

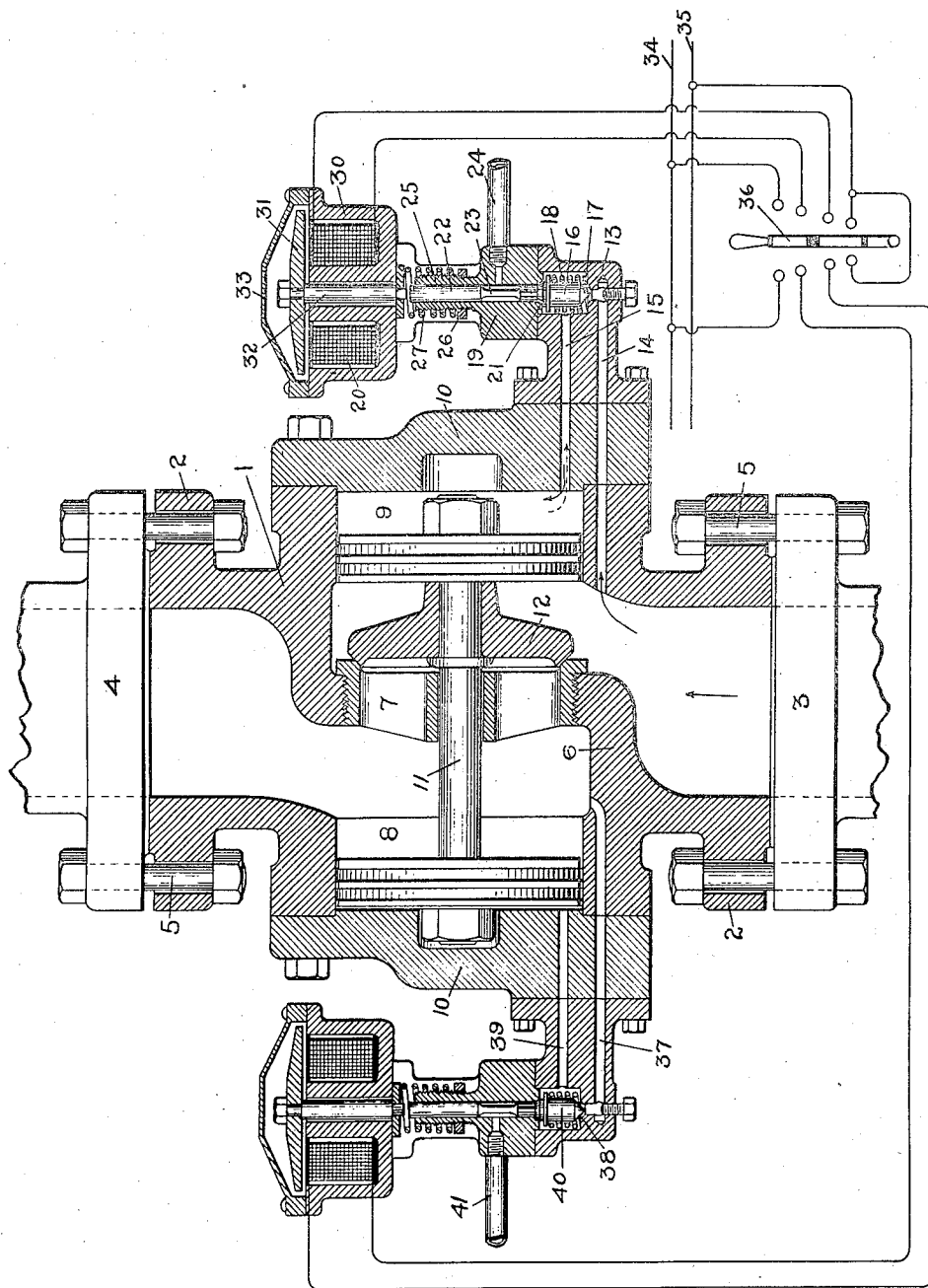
No. 746,337.

PATENTED DEC. 8, 1903.

O. JUNGREN.
ELECTRICALLY CONTROLLED VALVE.

APPLICATION FILED NOV. 15, 1902.

NO MODEL.



WITNESSES:

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UNITED STATES PATENT OFFICE.

OSCAR JUNGREN, OF SCHENECTADY, NEW YORK, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

ELECTRICALLY-CONTROLLED VALVE.

SPECIFICATION forming part of Letters Patent No. 746,337, dated December 8, 1903.

Application filed November 15, 1902. Serial No. 131,478. (No model.)

