

(No Model.)

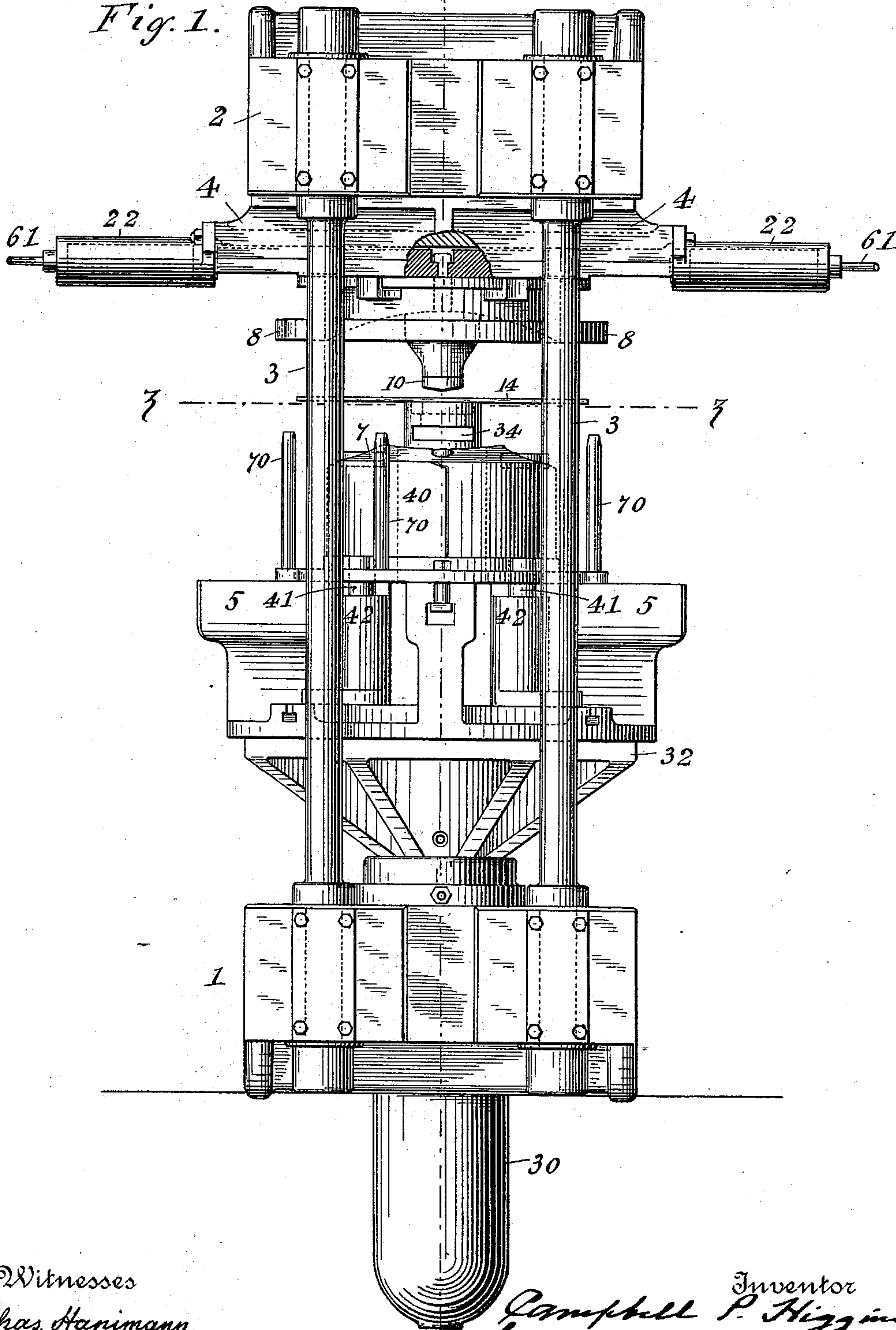
7 Sheets—Sheet 1.

C. P. HIGGINS.
PUNCHING AND FORMING MACHINE.

No. 521,858.

Patented June 26, 1894.

Fig. 1.



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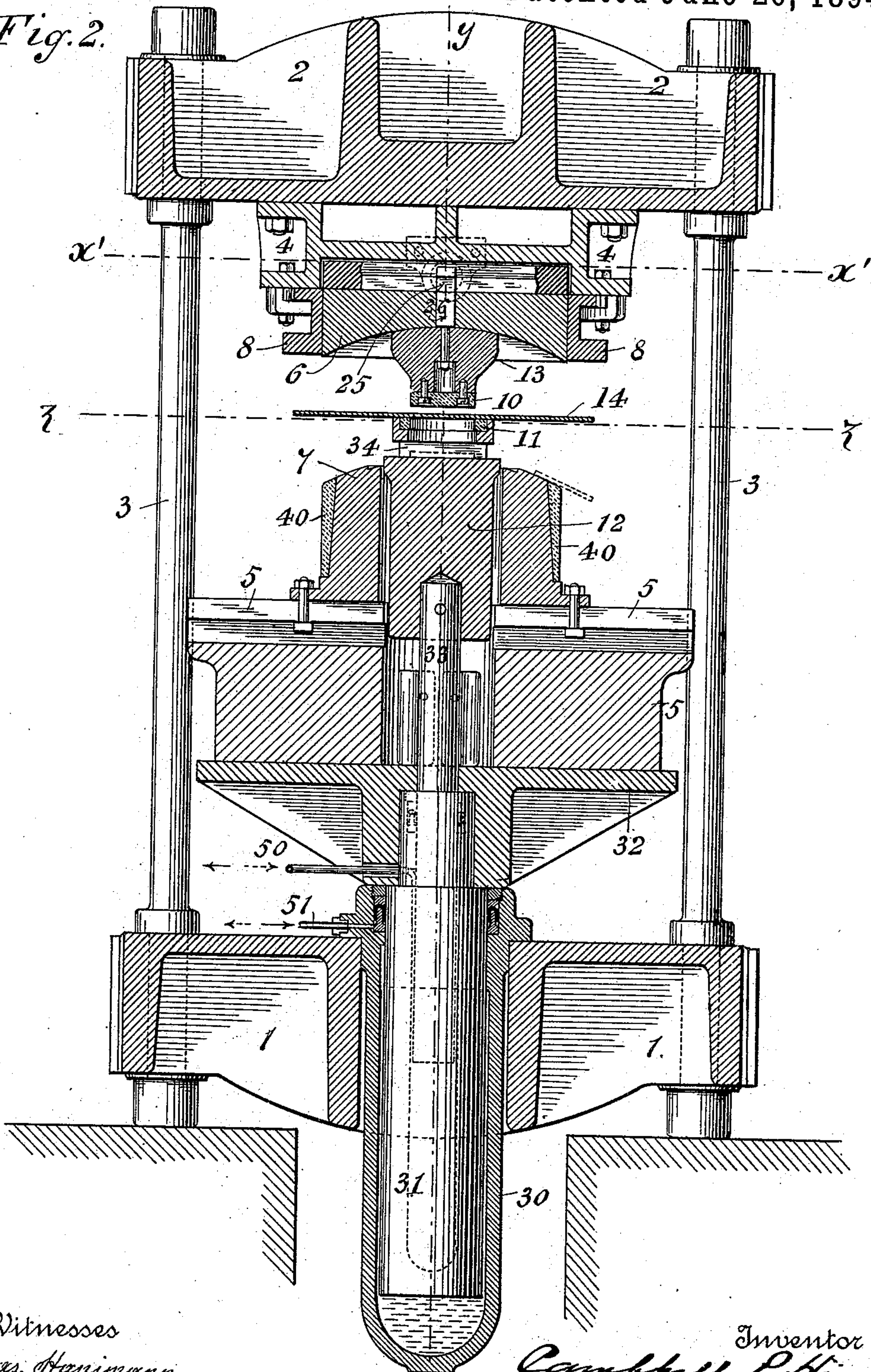
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Fig. 2.



