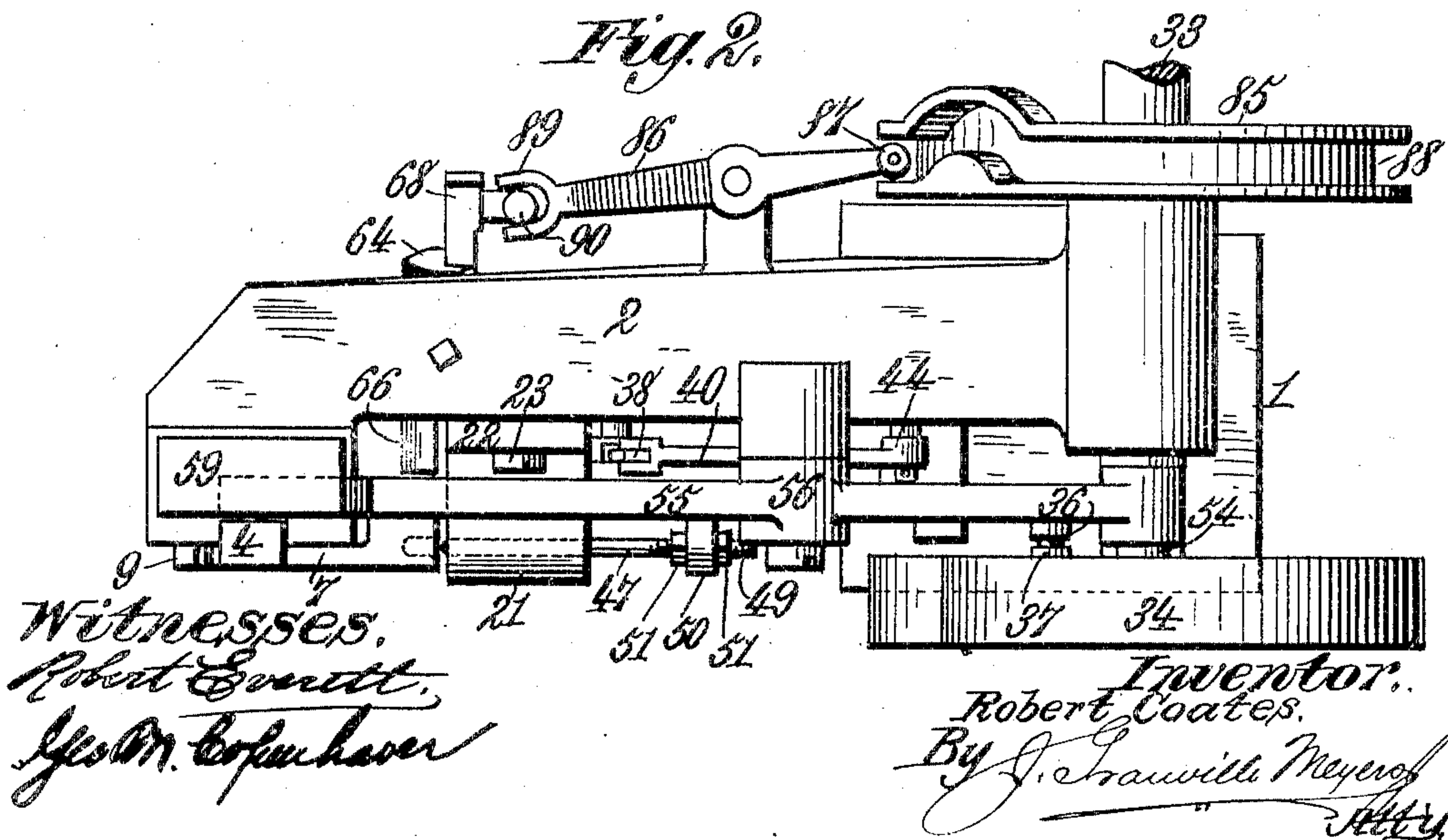
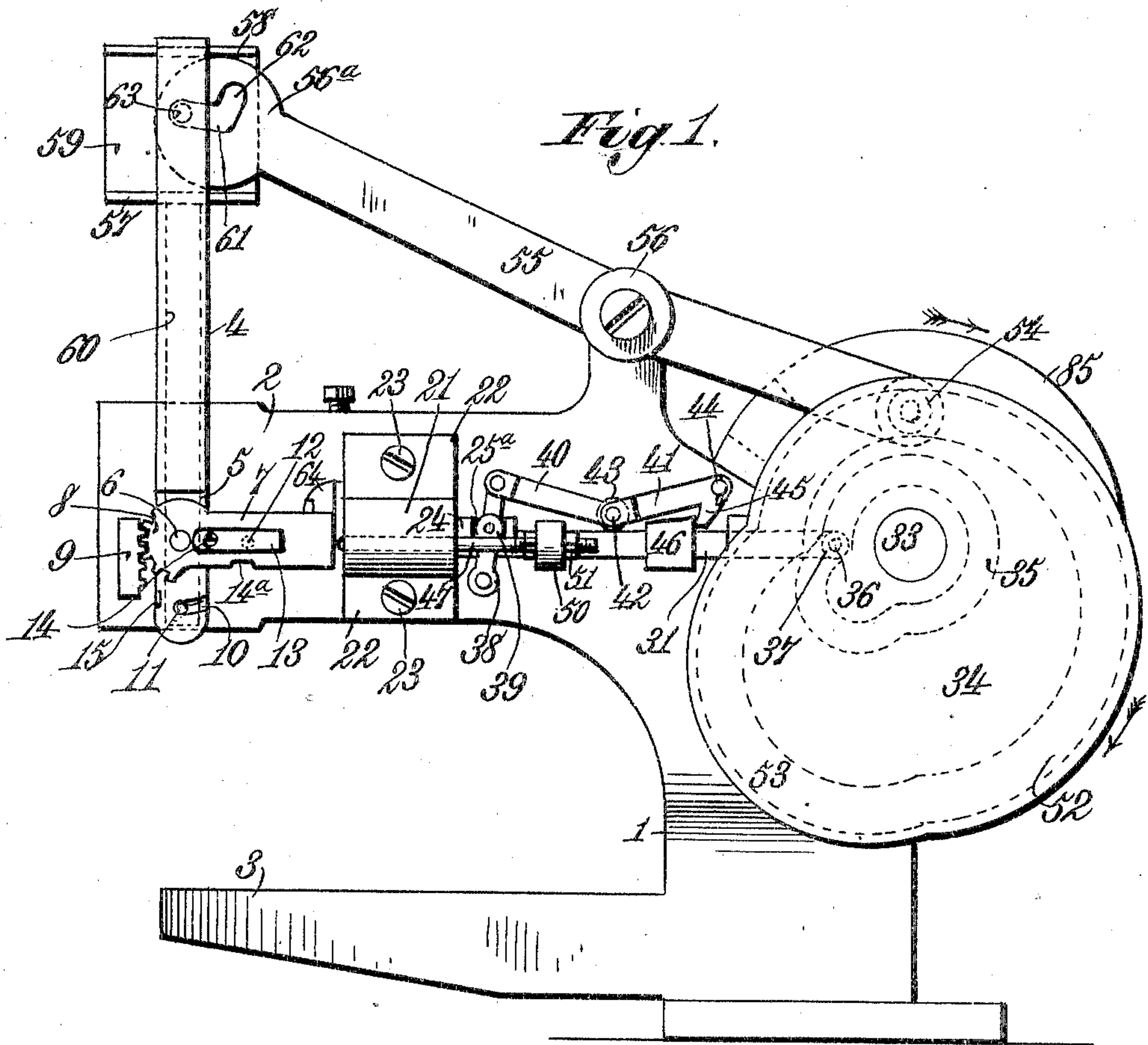


R. COATES.
MACHINE FOR SHAPING AND APPLYING RIVETS.

APPLICATION FILED FEB. 3, 1903.

