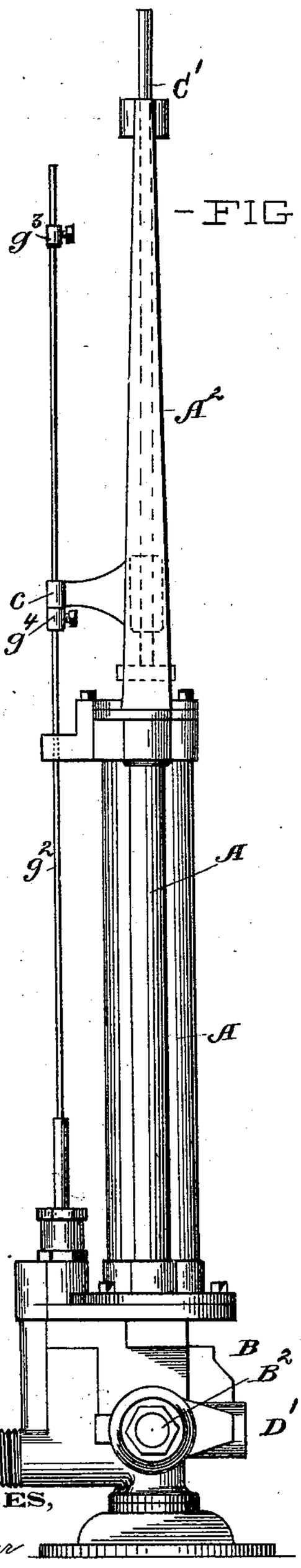
(No Model.) 4. Sheets--Sheet 1.

J. H. CHAMP.

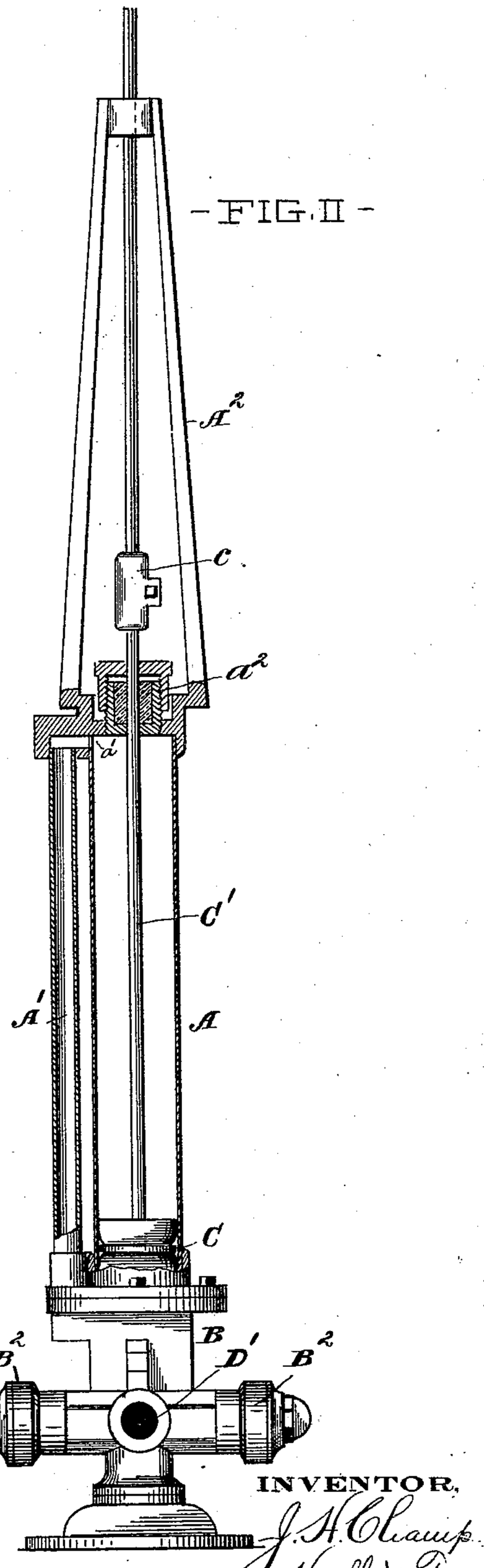
HYDRAULIC MOTOR.

