

No. 704,098.

Patented July 8, 1902.

C. K. PICKLES.
PNEUMATIC LASTING MACHINE.

(Application filed May 18, 1901.)

(No Model.)
Fig. 1.

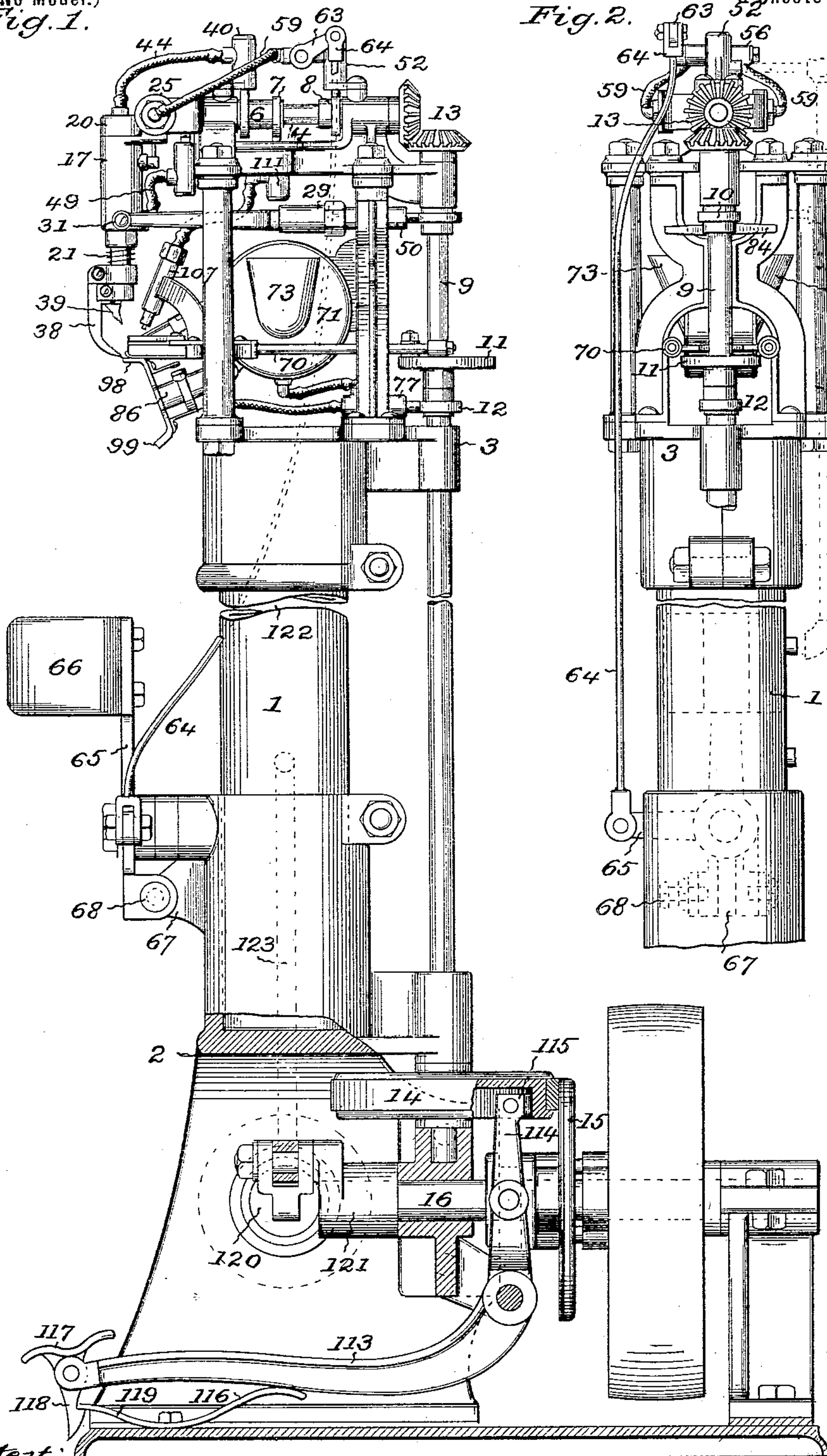
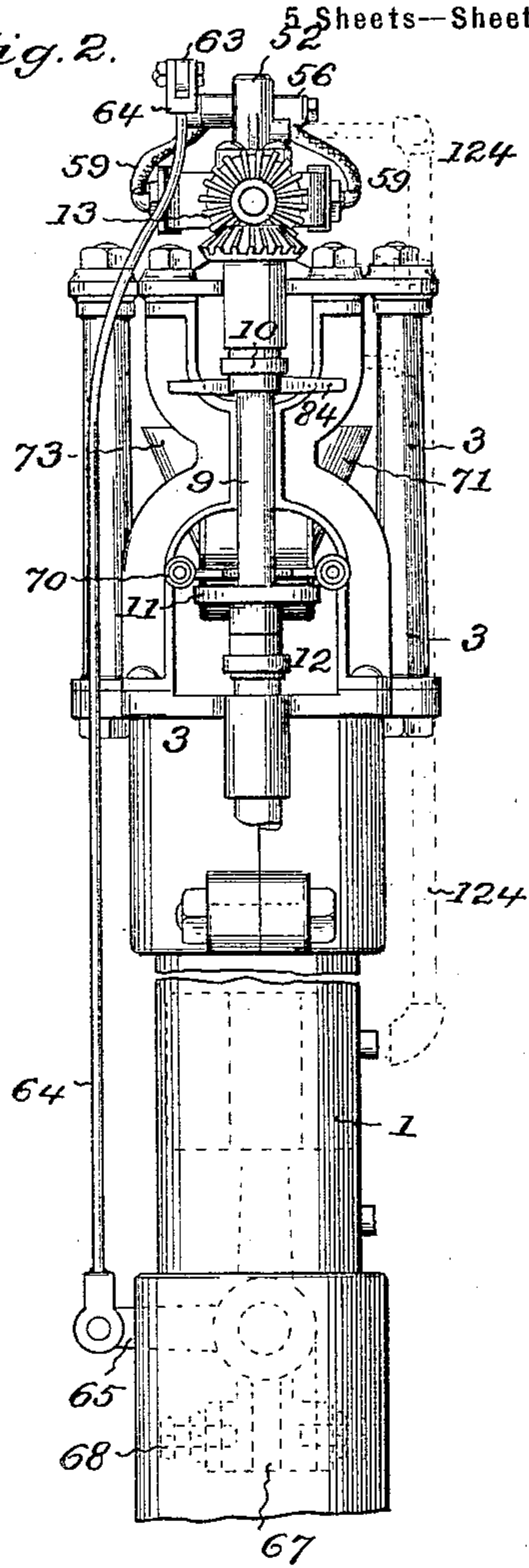


Fig. 2. 5 Sheets—Sheet 1.



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5 Sheets—Sheet 2.

Fig. 3.

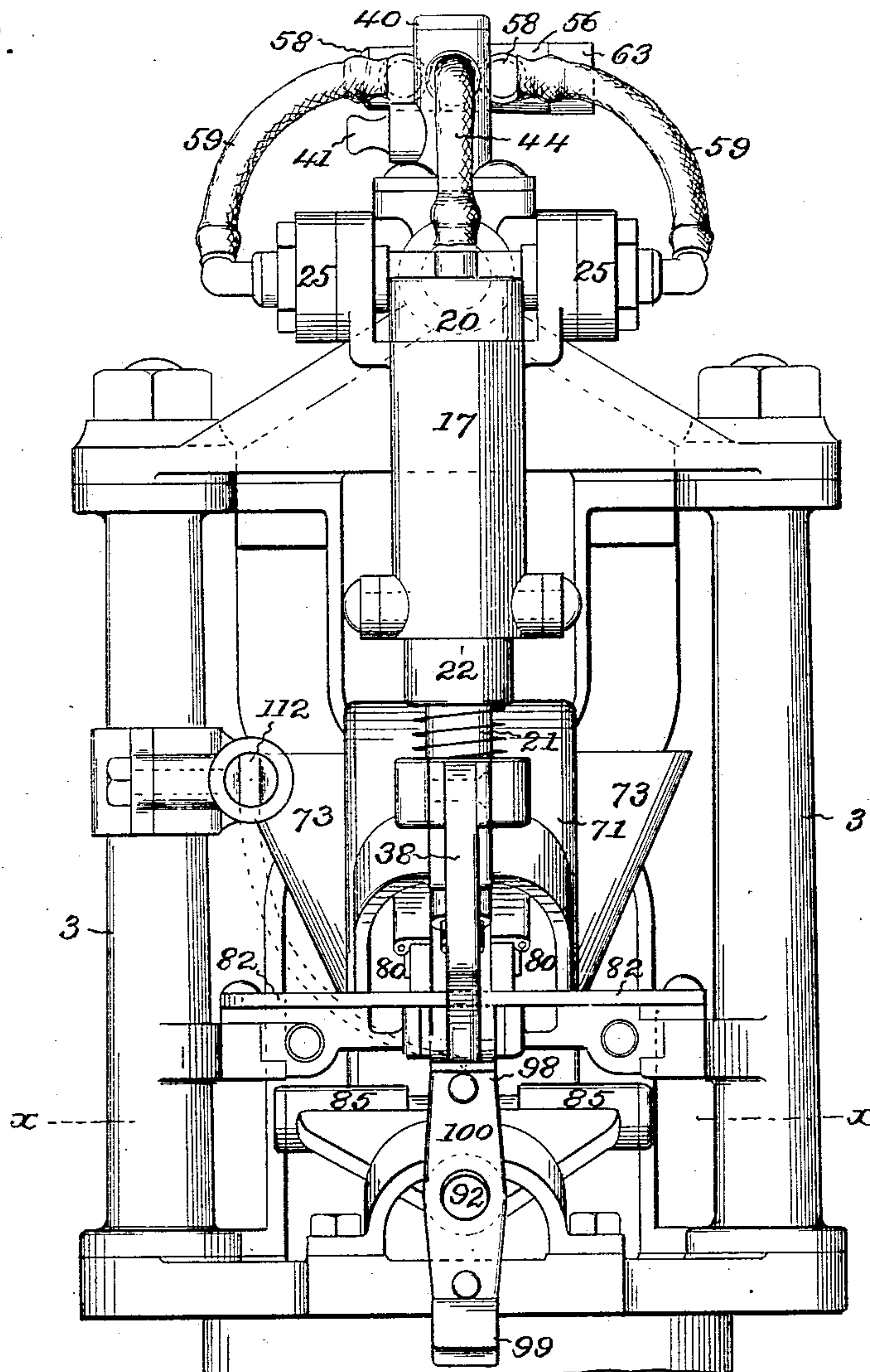


Fig. 4.

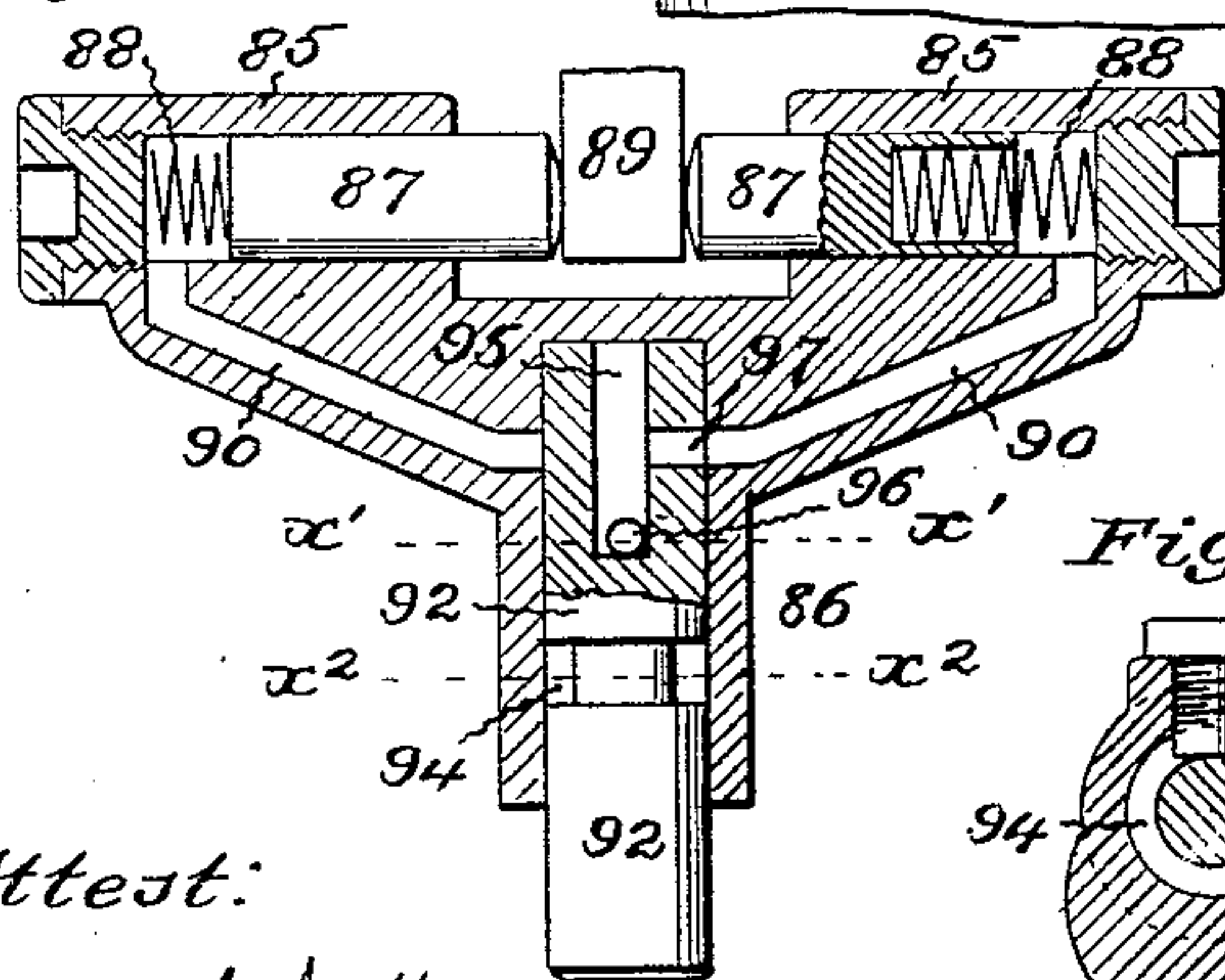


Fig. 5.

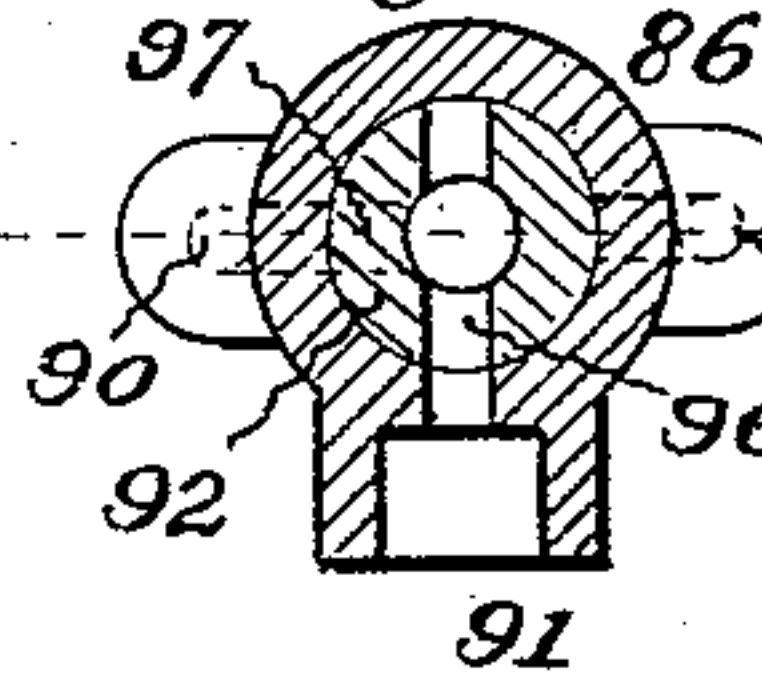


Fig. 6.

