

(No Model.)

C. R. HAMMELL.
STEAM ENGINE VALVE.

2 Sheets—Sheet 1.

No. 596,702.

Patented Jan. 4, 1898.

Fig. 1.

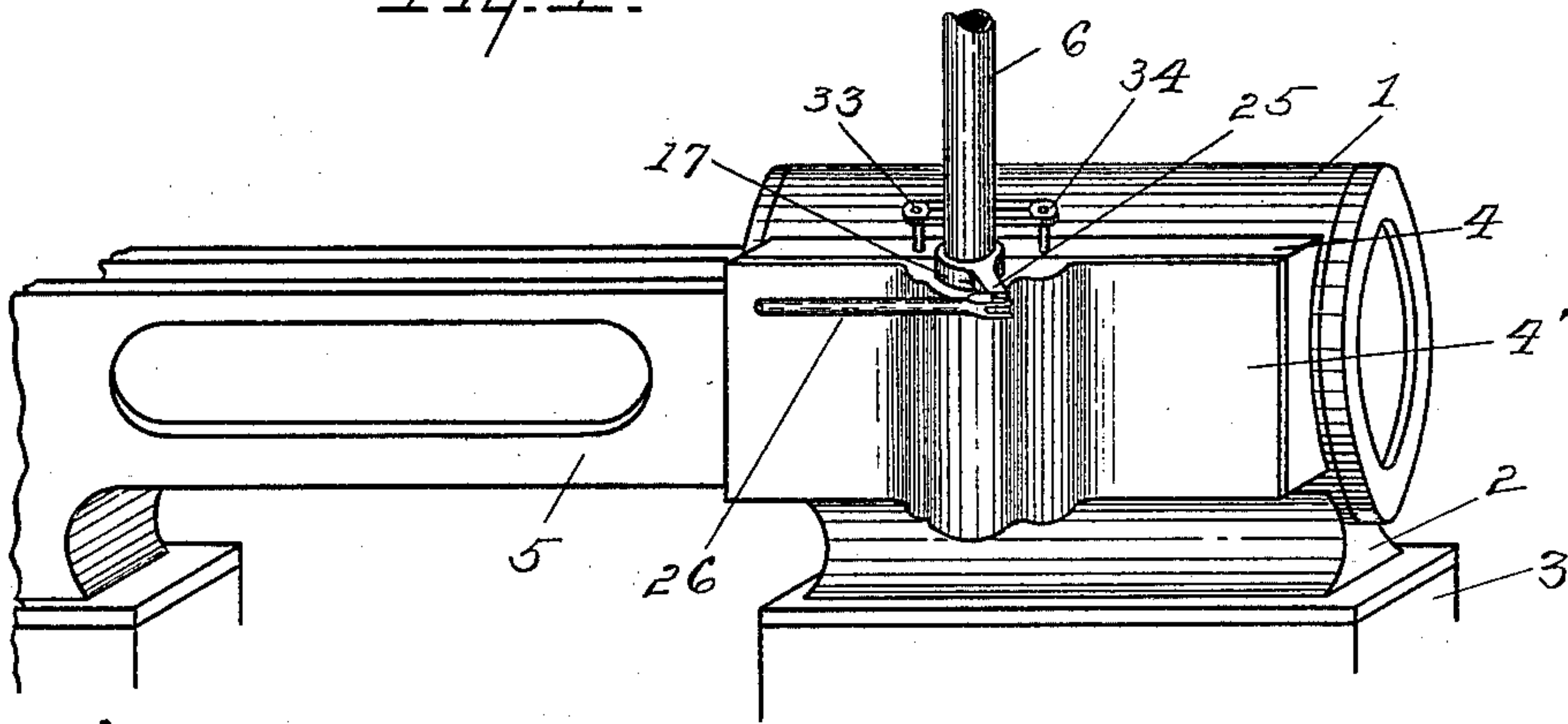


Fig. 2.

