

No. 675,091.

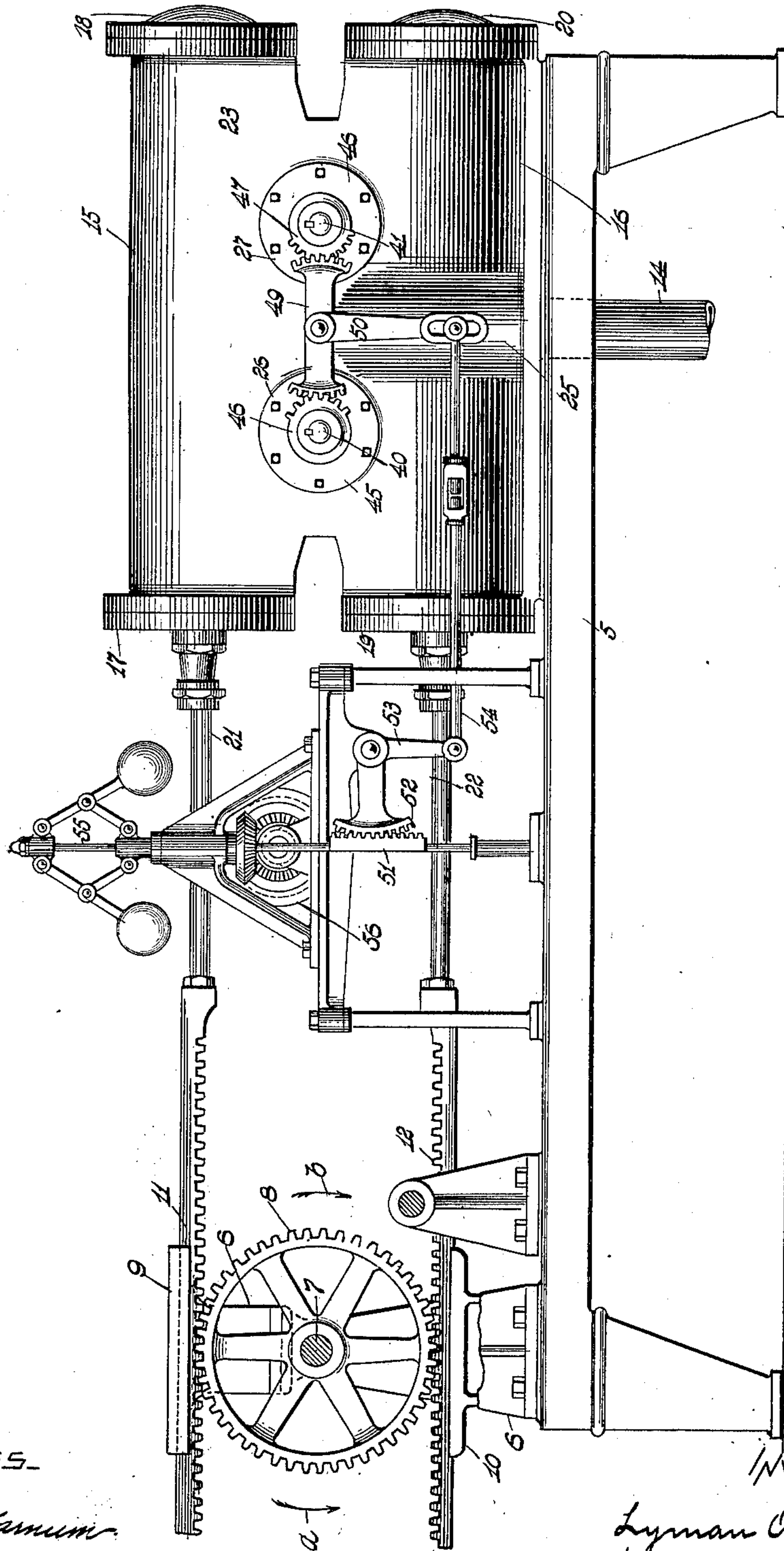
Patented May 28, 1901.