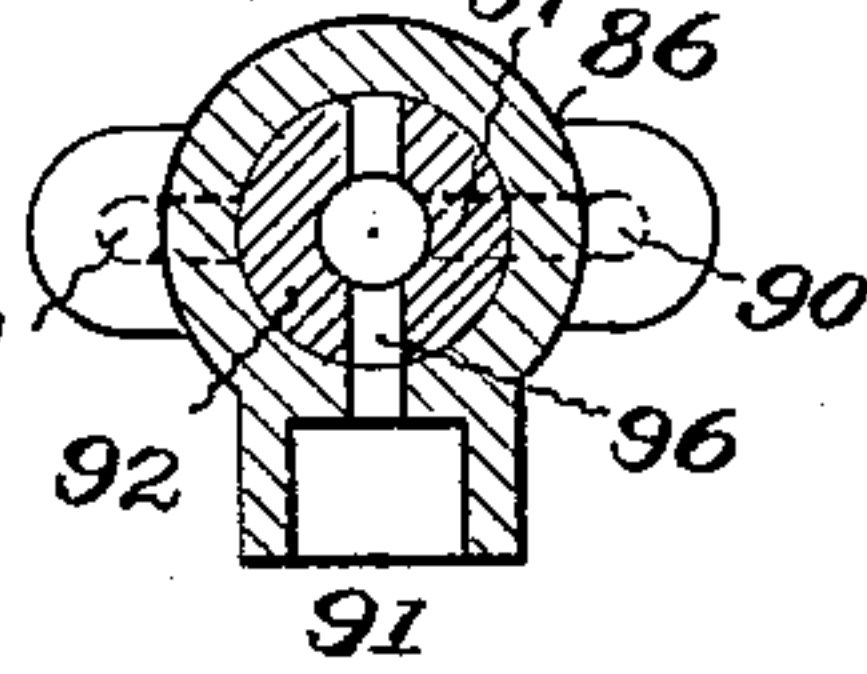
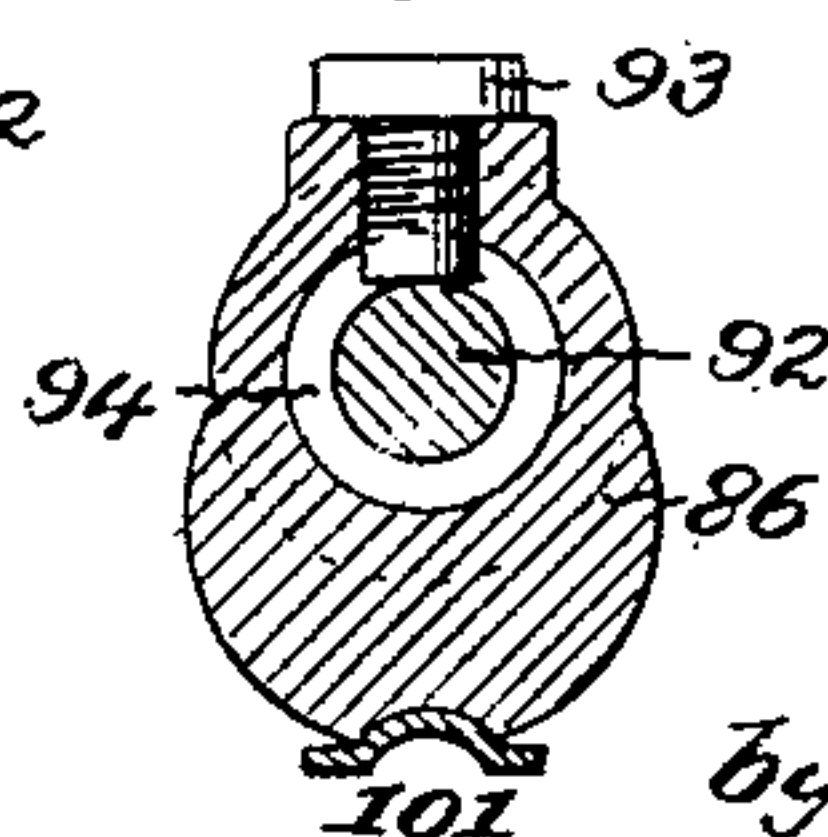


Fig. 7.



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5 Sheets—Sheet 3.

Fig. 8.

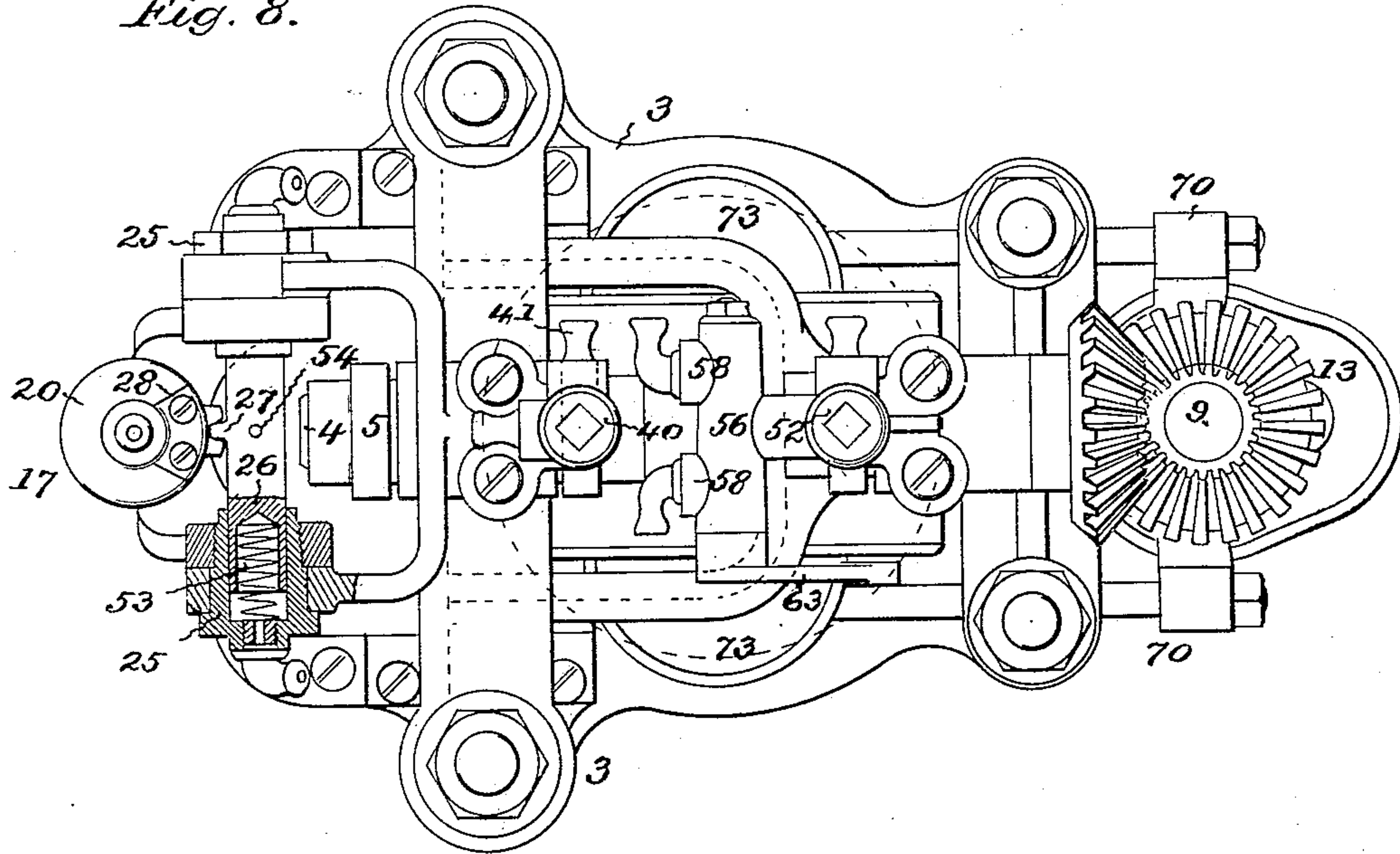


Fig. 9.

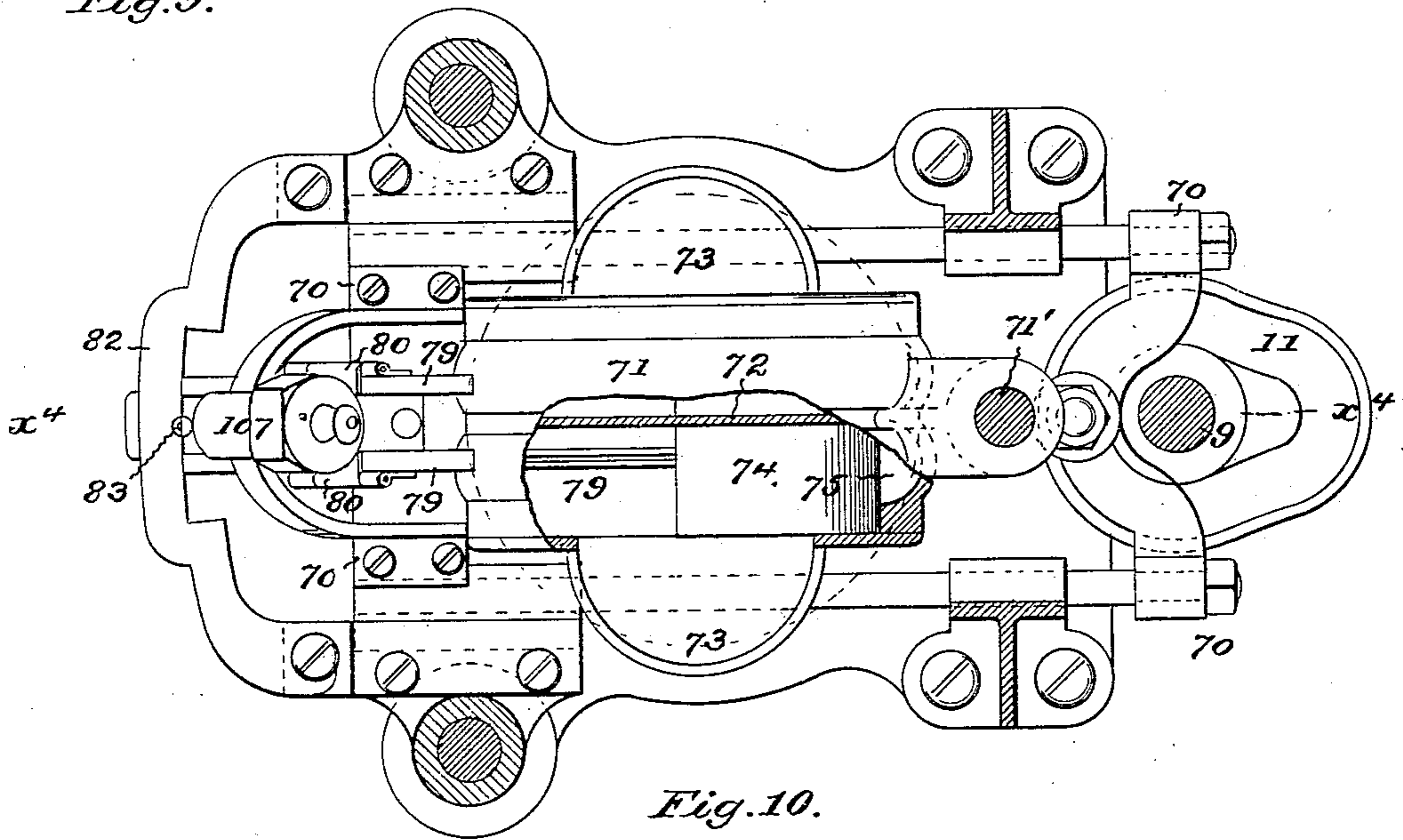
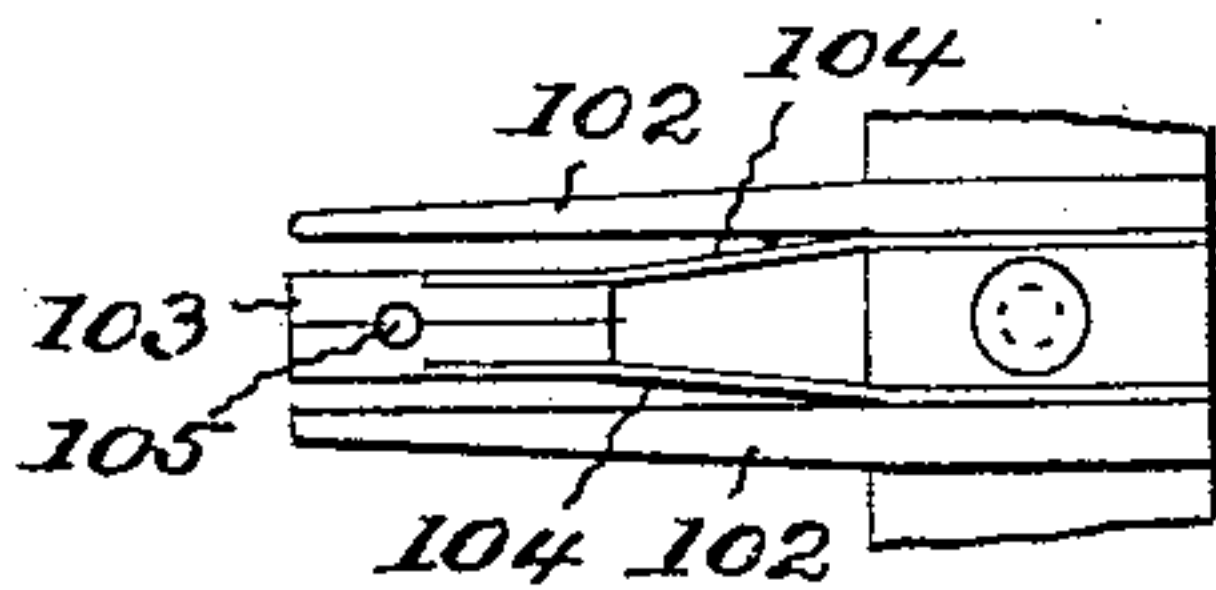


Fig. 10.



