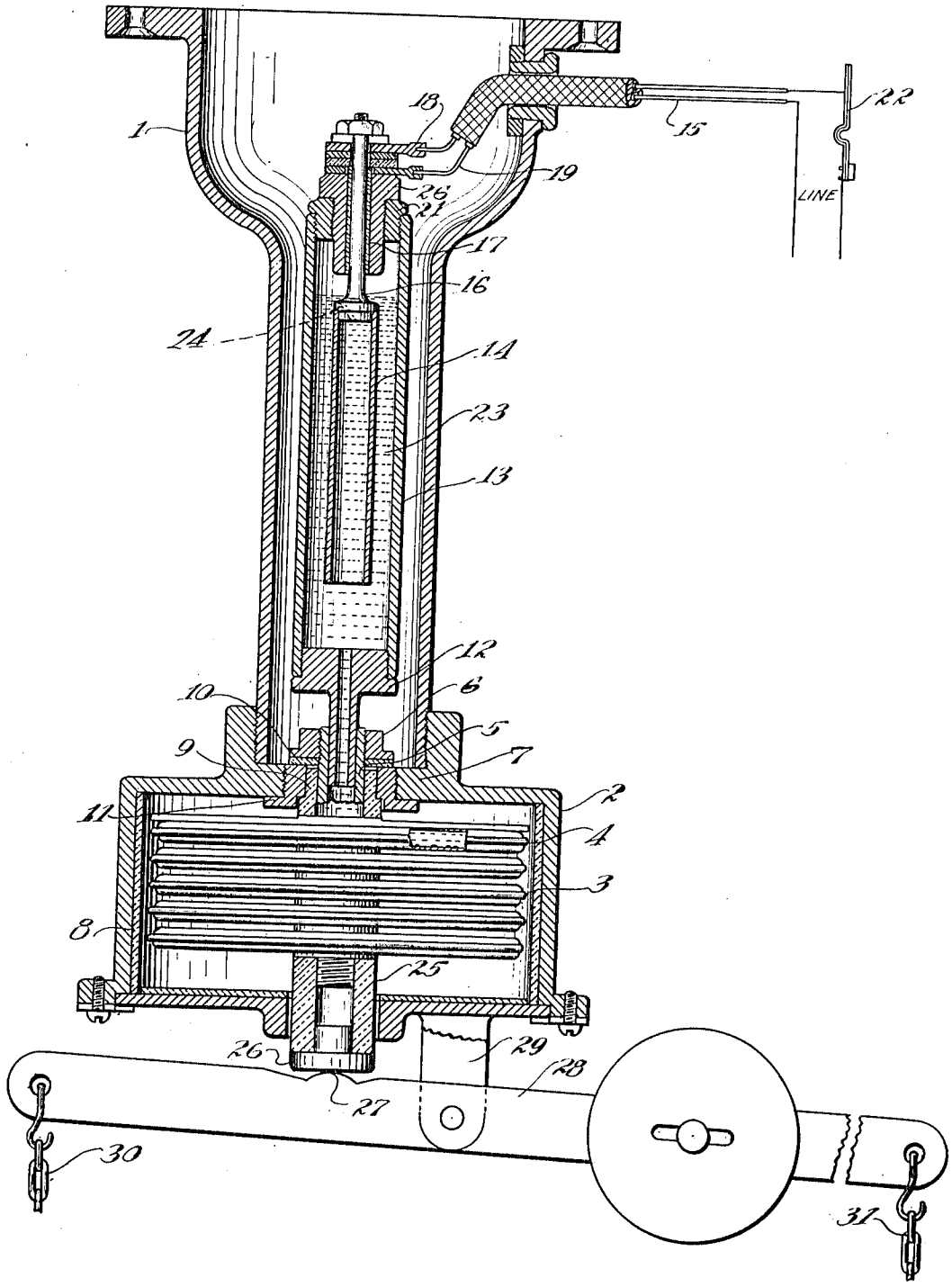
J. H. SWAN.

EXPANSION MOTOR.

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1,314,376.

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WITNESSES:

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JOHN H. SWAN, OF CHICAGO, ILLINOIS.

EXPANSION-MOTOR.

1,314,376. Specification of Letters Patent. Patented Aug. 26, 1919.

Application filed January 5, 1917. Serial No. 140,695.

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 Expansion-Motors, of which the following is a specification.

This invention relates to thermostatically-controlled expansion motors designed particularly for the operation of dampers or valves of heating apparatus, etc.

The main objects of the invention are to provide an electrically operated motor of this type which is quick acting or sensitive to slight changes in temperature therein, and to provide a compact and improved construction for such motors.

The drawing represents a vertical section of an expansion motor constructed according to this invention.