No. 548,035. Patented Oct. 15, 1895.

-FIG. I-



-FIG. II-



WITNESSES,

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Atty's,

(No Model.) 4 Sheets—Sheet 2.

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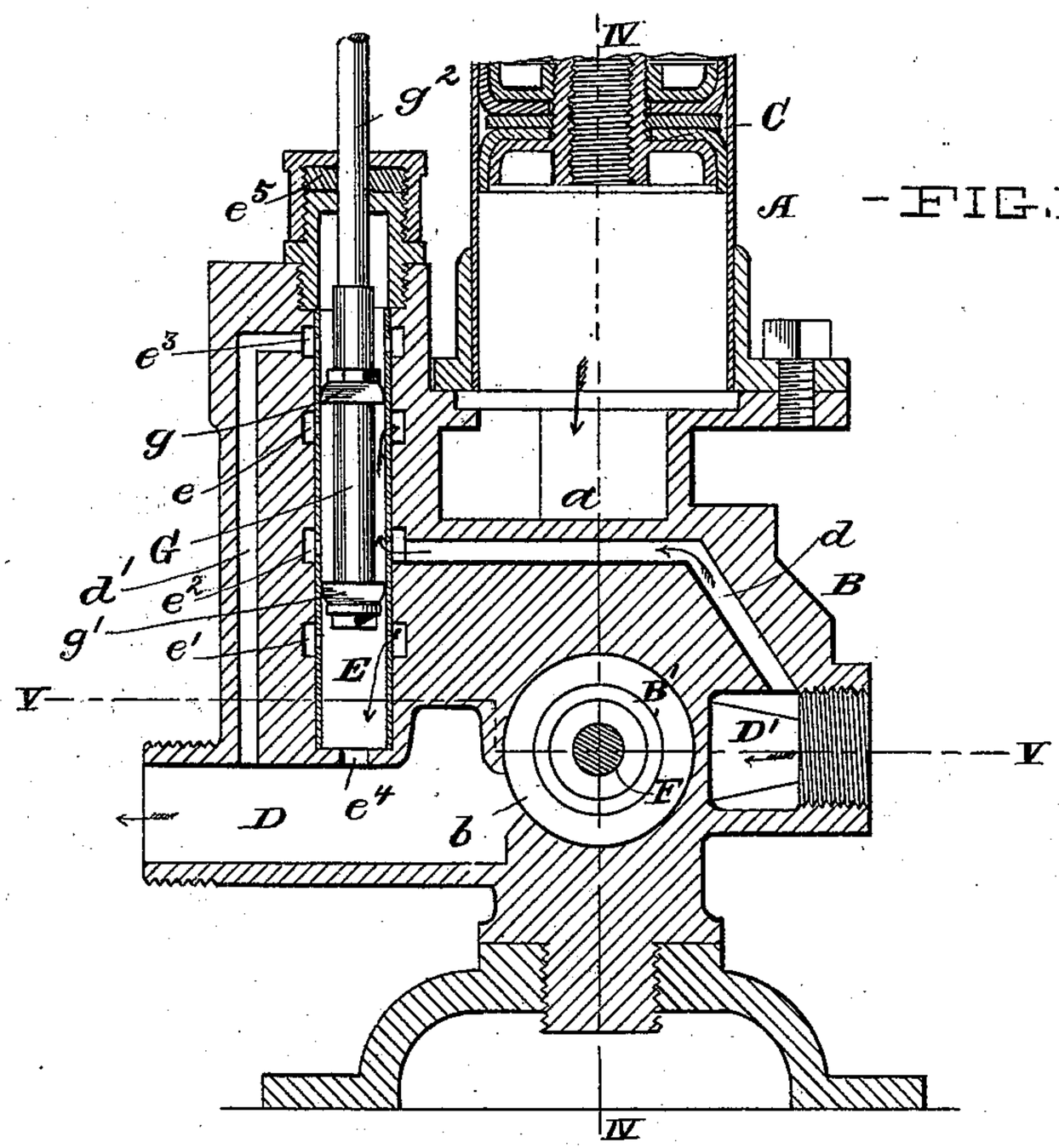