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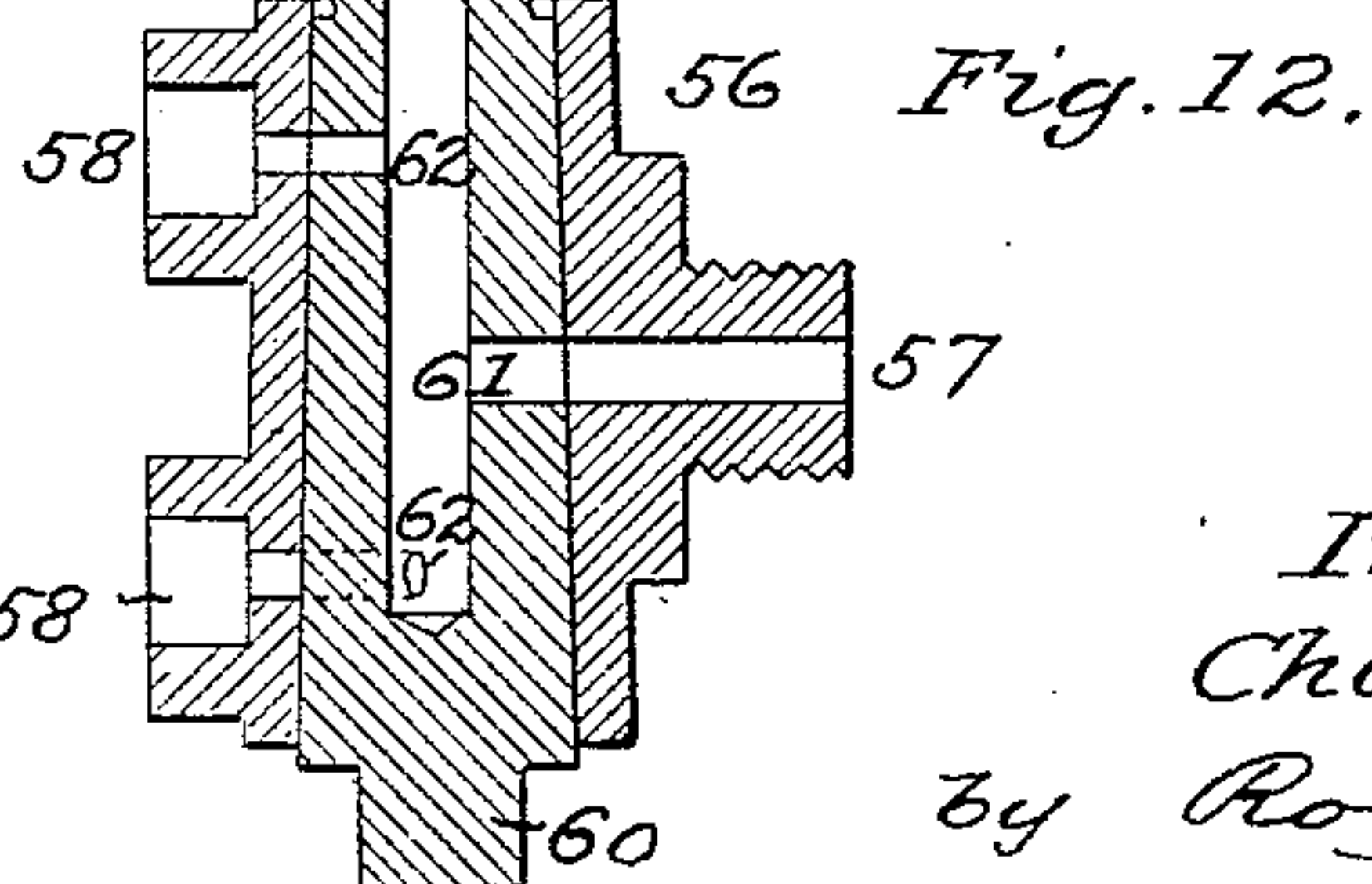
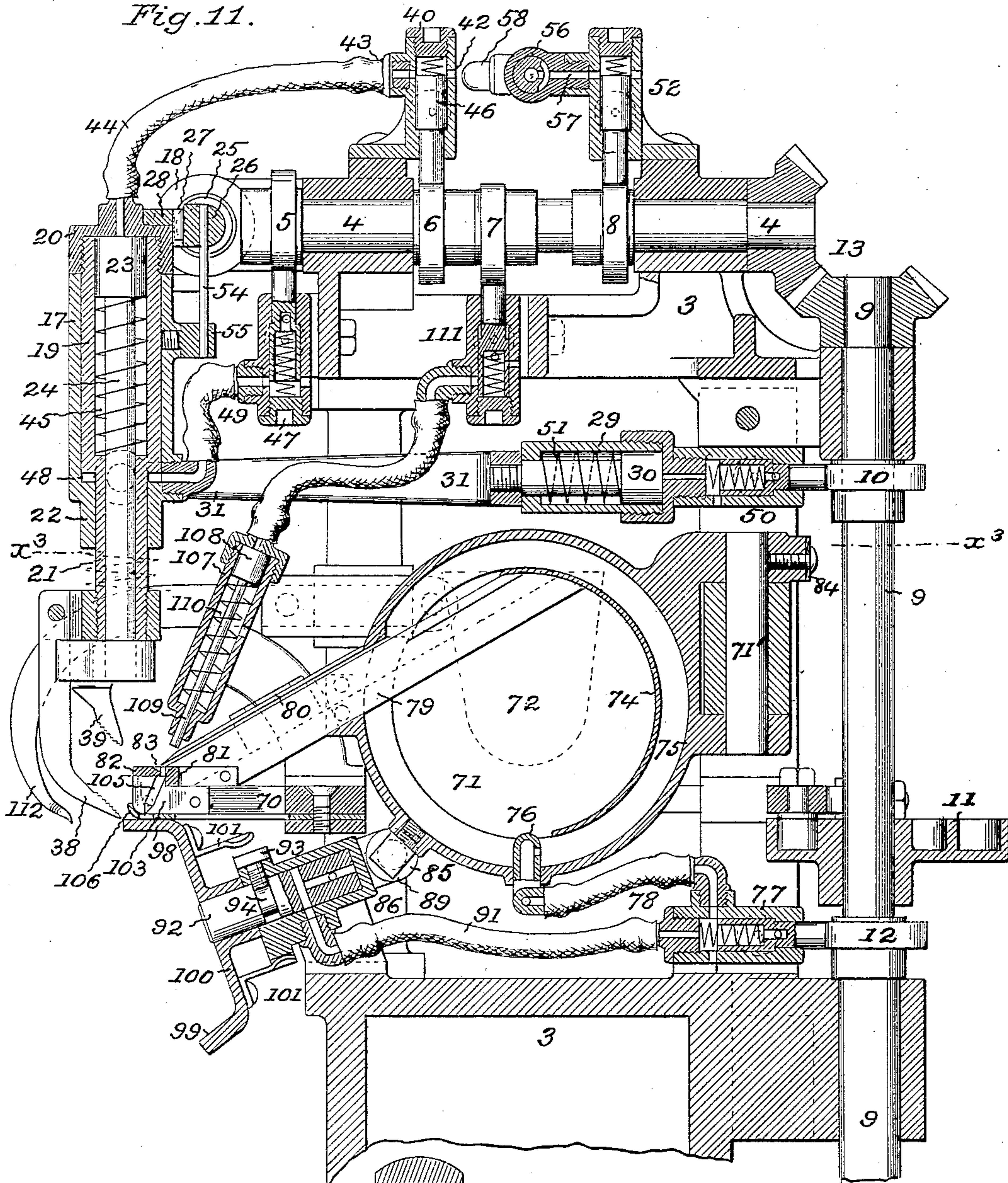
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Fig. 11.



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Fig. 13.

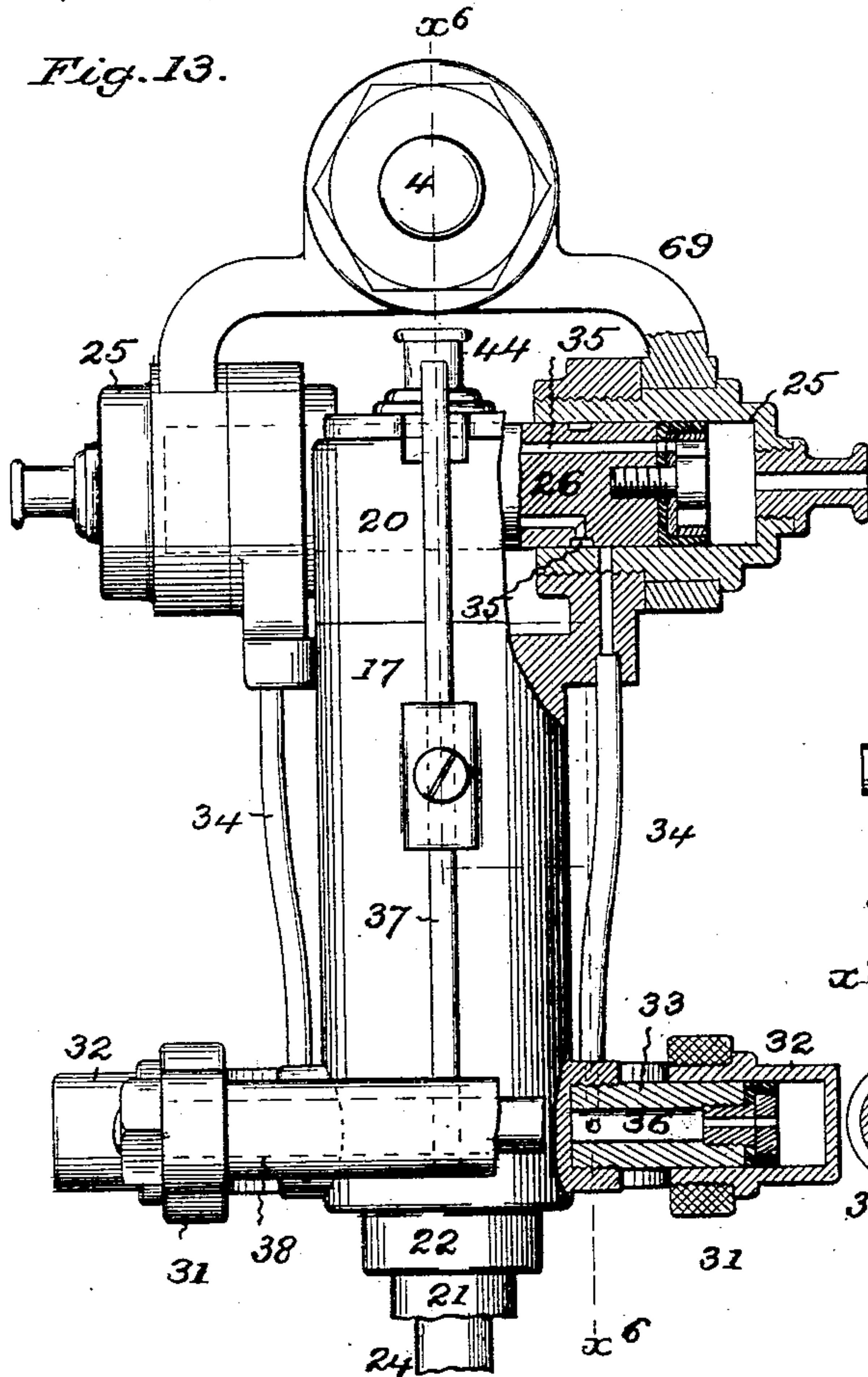


Fig. 14.

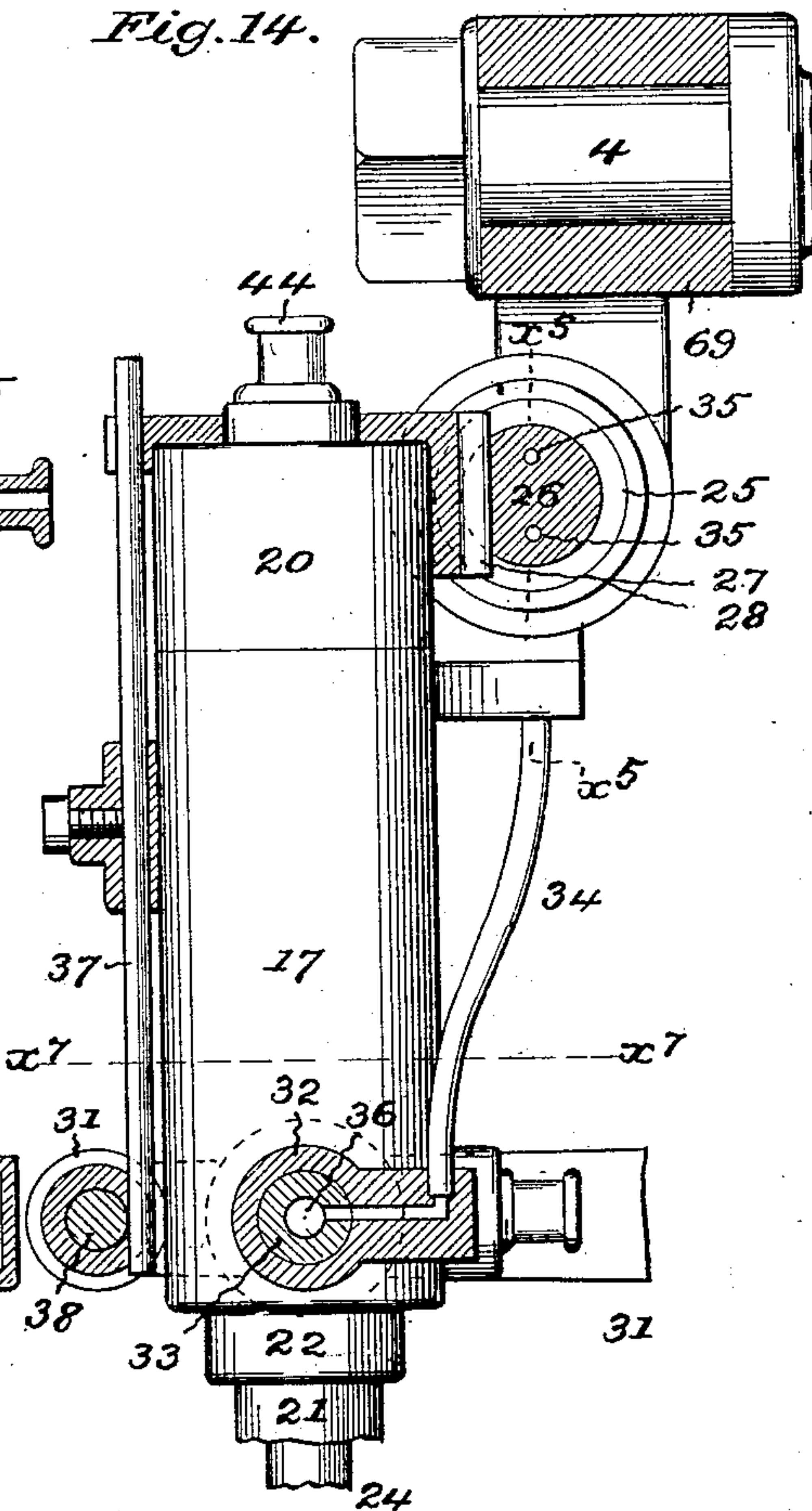
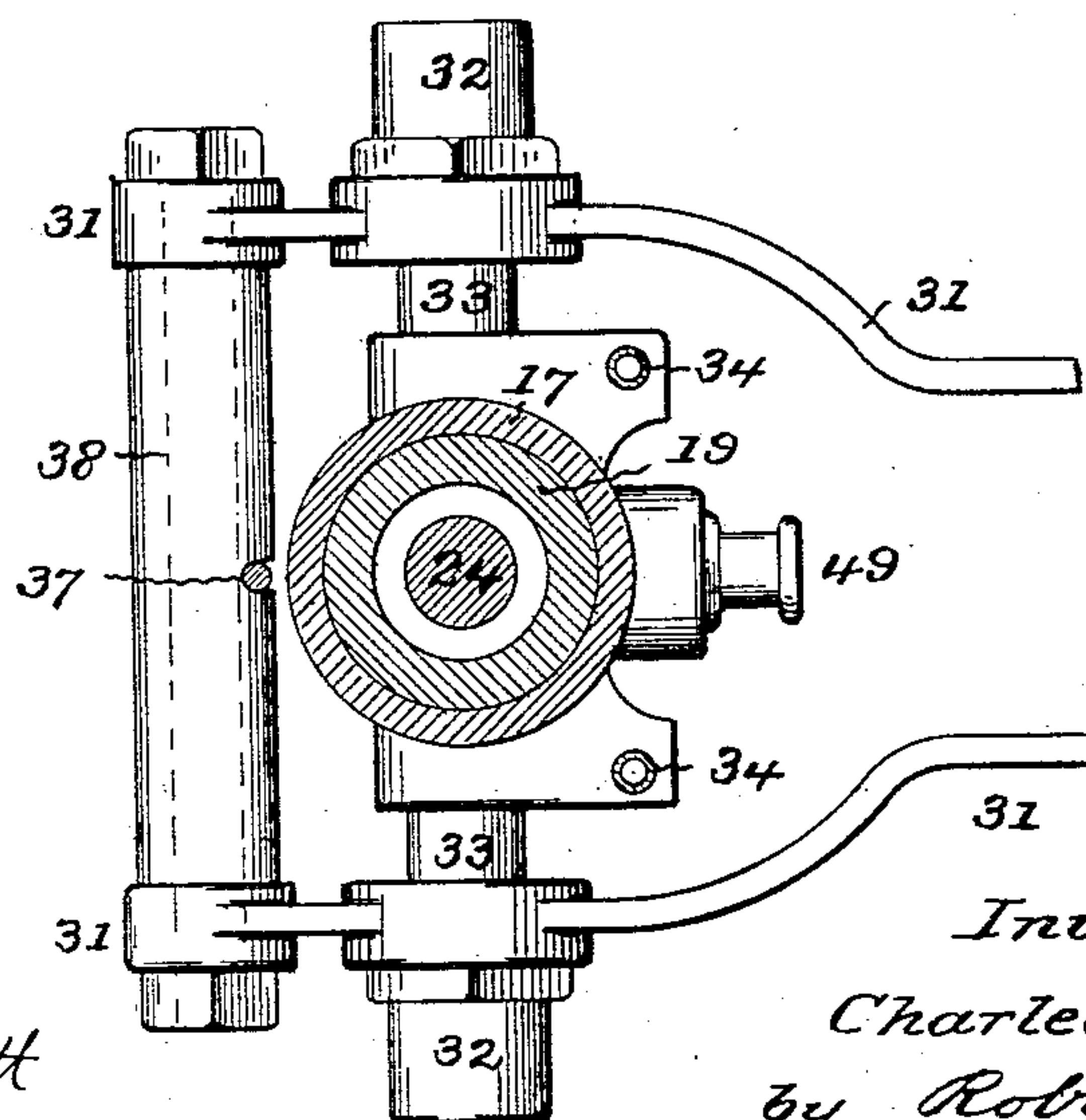


Fig. 15.



