

No. 633,119.

Patented Sept. 19, 1899.

J. J. M. CHAUVET & J. W. COULTER.

SEWING MACHINE.

(No Model.)

(Application filed Nov. 17, 1898.)

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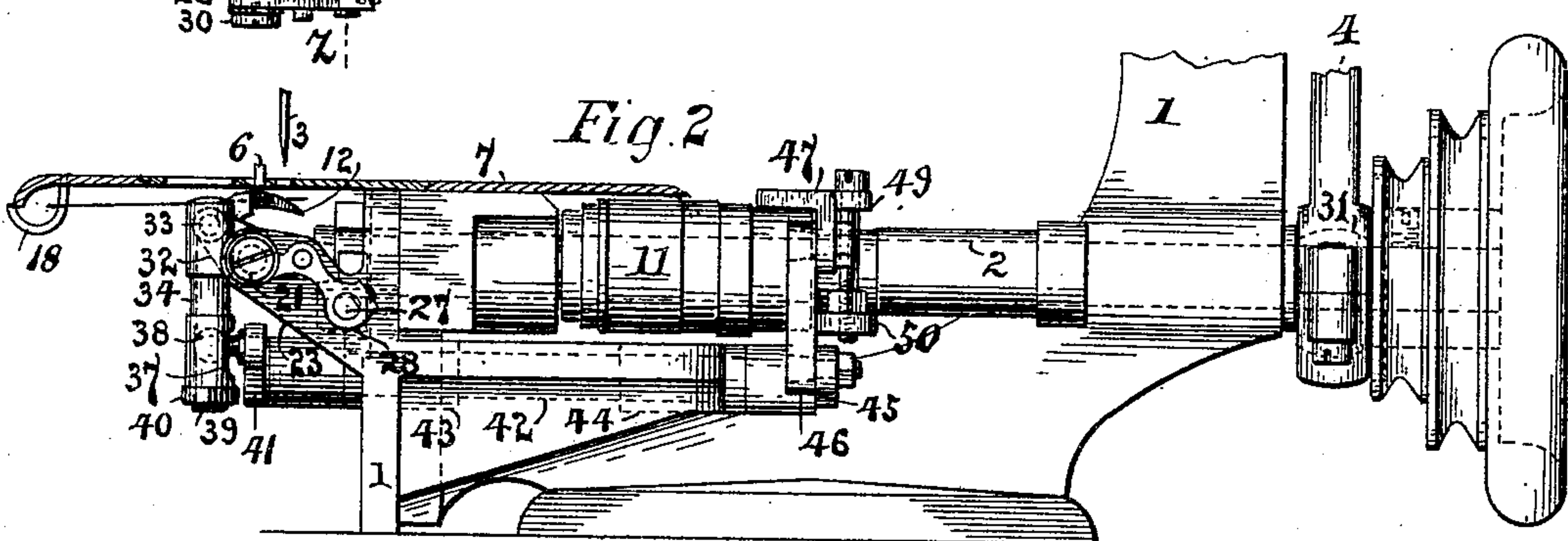
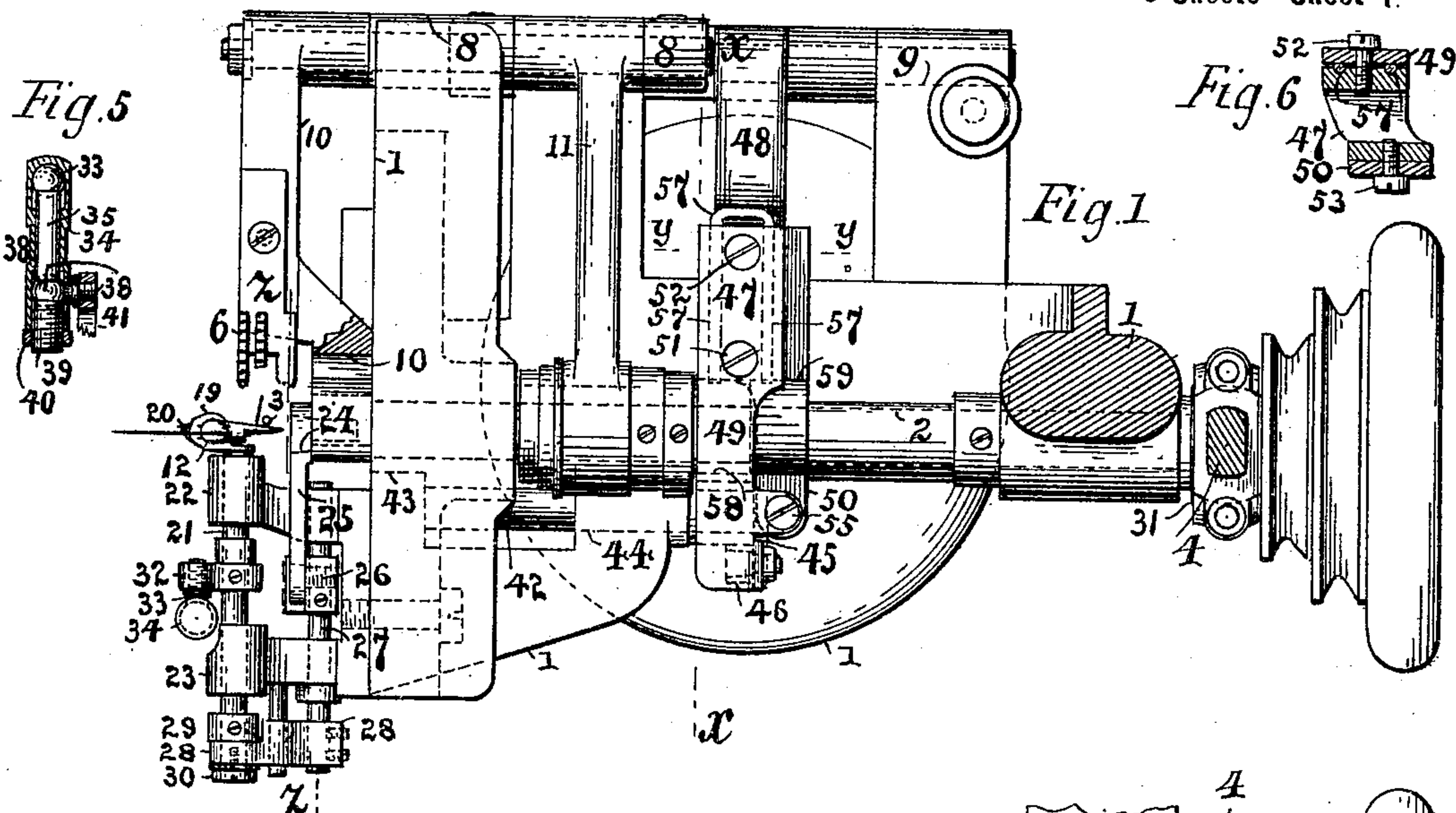