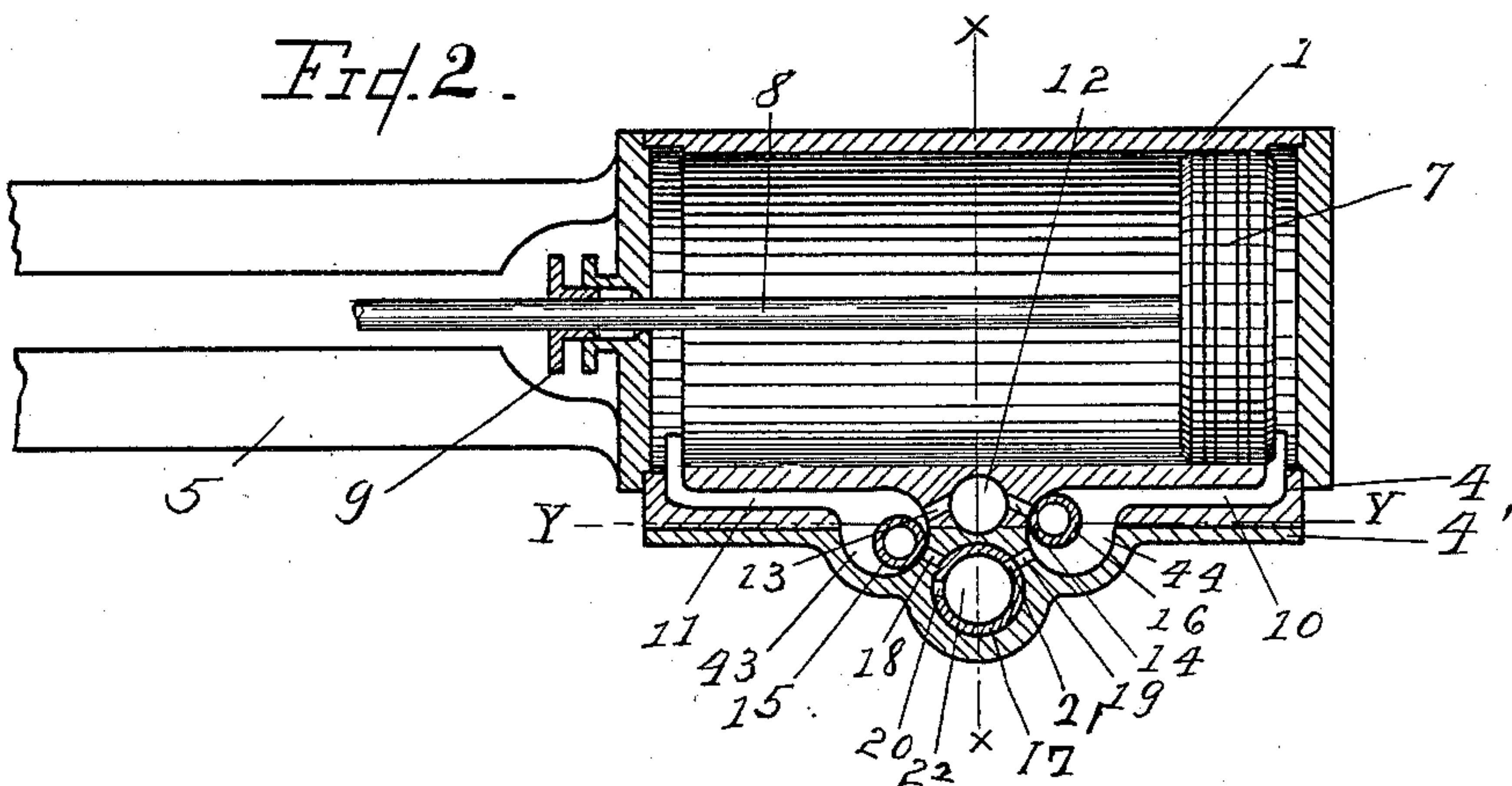