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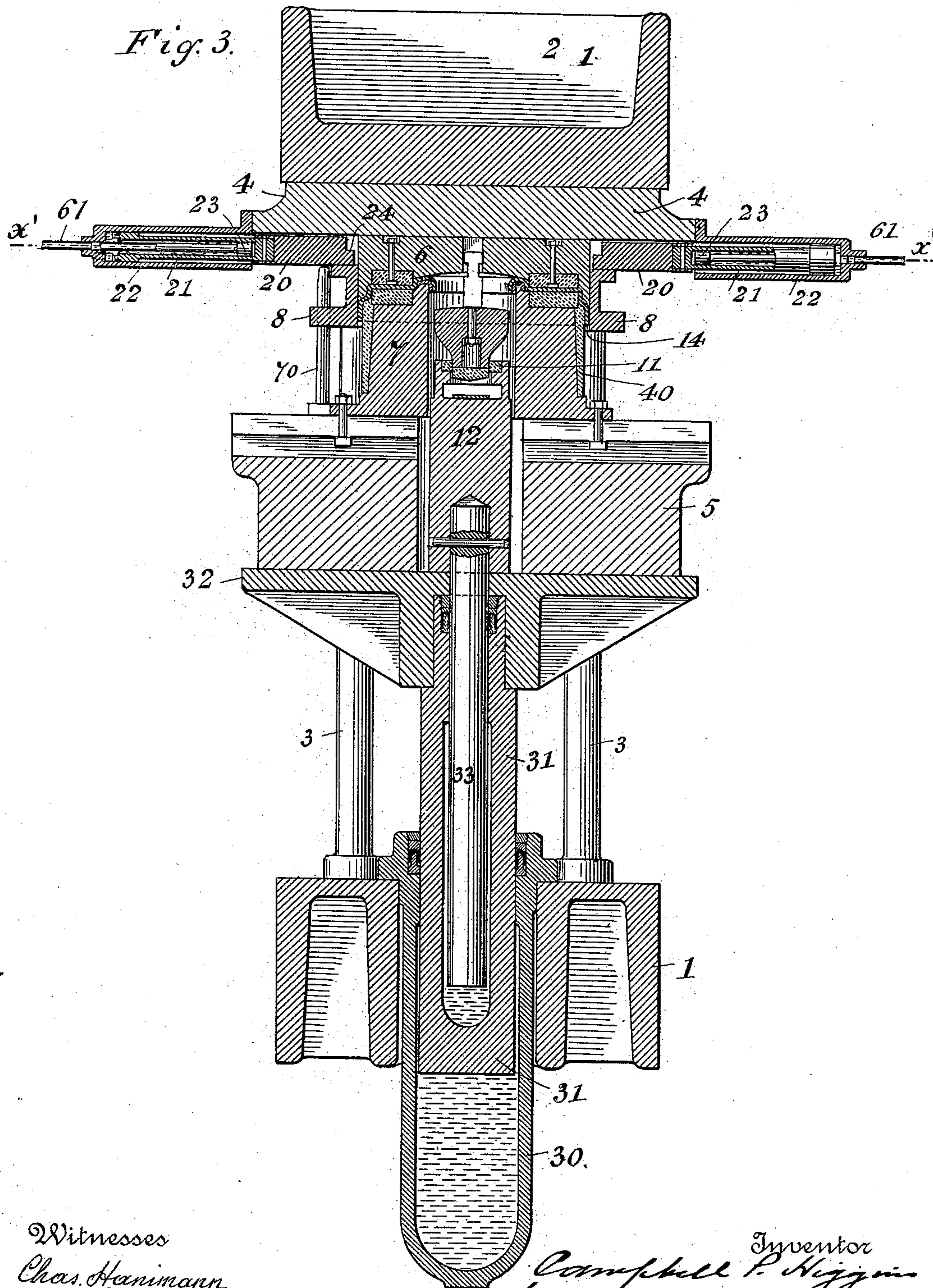
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Fig. 4

