

(No Model.)

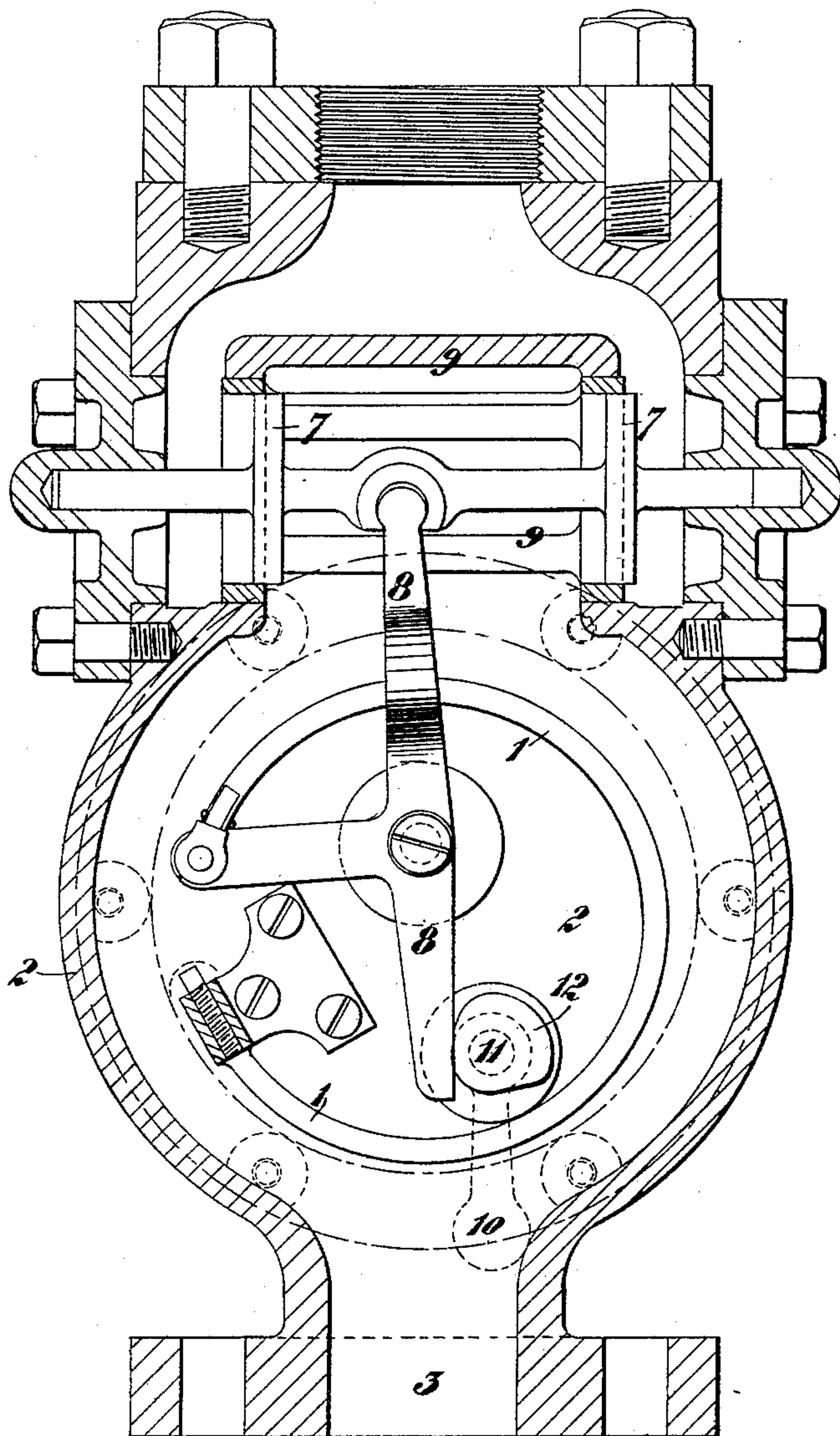
3 Sheets—Sheet 1.

H. LINDLEY.
APPARATUS FOR CONTROLLING THE CIRCULATION OF LIQUID THROUGH
CYLINDER JACKETS OF GAS OR OTHER MOTORS.

No. 450,771.

Patented Apr. 21, 1891.

Fig. 1.



Witnesses.