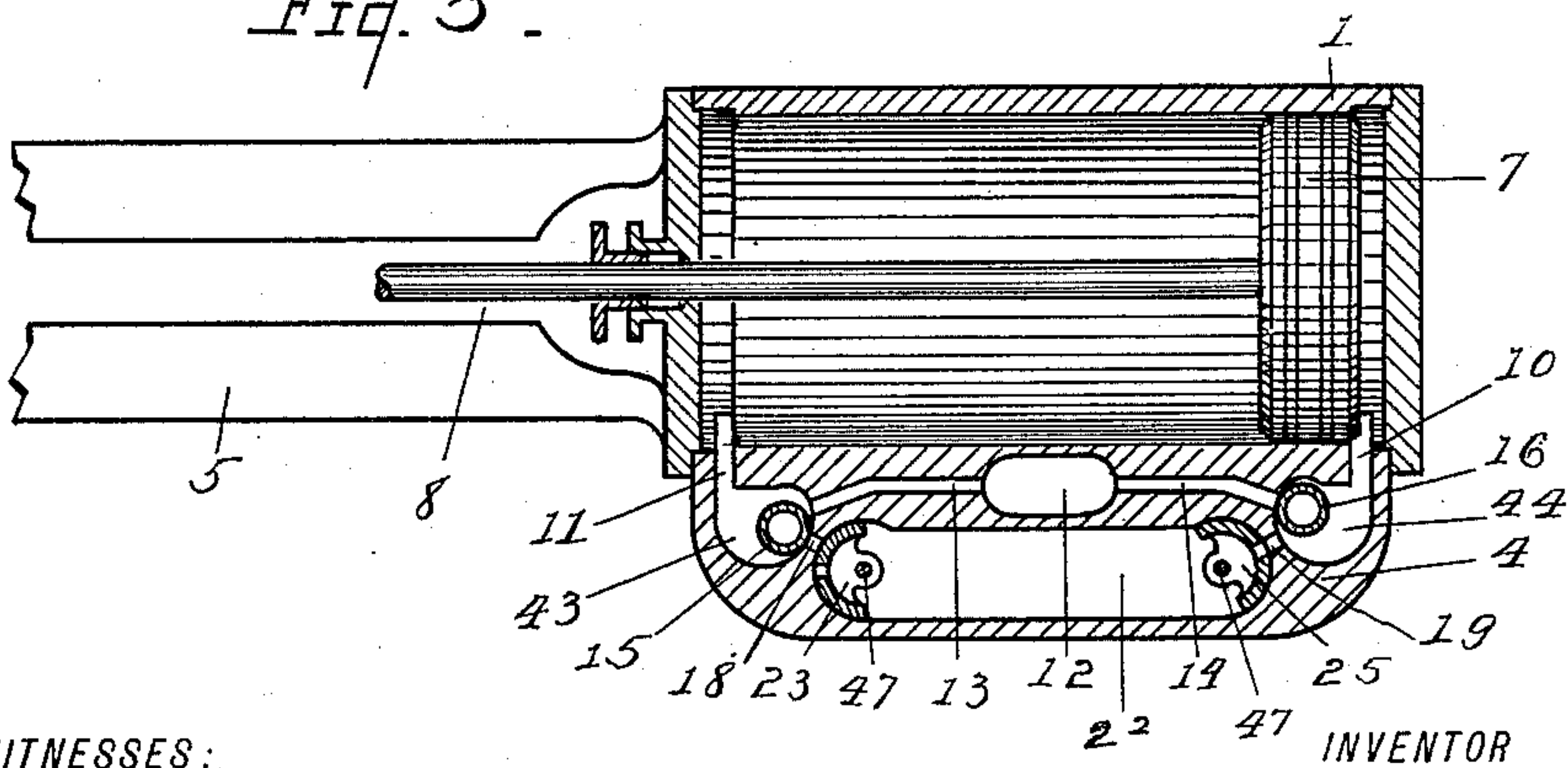


