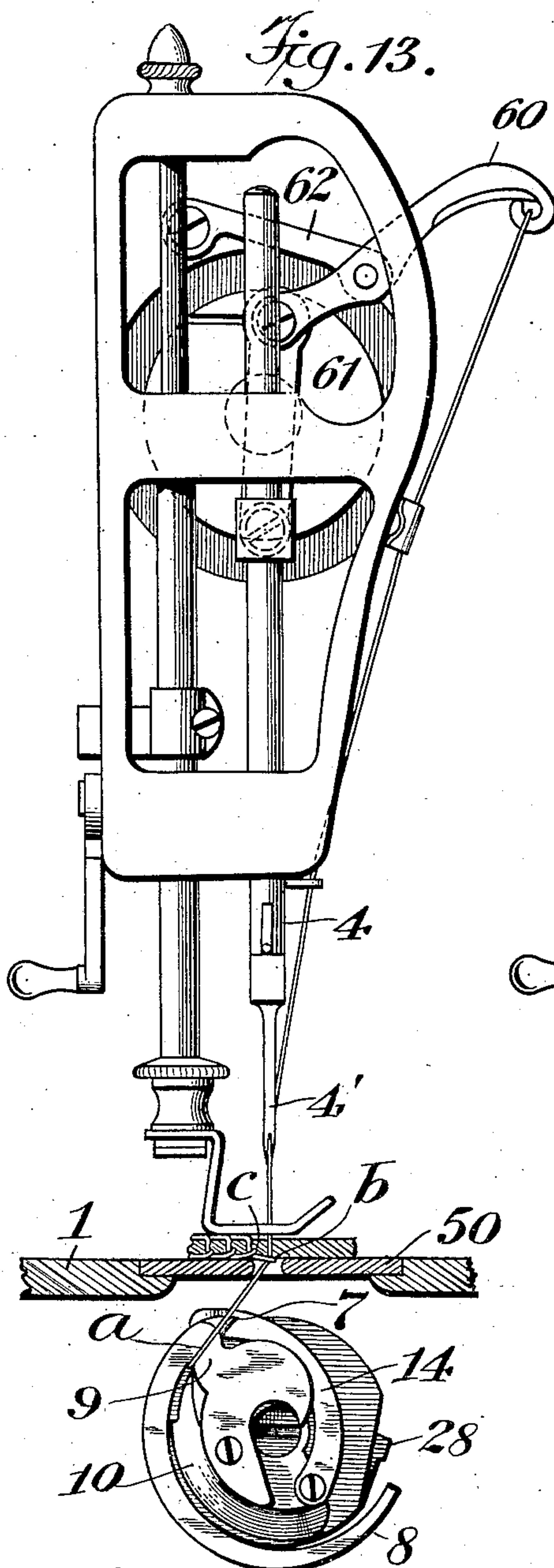
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APPLICATION FILED OCT. 22, 1904.

5 SHEETS—SHEET 4.



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PATENTED AUG. 13, 1907.