L. O. GOODWIN.
WATER WHEEL GOVERNOR.

(Application filed Feb. 7, 1901.)

(No Model.)

2 Sheets—Sheet 1.



WITNESSES—

Wm. F. Vamum

A. W. Hamblen

INVENTOR—

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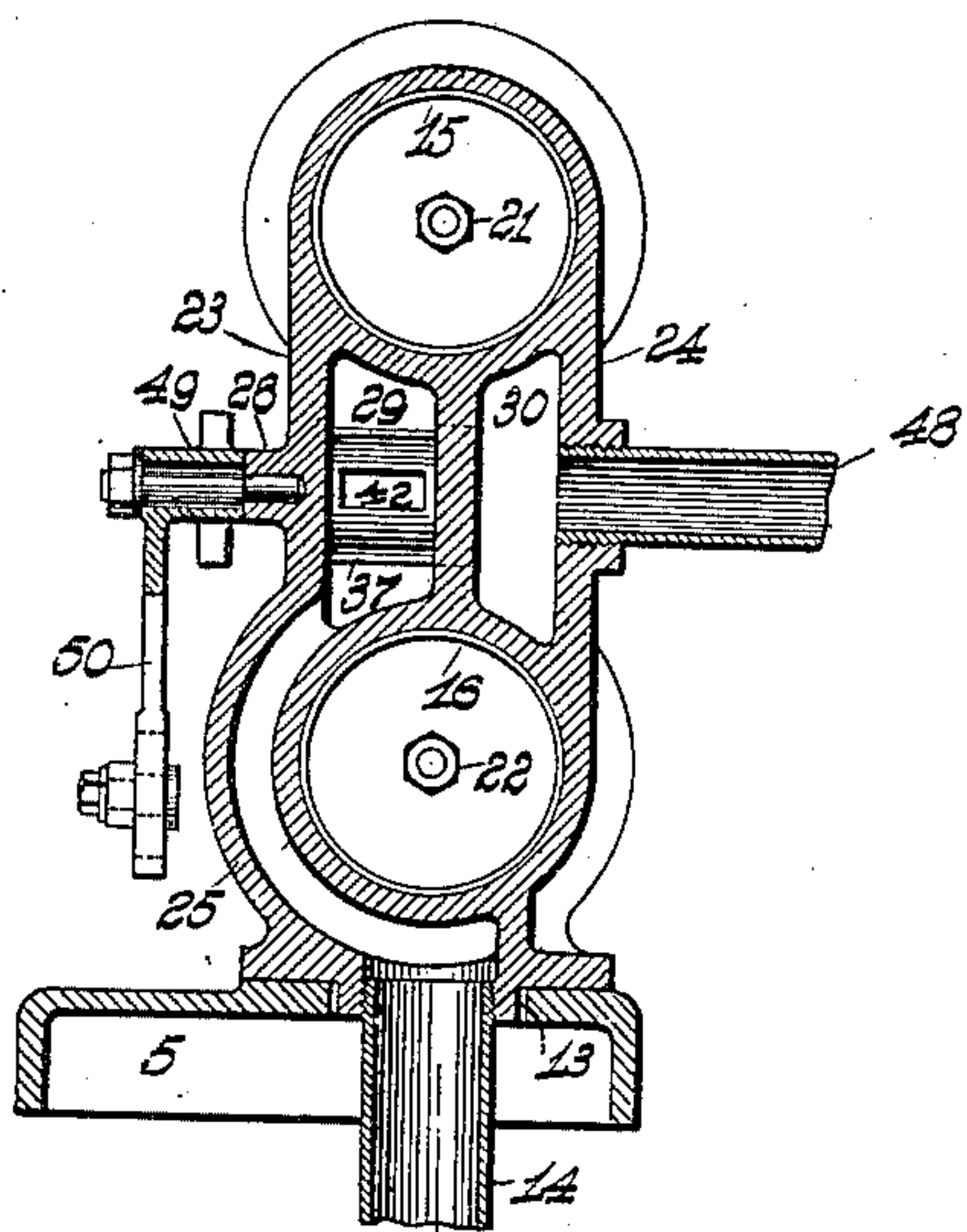
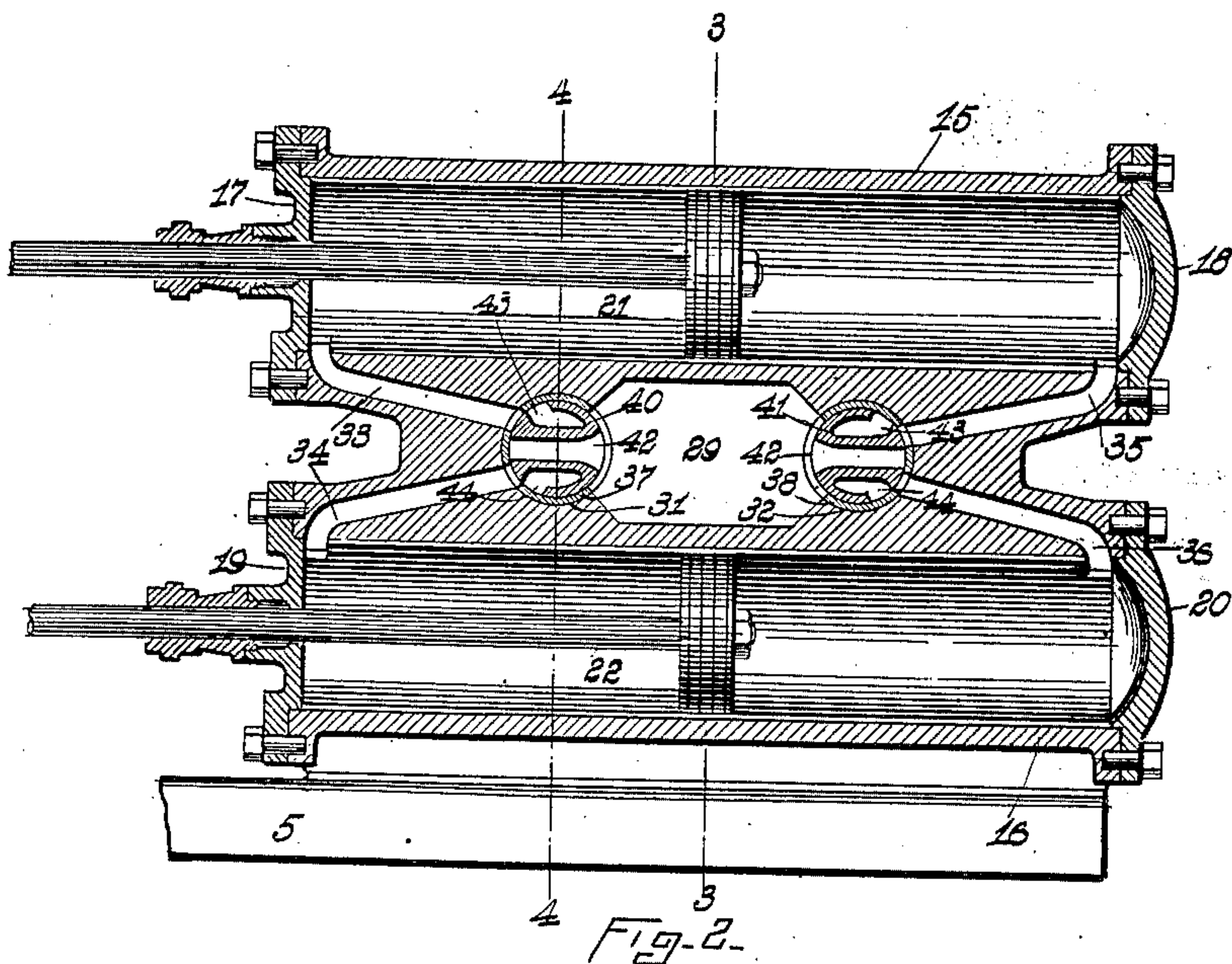