Fig. 8 *Fig. 7*



Fig. 9

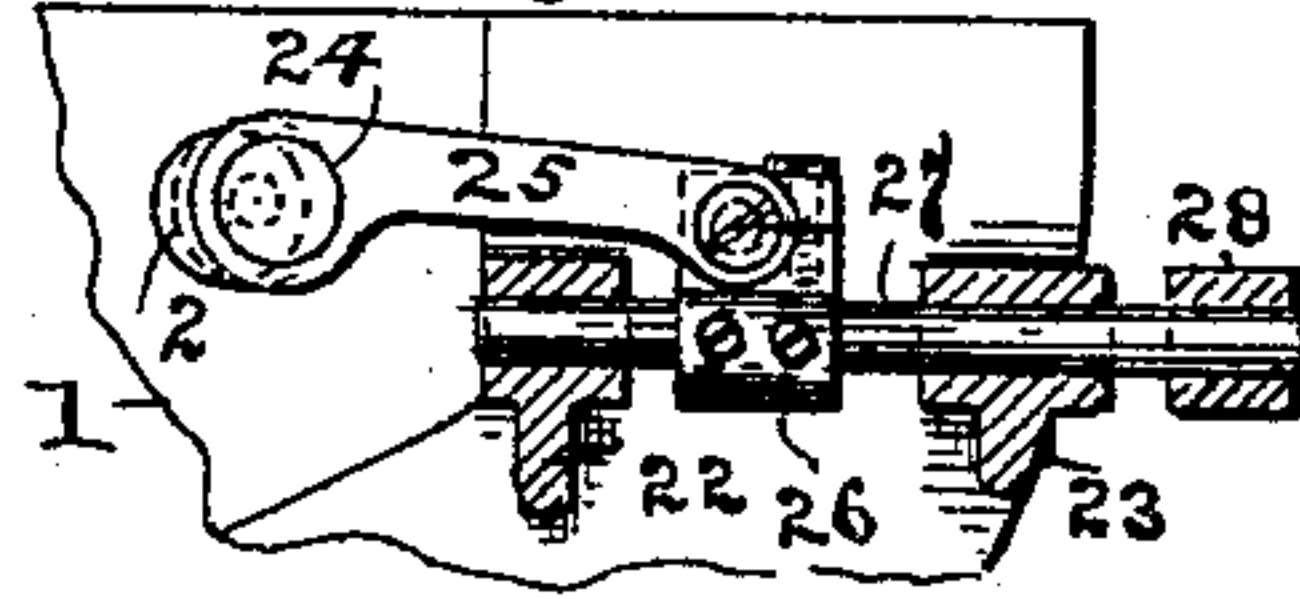


Fig. 3

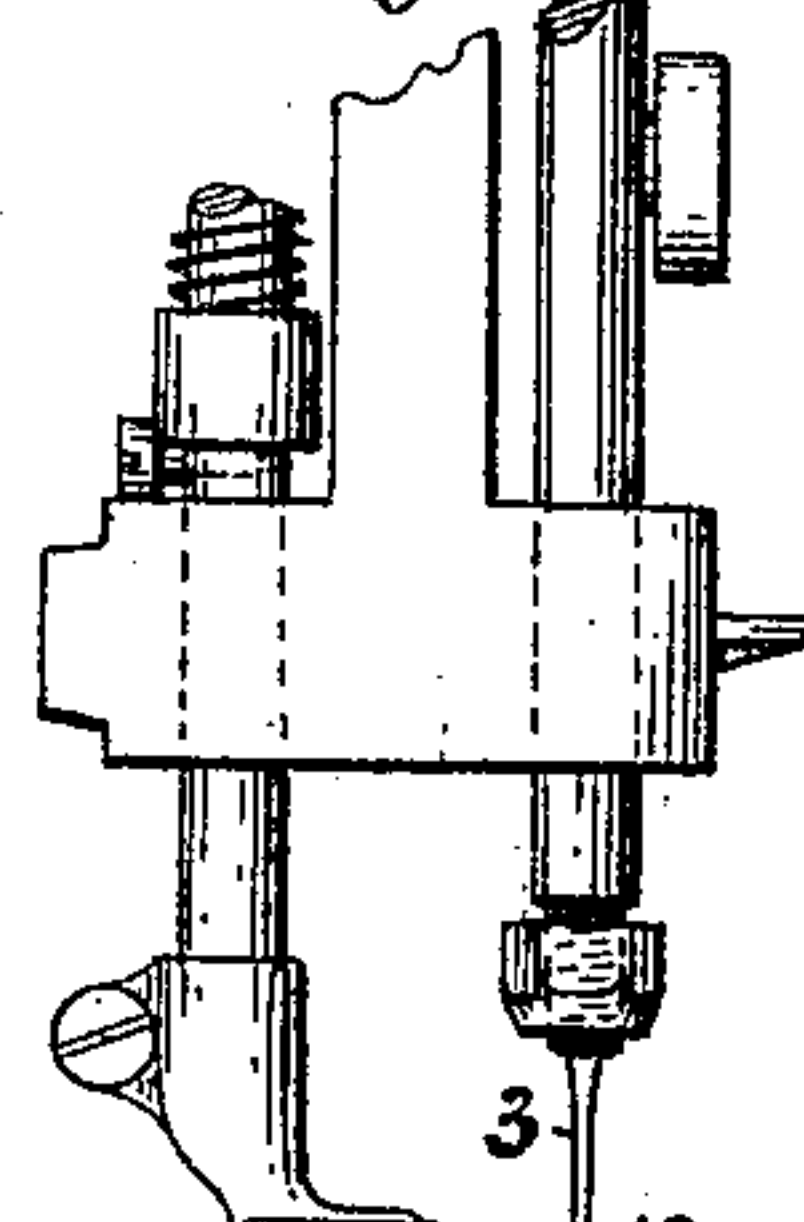


Fig. 4

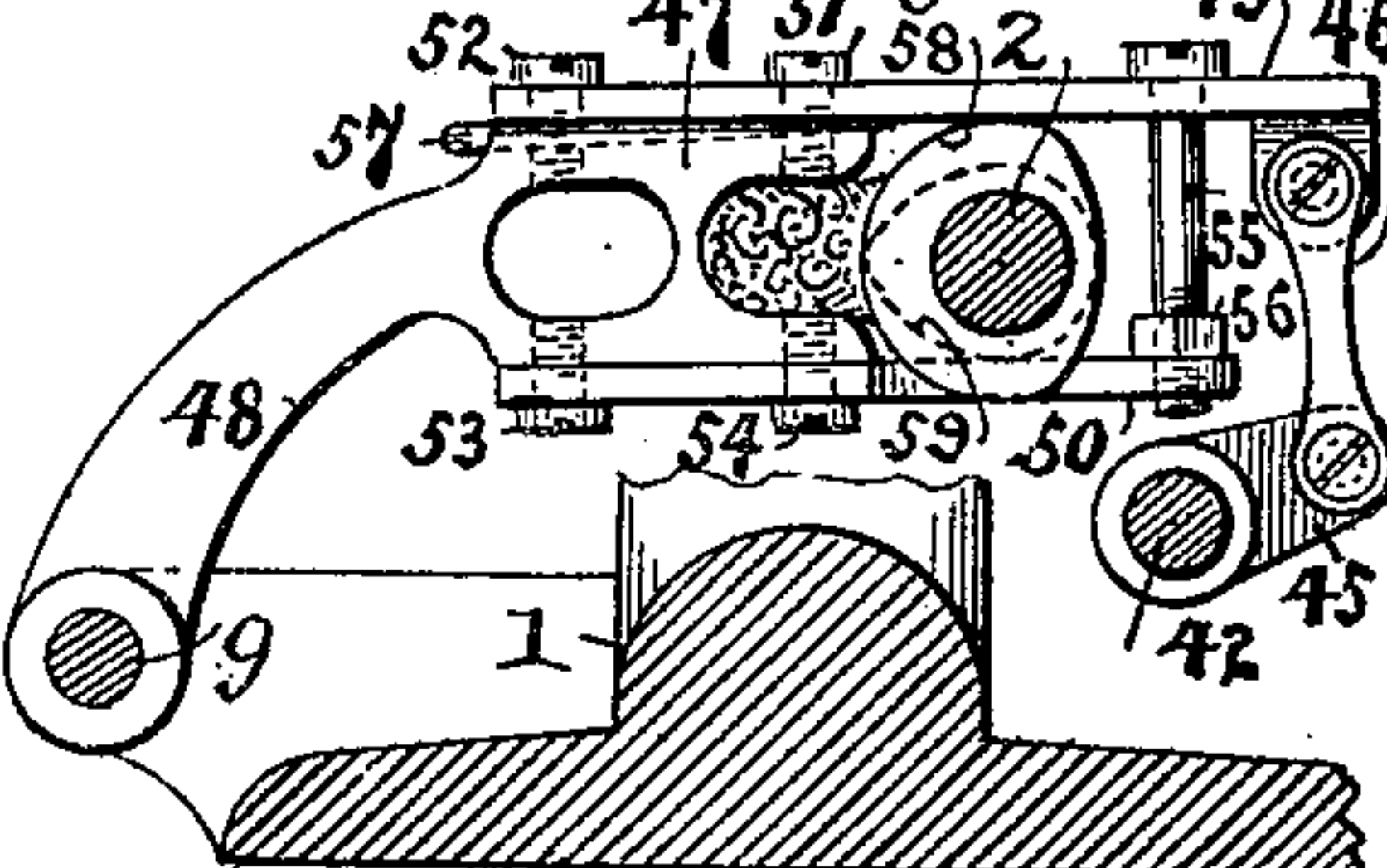
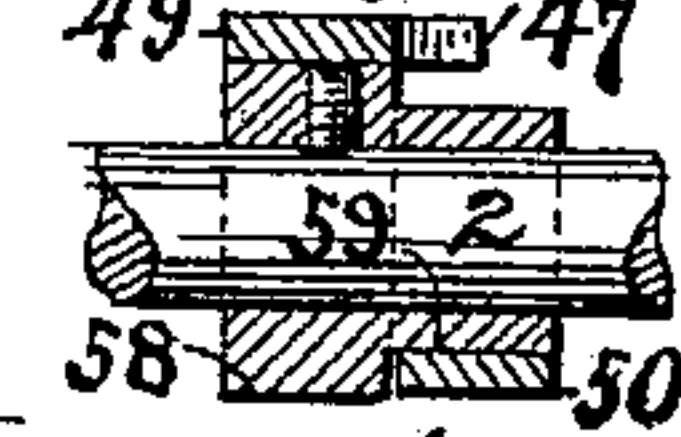


