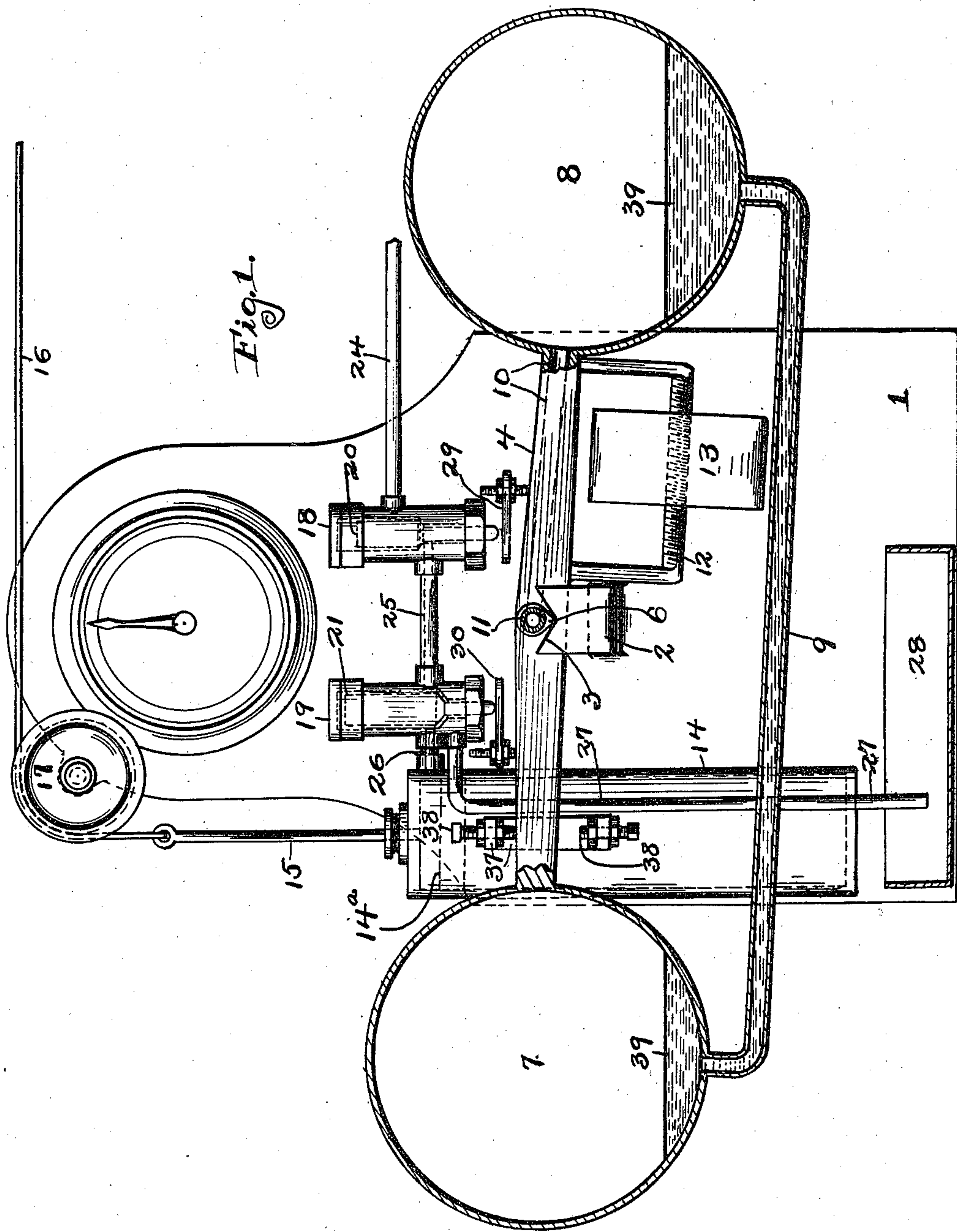


J. E. RADIGAN.
CONTROLLING DEVICE.
APPLICATION FILED DEC. 7, 1907.

974,991.

Patented Nov. 8, 1910.

3 SHEETS—SHEET 1.



Witnesses
Daniel E. Daly,
W. L. McDonnell.

