No. 652,347. Patented June 26, 1900.

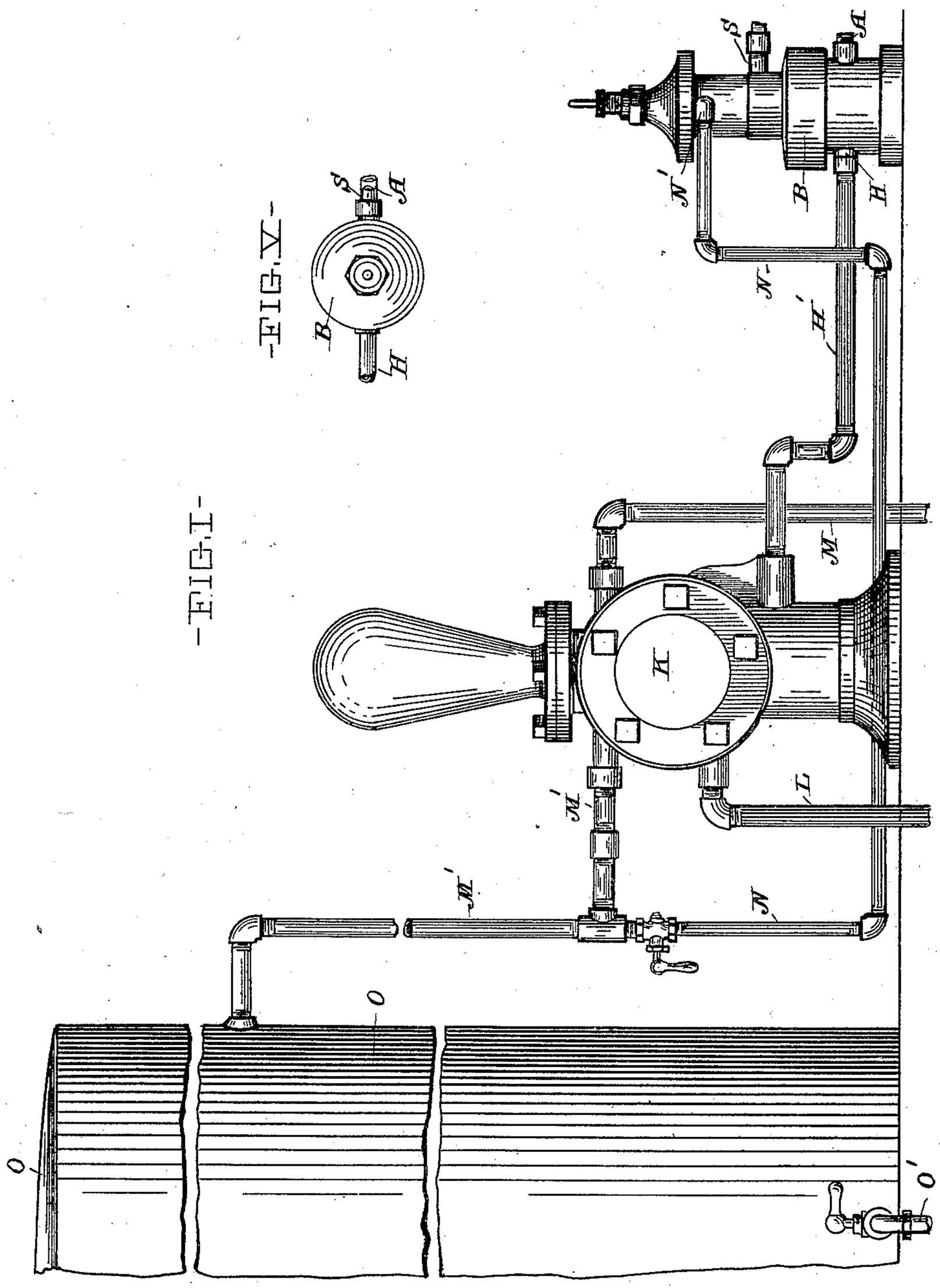
J. H. CHAMP.