Fig. 10



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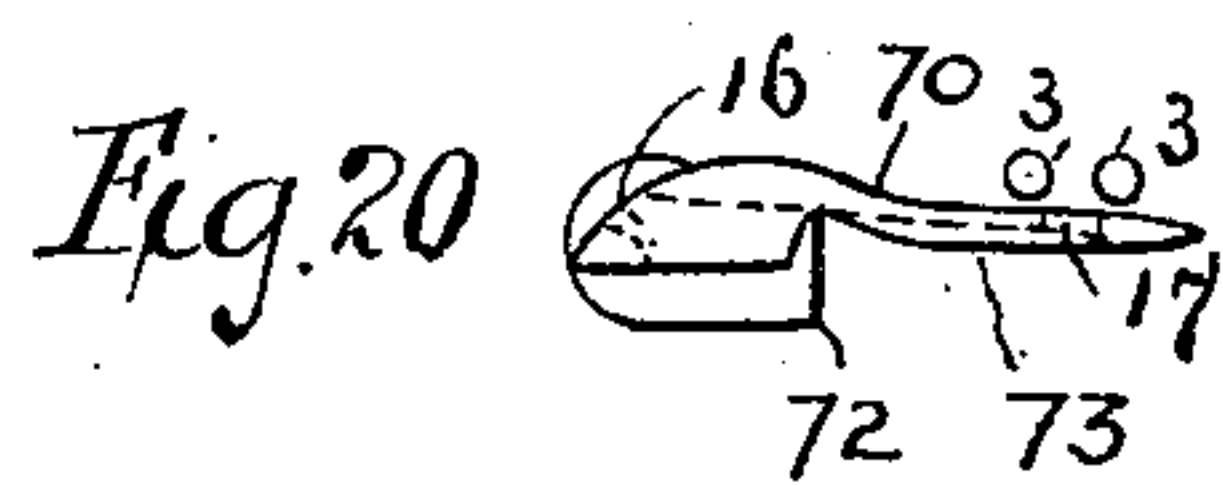
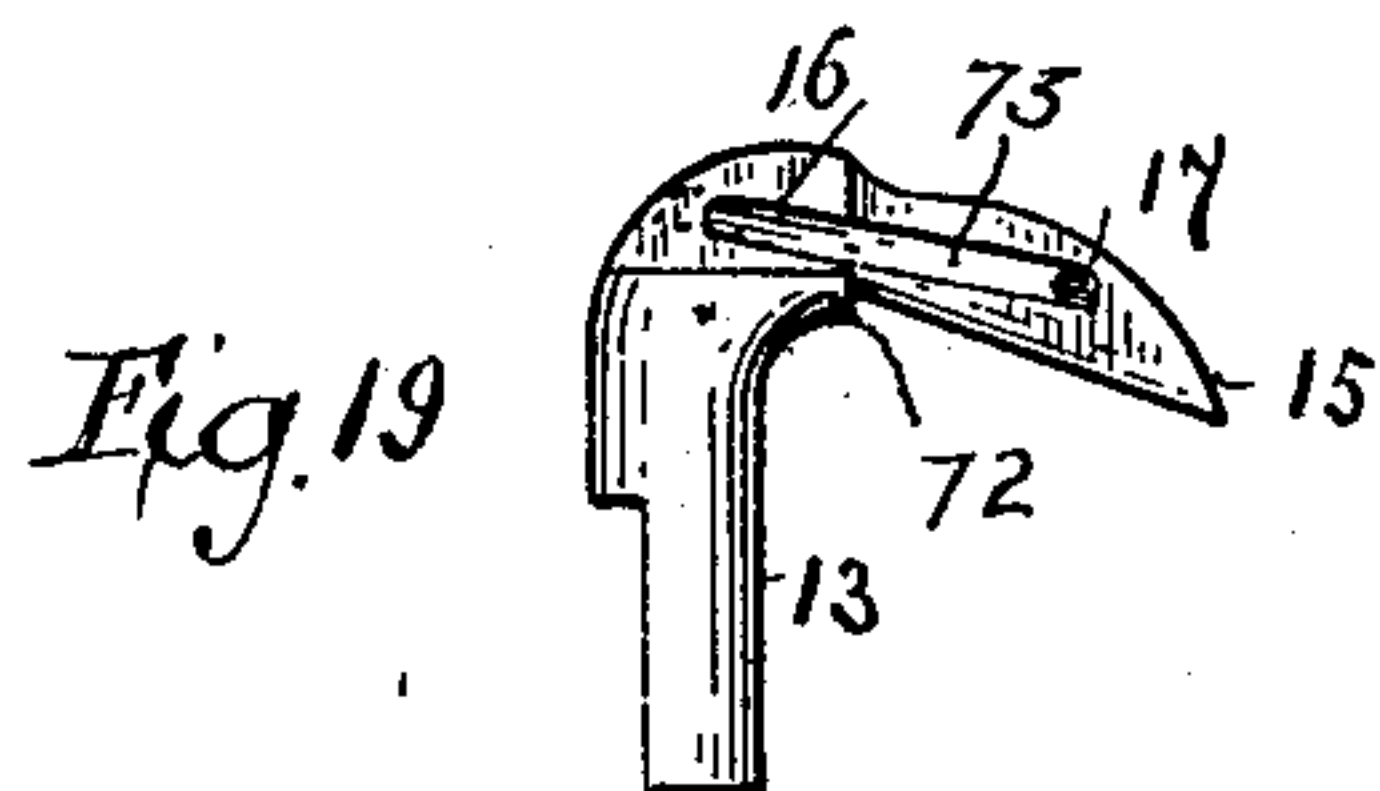
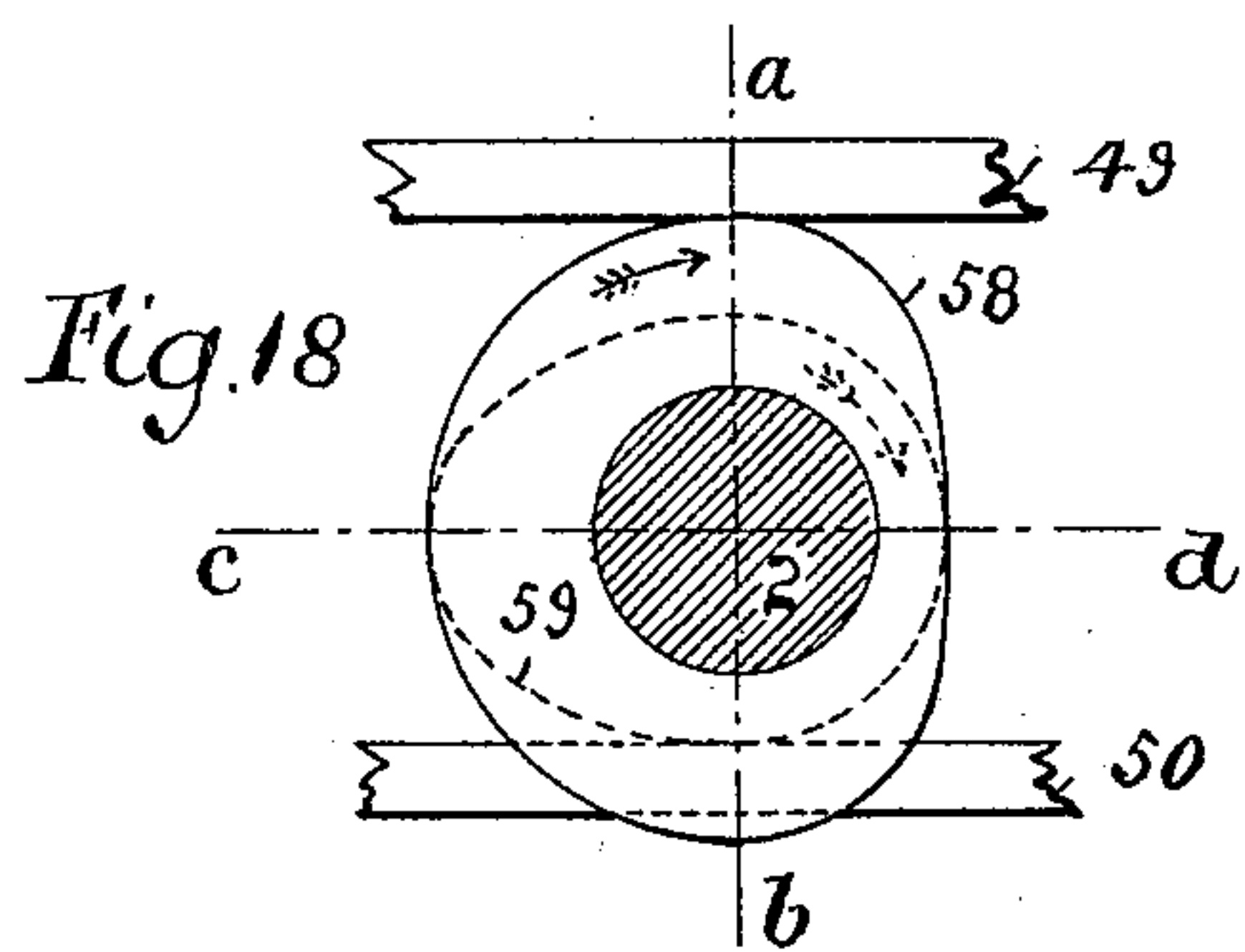