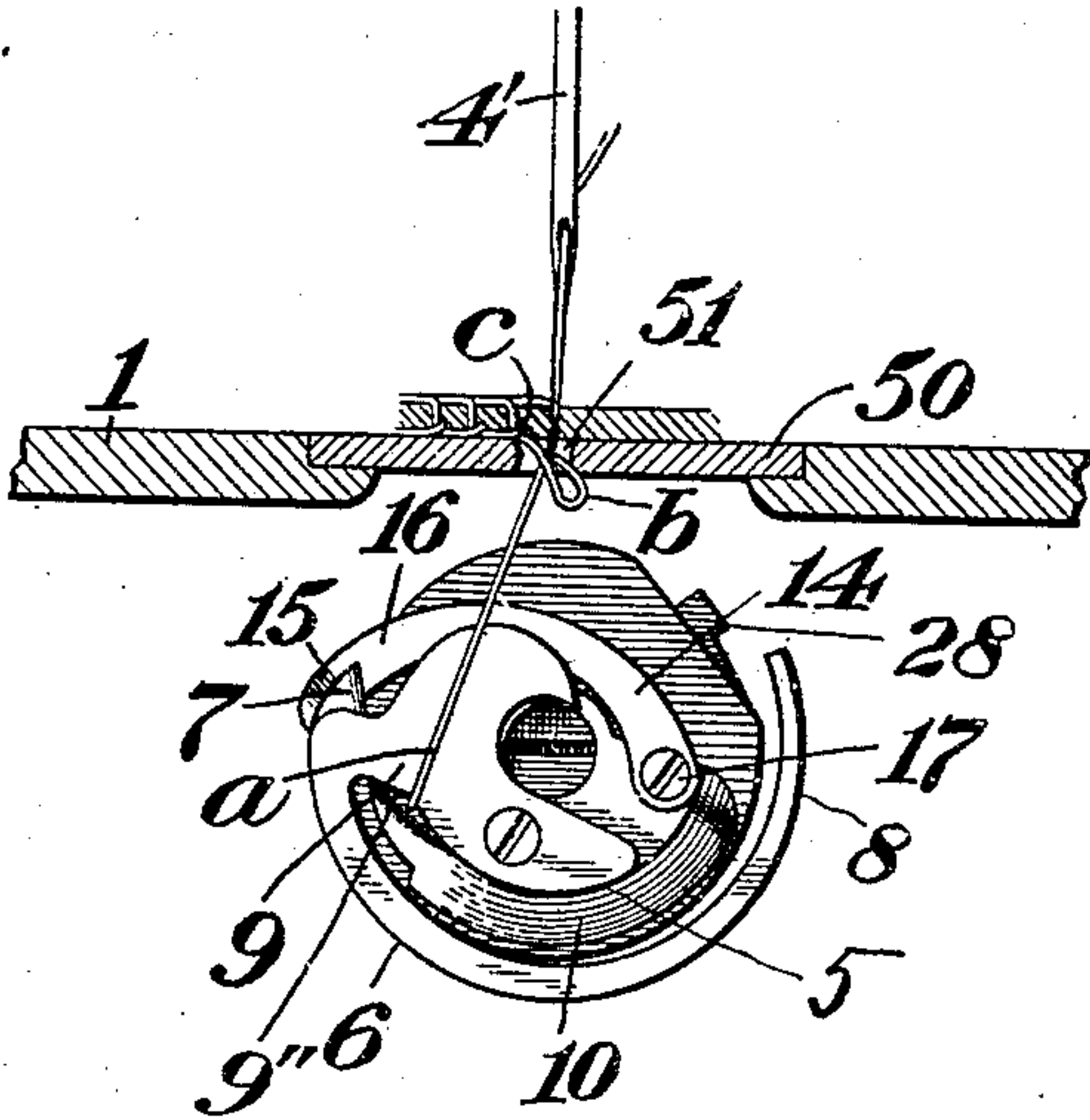
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6. SHEETS—SHEET 5.

Fig. 19



WITNESSES

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UNITED STATES PATENT OFFICE.

WILLIAM M. AMMERMAN, OF NEW HAVEN, CONNECTICUT, ASSIGNOR TO THE EDWIN J. TOOF COMPANY, OF NEW HAVEN, CONNECTICUT, A CORPORATION OF NEW JERSEY.

STITCH-FORMING MECHANISM FOR SEWING-MACHINES.

No. 863,489.

Specification of Letters Patent.

Patented Aug. 13, 1907.

Application filed October 22, 1904. Serial No. 229,627.

To all whom it may concern:

Be it known that I, WILLIAM M. AMMERMAN, a citizen of the United States, and a resident of New Haven, in the county of New Haven and State of Connecticut, have invented certain new and useful Improvements in Stitch-Forming Mechanism for Sewing-Machines, of which the following is a specification.

This invention relates to improvements in sewing machines of the class employing a rotary looper, and particularly to a sewing machine included in said class in which the looper is carried directly by its driver independent of a race-way and is operated to have a plurality of revolutions to each reciprocation of the needle.