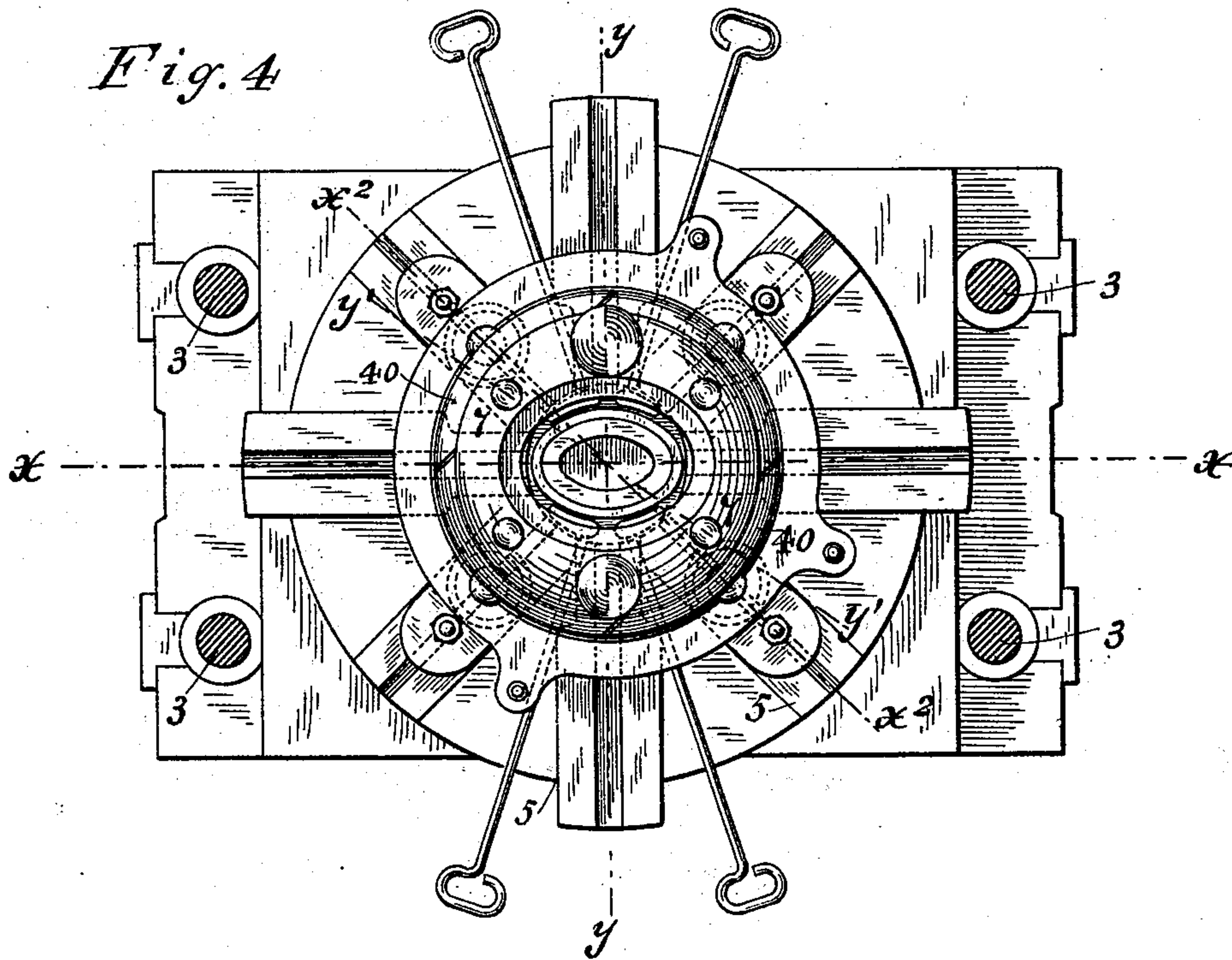
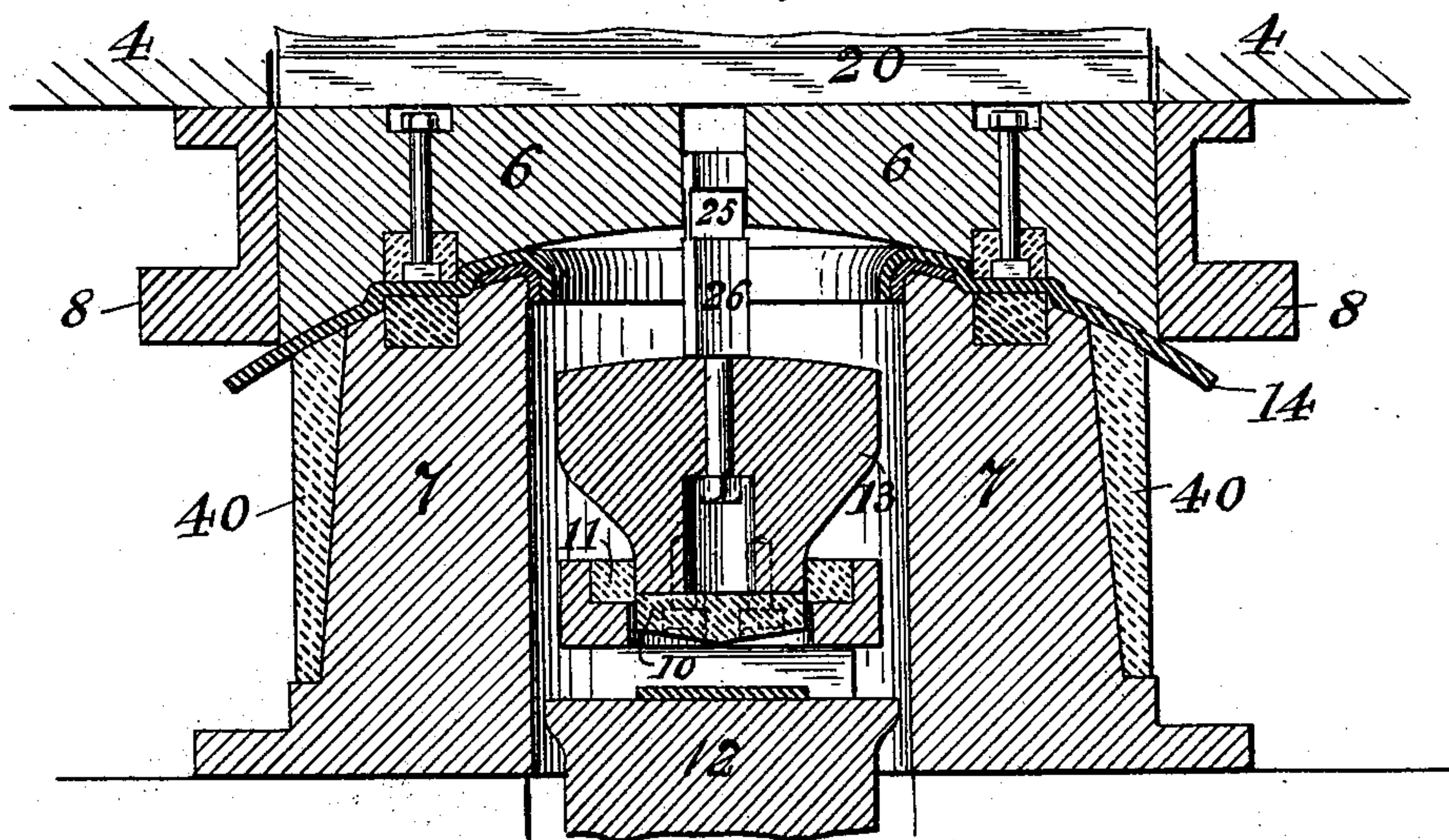


Fig. 9



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Fig. 5.