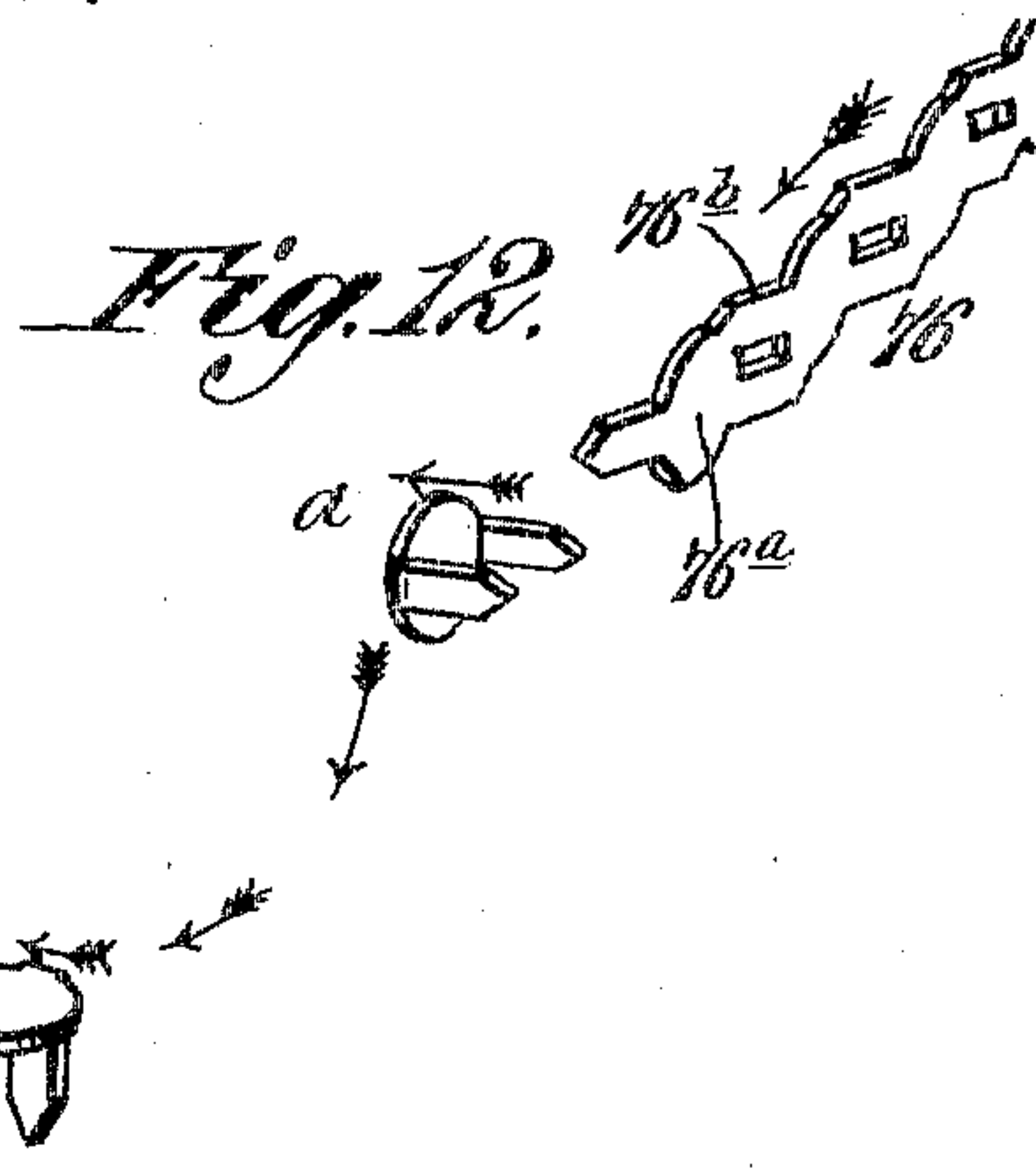
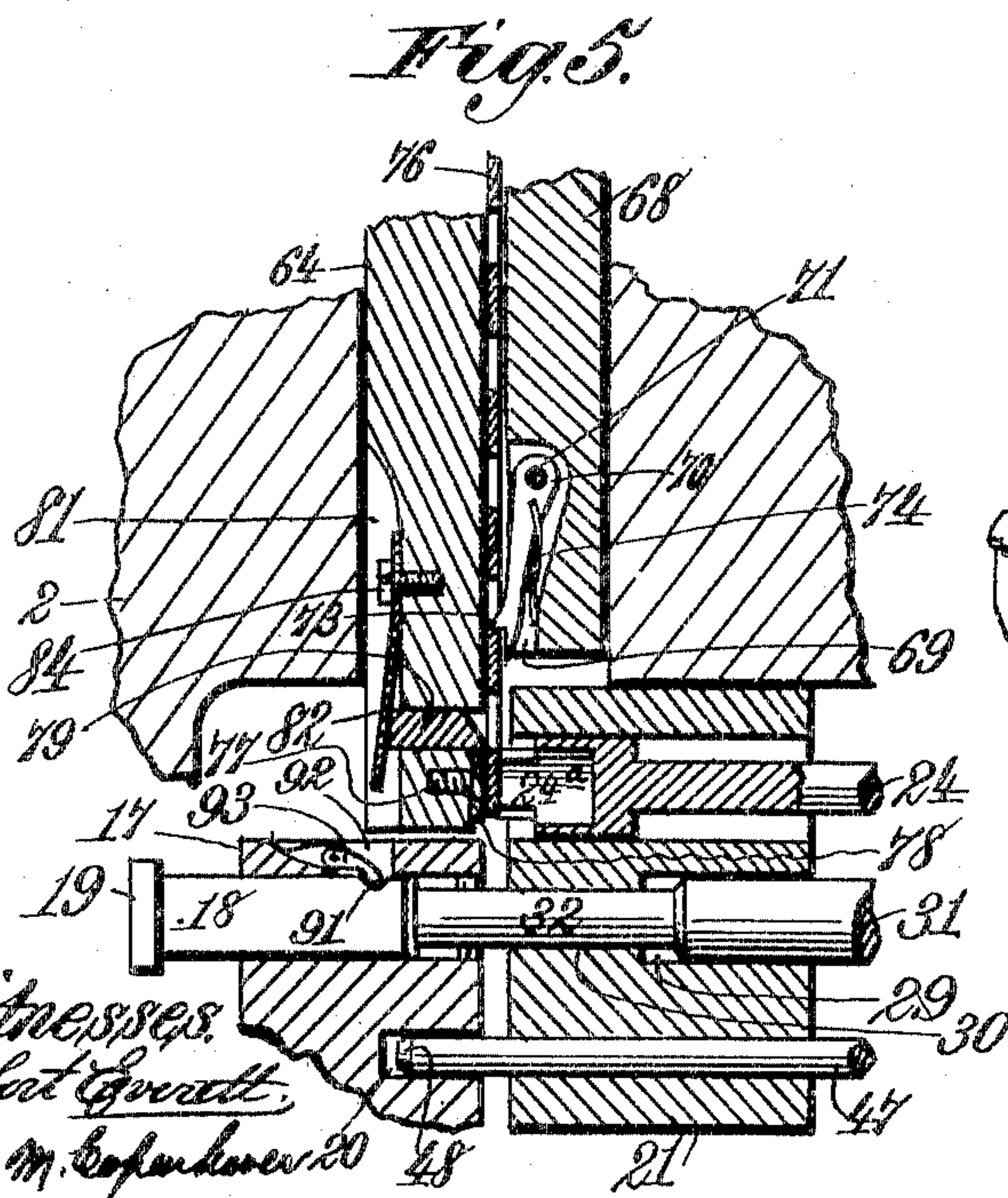
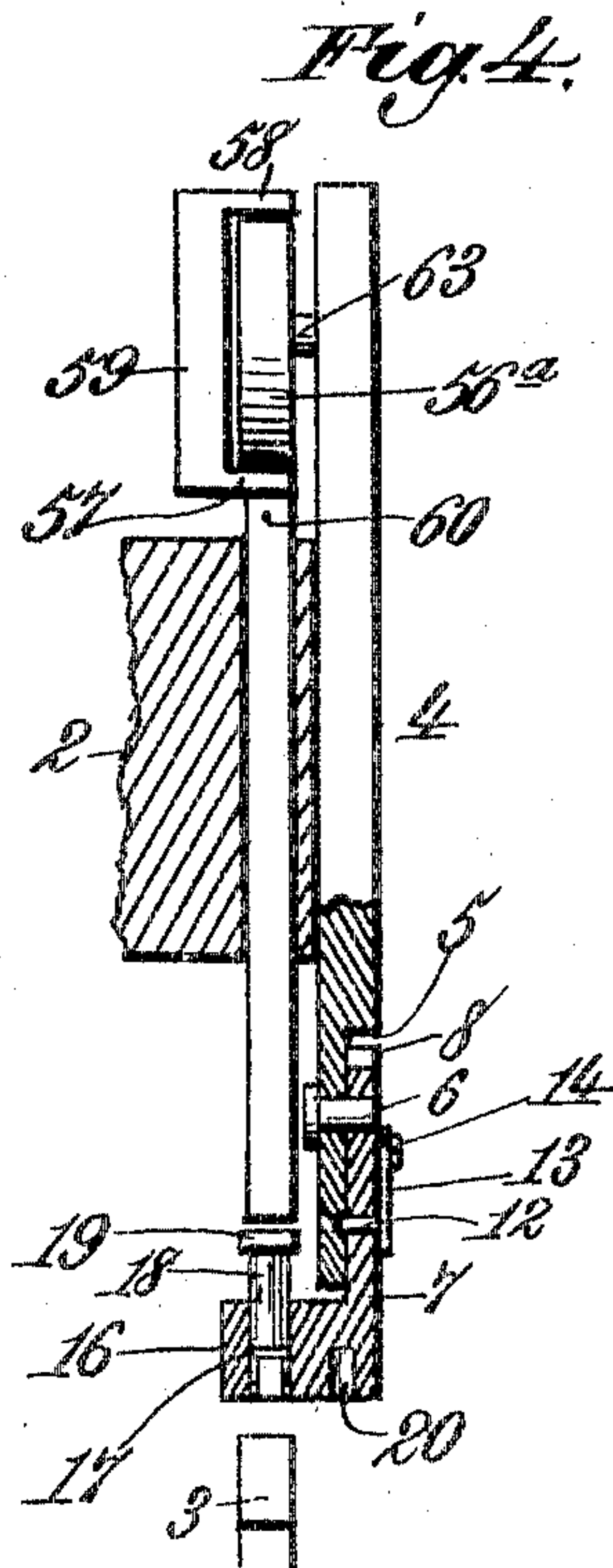
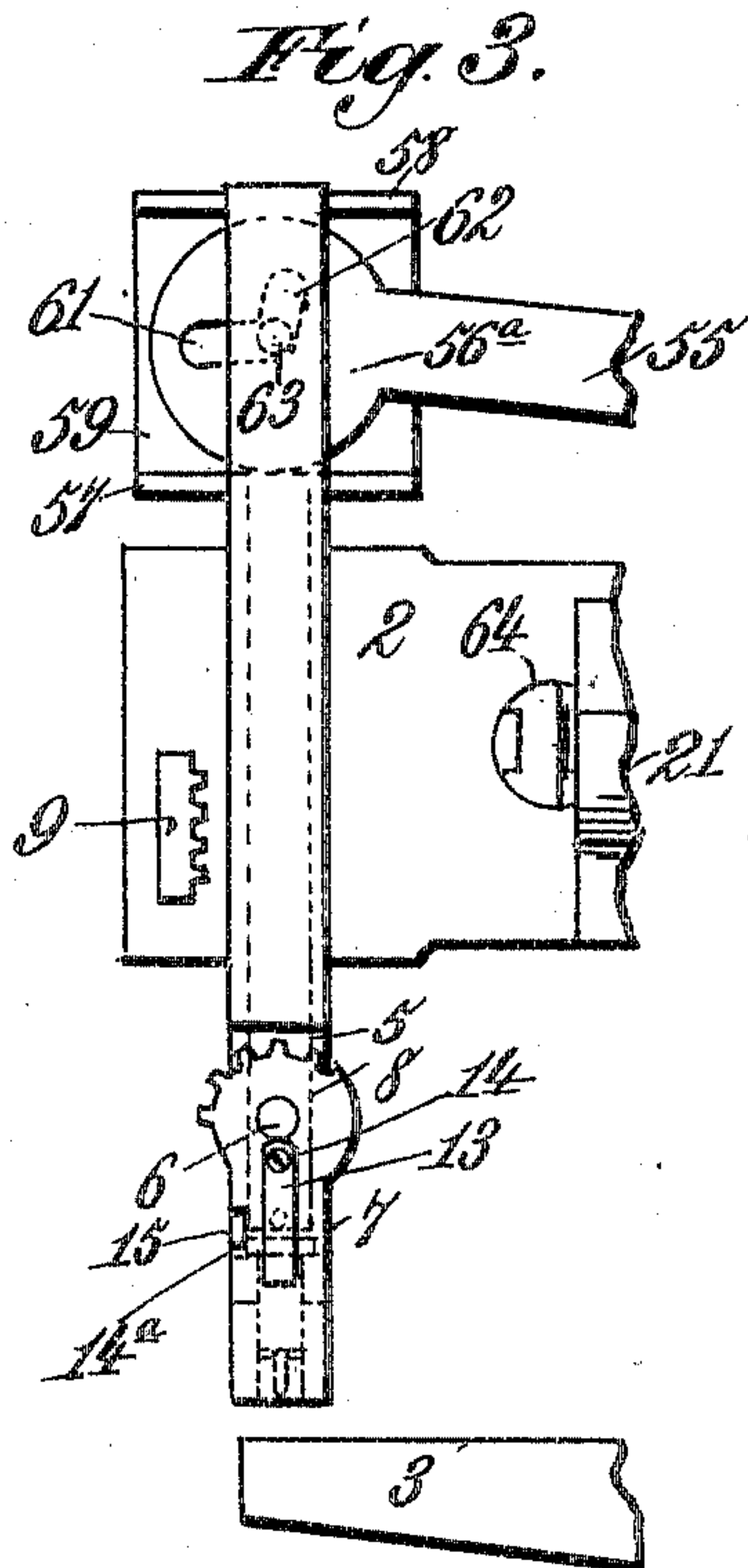
3 SHEETS—SHEET 1.