One of the objects of the present invention is to equip a machine of the character referred to with means whereby it may be used interchangeably as a lock or chain stitch sewing machine without change or adjustment of the parts other than the substitution of a chain-stitch looper and a lock stitch looper one for the other.

A further and important object of the invention is the provision of means whereby the machine, when being used for chain-stitch sewing, will so control and manipulate the thread as to insure the formation of a tight stitch having the loop drawn closely into the work at the under side thereof, and thereby avoiding the objectionable feature of looseness or lack of tension commonly existing in chain stitch sewing where other than a loose or hosiery stitch is desired.

These objects, and others to be hereinafter referred to, I secure by means of the novel construction and combination of parts as hereinafter set forth in detail and pointed out in the claims.

Referring to the accompanying drawings forming a part of this specification, Figure 1 is a front elevation, partly broken away and in section, of a sewing machine embodying my invention with a chain-stitch looper applied thereto. Fig. 2 is an enlarged sectional detail of the looper mechanism at the front end of said machine, showing the connection between certain of the parts. Figs. 3 and 4 are edge views of the chain-stitch looper from different sides thereof. Fig. 5 is a front end elevation of the looper driver with the looper removed. Fig. 6 is a rear view of the looper driver partly in section. Figs. 7 and 12 inclusive are detail views showing the chain-stitch looper in front elevation and the work-plate in section and illustrate the operation of the parts at different times during the formation of a chain-stitch. Figs. 13 and 14 are front end views of the machine with the bed-plate broken away and in section and the face-plate removed, showing the relative positions of the take-up and chain-stitch looper at different times during the formation of a chain-stitch. Figs. 15 and 16 are enlarged detail views illustrating

the stitch tightening formation of the stitch. Fig. 17 is a detail plan view of the needle-plate of the machine. Fig. 18 is a detail view of the looper driver and a lock-stitch looper, which latter is interchangeable with the chain-stitch looper for connection with said driver. Fig. 19 is a detail view similar to Figs. 7 to 12 inclusive, showing another position of the parts during the formation of a chain-stitch.

Similar reference characters designate like parts in the several figures of the drawings.

The sewing machine herein shown in connection with which I have illustrated my invention is, aside from the looper and its driver, of the same general construction and operation as that forming the subject-matter of another application of mine now pending, bearing Serial No. 198,184, and filed March 15, 1904, the same comprising the bed-plate 1; the overhanging bracket-arm 2; the upper driving shaft 3 journaled in bearings in said bracket-arm; the vertically reciprocating needle-bar 4 with its needle 4' actuated from the driving-shaft 3; the looper driving shaft 13 journaled in bearings at the under side of the bed-plate 1; and the means for transmitting motion from the upper driving shaft 3 to the lower looper driving shaft 13 so as to impart two revolutions to the looper to each reciprocation of the needle, comprising the pitman-lever 29 connecting at its upper end with the crank 26 in the driving shaft and at its lower end with the looper shaft 13 through the gearing 31-32, the latter being so proportioned as to impart the desired ratio of movement from the upper driving shaft to the lower driven shaft. In the machine forming the subject-matter of my said prior application Serial No. 198,184, the looper is supported to run in a race-way independent of direct connection with its driver, but in the present case and in accordance with my invention the looper is adapted to be connected directly with its driver to be supported and carried thereby. This manner of supporting the looper obviously necessitates a different manipulation of the thread loop by the looper in the formation of a stitch from that which takes place where the looper is supported to run in a race-way, for the reason that in the present case it is necessary to guide both sides of the thread-loop across the face side of the looper because of the connection of the looper at its rear side with the driver, whereas, in the case of the looper being loosely supported in a race-way, the thread-loop may be carried around the same at both sides thereof.

The chain-stitch looper forming part of the subject-matter of my present application and which is adapted to be attached to and carried by the driving shaft 13 in a manner to be hereinafter referred to, comprises a body portion 5, a looper-arm 6 having at one end thereof a loop-taker beak 7 and at its opposite end a forked tail 8

and being connected at a point between its ends with the said body portion 5 through the medium of a contracted neck or web 9, and a cast-off surface 10 located on the body portion 5 in a position at the rear of the loop-taker beak and extending across the plane of its path of movement.