FIG. III

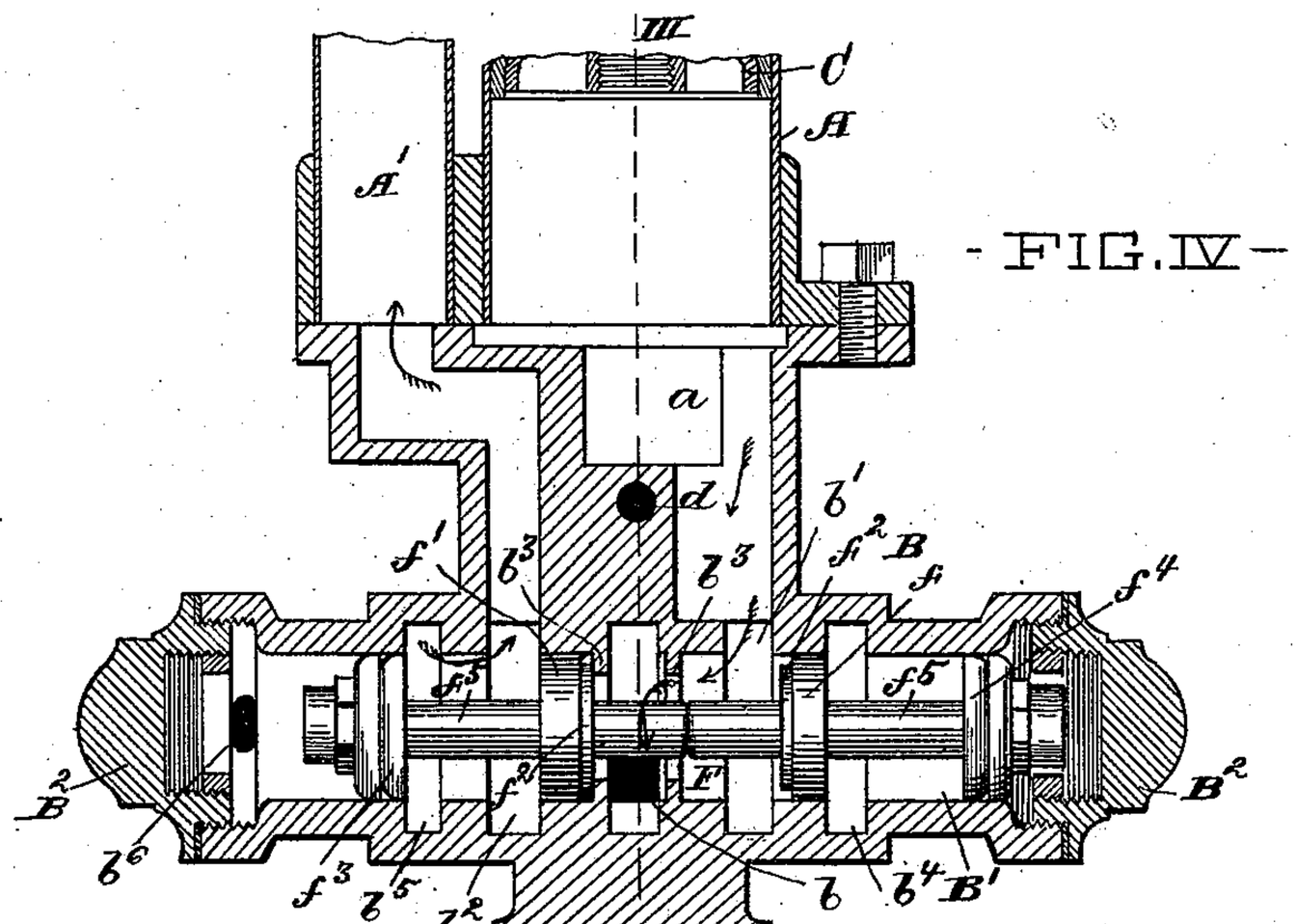

FIG. IV

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HYDRAULIC MOTOR.