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3 SHEETS—SHEET 2.



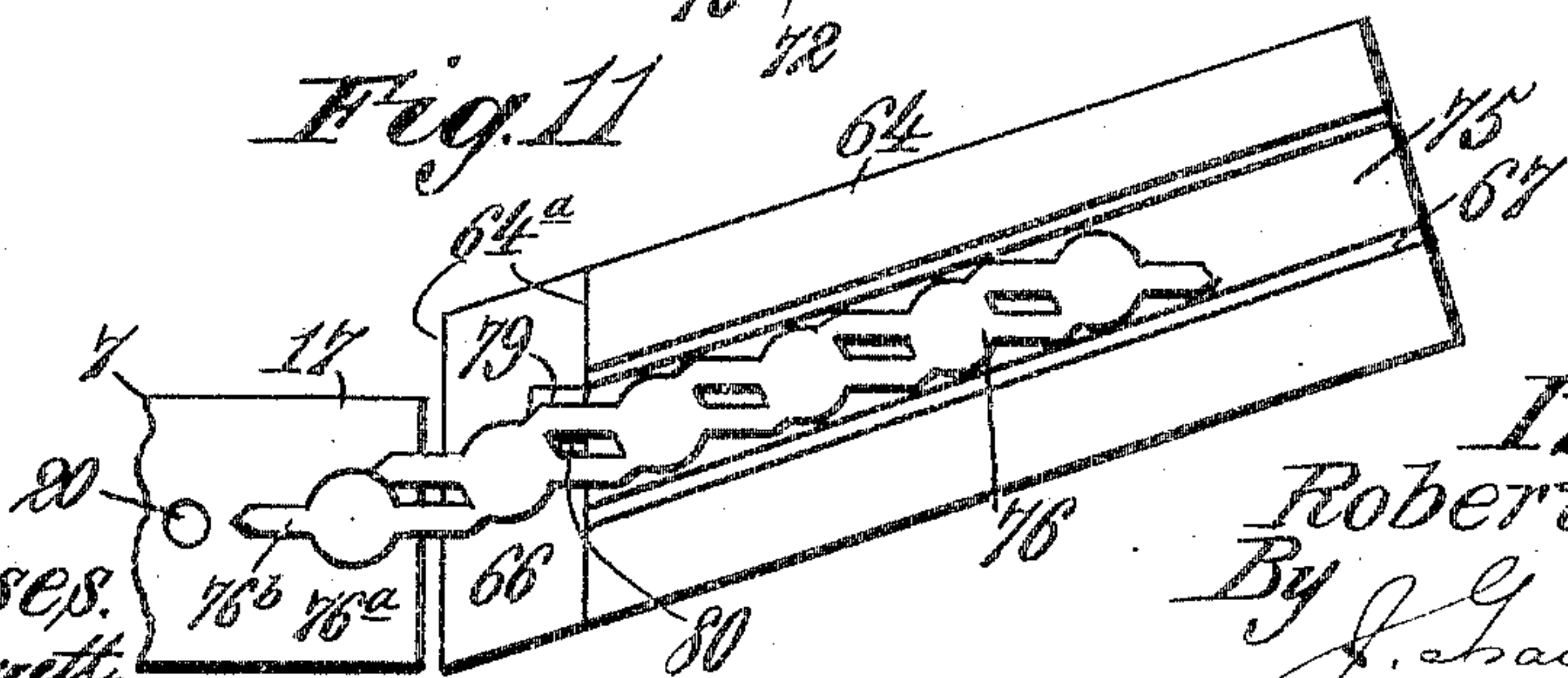
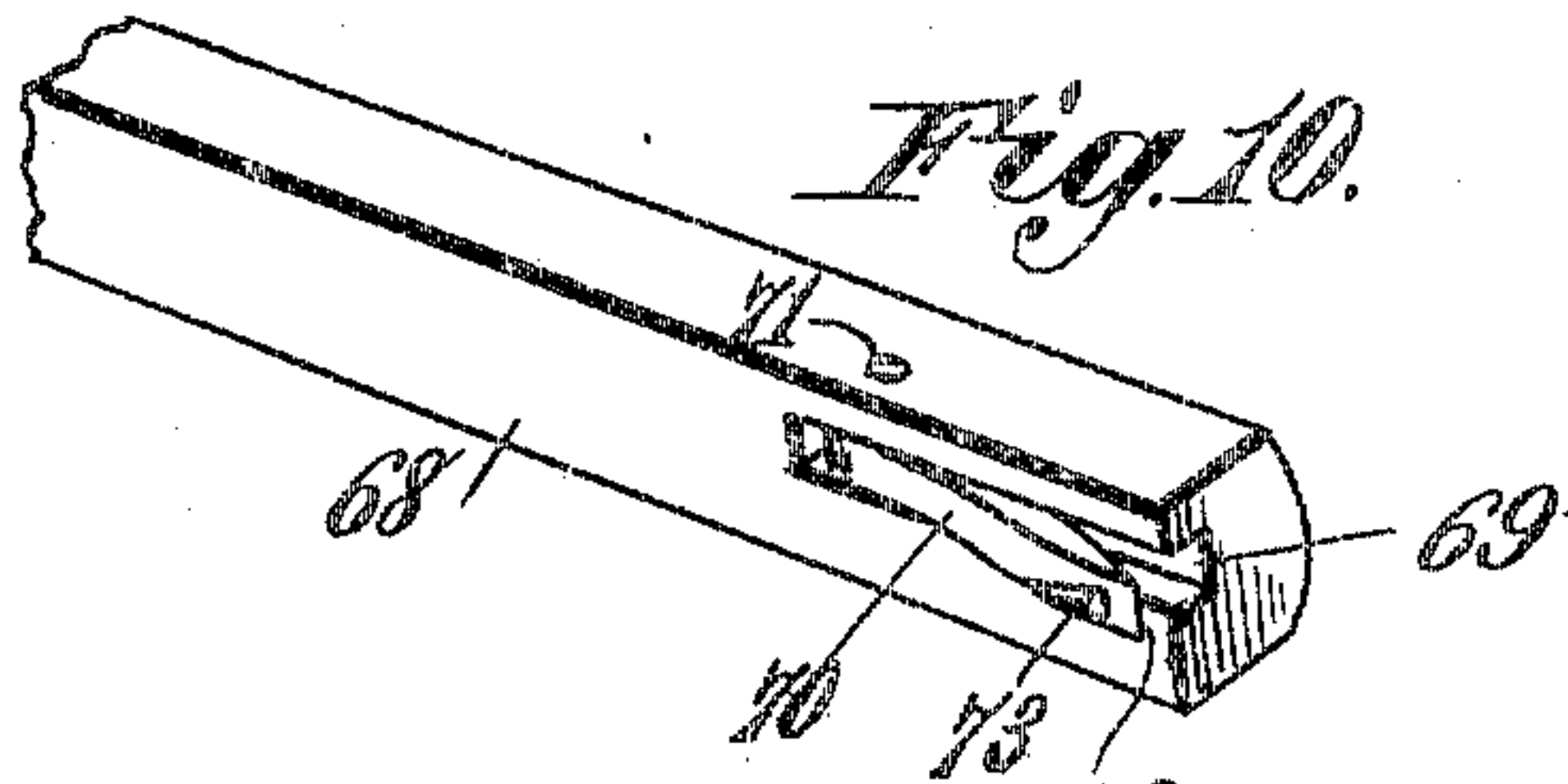
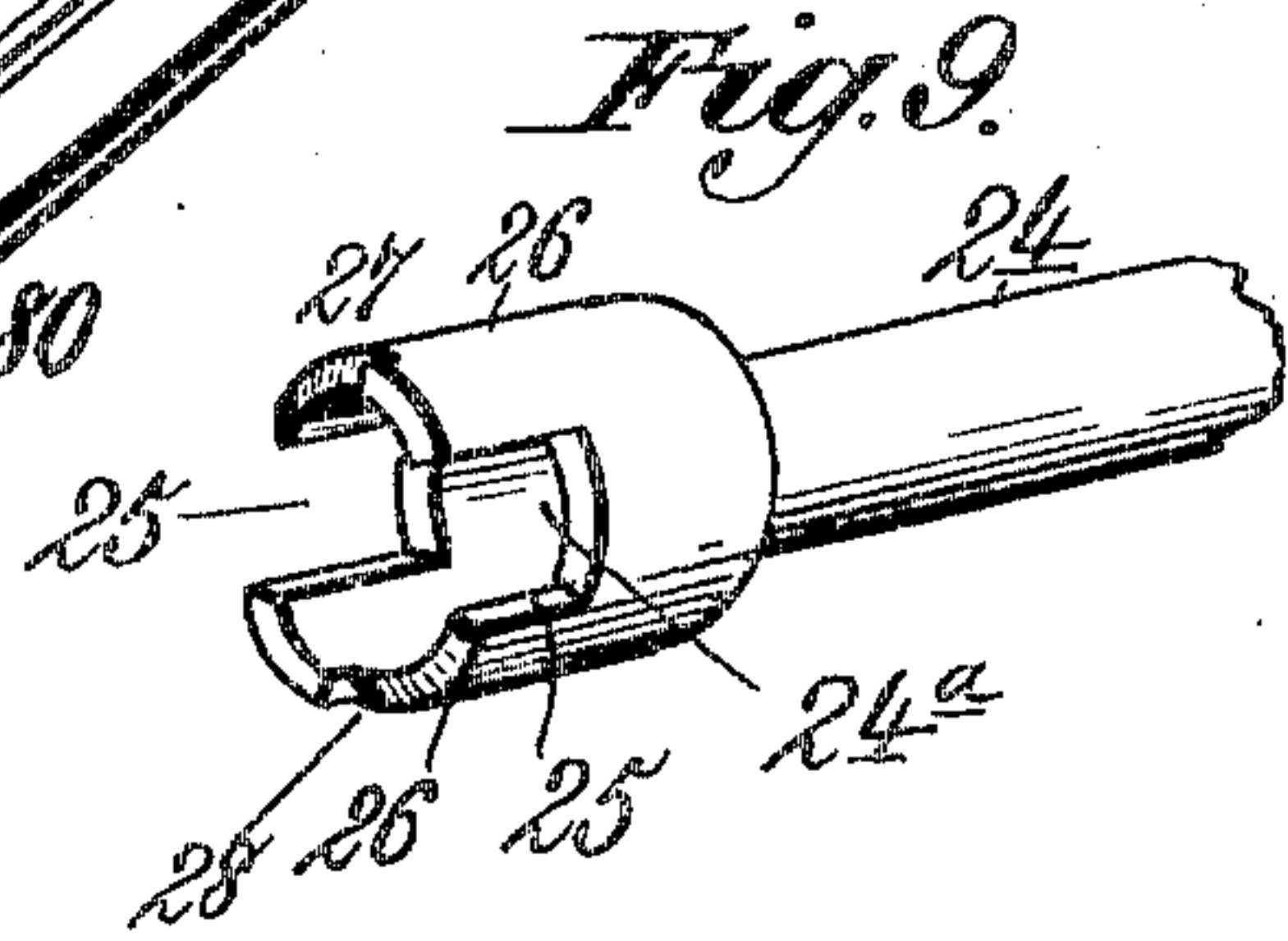
