(No Model.)

J. E. HOLMES.

TEMPERATURE CONTROLLER.

No. 357,829. Patented Feb. 15, 1887.

Fig. 1.

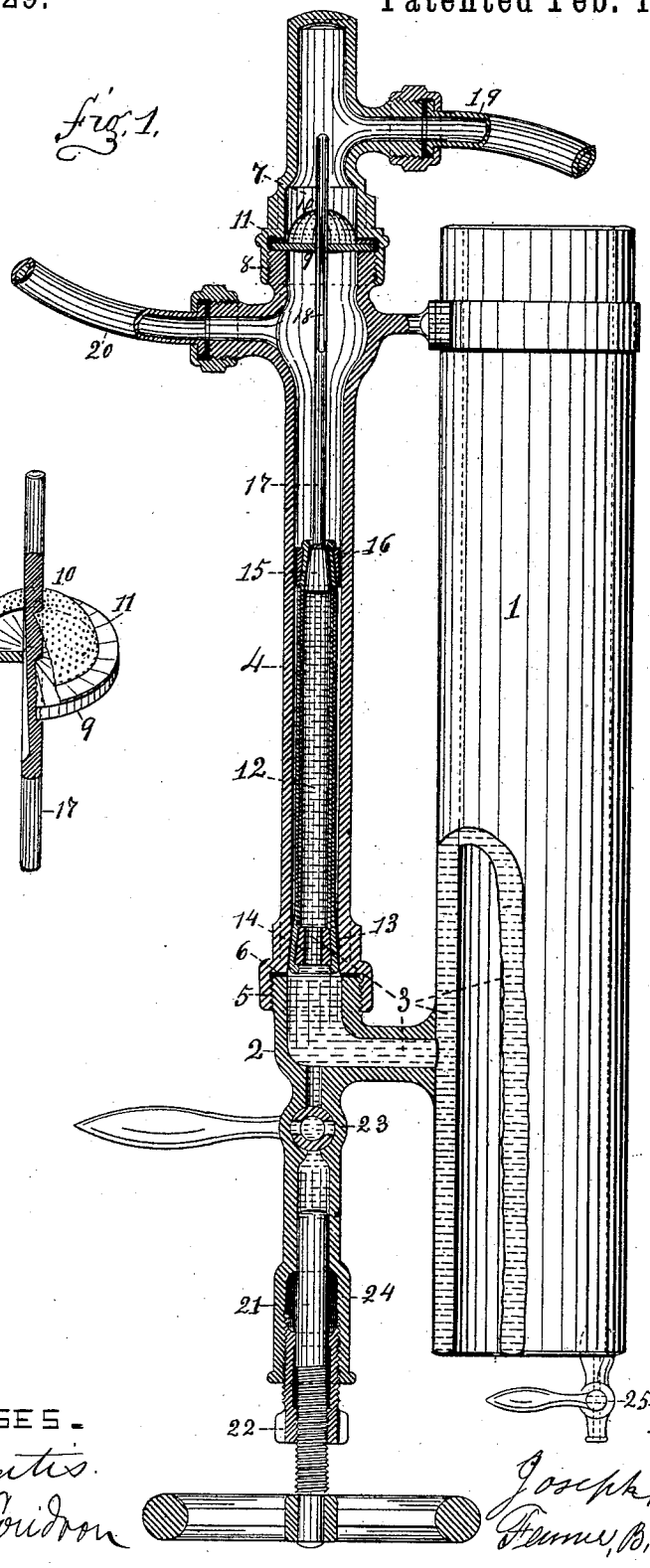


Fig. 2.

WITNESSES.

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JOSEPH ELLICOTT HOLMES, OF WASHINGTON, DISTRICT OF COLUMBIA.

TEMPERATURE-CONTROLLER.

SPECIFICATION forming part of Letters Patent No. 357,829, dated February 15, 1887.

Application filed July 31, 1886. Serial No. 209,711. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH ELLICOTT HOLMES, a citizen of the United States, residing at Washington, in the District of Columbia, have invented certain new and useful Improvements in Thermometric Governors; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to improvements in what I term "thermometric governors," or instruments employed to control and regulate the flow or discharge of liquefied or highly-compressed gases or other fluids for refrigeration or other purposes.

The object of my invention is to secure an automatic action in an instrument, when adjusted to any desired or fixed degree of temperature to be maintained in safes, vaults, or rooms within which such instrument is placed, to be acted upon by the surrounding temperature. This object is attained by the mechanism illustrated in the accompanying drawings, in which similar figures of reference indicate corresponding parts.

Figure 1 in the drawings represents a sectional elevation of my improved instrument, showing its construction and general arrangement, in which 1 is a vessel made of thin metal of good heat-conducting quality, which is closed at both ends, and to be filled with a liquid of high expansive qualities under the influence of heat. It can be made either spiral or annular in form, so as to render it as sensitive as possible to the variations of temperature, and can be employed singly or in manifold form, according to the space to be acted upon.

Fig. 2 is a detailed illustration of the diaphragm and strainer.

2 is a branch attached to the side of the vessel 1, and forms a support and communication between the vessel and the working parts of the instrument. 3 indicates the communication.