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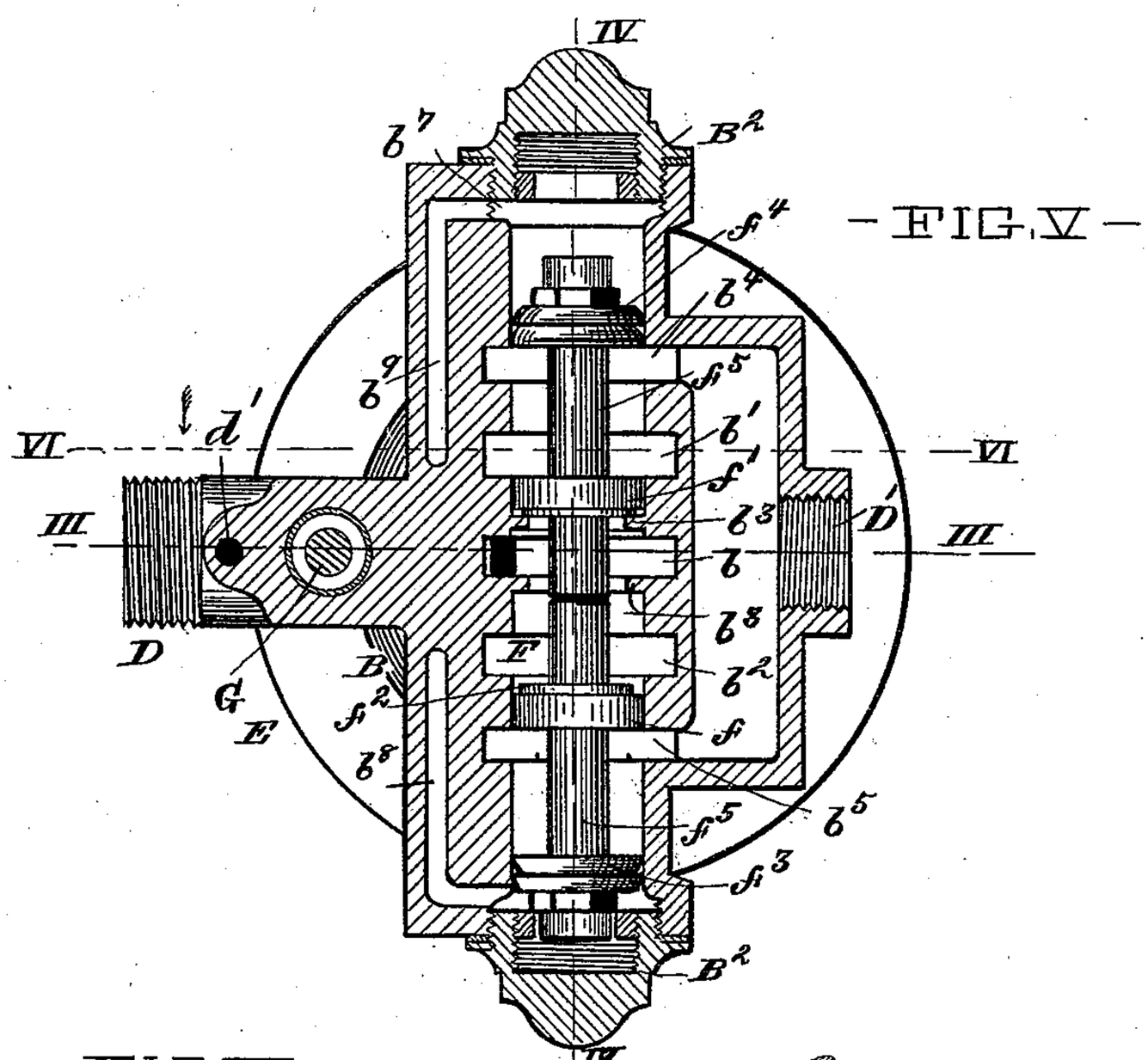