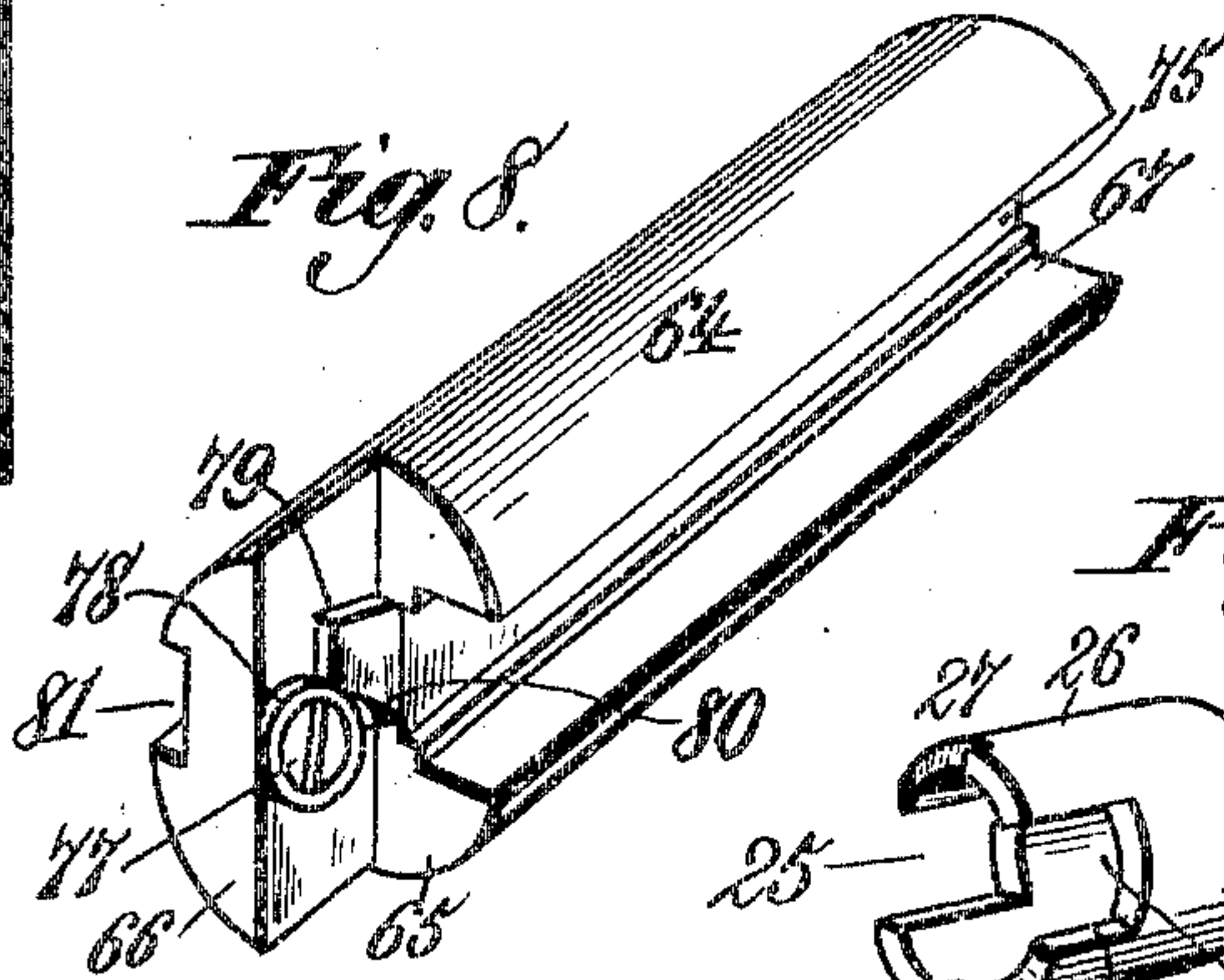
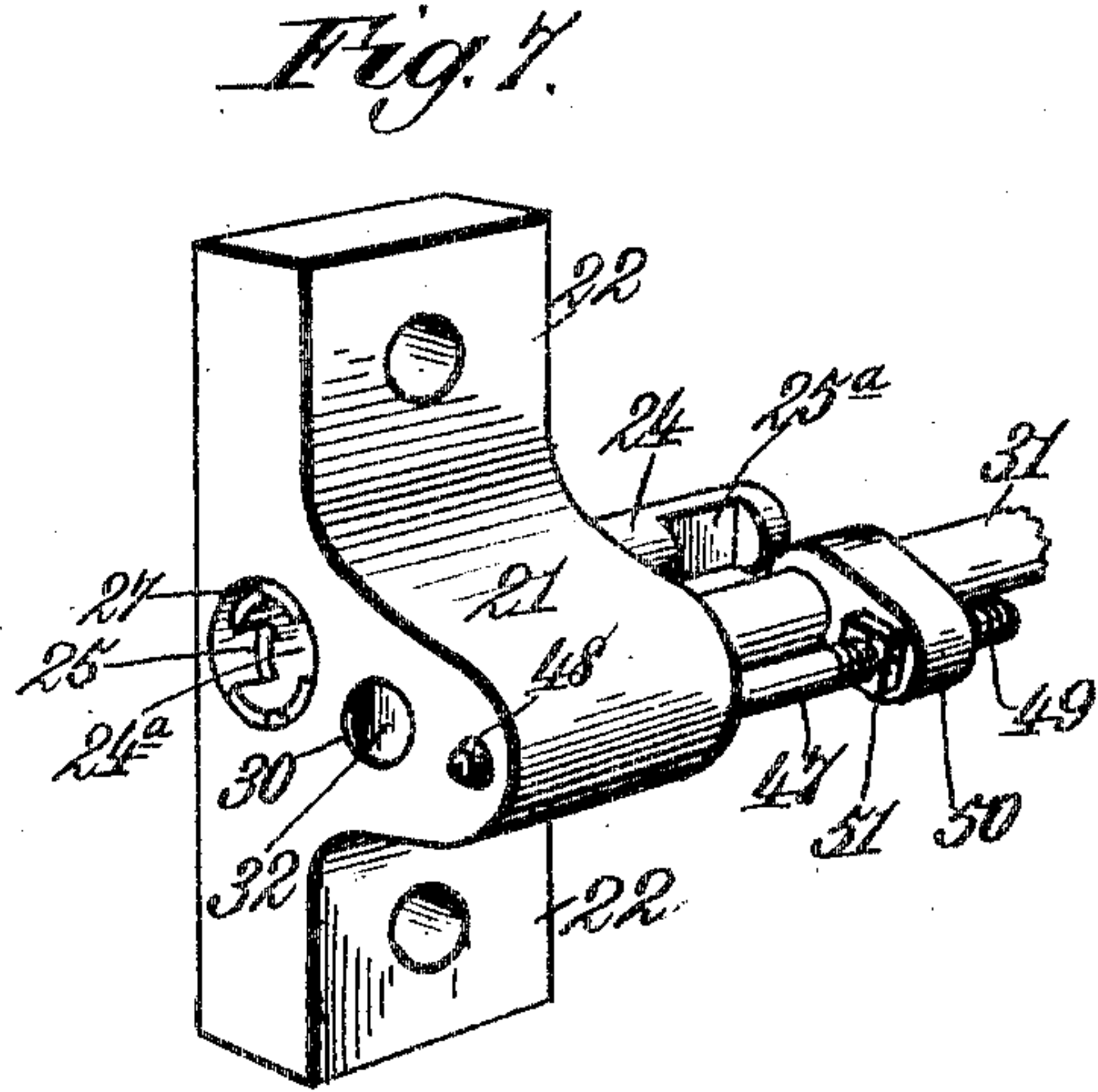
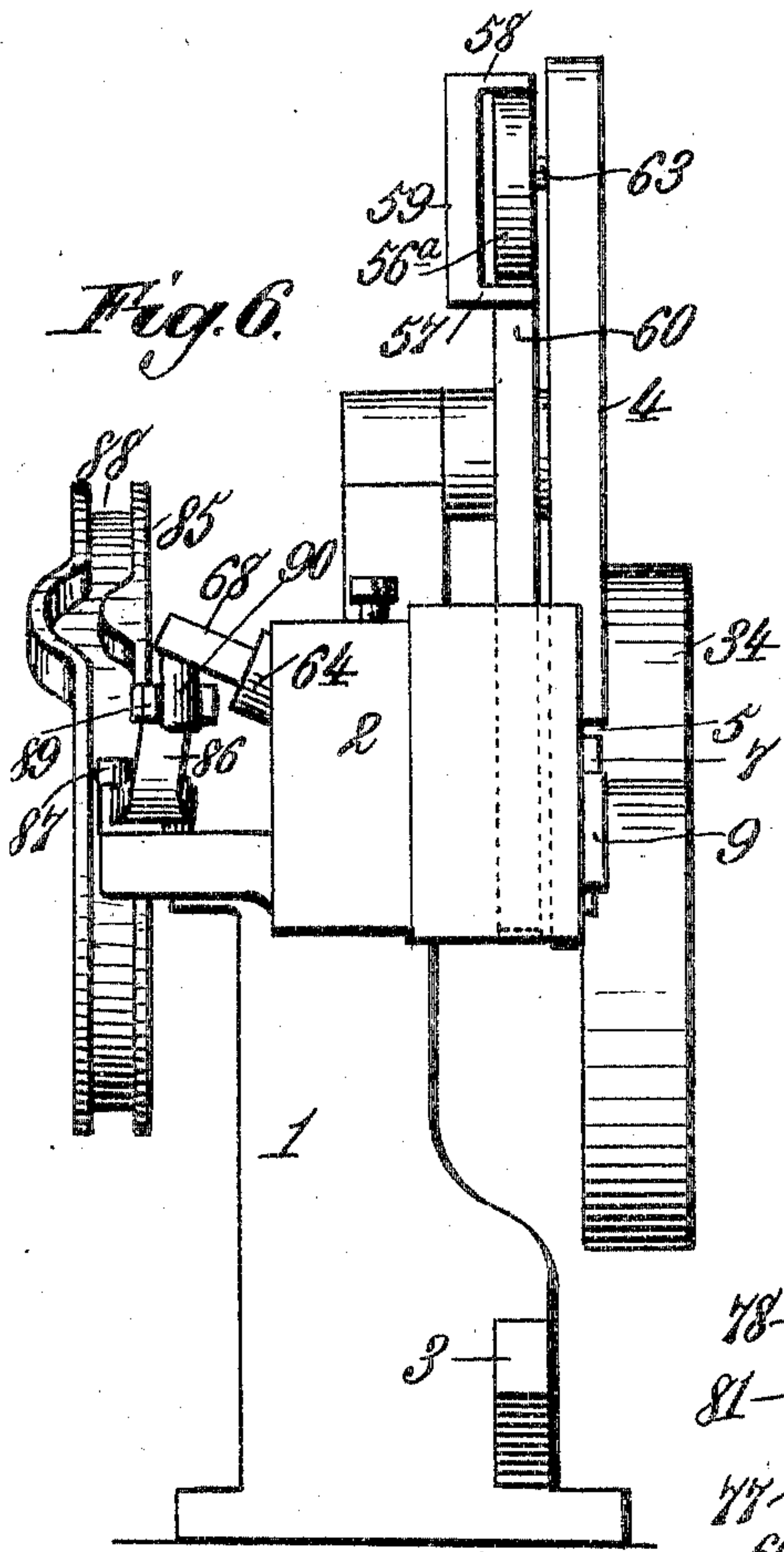
Witnesses:
Robert Coates,
Geo. M. Copeland