Fig-3-

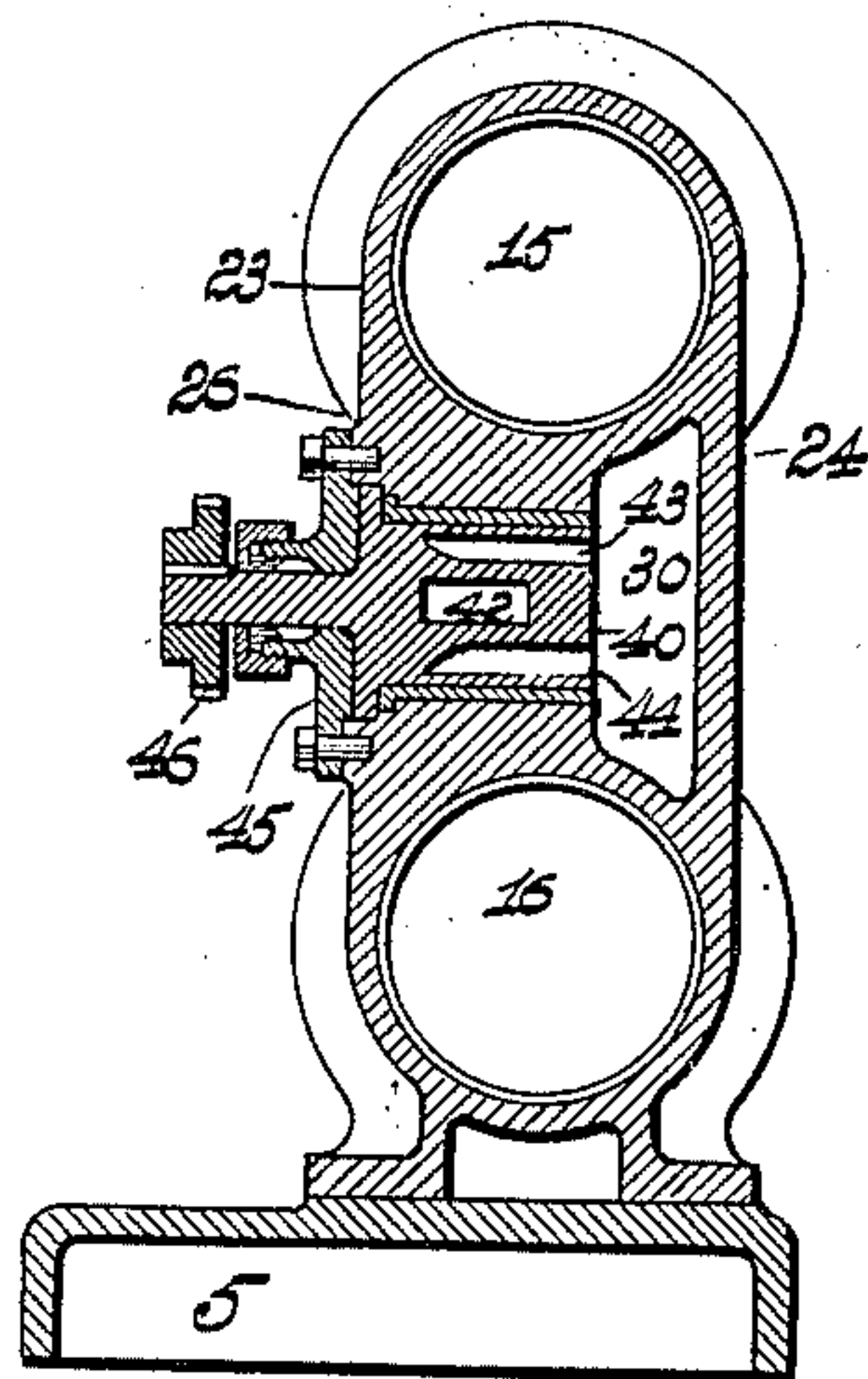


Fig-4-

WITNESSES.

