

No. 855,065.

PATENTED MAY 28, 1907.

C. R. MOORE.
PUMP GOVERNOR.
APPLICATION FILED JUNE 7, 1906.

2 SHEETS—SHEET 1.

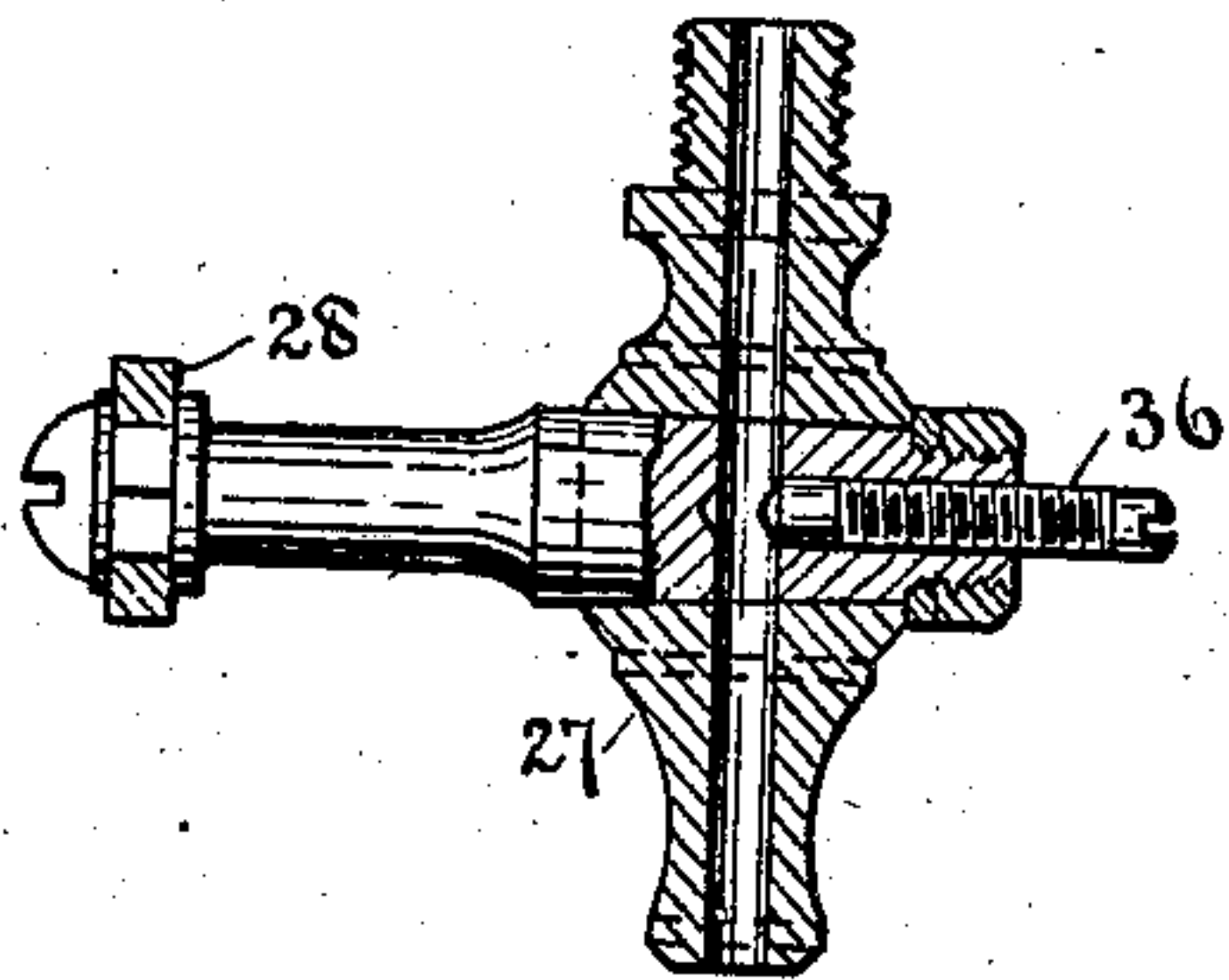


Fig. 4.

