W. D RALPHS.

ELECTRICAL VALVE.

APPLICATION FILED APR. 8, 1916.

1,243,219. Patented Oct. 16, 1917.

Fig. 2.

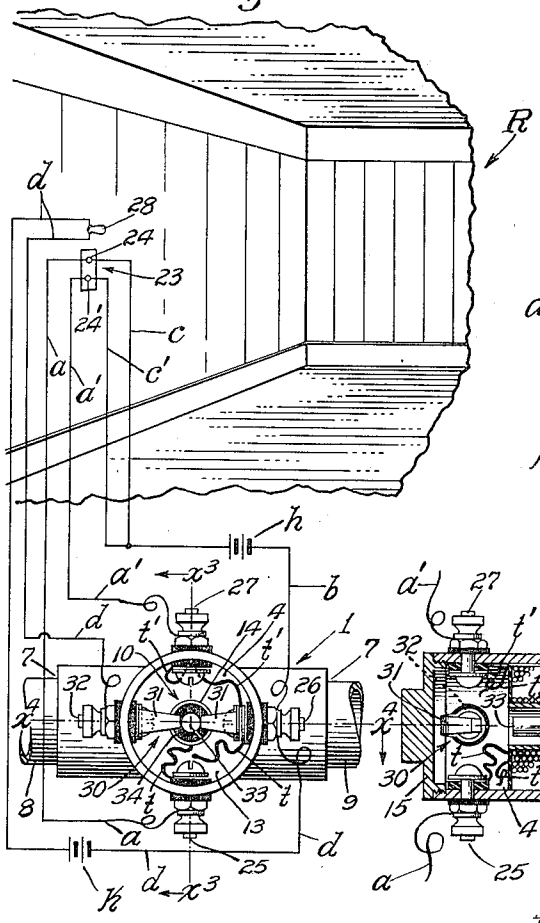


Fig. 1.

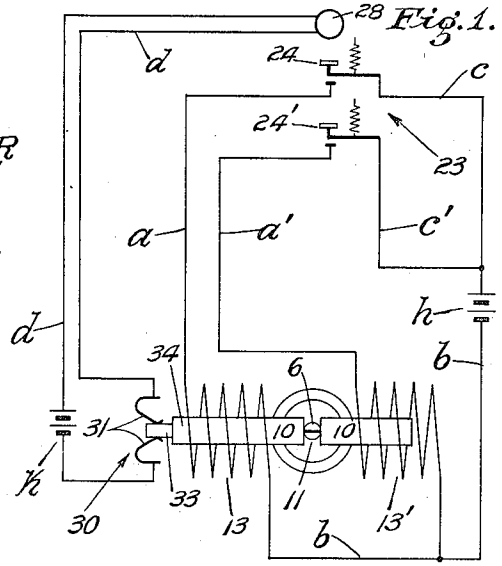


Fig. 3.

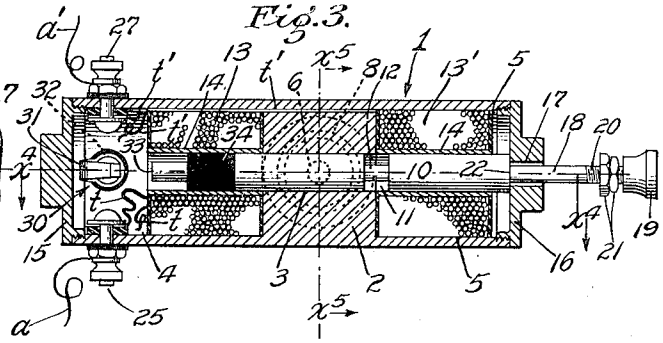


Fig. 4.