Inventor,
Robert Coates.
By J. Granville Meyers
Att'y.

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MACHINE FOR SHAPING AND APPLYING RIVETS.

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3 SHEETS—SHEET 3.



Witnesses:
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Inventor:
Robert Coates,
By J. Lawrence Meyer,
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UNITED STATES PATENT OFFICE.

ROBERT COATES, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO
JOHN STOGDELL STOKES, OF MOORESTOWN, NEW JERSEY, AND
CHARLES F. DA COSTA, OF VILLANOVA, PENNSYLVANIA.

MACHINE FOR SHAPING AND APPLYING RIVETS.

SPECIFICATION forming part of Letters Patent No. 789,356, dated May 9, 1905.

Application filed February 3, 1903. Serial No. 141,651.

To all whom it may concern:

Be it known that I, ROBERT COATES, a subject of the King of Great Britain, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented new and useful Improvements in Machines for Shaping and Applying Rivets, of which the following is a specification.

This invention relates to machines for shaping and applying rivets or fasteners to paper-board and other boxes and like articles, and is particularly designed for shaping and inserting the rivets shown and described in Letters Patent granted to J.S. Stokes, No. 712,422, on the 28th day of October, 1902, though it will be perfectly obvious to those skilled in the art that it is well adapted for shaping and inserting various other rivets or metallic fastenings. In the patent referred to a plurality of rivets are formed in a continuous strip of indefinite length, each strip comprising a number of completely-formed connected rivets, each rivet consisting of a head and two prongs projecting from opposite sides of the head, the prongs of one rivet being joined at their points to the heads of adjacent rivets and said prongs being disposed at an angle to a line projected longitudinally and centrally of the strip. In practice the strip is fed into the machine and the rivets are successively severed, the prongs bent at right angles to the head and then driven into the box to be stayed or fastened and the points clenched, the said operations being carried out successively in the machine in the order stated. These operations are performed through the instrumentality of a novel feed mechanism constructed to feed the rivet-strip first to the cutting-dies which operate to sever the rivet about to be shaped and partially sever the next succeeding rivet from the strip, a stamp and die for shaping the severed rivet, and an ejector or plunger for inserting the shaped rivet in the box and coöperating with an anvil or work-holder for clenched the ends of the prongs of the rivet. In the present machine the female die for shaping the rivets and the plunger for ejecting and inserting them are

carried by a rocking or swinging head which is pivotally connected to a reciprocating bar, mechanism being provided for alternately swinging said head to a horizontal position for receiving and shaping the rivet and to a vertical position for ejecting and inserting the rivet.

I will now proceed to describe in detail the preferred means for effecting the several results above described, reference being had to the accompanying drawings, forming a part of this specification, wherein—

Figure 1 is a view in side elevation of my improved machine. Fig. 2 is a top plan view thereof. Fig. 3 is a view similar to Fig. 1 of a portion of the machine, showing the head in its raised or horizontal position. Fig. 4 is a vertical sectional view of the parts shown in Fig. 3. Fig. 5 is a detail sectional view illustrating the rivet-strip feed mechanism, the cutting-dies, the shaping-dies and plunger, and the means for holding the head accurately in place during the operation of severing and shaping the rivets. Fig. 6 is an end view of the machine. Fig. 7 is a detail perspective view of the bracket for supporting the cutting-die, the male shaping-die, and the centering-bolt, said parts being shown in place in said bracket. Fig. 8 is a similar view of the rivet-strip feed-guide. Fig. 9 is a similar view of the cutting-die. Fig. 10 is a similar view of the rivet-strip feed-bar. Fig. 11 is a detail view illustrating the manner in which the rivet-strip is fed to the severing mechanism and the shaping-dies, and Fig. 12 is a diagrammatic view illustrating the different positions the rivets assume during the several operations hereinbefore referred to.

Referring to the accompanying drawings, the frame of the machine is shown as comprising a vertical standard 1, provided with a laterally-projecting arm 2, the standard being provided with a horizontal work support or anvil 3, that is disposed beneath and in the same vertical plane with the arm 2, but relatively distant therefrom. Arranged to move vertically in suitable guideways on the end of the arm 2 is a reciprocatory bar 4, the lower

end of which is cut away or removed on one side, as at 5, and on said cut-away side is pivoted, by means of a pivot-pin 6, one end of a head 7. The said pivoted end of the head 5 has formed integrally therewith a toothed sector 8, which engages a fixed rack 9 on the arm 2, whereby as the bar 4 is raised and lowered the head 7 will be swung about its pivot in an arc of ninety degrees, the arrangement being such that when the bar 4 is in its highest position the head will be horizontal, and when said bar is in its lowest position the head will be vertical. On the side of the lower end of the bar 4 to which the head is pivoted is formed a segmental groove 10, (see Fig. 1,) which terminates at its inner end in a circular depression or socket 11. Loosely passing through a suitable transverse perforation in the head 7 is an endwise-movable bolt 12, (see Fig. 4,) one end of which is adapted to travel in the groove 10 and seat in the socket 11, and against the other end bears the free end of a leaf-spring 13, which is fastened at its other end to the head by a screw 14. As the head is swung down to a vertical position the end of the bolt rides over the bottom of the groove 10 and when the head reaches a perfectly vertical position is forced into the socket 11 by the spring 13, thus holding the head in its vertical position. When the head is swung upward in the reverse position, the movement of the head causes the end of the bolt to ride out of the socket and groove. Means are also provided for locking the head in its horizontal position, as will hereinafter be described. The head is also provided on its outer or lower edge with a mortise 14^a, which is adapted to be engaged by a lug 15 and assist in holding the head in its vertical position.

The head 7 is provided at its free end with a laterally-projecting foot or flange 16, in which is formed a transverse perforation 17, constituting the female portion of the die for shaping the previously-severed rivet, and also forming a seat or socket for the plunger or ejector, which consists of a rod 18, which is endwise movable in the perforation 17 and is provided at its outer or upper end with a circular head 19. In the lower or outer end of the foot or flange 16 is formed a socket 20 for the reception of the centering and locking bolt, presently to be described.

On the arm 2 is fastened a bracket comprising an enlarged central portion 21, provided with flanges 22, by means of which and screws 23 the bracket is secured to the side of the arm 2. In the bracket is formed a horizontal perforation in which is fitted a longitudinally-movable rod 24, one end of which is enlarged and hollowed out, as at 24^a, and said hollowed-out portion is longitudinally slotted on diametrically opposite sides, as at 25, (see Fig. 9,) forming two segmental dies or blades 26, each of which at one end is provided with

segmental extensions 27 and 28, constituting cutters. The cutters 27 and 28 are formed on opposite or alternate ends of the blades 26 in the manner most clearly shown in Fig. 9 and for the purpose hereinafter described. In the opposite end of the rod 24 is formed a slot 25^a. Formed in the rear side of the bracket 21 is a horizontal bore or socket 26, which terminates in a reduced or smaller bore or socket 30, which extends through the front side of the bracket. Fitted and longitudinally movable in the larger bore 27 is a rod 31, which terminates in a rod 32 of less diameter and is longitudinally movable in the smaller bore 30 and is also adapted to be projected at its end beyond the outer side of the bracket and into the female die 17, the rod 32 constituting a stamp or male portion of the die.

Journaled transversely in the upper end of the standard 1 is a driving-shaft 33, on which is fixed a cam-wheel 34, having formed in one of its faces an endless cam-groove, one portion 35 of which is concentric with the shaft 33 and the remaining portion 36 is offset or projects laterally from the concentric portion 35 and is eccentric to said shaft. On the rear end of the rod 31 is a laterally-projecting stud 36^a, on which is rotatably mounted an antifriction-roller 37, that is arranged to travel in said cam-groove. It will be obvious that as long as the antifriction-roller is resting in the concentric portion 35 of the groove no movement will be communicated to the rod 31, and the latter will remain stationary; but when said roller is engaged by the offset and eccentric portion 36 of the cam-groove the rod 31 will first be thrust forward and then retracted, thus first projecting and then retracting the stamp or male die 32. To the arm 2 is pivoted one end of a lever 38, which is provided intermediate its ends on one side with an antifriction-roller 39, which loosely rests in the slot 25^a, formed in the rear end of the rod 24. The other end of the lever 38 is pivotally connected to the end of one member, 40, of a toggle-lever 40 41, the adjacent ends of the two members of the toggle-lever being pivotally connected by a pivot-pin 42, on which is rotatably mounted an antifriction-roller 43, that normally rests on the rod 31. The rear end of the member 41 of the toggle-lever is pivoted to the arm 2, as at 44, and is provided with a downwardly-hook-shaped tappet 45, which is rigid with the member 41. On the rod 31 is fixed a projection, which may conveniently consist of a sleeve or collar 46. As the rod 31 is thrust forward and backward in the manner before described the collar 46 will engage the roller 43, and thus raise the two members of the toggle-lever to a horizontal position or into alinement, thereby rocking the lever 38 on its pivot, thrusting forward the rod 24 and the female member 24^a of the cutting-die. On the return movement of the rod

31 the collar 46 will engage the front edge of the tappet 45 and will flex the toggle-lever, thus rocking the lever 38 in a direction to retract the rod 24 and the female cutting-die.