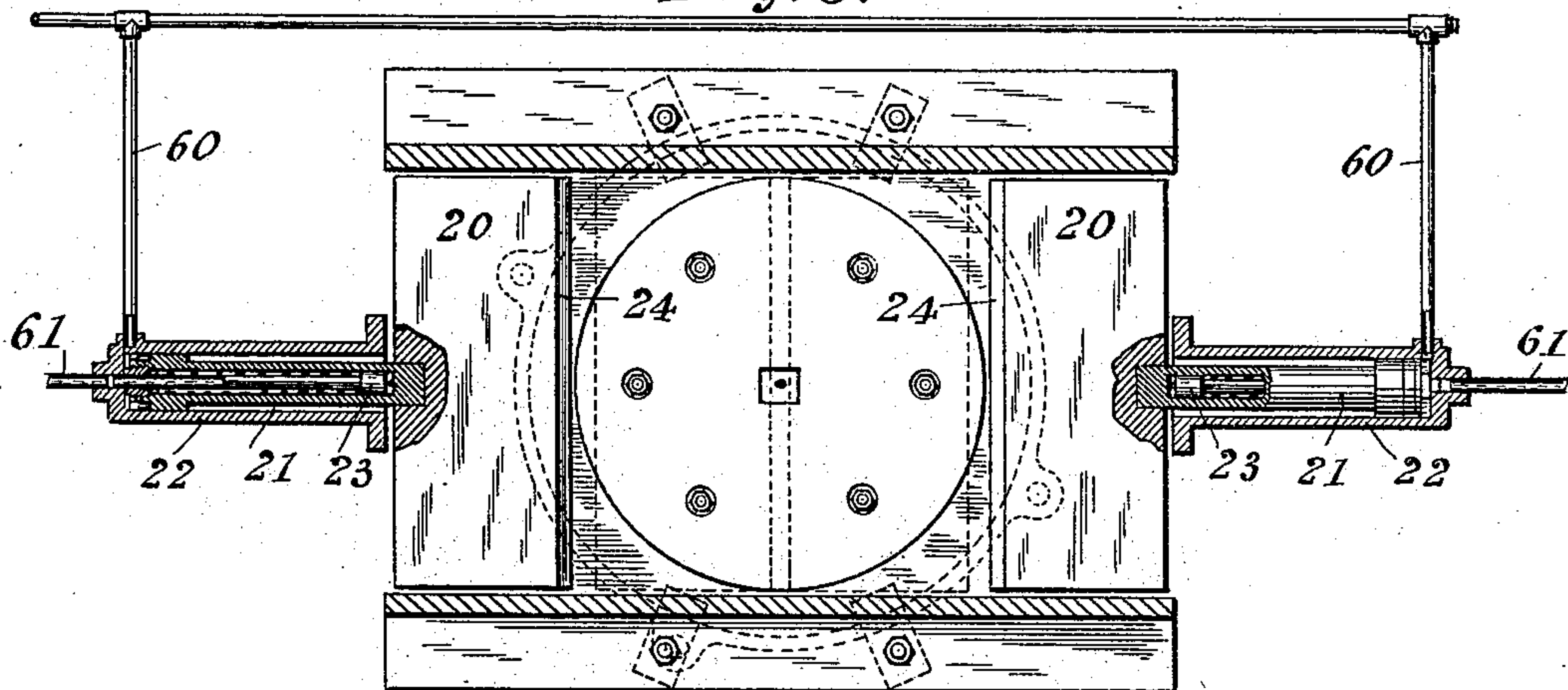
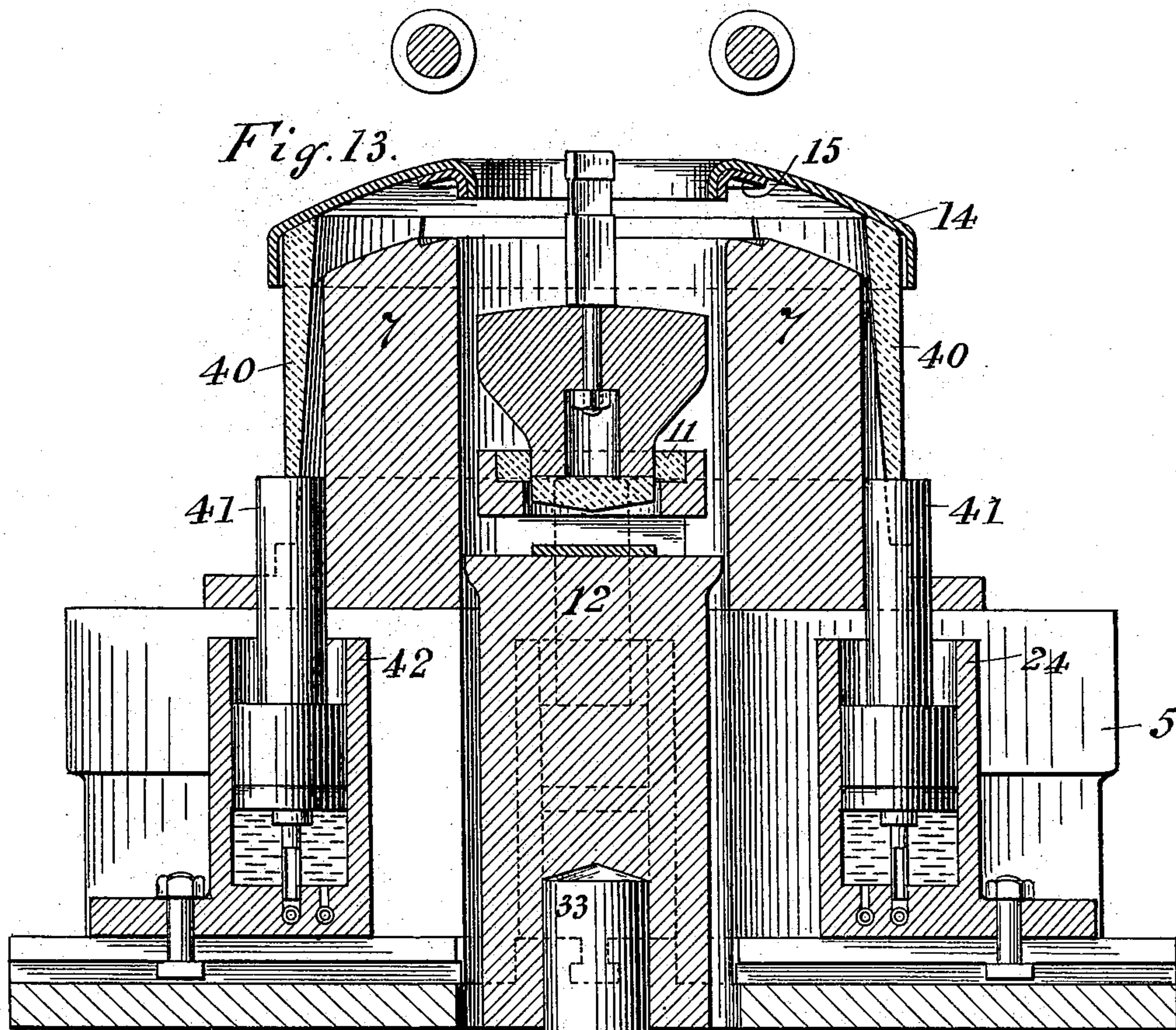


Fig. 13.



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Fig. 6.