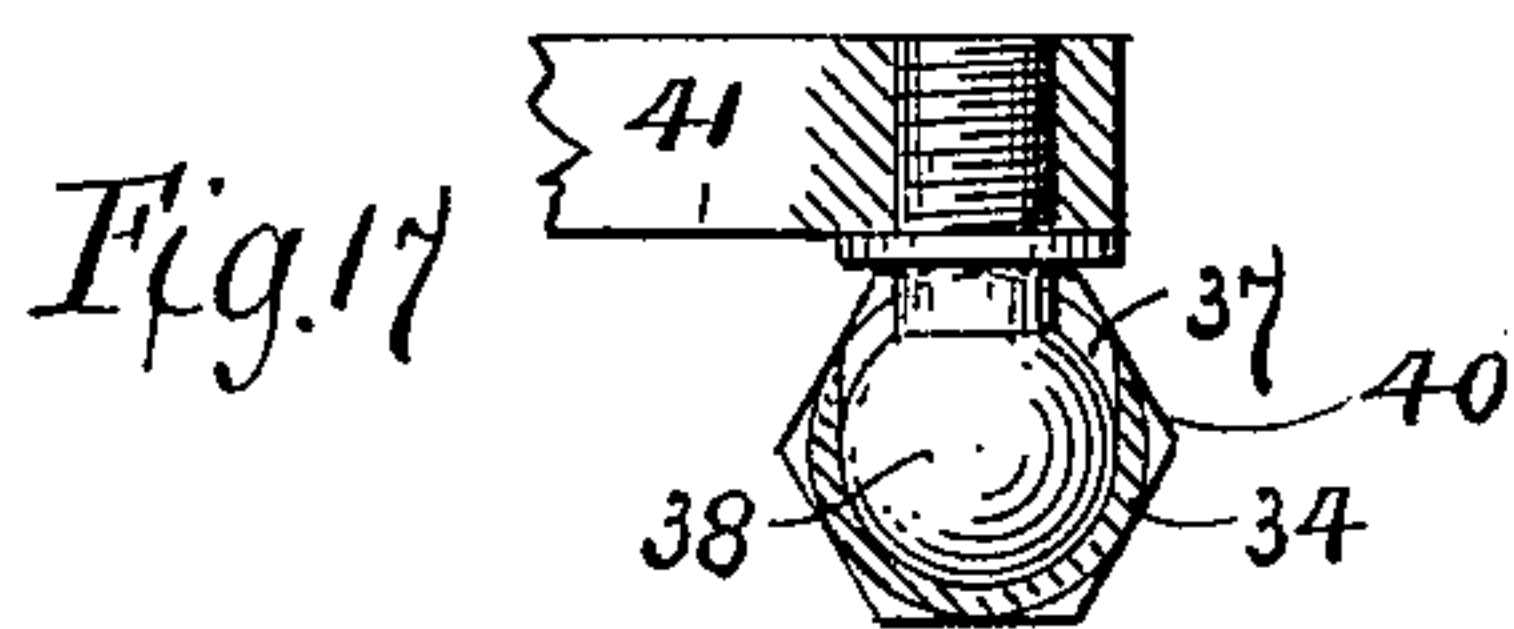
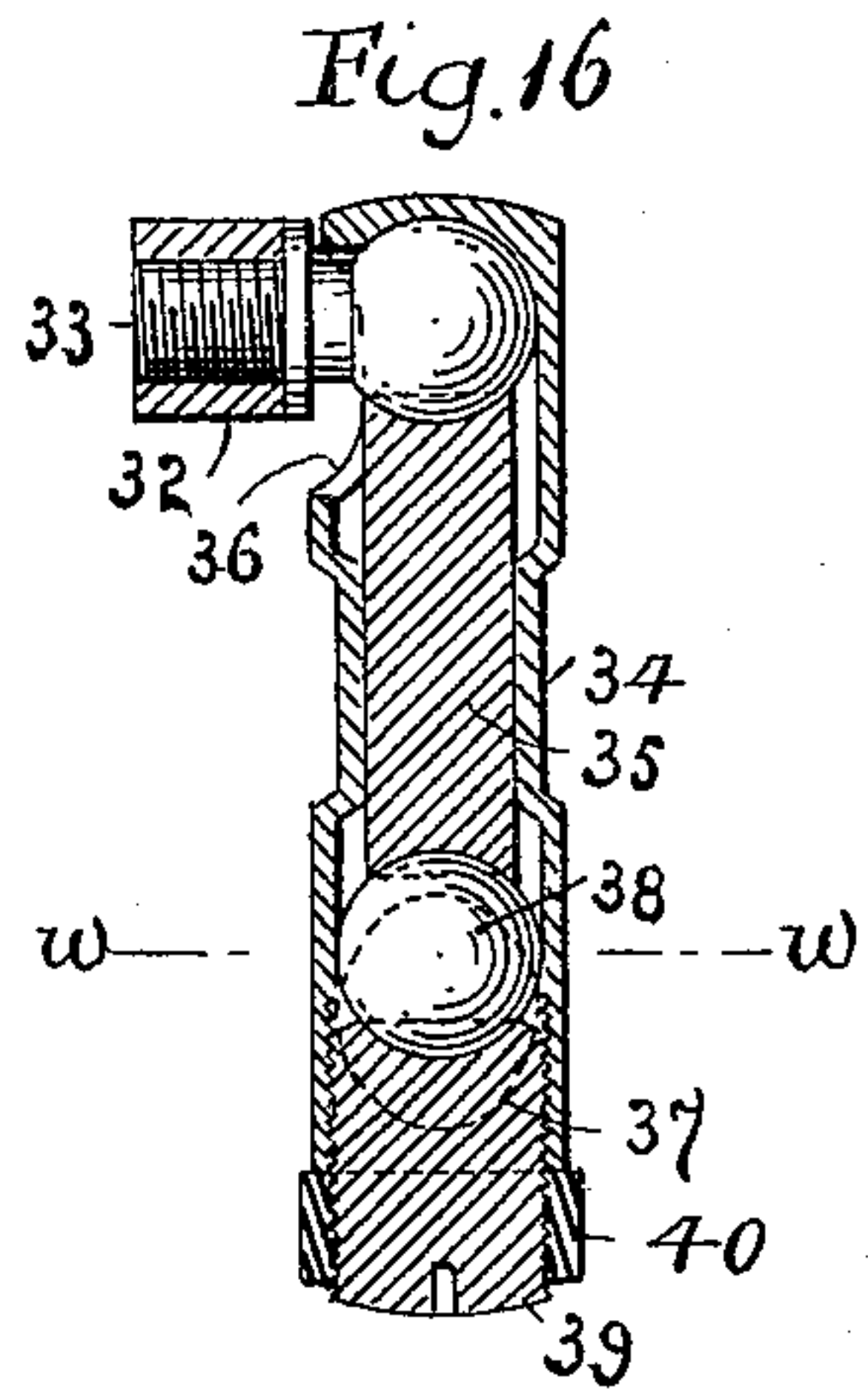
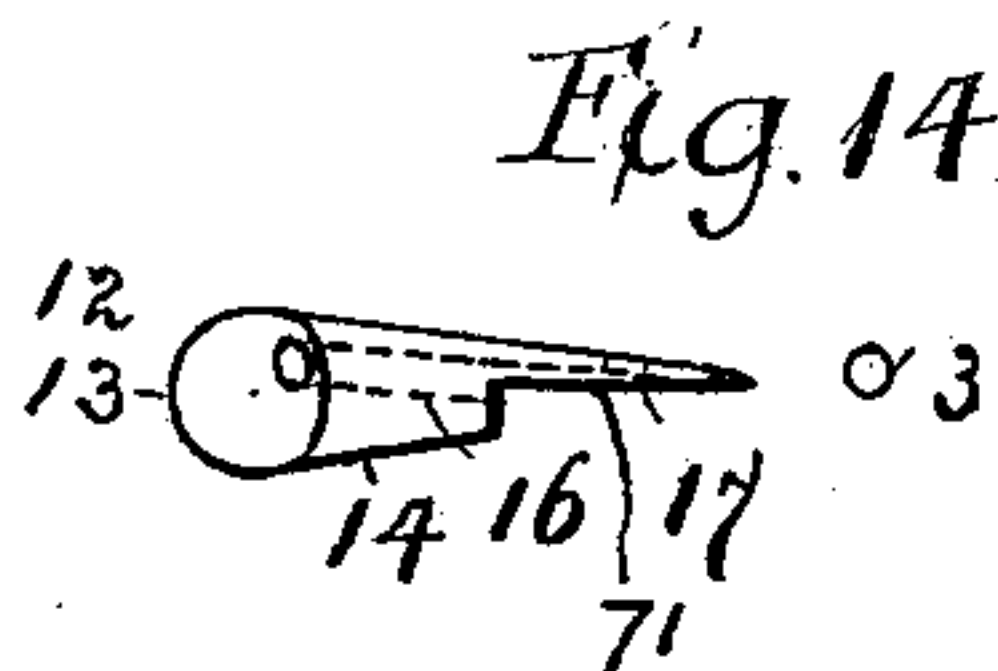
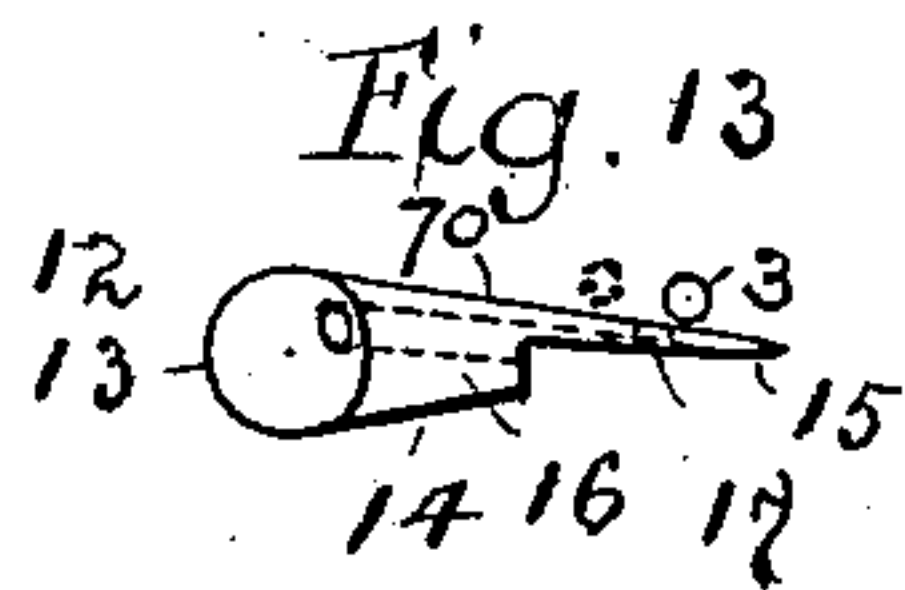