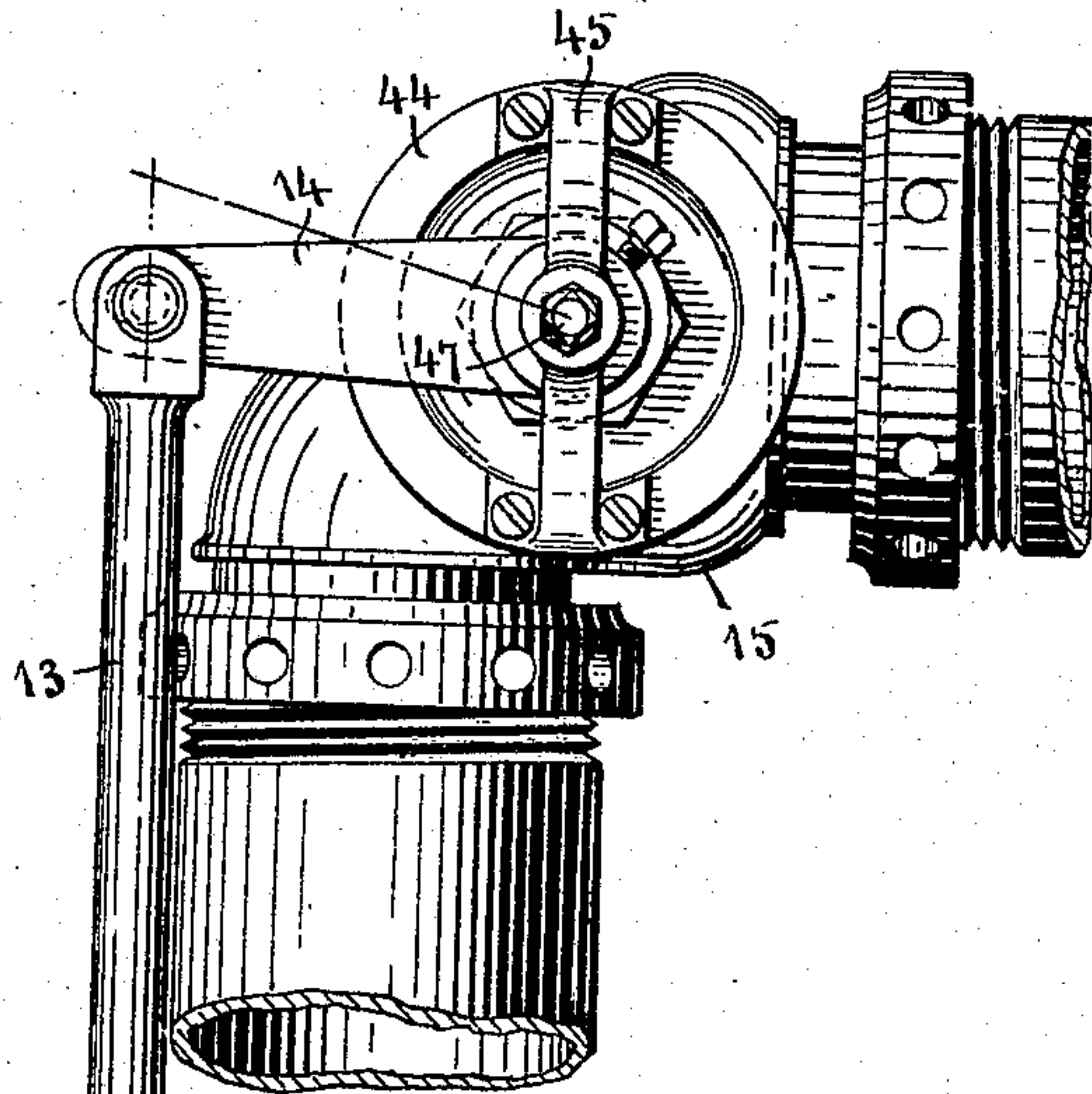


Fig. 1.

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2 SHEETS—SHEET 2.