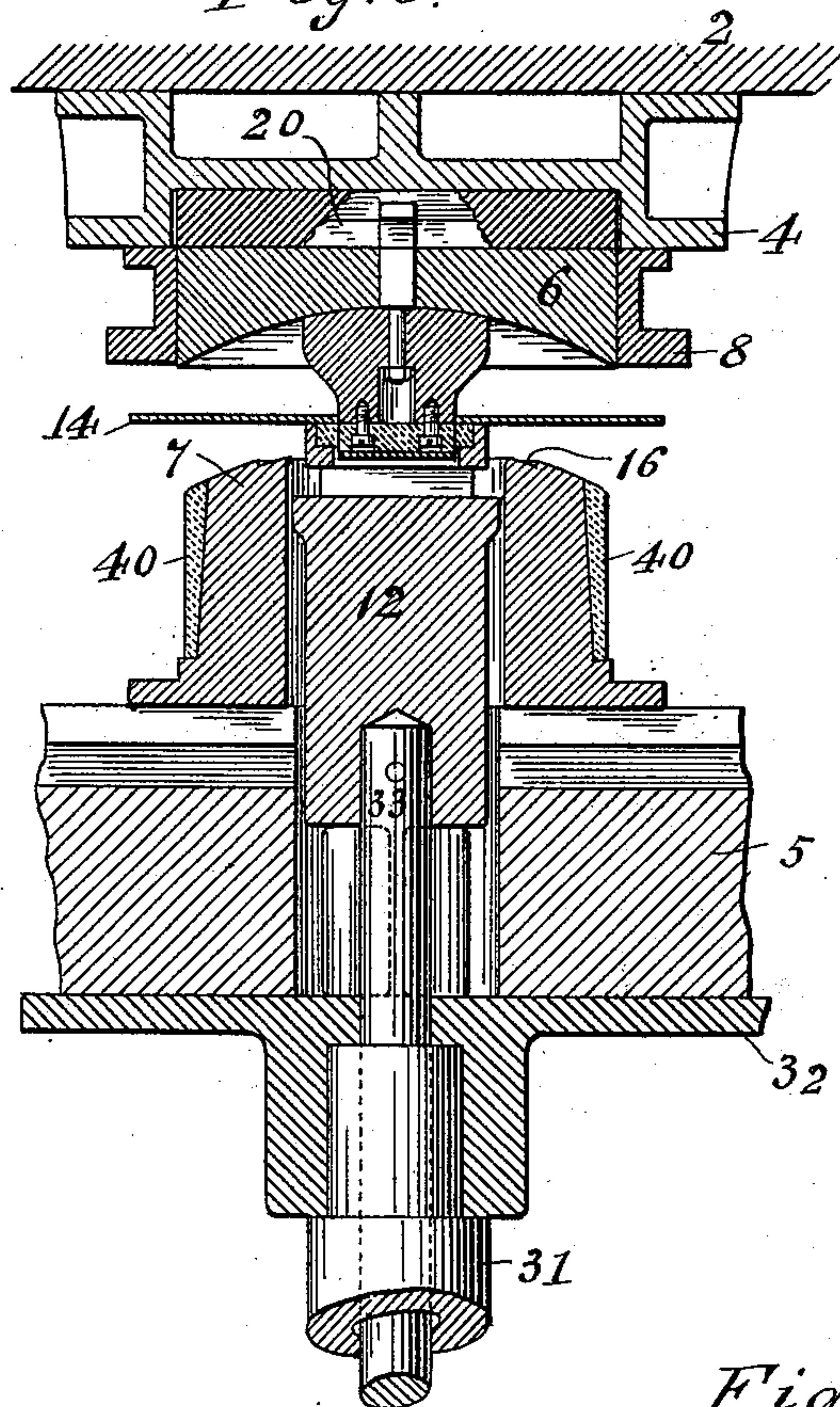


Fig. 7.