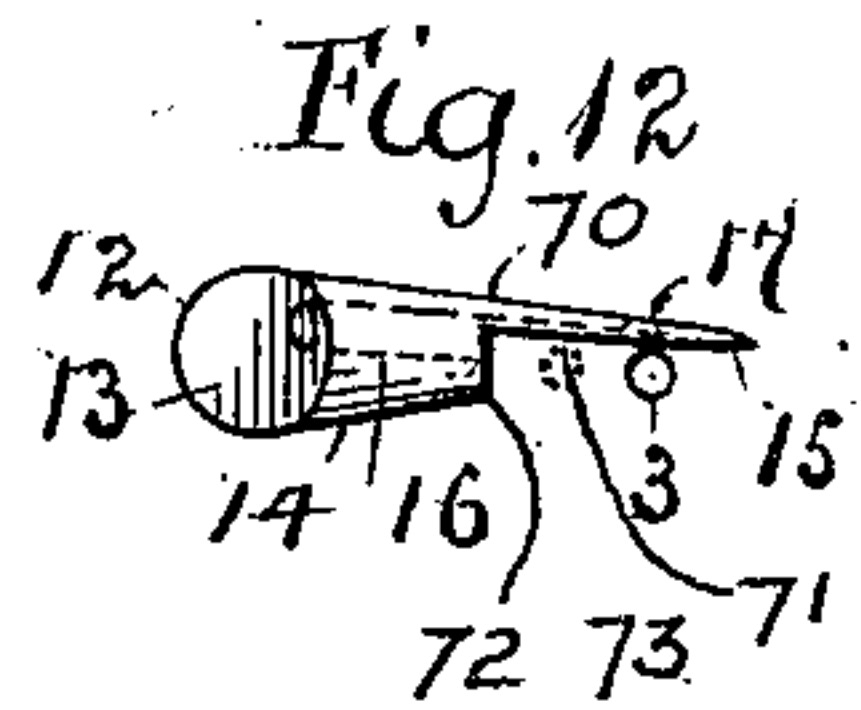
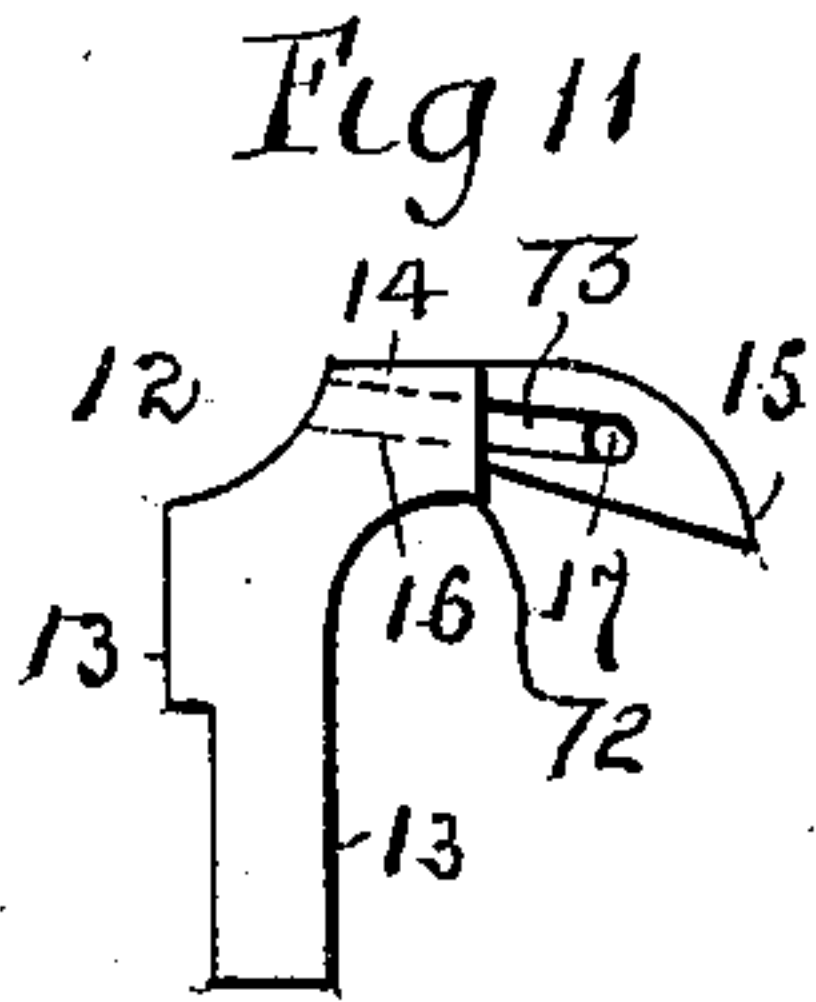
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SEWING MACHINE.