PUMPING ENGINE REGULATOR.

(Application filed Feb. 1, 1899.)

(No Model.) 4 Sheets—Sheet 1.

-FIG. I-



-FIG. A-

Witnesses,
J. C. Turner
D. T. Davies

Joseph H. Champ
by Thos. B. Hall
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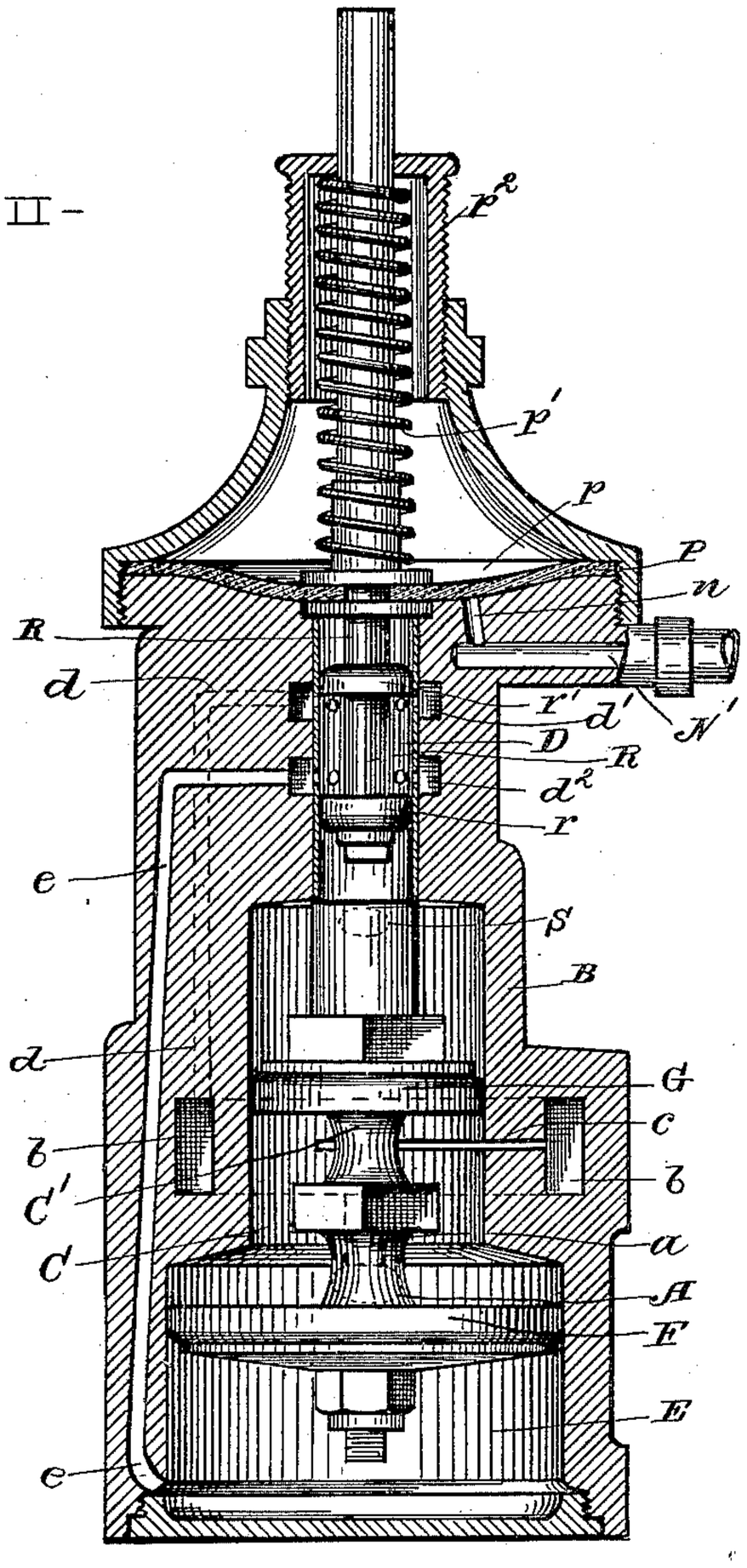
-FIG. II-