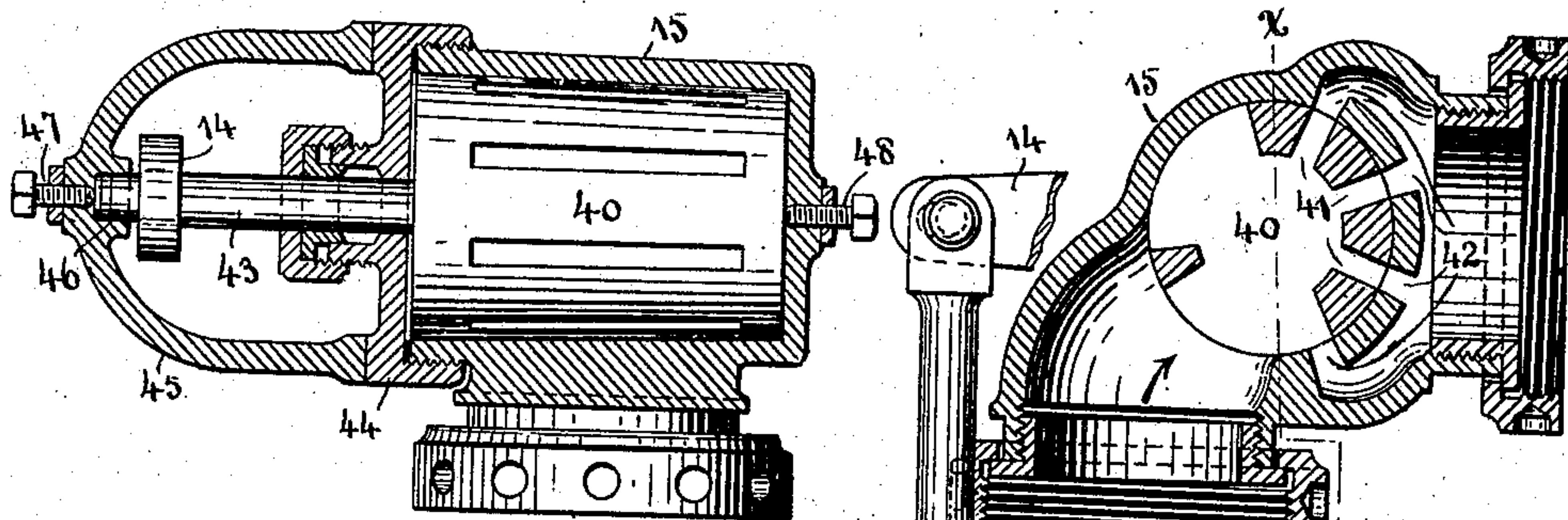


Fig. 3.