Fig. 3.



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Fig. 4.

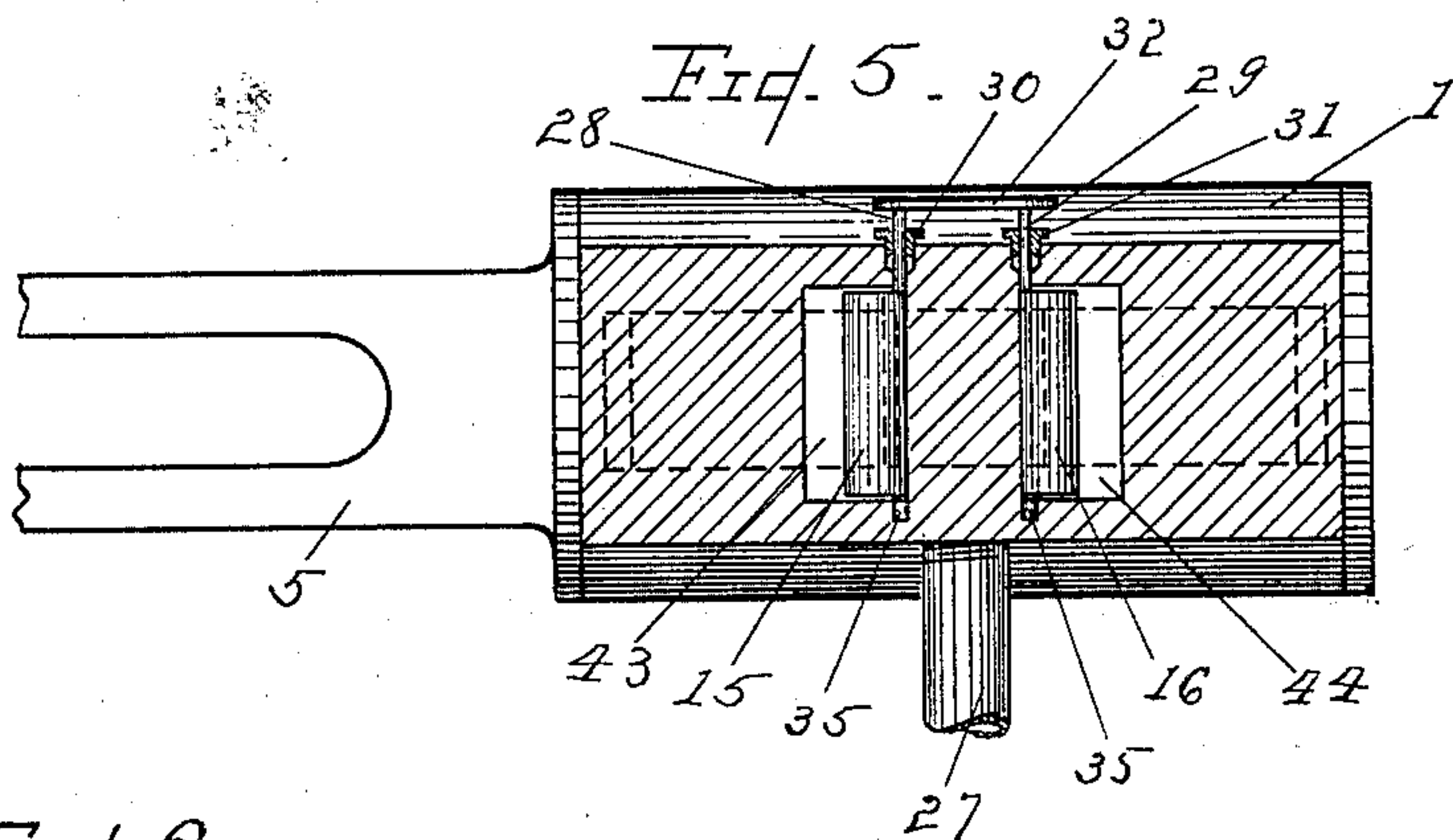
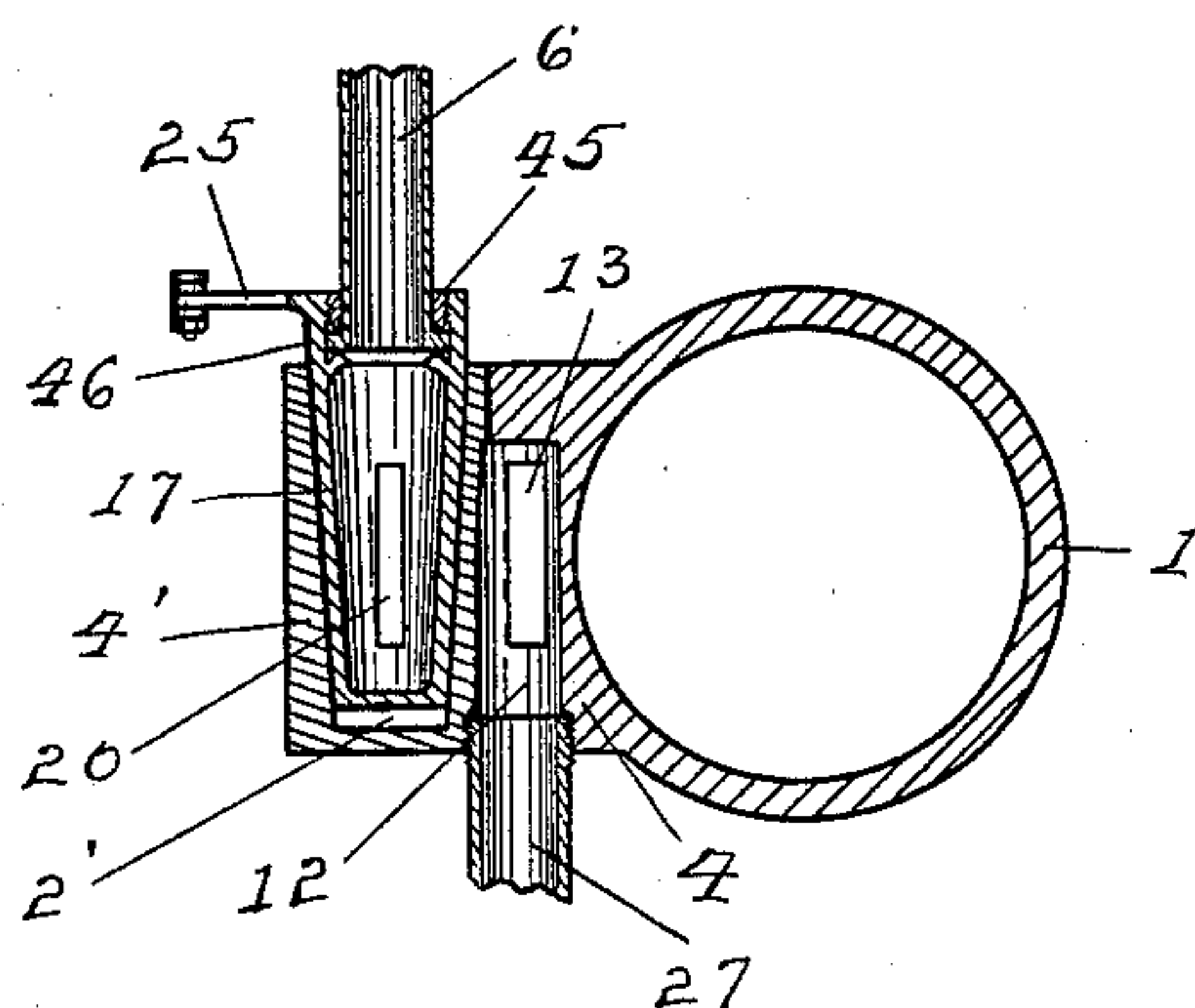