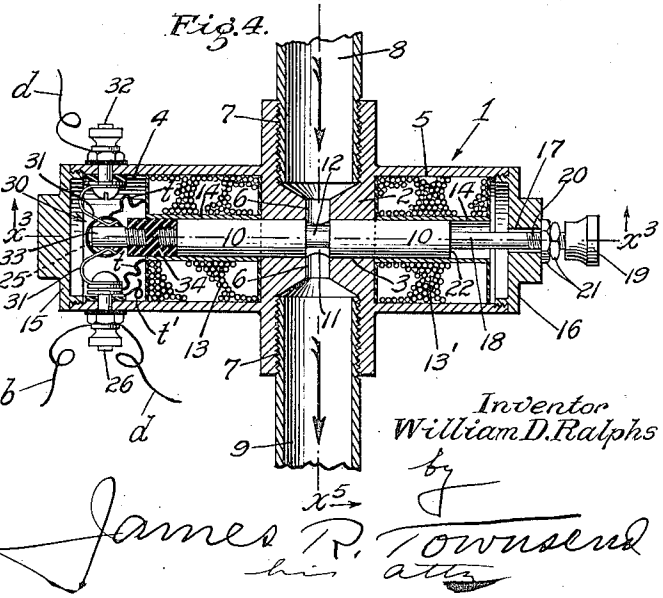
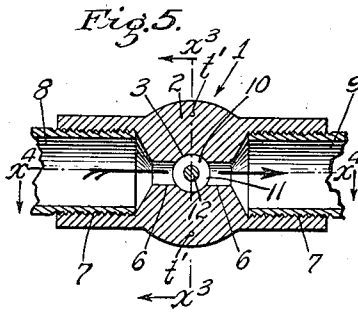


Fig. 5.



Witness

K. N. Kirkby

Inventor

William D. Ralphs

by

James R. Townsend

his atty

UNITED STATES PATENT OFFICE.

WILLIAM D. RALPHS, OF PASADENA, CALIFORNIA.

ELECTRICAL VALVE.

1,243,219. Specification of Letters Patent. Patented Oct. 16, 1917.

Application filed April 8, 1916. Serial No. 90,015.

To all whom it may concern:

Be it known that I, WILLIAM D. RALPHS, a citizen of the United States, residing at Pasadena, in the county of Los Angeles and State of California, have invented a new and useful Electrical Valve, of which the following is a specification.

This invention relates to valve mechanism and more particularly to an electrically-operated valve that is opened and closed by an electric controlling switch located at any appropriate place, distant from the valve.

An object of the invention is to provide a light, compact valve of this type that is simple in construction and easily installed, and one in which liability of leakage is minimized upon shutting off a flow of fluid.

Another object is the provision of automatic indicator means electrically connected with the valve to show whether the same is open or closed.

More specifically, the valve comprises a casing provided with a passage-way, independent energizing coils mounted within said casing, and an armature plunger reciprocable between said coils and adapted to move across the passage-way to open and close communication therethrough.

A feature of the invention is the ready withdrawal of the plunger valve from its seat for cleaning or inspection purposes.

In the form herein presented the valve is especially well adapted for use in connection with controlling a supply of gas to a furnace, said valve being operated through magnetic means actuated in the instance shown by an electric switch positioned in a room of the house above said furnace.

The valve may be used in connection with various fluids as gas, water, air or oil, and I do not contemplate limiting myself to the specific form of construction herein shown and described.

The accompanying drawings illustrate the invention.

Figure 1 is an electrical diagram showing a valve and its electrical operating connections as embodied by this invention.

Fig. 2 is an end view of the valve from the left of Fig. 3, omitting the end closure cap to illustrate the indicator operating means which is shown electrically connected with an indicator appropriately positioned in a room, adjacent the valve-controlling switch.

Fig. 3 is a longitudinal section on line x^3, Figs. 2, 4 and 5, showing the valve in shut-off position.

Fig. 4 is a longitudinal section at right angles to that of Fig. 3 on line x^4, Figs. 2, 3 and 5, showing the valve in open position.

Fig. 5 is a transverse section through the valve passage-way on line x^5, Figs. 3 and 4, the valve being in open position corresponding to Fig. 4.

Arrows on the various section lines indicate the direction of sight.