5 In the bracket 21 is formed a horizontal perforation in which is fitted a longitudinally-movable rod or bolt 47, the forward end of which is beveled or of the shape of a truncated cone, as at 48, and the rear end is threaded, as at 49. The threaded end of the bolt loosely passes through a lug 50, fixed on the rod 31, and is adjustably connected to said lug by nuts 51, which are screwed on the threaded end of the rod or bolt on opposite sides of the
10 lug. When the head 7 is raised to a horizontal position and the cutting-die and stamp or male member of the shaping-die fail to properly register with their corresponding members, hereinafter referred to, the beveled end
15 of the bolt 47 will engage the socket 20, formed in the end of the head, and guide said bolt therein, thus accurately centering the head and firmly locking it in place while the rivet is being severed and shaped. In practice the
20 lever 38 is so arranged relatively to the rod 24 or the collar 46 is fixed on the rod 31 at such point that the cutting-die will be moved forward slightly in advance of the stamp or male member of the shaping-die.

30 Formed in one face of the cam-wheel 34 is an endless groove 52, one portion 53 of which is offset or formed eccentrically to the center of the cam-wheel, and arranged to travel in said groove is an antifriction-roller 54, that is
35 journaled on one end of a rocking lever 55, which is pivoted intermediate its ends, as at 56, to the arm 2. On the other end of the lever 55 is formed or attached a disk 56^a, that is loosely seated between two parallel flanges
40 57 and 58, forming part of a cross-head 59, that is attached to the upper end of a vertically-reciprocating bar 60, arranged to reciprocate vertically through the arm 2 in parallelism with the bar 4. The disk 56 has formed
45 therein an approximately horizontal groove 61, which terminates at its inner end in a nearly-vertical groove 62, and the upper end of the reciprocating bar 4 is provided with a laterally-projecting stud or pin 63, that is arranged to travel in said L-shaped groove
50 61 62, the arrangement being such that as the cam-wheel rotates the rocker-arm 55 will be rocked or oscillated on its pivot 56 and will through the medium of the disk 56^a and pin
55 or stud 63 give to the reciprocating bar 4 at stated intervals an alternately downward and upward movement. The arrangement is such that as long as the pin 63 travels in the horizontal groove 61 the reciprocating bar 4 will
60 be raised or lowered; but when the rocker-arm has been sufficiently depressed to permit the pin to enter the nearly perpendicular slot or groove 62 it will communicate no further movement to said bar. As the rocker-arm is
65 oscillated the disk 56^a, engaging the flanges

57 and 58 of the cross-head 59, will raise and lower the bar 60. The lower end of the bar 60 is in the same vertical plane with the plunger 18 when the head 7 is in alinement with the bar 4, and hence when the bar 60 descends
70 it will engage the head 19 of the plunger and force the latter down to eject the rivet, as will more fully hereinafter appear.

Extending transversely through the end of the arm 2 in a downwardly-inclined direction
75 is a cylinder 64, (see Fig. 8,) that is cut away at its lower end, as at 65, to form a semicylindrical extension 66, the lower end of which and the cylinder 64 is beveled or formed at an angle to the longitudinal axis of the cylinder, as at 64^a, (see Fig. 11,) to cause it to coincide with the face of the foot 16 of the head
80 7 when the latter is swung up into the position shown in Fig. 1. The cylinder 64 is grooved longitudinally, as at 67, from end to
85 end, and arranged to move longitudinally therein is a feed-dog consisting of a bar 68, in the inner side of the lower end of which is formed a recess 69, (see Figs. 5 and 10,) and in said
90 recess is disposed a pawl 70. The upper end of the pawl is pivoted, as at 71, and the lower end is flattened to a knife-edge, as at 72, while just above the lower end thereof the pawl has formed on its inner side a shoulder 73. A
95 spring 74 is disposed behind the pawl and operates to project the end of the latter from out of the recess. Formed in the bottom of the groove 67 is a narrower and shallow groove
75 to receive the rivet-strip 76.

Fixed to the flat face of the extension 66
100 by means of a screw 77 or in any other suitable manner is a circular male die 78, and longitudinally movable in a suitable aperture formed transversely in said extension is a yielding block 79, provided on its operative
105 end with a small beveled detent-tooth 80. On the cylindrical side of the extension 66 is formed a groove 81, in which is disposed a flat spring 82, (see Fig. 5,) the upper end of said spring being fixed by a screw 84 and its
110 free end bearing against the end of the block 79 and normally holding its toothed end projected beyond the flat face of the extension, as shown most clearly in Fig. 8.

It will be noted that the yielding block 79,
115 which carries the tooth 80, is arranged adjacent to the male die 78 and has a flat upper face that lies on a level, or substantially so, with said die, thus forming a support or sort of anvil for one of the prongs of each rivet
120 during the feeding and cutting operation. This construction will obviate any tendency of the points of the prongs being bent downward so far during the cutting operation as to interfere with the feeding of the strip.
125 The yielding block acts to lift the points of the prongs after they have been severed, so as to raise them free of the edge of the male die 78. Hence the said points will not engage with the die during the forward feed of the
130

strip, which would likely be the case were it not for the action of the yielding block 79.

Fixed on the shaft 33 is a cam-wheel 85, and pivoted intermediate its ends to one side of the arm 2 is a rocker-arm 86, one end of which is provided with antifriction-roller 87, that travels in an eccentric cam-groove 88, formed in the periphery of the cam-wheel, and at its other end is provided with a yoke 89, in which loosely fits a headed pin 90, projecting laterally from the upper end of the feed-dog 68, the arrangement being such that as the rocker-arm is oscillated by the cam-wheel the feed-dog is reciprocated in the groove 67 in the cylinder.

Referring again to the plunger 18, said plunger is provided on one side with a notch 91, (see Fig. 5,) and formed in the end of the foot 16 is a recess 92, in which is disposed a pivoted spring-pawl 93, the free end of which is adapted to engage said notch and normally hold the plunger in the position shown in Fig. 5.

The operation of my improved machine is as follows: A metallic rivet-strip is first fed into the groove 75 of the cylinder, and the overlapping edges or corners of the box to be riveted are placed on the anvil 3. As the cam-wheel 34 rotates it first operates to oscillate the rocker-arm 55 and raise the reciprocating bars 4 and 60, and when the sector 8 of the head 7 comes in contact with the fixed rack-bar 9 the head will be rocked about its pivot 6 and swung up to a horizontal position, as shown in Fig. 1. When this has taken place, the cam-wheel 85 will rock the arm 86 and thrust downwardly the feed-dog 68. The shoulder 73 of the pawl 70 of the feed-dog engages one of the heads 76^a of one of the rivets composing the rivet-strip and feeds down said strip, moving the head 76^a of the lowermost rivet onto or in front of the male die 78, (see Fig. 5,) whereupon the tooth 80 of the detent 79 will be caused to enter the space between two of the prongs 76^b and engage the edge of the head 76^a, resting on the male die, thereby holding the rivet-strip against backward movement. The cam-wheel 34 then moves forward the rod 31, and with the latter the rod 24 and bolt 47, the latter being moved forward first and entering the socket 20 in the foot 16, thus centering the head accurately. As the rod 24 moves forward the female die 24^a the cutters 27 and 28 operate to sever two of the prongs 76^b from the head of the rivet, as shown by dotted lines in Fig. 11, leaving the lowermost rivet still attached to the rivet-strip by the upper prong, as shown. As the cam-wheel 34 continues to rotate the rod 31, bolt 47, and female die 24^a are retracted and the rods 4 and 60 are moved downward, thereby swinging the head downward into a vertical position in alinement with the bar 4.

The foregoing is descriptive of the operation of the machine when the rivet-strip is

first fed to the machine. On the next complete rotation of the shaft 33, however, and on each succeeding rotation thereof the same operation takes place and in addition thereto the following. It being remembered that the lowermost rivet is attached to the rivet-strip by a single prong 76^b only, when the feed-dog again moves forward to feed a rivet onto the male die 78 the lowermost rivet is moved over the female shaping-die 17 in the foot 16, and after the cutter 28 has completely severed the lowermost rivet from the strip the male shaping die or stamp 32 moves forward and forces the head of said lowermost rivet into the female die 17, drawing in with it the two prongs attached to the rivet-head and bending the latter at right angles to the head, as shown at *a* in Fig. 12, at the same time moving the plunger 18 into the position shown in Fig. 5. The cam-wheel 34 now operates to retract the bolt 47, stamp 32, and die 24^a, leaving the finished rivet in the female die 17 and also operates to move down the rods 4 and 60 in the manner before described. While this is taking place the feed-dog 68 is retracted, the end of the pawl 70 slipping idly over the rivet-strip and the latter being prevented from moving backward by means of the tooth 80 of the detent. As the disk 56^a is first moved downward by the rocker-arm 55 the pin 63 is in the member 61 of the L-shaped slot, and hence the bar 4 is also caused to move downward, thereby swinging the head 7 into alinement with the bar 4 and directly over the anvil, and when this has been accomplished the pin 63 will be in the position shown in Fig. 3, and upon the continued descent of the disk 56^a the pin 63 will enter the vertical member 62 of said slot and the bar 4 will then remain stationary. During this operation the disk 56^a has been moving down the bar 60, and when the bar 4 comes to a state of rest the bar 60 continues to descend and strikes the head of the plunger 18, thereby ejecting the rivet from the female die 17 and forcing the prongs through the edges of the box and against the anvil 3, whereby the ends of the prongs are clenched down.

In order to distinguish the reciprocating bar 60 from the reciprocating bar 4, I shall in the claims appended hereto refer to the former as a "reciprocating push-bar."

Having described my invention, what I claim is—

1. In a machine of the class described, the combination with a reciprocating bar, of a head pivotally connected to said bar and provided with a perforation forming a female die for receiving and shaping a rivet, means constructed to swing said head out of alinement with the bar in position to receive a rivet in said perforation, when the bar is moved in one direction, and to move the head into alinement with the bar in position to eject

and set the rivet when the bar is moved in the opposite direction.

2. In a machine of the class described, the combination with a reciprocatory bar, of a head pivotally connected at one end to one end of the bar, means constructed to swing said head out of alinement with the bar to receive a rivet, when the bar is moved in one direction, and to move the head into alinement with the bar when the latter is moved in the opposite direction, means for inserting a rivet in the head, and means for ejecting and setting the rivet when the head is in alinement with the bar, substantially as described.

3. In a machine of the class described, the combination with a reciprocatory bar, of a head pivotally connected at one end to one end of the bar, means actuated by the movement of the bar for swinging the head into and out of alinement with the bar, means for inserting a rivet in the head while the latter is out of alinement with the bar, and means carried by said head for ejecting the rivet from the head and setting it in the work when the head is in alinement with the bar, substantially as described.