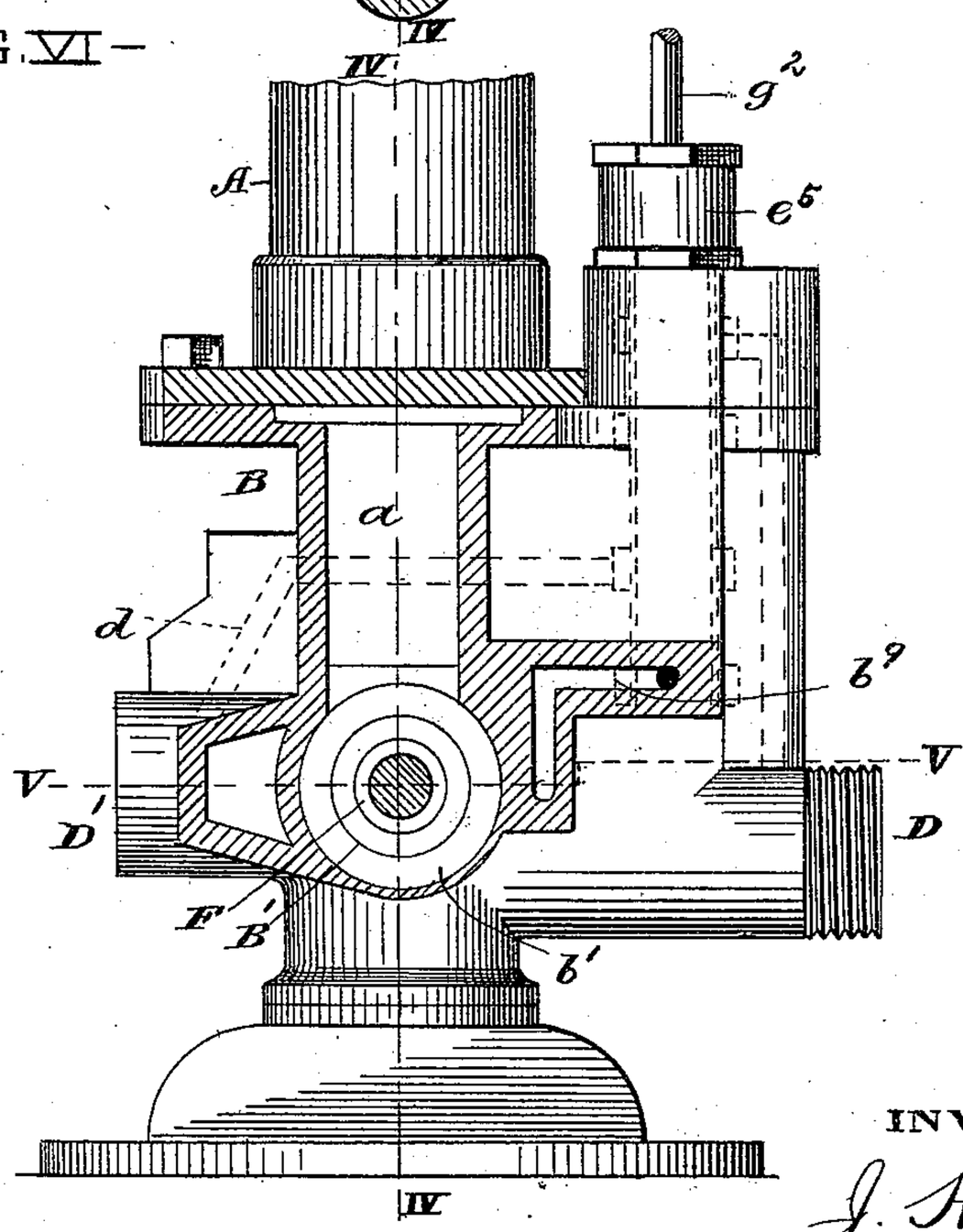
— FIG. V —



