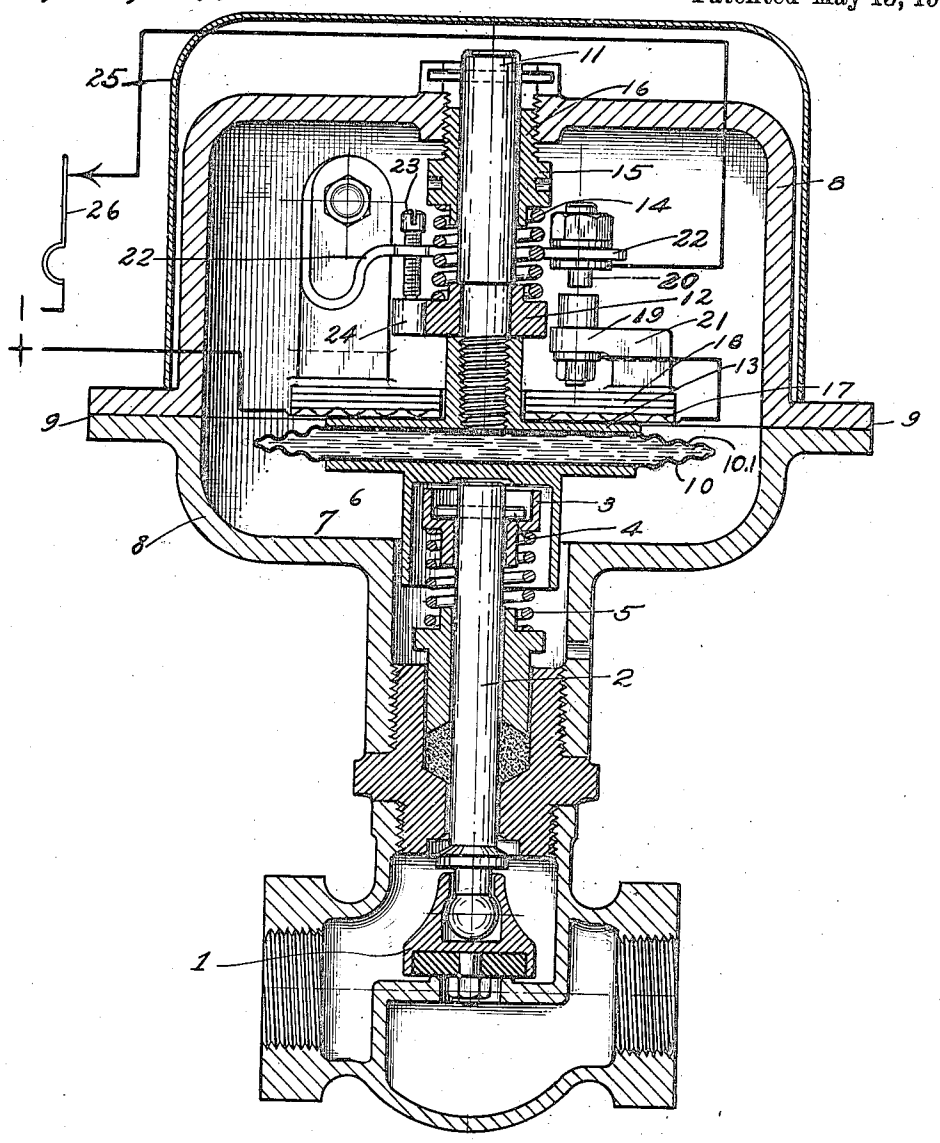
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VALVE OPERATING MECHANISM.

APPLICATION FILED JULY 22, 1915.

1,225,887. Patented May 15, 1917.



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VALVE-OPERATING MECHANISM.

1,225,887. Specification of Letters Patent. Patented May 15, 1917.

Application filed July 22, 1915. Serial No. 41,312.

To all whom it may concern:

Be it known that I, JOHN H. SWAN, a citizen of the United States of America, and a resident of Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Valve-Operating Mechanisms, of which the following is a specification.

The main objects of this invention are to provide an improved form of valve operating device and controlling means therefor; to provide a valve operating device or motor having a double action, the primary action being utilized for actuating the valve, and the secondary action being utilized for adjustment of the controlling means for the motor; to provide improvements particularly applicable to electrically controlled valve mechanisms; and to provide an electrically controlled valve operating mechanism having circuit connections actuated thereby, insuring that the valve is either in its fully open or closed position before the circuit is opened or closed.

A specific embodiment of this invention is shown in the accompanying drawing, in which the figure is a vertical section of an electrically controlled valve.

In devices of this general class heretofore employed for electrically operating valves of temperature regulating systems, etc., a single motion is employed to shift the valve and also open the circuit which controls the operating means which shift said valve. Such arrangements are unsatisfactory, because the movement of the valve operating means is checked before the valve is fully seated.

In this device, the valve is fully seated and then a further action of the valve operating means is required to operate the controlling mechanism for said operating means.