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(No Model.)

3 Sheets—Sheet 2.



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Fig. 15

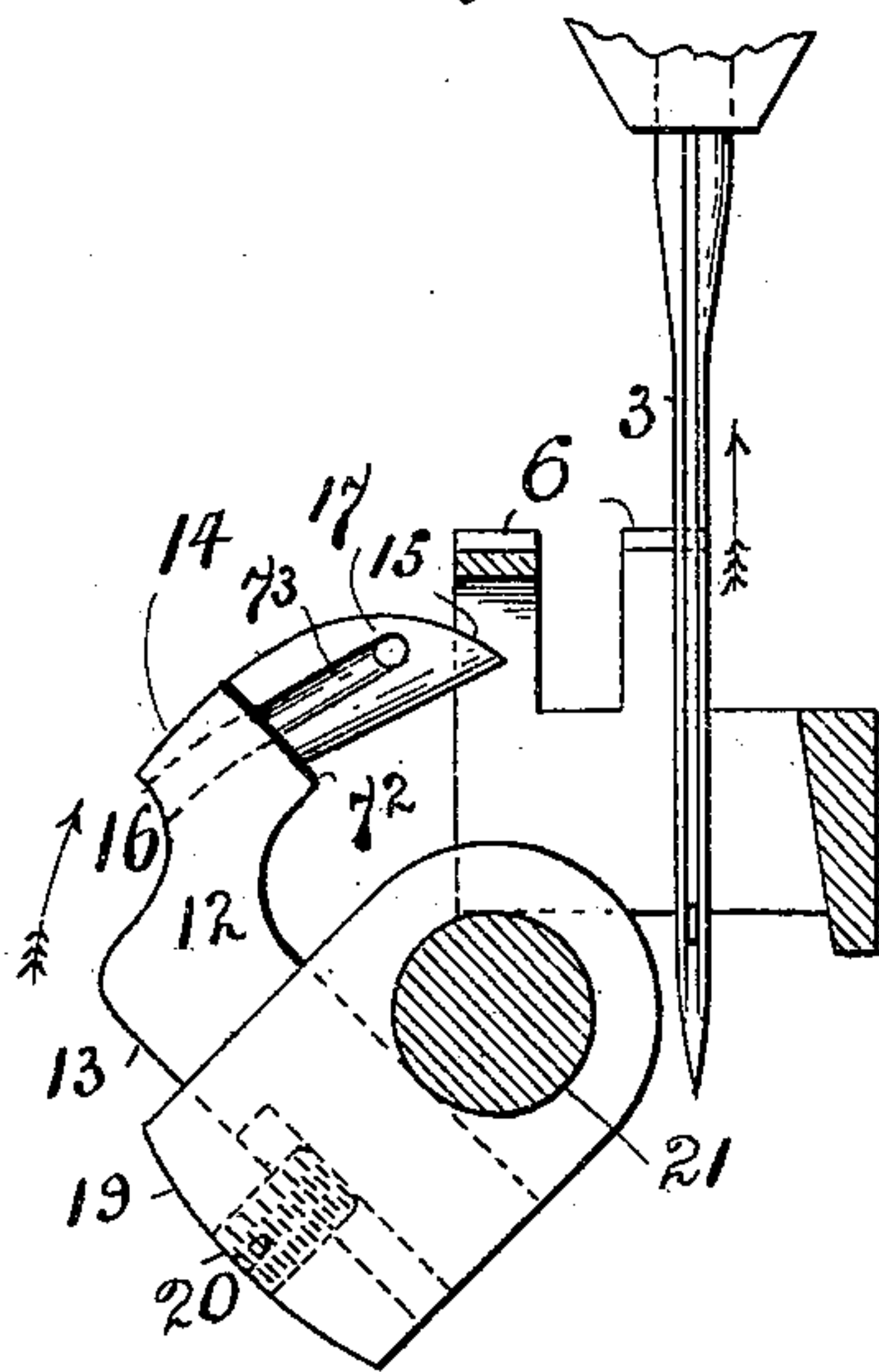
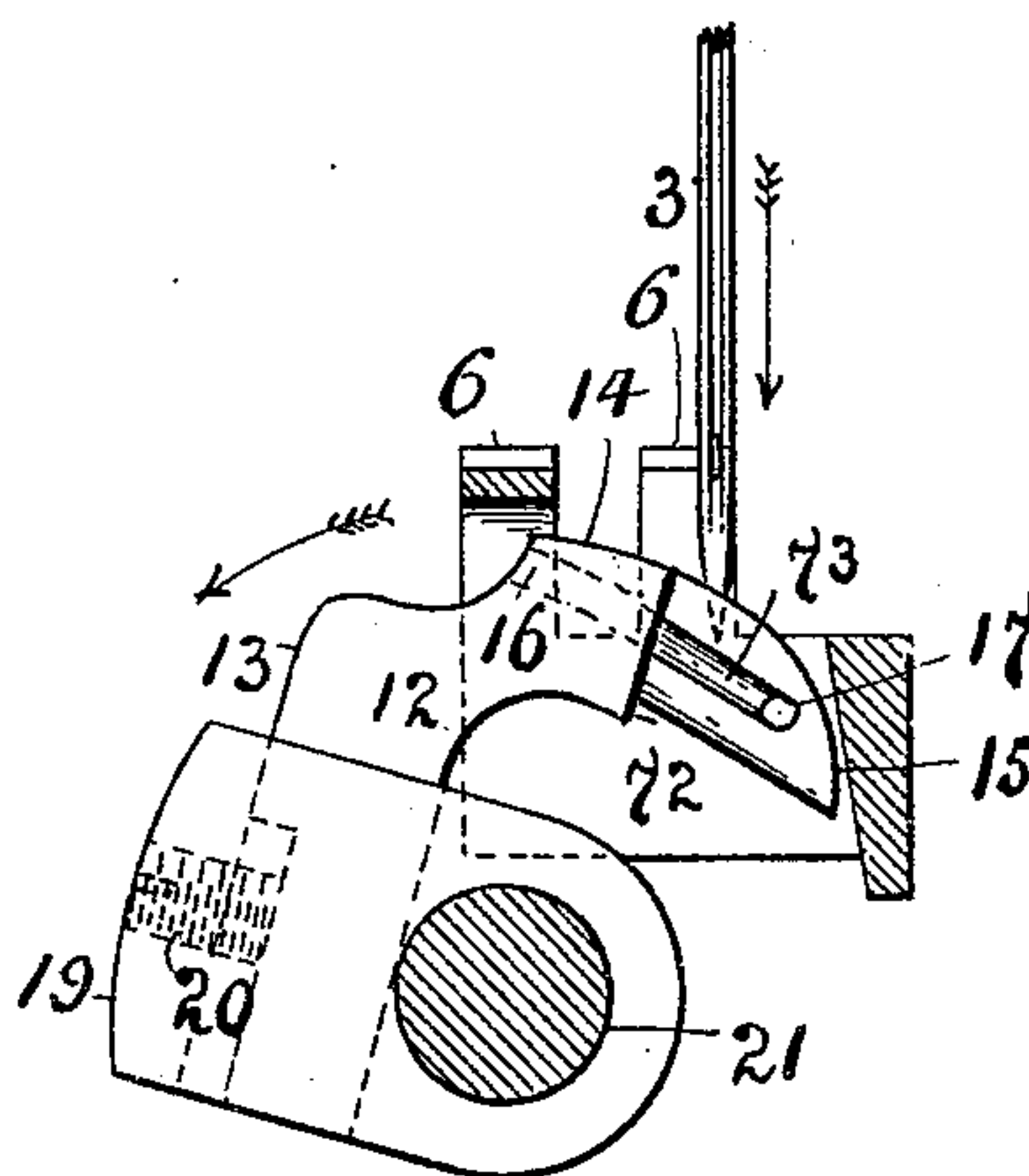


Fig. 15 a.