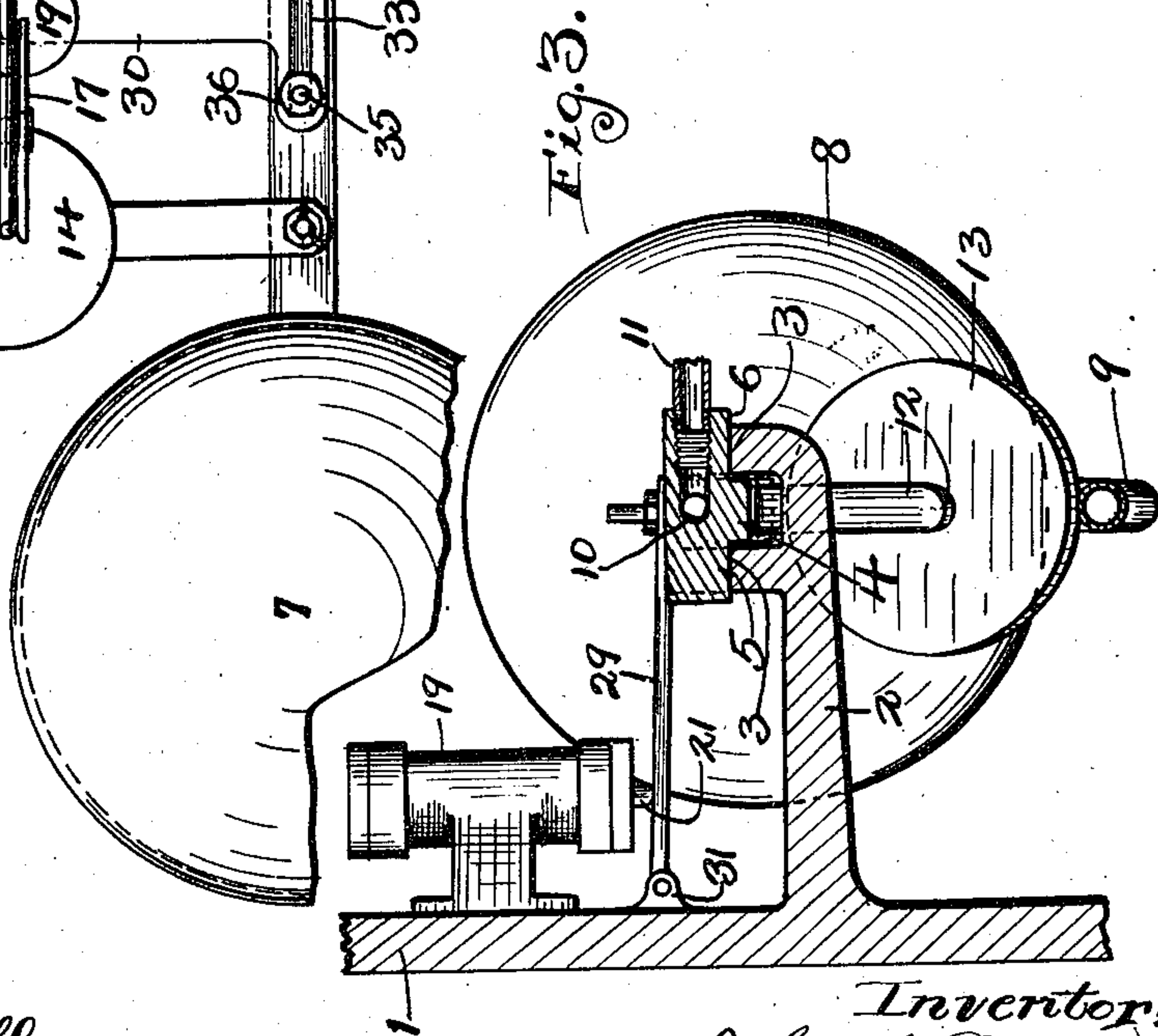
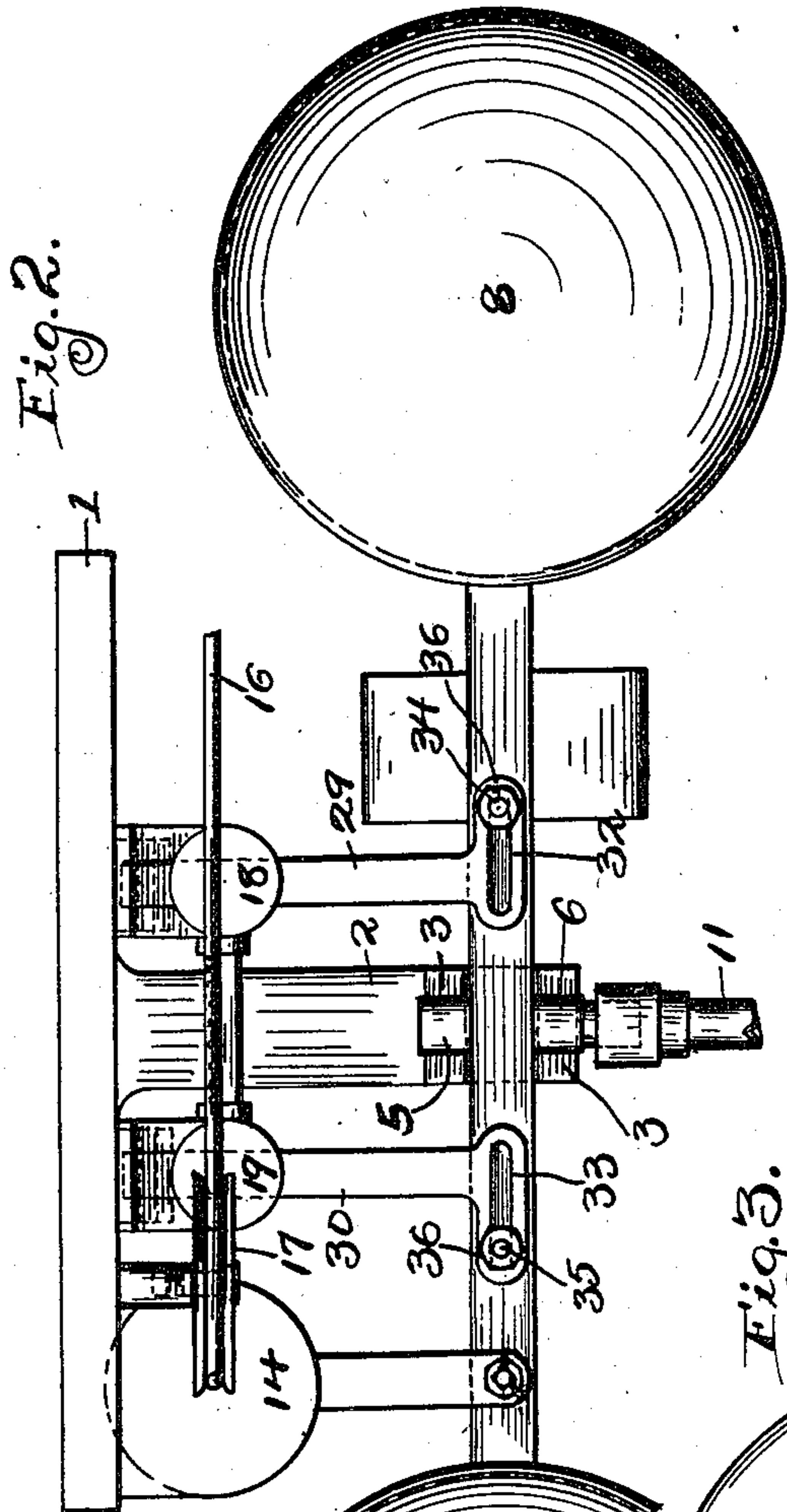
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John E. Radigan
by Lynch & Co.
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3 SHEETS—SHEET 2.