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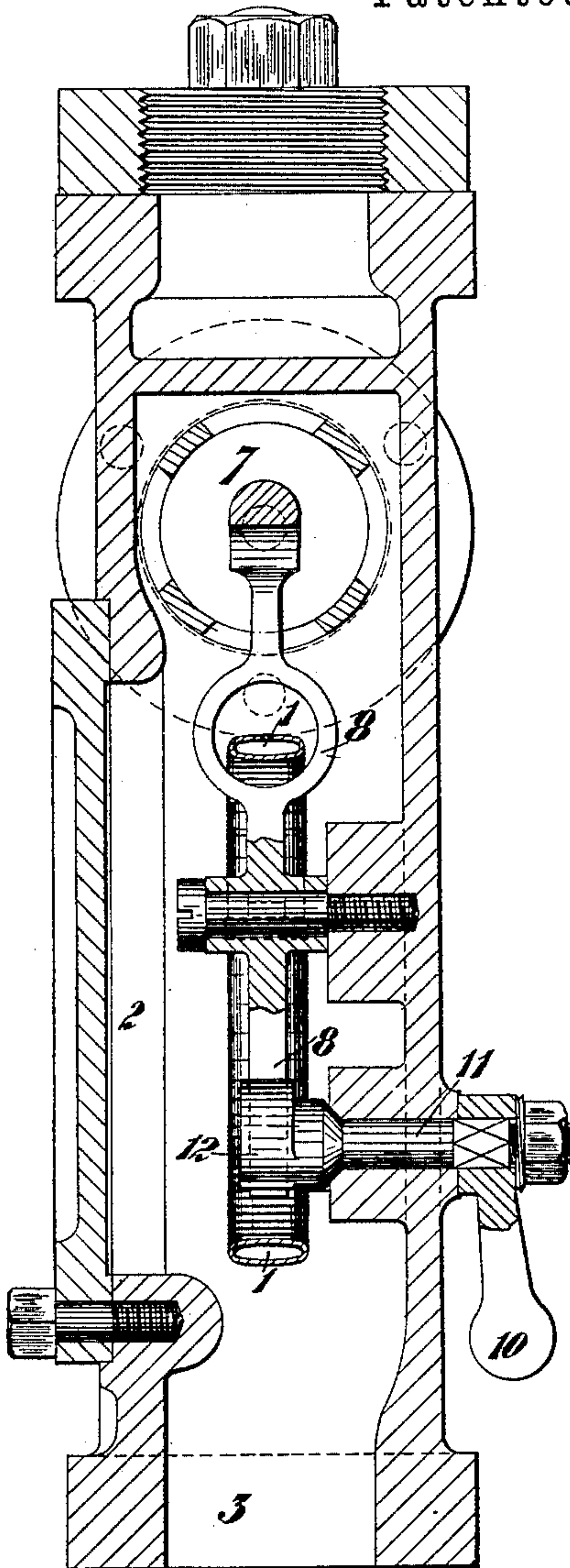
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No. 450,771.

Fig. 2. Patented Apr. 21, 1891.



Witnesses.

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(No Model.)