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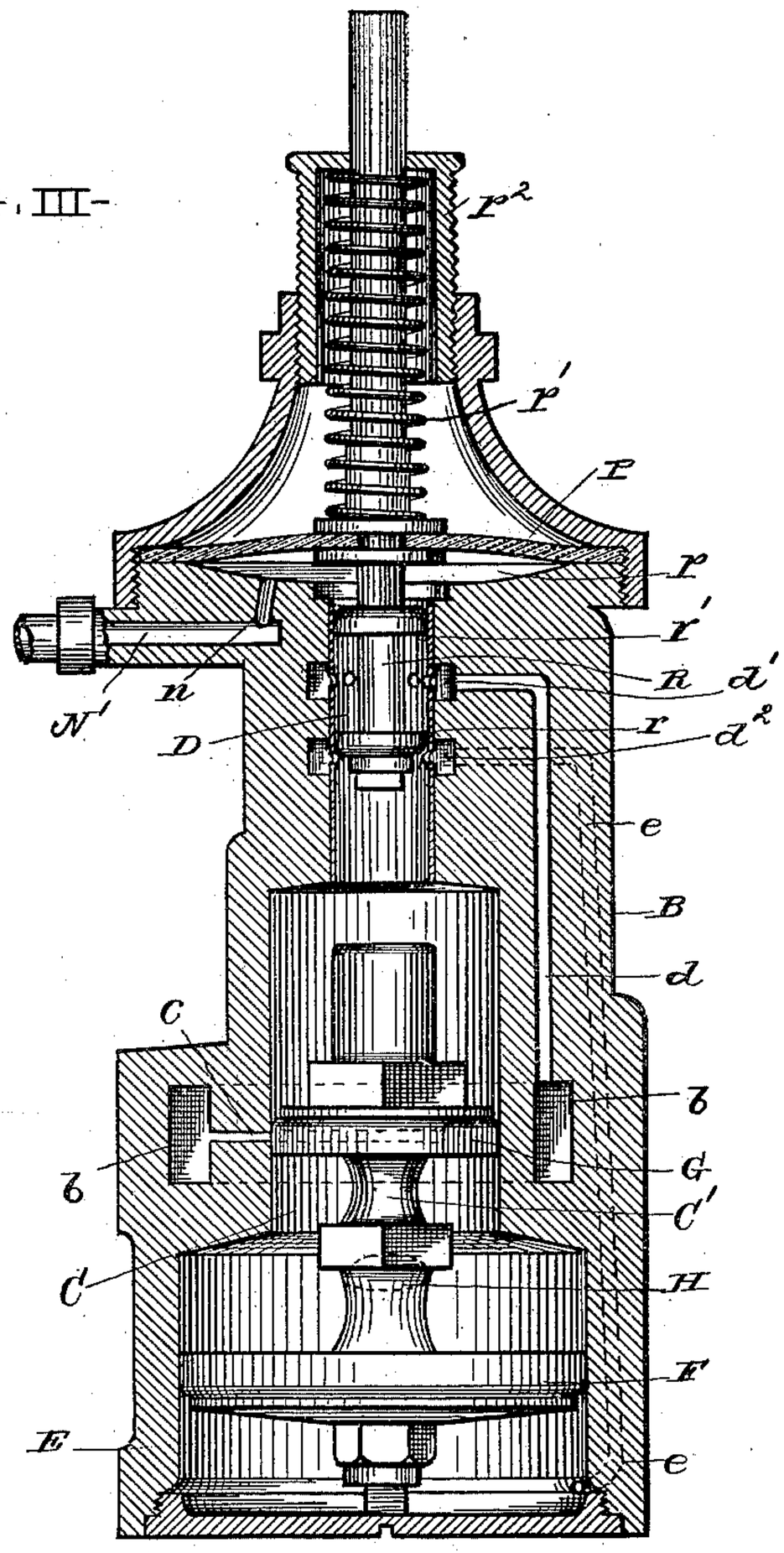
(No Model.) 4 Sheets—Sheet 3.