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UNITED STATES PATENT OFFICE.

CHARLES K. PICKLES, OF ST. LOUIS, MISSOURI, ASSIGNOR TO HIMSELF,
LOUIS BRY, OF ST. LOUIS, MISSOURI, AND IKE BLOCK, OF MEMPHIS,
TENNESSEE.

PNEUMATIC LASTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 704,098, dated July 8, 1902.

Application filed May 18, 1901. Serial No. 60,844. (No model.)

To all whom it may concern:

Be it known that I, CHARLES K. PICKLES, a citizen of the United States of America, and a resident of the city of St. Louis, in the State of Missouri, have invented certain new and useful Improvements in Pneumatic Lasting-Machines, of which the following is a specification.

The present invention more particularly relates to that class of shoe-lasting machines in which the last is supported by hand in the proper relation to the lasting mechanisms while such mechanisms are operating to draw, lay, and tack the shoe-upper to the insole.

The object of the present invention is in the main to provide a simple, durable, and efficient construction and arrangement of the different individual mechanisms comprised in the present type of lasting-machines in which the movements are accomplished by pneumatic pressure in a direct and positive manner and with a minimum amount of friction and wear of the parts, all as will hereinafter more fully appear and be more particularly set forth in the claims. I attain such object by the construction of parts illustrated in the accompanying drawings, in which—

Figure 1 is a general side elevation, with parts in section, of a lasting-machine embodying the present invention and illustrating the relative arrangement of the lasting-machine head, its support, and the operating and controlling mechanisms; Fig. 2, a detail rear elevation of the same; Fig. 3, a front elevation of the lasting-machine head; Fig. 4, a detail horizontal section at line $x x$, Fig. 3, illustrating the tack-box-shifting motor and the switch-valve for controlling said motor. Figs. 5 and 6 are detail transverse sections at line $x' x'$, Fig. 4, showing the two positions of the valves in the actual use of the machine; Fig. 7, a detail vertical section at line $x^2 x^2$, Fig. 4; Fig. 8, a plan view of the lasting-machine head with parts of the actuating means of the pincers mechanism in section; Fig. 9, a horizontal section of the same at line $x^3 x^3$, Fig. 11, with parts mainly in plan view on said line and with the pincers mechanism removed; Fig. 10, a detail plan view of the outer portion of tack-carrier

and illustrating the spring tack-holder; Fig. 11, a central vertical section of the lasting-head at line $x^4 x^4$, Fig. 9; Fig. 12, a detail horizontal section of the switch-valve motor for rotating the carrying-spindle of the pincers mechanism; Fig. 13, an enlarged detail front elevation, partly in section, at line $x^5 x^5$, Fig. 14, illustrating the arrangement of parts for imparting a combined lateral and turning movement to the pincers mechanism; Fig. 14, an enlarged detail longitudinal section of the same at line $x^6 x^6$, Fig. 13; Fig. 15, an enlarged detail horizontal section of the same at line $x^7 x^7$, Fig. 14.

Similar numerals of reference indicate like parts in the several views.

Referring to the drawings, 1 represents the usual tubular column, to the upper end of which the lasting-machine head is secured, and provided at its lower end with an expanded base 2, by which it is supported upon the floor of the workshop, such expanded base portion forming in addition journal-bearings, pivot-supports, and the like for the foot-controlled operating mechanisms of the lasting-machine, as hereinafter more fully described.

The lasting mechanism proper will comprise a construction as follows:

3 is a stationary housing or frame carried at the upper end of the tubular supporting-column 2 and affording a journal or other support or attachment for the particular shafts and other moving parts of the lasting mechanism.

4 is a revoluble cam-shaft arranged longitudinally in bearings at the upper end of the frame 3 and provided with a series of four eccentrics or cams 5, 6, 7, and 8, adapted to control and operate the individual mechanisms of the pincers mechanism, as well as the tack-driving mechanism, in proper concert.

9 is a revoluble cam-shaft arranged vertically in bearings at the rear end of the frame 3 and provided with a series of three eccentrics or cams 10, 11, and 12, adapted, in connection with the cams or eccentrics 5, 6, 7, and 8, heretofore mentioned, to control in proper concert the individual mechanisms of

the pincers mechanism, the tack-feeding mechanism, and the reciprocating carrier for the tack-presenting and tack-driving mechanism.

The cam-shafts 4 and 9 are geared together by a pair of miter-wheels 13, so as to revolve in unison, and the vertical shaft 9 will in the present construction be extended down to the base portion 2 of the machine and provided with a friction wheel or pulley 14, adapted to be engaged and driven by a friction-disk 15, carried by a power-driven countershaft 16, as will hereinafter more fully appear.

17 is the suspension-hanger for the pincers mechanism, which in the present improvement will comprise a pendent cylinder having at its upper ends side ears or brackets 18, by which it is pivotally connected to the main frame, so as to be capable of vibration in the longitudinal plane of the machine, and which in the present invention constitutes a single-acting motor-cylinder for effecting "up" movement of the pincers mechanism in a positive and at the same time yielding manner under excessive strain.

19 is a tubular plunger extending through the cylinder 17, and provided at its upper end with a closure-cap 20, which is also adapted to limit a downward movement by contact with the upper end of the cylinder 17. Such tubular plunger is also provided with a reduced tubular extension 21 at its lower end, passing in a fluid-tight manner through a guide-neck 22 at the lower end of the cylinder 17, and carrying the lowermost or fixed jaw of the pincers mechanism.

23 is a piston-head fitting the tubular bore of the plunger 19 and provided with a piston-rod 24, passing through the tubular extension 21 of the plunger 19 aforesaid and carrying at its lower end the uppermost or movable jaw of the pincers mechanism.

25 25 are a pair of opposed single-acting motor-cylinders secured in a transverse direction on the main frame, and 26 a piston common to both cylinders and provided at or near its center with a tooth or projection 27, adapted to engage a toothed sector 28 or other like formation secured to the cap-piece of the tubular plunger 19 of the pincers mechanism, the arrangement being such that such motor-cylinders are adapted to impart a partial turning motion to the pincers mechanism in an automatic manner, as hereinafter more fully set forth.

The projection 27 and toothed sector 28, above described, will have a vertical depth sufficient to maintain operative engagement of the parts during the vertical movement of such sector in the usual up-and-down movements of the pincers mechanism.

29 is a single-acting motor-cylinder secured to the main frame, the piston 30 of which has piston-rod connection with the rear end of a longitudinally-arranged yoke 31, the forward ends of which have pivotal connection with

the suspension hanger or cylinder 17 and adapted to impart to such suspension-hanger and to the pincers mechanism a vibration in a direction longitudinal of the machine and in an automatic manner, as hereinafter described.

38 is the lowermost jaw, and 39 the uppermost jaw, of the pincers mechanism. Such jaws are of any usual and approved construction, and the lowermost jaw 38, usually termed the "fixed" jaw, is secured to the lower end of the tubular extension 21 of the plunger 19, while the uppermost jaw 39, usually termed the "movable" jaw, is arranged to slide vertically against one side of the pendent shank of the fixed pincer-jaw 38 to be guided thereby and is secured to the lower end of the piston-rod 24 of the vertically-moving piston-head 23.

The mechanism for imparting the usual closing and opening movements to the pincer-jaws will in the present invention comprise a construction as follows:

40 is a controlling-valve preferably of the piston type shown, the casing of which is provided with an inlet neck or passage 41, connected to the source of motive-fluid supply, an exhaust-passage 42, opening to the atmosphere, and a supply-passage 43, connected by a flexible connection 44 to the closure-cap 20 and communicating with the tubular bore of the plunger 19 and adapted to introduce a supply of motive-fluid pressure into the upper end of said bore or chamber to force the piston-head 23 downward in a positive manner and at the required period in the operation of the machine and at another period to permit the exhaust of the motive fluid from the upper end of said bore or chamber to permit of an upward movement of the piston-head by the resiliency of the spring 45.

46 is the vertically-moving piston of the valve 40 of any usual construction and adapted in one position to register the source of motive-fluid pressure with the upper end of the bore or chamber of plunger carrying the movable pincer-jaw and in the other position to register said bore or chamber with the atmosphere. Such valve has the described movements imparted to it at the proper periods in the operation of the machine by the cam or eccentric 6, having the required construction and set upon the cam-carrying shaft 4.

With the described construction and arrangement the upper or movable pincer-jaw 39 is moved downward toward the fixed pincer-jaw 38 to grasp the shoe-upper and to move away from such fixed jaw to release the shoe-upper in the different periods of the lasting operation, as hereinafter more fully set forth in the operation of the machine.

The mechanism for imparting the usual up-and-down movement to the pincers mechanism will in the present invention comprise a construction as follows:

47 is a valve substantially identical with the valve 40 heretofore described and actuated in like manner by the cam or eccentric 5 on the cam-carrying shaft 4 to at one time register the motive-fluid inlet of said valve with the annular chamber 48 of the cylinder 17 beneath the plunger 19 to cause a positive upward movement of the said plunger and at another time to register said annular chamber 48 with the atmosphere to permit of the descent of such plunger and its attached pincer-mechanism parts by gravity.

49 is a flexible connection between the valve 47 and the chamber 48 to permit of the normal and independent movements of the cylinder 17 and the pincer-mechanism parts carried thereby in relation to such valve and its fixed and immovable position on the main frame.

With the described construction the pincers mechanism is moved bodily in either an up or down direction and affords an elastic connection under excessive strain in the movements of the pincers mechanism in the operation of drawing and laying the shoe-upper upon the last, and thus prevents an undue strain upon the shoe-upper and the liability of tearing the same, which would occur at times were such yielding feature absent from the mechanism.

The mechanism for imparting the outward and inward overmovements to the pincers mechanism will in the present invention involve a construction as follows:

50 is a valve substantially identical with the valve 40 heretofore described and actuated in an identical manner by the cam or eccentric 10 on the cam-carrying shaft 9 to at one time register the motive-fluid inlet of said valve with the rear piston-chamber of the motor-cylinder 29 to force the piston 30 of the same forward and by means of the connecting-yoke 31 impart the outward overmovement to the pincers mechanism in a positive manner and at another time to register said rear piston-chamber with the atmosphere to permit the return-spring 51 to force the piston 30 and its connected parts backward and impart the inward overmovement to the pincers mechanism.

The mechanism for imparting a rotative movement to the pincers mechanism in an oblique direction to one side or the other of the longitudinal axis of the machine will in the present invention comprise a construction as follows:

52 is a valve substantially identical with the valve 40 heretofore described and actuated in a similar manner by the cam or eccentric 8 on the cam-carrying shaft 4 to at one time register the motive-fluid inlet of said valve with the outer piston-chamber of one or the other of the twin motor-cylinders 25 25 in a manually-controlled manner, as hereinafter set forth, to force the piston end in such particular cylinder in a transverse direction and by means of the lateral tooth or projection 27

on said piston 26 and the toothed sector 28 on the closure-cap of the tubular plunger 19 impart a turning movement to said plunger and to the pincers mechanism carried thereby in a lateral or oblique direction to one side or the other of the longitudinal axis of the machine, in accordance with which one of the twin motor-cylinders 25 25 is in action, and at another time to register such piston-chamber with the atmosphere and permit the return-spring 53 of such motor-cylinder to force the piston to a normally central position to attain the normal position of the pincers mechanism in line with the longitudinal axis of the machine.

54 is a spring secured centrally to the piston 26 and extending downwardly from the same, its lower end being engaged by a boss or lug 55 on the suspension housing or hanger 17 of the pincers mechanism and adapted to act in conjunction with the spring or springs 53 in effecting the central and normal position of the piston and the parts operatively connected thereto. 56 is a motive-fluid switching-valve arranged intermediate of the valve 52 and the pair of twin motor-cylinders 25 25, above mentioned, its stationary casing being provided with a single central neck 57, communicating with the valve 52, and a pair of lateral necks 58 58, connected by individual flexible connections 59 59 with the respective outer ends of the single-acting twin motor-cylinders 25 25, as illustrated in Figs. 3, 8, 11, and 12.

60 is the movable member of the valve 56 and is preferably of the semirotary type illustrated in Figs. 11 and 12 and is formed with a single middle inlet 61, connecting with the valve 52, and two side ports 62 62, adapted to connect in an individual manner with the passages of the individual connections 59 59, leading to the twin motor-cylinders 25 25. In the construction shown the passages 62 62 are so arranged that when one is in register with its passage in the valve-casing the other passage will be out of register with its individual passage, and vice versa.

63 is a rock-arm secured to the movable valve member 60 and operatively connected by the connecting-rod 64 to a bell-crank lever 65, pivoted on the upper end of the base 2 of the machine in convenient position to be engaged and operated by the knee of the operator and for this purpose is provided at its upper end with a knee-stirrup 66, as illustrated in Figs. 1 and 2, the construction being such that the operator can conveniently shift said lever to the right, to the left, or to the center to cause a rotative or turning movement of the pincers mechanism to the right or to the left of the longitudinal axis of the machine or render said movement dormant and as required in the progress of the operation upon the different portions of the shoe-upper.

67 is a stop-lug on the base 2, against which stop-screws 68, carried by the knee-lever 65,

contact to limit the movement of such knee-lever.

When it is desired to have a lateral movement of the pincers mechanism to operate in unison with the rotative movement of the pincers mechanism above described to attain a more effective plaiting of the shoe-upper in the lasting operation upon the rounded parts of the same, the arrangement of parts illustrated in Figs. 13, 14, and 15 will be employed and will comprise a construction as follows:

69 is a yoke carrying the cylinders 25 25, heretofore described, and having a pivotal attachment to the cam-carrying shaft 4 to permit of a lateral swinging movement of the connected parts, as shown.

32 32 are a pair of opposed single-acting motor-cylinders secured in a transverse direction to the forward ends of the connecting-yoke 31, by which the outward and inward overmovements are imparted to the pincers mechanism.

33 33 are pistons individual to the motor-cylinders and secured to opposite sides of pendent cylinder 17, which constitutes the suspension-hanger of the pincers mechanism.

In the construction illustrated in Figs. 13, 14, and 15 the motor-engines above described for imparting lateral movement to the pincers mechanism are controlled by the same valve 52 by which the motor-engines 25 25 are controlled in their operation of imparting a turning movement to the pincers mechanism, so that the two sets of motor-engines will be mutually dependent upon and controlled by the one controlling-valve 46 in my preferred arrangement illustrated in the accompanying drawings.

In order that the lateral and turning movements of the pincers mechanism will take place with the above-described arrangement of parts, the two sets of motor-cylinders will be cross-connected in any usual manner. In Fig. 13 I illustrate a simple form of such cross connection, in which—

34 represents a pair of connecting pipes or passages between the sets of cylinders adapted to register in an individual manner with counterpart passages 35 in the piston 26 of the upper set of cylinders 25 25 and with the angular passages 36 of the pistons 33, which passages extend through the outer ends of the pistons into the piston-chambers of the cylinders 32. The passages 35 have a reversed arrangement, the one passage extending through one end of the piston 26 into the piston-chamber of the one cylinder 25 and the companion passage extending through the other end of the piston into the piston-chamber of the other cylinder 25, as illustrated in Fig. 13.