4. In a machine of the class described, the combination with a reciprocatory bar, of a head pivotally connected at one end to one end of the bar and provided with a female die for receiving and shaping a rivet, means actuated by the movement of the bar for swinging the head into and out of alinement with the bar, means for inserting a rivet in said female die while the latter is out of alinement with the bar, means for holding the head in a fixed position while the rivet is being fed thereto, and means for ejecting and setting the rivet, substantially as described.

5. In a machine of the class described, the combination with a reciprocatory bar, of a head pivotally connected at one end to one end of the bar, and provided with a female die for receiving and shaping a rivet, means actuated by the movement of the bar for swinging the head into and out of alinement with the bar, means for inserting a rivet in said female die while the latter is out of alinement with the bar, means for normally locking the head in alinement with the bar, and means for ejecting and setting the rivet, substantially as described.

6. In a machine of the class described, the combination with a reciprocatory bar, of a head pivotally connected at one end to one end of the bar and provided with a female die for receiving and shaping a rivet, means actuated by the movement of the bar for swinging the head into and out of alinement with the bar, means for locking the head in both of said positions, and means for ejecting and setting the rivet, substantially as described.

7. In a machine of the class described, the combination with an anvil, of a reciprocatory

bar movable toward and from the anvil, a head pivotally connected at one end to the end of the bar and provided with a female die for receiving and shaping a rivet, means actuated by the movement of the bar for swinging the head out of alinement with the bar and away from the anvil in position to receive a rivet in said female die, and for swinging the head into alinement with the bar and into proximity with the anvil, and means for ejecting and setting the rivet, substantially as described.

8. In a machine of the class described, the combination with a vertically-reciprocatory bar, of a head pivotally connected at one end to the end of the bar and provided with a female die for receiving and shaping a rivet, a toothed sector on the pivoted end of said head, a fixed rack arranged to be engaged by the toothed sector during its reciprocatory movements whereby as the bar is reciprocated the head will be swung about its pivot into and out of alinement with the bar, means for inserting a rivet in the said female die when the head is out of alinement with the bar, and means for ejecting and setting the rivet when the head is in alinement with the bar.

9. In a machine of the class described, the combination with a reciprocatory bar, of a head pivotally connected at one end to the end of the bar and provided with a perforation forming a female die to receive a rivet and with a socket, means actuated by the movement of the bar for swinging the head into and out of alinement with the bar, means for inserting a rivet in said female die and an endwise-movable bolt passing transversely through the head and arranged at one end to engage the socket formed in the bar to hold the head in alinement with the bar, substantially as described.

10. In a machine of the class described the combination with a reciprocatory bar provided near one end with a segmental groove and a socket, of a head pivotally connected at one end to the end of the bar, means actuated by the movement of the bar for swinging the head into and out of alinement with said bar, an endwise-movable bolt passing transversely through the head and arranged at one end to travel in said segmental groove formed in the bar and to be seated in said socket, and a blade-spring arranged to thrust the bolt into said socket to yieldingly hold the head in alinement with the bar, substantially as described.

11. In a machine of the class described, the combination with a reciprocatory bar provided near one end with a socket, of a head pivotally connected at one end to one end of the bar and provided with a mortise in one edge, means actuated by the movement of the bar for swinging the head into and out of alinement with said bar, an endwise-movable bolt passing transversely through the head and ar-

ranged at one end to engage said socket formed in the bar to yieldingly hold the head in alignment with the bar, and a lug on the bar arranged to engage said mortise formed in the edge of the head when the latter and the bar are in alinement, substantially as described.

12. In a machine of the class described, the combination with a reciprocatory bar, of a head carried by the bar and provided at its free end with a laterally-projecting foot having formed therein a transverse perforation forming a female die for receiving and shaping the rivet, and a plunger movable endwise in said die for ejecting the rivet and forcing it into the work, substantially as described.

13. In a machine of the class described, the combination with a reciprocatory bar, of a head carried by the bar and provided at its free end with a laterally-projecting foot having formed therein a transverse perforation constituting a female die for receiving and shaping the rivet, a plunger movable endwise in said die for ejecting the rivet and forcing it into the work, and means for yieldingly holding the plunger against movement in the die, substantially as described.

14. In a machine of the class described, the combination with a reciprocatory bar, of a head carried by the bar and provided at its free end with a laterally-projecting foot having formed therein a recess and a transverse perforation, the latter constituting a female die for receiving and shaping the rivet, a plunger movable in said die for ejecting the rivet and forcing it into the work, and a pivoted spring-pawl disposed in a recess in the foot and arranged at its free end to engage a notch formed in the side of the plunger and yieldingly hold the latter against movement in the die, substantially as described.

15. In a machine of the class described, the combination with a reciprocatory bar, of a head carried by the bar and provided at its free end with a laterally-projecting foot having formed therein a transverse perforation forming a female die for receiving and shaping the rivet, a male die for inserting the rivet in the female die, and a plunger movable endwise in the female die for ejecting the rivet and forcing it into the work, substantially as described.

16. In a machine of the class described, the combination with a reciprocatory bar, of a head pivotally connected at one end to one end of the bar and provided at its free end with a laterally-projecting foot having formed therein a female die for receiving and shaping the rivet, a male die arranged out of the path of the bar, for inserting the rivet in the female die, a plunger arranged in the female die for ejecting the rivet and forcing it into the work, and means actuated by the movement of the bar for swinging the head to one side to receive the rivet and into alinement with the

bar for inserting the rivet in the work, substantially as described.

17. In a machine of the class described, the combination with a reciprocatory bar, of a head pivotally connected at one end to one end of the bar and provided at its free end with a laterally-projecting foot having formed therein a female die for receiving and shaping the rivet, a male die arranged out of the path of the bar for inserting the rivet in the female die, a plunger arranged in the female die, means for swinging the head to one side in position to receive the rivet and into alinement with the bar in position to eject it, and a reciprocatory push-bar arranged to engage the plunger when the head is in alinement with the bar to insert the rivet in the work, substantially as described.

18. In a machine of the class described, the combination with a reciprocatory bar, of a head pivotally connected at one end to one end of the bar and provided at its free end with a laterally-projecting foot having formed therein a female die for receiving and shaping the rivet, a male die arranged out of the path of the bar for inserting the rivet in the female die, a plunger arranged in the female die, means for swinging the head to one side in position to receive the rivet and into alinement with the reciprocatory bar in position to eject it, and a reciprocatory push-bar in parallelism with the first-named bar and arranged to register with the plunger when the head is moved into the last-named position to insert the rivet in the work, substantially as described.

19. In a machine of the class described, the combination with a reciprocatory bar, of a head pivotally connected at one end to one end of the bar and provided at its free end with a laterally-projecting foot having formed therein a female die for receiving and shaping the rivet, a male die arranged out of the path of the bar for inserting the rivet in the female die, a plunger arranged in the female die, means for swinging the head to one side in position to receive the rivet and into alinement with the bar in position to eject it, means for actuating the plunger, and a bolt movable with said male die and arranged to engage a socket in the foot to lock the latter in position during the insertion of the rivet, substantially as described.

20. In a machine of the class described, the combination with a reciprocatory bar, of a head pivotally connected at one end to one end of the bar and provided at its free end with a laterally-projecting foot having formed therein a female die for receiving and shaping the rivet, a male die arranged out of the path of the bar for inserting the rivet in the female die, a plunger arranged in the female die, means for swinging the head to one side in position to receive the rivet and into aline-

ment with the head in position to eject it, means for actuating the plunger, and a bolt movable with the male die and having a conical end arranged to engage a socket in the foot to cause the male and female dies to accurately register and lock the head during the insertion of the rivet in the female die, substantially as described.

21. In a machine of the class described, the combination with a reciprocatory bar, of an oscillatory head carried thereby and having formed therein a female die, a plunger in the die, means for swinging the head into and out of alinement with the bar, means arranged to feed a rivet-strip to the machine, means for severing the rivets, one at a time, from the strip, a male die arranged to insert the severed rivets in the female die when the head is out of alinement with the bar, and means for actuating the plunger to force the rivet out of the female die into the work when the head is in alinement with said bar, substantially as described.

22. In a machine of the class described, the combination with a reciprocatory bar, of an oscillatory head carried thereby and having formed therein a female die, a plunger in the die, means for swinging the head into and out of alinement with the bar, means arranged to feed a rivet-strip to the machine, a die for severing the rivets, one at a time, from the strip, means for inserting the severed rivets in the female die when the head is out of alinement with the bar, and a reciprocating push-bar for actuating the plunger to force the rivet out of the female die into the work when the head is in alinement with the bar to which it is attached, substantially as described.

23. In a machine of the class described, the combination with a reciprocatory bar, of an oscillatory head carried thereby and having formed therein a female die, means for swinging the head into and out of alinement with the bar, means arranged to feed a rivet-strip to the machine, a die constructed to completely sever the foremost rivet from the strip and partially sever the succeeding rivet, means for inserting the severed rivet in the female die when the head is out of alinement with the bar, and means for forcing the rivet out of said die and into the work when the head is in alinement with said bar, substantially as described.

24. In a machine of the class described, the combination with a combined reciprocatory and oscillatory head having formed therein a female die, of means for feeding a rivet-strip to the machine, a die constructed to completely sever the foremost rivet from the strip and partially sever the succeeding rivet, means for swinging the head into one position to receive the rivet and into another position for ejection and insertion in the work, means for inserting the rivet in the female die, and means

for forcing it therefrom into the work, substantially as described.

25. In a machine of the class described, the combination with a head having formed therein a female die for receiving and shaping a rivet, of means for feeding a rivet-strip with a step-by-step movement in such manner that the foremost rivet, while yet attached to the strip will rest in front of the female die, means operating to completely sever the foremost rivet and partially sever the succeeding rivet from the strip while in such position, means for inserting the severed rivet in the female die, means for moving the head to the work, and means for forcing the rivet out of the female die into the work, substantially as described.

26. In a machine of the class described, the combination with a male die of the shape of the head of the rivet to be inserted, of mechanism for successively feeding the heads of rivets composing a rivet-strip over said male die, a reciprocatory female die having cutters operating to simultaneously completely sever the foremost rivet and partially sever the succeeding rivet from the strip, a male and female die for shaping the rivet, and means for forcing the shaped rivet from the female die into the work, substantially as described.

27. In a machine of the class described, the combination with a guide for the reception of a rivet-strip, of a male die located at one end of said guide, means for feeding the rivet-strip along said guide and over the die, and a female die arranged to move over the male die and completely sever the foremost rivet and partially sever the succeeding rivet from the strip.