Fig. 6.

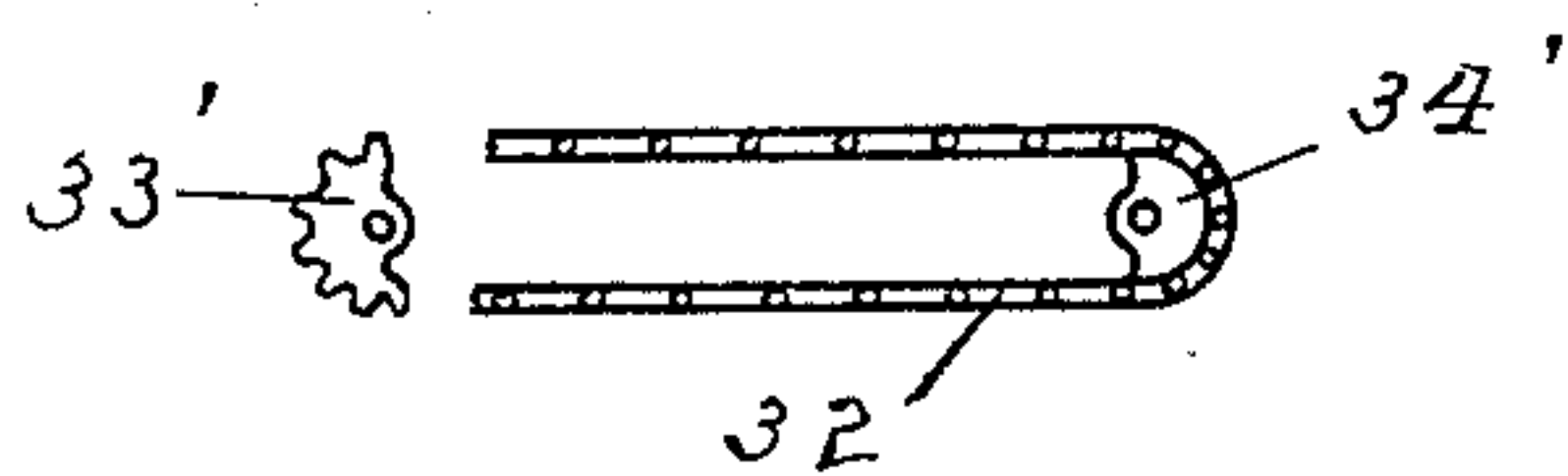
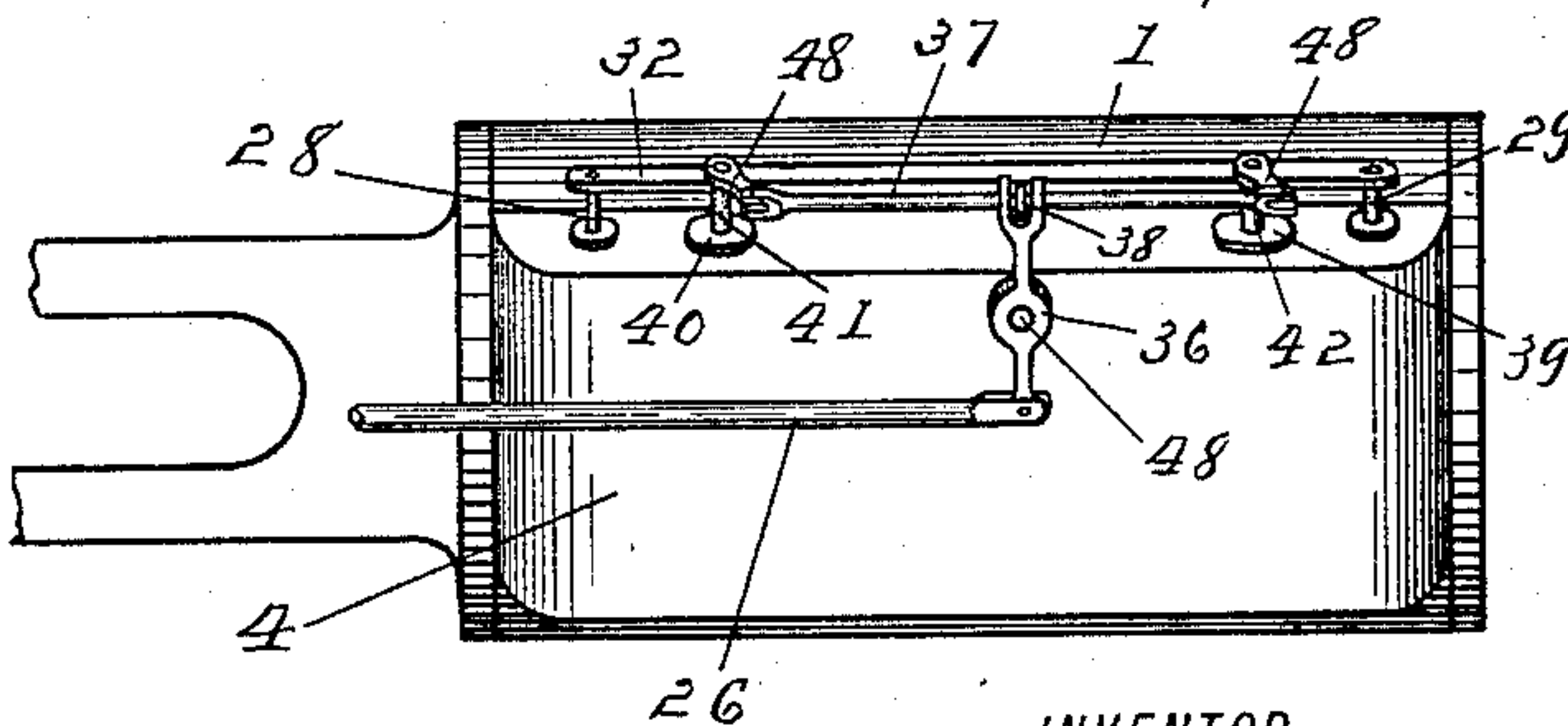


Fig. 7.



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UNITED STATES PATENT OFFICE.

CYRUS R. HAMMELL, OF DECATUR, INDIANA.

STEAM-ENGINE VALVE.

SPECIFICATION forming part of Letters Patent No. 596,702, dated January 4, 1898.

Application filed July 15, 1897. Serial No. 644,643. (No model.)

To all whom it may concern:

Be it known that I, CYRUS R. HAMMELL, a citizen of the United States, residing at Decatur, in the county of Adams, in the State of Indiana, have invented certain new and useful Improvements in Steam-Engine Valves; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, which form part of this specification.

My invention relates to improvements in steam-engine valves and in the means of operating the same.

The object of my invention is to provide an improved exhaust-valve for steam-engines, of simple and economical construction, adapted to be readily applied to any ordinary steam-engine, adapted to take the initial steam direct from the boiler with its full expansive power instead of from a steam-chest, and adapted to open the exhaust-ports fully at once at the desired time by the initial steam from the inlet-valve, and to provide a full and free exhaust all the time, thus giving a quicker motion and more power.

My invention consists in the improved means of securing a full exhaust simultaneously with the admission of steam from the inlet-valve and constantly maintaining the same.