Wm. H. Varnum.

a. W. Hamblen.

INVENTOR

Lyman C. Goodwin

by Henry J. Miller atty.

UNITED STATES PATENT OFFICE.

LYMAN O. GOODWIN, OF NORTH ANDOVER, MASSACHUSETTS, ASSIGNOR TO HIMSELF AND GEORGE L. WRIGHT, OF SAME PLACE.

WATER-WHEEL GOVERNOR.

SPECIFICATION forming part of Letters Patent No. 675,091, dated May 28, 1901.

Application filed February 7, 1901. Serial No. 46,327. (No model.)

To all whom it may concern:

Be it known that I, LYMAN O. GOODWIN, of North Andover, in the county of Essex and State of Massachusetts, have invented certain new and useful Improvements in Water-Wheel Governors; and I hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification.

This invention has reference to improvements in devices for actuating and controlling the main-gate shaft of a water-supply, whereby the admission of water thereto is governed.

One object of the invention is to so construct a water-wheel governor in which a gate-controlling shaft is rocked or rotated by pistons that a balanced action of the pistons is secured, whereby less power is required to actuate the pistons.

Another object of the invention is to so construct a governor of this nature in which multiple cylinders and pistons are used that pressure may be alternately supplied to the corresponding end of each cylinder by a single valve.

Another object of the invention is to improve the construction of the cylinders with the pressure and exhaust chambers and the valves for controlling the passages to and from the cylinders.

The invention also consists in a pair of cylinders mounted in parallel series, valve-chambers common to both cylinders, connections extending from each valve-chamber to the corresponding ends of both cylinders, and valves in said chambers adapted to alternately close said connections.

The invention also consists in a pair of cylinders, a pressure-chamber and an exhaust-chamber common to both cylinders, a pair of valve-chambers connecting the pressure-chamber with the exhaust-chamber, connections from each valve-chamber to each of the cylinders, and valves in the valve-chambers.

The invention also consists in the pair of cylinders, the pressure-chamber and the exhaust-chamber formed in part with the cylinders and located therebetween, and the supply-passage formed in part with the lower cylinder,

partially embracing the same, and connecting with the pressure-chamber.

The invention also consists in a pair of primary cylinders, a pair of pistons adapted to work in unison but in opposite directions in said cylinders, connections between said pistons and a rotatable controlling mechanism, a pressure-chamber and an exhaust-chamber common to both cylinders, connecting-ducts between the pressure-chamber and the cylinders, and valves common to both cylinders adapted to open and close connection between said ducts and the pressure-chamber or the exhaust-chamber.

The invention also consists in such other novel features of construction and combination of parts as shall hereinafter be more fully described, and pointed out in the claims.

In the drawings, Figure 1 represents a side elevation of the improved water-wheel governor shown in connection with the main-gate shaft of any well-known water-supply mechanism and illustrating the ordinary centrifugal regulator for controlling and actuating the valves. Fig. 2 represents a vertical longitudinal sectional view of the cylinders and the valves, showing the pistons, the pressure-chamber, and the connections between this chamber and the cylinders. Fig. 3 represents a vertical sectional view taken on line 3 3, Fig. 2. Fig. 4 represents a similar view taken on line 4 4, Fig. 2.

Similar numerals of reference designate corresponding parts throughout.