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UNITED STATES PATENT OFFICE.

JOSEPH J. M. CHAUVET AND JOHN W. COULTER, OF NEW YORK, N. Y.

SEWING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 633,119, dated September 19, 1899.

Application filed November 17, 1896. Serial No. 612,410. (No model.)

To all whom it may concern:

Be it known that we, JOSEPH J. M. CHAUVET, of New York, in the county of New York, and JOHN W. COULTER, of New York, (Brooklyn,) in the county of Kings, State of New York, citizens of the United States, have invented certain new and useful Improvements in Sewing-Machines, of which the following is a specification.

10 This invention is applicable to that class of sewing-machines operating by the coaction of one or more needles, each carrying a thread with a looper carrying a thread. The high speed (three thousand revolutions, more or
15 less) at which this class of sewing-machines can be run smoothly and without undue wear is one of the chief points in its favor, and our present invention is particularly directed to the improvement of existing machines in that
20 regard.

Heretofore it has been understood that to secure high speed it was essential that the looper should be driven by an eccentric as distinguished from a cam and the most rapid
25 and preferred machines have operated the looper by an eccentric, although compelled in connection with the motion imparted by the eccentric to employ a long looper having a long stroke, whereby each stroke of the looper
30 draws so much thread as to require the use of a take-up on the return stroke, and even then to be productive of serious drawbacks. By our invention we are enabled to run the looper with great speed, ease, and freedom from
35 wear, and at the same time we can, if desired, impart to the looper the proper motion for securing a short stroke and enabling the employment of a short looper which does not require the aid of a take-up for the looper-thread.

40 In the accompanying drawings, Figure 1 is a top view of the lower portion of a sewing-machine containing the improvement, the cloth-plate and portions of the feed mechanisms being omitted. Fig. 2 is a side elevation
45 of the same, the cloth-plate being shown in section. Fig. 3 is an end elevation of the same, the cloth-plate being in section and portions of the feed mechanism being broken away. Fig. 4 is a transverse vertical section
50 taken at the plane of the line $x x$, Fig. 1. Fig. 5 is a sectional view of the link having ball-and-socket connections at both ends ad-

justable from one end. Fig. 6 is a vertical section at the plane of the line $y y$, Fig. 1. Fig. 7 is an end portion of the main shaft. 55 Fig. 8 is an end view of the same. Fig. 9 is a transverse vertical section taken at the plane of the line $z z$, Fig. 1. Fig. 10 is a central longitudinal section of a cam, shown best in Fig. 4. Figs. 11, 12, 13, and 14 are 60 details of the looper enlarged, properly proportioned for use with a single needle, which latter is shown at about the positions it will occupy on opposite sides of the looper at the time when the looper is about midway of its
65 forward and backward strokes. Fig. 15 shows accurately the relative positions of the needle, looper, shaft 21, and feed-bar 6 at the instant when the looper is commencing its forward movement, which is also substantially the
70 instant when the needle is commencing its ascent. Fig. 15^a shows the relative positions of the same parts at the instant when the looper is commencing its backward movement and the needle has accomplished substan- 75 tially half its descent. Figs. 16 and 17 are details of the cap 34 enlarged. Fig. 18 is a detail end view of the double cam shown in longitudinal section in Fig. 10. Figs. 19 and 20 are details of a looper enlarged, properly 80 proportioned for use with two needles.

1 is the frame of the machine.

2 is the main shaft having its bearing in the frame.

3 is the needle, and 4 the connecting-rod by 85 which the needle mechanism is driven from the usual eccentric on the shaft.

5 is the presser-foot.

6 is the feed-bar; 7, the cloth-plate.

8 is a rocker pivoted on the shaft 9, on 90 which the arms 10 and 11 are pivoted at one end, while the other end of each of said arms embraces an eccentric on the shaft 2. The feed-bar 6 is fixed to the arm 10 and receives the usual motions of a four-motion feed-bar. 95

12 is the looper, which is shown in double full size and properly proportioned to cooperate with a single needle in Figs. 11 to 14 of the drawings filed herewith. It consists of a shank 13, a shank-head 14, and a nose 15. 100 The head is perforated from back to front, as shown in dotted lines at 16, and the nose is perforated transversely, as shown at 17. The nose of the looper is mounted directly upon

the shank-head and overhangs only one side thereof instead of being connected with the shank-head by a long backward-turned neck, as in former thread-carrying loopers, such as shown in Patents Nos. 299,568, 344,492, 344,493, and 152,813. The side 70 of the nose facing the needle as it ascends may be flush, or nearly so, with the side of the shank-head; but on the opposite side the shank-head is offset from the side 71 of the nose so as to form a shoulder at 72, which shoulder extends below the nose, as shown in Figs. 11, 15, and 19. A groove 73 on the side of the nose facing the needle as it ascends connects perforations 17 and 16. The form of the nose is correctly shown in the drawings.

The above-described construction of the looper coöperates with the length of its forward strike, so that when the looper has advanced and entered the loop or loops of the needle thread or threads and has come to rest at the end of its forward stroke the distance from the perforation 17 to the shoulder 72 will be just sufficient (for a single needle-thread about one-eighth inch and for two needle-threads about three-sixteenths inch) to produce the proper interlocking of the threads without skip. When the looper is at the end of its forward movement, the position of the needle is between the line of the eye and the plane of the shoulder somewhat, as indicated in dotted lines in Figs. 12 and 13. The forward and backward movements of the looper are so timed that the looper is substantially at rest so far as forward or backward movement is concerned from the time that the point of the needle in ascending ascends substantially from the level of the looper-thread until the point of the needle in descending returns substantially to the level of the looper-thread. During this period of rest in the forward or backward movement of the looper it is moved sidewise from the side of the needle-path shown in Fig. 12 to the side of the needle-path shown in Fig. 13. The inverse sidewise movement of the looper occurs when the needle is down and the looper is in its backward position. When the needle is down and the looper is in its backward position, a position relatively to the needle-path is represented in Fig. 14. The looper-thread runs to the looper from suitable tension mechanism through a guide 18, arranged behind the looper nearly in the plane of its forward and backward movement. It will be observed that by having the looper-shoulder 72 on the same side of the shank with the nose the distance between the shoulder 72 and the eye 17 may be so short as only sufficient to permit the needle to pass between them when the shoulder is at rest in the line of the feed 6. Thus the shoulder 72 is in position to receive the contact of the needle-thread and act as a guide for the same as soon the eye 17 has advanced beyond the needle, and the looper can therefore remain at rest in this position, so far as movement

forward or backward is concerned, as long as the needle remains above it in ascending and descending, which is during one-half the revolution of the main shaft. The upward inclination of the bottom of the looper-nose from its point to the shoulder 72 acts to deflect the needle-thread back against the shoulder 72 after the forward motion of the looper stops. Since the looper holder or stock 19 extends from the shaft 21 in a direction backward from the path of the needle and since the looper-shank 13 and head 14 extend upward and forward, the shoulder 72 is brought forward substantially into a position overhanging the line of shaft 21, or, stated in other words, by having the head of the looper located at the forward side of the shank, as shown, the face of the shoulder 72 when the looper is in its forward position of rest is brought, as shown in Fig. 1, substantially up to or forward of the vertical plane in which the axis of shaft 21 lies, (considering the path of the needle as a vertical line). The mechanism whereby said motions are imparted to the looper will now be described.

The looper-shank 13 is held in a socket 19 by a set-screw 20. The socket 19 is fixed upon the end of the shaft 21 and made substantially integral therewith. The shaft 21 has its bearings in the frame-brackets 22 and 23 and its axis lies in a line which intersects the plane of the needle-path at a point slightly below the lowest level attained by the needle-eye and somewhat removed (in a direction opposed to the forward movement of the looper) from the path of the needle, so that when the point of the looper enters the loop of needle-thread the point of the looper has passed the meridian of its motion and is moving in a direction somewhat downwardly inclined. In its backward movement the looper retreats only far enough to bring the point of the looper about to its meridian of motion, which point it reaches at about the instant that the needle completes its descent. The relative position of the needle, the looper, and the shaft 21 at the moment when the needle has completed its descent is shown in Fig. 15, looking from a point of view in line with the axis of the shaft 21. The shaft 21 receives two motions, a reciprocating motion in the line of its axis and an oscillating motion.