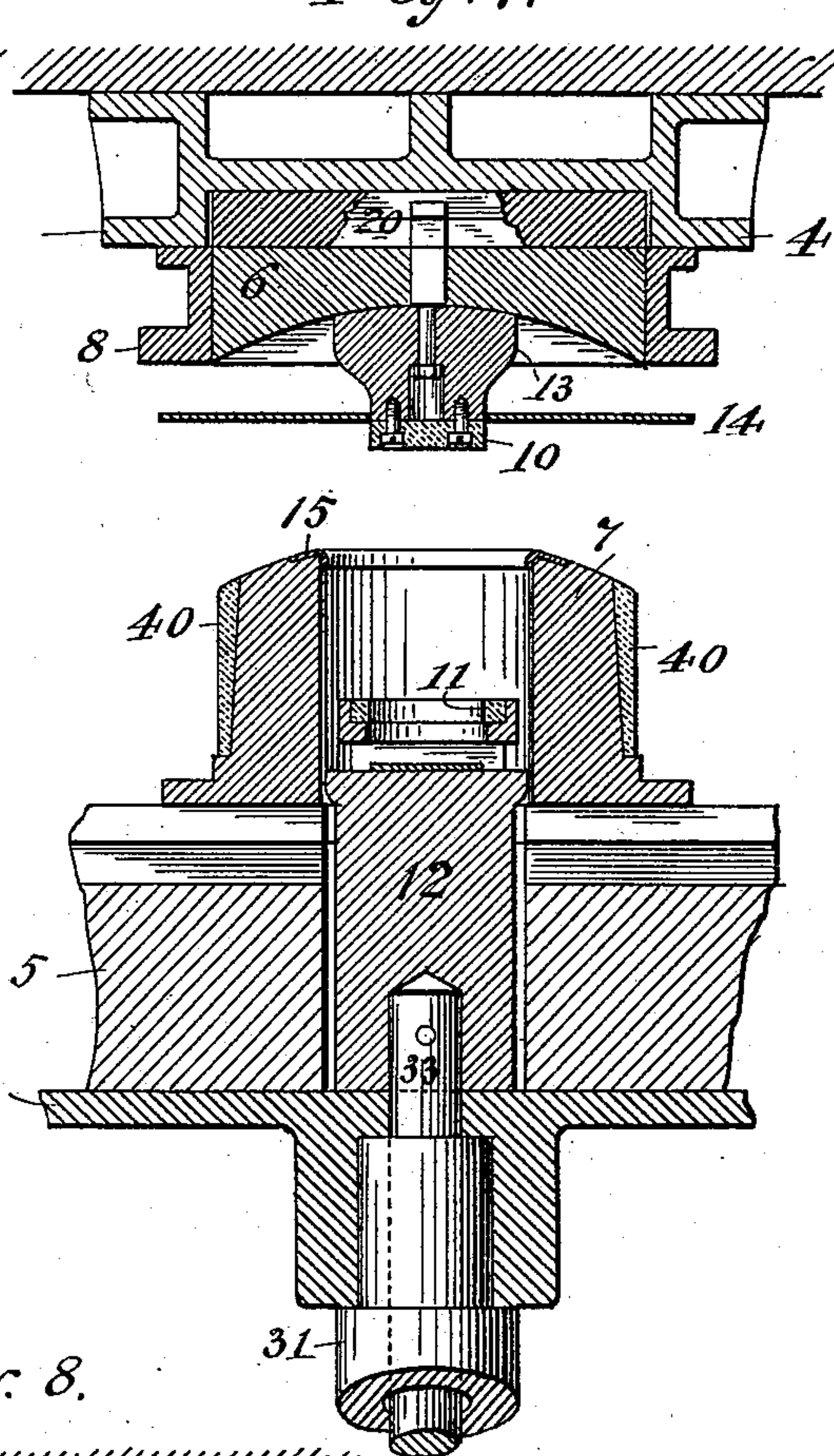
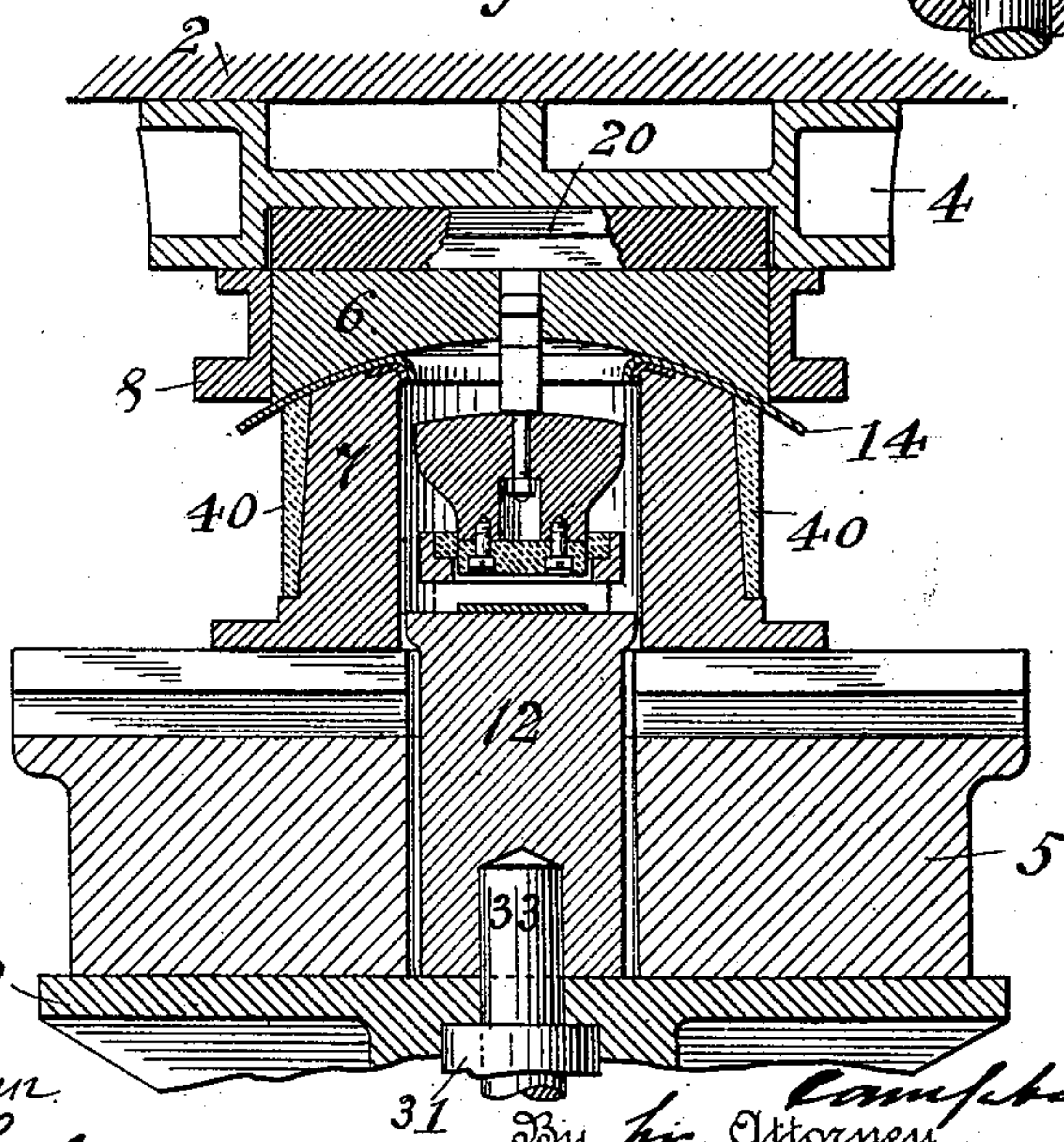