The operation of the looper as described, when attached to its driver in the machine, is as follows: The machine being set in motion to operate the several parts of the stitch-forming mechanism and impart two revolutions to the looper to each reciprocation of the needle, the needle descends and rises and throws out a loop *a* of the thread which is seized by the loop-taker beak 7, as shown in Figs. 1 and 7, then, as the looper continues its rotation carrying with it the thread loop, the inner side of the latter is engaged by the projecting end wall 11 of the cast-off 10 and guided thereby onto the latter, as shown in Fig. 8, by which it is deflected toward the front side of the looper body to be drawn thereover when the loop is drawn up by the take-up, indicated at 60. During the first revolution of the looper from the position shown in Fig. 7 to that shown in Fig. 9, in which latter position the looper has made somewhat more than three quarters of a revolution and the loop has been drawn taut by the take-up, the said loop has been maintained in continuous engagement with the neck 9 of the looper but has been shifted from the forward edge 9' thereof, adjacent to the loop-taker beak, to the rear edge 9'', by which latter the loop is held in position to be entered by the loop-taker beak at the beginning of its second revolution, as shown in Fig. 10. As the looper now enters upon its second revolution the loop is guided from the neck 9 onto the looper arm 6 by which it is detained during the continued rotation of the looper, as shown in Fig. 11, until the next descent of the needle to throw out the succeeding loop, at which time the looper arm will have moved through the detained loop to a position where the two prongs of its forked end or tail will hold said loop in an open or distended position across the path of movement of the needle to be entered by the latter and its thread, as shown in Fig. 12. As the looper now continues its rotation, the first loop is cast off the looper arm and the second loop thrown out by the needle is seized by the loop-taker beak and drawn through the first loop, which latter is subsequently drawn up to complete the stitch. In this latter operation of drawing up the loop to complete the stitch, it is desirable in all forms of sewing other than where a loose or hosiery stitch is required that the loop should be drawn up tightly whereby it will lay closely against the under side of the work and insure the formation of a tight stitch. This is accomplished in the present case in a manner as follows: During the movement of the looper from the position shown in Fig. 9 to that shown in Figs. 10 and 13, the take-up 60 performs and completes its take-up operation in drawing up and tightening the preceding cast off loop *b*. At this time in the operation of the parts the looper has not yet completed its first revolution and therefore holds the thread loop *a* between it and the work in an inclined position extending backwardly through the loop *b* whereby the latter may be drawn more tightly or of less length between the loop *a* adjacent to the work and the previous stitch or point of interlock,

indicated at *c*, than could be done if the loop *a* were held perpendicularly during such operation, and as the looper continues its movement from the position shown in Figs. 10 and 13 to that shown in Fig. 14, the take-up 60 is also operated to have a continued upward movement to cooperate with the looper in keeping the thread taut between the same and draw it upwardly through the tightened loop *b*, such upwardly drawing action of the thread *a* through the loop *b* while moving from its inclined position to a perpendicular position operating to draw the said loop *b* tightly against or into the work, as clearly illustrated in Figs. 15 and 16. In this manner, the tightening and positioning of the loop to obtain the desired character of stitch is secured, first, by the inclined position of the loop *a* relatively to the loop *b* during the tightening of the latter by the take-up, and second, by the upwardly drawing action of one side of the loop *a* through and against the loop subsequent to such tightening of the latter by the take-up; the result being the formation of a tight stitch drawn closely into the work. A further and important feature incident to the loop *a* being held by the looper in an inclined position extending backwardly through the loop *b* during the drawing up of the latter by the take-up is the fact that it will not interfere with or produce any undue friction on the said loop *b* during such drawing up operation.