-FIG. III-



Witnesses,
J. C. Turner
D. G. Davies

Joseph H. Champ, Inventor,
By Thos. G. Hall Atty.

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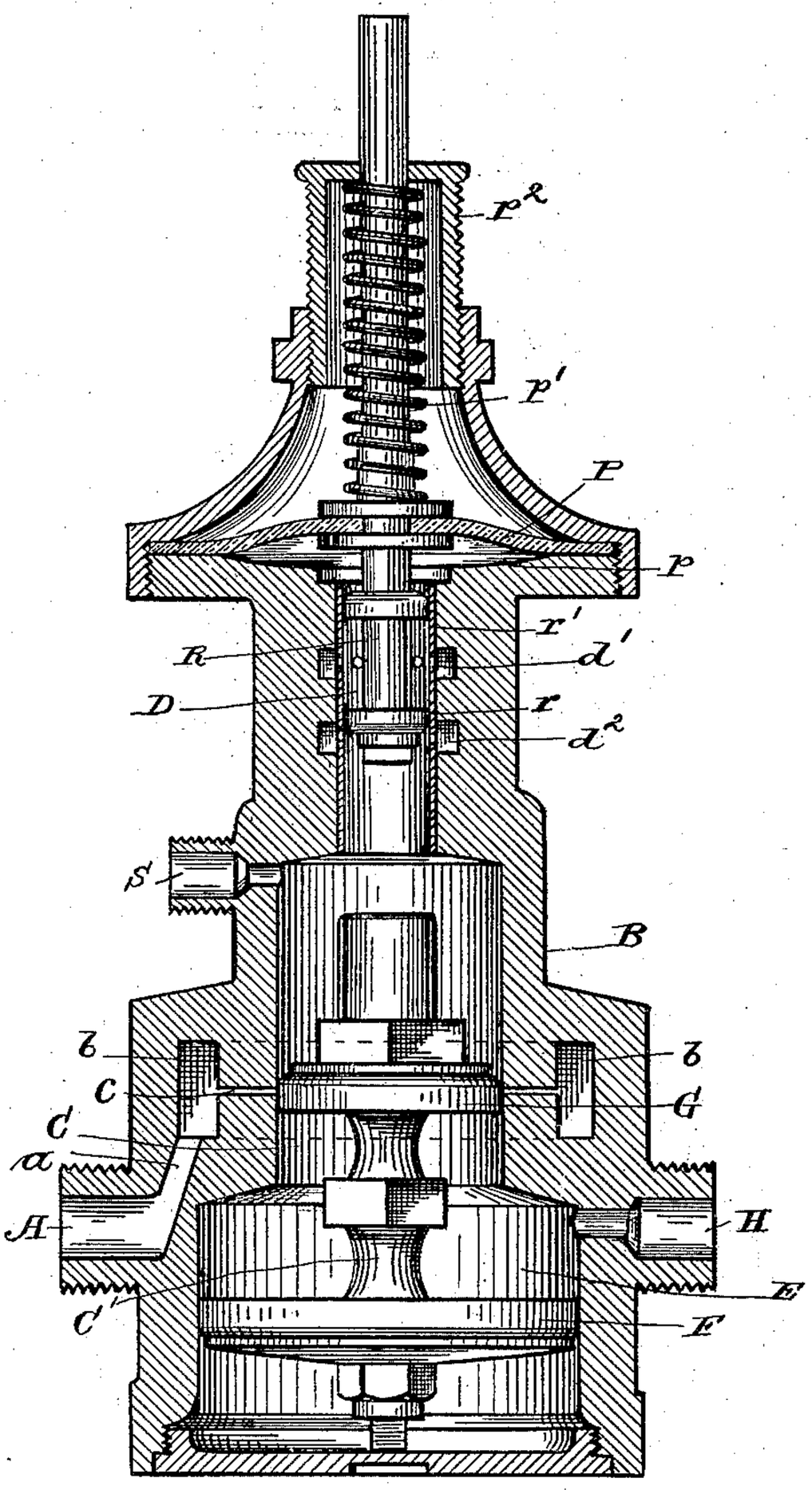
(Application filed Feb. 1, 1899.)