Fig. 8.



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Fig. 10.

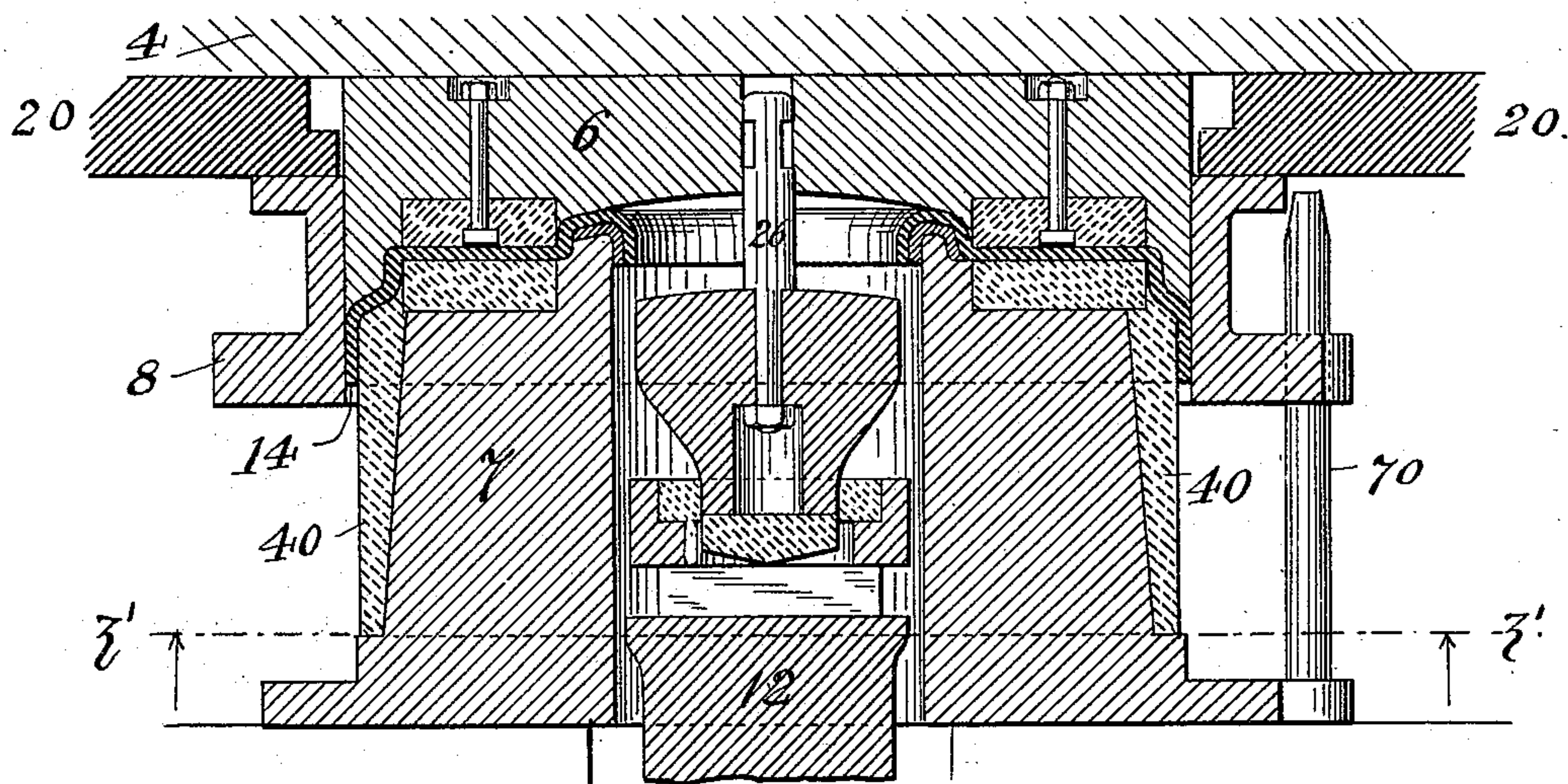
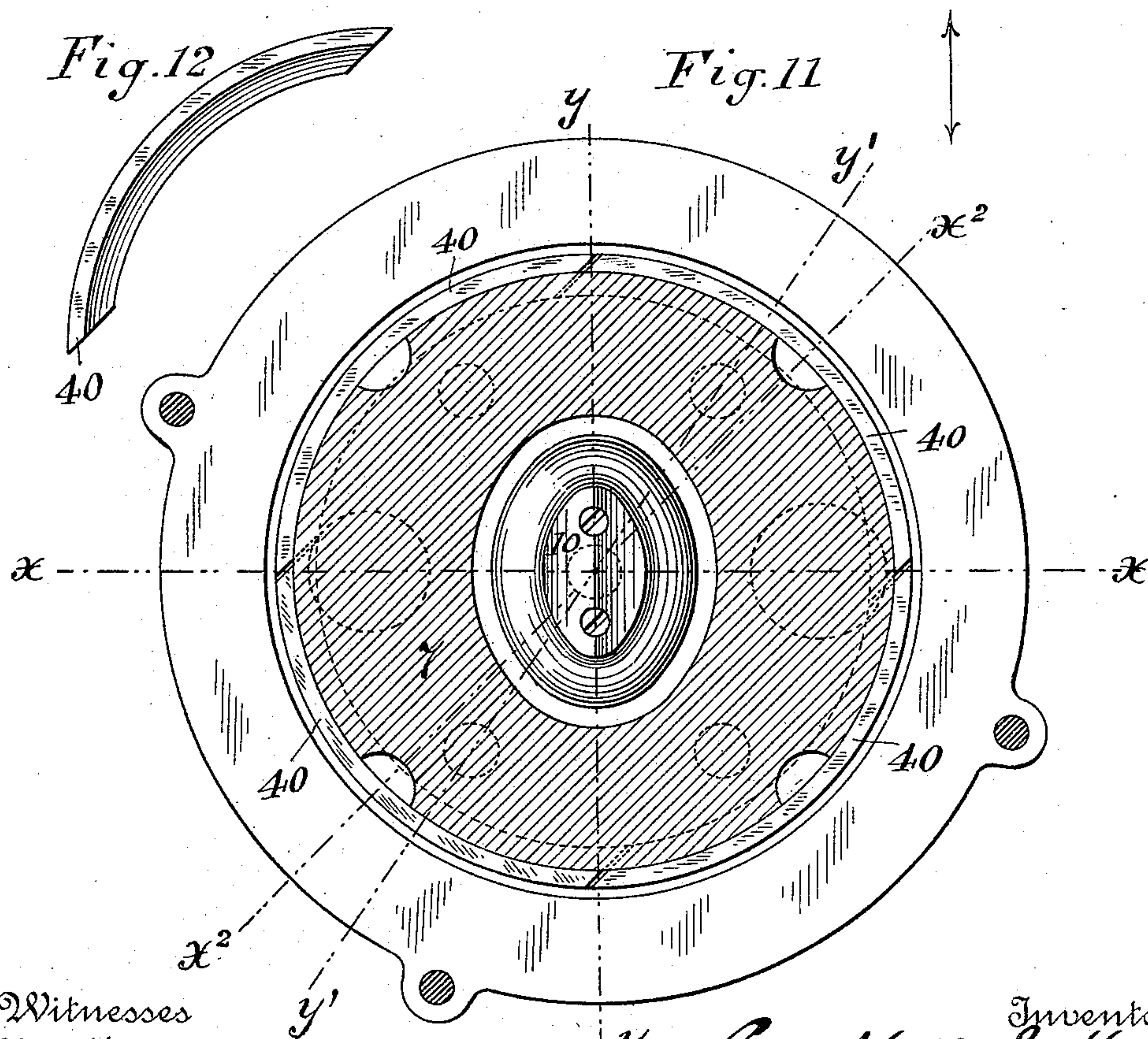


Fig. 12

Fig. 11



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UNITED STATES PATENT OFFICE.

CAMPBELL P. HIGGINS, OF ROSELLE, NEW JERSEY.

PUNCHING AND FORMING MACHINE.

SPECIFICATION forming part of Letters Patent No. 521,858, dated June 26, 1894.

Application filed May 27, 1893. Serial No. 475,789. (No model.)

To all whom it may concern:

Be it known that I, CAMPBELL P. HIGGINS, a citizen of the United States, residing at Roselle, county of Union, and State of New Jersey, have invented certain new and useful Improvements in Punching and Forming Machines, of which the following is a specification.

This invention embodies various novel elements which are applicable to machines for the manufacture of wrought metal drum-heads, and in order to enable others skilled in the art to which this said invention appertains, to understand and use the same, I will proceed to describe the various details of its construction, explain its operation, and point out in the appended claims its novel characteristics.

Referring to the accompanying drawings, Figure 1, is a side elevation in preparatory position; Fig. 2, a front sectional elevation taken on the line $x-x$, Figs. 1, and 4, in preparatory position; Fig. 3, a partial sectional side elevation taken on the line $y-y$, Figs. 2, 4, and 11, in flanging position; Fig. 4, a horizontal section taken on the line $z-z$, Figs. 1, and 2; Fig. 5, a horizontal section taken on the line $x'-x'$, Figs. 2, and 3. Figs. 6, 7, and 8, are sectional detail views showing the different positions respectively of punching, inserting the stiffening collar, and forming, taken in planes of section corresponding to the plane of section in Fig. 2. Fig. 9, is an enlarged sectional detail view of the dies, corresponding in position to Fig. 8, of forming, taken in a plane of section indicated by the line $y'-y'$, in Figs. 4, and 11. Fig. 10, is an enlarged sectional detail view of the dies, corresponding in position to Fig. 3, of flanging, and taken in a plane of section indicated by the line $y-y$, in Figs. 2, 4, and 11. Fig. 11, is an enlarged horizontal section taken on the line $z'-z'$, Fig. 10, showing an inverted view of the parts. Fig. 12, is a detail view showing one of the segments of the casting-off collar inverted. Fig. 13, is an enlarged sectional detail view of the dies, taken on the line x^2-x^2 , Figs. 4, and 11, showing the manner in which the work is cast off when completed.

1, is the base of the press; 2, the head of the press; 3, the pillars or tie rods; 4, the up-

per or fixed platen; 5, the lower or movable platen; 6, the upper forming die which when active, occupies an advanced position upon the upper platen 4, as in Figs. 1, 2, 6, 7, 8, and 9, but when inactive is permitted to retire toward the platen 4, as in Figs. 3, and 10; 7, the lower forming die permanently secured to the movable platen 5.