The shaft 21 may be reciprocated axially to give the looper its sidewise movements by the following mechanism:

Inserted eccentrically in the end of the main shaft 2 is a crank-pin 24, which serves as a bearing for the pitman 25, pivotally connected with the block 26, fixed to the sliding shaft 27, having its axis parallel with the shaft 21 and its bearings also in the brackets 22 and 23. An arm 28, fixed to the outer end of the sliding shaft 27, has a connection with the shaft 21 between the collar 29 and the set-screw 30, fixed to the said shaft 21, the shaft being free to rotate in the arm 28. There-

fore the shaft 21 is compelled to slide axially in unison with the axial-sliding movement imparted to the shaft 27 from the crank-pin 24. The eccentricity of the crank-pin 24 is such as to move the looper sidewise from one side to the other of the needle-path. The position of the crank-pin 24 on the main shaft 2 is such relatively to the eccentric at 31 on the same shaft which drives the needle mechanism that the sidewise motion of the looper occurs when the point of the needle is above the level of the looper.

The shaft 21 may be oscillated to give the looper its forward and backward movements by the following mechanism:

32 is an arm fixed to the shaft 21, and it carries the pin 33, the outer end of which is of spherical form. 34 is a cap shown in detail in Fig. 16. Within this cap is a pin 35, free to move endwise, which pin has concave ends. At the upper end the side of the cap is cut away at 36, so as to admit the ball of the pin 33, and the interior of the cap above the concave top of the pin 35 is made concave, so that the concaves in the cap and on the upper end of the pin 35 form the socket of a universal joint with the ball or spherical end of the pin 33. Opposite the lower end of the pin 35 the side of the cap is cut away at 37, so as to admit the spherical-ended pin 38.

39 is a set-screw threaded in the lower end of the cap 34, which set-screw has a concave point opposed to the concave lower end of the pin 35.

40 is a jam-nut on the set-screw 39.

The opposed concaves on the pin 35 and the set-screw 39 form the socket of a universal joint with the ball or spherical end of the pin 38, so that the vertical motion communicated from the pin 38 to the pin 33 will not conflict with the motion due to the fact that those pins are mounted on arms rocking in planes transverse to each other and that the pin 33 follows the reciprocating motion of the shaft 21. The pin 38 is fixed to the extremity of the rocker-arm 41, which is fixed to the end of a rocker-shaft 42, running at right angles with the shaft 21 and parallel with the main shaft 2 and which has its bearings in the frame at 43 and 44. Upon the opposite end of the rocker-shaft 42 is fixed a rocker-arm 45, connected by the connecting-rod 46 with a cam-follower 47. The cam-follower 47 consists of the arm 48, pivoted on the shaft 9, and the projecting plates 49 and 50, parallel to each other and secured, respectively, to the top and bottom of the arm 48 by the set-screws 51 52 53 54. The outer ends of the plates 49 and 50 are connected together by the pin 55, which admits of adjusting the distance between the two plates by being screw-threaded to the plate 50 and being provided with the jam-nut 56. The distance between the plates 49 and 50 at the rear end of said plates may be adjusted by a wedge 57, inserted between the plate 49 and its seat on the arm 48.

58 and 59 are two members of a double cam fixed upon the main shaft 2. The cam member 58 coöperates with the follower-plate 49 and the cam 59 with the follower-plate 50. For convenience of explanation two diameters at right angles with one another are indicated, respectively, by the dotted lines $a b$ and $c d$. One half of each cam member is circular and concentric with the shaft 2, and the circular half of one cam is diametrically opposite the circular portion of the other. Thus, referring to the diameter lying in the dotted line $a b$ of Fig. 18, the circular half of the cam 58 lies on the left of that diameter and the circular half of the cam 59 (shown in dotted lines) lies on the right of it. The sum of the radii of these two circular halves is equal to the distance between plates 49 and 50; but the radius of the circular half of 59 is much shorter than the radius of the circular half of 58. The surface of cam 58 lying on the right of diameter $a b$ adjacent to the diameter $c d$ is the arc of a circle struck from a center lying in the diameter $c d$. A plane at right angles with the diameter $c d$, which is tangent to the cam 59, will also be tangent to said arc of the cam 58. The portion of cam 59 lying on the left of diameter $a b$ has its apex in a plane tangent to the cam 58 and at right angles with diameter $c d$, and from this apex to the diameter $a b$ the surface of cam 59 lies in the divergent convex dotted lines shown in Fig. 18. The cam 59 on the diameter $c d$ measures equal to the distance between plates 49 and 50. For each rotation of the main shaft and each complete vibration of the needle the above-described cam will give the looper a period of rest during one-half the rotation and a vibration during the other half—that is to say, as the cams move in the direction of the arrow of Fig. 18 the looper will remain at rest in its forward position and the needle-point will ascend from slightly above the level of the looper and return to that level during the first half of that revolution, because the cam-surface in contact with plate 49 will be the circular half of cam 58 and the cam-surface in contact with plate 50 will be the circular half of cam 59. As the rotation is continued in the same direction the cam 59 will force the plates 49 and 50 downward, and thus carry the looper backward during a quarter-revolution and until the needle has completed its descent and until the apex of cam 59 reaches plate 50, after which, during the next quarter-revolution in the same direction, the cam 58 will force the plates 49 and 50 back to their normal position. In the line of any diameter of the cams the sum of the radii is always equal to the distance between the plates 49 and 50. In other words, the cam member 59 being ovate in form the curvature of cam member 58 approaches the center as the ovate curvature recedes from the center on the opposite side of the center. The members 58 and 59 of the double cam may therefore be described as

complemental to each other. There is never any lost motion between the plates and cams. Wear may be taken up by the adjustment between the plates. The plates themselves may
 5 be constructed in such manner as to secure the greatest freedom from wear. As a consequence of these features the described motions of the looper, including a condition of rest and of vibration during the revolution,
 10 are accomplished with unparalleled smoothness at the highest speed. By the cam described, employed in connection with the looper, as set forth, the amount of thread drawn off by the looper is reduced and the
 15 necessity of employing a take-up is dispensed with.

Prior to our invention the forward-and-backward movement has been imparted to a looper by an eccentric, (Patent No. 244,470;) also, by a projecting pin and slot, (Patent Nos. 152,813 and 378,653;) also, by a single cam, (Patent No. 245,997;) but neither of these devices is the equivalent of the double cam herein specified, which combines, substan-
 25 tially, unlimited capacity for determining the time and extent of the periods of rest and motion of the looper with stability and capacity to substantially obviate lost motion and wear under the condition of high speed.

30 We claim—

1. In a sewing-machine, in combination, the needle mechanism, the feed mechanism, and eye-pointed looper, and means for guiding the threads of the looper-eye, mechanism
 35 for moving the looper sidewise, and means for causing the looper to remain at rest so far as its backward-and-forward movement is concerned practically from the time the needle leaves it until it returns, and means formed

so as to move the looper backward and forward while the needle is on substantially the lower half of its stroke, whereby the amount of thread drawn off by the looper is reduced, substantially as described. 40

2. In a sewing-machine having a threaded looper, in combination, the needle mechanism, a looper containing a shoulder and a transversely-perforated nose projecting forward of said shoulder, a double cam having the faces of its cam members so related to each other that the advance of said looper so far as its backward-and-forward movement is concerned is arrested during substantially one-half of the rotation of the main shaft and from the time that the needle raises above
 55 the level of the looper until the needle descends to the level thereof, and means connecting the looper and cam, substantially as described.

3. A looper containing the perforated nose and a shoulder forward of which said nose projects, in combination with needle mechanism, and a double cam having connection with the looper whereby a backward-and-forward movement is imparted to said looper, and mechanism whereby a sidewise movement is imparted to said looper, said double cam having the faces of its cam members so related to each other that during substantially one-half the rotation of the main shaft
 70 and while a sidewise movement is occurring the looper is at rest as to its backward-and-forward movement, substantially as described.

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