To all whom it may concern:

Be it known that I, OSCAR JUNGREN, a citizen of the United States, residing at Schenectady, county of Schenectady, State of New York, have invented certain new and useful Improvements in Electrically-Controlled Valves, of which the following is a specification.

At times it becomes necessary to interrupt the flow of steam or other motive fluid from the boiler to the energy-consuming devices. This interruption may be necessary on account of changes in load conditions or on account of accident either to the energy-consuming devices or to the fluid-carrying conduit.

Accidents sometimes happen to engines—such, for example, as the breaking of a governor or cylinder-head—that render it exceedingly dangerous for persons to enter the engine-room. In cases of this kind there is usually a considerable loss of time in shutting off the steam. If the accident involves the steam-carrying connections or in any way opens communication between the source of steam-supply and the engine-room, the latter will be immediately filled with steam, rendering it practically impossible for a man to enter the room and manually operate the main throttle-valve. In one accident that has been called to my attention fifteen minutes elapsed before the throttle-valve could be closed, owing to the steam in the engine-room, and it was done only after the boilers had discharged their entire contents. As a result it necessitated the closing down of the system during its busiest hours. An additional throttle-valve is sometimes placed in the boiler-room; but owing to the fact that it has to be located at a relatively inaccessible place it frequently happens that before the valve can be shut the engine or other energy-consuming device is wrecked. If the accident happens to the steam-pipe in the boiler-room, this valve is of course inaccessible, and owing to the steam in the room the fires cannot be drawn.

Throttle-valves for the systems of large capacity are so constructed that to completely close them requires considerable time—for

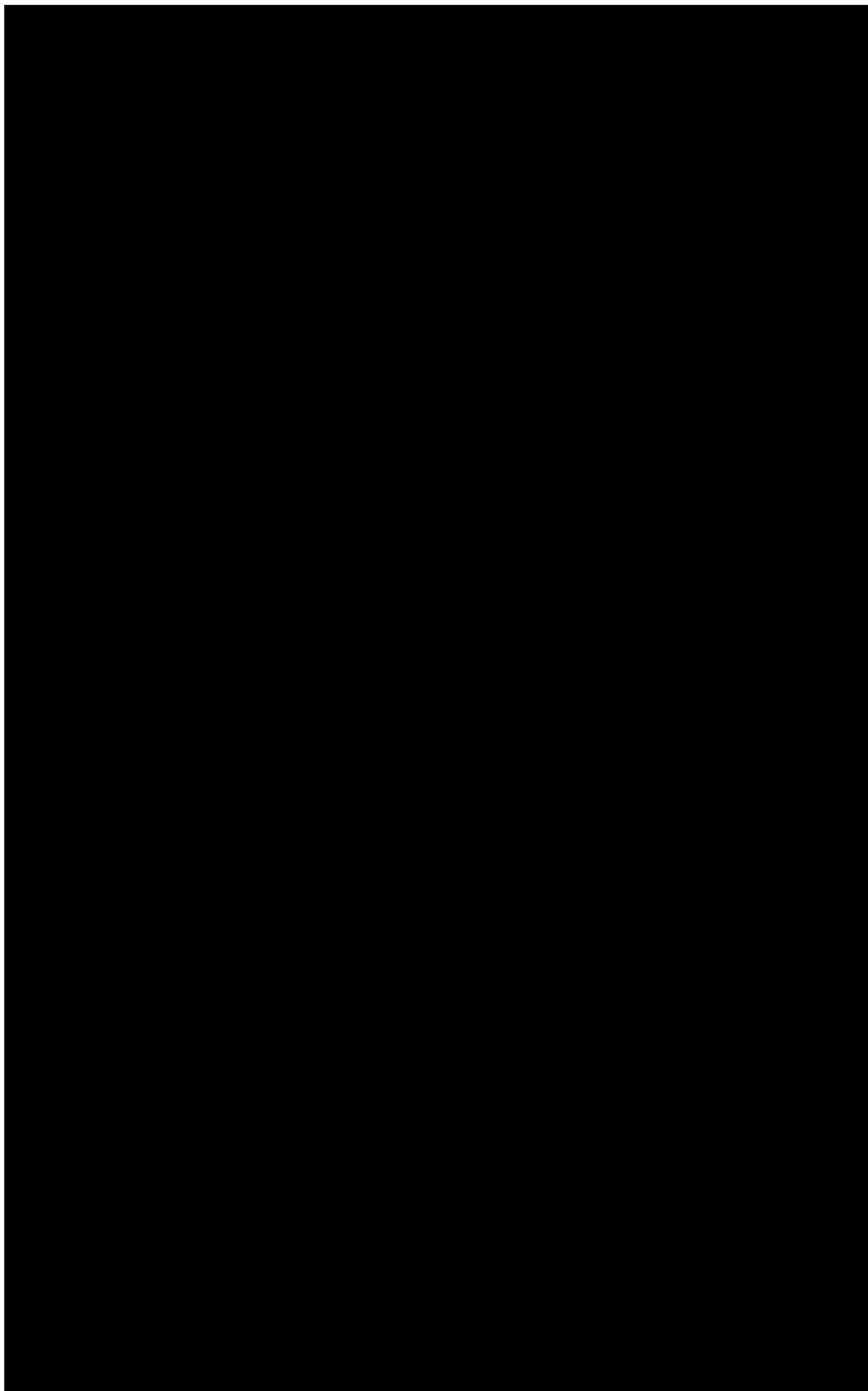
example, a couple of minutes. In some cases the valve can be closed by one man and in other cases two or more are required. The main throttle-valves in large stations are required to handle a large amount of steam under considerable pressure, and in order to reduce the labor of operating the valve to a minimum gearing of one sort or another is introduced into the actuating mechanism, hence the comparatively long period of time required in closing them.