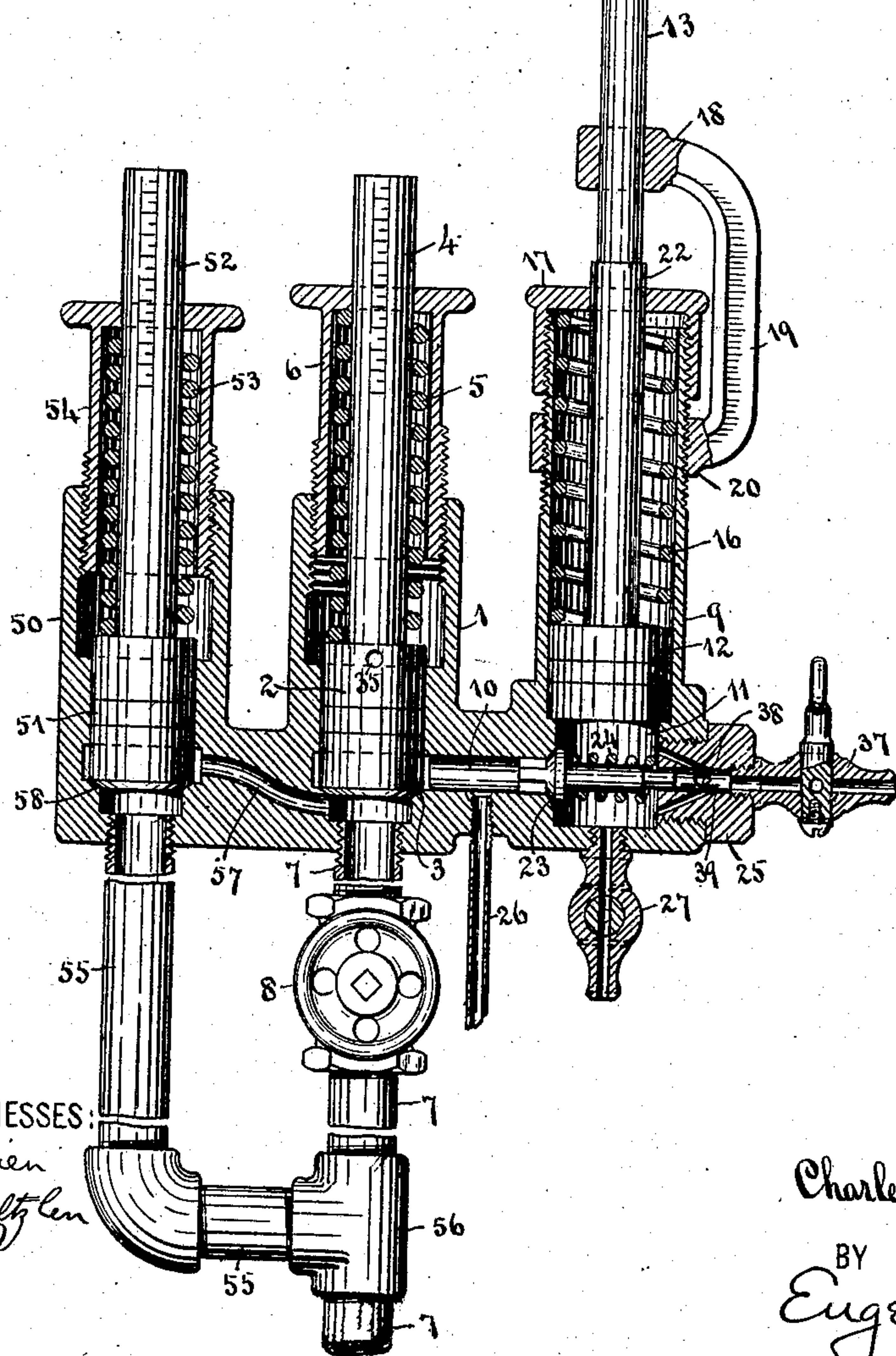


Fig. 2.

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CHARLES R. MOORE, OF ELMIRA, NEW YORK.

PUMP-GOVERNOR.

No. 855,065.

Specification of Letters Patent.

Patented May 28, 1907.

Application filed June 7, 1906. Serial No. 320,562.

To all whom it may concern:

Be it known that I, CHARLES R. MOORE, a citizen of the United States, residing at Elmira, in the county of Chemung and State of New York, have invented certain new and useful Improvements in Pump-Governors, of which the following is a specification.

This invention relates to improvements in automatic pressure actuated controlling devices for pumping engines, and has to do more particularly with a pressure actuated auxiliary throttle valve for use in connection with steam fire engines; the object of my invention being to provide positive and automatic means for quickly shutting off the admission of steam to the cylinders to prevent the water pressure from exceeding a predetermined point; and thereafter admitting steam to the cylinders gradually, when the water pressure falls, to start the pump slowly into action after each shut-down, thereby avoiding sudden shock and strain on the working parts.

A further object is to provide auxiliary means whereby the pressure, at which the governor is to act, may be quickly changed from a lower degree to a higher degree without changing the adjustment of the pressure regulating springs. And a final object is to provide a construction of the several parts of the device whereby the governor will be rendered free in action and readily adjustable to all requirements, with due allowance for expansion and contraction under changes in temperature, especially at the throttle valve.

I attain my object by arranging and constructing the several parts of the governor in the manner illustrated in the accompanying drawings, in which—

Figure 1 represents a side elevation of the complete device; Fig. 2, a vertical section through the same; Fig. 3, a transverse section through the throttle valve on the line $x-x$ in Fig. 2; and Fig. 4, a detail showing a drain cock for the throttle actuating cylinder provided with means for adjusting the speed of discharge therefrom.