(No Model.) 4 Sheets—Sheet 4.

FIG. IV.



Witnesses,
J. C. Turner
D. L. Davies

Inventor.
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UNITED STATES PATENT OFFICE.

JOSEPH H. CHAMP, OF CLEVELAND, OHIO, ASSIGNOR TO THE BISHOP & BABCOCK COMPANY, OF SAME PLACE.

PUMPING-ENGINE REGULATOR.

SPECIFICATION forming part of Letters Patent No. 652,347, dated June 26, 1900.

Application filed February 1, 1899. Serial No. 704,083. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH H. CHAMP, a citizen of the United States, and a resident of Cleveland, county of Cuyahoga, and State of Ohio, have invented a new and useful Improvement in Pumping-Engine Regulators, of which the following is a specification, the principle of the invention being herein explained and the best mode in which I have contemplated applying that principle, so as to distinguish it from other inventions.

The object of the invention is to provide improved means for automatically controlling the flow of the energizing fluid relative to a pumping-engine.

The invention consists of the means hereinafter described, and particularly pointed out in the claims.

The annexed drawings and the following description set forth in detail certain mechanism embodying the invention, such disclosed means constituting but one of various mechanical forms in which the principle of the invention may be used.

Figure I is a side elevation representing the regulator, pumping-engine, and tank, together with connecting-pipes. Fig. II is a sectional elevation of the regulator looking toward its induction-port of said energizing fluid. Fig. III is a sectional elevation of the regulator looking toward its eduction-port of said energizing fluid. Fig. IV is a view in sectional elevation of the regulator in a plane at right angles to the plane in which Figs. II and III are taken. Fig. V is a plan view of the regulator.

Water under pressure passes from a water-main through induction-port A into regulator B, connecting by passage *a* with annular channel *b*. Therefrom pressure-water may pass through port *c*, when the latter is open, into main-valve chamber C. But whether said port *c* be open or closed pressure-water passes from said channel *b* to channel *d* and into ring-chamber *d'*, thence into auxiliary-valve chamber D, this auxiliary-valve chamber D being always in communication with such pressure-water, and hence when valve *r* is below ring-chamber *d²* the pressure-water may pass thence through channel *e* into piston-chamber E at a point always below the piston. Packing-ring *r'* is rigidly secured to valve-stem R at such a point thereon as to cause such packing-ring to be always above ring-chamber *d'*, such packing-ring constituting the upper end of the auxiliary-valve chamber D and movable correspondingly with said valve-stem and with the central portion of diaphragm P, which is rigidly secured to such valve-stem above said packing-ring, the construction being such as to prevent any fluid within the auxiliary-valve chamber from passing into chamber *p*, within which diaphragm P works. When port *c* is open and piston F has pressure-water on both its upper and under faces, main valve G then has pressure-water only against its under face, and is therefore effectual to maintain itself and piston F in raised position, such piston being secured to the lower end of valve-stem C'. Said main-valve chamber and piston-chamber are in constant open communication with each other. The opposing faces of the main valve and the piston are always subject to the same fluid-pressure, and fluid-eduction port H is constantly in open communication with the piston-chamber at a point always above the piston, the pressure-water within valve-chamber C therefore finding exit from the regulator through eduction-port H and thence by intermediate connection H' to pumping-engine K and after operating the latter such water passing away through pipe L. The pumping-engine thus operated by said pressure-water takes cistern-water through pipe M and forces same out through pipe M' into tank O. This tank O is provided with a close top *o* and with a discharge-pipe *o'* at its bottom, such discharge-pipe having communication with the distributing system of cistern-water service-pipes throughout the house. As the cistern-water enters the tank the air confined in the lower portion of the latter is correspondingly displaced and rises into the upper portion of the tank in compressed form, such compressed volume of air acting in elastic pressure upon the cistern-water in connection with its distribution and service. When the tank becomes sufficiently filled with cistern-water to cause back pressure of the cistern-water in pipe N, communicating with pipe M', port N', and