As shown in the drawings, 5 designates a table or support of a substantial character on which the mechanism is mounted. At one end of this table are secured brackets, as 6, in bearings in which is journaled the shaft 7, representing the main-gate-controlling shaft of any usual water-supply mechanism. On this shaft 7 is fixed the toothed wheel 8, and above the wheel are guides 9 and 10, mounted in the brackets, as 6, and adapted to receive the reciprocal racks 11 and 12, the teeth of which engage with the teeth of the wheel 8. At the opposite end the table-top is supplied with an opening 13 to receive the connection from the pressure-supply pipe 14, connected with any usual pressure-supply.

Above the pressure-supply pipe 14 is mount-

ed on the table a casting, which includes the upper cylinder 15 and the lower cylinder 16, respectively closed at their ends by the caps or heads 17 and 18 and 19 and 20. In the cylinders are reciprocally mounted the pistons 21 and 22, the rods of which work through stuffing-boxes in the caps 17 and 19 and are connected with the racks 11 and 12. The upper portion of the cylinder-casting is circular in cross-section over the top of the cylinder 15. Below this the sides of the casting are flat, as at 23 and 24. At the lower portion of the side 23 is a convex hollow rib 25, which partially embraces the cylinder 16 and is connected with pressure-supply pipe 14 and form a passage from said pipe to the pressure-chamber. The side 23 has also the bosses 26 and 27 about the valve-chambers, and at the center is the stud 28.

The pressure-chamber 29 and the exhaust-chamber 30 lie between the cylinders and are connected at their ends by the valve-chambers 31 and 32, from which the inlet ports or channels 33 and 34 and 35 and 36 extend to the end portions of the respective cylinders. In the valve-chambers are secured valve-casings 37 and 39, having openings connecting with the pressure-chamber and with the inlet-ports. These casings have annular shoulders which are recessed in the side 23, as shown in Fig. 4, and in the valve-casings are rotatably mounted the valves 40 and 41, each of which has the transverse pressure-port 42 and the longitudinal exhaust-ports 43 and 44, extending to the end of the valve and connecting with the periphery. The valve-stems extend through stuffing-boxes in the plates 45 and 46 and at their outer portions are furnished with toothed segments or gears 46 and 47.

From the exhaust-chamber 30 extends the exhaust-pipe 48, connecting through a perforation in the side 24.

On the stud 28 is pivotally mounted the cross-plate 49, having the depending arm 50 and segmental toothed portions which engage with the toothed segments or gears 46 and 47 to rock the valves 40 and 41 when the arm 50 is swung.

I have herein shown a centrifugal regulator of well-known construction for actuating and controlling the valves. This regulator is connected from the vertically-reciprocal rack 51, working in the toothed sector 52 on one arm of the pivoted bell-crank 53, to the rod 54, pivoted to the bell-crank, and to the arm 50 of the valve-lever 49, the regulator-stem 55, with its weight, being driven from a belt working over the pulley 56 and over a corresponding pulley mounted on some rotatable part of the mechanism, as is well known. Under a normal load operated by the water wheel or wheels this governor is not called into action; but when the load is increased or decreased a corresponding change in the water-supply should be effected. For this purpose it is necessary to rotate or rock the shaft 7 in

order that through mechanism of well-known construction the gate may be operated to increase or decrease the passage for the water to the wheels. This change in load results in the undue increase or decrease of the speed in the mechanism with which the pulley 56 is connected, thus through the variation of centrifugal action in the weights of the regulator causing the reciprocation of the racks 51 and by the connections 53 53 and 54 the swinging of the arm 50 and the partial rotation of the valves 40 and 41. When the rack 51 is raised, the arm 50 is moved to the left, while when said rack is depressed this arm is moved to the right, causing a corresponding rotation of the valves.