— FIG. VI —



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HYDRAULIC MOTOR.

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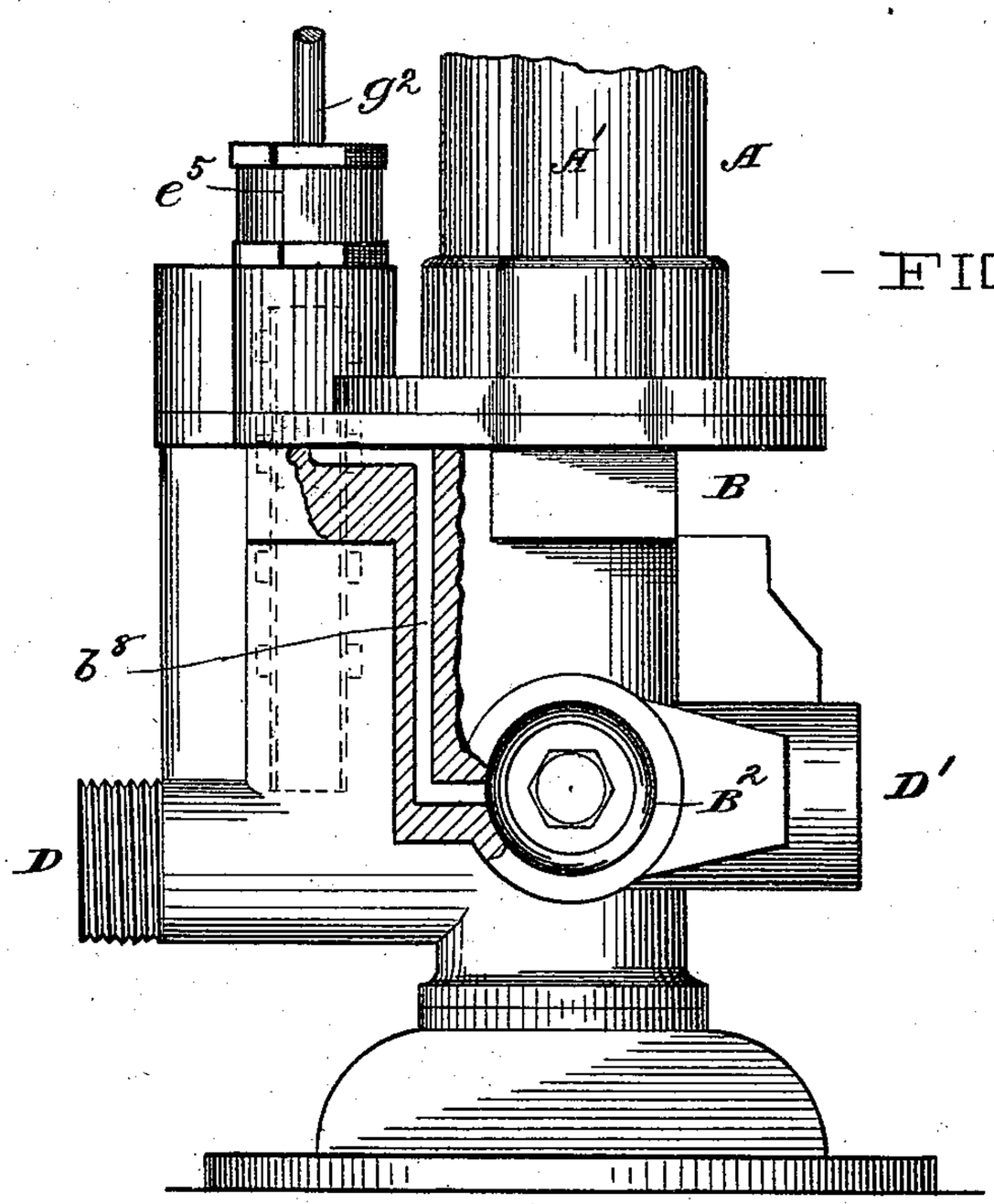

— FIG. VII —

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UNITED STATES PATENT OFFICE.