4 is the main barrel or piston-chamber, connected at its lower end to the branch 2 by a screw-joint, 5, and packing 6. It is enlarged at its upper end and closed by a chamber, 7, and secured by a screw-joint, 8. In this joint is placed a diaphragm, 9, which divides off this chamber 7 from that in the upper end of the piston-chamber 4. On the top of this diaphragm is placed a hemispherical or cone-shaped strainer, 10, (which is shown in Fig. 2 enlarged,) composed of thin metal or fine wire-cloth struck up into shape, (in forms prepared for the purpose,) and secured in position in the screw-joint 8 by the flanges 11. The perforations or meshes in this strainer must be of the finest character possible to effectually prevent the passage of any foreign substance that may be contained in the gas, and yet of sufficient area to allow of the free passage of the gas under all conditions.

12 is a tubular elastic piston adjusted in the interior of the piston-barrel 4 and slightly less in diameter, said elastic piston being composed of rubber or other elastic gums, in the walls of which are incorporated and embedded small wire or cord closely coiled and extending from end to end to prevent the lateral expansion of the tube, but offering no resistance to its elongation or expansion lengthwise. It is secured at one end in a conical seat, 13, formed in the lower end of the piston-chamber 4, by a hollow conical plug, 14, allowing the interior to be filled with the expansible liquid in connection with the annular cylinder 1. The other end is hermetically sealed by a conical plug, 15, and wedge-ring 16, which is free to move in the valve-chamber 4. Attached to the plug 15 is a valve-rod, 17, extending upward through a closely-fitting orifice in the diaphragm 9 and the strainer 10, and into the receiving-chamber 7 a sufficient distance that by its downward movement it cannot pass out of the strainer and diaphragm. In this piston-rod is formed a groove corresponding in length with the travel of the rod, and graduated in its sectional area from a mere point at its upper end to any desired area at the other. Through this graduated groove the gas, under pressure, is allowed to escape and expand, thereby producing refrigeration, the quantity escaping being controlled by the position of the graduated groove in relation to the diaphragm, which is dependent upon the elongated expansion and contraction of the tubular piston 12, caused by the difference in volume of the expansible liquid at different temperatures.

19 is an inlet-pipe communicating with a

reservoir of compressed gas, and 20 the discharge-pipe, forming a connection with pipes coiled or otherwise arranged in a refrigerating-chamber.

21 is a piston for regulating the position of the graduated groove 18 in relation to the diaphragm 9 after the instrument shall have been filled and connected with the gas-reservoir and refrigerating-chamber. The movement of this piston upward or downward by turning it in the threaded packing-nut 22 produces a corresponding movement in the column of liquid contained in the tubular piston 12, and with it the piston-rod 17 and graduated groove 18. After the desired temperature shall have been secured, it will be automatically maintained at said point in the refrigerating-chamber by the instrument acted on by the surrounding atmosphere.

23 is a stop-cock, which is closed after the instrument is adjusted to prevent leakage.

25 is an air-cock, which is also closed after the instrument has been filled.

To prepare or adjust the instrument for practical use, after being filled it is placed in water reduced to the temperature it is proposed to maintain in the safe or room to be cooled, by adding snow-ice, or ice and salt, until, by a correct thermometer, the said instrument and expansible liquid contained therein is of a proper temperature, when by the regulating-piston 21 the valve-stem is lowered in its seat to the point of the graduated groove, all air having been expelled from the instrument. It is thus prepared for its connection between the holder of liquefied or compressed gas and the expansion-coil in the safe, vault, or room to be refrigerated.

I am aware that instruments have been patented designed for the general purposes above described and for an automatic control of the discharging-valve, which is fully described in a patent granted to me December 8, 1885, No. 332,150, none of which do I broadly claim; but

What I do claim as new and of my invention, and which I desire to secure by Letters Patent, is—

1. In a thermometric governor, a vessel or cylinder made either in a spiral or in annular form, (to contain an expansible liquid,) in combination with the branch 2, the tubular elastic piston 12, having incorporated in its walls and embedded therein wire or fine cord wound spirally from end to end to effectually prevent lateral expansion, but offering no resistance to elongation when acted upon by the pressure of liquids in the interior, the conical seat 13 in the valve-chamber 4, and hollow conical plug 14, by which one end of the tubular piston is secured, the conical plug 15, and wedge-ring 16, by which the other end of the piston is sealed, having free communication between the interior of the piston and annular space in the cylinder or vessel 1, substantially for the purposes set forth.

2. The combination, in a thermometric governor, of an elastic tubular piston, 12, with the valve-rod 17, removable diaphragm 9, and strainer 10, composed of thin finely-perforated metal or fine wire-cloth, substantially for the purposes described.

3. In a thermometric governor, the combination of the tubular elastic piston 12 with the regulating-piston 21, stop-valve 23, and air-escape cock 25, substantially for the purposes described.

4. In a thermometric governor, the combination of the cylinder 1, branch 2, tubular elastic piston 12, diaphragm 9, strainer 10, adjusting-piston 21, stop-valve 23, and air-escape cock 25, substantially as arranged, and for the purposes set forth and described.

In testimony whereof I affix my signature in presence of two witnesses.

JOSEPH ELLICOTT HOLMES.

Witnesses:
HIRAM C. COVERT,
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