Like numerals designate like parts in the several views.

In a casing 1 is mounted a puppet valve 2, the lower end of which seats upon the valve seat 3, the upper portion being of piston form provided with suitable packing means for preventing the flow of water into the chamber above. Through this upper cham-

ber passes the stem 4 of the valve, which is surrounded by a coiled spring 5, the pressure of which upon the valve is adjusted by means of the screw cap 6 and indicated by graduated marks on the stem. Below the valve seat 3 is a chamber into which is screwed the pipe connection 7, which leads to the delivery side of the pump, said pipe being provided with a globe valve 8 at any desirable point, whereby flow of water to the valve through pipe 7 may be shut off when desired.

Adjacent the casing 1, and preferably forming part of the same casting, is a cylinder 9, which rises from a chamber 11, into which the passage 10 leads from an annular chamber in casing 1 above the valve seat 3. Within the cylinder 9, is a piston 12 provided with suitable packing and connected by the rod 13 to the lever 14, which operates a throttle valve in the valve casing 15. Acting upon the piston 12 in the cylinder 9 is a spring 16 of a strength sufficient simply to return the piston and throttle valve to normal, or open position. A cap 17 closes the top of the cylinder 9, and may be utilized for adjusting the pressure of the spring 16 upon the piston 12. At 18 is located a combined guide and stop for the piston rod, said guide being mounted upon one or more arms 19 rising from a collar 20, which I preferably screw upon the cylinder 9. A shoulder 22 is formed upon the rod 13 to limit the travel of the said rod, said travel being adjusted, by raising or lowering the stop 18, to accomplish the proper closing of the throttle valve in the valve casing 15. When in proper adjustment, the collar 20 is locked in position by means of the set screw 21, (see Fig. 1). In place of the set screw, however, a lock nut may be used for this purpose.

The opening of the passage 10 into the chamber 11 is closed by a valve 23 held normally closed by a light spring 24, the valve stem being guided at its outer end in a screw cap 25. Leading from the passage 10 between valves 2 and 23 is a pipe 26 of small diameter, which is always open; and leading from the bottom of chamber 11 is a drain cock 27 provided with a valve which is automatically closed and opened by the rise and fall respectively of the puppet valve 2. This automatic actuation of the drain cock is accomplished by means of the lever 28 attached to the valve stem and coupled by link 29 to the rock arm 30, which is mounted upon a pivot pin 31 projecting from the side of the

governor casting; the opposite end of said rock arm being coupled by link 32 to the valve 2 by means of the pin 33 which projects through a slot 34 formed in the casing 1, said pin being attached to the valve 2 at the point 35 (see Fig. 2).

In order to adjust the passageway through the drain cock 27 to regulate the outflow from the chamber 11, I may provide the valve with a regulating screw 36 adapted to constrict the passageway through the valve. This feature, however, may be omitted and the passageway through the drain cock bored to a predetermined small diameter which will so restrict the outflow from chamber 11 as to properly retard the return of piston 12 to normal position.

The throttle valve for this governor, which is auxiliary to the main throttle valve, I preferably locate in a valve casing 15 formed in the shape of an elbow and provided with couplings whereby the valve may be substituted for the elbow which, in most fire engines, lies in the pipe connection between the boiler and the steam chest. But I do not restrict myself to the use of such elbow construction for this valve casing. In order that the valve may have a short travel and therefore be quick in action, I provide a ported valve 40, the ports 41 of which register with narrow ports 42 in the discharge end of the valve casing, said valve casing being enlarged at this point to provide sufficient port area. The valve is also slightly tapered to fit a corresponding valve chamber in the valve casing, and is provided with a stem 43 which passes out through a suitable stuffing box in the cap 44. The outer end of this stem is mounted in a bearing 46 carried by a yoke 45 attached to the cap 44; and, between this bearing and the cap, the lever 14 is secured to the rod in any suitable manner. Some little side play is allowed the valve in its chamber; and, by means of the adjusting screws 47 and 48, said valve may be so positioned in its chamber as to turn freely when subjected to any temperature of steam passing therethrough. It will be evident that such adjustment of the valve is essential, in order to insure the proper operation of the governor; for, if the valve or other governor parts stick or bind, it will utterly fail to accomplish its purpose at the critical moment.