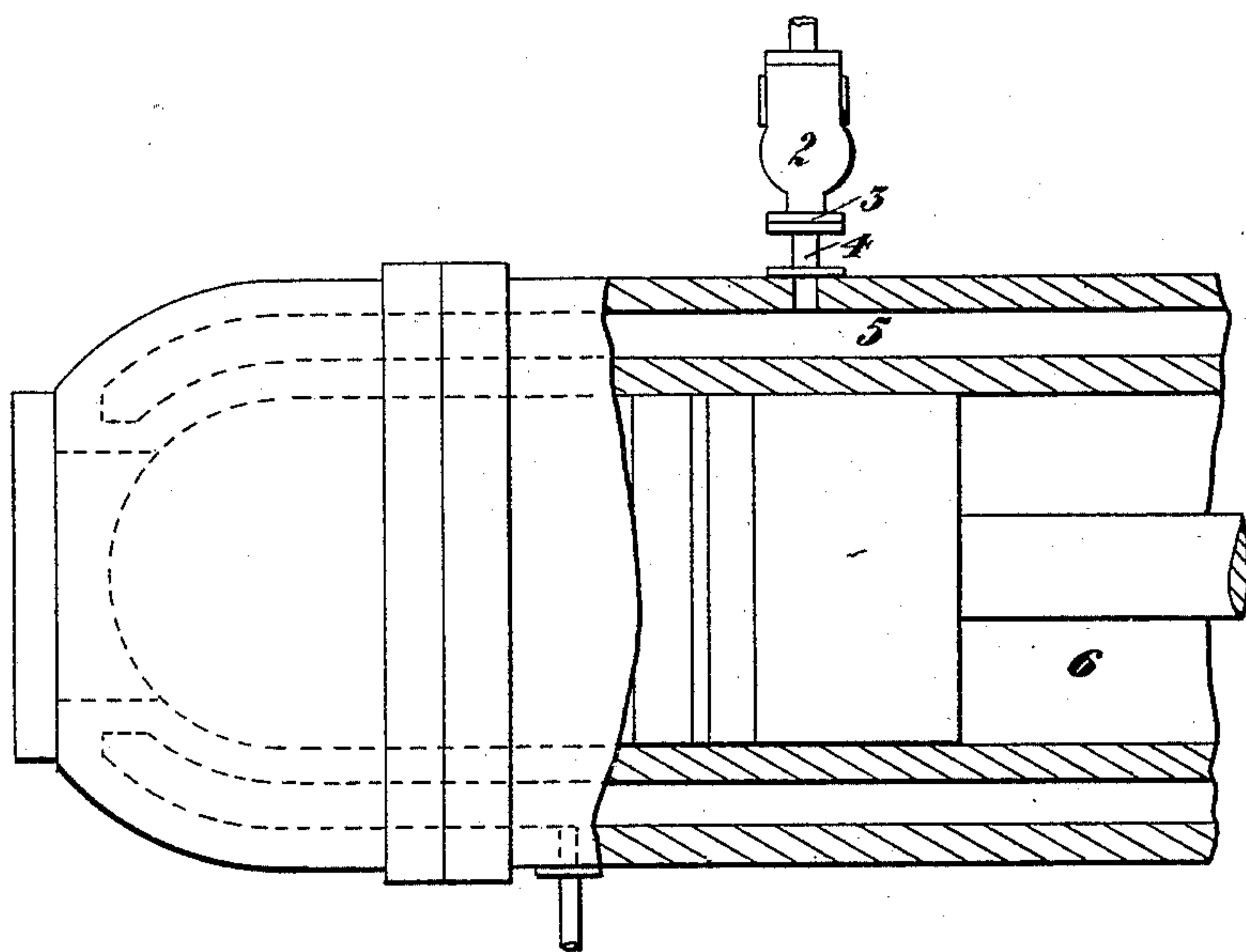
3 Sheets—Sheet 3.

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CYLINDER JACKETS OF GAS OR OTHER MOTORS.

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Fig. 3



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UNITED STATES PATENT OFFICE.

HERBERT LINDLEY, OF SALFORD, ENGLAND.

APPARATUS FOR CONTROLLING THE CIRCULATION OF LIQUID THROUGH CYLINDER-JACKETS OF GAS OR OTHER MOTORS.

SPECIFICATION forming part of Letters Patent No. 450,771, dated April 21, 1891.

Application filed August 25, 1890. Serial No. 363,014. (No model.) Patented in England December 12, 1889, No. 20,033; in Norway September 1, 1890, No. 1,924; in South Australia September 19, 1890, No. 1,721; in New Zealand September 26, 1890, No. 4,617; in Italy September 30, 1890, LV, 244; in Cape of Good Hope October 1, 1890, No. 633; in Natal October 1, 1890; in Transvaal October —, 1890, No. 212; in Brazil October 24, 1890, No. 981; in Spain November 14, 1890, No. 11,204, and in Argentine Republic December 29, 1890, No. 975.

To all whom it may concern:

Be it known that I, HERBERT LINDLEY, a subject of the Queen of Great Britain and Ireland, residing at Salford, in the county of Lancaster, Kingdom of Great Britain and Ireland, have invented Apparatus for Controlling the Circulation of Liquid through the Cylinder-Jackets of Gas or other Motors, (for which I have obtained Letters Patent in England December 12, 1889, No. 20,033; in Norway September 1, 1890, No. 1,924; in South Australia September 19, 1890, No. 1,721; in New Zealand September 26, 1890, No. 4,617; in Italy September 30, 1890, LV, 244; in Cape of Good Hope October 1, 1890, No. 633; in Natal October 1, 1890; in Transvaal October —, 1890, No. 212; in Brazil October 24, 1890, No. 981; in Spain November 14, 1890, No. 11,204, and in Argentine Republic December 29, 1890, No. 975,) of which the following is a specification.

In certain types of heat-engines—as, for example, gas and liquid-hydrocarbon motors—it is usual to provide the motor-cylinders with jackets, through which fluid—for example, water—is caused to circulate for the purpose of preventing the overheating of the cylinders.