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974,991.

8 SHEETS—SHEET 3.



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UNITED STATES PATENT OFFICE.

JOHN E. RADIGAN, OF CLEVELAND, OHIO, ASSIGNOR OF ONE-FOURTH TO JOHN R. QUINN, ONE-FOURTH TO JAMES J. QUINN, AND ONE-FOURTH TO ALPHONSO J. BYRNE, ALL OF CLEVELAND, OHIO.

CONTROLLING DEVICE.

974,991.

Specification of Letters Patent.

Patented Nov. 8, 1910.

Application filed December 7, 1907. Serial No. 405,607.

To all whom it may concern:

Be it known that I, JOHN E. RADIGAN, a citizen of the United States of America, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Controlling Devices; and I hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use the same.

This invention relates to regulating devices and in particular the invention relates to damper-operating mechanism for use in connection with steam-generating furnaces, and has for its object to provide an improved apparatus of this character which shall automatically control the generation of steam by the pressure thereof by regulating the fire so as to increase the same when the pressure of the steam falls below a predetermined limit and to reduce the fire when the pressure of the steam exceeds a predetermined limit.

More limitedly, the object of my invention is to provide for controlling the furnace damper by means of a movable member or motor connected thereto which is subjected to the pressure of fluid tending to move the same in a direction to close the damper when the steam reaches its predetermined limit of high pressure and to automatically cut off the supply of such fluid from the movable member when the steam pressure reaches its predetermined lower limit.

Generally speaking, the invention may be defined as consisting of the combinations of elements embodied in the claims hereto annexed and illustrated in the drawings forming part hereof wherein—

Figure 1 represents a front elevation of my apparatus, certain parts being shown in section; Fig. 2 represents a top plan view of said apparatus; Fig. 3 represents a central sectional detail of said apparatus; and Figs. 4 and 5 represent enlarged sectional details of the valve mechanism which controls the supply of pressure fluid to the movable member or motor hereinbefore referred to.

Describing the parts by reference characters, 1 represents a frame, which may be a part of the front of a steam boiler. This frame is provided with a centrally arranged

bracket 2 having at its upper end a pair of V-shaped bearings 3 whereon there is supported a beam 4, said beam being provided with a pair of knife-edge pivots 5 and 6 resting in the bearings 3. Beam 4 has attached to the opposite ends thereof a pair of spherical receptacles 7 and 8 respectively, said receptacles being connected by means of a pipe 9 communicating with the bottoms thereof. Beam 4 is provided with a passageway or duct 10 which extends from the central part thereof to receptacle 8. At the central portion of the beam, this passageway communicates with pivot 6, to which there is fitted a pipe 11 extending to the boiler (not shown). The arm of the beam which carries the receptacle 8 is provided with a threaded rod 12, which may be formed as the bottom member of a bail, the other members whereof are connected to said arm. Rod 12 extends parallel with the beam and is provided with a weight 13 threaded thereon.

14 denotes a cylinder, which is carried by the frame 1 and has therein a piston 14^a (shown in dotted lines, Fig. 1) provided with a piston rod 15, the upper end whereof is connected to a rope or similar flexible connection 16, leading over a pulley 17 to the furnace damper (not shown). This damper may be provided with a weight which tends to open the same and, through connection 16, to lift the piston to the upper end of its cylinder. For the purpose of operating said piston in a direction to close the damper and thereafter permit the opening of the damper, I provide the following construction:—18 and 19 denote a pair of valve casings each having therein a downwardly seating valve 20, 21, respectively, and each being provided with a downwardly tapered valve seat 22, 23, respectively, for the correspondingly tapered surface of its valve. A pipe 24, communicating with any suitable source of fluid under pressure, as a water-main, is connected to valve casing 18 above the valve seat therein. A pipe 25 connects casing 18 with casing 19, communicating at one end with casing 18 below its valve seat and at its other end with casing 19 above its valve seat. The lower ends of the stems of valves 20 and 21 project through their respective valve casings and are provided with suitable packing glands. The space in casing 19

above seat 23 communicates directly with cylinder 14 by means of a tubular connection 26, and the space below valve seat 23 communicates with a waste pipe 27, the lower end whereof may discharge into a tank 28.

For the purpose of opening valves 20 and 21 by opposite movements of the beam 4, I provide a pair of arms 29, 30, each being pivoted between ears or lugs 31 on casing 1 (see Fig. 3) to permit said arms to be moved in a vertical plane. Each arm is provided at its outer end with an elongated slot 32, 33, respectively, through which there extends a screw 34, 35 respectively, each of said screws being vertically adjustable in its slot, as by means of nuts 36 engaging opposite surfaces of the outer extremity of each arm. The lower ends of the screws 34, 35 bear on top of the beam 4, on opposite sides of the pivot thereof, and said arms are adapted to engage the lower ends of stems of valves 20 and 21 respectively.