The novel feature of my invention is the method and means of exhausting steam from the opposite ends of the working chamber of the main cylinder simultaneously with the admission of steam through the inlet-valve.

In the accompanying drawings similar reference-numerals indicate like parts throughout the several views, in which—

Figure 1 is a perspective view of my improvement in position upon a proper steam-cylinder, showing the means for operating the inlet and exhaust valve. Fig. 2 is a horizontal central section of Fig. 1, showing the relative arrangement of the said valves. Fig. 3 is a horizontal central section of a modified form and arrangement of the valves and valve-gear as shown in Fig. 7. Fig. 4 is a cross-section of Fig. 2 on the line X X, showing the preferred form and arrangement of the inlet-

valve. Fig. 5 is a side elevation of Fig. 2, taken on the line Y Y. Fig. 6 is a detail of the means for operatively connecting the steam-actuated exhaust-valves. Fig. 7 is a perspective view of the modified form of inlet-valve shown in Fig. 3.

The main steam-cylinder 1, of any proper form and dimensions, has an integral or rigid pedestal 2, is supported upon a proper base 3, and is rigidly connected to the adjacent end of a proper cross-head guide 5 of the usual construction. In the working chamber of said cylinder 1 is arranged a proper piston 7, having a piston-rod 8, properly arranged in the stuffing-box 9.

No steam-chest proper is employed with my improvement, as I take the initial steam direct from the boiler.

Instead of a steam-chest I provide a chambered extension or valve-chest 4, having a removable lid 4'. The said lid 4' has a vertical circular opening 2', Fig. 4, midway its ends, in which the annular inlet-valve 17 is snugly but rotatably mounted. The said valve-chest 4 is provided upon each side of the said opening 2' with the valve-chambers 43 and 44, which are connected with the forward and rear ends of the working chamber of said cylinder 1 by the steam-conduits 11 and 10, respectively, Fig. 2. The said chambers 43 and 44 are connected with the said chamber 2' by the admission-ports 18 and 19, respectively, and with the exhaust-chamber 12 by the outlet-ports 13 and 14, respectively, Fig. 2. The exhaust-chamber 12 has a proper exhaust-pipe 27 fixed therein, as shown, Fig. 4. The hollow annular inlet-valve 17, arranged as shown in the said opening 2', has its upper end extended above the upper surface of said lid 4', and has an integral lateral arm 25, whose free end is pivotally connected to the adjacent end of a proper operating eccentric-rod 26, Figs. 1 and 4. The said valve 17 is also provided in its periphery with the inlet-ports 20 and 21, adapted to alternately register with the said admission-ports 18 and 19, respectively, Figs. 2 and 4. The top of the valve 17 is internally screw-threaded and has an internal annular flange 46, Fig. 4, adapted to receive the outer end of the boiler-supply pipe 6, having upon its said end an annular flange adapted to form a bearing on said flange 46. The open end of

said valve 17 is then provided with an externally-screw-threaded collar 45, closely fitting about said pipe 6 and against the top of the annular flange thereof. In the said chambers 5 43 and 44 are pivotally mounted the rocking cylindrical exhaust-valves 15 and 16, respectively, identical in construction and operation. They each have upon their lower end and near their adjacent sides an integral lug 10 or fixed pivot 35, arranged in a suitable socket in the base of said chambers, Fig. 5. The upper ends of said exhaust-valves are respectively provided with the upright fixed operating-rods 28 and 29, arranged in proper stuffing-boxes 30 and 31, respectively. Upon the 15 upper end of said operating-rods are rigidly fixed proper sprocket-wheels 33 and 34, Fig. 1, or the sprocket-segments 33' and 34', Fig. 6. Upon these sprocket wheels or segments is 20 properly mounted the connecting sprocket-chain 32.

As seen in Fig. 3, the annular chamber 2' for the inlet-valve may be extended into the oblong steam-chamber 2² and the exhaust-chamber 12, also elongated, as shown. In this 25 modified form the inlet-valve is constructed in two parts 23 and 25, semicircular in cross-section, each being adapted for an oscillatory movement on the vertical pivots 47, whose 30 lower ends are loosely mounted in suitable recesses in the base of said lid 4' and whose upper ends are each provided with a fixed lateral arm 48, Fig. 7, whose free ends are pivotally united by the horizontal connecting-rod 37, having a rigid collar 38 approximately 35 midway its ends to engage the adjacent bifurcated end of the operating-lever 36. The said lever 36 is pivoted midway its ends on the pivot 48, fixed in the said detachable valve-chest lid 4', its bifurcated end loosely received in the rod 37, and its other end is pivoted in any proper manner to the forward end of the eccentric-rod 26.