channel n, it exerts itself in diaphragm-chamber p. As soon as such back pressure of cistern-water is sufficient to overcome the tension of the adjustably-set spiral spring p' then the diaphragm P is raised, carrying with it the valve-stem R, to which are secured the valve r and the packing-ring r', the central portion of the diaphragm being rigidly secured to the valve-stem, so as to move together either up or down. This valve-stem movement carries valve r above ring-chamber d^2, thereby cutting off the under face of piston F from the pressure-water and throwing said piston-face into communication with the waste-port S, whereupon the pressure of supply-water against the upper face of piston F overcomes the pressure of supply-water against the under face of main valve G, and said main valve and piston thereupon start in downward movement, causing such valve to shut off the supply-water from entering into valve-chamber C through port c. This necessarily shuts off such supply-water from passing out from said valve-chamber C, through port H, to the pumping-engine K, and thereupon the latter ceases its work of forcing cistern-water into tank O. After cistern-water has been drawn from tank O sufficiently to reduce the back pressure of the cistern-water against the under face of diaphragm P to enable spring p', as tensioned by screw-cap p^2, to again become effectual, then such spring forces the central portion of said diaphragm downward, together with valve-stem R. Such downward movement of said valve-stem carries valve r below ring-chamber d^2, thereby cutting off the lower face of piston F from communication with the waste-port S and restoring such piston-face in communication with the supply-water by means of channel e, ring-chamber d^2, auxiliary-valve chamber D, ring-chamber d', channel d, annular channel b. Main valve G thus becomes effectual to raise itself and piston F, the two being rigidly secured to main-valve stem C', again permitting the supply-water to pass out through port c into main-valve chamber C, when the first-described operation of parts obtain, and the supply-water passes through port H to pumping-engine K and causes the latter to resume its work of pumping cistern-water into tank O.

While I show in this instance the energizing fluid of the pumping-engine as being water under pressure, it is apparent that the same construction and operation would obtain in using steam, compressed air, or other fluid as the energizing fluid. Such energizing fluid is absolutely and completely cut off from the pumping-engine, so that there is no delicate balance between supplying the energizing fluid and cutting the latter off. Experience and long practice show that it is impossible to maintain valves of a pumping-engine in such order that they will not permit of some leakage of the energizing fluid into the pumping-engine, provided the pressure of such fluid is maintained against such valves when the tank is filled and the pumping-engine should be at rest. Such leakage cannot obtain according to my invention, and when the tank is full and the pumping-engine should therefore be completely at rest its valves are absolutely cut off from pressure of the energizing fluid.

In addition to the foregoing my invention presents means adapted to insure the automatic resumption of the eduction of the energizing fluid from the regulator when the tank is prepared to receive further supply of cistern-water, so that such energizing fluid is without intervention of an attendant let on again to the pumping-engine at the time when the latter should recommence pumping cistern-water into the tank.

Other modes of applying the principle of my invention may be employed instead of the one explained, change being made as regards the mechanism herein disclosed, provided the means covered by any one of the following claims be employed.

