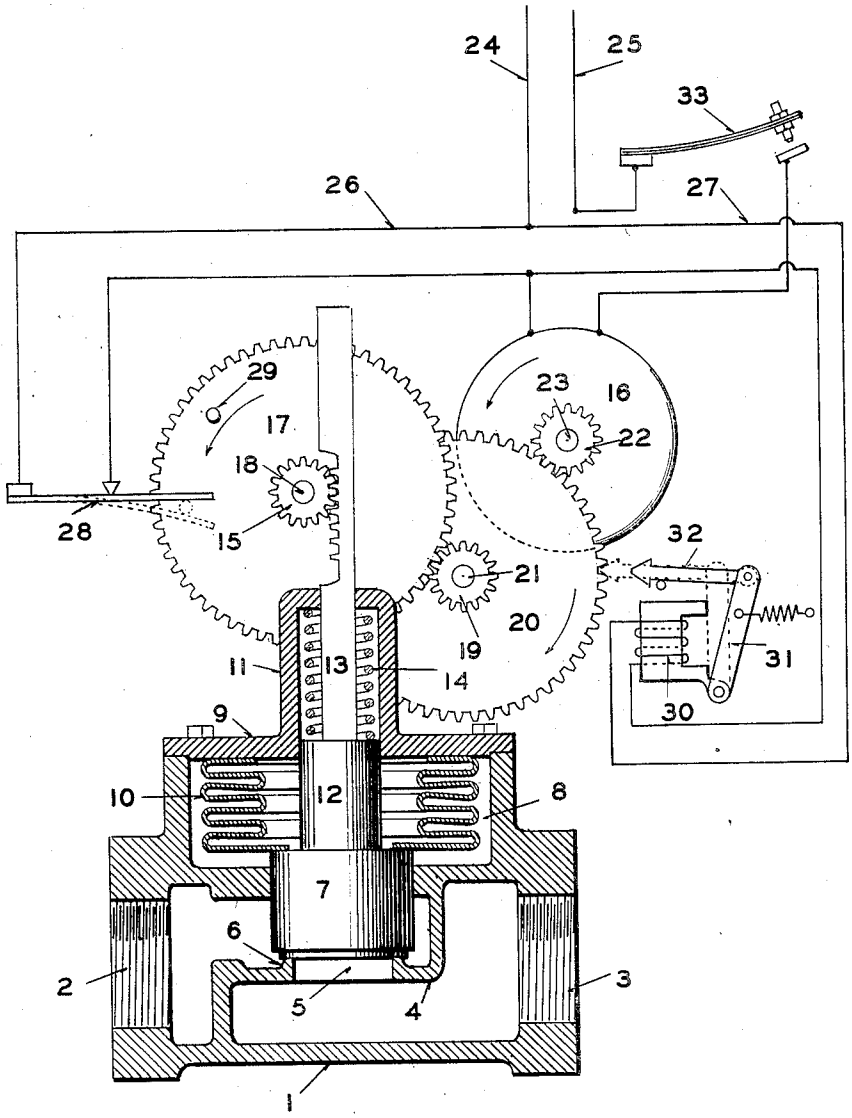
April 26, 1932. L. M. PERSONS 1,855,415

ELECTRIC VALVE CONTROL

Filed March 14, 1931



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UNITED STATES PATENT OFFICE

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ELECTRIC VALVE CONTROL

Application filed March 14, 1931. Serial No. 522,590.

My invention relates to electrically operated means for controlling valves or the like to regulate the fuel supply to oil or gas burning furnaces or for actuating the dampers controlling the draft of furnaces consuming solid fuel.

One object of my invention is to provide positive means for locking the valve in its open position, and another object is to reduce the current consumption of the motor when the valve is in such locked position.

The accompanying drawing is a semi-diagrammatic view showing my invention applied to the fuel supply valve of a furnace.