The operation of my improvement thus described is obvious and, briefly stated, is substantially as follows: The inlet or cut-off valve operating mechanism is so arranged that the inlet-ports 20 and 21 of said valve 45 respectively register with the inlet-ports 18 and 19 when the working piston reaches the corresponding end of its stroke. As the exhaust-valves 15 and 16 are connected by means of the operating-rods 28 and 29 and the sprocket-chain 32, when the said admission- 50 port 21 registers with the said inlet-port 19 the entering steam will force the said exhaust-valve 15 wide open instantaneously by forcing back to its seat and closing the companion exhaust-valve 16, Fig. 2. The exhaust- 55 steam at the rear of the piston is thus free to exhaust through the ports 11 and 13, the chamber 12, and the pipe 27 as soon as the piston reaches the limit of its stroke and during the entire time the piston is approaching the other 60 limit of its stroke. As soon as the piston reaches the other limit of its stroke the admission-port 20 of the inlet-valve will regis-

ter with the inlet-port 18, upon which the entering steam will instantly force the exhaust-valve 15 back to its seat, thus closing the exhaust-port 13 and simultaneously opening to 70 its full extent, as described, the companion valve 16, thus permitting a free and full exhaust immediately before and during the time of the return stroke of the piston. It will 75 thus be seen that one or the other of the said exhaust-valves will at all times be wide open, permitting a free full exhaust all the time, and that the opening of the proper exhaust-valve will be simultaneous with the admission 80 of steam by the inlet-valve. This is believed to be a novel feature of great utility not heretofore attained.

In the modified form of my invention shown in Figs. 3 and 7 the operation is identical with 85 that above described.

It is obvious that the valve-chest 4 may be connected with the cylinder 1 in any proper manner, and the valve-gear or operating mechanism of my improvement may be indefinitely varied without departing from the 90 spirit and scope of my invention, which consists in providing a method and means for opening fully the exhaust-valves automatically simultaneously with the admission of 95 initial steam from the inlet-valve, thereby securing an economy of steam, a quicker movement of the working piston in starting, and a conservation of power.

Having thus described my improvement 100 and the manner of its operation, what I desire to secure by Letters Patent is—

1. The combination with the main cylinder, piston and piston-rod, and a chambered valve-chest, of a double-ported oscillating inlet- 105 valve mechanically operated by connection with a moving part of the engine; a pair of steam-actuated and operatively-connected exhaust-valves pivotally mounted in the oppositely-arranged steam-chambers of said 110 valve-chest, and adapted to open and close automatically and simultaneously with the inlet-valve, whereby a full exhaust is maintained all the time, all substantially as described. 115

2. The combination of a valve-chest, chambered as shown; a double-ported oscillating inlet or cut-off valve arranged in said valve-chest, and mechanically operated as described; a pair of automatic steam-actuated 120 exhaust-valves pivotally mounted in oppositely-arranged steam-chambers of said valve-chest, and adapted to be alternately opened and closed by the admission of initial steam from said inlet-valve, substantially as described. 125

3. In combination with an inlet-valve adapted to admit steam into the main cylinder for the initiatory movement of the piston, and rotatively mounted in a steam-chambered 130 valve-chest; of a pair of exhaust-valves pivotally mounted in said valve-chest and adapted to be automatically actuated by the admission of steam by said inlet-valve in the man-

ner described, whereby one or the other of said valves will be fully open at all times; and means for operatively connecting said valves, all substantially as described.

5 4. A two-part exhaust-valve consisting of two pivoted cylindrical valves or sections adapted to alternately exhaust from the main cylinder automatically under the pressure of the inflowing initial steam, whereby said
10 valves are fully opened at once and a free exhaust is provided through one or the other of said valves all the time; and means for operatively connecting said valves or sections, substantially as described.

15 5. The combination with a proper inlet-valve for admitting initial steam to the main

cylinder; the exhaust-valves 15 and 16 pivotally mounted as shown in the steam-chambers of a proper valve-chest 4, and having their valve-stems operatively connected, whereby 20 the opening and closing of said valves are controlled by the admission of steam through said inlet-valve in the manner specified, all substantially as described.

Signed by me at Decatur, Adams county, 25
State of Indiana, this 5th day of July, A. D.
1897.

CYRUS R. HAMMELL.

Witnesses:

DORE B. ERWIN,
JAMES T. MERRYMAN.