It is understood that a constant pressure is maintained in the chamber 29. Under a normal load the piston-heads will assume approximately the positions shown in Fig. 2 of the drawings. If now the valves be rotated by the arm 50 moving toward the left, it will be caused by the lifting of the rack 51 by the undue speed of the regulator-weights, and the valves will be rotated to bring the port 42 of the valve 40 in position to connect the pressure-chamber with the passage 34 to direct the pressure into the forward part of the cylinder 16 to exert a backward pressure on the head of the piston 22. This movement of the valve 40 also brings the exhaust-port 43 opposite the passage 33, opening a way from the forward end of the cylinder 15 to the exhaust-chamber 30. At the same time the valve 41 is operated to open a passage from the pressure-chamber to the rear end of the cylinder 15 to admit pressure thereto to exert a forward pressure on the head of the piston 21, while the exhaust-port 44 of this valve opens the way for the exhaust to pass from the channel 36 of the cylinder 22 to the common exhaust-chamber 30, the forward movement of the piston 21 and the rearward movement of the piston 22 causing, through the racks 11 and 12, the rotation of the gear or wheel 8 in the direction of the arrow A to more or less close the gate through the connecting mechanism, depending on the more or less rotation of the wheel 8. It would be evident that this action of the piston is more steady and balanced than when a single piston is used, and the power is exerted by the racks 11 and 12 in a greater degree. When the arm 50 is swung to the right, an opposite movement of the valves is effected, opening the passages for pressure to the forward ends of the cylinder 15 and to the rear end of the cylinder 16, while the ways for the exit of the exhaust from the opposite ends of these cylinders are opened, thus causing the pistons to be so driven as to effect the rotation of the wheel 8 in the direction of the arrow b to more or less open the water-supply gate.

It is understood that while my improved system of cylinders and supply and exhaust therefor are herein described in connection with water-wheel-governing mechanism I do

not limit myself to such use, for it is evident that the same may be used in combination with various kinds of regulating mechanism.

5 The ball-governing device and the connections between the same and the valves are included herein as more clearly illustrating the operation of my invention and may be varied in construction without departing from the spirit thereof. I also prefer to apply an
10 antiracing device to the governor employed as calculated to control under sudden changes of load.

15 Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. A pressure-exerting device comprising a pair of cylinders arranged in parallel series, pistons working therein, a pressure-chamber and an exhaust-chamber located between the
20 cylinders and common to both, valve-chambers connecting the pressure and exhaust chambers, channels extending from each valve-chamber to the corresponding ends of the cylinders, and valves in the valve-cham-
25 bers and adapted to connect said channels with the pressure-chamber or with the exhaust-chamber.

2. A governing device for a mechanism having a toothed wheel, and comprising a pair of
30 racks working in the toothed portion thereof, a pair of pistons connected with said racks, a pair of cylinders in which the pistons are adapted to work in opposition, a pressure-chamber common to both cylinders, valve-
35 chambers at the ends of the pressure-chamber, valves in the valve-chambers, and con-

nections extending from each valve-chamber to the corresponding ends of both cylinders.

3. In a governor device an upper cylinder, a lower cylinder, pressure and exhaust cham- 40
bers between the cylinders, valve-chambers at the ends of the pressure and exhaust chambers, channels connecting the valve-chambers with the cylinders, and a pressure-supply
45 channel formed in part with the lower cylinder partially embracing the same and opening into the pressure-chamber.

4. A cylinder-casting comprising the cylinders 15 and 16, the cylinder 16 having the supply-channel 25, the pressure-chamber 29 50
and the exhaust-chamber 30 between the cylinders, the valve-chambers 31 and 32 at the ends of the pressure-chambers, and the channels 33 and 34 and 35 36 connecting the valve-
55 chambers with the respective cylinders.

5. The combination with the cylinders 15 and 16 having the pressure-chamber 29 and the exhaust-chamber 30 therebetween, the valve-chambers 31 and 32, casings in the valve-chambers, and the channels 33 34 and 60
35 36 extending from the valve-chambers to the respective cylinders, of the valves 40 and 41 rotatable in the casings of the valve-chambers and having the ports 42 and 43 and 44,
65 and means for rotating the valves.

In testimony whereof I affix my signature in presence of two witnesses.

LYMAN O. GOODWIN.

Witnesses:

NEWTON P. FRYE,
GEORGE WOOLLEY.