During the stitch-forming operation it is desirable that the thread should be controlled by the looper with a minimum degree of frictional engagement, and with this in view I have formed the rear edge or surface 9'' of the looper neck 9 to extend in a substantially radial direction with respect to the center of the looper, whereby, when the thread-loop *a* is first drawn tight against the said radial surface 9'' by the action of the take-up, it will engage the same at the inner end thereof, as shown in Fig. 19, and then, during the continued drawing up of the thread-loop by the take-up while the looper advances in its rotation toward the position shown in Fig. 9, the thread-loop will gradually move outwardly toward the circumferential end of the radial surface with a running motion of the thread thereover, and so minimize the strain and wear on the thread.

The take-up 60 may be operated in any suitable manner to secure its cooperation with the looper in controlling the thread in the manner described, the same in the present case being pivoted to the rotating needle-bar actuating crank 61 and controlled in its movement by a connecting link 62 in a manner as fully set forth in United States Letters Patent No. 842,161, dated Jan. 29, 1907.

During the formation of a stitch, it is desirable that the thread should be capable of ready passage through the needle slot of the sewing machine needle plate and without undue frictional engagement with the wall thereof. For this reason I have provided the needle plate 50 of my present machine with an elongated needle slot 51 whereby, when the looper is moving through the latter part of its first revolution and the thread loop is held thereby in an inclined position toward the rear part of the machine while being drawn up by the take-up, as shown in Figs. 10 and 13, the said slot will permit such inclined or angular position of the thread loop

without undue engagement or binding of the same against its end wall and also provide ample clearance space for the drawing upwardly therethrough of the previous cast-off loop *b* from the position in Fig. 9 to that shown in Fig. 10. The provision of such elongated needle slot, while desirable for use in connection with all sizes of thread, is particularly desirable for use in connection with the larger sizes of thread where an opening of relatively large size is necessary for the proper clearance of the two thread loops. As the said slot is made sufficiently small adjacent to the path of movement therethrough of the needle to support work of any thickness under the pressure of the needle in entering the same, it is very important in a machine of the present character, that is, a machine adapted to make either a lock or chain-stitch, as it renders the use of a single needle-plate capable of use for any kind of sewing for which the machine is adapted and so avoids the necessity of substituting different needle plates upon changing the character of the stitch or the size of the thread.

After a thread loop has been cast off by the looper arm during the formation of a chain-stitch in the manner hereinbefore described, it is not drawn up or tightened until the second or succeeding loop is drawn up by the take-up into engagement with the looper arm during the succeeding rotation of the looper; therefore, in order that the said first or cast-off loop may not be seized or engaged by the loop-taker beak during the passage of the latter past the same, the forked end of the looper-arm is arranged in a position radially beyond the path of movement of said beak whereby the loop will be cast off by the same in position above the path of movement of the said beak. When the loop is thus cast off by the looper, however, it is in an open or distended position which permits of the possibility of its sagging into the path of movement of the loop-taker beak. To prevent engagement of the loop by the loop-taker beak in the event of such sagging, however, I have located an arm 14 on the looper with a portion of its outer edge 15 extending past the loop-taker beak in a position adjacent to and radially beyond the same, which edge 15 will operate as a loop-deflector to engage with a sagging loop and move it upward and away from the path of movement of the loop-taker beak.

In the usual operation of the machine herein illustrated, the needle descends in a position at the rear side of the path of the loop-taker beak and in rising throws out a loop to be entered by the latter. In this operation, the loop is liable to be thrown out at either side of the needle, and, in the event of its being the wrong side thereof cause the machine to skip stitches. Possibility of this is prevented in the present machine, however, by reason of the arm 14 being arranged at one end in a position at one side and in advance of the loop-taker beak so that its front wall 16 will move in a path adjacent to the path of the needle at the rear side thereof, as shown in Figs. 2 and 7, and operate as a guard to prevent the loop being thrown out at such side of the needle, or in other words, operate to insure the loop being thrown out at the forward side of the needle and in position to be seized by the loop-taker beak, the said front wall 16 of the arm 14 thus forming what I term a "loop-guard". The arm 14, as herein shown, is made of springy material and is secured at one end to

the body of the looper at 17 and is free at its opposite or loop-engaging end so as to yield laterally under any side pressure by the needle.