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

HYDRAULIC MOTOR.

SPECIFICATION forming part of Letters Patent No. 548,035, dated October 15, 1895.

Application filed June 5, 1895. Serial No. 551,705. (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 certain new and useful Improvements in Hydraulic Motors, 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 annexed drawings and the following description set forth in detail one mechanical form embodying the invention, such detail construction being but one of various mechanical forms in which the principle of the invention may be used.

In said annexed drawings, Figure I represents a side view of my improved hydraulic motor; Fig. II, a front view of the motor, illustrating the cylinder and the channel for the upper end of the same in axial section; Fig. III, a vertical section of the lower portion of the motor, taken on the lines III III in Figs. IV and V; Fig. IV, a vertical section on the lines IV IV in Figs. III, V, and VI; Fig. V, a horizontal section on the lines V V in Figs. III, IV, and VI; Fig. VI, a vertical section on the lines VI VI in Fig. V; and Fig. VII, a side view of the valve-casing, showing a portion broken away and removed.

A water-cylinder A is supported upon a valve-casing B, and said cylinder has a water inlet and outlet a in its bottom and a water inlet and outlet a' in its top, which respectively communicate directly with the controlling-valve chamber in the casing and through a vertical tube A′ with said chamber. A piston C is fitted to slide in the cylinder, and has a rod C′, which passes through a stuffing-box a^2 in the upper end of the cylinder. The piston-rod is guided in an upright guide A^2, projecting from the upper end of the cylinder. A horizontal controlling-valve chamber B′ is formed in the valve-casing and has an annular outlet-port b at its middle, which communicates with the water-outlet D, which is suitably connected to the sewer or other waste. Two annular distributing-ports b' and b^2 are formed at each side of the middle port and respectively communicate with the water inlet and outlet a for the bottom of the water-cylinder and with the tube A′ and the water inlet and outlet a' for the top of the cylinder. Annular flanges b^3 are formed upon the walls of the cylindrical valve-chamber at or near the edges of the annular middle port. Two annular inlet-ports b^4 and b^5 are formed at a distance from the two distributing-ports b' and b^2, and said inlet-ports communicate with the water-inlet D′, which is suitably connected to a water-service pipe or other source of water under a head or pressure. Two ports b^6 and b^7 are provided at the ends of the valve-chamber and communicate through channels, respectively, b^8 and b^9 with two annular ports e and e', respectively, in the upper and lower portions of a vertical primary-valve chamber E in the valve-casing. Said valve-chamber has an annular inlet-port e^2, which communicates with the water-inlet by a channel d. Outlet-ports e^3 and e^4, respectively, are formed at the upper end of the valve-chamber and in the bottom of the valve-chamber, the upper port communicating with the outlet through a channel d' and the bottom port opening directly into the outlet. The upper end of the valve-chamber has a stuffing-box e^5 or other suitable packing. A controlling-valve F fits in the controlling-valve chamber and is provided with two valve-pistons f and f', each of which has play over and at both sides of the distributing-ports b' and b^2. The inner faces of said valve-pistons have packings f^2, which may form tight closures against the annular flanges b^3. Actuating-pistons f^3 and f^4 are provided at the ends of the valve, said pistons being permanently open to the outside of the inlet-ports and to the inside of the end ports b^6 and b^7. For the purpose of admitting of the insertion of the controlling-valve its stem is divided at its middle to form two halves f^5, the inner ends of which abut against each other. The ends of the controlling-valve chamber are closed by removable caps B^2, which may be removed and the two valve-halves inserted, one half from each end, when the valve may act as one entire valve on account of the actuating-pressure being applied upon the outer faces of the actuating-pistons only and thus acting to keep the two halves together. A primary valve G fits in

