No. 851,385. PATENTED APR. 23, 1907.

D. STUART.

REGULATOR.

APPLICATION FILED NOV. 2, 1906.

Fig. 1,

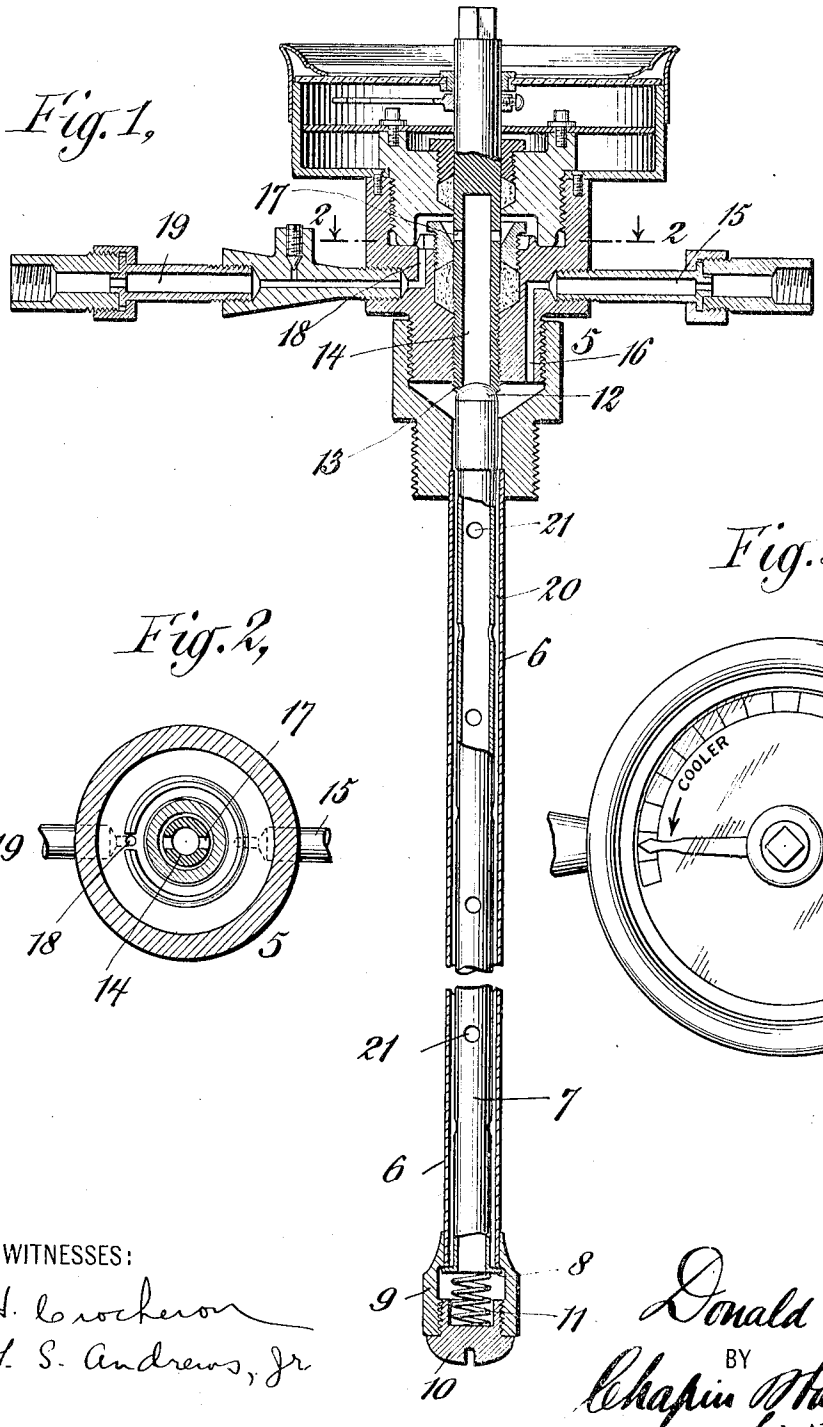


Fig. 2,

Fig. 3,

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REGULATOR.

No. 851,385. Specification of Letters Patent. Patented April 23, 1907.

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To all whom it may concern:

Be it known that I, DONALD STUART, a citizen of the United States of America, and a resident of Rochester, county of Monroe, and State of New York, have invented certain new and useful Improvements in Regulators, of which the following is a specification, reference being had to the accompanying drawings, forming a part thereof.

My invention relates to improvements in regulators, and particularly to thermostatically controlled hot water regulators.

The form of regulator consists generally in valve mechanism having thermostatic members comprising a closed tube which extends into the body of water or other liquid to be regulated, and a longitudinal rod, bar or the like, enclosed therein. These two thermostatic members are in engagement at one end, and at the other end the one carries a valve and the other the valve seat therefor. The said members are composed of materials having different co-efficients of expansion, whereby the relative contraction and expansion between the members will operate the valve. This valve controls supply of motive fluid to the motor of a heat controller, by the operation of which the heat of the water or other fluid, is regulated.