The chain-stitch looper herein shown may be connected with its driving shaft 13 in any suitable manner, the same in the present case being provided with means for detachable connection therewith whereby it may be interchangeable with a lock-stitch looper, indicated generally by 70 in Fig. 18, so as to render the machine capable for use in making either a lock-stitch or chain-stitch. The particular means herein shown for securing such detachable connection between the looper and its driving shaft comprise a head or disk 18 secured on the front end of the shaft 13 by means of a hub 18' and having in its face side a socket 19 adapted to receive a projecting part or shank 20 on the rear side of the looper body 5, as most clearly shown in Fig. 2, the said shaft 13 with its attached head or disk 18 constituting the looper driver. When the said shank 20 of the looper is inserted into the socket 19 of the looper driver, it will be removably retained therein by a suitable locking means; such means in the present case comprising a locking-lever 24 which is pivoted at 24' on the rear side of the driver disk and arranged with one end 25 normally extending through a slot 18'' in the driver disk to a position for locking engagement with the looper shank 20 in a slot 27 therein and its opposite or operating end 28 extending to a convenient position to be reached by the operator adjacent to the periphery of the disk. In placing the looper in operative connection with its driver, the beveled end 20' of the looper shank 20 in being entered into the driver socket will engage with the inwardly projecting end 25 of the locking-lever 24 and force the same laterally outward whereby it will ride upon the outer surface of the shank until the slot 27 in the latter has been brought into registry with it, at which time the lever will automatically snap into the said slot under the action of a suitable spring, such as indicated at 30, and so operate to lock the looper in connection with the driver. To unlock the looper preparatory to its disconnection from the driver, it is only necessary for the operator to press inwardly upon the free end of the locking lever, which operation removes its inner or locking end from locking position in the slot 27 of the looper shank. The described means for effecting locking connection between the looper and its driver are employed in the present case only for the purpose of retaining connection between the looper and its driver in a longitudinal direction or direction parallel with their axis, and a further means is therefore employed for the purpose of so connecting the said parts as to cause the looper to rotate with its driver; such means in the present case comprising a locking projection 35 on the inner peripheral wall of the driver socket entering a slot 36 in the looper shank 20.

As a means for adjusting the position of the looper relatively to the path of movement of the needle, the looper carrying and driving shaft 13 is journaled at its front end in a bushing 39 which is supported in a longitudinally adjustable position in a split hanger 40 on the under side of the bed-plate, and with this adjustable bushing the shaft 13 is rendered movable by means of suitable stops thereon engaging with the opposite ends of the bushing, one of these stops in the present case

being the hub 18' of the driver disk and the other stop being a set-collar 41. By this means, the shaft 13 may be shifted longitudinally to adjust the looper as desired with respect to the path of movement of the needle and thereafter be secured in adjusted position by clamping the bushing 39 in a stationary position within its supporting hanger by means of a set-screw 42.

In Fig. 18, I have illustrated a rotary lock-stitch looper or hook with its contained bobbin-case, indicated generally by 70, which is adapted to be interchangeable with the chain-stitch looper for detachable connection with the looper driver, the same being provided with an attaching shank 20 like that of the chain-stitch looper for locking connection with the said looper driver. This lock-stitch looper or hook, however, will not be described in detail herein, as the same with certain of its associated parts form the subject-matter of another application of mine filed of even date herewith and bearing Serial No. 229,628.

20 What I claim is:

1. In a sewing machine, a stitch-forming mechanism comprising a reciprocating needle and a rotary chain-stitch looper having a plurality of revolutions to each reciprocation of the needle, the said looper comprising a loop-taker beak, a forked tail, and means for receiving the threaded loop subsequent to its engagement by the loop-taker beak on one revolution of the looper and holding it in position to be entered by said loop-taker beak on the succeeding revolution of the looper and guided onto the forked tail, for the purpose set forth.

2. In a sewing machine, a stitch-forming mechanism comprising a reciprocating needle and a rotary chain-stitch looper having a plurality of revolutions to each reciprocation of the needle, the said looper comprising a loop-taker beak, a forked tail, means for guiding the rear side of the thread-loop across the face-side of the looper, and means for receiving the thread loop subsequent to its engagement by the loop-taker beak on one revolution of the looper and holding it in position to be entered by said loop-taker beak on the succeeding revolution of the looper and guided into the forked tail, for the purpose set forth.