In order to automatically control the water circulation in a heat-engine of the kind mentioned, so that the cylinder of such an engine may not be too hot when working at full load nor so cold when working at light loads as to condense the vapor drawn in, I make the circulation of water in the jacket surrounding such cylinders dependent on or proportional to the amount of work being done by the engine. To this end a throttle-valve is arranged in the entering or delivery pipe that conducts the cooling-water to or from the jacket, and this valve is automatically controlled or operated by a thermostat. This thermostat may conveniently consist of a twisted or bent coil or merely of a straight bar, such coil or bar being composed of two different metals and so arranged as to be subject to the heat of the motor-cylinder, so that when the temperature in the cylinder becomes too high such coil or bar will bend or twist and will impart

motion to the valve and tend to open the same and allow a more rapid circulation, the reverse action taking place when the cylinder gets too cold or tends to do so. The thermostat may consist of a metal thermometer depending for its action on the unequal expansion of two metals—such, for example, as zinc and brass—or of a curved tube—such as a Bourdon gage-tube—filled with spirit or other suitable liquid. The thermostat may be placed in the water-delivery pipe or in the water-jacket of the cylinder or in contact with the exterior hot wall of the jacket.

In the accompanying drawings, Figures 1 and 2 are sections at right angles to each other of one form of such a thermostat inclosed within a casing or chamber adapted to be placed in communication with the water-jacket of the cylinder by the branch and a rising main. Fig. 3 is a part of a motor-cylinder having a water-jacket and thermostat according to this invention.

The thermo-sensitive device in this case is shown as a Bourdon tube 1, that is filled with spirits of wine and inclosed in a casing or chamber 2, that is in communication by the branch 3 and delivery-pipe or rising main 4 with the water-jacket 5 of a motor-cylinder 6. The tube is fixed at one end and connected at the other end to an equilibrium-valve 7 by a three-armed lever 8 in such a manner as to move said valve endwise in its case 9 and open it when the temperature of the water in the casing 2 rises too high and close it when the temperature falls too low. To enable the valve 7 to be moved externally by hand, there is provided a hand-lever 10, fixed upon a spindle 11, that fits in a bush or gland in the side of the casing 2, and is provided with a cam 12 on its inner end, that acts against one arm of the lever 8 when the hand-lever is operated.

As will be obvious, other devices depending for their action on the heat imparted by the explosion in the cylinder to the water in the casing or jacket surrounding the same may be utilized to operate the throttle-valve.

What I claim is—

1. In combination, the water-jacket of the cylinder, a passage into said jacket, a valve in said passage controlling the passage of water through the same, and a thermostat 5 controlling the movement of said valve and located in contact with the water or the cylinder to open the valve when the heat is above a certain point and tend to close the valve when the heat falls.
- 10 2. In combination, a thermostat located in the water-passage to or from the cooling-jacket of the cylinder, a valve in said passage, and means controlled by said thermostat to open the valve when the heat rises 15 and which tend to close the same when the heat falls.
3. In a gas or other motor of the kind here- in referred to, the combination, with a motor- cylinder provided with a jacket, of a valve 20 for controlling the circulation of liquid through said jacket, a conduit in communication with said jacket and through which liquid after being heated by said cylinder flows, and a thermostat located in said con- 25 duit, subject to the heat of said liquid, and capable of automatically operating said valve, substantially as herein described, for the purpose set forth.
4. In a gas or other motor of the kind here- 30 in referred to, the combination, with a motor- cylinder having a water-jacket provided with inlet and delivery pipes, of a valve for controlling the flow of liquid through said jacket, and a thermostat consisting of a curved tube, 35 such as a Bourdon gage-tube, connected with

said valve and arranged to be immersed in liquid that has been in contact with said cylinder, substantially as herein described, for the purpose set forth.

5. In a gas or other motor of the kind re- 40 ferred to, the combination, with a motor-cylinder having a water-jacket, of a valve located in the delivery-pipe of said jacket, a thermostat, also located in said delivery-pipe and consisting of a curved tube 1, filled with liq- 45 uid and fixed at one end, and a lever arranged to transmit motion from said tube to said valve, substantially as herein described.

6. In a gas or other motor of the kind here- in referred to, the combination, with a motor- 50 cylinder having a water-jacket and a valve for controlling the circulation of water through said jacket, of a curved tube 1, located in the delivery-pipe of said jacket and fixed at one end, a lever 8, connected to said tube and 55 adapted to operate said valve, and means, comprising a hand-lever 10, arranged externally to said delivery-pipe, a spindle 11, connected to said hand-lever, and a cam 12, carried by said spindle and arranged to act against 60 said lever 8, substantially as herein described, for the purpose specified.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

HERBERT LINDLEY.

Witnesses:

S. B. BOARDLEY,
FRED. A. CLIFFE,
Both Clerks, Sandon Works, Salford.