the primary-valve chamber and has two pistons g and g', which are at such distance from each other that they may alternately connect the middle inlet-port e^2 with either one of the distributing-ports e and e', at the same time alternately uncovering one of said ports to the waste when the valve is raised or lowered. The valve has a rod g^2, which extends through the packing of the valve-chamber, and said rod has two stops g^3 and g^4, adjustably secured upon it, which stops may be engaged by an arm c, which projects from the piston-rod and is adjustably secured upon the same.

For the purpose of describing the operation of the motor the inlet will be assumed to be connected to a water-service pipe or other source of water under pressure, the outlet will be assumed as connected to a suitable waste, and the valves and piston will be assumed as being in the positions illustrated in Figs. III and IV. The piston is on its downstroke. The primary valve is in its raised position, whereby it admits water against the actuating-piston f^3 of the controlling-valve and connects the other end of the valve-chamber to the waste, and the controlling-valve is in such position that it admits actuating-water to the upper end of the cylinder and connects the lower end of the cylinder to the waste. When the piston arrives at the lowermost position of its stroke, it will depress the primary-valve rod by the arm upon the piston-rod engaging the lower stop upon said valve-rod. When the primary valve is depressed, it will expose the actuating-piston f^4 of the controlling-valve to the live-water pressure and the piston f^3 to the waste, and the controlling-valve will be shifted to the position illustrated in Fig. V, which will connect the lower end of the cylinder to the inlet and the upper end to the waste, so that the piston will be forced upward. When the arm upon the piston-rod engages the upper stop upon the primary-valve rod, said valve is again raised to the position in Fig. III and the controlling valve will be shifted into the position in Fig. IV and the piston will again descend. It is evident that the length of the stroke of the piston and piston-rod may be adjusted by adjusting the stops upon the primary-valve rod to shift said valve at the desired point of the stroke.

As the distributing-pistons f and f' are not provided with cup-packings or other packings upon their peripheries, which would be liable to catch in the annular ports and stop the valve from moving, the packings upon the faces of said pistons and the annular flanges to the inside of the distributing-ports are provided for the purpose of preventing leakage past that piston, against which the inlet-water acts in passing to the distributing-port. It is of advantage in the manufacture of the motor to form the open annular ports in the valve-chamber instead of lining the chamber with a tube and forming annular rows of holes in such tubes, inasmuch as the expense and labor of such lining-tube may be avoided and larger ports may be obtained which will admit of a more free and unobstructed flow of water than the perforations in the tube would admit of.

The motor is principally intended for operating the bellows of organs; but it is evident that the motor may be used for any other purpose to which it might be adapted. The stroke of the piston and rod is adjustable, so that the action of the motor upon the bellows may be adjusted according to requirements.

Other modes of applying the principle of my invention may be substituted for the mode herein explained. Change may therefore be made as regards the mechanism thus disclosed provided the principles of construction set forth in the following claims are employed.

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

In a hydraulic motor, the combination of a controlling valve chamber having removable caps at its ends and formed with an annular outlet port at its middle, two annular flanges at opposite sides of said port; two annular distributing ports at opposite sides of said flanges, two annular inlet ports to the outside of said distributing ports, and two ports at the ends of the chamber; a controlling valve composed of two halves having the inner ends of their stems abutting and having each a valve piston provided with a packing upon its inner face and playing between the flange and inlet port and an actuating piston at the outer end, and primary valve mechanism which alternately connects the end ports to the inlet and waste, substantially as set forth.

In testimony that I claim the foregoing to be my invention I have hereunto set my hand this 25th day of May, A. D. 1895.

JOSEPH H. CHAMP.

Witnesses:
WM. SECHER,
DAVID T. DAVIES.