Indicated at 1 is a valve casing provided with threaded inlet and outlet openings 2 and 3, respectively, for connection to the fuel pipe (not shown). Separating the inlet and outlet openings is a partition wall 4 in which is a part 5 surrounded by a valve seat 6 cooperating with a plunger valve 7. To avoid packing the valve and the resultant friction, I provide the valve casing with a chamber 8 into which the valve projects. The chamber is closed by a removable cap 9. Secured at one end to the cap 9 and at the other end to the valve 7 is a "sylphon" 10 which prevents the escape of any fluid passing around the valve stem. The cap 9 carries a sleeve 11 forming a guide for the stem 12 of the valve, and the rack bar 13 forming an extension of the valve stem projects through a central opening in the end of the sleeve. Surrounding the rack bar within the sleeve is a coil spring 14 bearing against the upper end of the stem, thus tending to hold the valve in position against its seat, as shown in the drawing.

Engaging with the teeth of the rack bar is a pinion 15 forming a part of a multiplying gear train connecting the rack with an electric motor 16 by the action of which the valve is opened against the tension of spring 14. The exact form of the multiplying train is not material to the invention but, as shown in the drawing, it comprises a gear wheel 17 mounted on the same shaft 18 with the pinion 15, a pinion 19 meshing with the wheel 17 and a gear wheel 20 mounted on the same shaft 21 with the pinion 19. The wheel 20 meshes with a pinion 22 on the rotor shaft 23 of the motor.

The motor is supplied with current from line wires 24 and 25. Line wire 24 is connected to one terminal of the motor through parallel circuits 26 and 27. In the circuit 26 is a switch 28 adapted to be opened by the pin 29 on gear wheel 17 when the valve is moved to full open position. Included in the circuit 27 is the coil 30 of an electromagnet, the armature 31 of which carries a detent 32 adapted to be moved into engagement with the teeth of wheel 20 to lock the gear train against valve closing movement. The resistance of the circuit 26 is quite small and much less than that of circuit 27. The other terminal of the motor is connected to line wire 25 through a switch 33. This switch may be operated either manually or automatically. In the drawing I have shown it as embodying a thermostatic element to automatically control the opening and closing of the switch according to the temperature to which it is subjected.

In the operation of the device the valve will remain closed while switch 33 is open. When, however, the line circuit is closed by the action of the thermostat the motor is started operating through the gear train to open the valve against the action of the spring 14. During this operation of the motor the current in the circuit 27 is so small that the magnet will not be energized sufficiently to move its armature. When the valve is brought to open position the pin 29 contacts with the switch arm 28 and thereby opens circuit 26, thus connecting the electromagnet 30 to the line in series with the motor. The magnet then brings the detent 32 in engagement with the wheel 20 and the resistance of the coil 30 of the magnet is such that the motor torque is so reduced that it no longer counteracts the effect of the spring 14 and the detent operates to hold the valve in open position.

My apparatus has the advantage that current consumption is much lower while the valve is maintained in open position than if the electromagnetic lock were not employed

and the valve held by the stalled torque of the motor.

When, as the result of increase of temperature effective on the thermostatic switch, the motor supply circuit is opened, the detent is retracted by its spring and the valve allowed to close under the influence of the spring 14.

Having fully described my invention, what I claim as new and desire to secure by Letters Patent of the United States is:

1. In apparatus of the class described, the combination with a regulating device, of means biasing said regulating device toward closed position, means including an electric motor for moving said device toward open position, electromagnetic means for maintaining the device in open position, a current supply circuit, and means operable when the device is in open position for connecting said last named means to the supply circuit in series with the motor.

2. In apparatus of the class described, the combination of a regulating device, means biasing said regulating device toward movement in one direction, an electric motor for moving said regulating device in the other direction, a supply circuit for said motor, an electromagnet, a detent actuated by said electromagnet for locking the regulating device against movement by the biasing means, and means for connecting the electromagnet to the supply circuit in series with the motor when said regulating device is moved to a predetermined position against the biasing means.

3. In apparatus of the class described, the combination of a regulating device, means biasing said regulating device toward movement in one direction, a rotary electric motor, a gear train connecting said motor with said regulating device to move it in the other direction, a supply circuit for said motor including parallel branches, a switch in one of said branches, an electromagnet in the other of said branches, a detent actuated by said electromagnet for locking the gear train, and means actuated from said gear train for opening said switch when said regulating device is moved to its extreme position against the biasing means.

In testimony whereof, I hereunto affix my signature, this 11th day of March, 1931.

LAWRENCE M. PERSONS.