My invention has for its object to provide a valve which is capable of quickly and positively opening or closing a passage, and thereby controlling the flow of fluid from one point to another, and one which is capable of being controlled from a nearby point or from a distance.

For a consideration of what I consider to be novel and my invention attention is called to the accompanying description and claims appended thereto.

In the drawing, which illustrates an embodiment of my invention, is shown an electrically-controlled valve in longitudinal section.

1 represents the main body of the valve, and flanges 2 are provided at the ends for connecting it with steam or other fluid-carrying conduits 3 and 4. In the present illustration the motive fluid passes from the conduit 3 to 4, and the valve itself may be located in the boiler or engine room, as desired. Bolts 5 are employed to unite the valve with the conduits. The casing is divided centrally by a partition 6, that contains a screw-threaded opening in which is mounted the detachable seat 7 of the main throttle or cut-off valve. Formed in the casing and situated in line with the valve-seat and on opposite sides thereof are cylinders 8 and 9. The cylinders and valve-seat are concentrically disposed, so that they may be bored out at the same operation. The outer end of each cylinder is closed by a head 10, which is held in place by bolts. Each cylinder is provided with a piston, and the pistons are connected by a rod 11, which also carries the main throttle or cut-off valve 12. The valve engages with a shoulder on the rod and is provided with



net is energized the armature 31 is attracted, which forces the valve-stem 22 downward by a hammer-blow against the action of the compression-spring 18. This causes the valve 16 to move downward and engage with the lower seat 17, which cuts off the supply of steam through the port or passage 15. At the same time the valve moves away from the seat 21 the steam that is back of the piston is permitted to escape to the exhaust-pipe 24, as is indicated by the arrow, thus creating an unbalanced condition as to pressures on the piston. As soon as the pressure on the back of the piston is relieved it begins to move toward the right under the action of the steam on the inlet side of the valve. In this connection it is to be noted that the area of the piston is greater than that of the main valve 12. As soon as the steam passes the valve-seat 7 it will enter the port 37 and pass through the valve-opening 38 into the port or passage 39 back of the left-hand piston. This means that the pressures on opposite sides of the left-hand piston are balanced, and hence no opposition is offered thereby to the opening of the valve. The opening of the valve requires only a very brief interval of time, and as soon as the operator is certain that the valve is open the circuit of the magnet is broken by the switch 36.

Assuming that the main throttle-valve is open and that for some reason it becomes necessary to close it, the switch 36 is moved to close the circuit of the left-hand magnet. This causes the valve 40 to close the space back of the piston to the steam-supply and open it to the exhaust-pipe 41. As soon as the pressure on the back of the left-hand piston is relieved the main valve starts to close, because the pressures on the left-hand piston are unbalanced—that is to say, the left-hand side of the piston is open to the exhaust, while the right-hand piston is subjected to the full pressure of the fluid passing through the valve. The right-hand piston is in a balanced condition, because both sides of it are subjected to the inlet-pressure.

From the foregoing it will be seen that in order to operate the valve two magnets are necessary, each magnet controlling a small valve, which in turn admits motive fluid to a piston or cuts off the supply, as the case may be. The pistons and their cylinders are, in fact, motors, one of which controls the opening of the valve and the other its closing. The motors are made large enough so that the supply of fluid passing through the valve can be quickly interrupted, and the supply of energy for these motors is obtained from the inlet side of the valve, and only a very small amount of energy is required to operate the magnets which regulate the operation of the motor-controlling valves, the said magnets only requiring current when the main valve is actually moving.