The operation of the governor, as above described, is as follows: The pressure spring 5 having been adjusted to a predetermined pressure, say 100 pounds, and the fire engine being in operation; then, if from any cause, either due to the use of a shut-off nozzle or other obstruction in the hose, the pressure at the delivery end of the pump rises above this critical point, the valve 2 will open, permitting water to flow through passage 10 past valve 23 into chamber 11, thereby causing the piston 12 to rise and, by a short stroke, to

quickly close the valve 40, and thereby stop the pumps before the water pressure at the delivery side can rise beyond that for which the governor is set to operate. As the valve 2 rises, it acts, through link 32, rock arm 31 and link 39 to close the drain cock 27, thereby preventing the escape of water from chamber 11. As soon, however, as the water pressure falls below the critical point, the valve 2 will again close, thereby opening the drain cock 27 and permitting the water, which has been trapped in chamber 11 by the valve 23, to be gradually discharged, as the piston 12 returns to its normal position. This causes a gradual opening of the valve 40, and prevents the sudden starting up of the pump from a state of complete or comparative rest. By means of the adjusting screw 36, it will be evident that the speed of discharge from the chamber 11, and consequently the opening of the throttle valve, may be adjusted to any desired degree. This opening of the valve, however, may, as I have already stated, be regulated once for all by providing the drain cock 27 with a properly restricted orifice.

I have found that, where the valve chamber in casing 1 has open communication with the chamber 11, there will result a fluttering of the governor valves, and a consequent partial closing down of the engine, when the water pressure is running near the critical point. To prevent this fluttering and insure the operation of the governor only when the critical point has been passed, I provide the valve 23 to shut off communication between passage 10 and chamber 11, and permit water leaking past the valve 2 to escape through the small waste pipe 26, said waste being not sufficiently large to interfere with proper operation of the governor when the critical point is passed and the valve 2 is thrown fully open. To hold the valve 23 closed during such periods of leakage, I provide a spring 24 which will exert upon the valve a pressure of from 15 to 20 pounds, this pressure being overcome by the inflow of the water when the pressure reaches a point sufficiently high to fully open the valve 2. By this arrangement, I also prevent the closing of the throttle valve 40, in case the valve 2 is held slightly away from its seat from any cause, the small leakage past the valve being taken care of by the waste pipe 26, and none of it passing into the chamber 11 because of the valve 23.

To insure the proper operation of the governor, a strainer of fine wire mesh will be placed in the pipe connection 7 somewhere between the pump and the valve casing 1. Should, however, any sediment or other obstruction clog up the passageway through the drain cock 27, thereby preventing the proper return of the piston 12 to its normal position, I provide the cap 25 with a pet cock

37, which communicates with the chamber 11 through the passageways 38 and 39, this pet cock being opened by the engineer to release the piston 12 in such an emergency.

5 As occasion frequently arises when the engineer is called upon to increase the water pressure, in order to overcome the resistance of a longer line of hose, or to take care of additional lines of hose, or to deliver the stream
10 at a more distant point or with heavier force; with the governor, as I have so far described it, he would be required either to adjust the spring pressure on the puppet valve by screwing down the cap 6 to meet the required in-
15 crease of pressure, or throw the governor temporarily out of commission by closing the valve 8. To enable him to meet this requirement, without changing the adjustment of the spring 5, and yet have his governor in
20 condition to control the engine in case the required increased water pressure should be exceeded, I may provide a second puppet valve 51 mounted in a casing 50 placed at one side of the casing 1, said valve being pro-
25 vided with the stem 52 surrounded by a spring 53, which may be stronger than spring 5, the pressure of the spring upon the valve being adjusted by the screw cap 54. The valve chamber above the valve seat 58 com-
30 municates, by way of passage 57, with the inlet chamber below the valve seat 3 in casing 1; and the inlet chamber below the valve seat 58 is connected with the pipe 7 by means of the by-pass pipe 55, which is coupled into
35 said pipe by a T at 56, the valve 8 lying between said T and the casing 1. With the governor so arranged, in case an increased water pressure is called for, the engineer simply closes valve 8, thereby causing the water
40 from pipe 7 to flow through pipes 55 to the valve 51. Should the pressure exceed that for which valve 51 is set to open, the water will then flow through passage 57 to the valve 2, causing said valve to open, which permits
45 the water to flow on to chamber 11 to actuate piston 12 and close the throttle valve 40. Instead of placing the casing 50 in alignment with casing 1 and cylinder 9, as herein shown for the purpose of more fully illustrating the
50 relative arrangement of the parts, I may place said casing either forward or back of the casing 1, if such arrangement be more convenient in applying the governor; or this secondary pressure valve may be omitted altogether.
55 Any suitable means will be provided for attaching this governor to the boiler or framework of the engine.