28. In a machine of the class described, the combination with a grooved guide for the reception of a rivet-strip, a male die disposed at the end of the guide opposite the said groove, of means for feeding the strip along said groove and over the said die, and a reciprocating female die arranged to move over said male die and completely sever the foremost rivet and partially sever the succeeding rivet from the strip.

29. In a machine of the class described, the combination with a male die of the shape of the head of the rivet to be inserted, of a yielding detent arranged adjacent to said die and adapted to enter openings in the rivet-strip for the purpose specified, means for feeding the heads of rivets comprising the strip over said male die, a female die having cutters operating to completely sever the foremost rivet and partially sever the succeeding rivet from the strip, a male and female die for shaping the rivet, and means for forcing the shaped rivet from the female die into the work.

30. In a machine of the class described, the combination with a male die of the shape of the head of the rivet to be inserted, of mech-

anism for feeding the heads of rivets composing a rivet-strip over said male die, a female die having cutters operating to completely sever the foremost rivet and partially sever the succeeding rivet from the strip, a male and female die for shaping the rivet, and means for forcing the shaped rivet from the female die into the work, substantially as described.

31. In a machine of the class described, the combination with a guide for the reception of a rivet-strip, of a male die located at one end of said guide, a yielding detent arranged adjacent to said die and adapted to enter openings in the rivet-strip for the purpose specified, means for feeding the rivet-strip along said guide over the said die, and cutters cooperating with the latter for completely severing the foremost rivet and partially severing the succeeding rivet from the strip.

32. In a machine of the character described, the combination with a reciprocary bar, of a head carried by the bar and having formed therein a perforation forming a female die for receiving the rivet, a plunger movable endwise in said die for ejecting the rivet and forcing it into the work, a reciprocary push-bar for actuating said plunger, means for reciprocating said bars, and means for permitting the first-named bar to remain stationary while the push-bar continues to move to actuate the plunger, substantially as described.

33. In a machine of the class described, the combination with the female die and means for feeding rivets thereto, of a reciprocary cutting-die for severing the rivets from a rivet-strip, a reciprocary male die for forcing the rivets into the female die, means for reciprocating the male die, a lever having a connection with the cutting-die, and means actuated by the movements of the male die for oscillating said lever to reciprocate the cutting-die.

34. In a machine of the class described, the combination with a reciprocary bar, of a head carried by the bar and provided at its free end with a laterally-projecting foot having formed therein a transverse perforation forming a female die for receiving the rivet, a plunger movable endwise in said die for ejecting the rivet and forcing it into the work, a reciprocating push-bar for actuating said plunger, means for reciprocating said bars, and means for permitting the first-named bar to remain stationary while the push-bar continues to move to actuate the plunger, substantially as described.

35. In a machine of the class described, the combination with a reciprocary bar, of a head carried by the bar and provided at its free end with a laterally-projecting foot having formed therein a transverse perforation forming a female die for receiving the rivet, a plunger movable endwise in said die for ejecting the rivet and forcing it into the work, a reciprocating push-bar for actuating said

plunger, a flanged cross-head fixed on one end of the push-bar, an oscillating lever provided at one end with a disk disposed between the flanges of the cross-head for reciprocating the push-bar, a loose connection between the disk and the reciprocating bar whereby the latter is alternately reciprocated and permitted to rest, and means for oscillating said lever, substantially as described.

36. In a machine of the class described, the combination with a reciprocating bar, of a head carried by the bar and provided at its free end with a laterally-projecting foot having formed therein a transverse perforation forming a female die for receiving the rivet, a plunger movable endwise in the die for forcing the rivet out of the die into the work, a reciprocating push-bar for actuating the plunger, a flanged cross-head fixed on the end of the push-bar, an oscillating lever provided at one end with a disk loosely disposed between the flanges of the cross-head for reciprocating the push-bar and provided with an L-shaped slot, and a pin on the reciprocary bar engaging said slot whereby said reciprocary bar is alternately reciprocated and permitted to rest, substantially as described.

37. In a machine of the class described, the combination with a female die and means for feeding rivets thereto, of a reciprocary cutting-die for severing the rivets from a rivet-strip, a reciprocary male die for forcing the rivets into the female die, means for reciprocating the male die, a lever fulcrumed at one end and loosely connected intermediate its ends to the cutting-die, and means actuated by the movements of the male die for oscillating said lever to reciprocate the cutting-die, substantially as described.

38. In a machine of the class described, the combination with a female die and means for feeding rivets thereto, of a reciprocary cutting-die for severing the rivets from a rivet-strip, a reciprocating male die for forcing the rivets into the female die, a lever fulcrumed at one end and loosely connected intermediate its end to the cutting-die, a toggle-lever connected at one end to the free end of said lever and pivoted at its other end to a fixed support, a tappet carried by one arm of the toggle-lever, and a projection on the male die arranged to engage said tappet and toggle-lever to alternately flex and straighten the latter and thereby oscillate the fulcrum-lever and reciprocate the cutting-die.

39. In a machine of the class described, the combination with a female die and means for feeding rivets thereto, of a reciprocary cutting-die for severing the rivets from a rivet-strip, a reciprocating male die for forcing the rivets into the female die, a lever fulcrumed at one end and loosely connected intermediate its ends to the cutting-die, a toggle-lever connected at one end to the free end of said lever and pivoted at its other end to a fixed support

and provided with a rigid hook-shaped tappet, and a projection adjustably fixed on the male die arranged to engage and flex said toggle-lever during its forward movement and engage said tappet on the return movement of the male die to straighten said toggle-lever and thereby oscillate the lever and reciprocate the cutting-die, substantially as described.

40. In a machine of the class described, the combination with a female die and means for feeding rivets thereto, of a reciprocatory cutting-die for severing the rivets from a rivet-strip, a reciprocatory male die for forcing the rivets into the female die, a lever fulcrumed at one end and loosely connected intermediate its ends to the cutting-die, a toggle-lever connected at one end to the free end of said lever and pivoted at its other end to a fixed support and provided with a rigid hook-shaped tappet, a projection on the male die arranged to engage said toggle-lever during its forward movement and engage said tappet on the return movement of the male die to straighten said toggle-lever and thereby oscillate the lever and reciprocate the cutting-die, and a rotary cam engaging said male die and constructed to alternately reciprocate it and permit it to rest, substantially as described.

41. In a machine of the character described, the combination with a reciprocatory bar, of a head carried by the bar and having formed therein a transverse perforation forming a female die for receiving and shaping the rivet, and a plunger movable endwise in said die for ejecting the rivet and forcing it into the work, substantially as described.

42. In a machine of the class described, the combination with a reciprocatory bar, of a head carried by the bar and having formed therein a transverse perforation constituting a female die for receiving and shaping the rivet, a plunger movable endwise in said die for ejecting the rivet and forcing it into the work, and means for yieldingly holding the plunger against movement in the die, substantially as described.

43. In a machine of the class described, the combination with a reciprocatory bar, of a head carried by the bar and having formed therein a transverse perforation constituting a female die for receiving and shaping the rivet, a plunger movable in said die for ejecting the rivet and forcing it into the work, and a pivoted spring-pawl disposed in a recess in the side of the plunger and yieldingly holding latter against movement in the die, substantially as described.

44. In a machine of the class described, the combination with a reciprocatory bar, of a head carried by the bar and having formed therein a transverse perforation forming a female die for receiving and shaping the rivet, a male die for inserting the rivet in the female die, and a plunger movable endwise in the fe-

male die for ejecting the rivet and forcing it into the work, substantially as described.

45. In the machine of the class described, the combination with a reciprocatory bar, of a head pivotally connected at one end to one end of the bar and provided at its free end with a female die for receiving and shaping the rivet, a male die arranged out of the path of the bar, for inserting the rivet in the female die, a plunger arranged in the female die for ejecting the rivet and forcing it into the work, and means actuated by the movement of the bar for swinging the head to one side to receive the rivet and into alinement with the bar for inserting the rivet in the work, substantially as described.

46. In a machine of the class described, the combination with a reciprocatory bar, of a head pivotally connected at one end to one end of the bar and provided at its free end with a female die for receiving and shaping the rivet, a male die arranged out of the path of the bar for inserting the rivet in the female die, a plunger arranged in the female die, means for swinging the head to one side in position to receive the rivet and into alinement with the bar in position to eject it, and a reciprocatory push-bar arranged to engage the plunger when the head is in alinement with the bar to insert the rivet in the work, substantially as described.

47. In a machine of the class described, the combination with a reciprocatory bar, of a head pivotally connected at one end to one end of the bar and provided at its free end with a female die for receiving and shaping the rivet, a male die arranged out of the path of the bar for inserting the rivet in the female die, a plunger arranged in the female die, means for swinging the head to one side to receive the rivet and into alinement with the reciprocatory bar to eject it, and a reciprocatory push-bar in parallelism with the first-named bar and arranged to register with the plunger when the head is moved into the last-named position to insert the rivet in the work, substantially as described.

48. In a machine of the class described, the combination with a reciprocatory bar, of a head pivotally connected at one end to one end of the bar and provided at its free end with a female die for receiving and shaping the rivet, a male die arranged out of the path of the bar for inserting the rivet in the female die, a plunger arranged in the female die, means for swinging the head to one side to receive the rivet and into line with the bar to eject it, means for actuating the plunger, and a bolt movable with said male die and arranged to engage a socket in the head to lock the latter in position during the insertion of the rivet, substantially as described.

49. In a machine of the class described, the combination with a male die, of a yielding block arranged adjacent to said die and con-

stituting a support for prongs of a rivet-strip fed thereover, and a female cutting-die coöperating with said male die.

50. In a machine of the class described, the
5 combination with a male die of the shape of the head of the rivet to be inserted, of a yielding block arranged adjacent to said die and having a flat upper face constituting a support for prongs of a rivet-strip fed over said
10 die, and a female cutting-die coöperating with said male die.

51. In a machine of the class described, the
combination with a male die of the shape of the head of the rivet to be inserted, of a yield-
15 ing block arranged adjacent to said die and constituting a support for prongs of a rivet-strip fed thereover, means for feeding the heads of rivets comprising the strip over said
male die, a female cutting-die having cutters
20 operating to completely sever the foremost rivet and partially sever the succeeding rivet from the strip, and means for shaping and setting the rivet.

52. In a machine of the class described, the
25 combination with means for feeding a strip

of connected fasteners, and means for completely severing the foremost fastener and partially severing a succeeding fastener from the strip.

53. In a machine of the class described, the
30 combination with means for feeding a strip of connected fasteners, and means for simultaneously completely severing the foremost fastener and partially severing the next succeeding fastener from the strip. 35

54. In a machine of the class described, the
combination with means for forming and setting fasteners, of means for feeding a strip of connected fasteners to said forming means, and a cutter for completely severing the fore-
40 most fastener and partially severing the next succeeding fastener from the strip.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

ROBERT COATES.

Witnesses:

A. FLORENCE YERGER,
J. H. BRINTON.