The two motors cooperate in a manner to actuate the main valve, one being employed

to close it, the other to open it. If only one motor was employed or one was rendered inoperative, the valve could be opened or closed, depending on which motor was dispensed with, but it would then be impossible to move the valve to its opposite position. The valve mechanism and motors are entirely inclosed by the casing, which dispenses with all packings and maintains them in condition for instant operation. The auxiliary-valve-controlling mechanism is also inclosed in a manner to completely protect it and dispense with packings.

In accordance with the provisions of the patent statutes I have described the principle of operation of my invention, together with the apparatus which I now consider to represent the best embodiment thereof; but I desire to have it understood that the apparatus shown is only illustrative and that the invention can be carried out by other means.

What I claim as new, and desire to secure by Letters Patent of the United States, is—

1. In combination, a main throttle-valve, a motor for moving the valve in one direction, a second motor for moving the valve in the opposite direction, a separately-actuated means alternately acting on each motor for creating an unbalanced condition when it is desired to operate the valve, and a passage for each motor that is controlled by said means which maintains it in a balanced condition while the other motor is in an unbalanced condition.

2. In combination, a main throttle-valve, a piston and cylinder for moving the valve in one direction, a piston and cylinder for moving the valve in the opposite direction, independent electrically-actuated valves for alternately creating an unbalanced condition as to pressures on the pistons for the purpose of moving the main valve, and passages controlled by the electrically-actuated valves for maintaining a balanced condition as to pressure on one piston while the other piston is in its unbalanced condition.

3. In combination, a main valve, pistons situated on opposite sides of the valve, one piston being employed to move the valve in one direction, the other in the opposite direction, a pair of independent and separately-actuated controlling-valves operatively related to the pistons, a magnet for operating one of the controlling-valves, a spring arranged to hold the valve open and create a balance as to pressure on one of the pistons, and a second magnet for operating the other controlling-valve in a manner to create an unbalanced condition as to pressure on the other piston, the two magnets being capable of independent operation.

4. In combination, a main valve having an open and a closed position but no intermediate, a pair of pistons for moving the valve, one piston being arranged to move the valve in one direction, the other in the opposite direction, independently-acting magnets for regulating the action of the pistons, the said

magnets being deenergized whenever the main valve is in either of its said positions, and valved passages for balancing the pressures on the pistons when the magnets are deenergized.

5. In combination, a main valve having an open and a closed position but no intermediate, pistons and cylinders for moving the valve in opposite directions, separately-actuated valves controlling the action of the pistons, each of which has a high and a low pressure seat, exhaust-ports for the cylinders, springs for holding the valves against the exhaust-seats and away from the high-pressure seats, and a separate magnet acting on each valve to open the exhaust when it is desired to move the main valve.

6. In combination, a main valve, a piston for actuating the valve, a cylinder for the piston, a head for closing one end of the cylinder, a bracket which is carried by the head and is provided with ports or passages, a support carried by the bracket, a magnet mounted in the support, an exhaust-port, a controlling-valve carried by the support and arranged to control the ports, and a valve-stem which extends into the support for actuating the controlling-valve.

7. In combination, a main valve, a piston for actuating the valve, a cylinder for the piston, a head for the cylinder, a bracket carried by the head, a support that is mounted on the bracket and is provided with a valve-seat, ports conveying motive fluid to and from the cylinder, a controlling-valve, an exhaust-port, a spring normally holding the valve in a position to close the exhaust-port, an electromagnet, and an armature which moves

the valve away from its seat when the magnet is energized.

8. In combination, a main valve and actuating-piston, with a controlling mechanism comprising a bracket which is carried by the main-valve casing, an electromagnet, a support for the magnet that is mounted on the bracket, a projection on the support, a valve-actuating stem that passes through the projection, an armature which is provided with a rod or actuator that is separated from the valve-stem by a space, and a spring which normally holds the rod and stem apart.

9. In combination, a main valve, a pair of oppositely-disposed pistons for actuating the valve, separately-actuated valves for controlling the pistons, electromagnets for actuating the valves, and a lost-motion connection between each magnet and its valve, whereby a hammer-blow is imparted to the valve when it is desired to operate it.

10. In combination, a main valve, a piston and cylinder for moving it, an inlet and an exhaust port, a valve for controlling both ports, a spring normally holding the valve against the exhaust-port, an armature for moving the valve from the exhaust-port and closing the inlet-port, a lost-motion connection between the magnet and the valve whereby a hammer-blow is imparted to the valve, and a spring which normally maintains a separation in said connection.

In witness whereof I have hereunto set my hand this 13th day of November, 1902.

OSCAR JUNGREN.

Witnesses:

BENJAMIN B. HULL,
HELEN ORFORD.