Appliances of the type shown in the drawing are frequently provided with electric heaters from which heat is conducted to an expansible element of the device for the purpose of causing its operation. In the present case the expansible motor itself contains a fluid of low conductivity which serves to generate the required heat on the passage of an electric current through the fluid to cause the expansion of the fluid and consequent operation of the motor. The sensitiveness of the device is increased by normally maintaining the fluid at less than atmospheric pressure under normal temperature conditions. The boiling point of the fluid in this manner may be be lowered to more approximately that of normal atmospheric temperatures or the local temperature under which the device is intended to work, the vapor condensing more rapidly upon a drop in temperature due to the presence of little air to retard the condensing action.

In the preferred construction of the device as shown in the drawing, a cylindrical casing 1 contains the operating devices and at its lower end is formed to provide an enlarged portion 2 for containing an expansion motor 3. The latter preferably comprises a plurality of hollow expansible diaphragm members 4 which communicate with each other at their central portions and are supported by a sleeve 5 which is clamped by a nut 6 to an annular flange 7 extending inwardly from the part 2 of the casing. The casing 2 is lined with insulating material 8 and the sleeve 5 is surrounded by a tube of insulating material 9, and a washer 10 of insulating material separates the nut 6 from flange 7 and a hollow plug 11 which is threaded into the flange. A block 12 having a central aperture extends into the end of tube 5, to which it is secured, and serves to provide communication between the diaphragm motor and the interior of a tube 13 supported on the block 12. Supported at the upper end of tube 13 and extending downwardly in said tube is a smaller tube 14. The tubes 13 and 14 are formed of conducting material preferably carbon and serve as the electrodes or terminals of an electric circuit 15. A rod 16 to which the tube 14 is secured extends upwardly through an insulating sleeve 17 and at its upper end is in electrical contact with conductor 18. The conductor 19 is in electrical connection with the tube 13 through the hollow plugs 26 and 21. The circuit 15 is controlled by a thermostatic device diagrammatically represented at 22.

The motor 3 and tubes 13 and 14 contain a fluid or liquid 23 of relatively low conductivity. A vent 24 drilled through the head of the rod 16 permits the liquid 23 to normally have the same level inside and outside of tube 14. When the circuit 15 is closed, the electric current passes between the tubes 13 and 14, causing the fluid therebetween to become heated and expand and thus operating the motor 3. The latter at its lower end carries a tube 25 of insulating material which extends through the lower end of casing 2 and is provided with a plug 26 for engagement with the curved surface 27 of the damper operating lever 28. The lever 28 is pivoted to a depending arm 29 of casing 2 and is shown as counterweighted, as usual, and having connections 30 and 31 at its ends for operating a plurality of dampers or valves.

The fluid 23 which by its expansion and contraction under temperature changes operates the motor, may be put into the device to advantage in a highly heated state or boiling condition, for the purpose of forming a partial vacuum when it cools or condenses. Then in the normal operation of the device, the diaphragm motor collapses more rapidly upon a drop in temperature, as when the electric circuit is opened by thermostat 22.

The expansion and contraction of the dia-

phragm motor 3 through the attachment 26 serves to oscillate the lever 28 and through it to transmit motion to operated devices in accordance with operations of thermostat 22 in permitting or cutting off a supply of current to electrodes 13 and 14.

Alternating current is preferably employed to avoid any serious deposit on and increased resistance at electrodes 13 and 14.

All of the structure containing the fluid 23 is hermetically sealed from the outer atmosphere, and accordingly, said fluid may have any desired pressure initially at the time of sealing the device, or under normal temperature conditions.

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 valve operating mechanism, comprising a hermetically sealed expansion motor having connections for operating a valve, an expansible fluid in said motor, a pair of electrodes in contact with said fluid, an electric circuit having connections to said electrodes, a switch in said circuit, and thermostatic means for controlling said switch.

2. A device of the class described, comprising an expansion motor, said motor having a tubular extension in communication therewith, a fluid of comparatively low conductivity in said motor and extension, the boiling point of said fluid approximating the normal atmospheric temperatures, and means for causing an electric current to traverse the fluid in said tubular extension for the purpose of heating the fluid and by the expansion of the fluid causing it to operate the motor.

3. A device of the class described, comprising an expansion motor, said motor having a tubular extension in communication therewith, a fluid at less than atmospheric pressure in said motor and extension, and means for causing an electric current to traverse the fluid in said tubular extension for the purpose of heating the fluid and by the expansion of the fluid causing it to operate the motor.

4. In a device of the class described, a pair of tubular conducting members one within the other but insulated and spaced apart, one end of said tubes being closed, a diaphragm motor communicating with the opposite end of said tubes, a fluid within said motor and tubes, and thermostatically controlled means for conducting an electric current to said tubes.

Signed at Chicago this 27th day of Dec., 1916.

JOHN H. SWAN.