3. In a sewing machine, a stitch-forming mechanism comprising a reciprocating needle and a rotary chain-stitch looper having a plurality of revolutions to each reciprocation of the needle, the said looper comprising a loop-taker beak, a forked tail, and means for receiving the thread loop subsequent to its engagement by the loop-taker beak on one revolution of the looper and maintaining continuous engagement therewith until the looper enters upon its succeeding revolution and thereafter guiding the said loop onto the forked tail, for the purpose set forth.

4. In a sewing machine, a stitch-forming mechanism comprising a reciprocating needle and a rotary chain-stitch looper having a plurality of revolutions to each reciprocation of the needle, the said looper comprising a body portion, a looper arm having at one end thereof a loop-taker beak and at its opposite end a forked tail and being connected at a point between its ends with said body portion through the medium of a contracted neck, the said neck operating to receive the thread loop subsequent to its engagement by the loop-taker beak on one revolution of the looper and maintaining continuous engagement therewith until the looper enters upon its succeeding revolution and thereafter guiding the said loop onto the forked tail end of the looper arm, and a cast-off located on the said body portion in a position at the rear of the loop-taker beak and operating to guide the rear side of the thread-loop across the face side of the looper, for the purpose set forth.

5. In a sewing machine, a stitch-forming mechanism comprising a take-up, a reciprocating needle, and a rotary chain-stitch looper, the said looper having means for holding a thread loop between it and the work in an in-

clined position extending backwardly through a previously formed loop and being operative to maintain its engaged loop in such inclined position and move upwardly with the same toward the work during the drawing up of the said looper-engaged loop and the said previously formed loop by the take-up, for the purpose set forth.

6. In a sewing machine, a stitch-forming mechanism comprising a take-up, a reciprocating needle, and a rotary chain-stitch looper having two revolutions to each reciprocation of the needle, the said looper having means for holding a thread loop between it and the work in an inclined position extending backwardly through a previously formed loop and being operative to maintain its engaged loop in such inclined position and move upwardly with the same toward the work during the latter part of its first revolution and during the drawing up of the said looper-engaged loop and the said previously formed loop by the take-up, for the purpose set forth.

7. In a sewing machine, a stitch-forming mechanism comprising a take-up, a reciprocating needle, and a rotary chain-stitch looper having a plurality of revolutions to each reciprocation of the needle, the said looper having means for holding a thread loop between it and the work in an inclined position extending backwardly through a previously formed loop and maintaining its engaged loop in such inclined position during the drawing up and tightening of the said previously formed loop by the take-up, and the said take-up cooperating with the looper to hold the thread taut between the same and draw it upwardly through the said previously formed loop during the movement of the looper in moving its engaged thread from an inclined to a perpendicular position, for the purpose set forth.

8. In a sewing machine, a stitch-forming mechanism comprising a reciprocating needle and a cooperative rotary chain-stitch looper having a plurality of revolutions to each reciprocation of the needle, the said looper comprising a body portion and a looper arm having at one end thereof a loop-taker beak and at its opposite end a forked tail and being connected at a point between its ends with said body portion through the medium of a contracted neck, for the purpose set forth.

9. In a sewing machine, a stitch-forming mechanism comprising a reciprocating needle and a cooperative rotary chain-stitch looper having a plurality of revolutions to each reciprocation of the needle, the said looper comprising a body portion, a looper arm having at one end thereof a loop-taker beak and at its opposite end a forked tail and being connected at a point between its ends with said body portion through the medium of a contracted neck, and a cast-off located on said body portion in a position at the rear of the loop-taker beak and extending at either side of the plane of its path of movement, for the purpose set forth.

10. In a sewing machine, a stitch-forming mechanism comprising a reciprocating needle and a cooperative rotary chain-stitch looper having a plurality of revolutions to each reciprocation of the needle, the said looper comprising a body portion, a looper arm having at one end thereof a loop-taker beak and at its opposite end a forked tail and being connected at a point between its ends with said body portion through the medium of a contracted neck, and a loop-deflector carried by the looper in a position extending past and radially beyond the loop-taker beak, for the purpose set forth.

