Oct. 11, 1932. J. L. MUSGRAVE 1,882,392

ELECTROMAGNETIC DOUBLE CONTROL VALVE

Filed Feb. 18, 1931

Fig. 1.

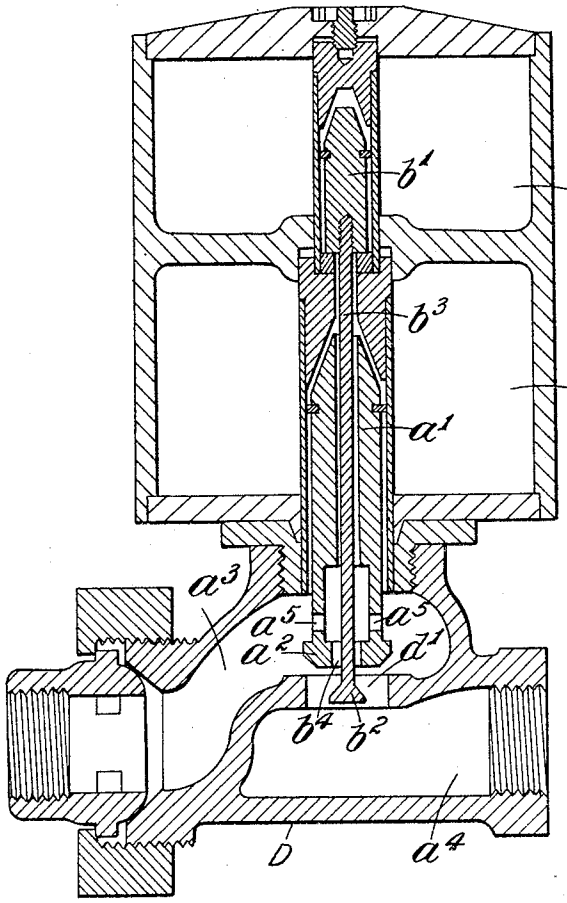
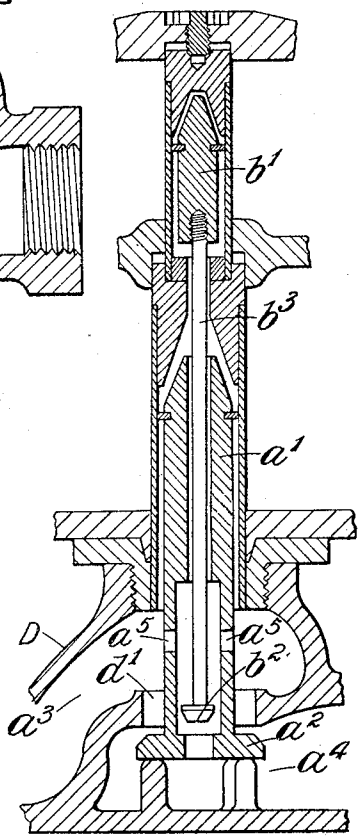


Fig. 2.



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ELECTROMAGNETIC DOUBLE CONTROL VALVE

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This invention relates to automatically controlled valves arranged to open and close under predetermined conditions, and refers to that class which are operated magnetically, more particularly in conjunction with a thermostat. The object of the invention is to produce a valve constructed with a main valve proper and a smaller valve proper, so that when the medium to be controlled is heated to a predetermined temperature the main valve proper closes, the control being then entirely performed by the smaller valve proper.

According to this invention the valve is constructed with two electro-magnets arranged one on the other. The lower electro-magnet functions to energize the iron core attached to the main valve proper, and the upper electro-magnet energizes the iron core to which the smaller valve proper is secured. The main port communicating with the inlet and outlet passages of the valve, which is formed in a central partition in the casing or body, is closed by the main valve resting on its seating by gravity, said valve being lifted off its seating when the iron core to which it is attached is energized.

The spindle of the smaller valve proper passes centrally through the main valve proper and through the electro-magnet which energizes said main valve said spindle being connected at its upper end to the iron core located in the upper electro-magnet. The port for the smaller valve proper is formed in the main valve, said smaller valve taking its seating on the underside of said port, and in that portion of the iron core of said main valve, which projects into the inlet passage, an opening is formed communicating with the port of the smaller valve, so that when the iron core in the upper electro-magnet is energized, said smaller valve is lifted and closes such port.