37 is a spring secured to a central boss or lug upon the suspension housing or cylinder 17, with its lower end engaging in a recess in the cross-tie 38 of the forward end of the connecting-yoke 31 and adapted to return the parts to a central and normal position with re-

lation to each other. In the construction shown such spring is also extended up from its attaching-lug on the cylinder 17 to engage a lug upon the upper end of the tubular plunger 19 to assist in returning the said plunger and the pincers mechanism carried thereby into a normal and central position after a turning movement in either direction has been imparted thereto in manner heretofore described and in this connection acting in conjunction with the spring 54, heretofore described.

The mechanisms for feeding and for driving the tacks in the lasting operation will in the present invention operate in unison with the other mechanisms of the machine, their operations being controlled automatically by cams or eccentrics on one of the cam-carrying shafts 9 of the machine, and will comprise a construction as follows:

70 is a reciprocating slide or carrier for the tack-feeding and tack-driving mechanisms, receiving positive reciprocation in a direction longitudinal of the machine by the operating-cam 11 on the cam-carrying shaft 9.

71 is the tack-box, provided with a central partition 72, dividing the same into two compartments, one for the smaller-sized tacks and the other for the larger-sized tacks used in the lasting operation, and each compartment provided with its individual filling-hopper 73 73 at opposite sides of the tack-box.

74 is a curved diaphragm arranged within the tack-box and forming in each tack-compartment a curved conduit 75, extending from the lower tack-containing portion of such compartment to the upper end of the same and adjacent to the tack-receiving slides and adapted in the operation of the machine to conduct the tacks upward and discharge the same onto the tack-race, as hereinafter more fully set forth.

76 is a motive-fluid jet-head, one for each tack-compartment, and arranged in adjacent relation to the lower or inlet mouth of the curved conduit 75 of each particular tack-compartment to discharge a jet of motive fluid into said conduit, and thereby carry the tacks upward to the tack-race.

77 is a valve substantially identical with the valve 40, heretofore described, and actuated in a similar manner by the cam or eccentric 12 on the cam-carrying shaft 9 to register motive fluid at intervals with the tack-elevating jet-head 76. This valve in addition controls the pair of single-acting twin engines, hereinafter described, by which the tack-shifting mechanism is operated.

78 is a flexible connecting-pipe between the valve 77 and the tack-lifting jet-head 76.

79 represents a pair of counterpart tack-races having a parallel and separated relation and individual to a tack-compartment of the tack-box. Such tack-races are secured to and carried by the tack-box and have a longitudinal downwardly-inclined direction toward the tack-switch mechanism, with their

rear portions extended into the interior of the compartments of the tack-box in adjacent relation to the outlet-mouth of the tack-conveying conduit 75 to receive and retain the tacks discharged therefrom. Each tack-race will comprise the usual pair of flat bars held in parallel and separated relation by usual distance blocks or ribs and having their outer and upper corners or edges beveled off in order to readily shed all tacks other than the ones whose shanks engage in the longitudinal groove or raceway formed by said bars.

80 is a hinged cover-plate secured in place above the tack-races and adapted to prevent accidental dislodgment of the tacks from said tack-races in the descent of such tacks to the tack-switch mechanisms.

81 is a transverse tie-bar securing the lower ends of tack-races in fixed and separated relation with each other.

82 is a transverse stop-bar secured to the main frame, with its rear face curved and forming a stop for the forward ends of the tack-races to retain the tacks in place therein. Such face of the bar 82 is also provided with a central receiving-recess 83, adapted to receive a tack from one or the other of the tack-races when one or the other of the same is brought in register therewith, as hereinafter set forth.

In the present invention the tack-box carrying the duplicate tack-races, as above set forth, will have a pivotal connection at its rear end with the main frame by means of a vertical pivot rod or shaft 71', so as to be capable of a limited oscillation in a horizontal plane to one side or the other of the longitudinal median line of the machine, and which oscillation on one side or the other of such median line is under the control of the operator, as hereinafter set forth, so that he can cause the machine to feed large or small tacks in the progress of the lasting operation, as his judgment may suggest.

84 is a centralizing-spring secured to the main frame and engaging the tack-box, the tendency of which is to return the tack-box and the tack-races back to a normal central position out of register with the tack-holder of the tack-driving mechanism. Such spring is aided in its centralizing action by the springs in the motor-engine hereinafter described.

85 85 are a pair of opposed single-acting motor-cylinders secured in a transverse direction on the main frame, and 86 is a reversing-valve, by means of which motive fluid is admitted to the outer end of one or the other of the said cylinders in accordance with the position of the valve, the position of such reversing-valve being under the control of the operator, as hereinafter described. 87 87 are the pistons of said motor-cylinders, the normal tendency of which is toward each other through the instrumentality of the springs 88 88, bearing against the outer ends of said pistons.

89 is a lug located centrally upon the tack-box and arranged between the pistons 87 87, so that the same will have bearings against the opposite sides of said lug.

The stationary casing of the reversing-valve 86, above mentioned, will be provided with a pair of lateral passages 90 90, communicating with the outer ends of the motor-cylinders 85 85 and also with a central neck or inlet connected by flexible-pipe connection 91 with the controlling-valve 77 of the tack-elevating jet-head. In the present connection said valve 77 is adapted at one time in a revolution of the machine to register one motor-cylinder 85 with the motive-fluid supply to operate the tack-shift mechanism and deliver a tack and at another period in such revolution of the machine to register the said motor-cylinder 85 with the atmosphere and permit its piston and the parts controlled thereby to return to a normal position.

92 is the semirotary member of the reversing-valve 86, secured in the stationary casing of the valve by a pin or screw 93, engaging in the peripheral recess 94 in said semirotary member, as illustrated in Figs. 4 and 7. Such semirotary valve member has a cylindrical form, its outer end carrying in a fixed manner a duplex or interchangeable side rest for the shoe-last, while its inner portion is formed with a longitudinal passage 95 and a pair of lateral ports 96 and 97, the one port 96 connecting with the motive-fluid-inlet neck of the valve-casing and the other port 97 adapted to connect in an individual manner with one or the other of the lateral passages 90 90 of the motor-cylinders 85 85 in accordance with the position of the valve member and as clearly illustrated in Figs. 4, 5, 6, and 11 of the drawings.

98 and 99 are side guides or rests carried at diametrically opposite sides of a web or spider 100, the central part of which is provided with a hub for fixed attachment to the semirotary valve member 92, before described, the construction being such that with either of said guides or rests in a raised position the same will constitute the side guide or rest, against which the edge of the last is held by the hands of the operator as the lasting operation progresses in manner usual to the present class of lasting-machines. In the construction shown one side guide or rest will be formed with the usual thin end face, so as to be adapted for use as a rest or guide for the sides and straighter portions of the last, while the companion guide or rest will be formed with the usual broad end face, so as to be adapted for use as a side guide or rest for the heel and other more rounding portions of the last. The connected guides or rests 98 99 are adapted to be manually changed from an active to an inactive position and in view of the fact that the heel and other more rounding portions of the shoe-upper require a much stronger attachment than the straighter side portions of such shoe-upper

the shifting or change of said side guides or rests from a thin end face support to a broad end face support, and vice versa, is in the present construction employed to automatically change the tack-feeding mechanism to feed larger or smaller tacks in accordance with the requirements of the case. Such automatic reversal of the tack-switching mechanism is attained by the described rigid connection of the carrying-spider 100 of such side rests or guides with the semirotary member 92 of the reversing-valve 86, which controls the operation of the shifting motor-engines of the tack-races and tack-box, as heretofore described.

101 101 are a pair of spring-detents upon the spider or web 100 of the side guides or rests 98 99 adjacent to the same and adapted to engage in a socket or depression in the stationary casing of the valve 86 to lock said side-guide-carrying spider 100 in either of its two positions.

102 represents forward extensions of the reciprocating slide or carrier 70, between which are arranged the counterpart pair of tack-holding jaws 103, carried by supporting-springs 104 and adapted to open laterally.

105 is a hopper-shaped opening for receiving the tack to be driven and which opening is formed in the meeting surfaces of the laterally-opening jaws 103, as shown in Fig. 10, and located immediately beneath the central recess 83 of the stop-bar 82 and adapted to receive a tack therefrom when the carrier 70 is in its rearward position, as indicated in Fig. 11.

106 is a spring plate or finger secured to the forward end of the slide or carrier 70, immediately beneath the tack-holding jaws 103, and provided with an opening in line with the tack-hopper of said jaws to admit of the free passage of the tack in the tack-driving operation of the mechanism. The forward and free end of such spring plate or finger is upturned and constitutes a wiper for pressing the shoe-upper down upon the last during the operation of driving the tack.

The tack-driving mechanism of the present invention will comprise a construction as follows:

107 is a single-acting motor-cylinder secured to its reciprocating slide or carrier 70, heretofore described; 108, the piston thereof, and 109 the piston-rod constituting the tack-driving plunger of the present invention. 110 is a spring tending to force the piston 108 into its upward position in the cylinder 107. Said cylinder, piston, and piston-rod or tack-driving plunger are arranged, preferably, in the oblique position shown and in axial alignment with the tack-holding hopper or orifice 105 of the tack-holding jaws 103, as illustrated in Fig. 11.

111 is a valve substantially identical with the valve 40, heretofore described, and actuated in an identical manner by the cam or eccentric 7 on the cam-carrying shaft 4 to at

one time register the motive-fluid inlet of said valve with the upper piston-chamber of the cylinder 107 to impel the piston of the same and the tack-driving plunger carried by said piston downwardly in a rapid and forcible manner to effect the tack-driving operation and at another time to register said upper piston-chamber with the atmosphere to permit of a return of the piston, &c., to the normal upward and dormant position of the same.

The different motor cylinders or engines employed in various individual operations of the machines as heretofore described are preferably of the single-acting type shown in the drawings on account of the simplicity and cheapness of construction attained thereby without loss of efficiency, the positive movement of such engines being attained in a direct manner by the pressure of the motive fluid employed and their return movements effected by coiled or other suitable springs surrounding or engaging their piston-rods.

112 is the usual downhold or rest against which the last has an upward abutment and is held in proper position against the upward pulling strain of the pincers mechanism during the lasting operation. Such rest is secured at its upper end to the main frame and is of the usual curved form shown in Fig. 11.

The driving friction-disk 15, heretofore described, is keyed to its shaft 16 and is adapted to have longitudinal movement thereon to fractionally engage the driven pulley 14 on the cam-shaft 9 or to be disengaged therefrom.

113 is foot-lever or treadle pivoted to the supporting-base 2 and having a vertically-extending bifurcated arm 114, which has operative connection with the hub of the friction-disk 15 to move the same longitudinally and which also carries a brake-shoe 115, adapted to engage against the inner rim of the driven pulley 14, the arrangement being such that with a depression of the forward end of the foot-lever 113 the brake-shoe 115 will be first released from its frictional engagement with the pulley 14, after which the constantly-running friction-disk 15 will be forced against the pulley 14 to receive motion therefrom.

116 is a spring member arranged beneath the forward arm of the foot-lever 113 and adapted to impart an upward movement to the same, the reverse to the movement above described, and in which the friction-disk 15 will be first released from driving contact with the pulley 14, after which the brake-shoe 115 will be brought into contact with such pulley 14 to stop further movement of the lasting machinery.

117 is a rocking footpiece pivoted at the outer end of the foot-lever 113 and provided with a depending hook 118, adapted to engage a spring member 119 on the base of the machine when the foot-lever 113 is depressed to lock said foot-lever in its depressed condition and afford a downward pull upon the same against the upward tendency of the other

spring member 116. With the construction shown a downward depression of the inner part of the footpiece 117 will release its hook portion 118 from engagement with the spring member 119 and permit the foot-lever 113 to move upwardly.

Motive-fluid pressure to operate the various fluid-pressure motors of the present invention as heretofore described may be obtained from any convenient source. Preference is, however, given to the arrangement illustrated in Fig. 1, in which—

120 is an air-compressor of any usual reciprocating type, the piston of which is operated by a crank 121, secured to one end of the main driving counter-shaft 16 of the machine.

122 is a compressed-air-storage chamber formed by the closed tubular column 1 of the machine and connected by a suitable inlet pipe or passage 123 (shown in dotted lines in Fig. 1) with the air-compressor and by suitable pipes and branch connections 124 (also shown in dotted lines in Fig. 2) with the various motor-engines of the present lasting-machine.

The operation of the present improved lasting-machine is as follows: The prepared last, with the shoe upper and insole temporarily attached thereto in the usual manner, is presented to the machine sole upward against the respective downhold rest or abutment 112 and the side rest or abutment 98 or 99, and as the lasting operation progresses the operator will support and turn the last in the manner usual to the present class of lasting-machines. With the last in position the operator starts the lasting-machine in motion by the depression of the foot-lever or treadle 113, as heretofore described. Assuming the machine parts to be in a position in which the pincers mechanism is in its outward over position, with the pincers-jaws 38 and 39 spread apart, as illustrated in Fig. 11, which is the initial as well as the final position of such pincers-jaws in an individual cycle of movements of the pincers mechanism, commencing with such initial position of the pincers-jaws the cam 10 by means of its cam-yoke and connecting-rod will cause the controlling-valve 50 to open the motive cylinder 29 to the atmosphere and cause the pincers mechanism to have its inward overmovement. During such inward overmovement of the pincers mechanism the cam 5 by means of its cam-yoke and connecting-rod will cause the controlling-valve 47 to open the lower annular chamber 48 of the motive cylinder 17 to the atmosphere and permit the pincers mechanism to descend bodily by gravity, aided by a spring, if so desired, into its extreme down position. With the attainment of such down position of the pincers mechanism the cam 6 by means of cam-yoke and connecting-rod will cause the controlling-valve 46 to admit motive fluid to the upper end of the tubular bore of the plunger 19 to force the piston 23,

carrying the upper pincers-jaw 39, downward against the fixed pincers-jaw 38 to grasp the shoe-upper between the serrated holding-surfaces of the two jaws, the lower pincers-jaw remaining stationary while such gripping of the upper takes place. The cam 5 again comes into action to operate the controlling-valve 47 to admit motive fluid to the lower annular chamber 48 of the motive-cylinder 17 beneath the plunger 19 to effect the up movement of the pincers mechanism, the grasping relation of the pincers-jaws upon the shoe-upper being maintained by the previously-mentioned pneumatic mechanism during such up movement of the pincers mechanism as well as during the outward overmovement of the same. The described up movement of the pincers mechanism draws or strains the shoe-upper vertically and in effecting this movement the power is yieldingly applied in order to prevent undue straining or tearing of the shoe-upper, in that the motive fluid employed, usually compressed air, is very elastic and adapted to yield readily to undue strain to prevent such tearing of the shoe-upper or a breakage or bending of the machine parts. With the ending or near the ending of the above-described up movement the cam 10 again comes into action to operate the controlling-valve 50 to admit motive fluid to the rear piston-chamber of the motive cylinder 29 to force the piston 30 thereof forward and by means of its yoke 31 impart the outward overmovement to the pincers mechanism to lay the shoe-upper upon the shoe-insole carried by the last and hold the shoe-upper in such position while the operation of tacking of the shoe-upper to the insole is taking place. With the ending or near the ending of the above-described outward overmovement the cam 11 comes into action to carry the tacking and tack-driving mechanisms into their forward operative position over the shoe-last and by means of the spring pressure plate or wiper 106 presses the shoe-upper down upon the insole. The cam 7 now comes into action to operate the controlling-valve 111 to admit motive fluid to the upper end of the motor-cylinder 107 to impel the piston and tack-driving plunger 109 downward in a rapid and forcible manner to effect the operation of driving the tack. With such tacking of the shoe-upper upon the insole and with a continued rotation of the controlling cam-shafts the cam 6 again comes into action to operate the controlling-valve 46 to open the tubular bore of the plunger 19 to the atmosphere and permit of an opening of the jaws of the pincers mechanism to their initial position first described and ready for a fresh cycle of operations. Coincident with such opening movement of the pincers-jaws the cam 7 will again come into action to operate the controlling-valve 111 to open the upper end of the motor-cylinder 107 to the atmosphere and admit of the return of the tack-driving plunger to its normal raised position, and at the same