11. In a sewing machine, a stitch-forming mechanism comprising a reciprocating needle and a cooperative rotary chain-stitch looper having a plurality of revolutions to each reciprocation of the needle, the said looper comprising a body portion, a looper arm having at one end thereof a loop-taker beak and at its opposite end a forked tail and being connected at a point between its ends with said body portion through the medium of a contracted neck, and a laterally yielding loop-guard carried by the looper in a position at one side and in advance of the loop-taker beak, for the purpose set forth.

12. In a sewing machine, a stitch-forming mechanism comprising a take-up, a reciprocating needle, and a rotary chain-stitch looper having a plurality of revolutions to each reciprocation of the needle, the said looper having

means for holding the thread-loop between it and the work in an inclined position extending backwardly through a previously formed loop and being operative to maintain its engaged loop in such inclined position and move upwardly with the same toward the work during the drawing up of the said looper-engaged loop and the said previously formed loop by the take-up, and a needle-plate having an elongated needle-slot through which said thread-loops extend, for the purpose set forth.

13. In a sewing machine, a stitch-forming mechanism comprising a reciprocating needle and a rotary chain-stitch looper having a plurality of revolutions to each reciprocation of the needle, the said looper comprising a loop-taker beak, a forked tail, means for guiding the rear side of the thread-loop across the face-side of the looper, and means for receiving the thread loop subsequent to its engagement by the loop-taker beak on one revolution of the looper and maintaining continuous engagement therewith until the looper enters upon its succeeding revolution and thereafter guiding the said loop onto the forked tail, for the purpose set forth.

14. In a sewing machine, a stitch-forming mechanism comprising a reciprocating needle and a rotary chain-stitch looper having a plurality of revolutions to each reciprocation of the needle, the said looper comprising a loop-taker beak operative upon the first revolution of the looper to seize the thread-loop thrown out by the needle, and a forked tail operative to receive the said thread-loop from the loop-taker beak and hold the same during the second revolution of the looper in an open or distended position across the path of the needle to be entered thereby.

15. In a sewing machine, a stitch-forming mechanism comprising a take-up, a reciprocating needle, and a rotary chain-stitch looper having a plurality of revolutions to each reciprocation of the needle, the said looper comprising a loop-taker beak, a looper arm having a forked tail, and a radially-arranged surface operative for receiving the

thread-loop subsequent to its engagement by the loop-taker beak and prior to its engagement by the looper arm and guiding it there-along under the action of the take-up to the looper-arm, for the purpose set forth.

16. In a sewing machine, a stitch-forming mechanism comprising a take-up, a reciprocating needle, and a rotary chain-stitch looper having a plurality of revolutions to each reciprocation of the needle, the said looper having means for holding a thread loop between it and the work in an inclined position extending backwardly through a previously formed loop and maintaining its engaged loop in such inclined position during the drawing up and tightening of the said previously formed loop by the take-up, and the said take-up coöperating with the looper to hold the inclined thread loop taut and to draw it upwardly through the said previously formed loop upon the tightening of the latter by the take-up, for the purpose set forth.

17. In a sewing machine, a stitch-forming mechanism comprising a take-up, a reciprocating needle, and a rotary chain-stitch looper having a plurality of revolutions to each reciprocation of the needle, the said looper having means for holding a thread loop between it and the work in an inclined position extending backwardly through a previously formed loop and maintaining its engaged loop in such inclined position during the drawing up and tightening of the said previously formed loop by the take-up, and the said take-up coöperating with the looper to hold the inclined thread loop taut and to draw it upwardly through the said previously formed loop subsequent to the said tightening of the latter by the take-up, for the purpose set forth.

Signed at New York in the county of New York and State of New York this 3rd day of October A. D. 1904.

WILLIAM M. AMMERMAN.

Witnesses:

CHAS. F. DANE,
E. M. FAITH.