Instead of the main valve closing by gravity on its seating on the top of the main port, it may be arranged to close magnetically on to a seating on the underside of said main port, and open by gravity, and the smaller valve may be closed by gravity and opened magnetically, taking its seating on the upper side of the port in the main valve.

In order that the invention may be clearly understood I have appended the accompanying drawing.

Fig. 1 is a sectional view showing a valve constructed according to this invention in which the main valve proper is closed by gravity, and the smaller valve proper opened by gravity.

Fig. 2 is a broken sectional view of a valve showing the main valve proper opened by gravity, and the smaller valve proper closed by gravity.

A represents the lower electro-magnet, B the upper electro-magnet, D the valve casing, a^1 the iron core to which the main valve proper a^2 is attached, and b^1 the iron core to which the smaller valve proper b^2 is attached.

Referring to Fig. 1 it will be seen that the main valve proper a^2 and the smaller valve proper b^2 are both shown in an open position. The main valve proper a^2, which is attached to or forms part of the iron core a^1 is lifted off its seating on the main port d^1 when the electro-magnet A functions to attract said iron core a^1, but when the electro-magnet is de-energized, the valve proper a^2 falls by gravity on to its seating, thus closing communication between the inlet passage a^3 and the outlet passage a^4 of the valve through this main port d^1.

The smaller valve proper b^2 is lifted against its seating when the electro-magnet B is energized and attracts the iron core b^1 to which the upper end of the spindle b^3 of said valve proper b^2 is attached. This spindle b^3 passes centrally through the port b^4 formed in the main valve proper a^2 and through the electro-magnet A, the smaller valve proper b^2 taking its seating on the underside of said port b^4, communication between the inlet and outlet passages a^3 a^4 and this port b^4 being obtained by the openings a^5 formed in that portion of the iron core a^1 that projects into the inlet passage a^3.

Normally the main valve a^2 is closed and the smaller valve b^2 open, but as soon as operations are started the electro-magnet A lifts the main valve a^2 off its seating, the control

of the medium to be heated being maintained by said main valve a^2. When however such medium reaches approximately the desired temperature, the electro-magnet A ceases to function and the electro-magnet is de-energized when the main valve a^2 shuts by gravity, the control being then carried out entirely by the smaller valve b^2. To entirely close the valve the electro-magnet B is brought into action, thus attracting the iron core b^1, and thereby lifting the smaller valve b^2 against its seating.

In the example illustrated by Fig. 2, the main valve proper a^2 closes against its seating on the underside of the main port d^1 when the electro-magnet A is energized and opens by gravity when said electro-magnet is de-energized; the smaller valve proper b^2 closes by gravity and opens magnetically when the electro-magnet B is energized.

In this case normally the main valve a^2 is open and the smaller valve b^2 closed, but after operations have been started and the medium to be heated reaches approximately the desired temperature, the electro-magnets A and B commence to function thus attracting the iron cores a^1 and b^1, and closing the main valve a^2 and opening the smaller valve b^2.

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

1. An electro-magnetically operated valve having a main valve proper actuated through the medium of an electro-magnet and a smaller valve proper located in the main valve proper actuated through the medium of another electro-magnet.

2. An electro-magnetically operated control valve comprising valves telescopically arranged with respect to each other and electromagnetic means for independently actuating said valves.

3. An electromagnetically operated control valve comprising a main valve normally maintained in closed position by gravity, a smaller valve within said main valve normally maintaining a port within said main valve open by gravity, and independently operated electro-magnets adapted to open said main valve and to close said smaller valve.

4. An electro-magnetically operated control valve comprising a main valve normally maintained in open position by gravity, a smaller valve within said main valve normally maintaining a port within said main valve closed by gravity, and independently operated electro-magnets adapted to close said main valve and to open said smaller valve.

In testimony whereof I have affixed my signature.

JOSEPH LESLIE MUSGRAVE.