time the cam 11 again comes into action to draw the carriage of the tack-holding and tack-driving mechanisms rearward to their rearward and normal position. After such carriage reaches a rearward position the cam 12 comes into action to operate the controlling-valve 77 to admit motive fluid to the tack-elevating jet 76 in the first place and in the second place to admit motive fluid to the outer end of one or the other of the motor-cylinders 85 85, as the case may be, to swing the tack-box and the one or the other of the tack-races 79 to a central register with the tack-receiving recess 83 to deliver a tack thereto, and from which the tack will drop by gravity into the tack-holding hopper 105 of the tack-holding jaws 103 ready for a subsequent tack-driving operation of the machine. The turning movement of the pincers mechanism, as well as an individual lateral and a combined turning and lateral movement, are all common to the present type of lasting-machines and are adapted for use in lasting the heel and other rounding portions of the shoe-upper to prevent any puckering or wrinkling of the upper along the insole. In the present construction the above-mentioned turning movement of the pincers mechanism is governed by the knee of the operator, engaging in the knee-stirrup 66 of the bell-crank lever 65, connected in the manner heretofore described with the reversing-valve 56 of the pair of motor-cylinders 25 25, by which a turning movement is imparted to the pincers mechanism, and of the pair of motor-cylinders 32 32, by which an interdependent lateral movement is imparted to such pincers mechanism, the arrangement being such that the operator by shifting said lever 65 to a median line will cause the reversing-valve 56 to turn to a position cutting off motive fluid from both cylinders 25 25 and 32 32, and thus render the turning and lateral-movement mechanisms dormant or inactive. By shifting said lever 65 laterally to one side or the other of the median line aforesaid the reversing-valve 56 will be operated to admit motive fluid into one or the other of the motor-cylinders 25 25 32 32, and accordingly an interdepending turning and lateral movement will be imparted to the pincers mechanism in one direction or the other from the longitudinal axis of the machine, as required in the progress of the lasting operation and depending upon the direction in which the knee-lever is shifted. During the lasting operation and as the heel or other rounded portion of the shoe-upper is reached the broad end face-rest 99 will be turned up into an operative or active position, replacing the thin end face-rest 98 previously in use, so as to present a more extended side rest or abutment for such rounded portions of the shoe-upper. Such change in the side rests or abutments is adapted with the present construction to automatically switch the tack-feeding mechanism to feed from one tack-race or the other and a conse-

quent feed of a large or small tack, as the case may be. Such automatic change is effected in the present construction by the connection of the carrying-hub of said web with the semi-rotary valve member 92 of the reversing-valve 86 of the pair of motor-cylinders 85 85, so as to admit motive fluid to one or the other of said cylinders to operate the tack-feeding mechanism from one side or the other to the common median line at which a tack is delivered.

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

1. A lasting-machine having a pincers mechanism adapted to engage the upper, combined with a motor-engine having operative connection with said pincers mechanism and adapted to impart a pulling motion to such mechanism, and an automatically-operated valve controlling said motor-engine, substantially as set forth.

2. A lasting-machine having a pincers mechanism adapted to engage the upper, and comprising a pair of jaws capable of movement in common and one of which jaws is movable with relation to the other, combined with means for imparting a pulling motion to such mechanism, a motor-engine having operative connection with the independently-movable jaw of the pincers mechanism, and an automatically-operated valve controlling said motor-engine, substantially as set forth.

3. A lasting-machine having a pincers mechanism adapted to engage the upper, and comprising a pair of jaws capable of movement in common and one of which jaws is movable with relation to the other, combined with a motor-engine for imparting a pulling motion to such mechanism, a motor-engine having operative connection with the independently-movable jaw of the pincers mechanism, and a pair of automatically-operated valves controlling said motor-engines, substantially as set forth.

4. A lasting-machine having a pincers mechanism adapted to engage the upper, combined with a single-acting motor-engine for imparting a pulling motion to such mechanism, and an automatically-operated valve controlling said motor-engine, substantially as set forth.

5. A lasting-machine having a pincers mechanism adapted to engage the upper, and comprising a pair of jaws capable of movement in common and one of which jaws is movable with relation to the other, combined with a single-acting motor-engine for imparting a pulling motion to such mechanism, a motor-engine having operative connection with the independently-movable jaw of the pincers mechanism, and a pair of automatically-operated valves controlling said motor-engines, substantially as set forth.

6. A lasting-machine having a pincers mechanism adapted to engage the upper, and comprising a pair of jaws capable of movement in common and one of which jaws is movable with

relation to the other, combined with a single-acting motor-engine for imparting a pulling motion to such mechanism, a single-acting motor-engine having operative connection with the independently-movable jaw of the pincers mechanism, a spring tending to move the pincers-jaws into an open condition, and a pair of automatically-operated valves controlling said motor-engines, substantially as set forth.

7. A lasting-machine having a pincers mechanism adapted to engage the upper, combined with a motor-engine having operative connection with said pincers mechanism and adapted to impart a pulling motion to said mechanism, a valve controlling said motor-engine, a cam-shaft revolubly mounted on the machine-frame, and a cam carried by said shaft and having operative connection with the said valve, substantially as set forth.

8. A lasting-machine having a pincers mechanism adapted to engage the upper, and comprising a pair of jaws capable of movement in common and one of which jaws is movable with relation to the other, combined with means for imparting a pulling motion to such mechanism, a motor-engine having operative connection with the independently-movable jaw of the pincers mechanism, a valve controlling said motor-engine, a cam-shaft revolubly mounted on the machine-frame, and a cam carried by said shaft and having operative connection with said valve, substantially as set forth.

9. A lasting-machine having a pincers mechanism adapted to engage the upper, and comprising a pair of jaws capable of movement in common and one of which jaws is movable with relation to the other, combined with a motor-engine for imparting a pulling motion to such mechanism, a motor-engine having operative connection with the independently-movable jaw of the pincers mechanism, a pair of valves controlling said motor-engines, a cam-shaft revolubly mounted on the machine-frame, and cams carried by said shaft and having operative connections with said valves, substantially as set forth.

10. A lasting-machine having a pincers mechanism adapted to engage the upper, combined with a single-acting motor-engine for imparting a pulling motion to such mechanism, a valve controlling said motor-engine, a cam-shaft revolubly mounted on the machine-frame, and a cam carried by said shaft and having operative connection with said valve, substantially as set forth.

11. A lasting-machine having a pincers mechanism adapted to engage the upper, and comprising a pair of jaws capable of movement in common and one of which jaws is movable with relation to the other, combined with a single-acting motor-engine for imparting a pulling motion to such mechanism, a motor-engine having operative connection with the independently-movable jaw of the pincers mechanism, a pair of valves control-

ling said motor-engines, a cam-shaft revolubly mounted on the main frame, and cams carried by said shaft and having operative connections with said valves, substantially as set forth.

12. A lasting-machine having a pincers mechanism adapted to engage the upper, and comprising a pair of jaws capable of movement in common and one of which jaws is movable with relation to the other, combined with a single-acting motor-engine for imparting a pulling motion to such mechanism, a single-acting motor-engine having operative connection with the independently-movable jaw of the pincers mechanism, a spring tending to move the pincers-jaws into an open condition, a pair of valves controlling said motor-engines, a cam-shaft revolubly mounted on the main frame, and cams carried by said shaft and having operative connections with said valves, substantially as set forth.

13. A lasting-machine having a pincers mechanism adapted to engage the upper, combined with means for imparting a pulling motion to such mechanism, a motor-engine having operative connection with the pincers mechanism and adapted to impart a turning movement to the same, and an automatically-operated valve controlling said motor-engine, substantially as set forth.

14. A lasting-machine having a pincers mechanism adapted to engage the upper, combined with means for imparting a pulling motion to such mechanism, a pair of single-acting motor-cylinders arranged transversely of the machine, a piston common to both cylinders and having operative engagement with the pincers mechanism and adapted to impart a turning movement to the same, and an automatically-operated valve controlling the flow of motive fluid to said cylinders, substantially as set forth.

15. A lasting-machine having a pincers mechanism adapted to engage the upper, combined with means for imparting a pulling motion to such mechanism, a motor-engine having operative connection with the pincers mechanism and adapted to impart a turning movement to the same, an automatically-operated valve controlling said motor-engine, and a manually-operated reversing-valve for governing the direction of the pincers mechanism, substantially as set forth.

16. A lasting-machine having a pincers mechanism adapted to engage the upper, combined with means for imparting a pulling motion to such mechanism, a pair of single-acting motor-cylinders arranged transversely of the machine, a piston common to both cylinders and having operative engagement with the pincers mechanism and adapted to impart a turning movement to the same, an automatically-operated valve controlling motive fluid to such cylinders, and a manually-operated reversing-valve for governing the direction of the turning movement of the pincers mechanism, substantially as set forth.

17. A lasting-machine having a pincers mechanism adapted to engage the upper, combined with means for imparting a pulling motion to such mechanism, a pair of single-acting motor-cylinders arranged transversely of the machine, a piston common to both cylinders and having operative engagement with the pincers mechanism by engaging recesses and projections on the respective parts and adapted to impart a turning movement to such mechanism, and an automatically-operated valve controlling motive fluid to said cylinders, substantially as set forth.

18. A lasting-machine having a pincers mechanism adapted to engage the upper, combined with means for imparting a pulling motion to such mechanism, a motor-engine having operative connection with the pincers mechanism and adapted to impart a turning movement to the same, a spring adapted to return the parts to a normal and central position, and an automatically-operated valve controlling said motor-engine, substantially as set forth.

19. A lasting-machine having a pincers mechanism adapted to engage the upper, combined with means for imparting a pulling motion to such mechanism, a pair of single-acting motor-cylinders arranged transversely of the machine, a piston common to both cylinders and having operative engagement with the pincers mechanism and adapted to impart a turning movement to the same, a spring adapted to return the parts to a normal central position, and an automatically-operated valve controlling motive fluid to said cylinders, substantially as set forth.

20. A lasting-machine having a pincers mechanism adapted to engage the upper, combined with means for imparting a pulling motion to such mechanism, a pair of single-acting motor-cylinders arranged transversely of the machine, a piston common to both cylinders and having operative engagement with the pincers mechanism by engaging recesses and projections on the respective parts and adapted to impart a turning movement to such mechanism, a spring adapted to return the parts to a normal central position, and an automatically-operated valve controlling the flow of motive fluid to said cylinders, substantially as set forth.

21. A lasting-machine having a pincers mechanism adapted to engage the upper, combined with means for imparting a pulling motion to such mechanism, a motor-engine having operative connection with the pincers mechanism and adapted to impart a turning movement to the same, a valve controlling said motor-engine, a cam-shaft revolubly mounted on the machine-frame, and a cam carried by said shaft and having operative connection with said valve, substantially as set forth.

22. A lasting-machine having a pincers mechanism adapted to engage the upper, combined with means for imparting a pulling mo-

tion to such mechanism, a pair of single-acting motor-cylinders arranged transversely of the machine, a piston common to both cylinders and having operative engagement with the pincers mechanism and adapted to impart a turning movement to the same, a valve controlling the flow of motive fluid to said cylinders, a cam-shaft revolubly mounted on the machine-frame, a cam carried by said shaft and having operative connection with said valve, substantially as set forth.

23. A lasting-machine having a pincers mechanism adapted to engage the upper, combined with means for imparting a pulling motion to such mechanism, a pair of single-acting motor-cylinders arranged transversely of the machine, a piston common to both cylinders and having operative engagement with the pincers mechanism by engaging recesses and projections on the respective parts and adapted to impart a turning movement to said mechanism, a valve controlling the flow of motive fluid to said cylinders, a cam-shaft revolubly mounted on the machine-frame, a cam carried by said shaft and having operative connection with said valve, substantially as set forth.

24. A lasting-machine having a pincers mechanism adapted to engage the upper, combined with means for imparting a pulling motion to such mechanism, a motor-engine having operative connection with the pincers mechanism and adapted to impart a turning movement to the same, a spring adapted to return the parts to a normal and central position, a valve controlling said motor-engine, a cam-shaft revolubly mounted on the machine-frame, a cam carried by said shaft and having operative connection with said valve, substantially as set forth.

25. A lasting-machine having a pincers mechanism adapted to engage the upper, combined with means for imparting a pulling motion to such mechanism, a pair of single-acting motor-cylinders arranged transversely of the machine, a piston common to both cylinders and having operative engagement with the pincers mechanism and adapted to impart a turning movement to the same, a spring adapted to return the parts to a normal central relation, a valve controlling the flow of motive fluid to said cylinders, a cam-shaft revolubly mounted on the machine-frame, a cam carried by said shaft and having operative connection with said valve, substantially as set forth.

26. A lasting-machine having a pincers mechanism adapted to engage the upper, combined with means for imparting a pulling motion to such mechanism, a pair of single-acting motor-cylinders arranged transversely of the machine, a piston common to both cylinders and having operative engagement with the pincers mechanism by engaging recesses and projections on the respective parts and adapted to impart a turning movement to such mechanism, a spring adapted to return the

parts to a normal central position, a valve controlling the flow of motive fluid to said cylinders, a cam-shaft revolubly mounted on the machine-frame, a cam carried by said shaft and having operative connection with said valve, substantially as set forth.

27. A lasting-machine having a pincers mechanism adapted to engage the upper, combined with means for imparting a pulling motion to such mechanism, a motor-engine having operative connection with the pincers mechanism and adapted to impart a lateral movement to the same, means for returning the pincers mechanism to a central position and an automatically-operated valve controlling said motor-engine, substantially as set forth.

28. A lasting-machine having a pincers mechanism adapted to engage the upper, combined with means for imparting a pulling motion to such mechanism, a pair of single-acting motor-cylinders arranged transversely of the machine, individual pistons in said cylinders and having operative engagement with the pincers mechanism and adapted to impart a lateral movement to the same, and an automatically-operated valve controlling the flow of motive fluid to said cylinders, substantially as set forth.

29. A lasting-machine having a pincers mechanism adapted to engage the upper, combined with means for imparting a pulling motion to such mechanism, a motor-engine having operative connection with the pincers mechanism and adapted to impart a turning movement to the same, a motor-engine having operative connection with the pincers mechanism and adapted to impart a lateral movement to the same, means for returning the pincers mechanism to a central position and an automatically-operated valve mutually controlling said motor-engines, substantially as set forth.

30. A lasting-machine having a pincers mechanism adapted to engage the upper, combined with means for imparting a pulling motion to such mechanism, a pair of single-acting motor-cylinders arranged transversely of the machine, individual pistons in said cylinders and having operative engagement with the pincers mechanism and adapted to impart a lateral movement to the same, an automatically-operated valve controlling supply of motive fluid to said cylinders, and a manually-operated reversing-valve for governing the direction of the turning and lateral movements of the pincers mechanism, substantially as set forth.

31. A lasting-machine having a pincers mechanism adapted to engage the upper, combined with means for imparting a pulling motion to such mechanism, a motor-engine having operative connection with the pincers mechanism and adapted to impart a turning movement to the same, a motor-engine having operative connection with the pincers mechanism and adapted to impart lateral

movement to the same, means for returning the pincers mechanism to a central position, an automatically-operated valve mutually controlling said motor-engines, and a manually-operated reversing-valve for governing the direction of the turning and lateral movements of the pincers mechanism, substantially as set forth.

32. A lasting-machine having a pincers mechanism adapted to engage the upper, combined with means for imparting a pulling motion to such mechanism, a motor-engine comprising a pair of single-acting motor-cylinders arranged transversely of the machine, a piston common to both cylinders and having operative engagement with the pincers mechanism and adapted to impart a turning movement to the same, a motor-engine having operative connection with the pincers mechanism and adapted to impart a lateral movement to the same, means for returning the pincers mechanism to a central position and an automatically-operated valve mutually controlling the said motor-engines substantially as set forth.

33. A lasting-machine having a pincers mechanism adapted to engage the upper, combined with means for imparting a pulling motion to such mechanism, a motor-engine comprising a pair of single-acting motor-cylinders arranged transversely of the machine, a piston common to both cylinders and having operative engagement with the pincers mechanism by engaging recesses and projections on the respective parts and adapted to impart a turning movement to the same, a motor-engine having operative connection with the pincers mechanism and adapted to impart a lateral movement to the same, means for returning the pincers mechanism to a central position and an automatically-operated valve controlling the said motor-engines, substantially as set forth.