With the parts arranged as described, the operation will be as follows:—Mercury or other liquid 39 which is not easily volatilized is introduced in suitable quantity into the receptacle 8 and part of the mercury so introduced flows through pipe 9 into receptacle 7, compressing more or less the air therein. When there is no pressure of steam in the boiler or the pressure is below the predetermined pressure at which the damper shall be closed, the parts are in the positions shown in Figs. 1 and 4; that is to say, with the spherical receptacle 8 at a lower level than receptacle 7 and valve 20 closed. Under these conditions, the furnace damper is open. When the pressure of steam in the boiler increases, more or less of the mercury in receptacle 8 is forced into receptacle 7, compressing the air therein. By adjusting the weight 13, the pressure at which the steam shall displace mercury in receptacle 8 to a sufficient extent to cause receptacle 7 to overbalance receptacle 8 may be varied. When sufficient pressure has been developed to overbalance receptacle 8 and weight 13, valve 20 is opened by arm 29, and valve 30 closes by its own gravity through the movement of arm 30 away from the lower end thereof. The water or other fluid in pipe 24 then flows through valve casing 18, pipe 25, valve casing 19 and connection 26 into the motor comprising cylinder 14 and the piston therein, depressing the piston and, through connection 16, closing the damper. When the pressure of steam in the boiler falls to the predetermined lower limit, the pressure of air in receptacle 7 transfers sufficient mercury therefrom into receptacle 8 to cause the beam to swing in the opposite direction, thereby allowing valve 20 to seat and valve 21 to be opened through its arm 30. The opening of valve 21 enables the

pressure in said motor to be relieved, the weight of the damper lifting the piston in cylinder 14 and said piston expelling the fluid from the cylinder through connection 26, valve casing 19 and pipe 27. A forked bracket 37 having set screws 38 adapted to engage the upper and lower surfaces of beam 4 limits the movement of said beam in both directions and insures the sealing at all times of the ends of pipe 9 by the mercury in receptacles 7 and 8.

Should it be desirable to vary the pressure at which the damper will be closed, this result may be easily accomplished by moving the weight 13 along its support. Furthermore, by adjusting the screws 35 in their slots, the action of the beam 4 on the valves 20 and 21 may be varied.

From the above description, taken with the drawings, it will be apparent that I have produced an apparatus of the character set forth which is simple of construction, which can be adjusted to meet the incidents of service and which can efficiently utilize the pressure of fluid for the purpose of operating the damper whenever the pressure conditions of the steam may require such operation.

While I have necessarily described the invention in detail, it will be understood that I do not desire nor intend that my invention shall be limited to details of construction, except as such details may be embodied in the claims hereto annexed or may be rendered necessary by the state of the prior art.

Having described my invention, what I claim is:—

1. As a means for operating furnace dampers, the combination of a cylinder, a piston therein, means whereby the piston may be connected with the damper, and means for operating said piston to close the damper, said means comprising a fluid supply pipe connected to said cylinder, valves in said supply pipe, a beam pivoted intermediate of its ends and having at each end a closed receptacle, a pipe connecting the bottoms of said receptacles, said receptacles being provided with liquid partly filling the same and said beam being arranged to operatively engage said valves on opposite sides of its pivot as it tips to one side or the other, and a pressure supply pipe communicating with the central portion of said beam and, through one arm thereof, with one of said receptacles, substantially as specified.

2. As a means for operating the damper of a steam boiler furnace, the combination of a cylinder, a piston therein, connections whereby said piston may operate said damper, and means for moving said piston to open and close said damper, said means comprising a supply pipe communicating with one end of said cylinder, a valve casing in

said pipe and having a valve therein and provided with a seat below the points of connection of said casing with said cylinder and said supply pipe, a waste pipe communicating with the valve casing below the valve seat, a second valve in said supply pipe and adapted to control the flow of fluid therethrough to the cylinder, and means for operating said valves, said means comprising
10 a beam pivoted between the valve casings, means whereby the movement of said beam in opposite directions shall open said valves, a closed receptacle supported at each end of said beam and each having liquid therein

partly filling the same, a pipe connecting the bottoms of said receptacles and adapted to permit liquid to flow from one of said receptacles to the other, and a connection for supplying steam from the boiler to one of said receptacles, substantially as specified. 15 20

In testimony whereof, I sign the foregoing specification, in the presence of two witnesses.

JOHN E. RADIGAN.

Witnesses:

VICTOR C. LYNCH,
N. L. McDONNELL.