8, is the flanging collar permanently fixed to the upper platen 4.

10, is the male punching die which may be connected or disconnected with the upper platen 4.

11, is the female punching die which is connected to an independent head 12, provided with means for its advancement, as in Figs. 2, and 6, or retraction in the platen 5, as in Figs. 3, 7, 8, 9, 10, and 13.

The enlargement 13, of the male punching die 10, serves to form, and inwardly flange the man-hole in plate 14, as in Figs. 3, 8, 9, and 10, after it has itself been formed over the stiffening collar 15, previously formed by another machine, and inserted as in Fig. 7, in the recess 16, (Fig. 6,) provided therefor in the lower forming die 7.

20, are movable interposing blocks which are advanced by hydraulic plungers 21, in cylinders 22, controlled by introduction of pressure applied through pipes 60. The interposing blocks 20, are retracted by constant water pressure from pipe 61, within said plungers 21, between the same and the stationary pistons 23; the application of pressure for effecting the advancement of the said interposing blocks being effected at will through the agency of suitable valves. The interposing blocks 20, are always interposed between the flanging collar 8, and the upper fixed platen 4, and said interposing blocks when advanced toward one another occupy an interposed position between the upper forming die 6, and said platen 4, as in Figs. 1, 2, 6, 7, 8, and 9, but when retracted permit the upper forming die 6, to retire within the flanging collar 8, so as to rest directly against the upper platen 4, as in Figs. 3, 5, and 10. The edges of the interposing blocks 20, which are adjacent when they are brought together, are provided with tongues 24, which fit into gains 25, in the shank 26, of the punching and man-hole forming die 10, and 13. The punching

and manhole forming die 10, 13, is raised up against the forming die 6, as in Figs. 1, 2, 6 and 7, and the said blocks 20, then brought together, securing the said die 10, 13, in its suspended position preparatory to the first step of operation.

30, Figs. 2, and 3, is the hydraulic cylinder for operating the forming and flanging mechanism, provided with a plunger 31, carrying the lower platen 5, on its base plate or platen proper 32. The plunger 31, serves also as a hydraulic cylinder within which the lifting ram 33, is operated, carrying the head 12, which supports the female punching die 11, to be operated independently of the forming die 7. The female punching die 11, is provided beneath it with a transverse mortise 34, for the removal of the pieces punched out.

40, is a segmental casting-off collar, which is made in four segments, as indicated in Figs. 4, and 11, and tapered interiorly so that when raised, as in Fig. 13, said segmental collar may contract to release the work. The segments of said collar are slightly separated at their joints when depressed into forming position, so as to permit said contraction when raised.

41, represents hydraulic plungers operated within cylinders 42, to raise and lower the segments of the collar 40, the movements of said plungers being effected by any suitable hand valves.

The hydraulic pressures in cylinders 30, and 31, and the motions of their respective plungers determined thereby, are controlled by any usual or suitable character of valves applied to pipes 50, and 51, which, being well known to the art, will not require specific description herein.

The operation of the machine is as follows: The male punching die 10, is raised by the lifting ram into the position shown in Figs. 1, and 2, and the interposed blocks 20, advanced between the forming die 6, and platen 4, until their tongues 24, enter the gains 25, in the shank 26, of said punching die 10, holding the same securely in position for punching. The platen 5, being in its retracted position the blank plate 14, is inserted as in Fig. 2. Water is introduced into the cylinder 31, elevating the female punching die 11, so as to punch the plate as in Fig. 6. After punching the manhole opening through the sheet, these two rams can then act independently. The female die 11, is then retracted as in Fig. 7, leaving the plate 14, to adhere to the punch 10. The stiffening collar 15, is now inserted in the recess of the forming die 7, as in Fig. 7, and pressure applied to the cylinder 30, advancing the platen 5, and forming die 7, within which the die 11, is now retired into an inactive position. The advance motion of the forming die 7, against the forming die 6, first forces the plate 14, over the enlargement or shoulder 13, of the punch 10, so that the margins of the manhole in the

plate 14, are formed upon the stiffening collar 15, as in Fig. 8; the abutment of the forming die 7, against the forming die 6, convexing the plate 14. The pressure in cylinder 30, is now released sufficiently to allow the platen 5, to partially retract and relieve the compression upon the forming die 6. The interposing blocks 20, are then retracted to the position shown in Figs. 3, and 5, and the manhole punching and forming die 13, permitted to drop through the manhole into an inactive position, as in Figs. 3, 8, 9 and 10. Pressure is again applied to cylinder 30, advancing the platen 5, so that the forming die 7, abutting against the forming die 6, now released, will push the same into the flanging collar 8, while the latter remains in its fixed position, and forms the flange on the perimeter of the plate 14, as in Figs. 3, and 10; the flanging collar 8, being guided concentrically with the work by means of guides 70. Pressure being again released from cylinder 30, the platen 5, is permitted to retract, leaving the work on the forming die 7, which work is afterward ejected by the segmental collar 40, in the manner aforesaid, and as illustrated in Fig. 13.

Having described my invention, what I claim is—

1. In a punching and forming machine, the combination of a stationary platen, the forming die supported thereon, the punching and forming die movable relatively to said forming die, the movable blocks for securing the punching die in a fixed position relatively to the said forming die, the movable female die and the movable forming die, substantially as specified.

2. In a punching and forming machine, the combination of the forming dies, the punching dies, the interposing blocks for holding the male punching die in an operative position, and means for moving said interposing blocks in both directions, substantially as specified.

3. In a punching and forming machine, the combination with the forming dies of manhole punching and forming dies, means for holding one of said punching and forming dies in an operative position, means for advancing the other of said punching dies, and a contractible casting-off collar, substantially as specified.

4. The combination with the punching dies and the forming dies, of the segmental casting-off collar surrounding one of said forming dies, substantially as specified.

5. The combination with the fixed forming die and the fixed punching die, of the movable forming die, the movable punching die, and the casting off collar consisting of segments internally tapered and surrounding the movable forming die, substantially as specified.

6. In a punching and forming machine the combination with the punching dies and the

forming dies, of the contractible casting-off collar and the hydraulic plungers for operating said collar, substantially as specified.

7. In a punching and forming machine, the combination of a fixed platen, a flanging collar carried thereby, a forming die movable in the flanging collar, the male punching die, the movable platen, the forming die carried by said movable platen, the female punching die movable within the last named forming die and in advance of said forming die, substantially as specified.

8. The combination with the forming dies, of the punching die having the stem portion provided with gains, the interposing blocks

and means for moving said interposing blocks into engagement with the gains of said stem portion, substantially as specified.

9. The combination with the upper forming die and the male punching die, of the movable platen, the forming die carried thereby, the cylindric plunger operating in a hydraulic cylinder and carrying said platen, the lifting ram operating in said cylindric plunger, and the female punching die carried by said ram, substantially as specified.

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