In the embodiment shown the straight way valve casing or barrel 1 is provided with a mid-body portion 2 having a cylindrical valve seat 3 that is axially arranged and opens into end chambers 4, 5, positioned one upon each side of the body portion 2.

Oppositely-arranged ports 6 extend from said valve seat 3 to sockets 7 into which are screwed pipes 8, 9, that constitute the inlet and outlet to and from the valve respectively, said ports 6 forming a transverse passage-way through the valve. In the seat 3 is mounted a cylindrical plunger valve 10 that is reciprocable therein and adapted to move across the passage-way to open and close communication therethrough, said valve being preferably provided with a mid-port 11 that may be variously formed. In the present instance said port consists of a gap formed by reducing the plunger body to a spindle portion 12 of smaller cross-section than the plunger body, said gap being of a width corresponding to the ports 6. When the plunger valve is in position with its port 11 in register with the ports 6 as shown in Fig. 4 communication through the valve and around the spindle 12 is established and when the port 11 is moved out of register with the ports 6, as shown in Fig. 3, communication through the valve is blocked or shut off.

The ends of said valve, when in position in its seat 3, extend into the respective chambers 4, 5, and magnetic coils 13, 13′ are positioned in said chambers to alternately act upon said plunger valve as an armature and thus reciprocate the same in the seat 3 to open and close communication through the transverse passage-way 6. Said coils 13, 13′ are independent of each other and adapted to be separately energized to attract and move the plunger and are preferably in the form of solenoids that are inserted into their respective chambers 4, 5, through the open ends thereof. The solenoids are each pro-

vided with an inner barrel 14 which barrels together with the valve seat 3 form a way for the plunger to play back and forth in.

Caps 15, 16 are screwed into the open ends of the chambers 4, 5, respectively, to inclose the coils as well as the plunger valve 10, and the cap 16 is provided with a central orifice 17 through which an extension stem 18 on the plunger extends, said stem having a finger-piece 19 by means of which the valve 10 may be manually actuated in case it is desired so to do. The outer extremity of said stem is threaded at 20 to receive lock nuts 21 that serve as an adjustable stop to contact with the outer face of said cap when the valve is moved by the solenoid 13 into open position with the valve port 11 in register with the passage-way 6. A shoulder 22 of the plunger valve is adapted to abut against the inner face of the cap 16 when the valve is moved by the solenoid 13′ into shut-off position, said adjustable stop 21 together with the shoulder 22 serving as stop means to limit the closing movement of the plunger. By adjusting the stop 21 the valve may be set to open more or less so as to regulate the flow through the valve.

For purposes of illustration the valve may be considered as applied to a gas line 8, 9, of a furnace (not shown) and the solenoids 13, 13′ are electrically connected with a switch 23 that may be located at any accessible place, distant from the valve, to operate the same.

In Fig. 2 the switch 23 is shown positioned in the wall of a room R to operate the valve, as in the case of controlling a flow of gas to a furnace in a basement below. Said switch may be of any well known construction and is preferably of a momentary contact type having a switch-button 24 to momentarily energize the solenoid 13 and thus move the plunger to open communication through the valve, together with a switch-button 24′ to momentarily energize the solenoid 13′ and thus move the plunger to shut off communication through the valve.

With reference to Figs. 1 and 2 it is seen that the solenoid 13 is connected with a suitable source of electrical energy, as battery *h*, through switch-button 24 and leads *a*, *b*, and *c*, the wire terminals *t*, in Figs. 2, 3 and 4, connecting said leads with the solenoid 13 through binding posts as 25, 26 that are suitably mounted upon the casing 1 near the open end of the chamber 4. The solenoid 13′ is connected with said source of electrical energy through switch-button 24′ and leads *a*′, *b* and *c*′, wire terminals *t*′ connecting said leads with the solenoid 13′ through binding posts as 27, 26.