34. A lasting-machine having a pincers mechanism adapted to engage the upper, combined with means for imparting a pulling motion to such mechanism, a motor-engine having operative connection with the pincers mechanism and adapted to impart a turning movement to the same, a spring adapted to return the parts to a normal and central position, a motor-engine having operative connection with the pincers mechanism and adapted to impart a lateral movement to the same in one direction, means for returning the pincers mechanism to a central position and an automatically-operated valve mutually controlling the motor-engines, substantially as set forth.

35. A lasting-machine having a pincers mechanism adapted to engage the upper, combined with means for imparting a pulling motion to such mechanism, a motor-engine comprising a pair of single-acting motor-cylinders arranged transversely of the machine, a piston common to both cylinders and having operative engagement with the pincers mechanism

anism and adapted to impart a turning movement to the same, a spring adapted to return the parts to a normal central position, a motor-engine having operative connection with the pincers mechanism and adapted to impart a lateral movement to the same in one direction, means for returning the pincers mechanism to a central position and an automatically-operating valve mutually controlling the motor-engines, substantially as set forth.

36. A lasting-machine having a pincers mechanism adapted to engage the upper, combined with means for imparting a pulling motion to such mechanism, a motor-engine having operative connection with the pincers mechanism and adapted to impart a turning movement to the same, a spring adapted to return the parts to a normal and central position, a motor-engine having operative connection with the pincers mechanism and adapted to impart a lateral movement to the same in one direction, means for returning the pincers mechanism to a central position, an automatically-operating valve mutually controlling the motor-engines, and a manually-operated reversing-valve for governing the direction of the turning and lateral movements of the pincers mechanism substantially as set forth.

37. A lasting-machine having a pincers mechanism adapted to engage the upper, combined with means for imparting a pulling motion to such mechanism, a motor-engine comprising a pair of single-acting motor-cylinders arranged transversely of the machine, a piston common to both cylinders and having operative engagement with the pincers mechanism, and adapted to impart a turning movement to the same, a spring adapted to return the parts to a normal central position, a motor-engine having operative connection with the pincers mechanism and adapted to impart a lateral movement to the same in one direction, means for returning the pincers mechanism to a central position, an automatically-operating valve mutually controlling the motor-engines, and a manually-operated reversing-valve for governing the direction of the turning and lateral movements of the pincers mechanism, substantially as set forth.

38. A lasting-machine having a pincers mechanism adapted to engage the upper, combined with means for imparting a pulling motion to such mechanism, a motor-engine comprising a pair of single-acting motor-cylinders arranged transversely of the machine, a piston common to both cylinders and having operative engagement with the pincers mechanism by engaging recesses and projections on the respective parts and adapted to impart a turning movement to such mechanism, a spring adapted to return the parts to a normal central position, a motor-engine having operative connection with the pincers mechanism and adapted to impart a lateral movement to the same in one direction, means for

returning the pincers mechanism to a central position and an automatically-operated valve mutually controlling the said motor-engines, substantially as set forth.

39. A lasting-machine having a pincers mechanism adapted to engage the upper, combined with means for imparting a pulling motion to such mechanism, a motor-engine having operative connection with the pincers mechanism and adapted to impart a turning movement to the same, a motor-engine having operative connection with the pincers mechanism and adapted to impart a lateral movement to the same in one direction, a valve mutually controlling said motor-engines, a cam-shaft revolubly mounted on the machine-frame, means for returning the pincers mechanism to a central position and a cam carried by said shaft and having operative connection with said valve, substantially as set forth.

40. A lasting-machine having a pincers mechanism adapted to engage the upper, combined with means for imparting a pulling motion to such mechanism, a motor-engine comprising a pair of single-acting motor-cylinders arranged transversely of the machine, a piston common to both cylinders and having operative engagement with the pincers mechanism and adapted to impart a turning movement to the same, a motor-engine having operative connection with the pincers mechanism and adapted to impart lateral movement to the same in one direction, a valve mutually controlling said motor-engines, a cam-shaft revolubly mounted on the machine-frame, means for returning the pincers mechanism to a central position and a cam carried by said shaft and having operative connection with said valve, substantially as set forth.

41. A lasting-machine having a pincers mechanism adapted to engage the upper, combined with means for imparting a pulling motion to such mechanism, a motor-engine comprising a pair of single-acting motor-cylinders arranged transversely of the machine, a piston common to both cylinders and having operative engagement with the pincers mechanism by engaging recesses and projections on the respective parts adapted to impart a turning movement to said mechanism, a motor-engine having operative connection with the pincers mechanism and adapted to impart a lateral movement to the same in one direction, a valve mutually controlling said motor-engines, a cam-shaft revolubly mounted on the machine-frame, means for returning the pincers mechanism to a central position and a cam carried by said shaft and having operative connection with said valve, substantially as set forth.

42. A lasting-machine having a pincers mechanism adapted to engage the upper, combined with means for imparting a pulling motion to such mechanism, a motor-engine having operative connection with the pincers mechanism and adapted to impart a turning movement to the same, a spring adapted to

return the parts to a normal and central position, a motor-engine having operative connection with the pincers mechanism and adapted to impart a lateral movement to the same in one direction, a valve mutually controlling said motor-engines, a cam-shaft revolvably mounted on the machine-frame, means for returning the pincers mechanism to a central position and a cam carried by said shaft and having operative connection with said valve, substantially as set forth.

43. A lasting-machine having a pincers mechanism adapted to engage the upper, combined with means for imparting a pulling motion to such mechanism, a motor-engine comprising a pair of single-acting motor-cylinders arranged transversely of the machine, a piston common to both cylinders and having operative engagement with the pincers mechanism and adapted to impart a turning movement to such mechanism, a spring adapted to return the parts to a normal central position, a motor-engine having operative connection with the pincers mechanism and adapted to impart a lateral movement to the same in one direction, a valve mutually controlling said motor-engines, a cam-shaft revolvably mounted on the machine-frame, means for returning the pincers mechanism to a central position and a cam carried by said shaft and having operative connection with said valve, substantially as set forth.

44. A lasting-machine having a pincers mechanism adapted to engage the upper, combined with means for imparting a pulling motion to such mechanism, a motor-engine comprising a pair of single-acting motor-cylinders arranged transversely of the machine, a piston common to both cylinders and having operative engagement with the pincers mechanism by engaging recesses and projections on the respective parts and adapted to impart a turning movement to said mechanism, a spring adapted to return the parts to a central normal position, a motor-engine having operative connection with the pincers mechanism and adapted to impart a lateral movement to the same in one direction, a valve mutually controlling said motor-engines, a cam-shaft revolvably mounted on the machine-frame, means for returning the pincers mechanism to a central position and a cam carried by said shaft and having operative connection with said valve, substantially as set forth.

45. A lasting-machine having a pincers mechanism adapted to engage the upper, combined with means for imparting a pulling motion to such mechanism, a motor-engine having operative connection with the pincers mechanism and adapted to impart a turning movement to the same, a motor-engine comprising a pair of single-acting motor-cylinders arranged transversely of the machine, individual pistons in said cylinders connected to opposite sides of the pincers mechanism and adapted to impart lateral motion to the same,

and an automatically-operated valve mutually controlling said motor-engines substantially as set forth.

46. A lasting-machine having a pincers mechanism adapted to engage the upper, combined with means for imparting a pulling motion to such mechanism, a motor-engine comprising a pair of single-acting motor-cylinders arranged transversely of the machine, a piston common to both cylinders and having operative engagement with the pincers mechanism and adapted to impart a turning movement to the same, a motor-engine comprising a pair of single-acting motor-cylinders arranged transversely of the machine, individual pistons in said cylinders connected to opposite sides of the pincers mechanism and adapted to impart lateral motion to the same, and an automatically-operated valve mutually controlling said motor-engines, substantially as set forth.

47. A lasting-machine having a pincers mechanism adapted to engage the upper, combined with means for imparting a pulling motion to such mechanism, a motor-engine comprising a pair of single-acting motor-cylinders arranged transversely of the machine, a piston common to both cylinders and having operative engagement with the pincers mechanism by engaging recesses and projections on the respective parts and adapted to impart a turning movement to the pincers mechanism, a motor-engine comprising a pair of single-acting motor-cylinders arranged transversely of the machine, individual pistons in said cylinders connected to opposite sides of the pincers mechanism and adapted to impart lateral motion to the same, and an automatically-operated valve mutually controlling said motor-engines, substantially as set forth.

48. A lasting-machine having a pincers mechanism adapted to engage the upper, combined with means for imparting a pulling motion to such mechanism, a motor-engine having operative connection with the pincers mechanism and adapted to impart a turning movement to the same, a spring adapted to return the parts to a normal and central position, a motor-engine comprising a pair of single-acting motor-cylinders arranged transversely of the machine, individual pistons in said cylinders connected to opposite sides of the pincers mechanism and adapted to impart lateral motion to the same, and an automatically-operated valve mutually controlling said motor-engines, substantially as set forth.

49. A lasting-machine having a pincers mechanism adapted to engage the upper, combined with means for imparting a pulling motion to such mechanism, a motor-engine comprising a pair of single-acting motor-cylinders arranged transversely of the machine, a piston common to both cylinders and having operative engagement with the pincers mechanism and adapted to impart a turning move-

ment to the same, a spring adapted to return the parts to a normal central position, a motor-engine comprising a pair of single-acting motor-cylinders arranged transversely of the machine, individual pistons in said cylinders connected to opposite sides of the pincers mechanism and adapted to impart lateral motion to the same, and an automatically-operated valve mutually controlling said motor-engines, substantially as set forth.

50. A lasting-machine having a pincers mechanism adapted to engage the upper, combined with means for imparting a pulling motion to such mechanism, a motor-engine comprising a pair of single-acting motor-cylinders arranged transversely of the machine, a piston common to both cylinders and having operative engagement with the pincers mechanism by engaging recesses and projections on the respective parts and adapted to impart a turning movement to such mechanism, a spring adapted to return the parts to a normal central position, a motor-engine comprising a pair of single-acting motor-cylinders arranged transversely of the machine, individual pistons in said cylinders connected to opposite sides of the pincers mechanism and adapted to impart lateral motion to the same, and an automatically-operated valve mutually controlling said motor-engines, substantially as set forth.

51. A lasting-machine having a pincers mechanism adapted to engage the upper, combined with means for imparting a pulling motion to such mechanism, a motor-engine having operative connection with the pincers mechanism and adapted to impart a turning movement to the same, a motor-engine comprising a pair of single-acting motor-cylinders arranged transversely of the machine, individual pistons in said cylinders connected to opposite sides of the pincers mechanism and adapted to impart lateral motion to the same, a valve mutually controlling said motor-engines, a cam-shaft revolubly mounted on the machine-frame, and a cam carried by said shaft and having operative connection with said valve, substantially as set forth.

52. A lasting-machine having a pincers mechanism adapted to engage the upper, combined with means for imparting a pulling motion to such mechanism, a motor-engine comprising a pair of single-acting motor-cylinders arranged transversely of the machine, a piston common to both cylinders and having operative engagement with the pincers mechanism and adapted to impart a turning movement to the same, a motor-engine comprising a pair of single-acting motor-cylinders arranged transversely of the machine, individual pistons in said cylinders connected to opposite sides of the pincers mechanism and adapted to impart lateral motion to the same, a valve mutually controlling said motor-engines, a cam-shaft revolubly mounted on the machine-frame, and a cam carried by said shaft and

having operative connection with said valve, substantially as set forth.

53. A lasting-machine having a pincers mechanism adapted to engage the upper, combined with means for imparting a pulling motion to such mechanism, a motor-engine comprising a pair of single-acting motor-cylinders arranged transversely of the machine, a piston common to both cylinders and having operative engagement with the pincers mechanism by engaging recesses and projections on the respective parts adapted to impart a turning movement to said mechanism, a motor-engine comprising a pair of single-acting motor-cylinders arranged transversely of the machine, individual pistons in said cylinders connected to opposite sides of the pincers mechanism and adapted to impart lateral motion to the same, a valve mutually controlling said motor-engines, a cam-shaft revolubly mounted on the machine-frame, and a cam carried by said shaft and having operative connection with said valve, substantially as set forth.

54. A lasting-machine having a pincers mechanism adapted to engage the upper, combined with means for imparting a pulling motion to such mechanism, a motor-engine having operative connection with the pincers mechanism and adapted to impart a turning movement to the same, a spring adapted to return the parts to a normal central position, a motor-engine comprising a pair of single-acting motor-cylinders arranged transversely of the machine, individual pistons in said cylinders connected to opposite sides of the pincers mechanism and adapted to impart lateral motion to the same, a valve mutually controlling said motor-engines, a cam-shaft revolubly mounted on the machine-frame, and a cam carried by said shaft and having operative connection with said valve, substantially as set forth.

55. A lasting-machine having a pincers mechanism adapted to engage the upper, combined with means for imparting a pulling motion to such mechanism, a motor-engine comprising a pair of single-acting motor-cylinders arranged transversely of the machine, a piston common to both cylinders and having operative engagement with the pincers mechanism and adapted to impart a turning movement to such mechanism, a spring adapted to return the parts to a normal central position, a motor-engine comprising a pair of single-acting motor-cylinders arranged transversely of the machine, individual pistons in said cylinders connected to opposite sides of the pincers mechanism and adapted to impart lateral motion to the same, a valve mutually controlling said motor-engines, a cam-shaft revolubly mounted on the machine-frame, and a cam carried by said shaft and having operative connection with said valve, substantially as set forth.

56. A lasting-machine having a pincers mechanism adapted to engage the upper, com-

bined with means for imparting a pulling motion to such mechanism, a motor-engine comprising a pair of single-acting motor-cylinders arranged transversely of the machine, a piston common to both cylinders and having operative engagement with the pincers mechanism by engaging recesses and projections on the respective parts and adapted to impart a turning movement to said mechanism, a spring adapted to return the parts to a central and normal position, a motor-engine comprising a pair of single-acting motor-cylinders arranged transversely of the machine, individual pistons in said cylinders connected to opposite sides of the pincers mechanism and adapted to impart lateral motion to the same, a valve mutually controlling said motor-engines, a cam-shaft revolubly mounted on the machine-frame, and a cam carried by said shaft and having operative connection with said valve, substantially as set forth.

57. A lasting - machine having a pincers mechanism adapted to engage the upper, combined with means for imparting a pulling motion to said mechanism, a motor-engine having operative connection with the pincers mechanism and adapted to impart an outward overmovement to the same, and an automatically-operated valve controlling said motor-engine, substantially as set forth.

58. A lasting - machine having a pincers mechanism adapted to engage the upper combined with a motor-engine for imparting a pulling motion to such mechanism, a motor-engine having operative connection with the pincers mechanism and adapted to impart an outward overmovement to the same, and a pair of automatically-operated valves controlling said motor-engines, substantially as set forth.

59. A lasting - machine having a pincers mechanism adapted to engage the upper, combined with a single-acting motor-engine for imparting a pulling motion to such mechanism, a single-acting motor-engine having operative connection with the movable jaw of the pincers mechanism, a spring tending to move the pincer-jaws into an open condition, a motor-engine having operative connection with the pincers mechanism and adapted to impart an outward overmovement to the same, and automatically-operated valves controlling said motor-engines, substantially as set forth.

60. A lasting - machine having a pincers mechanism adapted to engage the upper, combined with means for imparting a pulling motion to said mechanism, a single-acting motor-engine adapted to impart an outward overmovement to said mechanism, a spring adapted to impart an inward overmovement to said mechanism, and an automatically-operated valve controlling said motor-engine, substantially as set forth.

61. A lasting - machine having a pincers mechanism adapted to engage the upper combined with means for imparting a pulling motion to said mechanism, a motor-engine hav-

ing operative connection with the pincers mechanism and adapted to impart an outward overmovement to the same, a valve controlling said motor-engine, a cam-shaft revolubly mounted on the machine-frame, and a cam carried by said shaft and having operative connection with said valve, substantially as set forth.