In the form of thermostat to which my invention particularly applies, the outer member, which is the enclosing tube, is the one which is composed of a material having the greater co-efficient of expansion, such material being usually brass, while the inner member is composed of iron, steel, carbon or other material whose co-efficient of expansion is lower. The liquid which acts upon the thermostatic members will, it will be seen, in such a regulator be in direct contact with the outer member, but is prevented from direct contact with the inner member by the fact that said inner member is entirely enclosed within the tube or casing in which the outer member is comprised. Furthermore, these two members are separated by a space, so that one is to a certain extent insulated from the other. I have found that the result of this has been that the inner member has responded to variations of temperature in the surrounding liquid very much more slowly than has the outer member, so that, upon, say, a raise of temperature of the liquid, the outer member has quickly expanded, lifting the valve from its seat enough to cause motive fluid to pass same, yet, when finally the inner member had fully expanded in response to the heat eventually transmitted thereto, such expansion has been enough to again close the valve to its seat, and it has required a still further raise of temperature to lift the valve from its seat and hold it in such lifted position. It will be readily understood that this has caused an uncertainty of operation of the regulator, and, as commercial utility of these regulators depends for many purposes upon very accurate operation, such uncertainty has been a serious defect. To overcome this defect, I have made the inner member of tubular form, and have perforated the walls throughout the length thereof, so that the interior thereof will always be in active communication with the annular space between the two said members. By this means I have found that heat is transferred to the inner member very much more quickly than has been the case heretofore, so much so that the two members expand and contract almost simultaneously, though, of course, to a different extent, each one according to the co-efficient of expansion of the material of which it is composed.

In order that my invention may be fully understood, I will now describe a regulator in which the same is embodied, having reference to the accompanying drawings illustrating same, and will then point out the novel features in claims.

In the drawings: Figure 1 is a view in central vertical longitudinal section through the regulator. Fig. 2 is a view in transverse section therethrough, the plane of section being taken substantially upon the line 2—2 of Fig. 1. Fig. 3 is a top or face view looking toward the dial plate.

The regulator comprises a valve casing 5 to which is secured one end of a longitudinal tube 6, said tube forming the outer member of the thermostat. Disposed within the said tube 6 is another tube 7, said inner tube having a flange 8 at its outer end, which flange rests upon the outer end of the tube 6. A thimble 9, secured to the outer end of the said tube 6 and provided with a cap 10, serves to enclose the ends of the said tubes, and also to enclose a relief spring 11 which extends between the said cap 10 and the outer end of the tube 7. At its inner end the said tube 7 carries a valve 12, which valve is

adapted to engage with a valve seat 13 formed at the end of an adjustable plug 14 mounted in, and carried by, the valve casing 5. Motive fluid is admitted through a connection 15 and passage 16 to one side of the valve 12, said motive fluid being permitted, when the said valve is lifted from its seat, to pass through the hollow plug 14, out through passages 17 in the walls thereof along a passage 18 in the valve casing, and out through a connection 19 which leads to a motor for controlling the means, as will be well understood by those skilled in this art. The motive fluid will, it is seen, have access at all times to the annular space or chamber 20 formed between the members 6 and 7, and, in order to permit free communication between this chamber and the space enclosed by the inner tube 7, I have perforated the walls of the said tube 7 throughout the length thereof, as shown at 21, 21 in the drawings. I have found that, with the thermostatic members thus formed, the heat is quickly transferred to the said inner member 7, whereby the said inner and outer members will expand and contract simultaneously instead of one later than the other, as heretofore, and the regulator is hence not only more sensitive than regulators of this description formerly made, but also far more accurate.

What I claim is:

1. A regulator including a thermostat comprising an outer tube closed to admission of the fluid in which it is immersed and the temperature of which is to be regulated, said tube composed of a material having a relatively high co-efficient of expansion, and an inner tube composed of a material having a relatively low co-efficient of expansion, enclosed within said outer tube, the walls of said inner tube perforated at various points throughout the length thereof, the two said tubes normally connected unyieldingly at one end, and provided at the other end the one with a valve and the other with a valve seat.

2. A regulator including a thermostat having an outer tube closed to admission of the fluid in which it is immersed and the temperature of which is to be regulated, said tube composed of a material having a relatively high co-efficient of expansion, and an inner tube enclosed within the said outer tube and composed of a material having a relatively low co-efficient of expansion, the space within the said inner tube being in free communication with the annular space between said tubes, the two said tubes normally connected together unyieldingly at one end, and provided at the other end the one with a valve and the other with a valve seat.

3. A regulator comprising a casing 5, an outer tube 6, projecting therefrom and composed of a material having a relatively high co-efficient of expansion, said tube closed to admission of the fluid in which it is immersed and the temperature of which is to be regulated, an inner tube 7 composed of a material having a relatively low co-efficient of expansion, connected normally unyieldingly to the outer tube at the end opposite the said casing, the walls of said inner tube perforated at various points throughout the length thereof, a valve 12 carried by said inner tube, and an adjustable valve seat 13 carried by said casing, said casing having means for admitting motive fluid thereto to be controlled by the valve and its seat, said motive fluid having free access to the annular space between the two said tubes and also to the space within the inner tube.

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