I therefore particularly point out and distinctly claim as my invention—

1. The combination of a main-valve chamber and a piston-chamber connected together in constant open communication with each other, a main valve and a piston connected together and respectively working in said two chambers, an induction-port controlled by said main valve and adapted when open to permit fluid to pass between the opposing faces of itself and said piston, an eduction-port, an auxiliary valve connected to a movable device in a fluid-pressure chamber and adapted to control communication of fluid relatively to the remaining face of said piston, substantially as set forth.

2. The combination of a main-valve chamber and a piston-chamber connected together in constant open communication with each other, a main valve and a piston connected together and respectively working in said two chambers, an induction-port, an eduction-port in communication with the chamber-space between the opposing faces of said main valve and piston, an auxiliary valve connected to a movable device in a fluid-pressure chamber and adapted to control communication of fluid relatively to the remaining face of said piston, substantially as set forth.

3. The combination of a main-valve chamber and a piston-chamber connected together in constant open communication with each other, a main valve and a piston connected together and respectively working in said two chambers, a fluid-induction port, a fluid-eduction port in constant open communication with the chamber-space between the opposing faces of said main valve and piston, an auxiliary valve connected to a movable device in a pressure-chamber and adapted to control communication of fluid on the remaining face of said piston with fluid-supply and with fluid-waste, substantially as set forth.

4. The combination of a main-valve chamber and a piston-chamber connected together in constant open communication with each other, a main valve and a piston connected together and respectively working in said two chambers, a fluid-induction port connecting with said main-valve chamber and adapted when not closed by said main valve to permit motive fluid to pass between the opposing faces of said main valve and piston, a fluid-eduction port in constant open communication with the chamber-space between the opposing faces of said main valve and piston, an auxiliary valve connected to a movable device in a fluid-pressure chamber and adapted to control communication of fluid on the remaining face of said piston, substantially as set forth.

5. The combination of a main-valve chamber and a piston-chamber connected together in constant open communication with each other, a main valve and a piston connected together and working respectively in said two chambers, such main valve controlling passage of fluid between the opposing faces of itself and said piston, an auxiliary valve connected to a movable device in a fluid-pressure chamber and adapted to control communication of fluid relatively to the remaining face of said piston, an auxiliary-valve chamber having two ring-chambers respectively connecting it with fluid-supply and with said piston-chamber, substantially as set forth.

6. The combination of a main-valve chamber and a piston-chamber connected together in constant open communication with each other, a main valve and a piston connected together and working respectively in said two chambers, said main valve controlling passage of motive fluid between opposing faces of itself and said piston, an auxiliary valve whose stem is connected to a movable device in a fluid-pressure chamber and controlling communication of fluid relatively to the remaining face of said piston, an auxiliary-valve chamber having two ring-chambers respectively connecting it with fluid-supply and with said piston-chamber, that portion of said auxiliary-valve chamber which has communication with said fluid-supply ring-chamber being always included between said auxiliary valve and a packing-ring on said valve-stem, substantially as set forth.

7. The combination of a main-valve chamber and a piston-chamber connected together in constant open communication with each other, a main valve and a piston connected together and working respectively in such two chambers, said main valve adapted to control passage of fluid between the opposing faces of itself and said piston, an auxiliary valve having its stem connected to a movable device in a fluid-pressure chamber and adapted to control passage of fluid relatively to the remaining face of said piston, an auxiliary-valve chamber having two ring-chambers respectively connecting it with fluid-supply and with said piston-chamber, that portion of said auxiliary-valve chamber which connects with said fluid-supply ring-chamber being always included between said auxiliary valve and a packing-ring on said valve-stem which constitutes a closed end of said auxiliary-valve chamber, the other end of said auxiliary-valve chamber having connection with a waste-port, substantially as set forth.

Signed by me this 27th day of January, 1899.

JOSEPH H. CHAMP.

Attest:
THOS. B. HALL,
D. T. DAVIES.