It is very essential to the successful operation of the valve that indicator means be provided in order to know at any time whether the valve is open or closed and accordingly an important feature of this invention is the provision of an automatic indicator, such as an electric lamp 28 positioned adjacent the controlling switch 23 and connected with the valve to automatically light when said valve is either opened or closed, as desired. Said lamp is connected through circuit *d* and a source of electric energy, as battery *k*, with a circuit breaker 30 arranged within the chamber 4 of the valve and adapted to co-act with the plunger valve 10 to complete the electrical circuit and light the indicator lamp whenever the valve is opened.

Said circuit breaker in the instance shown comprises oppositely-arranged contact prongs 31 positioned at the open end of the chamber 4 and adjacent the end of the plunger valve, said prongs being mounted upon binding posts 26, 32 that are insulated from the valve barrel 1 in the usual manner. The prongs extend into the path of a contact tip 33 which is suitably mounted in an insulated bushing 34 that may be screwed onto the plunger end, as shown in Fig. 4. The arrangement of the circuit breaker and plunger valve, in the instance shown, is such that when the plunger is moved in its seat 3 to open the passage-way 6 the tip 33 slides between the contact prongs 31 and completes the circuit to the indicator lamp 28, thus lighting the same. Said lamp remains lighted until the plunger valve is moved to close the passage-way when the tip 33 will be withdrawn from between the prongs, breaking the circuit and automatically turning off the light in the indicator lamp.

Access is readily afforded to either of the valve chambers 4, 5 by removing the separate end caps 15 and 16, in the one instance for inspection or adjustment of the circuit breaker 30, and in the other instance for removal of the plunger valve from its seat 3 to clean or oil the same. The plunger valve 10 and its seat are supplied with a surrounding oil film which serves the double purpose of lubricating as well as preventing leakage between the valve and seat.

From the foregoing it is obvious that the valve may be opened to admit a flow therethrough by pushing the switch push-button 24 in the room R, corresponding to switch-button 24 in Fig. 1, and energizing the solenoid 13. Said valve may be closed to shut off the flow by pushing the switch push-button 24′, corresponding to switch button 24′ in Fig. 1, and energizing the solenoid 13′; the indicator light 28, adjacent the switch 23, being automatically operated to indicate the open or closed position of the valve.

I claim:

1. A valve casing having oppositely arranged pipe sockets and a port connecting the sockets, and having a valve seat cross-

wise of the port and chambers at the ends of the valve seat, a straight cylindrical plunger mounted to reciprocate through the valve seat and close the port and provided with a mid-cross-passage to register with and open the port, solenoids in said chambers for reciprocating the plunger, a circuit breaker in one of said chambers outside of the solenoid and operated by the plunger, a cap for closing the chamber outside of the solenoid, a second cap for closing the other chamber, and a stem extending from the plunger through the second cap for manually operating the valve.

2. A valve casing having oppositely arranged pipe sockets and a port connecting the sockets, and having a valve seat crosswise of the port and chambers at the ends of the valve seat, a straight cylindrical plunger mounted to reciprocate through the valve seat and close the port and provided with a mid-cross-passage to register with and open the port, solenoids in said chambers for reciprocating the plunger, a circuit breaker in one of said chambers outside of the solenoid and operated by the plunger, a cap for closing the chamber outside of the solenoid, a second cap for closing the other chamber, a stem extending from the plunger through the second cap for manually operating the valve, and an adjustable stop upon the stem to regulate the flow.

3. A valve casing having oppositely arranged pipe sockets and a port connecting the sockets, and having a valve seat crosswise of the port and chambers at the ends of the valve seat, a straight cylindrical plunger mounted to reciprocate through the valve seat and close the port and provided with a mid-cross-passage to register with and open the port, solenoids in said chambers for reciprocating the plunger, a circuit breaker in one of said chambers outside of the solenoid and operated by the plunger, a lamp circuit connected to the circuit breaker, a cap for closing the chamber outside of the solenoid, a second cap for closing the other chamber, and a stem extending from the plunger through the second cap for manually operating the valve.

In testimony whereof, I have hereunto set my hand at Los Angeles, California, this 31st day of March, 1916.

WILLIAM D. RALPHS.

Witness:

JAMES R. TOWNSEND.