As to the precise details of construction of the several parts of the governor, as herein
60 shown and described by way of illustration, I do not wish to be limited. Neither do I restrict myself to its use in connection with steam fire engines only; as it may be used with other steam pumps and with pumps
65 driven by other than steam power.

What I claim as my invention and desire to secure by Letters-Patent is:

1. The combination, with a pumping engine, of a governor comprising a cylinder, a piston therein in operative connection with
70 an engine control, a conduit leading to said cylinder from the delivery side of the pump, a valve in said conduit adapted to be opened automatically at determinate pressures, and means automatically operative to close com-
75 munication between the cylinder and the conduit and prevent admission to the cylinder until the pressure of the flow past the valve exceeds the pressure at which the valve
80 is set to open.

2. The combination, with a pumping engine, of a governor comprising a cylinder, a piston therein in operative connection with an engine control, a conduit leading to said
85 cylinder from the delivery side of the pump, a valve in said conduit adapted to be opened automatically at determinate pressures, a restricted discharge outlet leading from the valve on the side toward the cylinder, and a
90 second valve adapted to open communication between the first valve and the cylinder when the flow from said valve exceeds the capacity of said discharge.

3. The combination, with a pumping engine, of a governor comprising a cylinder, a
95 piston therein in operative connection with an engine control, a valve mounted in a casing adjacent the cylinder provided with means for adjusting it to open at determinate pressures, a passage-way leading from said
100 valve to the cylinder below the piston, a conduit leading to the valve from the delivery side of the pump, a restricted discharge outlet leading from the passage-way between the valve and cylinder, a spring actuated valve
105 normally closing communication between said passage-way and the cylinder, and means for accomplishing a discharge from the cylinder when the pressure falls below that for which
110 the governor is set to operate.

4. The combination, with a pumping engine, of a governor comprising a cylinder, a piston therein in operative connection with an engine control, a valve mounted in a casing
115 adjacent the cylinder provided with means for adjusting it to open at determinate pressures, a passage-way leading from said valve to the cylinder, an independent discharge outlet leading from the cylinder, connecting
120 devices whereby the opening of the valve will close the discharge outlet and vice versa, and a conduit leading to the valve from the delivery side of the pump.

5. The combination, with a pumping engine, of a governor comprising a cylinder, a
125 piston therein in operative connection with an engine control, a valve mounted in a casing at the side of the cylinder provided with means for adjusting it to open at determinate pressures, a passage-way leading from the
130

valve to the cylinder at the underside of the piston, a drain cock controlling a discharge outlet from the cylinder below the piston, a rock-arm mounted between the casing and cylinder, links coupling the ends of said rock arm to the valve and to the drain cock, for the purpose set forth, and a conduit leading to the valve from the delivery side of the pump.

6. The combination, with a pumping engine, of a governor comprising a cylinder, a piston therein in operative connection with an engine control, a valve mounted in a casing at the side of the cylinder provided with means for adjusting it to open at determinate pressures, a passage-way leading from the valve to a chamber in the cylinder below the piston, a restricted discharge outlet leading from said passage-way, a valve in said chamber adapted to open communication between the passage-way and chamber when the flow from the first valve exceeds the capacity of said discharge, a drain cock controlling a discharge outlet from said chamber, means whereby the opening and closing of the first valve will automatically close and open the cock, and means for returning the piston to normal position as discharge takes place from said chamber.