62. A lasting - machine having a pincers mechanism adapted to engage the upper and comprising a pendent cylinder constituting the suspension-hanger of the mechanism, a tubular plunger arranged in said cylinder, a piston arranged in the bore of said plunger and having a downwardly-extending piston-rod, a pincer-jaw secured to the lower end of the plunger and a companion pincer-jaw secured to the lower end of the piston-rod, combined with a pair of automatically-operated valves controlling the supply of motive fluid to actuate said mechanisms, substantially as set forth.

63. A lasting - machine having a pincers mechanism adapted to engage the upper and comprising a pendent cylinder constituting the suspension-hanger of the mechanism, a tubular plunger arranged in said cylinder, a piston arranged in the bore of said plunger and having a downwardly-extending piston-rod, a pincer-jaw secured to the lower end of the plunger and a companion pincer-jaw secured to the lower end of the piston-rod, combined with a spring tending to move said piston-head upward, and a pair of automatically-operated valves controlling the supply of motive fluid to actuate said mechanisms, substantially as set forth.

64. A lasting - machine having a pincers mechanism adapted to engage the upper and comprising a pendent cylinder constituting the suspension-hanger of the mechanism, a tubular plunger arranged in said cylinder and provided with a stop-cap at its upper end, a piston arranged in the bore of said plunger and having a downwardly-extending piston-rod, a pincer-jaw secured to the lower end of the plunger, and a companion pincer-jaw secured to the lower end of the piston-rod, combined with a pair of automatically-operated valves controlling the supply of motive fluid to actuate said mechanisms, substantially as set forth.

65. A lasting - machine having a pincers mechanism adapted to engage the upper and comprising a pendent cylinder constituting the suspension-hanger of the mechanism, a tubular plunger arranged in said cylinder, a piston arranged in the bore of said plunger and having a downwardly-extending piston-rod, a pincer-jaw secured to the lower end of the plunger, and a companion pincer-jaw secured to the lower end of the piston-rod, combined with a transversely-arranged motor-engine having operative connection with said tubular plunger and adapted to impart a turning movement to the same, a pivot-yoke supporting said pendent cylinder and motor-

engine, pivot-lugs on the pendent cylinder having pivotal connection with the transversely-arranged motor-engine, a motor-engine adapted to impart a forward overmovement to the pincers mechanism, and a series of valves operating in unison to control the supply of motive fluid to actuate said mechanisms, substantially as set forth.

66. A lasting-machine having a pincers mechanism adapted to engage the upper and comprising a pendent cylinder constituting the suspension-hanger of the mechanism, a tubular plunger arranged in said cylinder, a piston arranged in the bore of said plunger and having a downwardly-extending piston-rod, a pincer-jaw secured to the lower end of the plunger and a companion pincer-jaw secured to the lower end of the piston-rod, combined with a transversely-arranged motor-engine having operative connection with said tubular plunger and adapted to impart a turning movement to the same, a pivot-yoke supporting said pendent cylinder and motor-engine, pivot-lugs on the pendent cylinder having pivotal connection with the transversely-arranged motor-engine, a motor-engine adapted to impart a forward overmovement to the pincers mechanism, a pair of transversely-arranged motor-engines adapted to impart lateral movement to the pendent cylinder, and a series of valves operating in unison to control the supply of motive fluid to actuate said mechanisms, substantially as set forth.

67. A lasting-machine having a pincers mechanism adapted to engage the upper and comprising a pendent cylinder constituting the suspension-hanger of the mechanism, a tubular plunger arranged in said cylinder, a piston arranged in the bore of said plunger and having a downwardly-extending piston-rod, a pincer-jaw secured to the lower end of the plunger, and a companion pincer-jaw secured to the lower end of the piston-rod, combined with a transversely-arranged motor-engine having operative connection with said tubular plunger and adapted to impart a turning movement to the same, a pivot-yoke supporting said pendent cylinder and motor-engine, pivot-lugs on the pendent cylinder having pivotal connection with the transversely-arranged motor-engine, a motor-engine adapted to impart a forward overmovement to the pincers mechanism, a series of valves controlling the supply of motive fluid to actuate said mechanisms, cam-shafts revolubly mounted in the machine-frame, and a series of cams carried by said shafts and having operative connection with said valves, substantially as set forth.

68. A lasting-machine having a pincers mechanism adapted to engage the upper and comprising a pendent cylinder constituting the suspension-hanger of the mechanism, a tubular plunger arranged in said cylinder, a piston arranged in the bore of said plunger and having a downwardly-extending piston-

rod, a pincer-jaw secured to the lower end of the plunger and a companion pincer-jaw secured to the lower end of the piston-rod, combined with a transversely-arranged motor-engine having operative connection with said tubular plunger and adapted to impart a turning movement to the same, a pivot-yoke supporting said pendent cylinder and motor-engine, pivot-lugs on the pendent cylinder having pivotal connection with the transversely-arranged motor-engine, a motor-engine adapted to impart a forward overmovement to the pincers mechanism, a pair of transversely-arranged motor-engines adapted to impart lateral movement to the pendent cylinder, a series of valves controlling the supply of motive fluid to actuate said mechanisms, cam-shafts revolubly mounted in the machine-frame, and a series of cams carried by said shafts and having operative connection with said valves, substantially as set forth.

69. A lasting-machine having a pincers mechanism adapted to engage the upper and comprising a pendent cylinder constituting the suspension-hanger of the mechanism, a tubular plunger arranged in said cylinder, a piston arranged in the bore of said plunger and having a downwardly-extending piston-rod, a pincer-jaw secured to the lower end of the plunger, and a companion pincer-jaw secured to the lower end of the piston-rod, combined with a transversely-arranged motor-engine having operative connection with said tubular plunger and adapted to impart a turning movement to the same, a pivot-yoke supporting said pendent cylinder and motor-engine, pivot-lugs on the pendent cylinder having pivotal connection with the transversely-arranged motor-engine, a motor-engine adapted to impart a forward overmovement to the pincers mechanism, a manually-operated reversing-valve for governing the direction of the turning movement of the pincers mechanism, and a series of valves operating in unison to control the supply of motive fluid to actuate said mechanisms, substantially as set forth.

70. A lasting-machine having a pincers mechanism adapted to engage the upper, and comprising a pendent cylinder constituting the suspension-hanger of the mechanism, a tubular plunger arranged in said cylinder, a piston arranged in the bore of said plunger and having a downwardly-extending piston-rod, a pincer-jaw secured to the lower end of the plunger and a companion pincer-jaw secured to the lower end of the piston-rod combined with a transversely-arranged motor-engine having operative connection with said tubular plunger and adapted to impart a turning movement to the same, a pivot-yoke supporting said pendent cylinder and motor-engine, pivot-lugs on the pendent cylinder having pivotal connection with the transversely-arranged motor-engine, a motor-engine adapted to impart a forward overmovement to the pincers mechanism, a pair of transversely-ar-

ranged motor-engines adapted to impart lateral movement to the pendent cylinder, a manually-operated reversing-valve for governing the direction of the turning movement of the pincers mechanism, and a series of valves operating in unison to control the supply of motive fluid to actuate said mechanisms, substantially as set forth.

71. A lasting-machine having a pincers mechanism adapted to engage the upper, combined with means for imparting a pulling motion to such mechanism, means for feeding and driving the tacks, the forwardly-moving tack-driving mechanism comprising a motor-cylinder, a piston within said cylinder, a tack-driving plunger forming part of such piston, an automatically-operated valve controlling the supply of motive fluid to said motor-cylinder, and a reciprocating slide having a forward movement in unison with the tack-driving mechanism and provided with a tack-holder in line with the tack-driving plunger, substantially as set forth.

72. A lasting-machine having a pincers mechanism adapted to engage the upper, combined with means for imparting a pulling motion to such mechanism, means for feeding and driving the tacks, the tack-driving mechanism comprising a motor-cylinder, a piston within said cylinder, a tack-driving plunger forming part of said piston, an automatically-operated valve controlling the supply of motive fluid to said motor-cylinder, and a reciprocating slide carrying said motor-cylinder and provided with a tack-holder in line with the tack-driving plunger, substantially as set forth.

73. A lasting-machine having a pincers mechanism adapted to engage the upper, combined with means for imparting a pulling motion to such mechanism, means for feeding and driving the tacks, the forwardly-moving tack-driving mechanism comprising a motor-cylinder, a piston within said cylinder, a tack-driving plunger forming part of such piston, an automatically-operated valve controlling supply of motive fluid to said motor-cylinder, a reciprocating slide having a forward movement in unison with the tack-driving mechanism and provided with a tack-holder in line with the tack-driving plunger, a cam-shaft revolubly mounted on the machine-frame, and a cam on said shaft having operative connection with the controlling-valve, substantially as set forth.

74. A lasting-machine having a pincers mechanism adapted to engage the upper, combined with means for imparting a pulling motion to such mechanism, means for feeding and driving the tacks, the forwardly-moving tack-driving mechanism comprising a motor-cylinder, a piston within said cylinder, a tack-driving plunger forming part of such piston, an automatically-operated valve controlling supply of motive fluid to said motor-cylinder, a reciprocating slide having a forward move-

ment in unison with the tack-driving mechanism and provided with a tack-holder in line with the tack-driving plunger, a cam-shaft revolubly mounted on the machine-frame, and a cam on said shaft having operative connection with the reciprocating slide, substantially as set forth.

75. A lasting-machine having a pincers mechanism adapted to engage the upper, combined with means for imparting a pulling motion to such mechanism, means for feeding and driving the tacks, the forwardly-moving tack-driving mechanism comprising a motor-cylinder, a piston within said cylinder, a tack-driving plunger forming part of such piston, an automatically-operated valve controlling supply of motive fluid to said motor-cylinder, a reciprocating slide having a forward movement in unison with the tack-driving mechanism and provided with a tack-holder in line with the tack-driving plunger, a cam-shaft revolubly mounted on the machine-frame, a pair of cams on said shaft having operative connection with the controlling-valve and with the reciprocating slide respectively, substantially as set forth.

76. A lasting-machine having a pincers mechanism adapted to engage the upper, combined with means for imparting a pulling motion to said mechanism, a central tack-holder, means for driving the tacks, a tack-box having duplicate tack-compartments, duplicate tack-races secured to the tack-box, and means for imparting lateral movement to the tack-box to one side or the other of a central line, the same comprising a motor-engine an automatic controlling-valve, a manually-operated reversing-valve and means for returning the tack-box to a central position, substantially as set forth.

77. A lasting-machine having a pincers mechanism adapted to engage the upper, combined with means for imparting a pulling motion to said mechanism, a central tack-holder, a tack-driving mechanism, a reciprocating slide carrying the tack holding and driving mechanism, a tack-box having duplicate tack-compartments, duplicate tack-races secured to the tack-box, and means for imparting lateral movement to the tack-box to one side or the other of a central line the same comprising a motor-engine, an automatic controlling-valve, a manually-operated reversing-valve and means for returning the tack-box to a central position, substantially as set forth.

78. A lasting-machine having a pincers mechanism adapted to engage the upper, combined with means for imparting a pulling motion to said mechanism, a central tack-holder, means for driving the tacks, a tack-box having duplicate tack-compartments, duplicate tack-races secured to the tack-box, and means for imparting lateral movement to the tack-box to one side or the other of a central line, the same comprising a pair of single-acting

motor-engines arranged transversely, an automatic controlling-valve and a manually-operated reversing-valve, substantially as set forth.

5 79. A lasting-machine having a pincers mechanism adapted to engage the upper, combined with means for imparting a pulling motion to said mechanism, a central tack-holder, a tack-driving mechanism, a reciprocating
10 slide carrying the tack holding and driving mechanism, a tack-box having duplicate tack-compartments, duplicate tack-races secured to the tack-box, and means for imparting lateral movement to the tack-box to one side or
15 the other of a central line, the same comprising a pair of single-acting motor-engines arranged transversely, an automatic controlling-valve, and a manually-operated reversing-valve substantially as set forth.

20 80. A lasting-machine having a pincers mechanism adapted to engage the upper, combined with means for imparting a pulling motion to said mechanism, a central tack-holder, means for driving the tacks, a tack-box having
25 duplicate tack-compartments, duplicate tack-races secured to the tack-box and means for imparting lateral movement to the tack-box to one side or the other of a central line, the same comprising a motor-engine, an automatic controlling-valve, a reversing-valve,
30 and a duplex side rest or abutment for the last having operative connection with the reversing-valve, substantially as set forth.

35 81. A lasting-machine having a pincers mechanism adapted to engage the upper, combined with means for imparting a pulling motion to said mechanism, a central tack-holder, means for driving the tacks, a tack-box having
40 duplicate tack-compartments, duplicate tack-races secured to the tack-box and means for imparting lateral movement to the tack-box to one side or the other of a central line, the same comprising a pair of single-acting motor-engines arranged transversely, an automatic controlling-valve, a reversing-valve,
45 and a duplex side rest or abutment for the last having operative connection with the reversing-valve, substantially as set forth.

50 82. A lasting-machine having a pincers mechanism adapted to engage the upper, combined with means for imparting a pulling motion to said mechanism, a central tack-holder, means for driving the tacks, a tack-box having a curved conduit extending from the lower
55 to the upper portion of the tack-box compartment, a tack-race secured to the tack-box, a jet-head arranged at the lower end of such conduit and adapted to discharge a jet of motive fluid into such conduit and means for
60 controlling such jet, substantially as set forth.

65 83. A lasting-machine having a pincers mechanism adapted to engage the upper, combined with means for imparting a pulling motion to said mechanism, a central tack-holder, means for driving the tacks, a tack-box having duplicate tack-compartments and dupli-

cate curved conduits extending from the lower to the upper portions of such compartments, duplicate tack-races secured to the tack-box, and jet-heads arranged at the lower ends of
70 said conduits and adapted to discharge jets of motive fluid into such conduits, substantially as set forth.

84. A lasting-machine having a pincers mechanism adapted to engage the upper, combined with means for imparting a pulling motion to said mechanism, a central tack-holder, means for driving the tacks, a tack-box having duplicate tack-compartments and duplicate curved conduits extending from the
80 lower to the upper portions of such compartments, duplicate tack-races secured to the tack-box, jet-heads arranged at the lower ends of said conduits and adapted to discharge jets of motive fluid into such conduits, and means for imparting lateral movement to the tack-box to one side or the other of a central line substantially as set forth. 85

85. A lasting-machine having a pincers mechanism adapted to engage the upper, combined with means for imparting a pulling motion to said mechanism, a central tack-holder, means for driving the tacks, a tack-box pivoted at its rear end and having duplicate tack-compartments and curved conduits extending from the lower to the upper portions
90 of such compartments, duplicate tack-races secured to the tack-box, and jet-heads arranged at the lower ends of said conduits and adapted to discharge jets of motive fluid into such conduits, substantially as set forth. 95 100

86. A lasting-machine having a pincers mechanism adapted to engage the upper, combined with means for imparting a pulling motion to said mechanism, a central tack-holder, means for driving the tacks, a tack-box having duplicate tack-compartments and duplicate curved conduits extending from the lower portions of such compartments, duplicate tack-races secured to the tack-box, jet-heads arranged at the lower ends of said conduits and adapted to discharge jets of motive fluid into such conduits, and means for imparting lateral movement to the tack-box to one side or the other of a central line, the same comprising a motor-engine, an automatic controlling-valve, a manually-operated reversing-valve, and means for returning the tack-box to a central position, substantially as set forth. 105 110 115 120

87. A lasting-machine having a pincers mechanism adapted to engage the upper, combined with means for imparting a pulling motion to said mechanism, a central tack-holder, means for driving the tacks, a tack-box having duplicate tack-compartments and duplicate curved conduits extending from the lower to the upper portions of such compartments, duplicate tack-races secured to the tack-box, jet-heads arranged at the lower end
125 of said conduits and adapted to discharge jets of motive fluid into such conduits, and 130

means for imparting lateral movement to the
tack-box to one side or the other of a central
line the same comprising a pair of single-act-
ing motor-engines arranged transversely, an
5 automatic controlling-valve and a manually-
operated reversing-valve, substantially as set
forth.

Signed at St. Louis, Missouri, this 13th day
of May, 1901.

CHARLES K. PICKLES.

Witnesses:

WM. H. OSMER,
W. W. NALL.