In the construction shown in the drawing, the valve 1 is carried by a vertically slidable stem 2 provided at its upper end with a cup collar 3 retained thereon by a pin 4. The valve is normally urged to an open position by a compression spring 5 which forces upward on the collar 3. Resting on the top of the stem 2 is a flat disk 6, provided with a downwardly projecting flange 7 which surrounds the top of the stem 2 and the spring 5. The top of the valve stem, the disk, and other mechanism carried thereby, are inclosed by a suitable casing 8 which may be made in two separable parts and joined at 9.

Actuating means comprising an expansible member is herein shown in the form of a fluid pressure motor having spaced diaphragms 10 and 10.1 between which is a readily expansible fluid. Diaphragm 10 rests on the disk 6, through which it may force the valve stem 2 downwardly against the action of the spring 5.

The top part of the housing 8 carries a slidable stem 11 provided with a collar 12 thereon and having a thin, flat disk or head 13 threaded to the lower end thereof. The disk 13 rests upon and is urged against the top of the diaphragm 10.1 by a compression spring 14 which surrounds the stem 11 and which bears between the collar 12 and a flange 15 on the adjustable nut 16.

Resting upon the upper side of the disk 13 and in close proximity to the diaphragm 10.1 is an electric heater 17 covered by layers of insulating material 18 for compelling the heat to flow mainly downward to the diaphragm.

Mounted on the inner wall of the upper part of the casing 8 are a pair of electric contacts 19 and 20. The contact 19 is supported by a rigid bracket 21, and the contact 20 is yieldingly supported on a spring arm 22. Contact 20 may be adjusted relatively to the contact 19 by means of a set screw 23 threaded in the arm 22 and located in position to be engaged by a projection 24 on the collar 12 when the collar is carried upward by the slidable stem 11.

A suitable cover 25 is provided to surround and inclose the upper part of the casing 8 in such manner that dust and dirt cannot enter said casing around the stem 11.

Current to the electric heater is controlled partly by a thermostatic arrangement 26 and partly by the contacts 19 and 20 which operate as a switch to open and close the line circuit.

The operation of the device is as follows:—

The expansible diaphragm motor is normally in its contracted position, thereby allowing the valve stem 2 to be held in its upper position by action of the spring 5, thus holding the valve 1 in an open position to permit steam to pass for instance, to a radiator. The upper slidable stem 11, which carries the collar 12 with projection 24 thereon, is held in its lower position, and the disk 13 against the top of the contracted

diaphragm by action of spring 14, and thus the switch, formed by the contacts 19 and 20, is in a closed position.

When the surrounding atmosphere becomes heated to a predetermined degree, the thermostatic arrangement 26 closes the switch to the electric heater 17, the switch formed by the contacts 19 and 20 being already closed. Current passing through the electric heater quickly raises the temperature of the fluid in the diaphragm motor causing it to expand and force the valve stem downwardly against the action of the spring 5, said spring being weaker and offering less resistance than the spring 14. When the valve 1 is closed and cannot be forced farther down, further expansion of the diaphragm motor then forces the disk 13 upwardlly against the action of the spring 14. Upward movement of the disk and stem 11 forces the projection 24 against the end of the screw 23, raising the spring arm and thus parting the contacts 19 and 20. This opens the circuit to the heater 17, allowing the fluid in the diaphragm motor to gradually cool and contract to its normal condition.

The device is so adjusted, that by the time the diaphragm motor is contracted sufficiently to again close the contacts 19 and 20, the thermostatic arrangement 26, effected by the lowering of the temperature caused by shutting the steam off the radiator, will have opened the line. The thermostatic arrangement 26 will remain in this open position until the temperature of the atmosphere is again raised to the predetermined degree when the circuit will be again closed thereby.

Although an expansible diaphragm has been herein described as the operating means, it is to be understood that this primary and secondary action may be applied to various operating means, the secondary action being utilized for controlling the operating means after the primary action has actuated the valve.

Although but one specific embodiment of this invention has been herein shown and described, it will be understood that numerous details of the construction shown may be altered or omitted without departing from the spirit of this invention as defined by the following claims.

I claim:—

1. A device of the class described, comprising a valve, a spring normally urging said valve to one position, a fluid pressure motor for shifting said valve to another position, an electric heater for heating the fluid in said motor, a switch for controlling said heater, a second spring of greater strength than the first mentioned spring for normally urging said switch to a closed position, said fluid pressure motor being arranged to actuate said switch to an open position after said valve has been shifted to said other position.

2. A fluid pressure motor, comprising a pair of spaced diaphragms, an expansible fluid held between said diaphragms, separate devices operated by the relative movement of said diaphragms, and unequal springs one of which resists said movement of one of said diaphragms and the other resists said movement of the other diaphragm under the expansive force of said fluid, whereby said devices will be successively actuated during expansion of said fluid.

3. A device of the class described, comprising a valve having an expansion motor, an electric circuit including means for heating and thereby causing the operation of said motor, a switch in said circuit, and a pair of springs opposing the operation of said motor and arranged to offer unequal resistances thereto, one of said springs being connected to operate said valve and the other of said springs being arranged to control the operation of said switch.

4. A device of the class described, comprising an expansion motor, an electric circuit including means for heating and thereby causing the operation of said motor, a pair of springs of unequal strength for resisting the operation of said motor, and separate devices connected to said springs for the purpose of being operated in succession by said motor.

Signed at Chicago this 19th day of July, 1915.

JOHN H. SWAN.