7. The combination, with a pumping engine, of a governor comprising a cylinder, a piston therein in operative connection with an engine control, means for automatically opening admission to said cylinder from the delivery side of the pump at predetermined pressures to actuate said piston for a quick stroke in one direction, means for accomplishing a slow discharge from the cylinder when the pressure falls, and means for returning the piston to normal position as the discharge takes place, whereby the engine will be stopped quickly and started slowly by the operation of the governor.

8. The combination, with a pumping engine, of a governor comprising a cylinder, a piston therein, a throttle valve in the admission pipe leading to the engine cylinders provided with a plurality of narrow ports, connecting devices between said piston and valve whereby the valve will be closed by a short stroke of the piston, means for automatically opening admission to the governor cylinder from the delivery side of the pump at predetermined pressures to actuate the piston in one direction under full pressure, and means for automatically returning the piston to normal position under a slow discharge from the cylinder when the pressure falls below the critical point.

9. The combination, with a pumping engine, of a governor comprising an auxiliary throttle valve provided with a plurality of narrow ports registering with corresponding ports in a valve casing provided therefor in the admission pipe leading to the engine cyl-

inders, a valve stem, means for adjusting the valve and stem to turn freely at the temperature of admission, an arm on the stem, a cylinder, a piston therein coupled to said arm, means for automatically opening admission to the cylinder from the delivery side of the pump at predetermined pressures to actuate the piston and close the valve, means for opening a discharge from the cylinder when the pressure falls below the critical point, and means for returning the piston to normal position as the discharge takes place.

10. The combination, with a pumping engine, of a governor comprising a cylinder, a piston therein in operative connection with an engine control, means for automatically opening admission to the cylinder from the delivery side of the pump at predetermined pressures to actuate the piston, means for automatically opening a restricted discharge from the cylinder to permit the return of the piston to normal position when the pressure falls below the critical point, and a manually operated discharge for use in case the automatic discharge fails to operate.

11. The combination, with a pumping engine, of a governor comprising a cylinder, a piston therein in operative connection with an engine control, a valve set to open admission to the cylinder from the delivery side of the pump at a certain pressure, a second valve set to open said admission at a higher pressure, and means for cutting off the admission to the first valve.

12. The combination, with a pumping engine, of a governor comprising a cylinder, a piston therein in operative connection with an engine control, a conduit leading to the cylinder from the delivery side of the pump, a valve in said conduit provided with means for setting it to open at determinate pressures, a second valve provided with means for setting it to open at determinate higher pressures, a passage-way leading from the second valve to the first, a by-pass leading from the main conduit to the second valve between the pump and the first valve, and a valve to close communication between the main conduit and the first valve.

13. In a governor of the type described, the combination of a cylinder, means for automatically opening admission from the delivery side of a pump to one end of the cylinder at determinate pressures, a piston in the cylinder, a piston rod projecting from the other end of the cylinder, an engine control to which said rod is coupled, a guide for the rod mounted on an arm projecting from the cylinder, and a shoulder on the rod adapted to strike said guide to limit the stroke of the piston.

14. In a governor of the type described, the combination of a cylinder, means for automatically opening admission from the delivery side of a pump to one end of the cylin-

der at determinate pressures, a piston in the cylinder, a piston rod projecting from the other end of the cylinder, an engine control to which said rod is coupled, a guide for the
5 rod mounted on an arm projecting from the cylinder, a shoulder on the rod adapted to strike said guide to limit the stroke of the piston, and means for adjusting the arm on the cylinder to lengthen or shorten said
10 stroke.

15 15. In a governor of the type described, the combination of a cylinder, means for automatically opening admission from the delivery side of a pump to one end of the cylinder at determinate pressures, a piston in the

cylinder, an engine control operated by said piston, a drain cock on the cylinder through which discharge takes place on the return stroke of the piston, means for closing and opening said cock automatically as the pressure respectively rises to and falls below the critical point for which the governor is set to operate, and means for adjusting the size of the passage-way through the cock. 20

In testimony whereof I have affixed my
signature, in presence of two witnesses. 25

CHARLES R. MOORE.

Witnesses:

J. H. O'BRIEN,

LEO U. STOELTZLEN.