

No. 889,355.

PATENTED JUNE 2, 1908.

P. A. BROWN.  
THERMOSTAT.

APPLICATION FILED SEPT. 4, 1906.

2 SHEETS—SHEET 1.

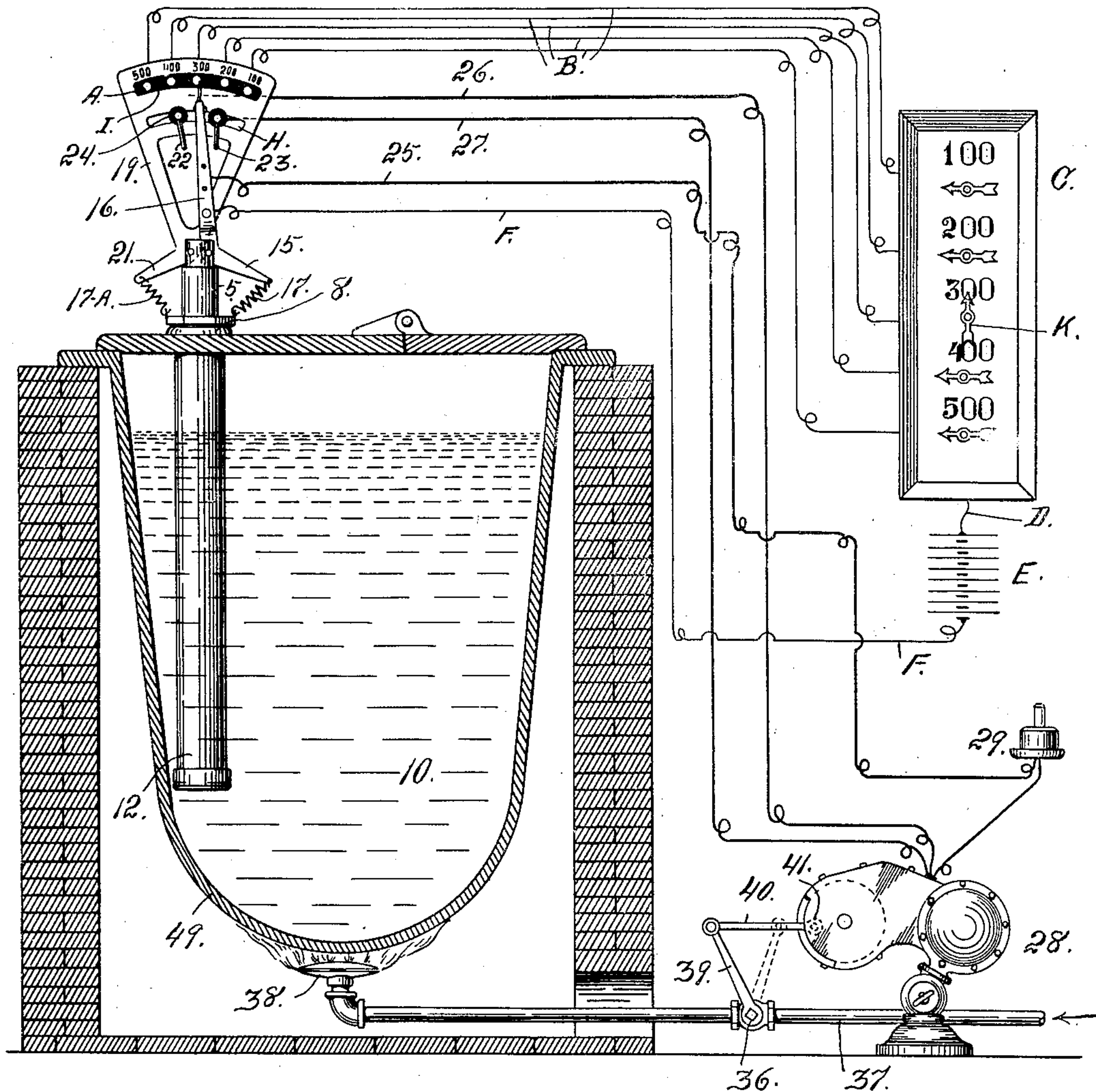


Fig. 1.

Witnesses  
Otto E. Hoddick  
Dena Nelson

P. A. Brown.  
Inventor  
By, *A. J. Men*  
Attorney

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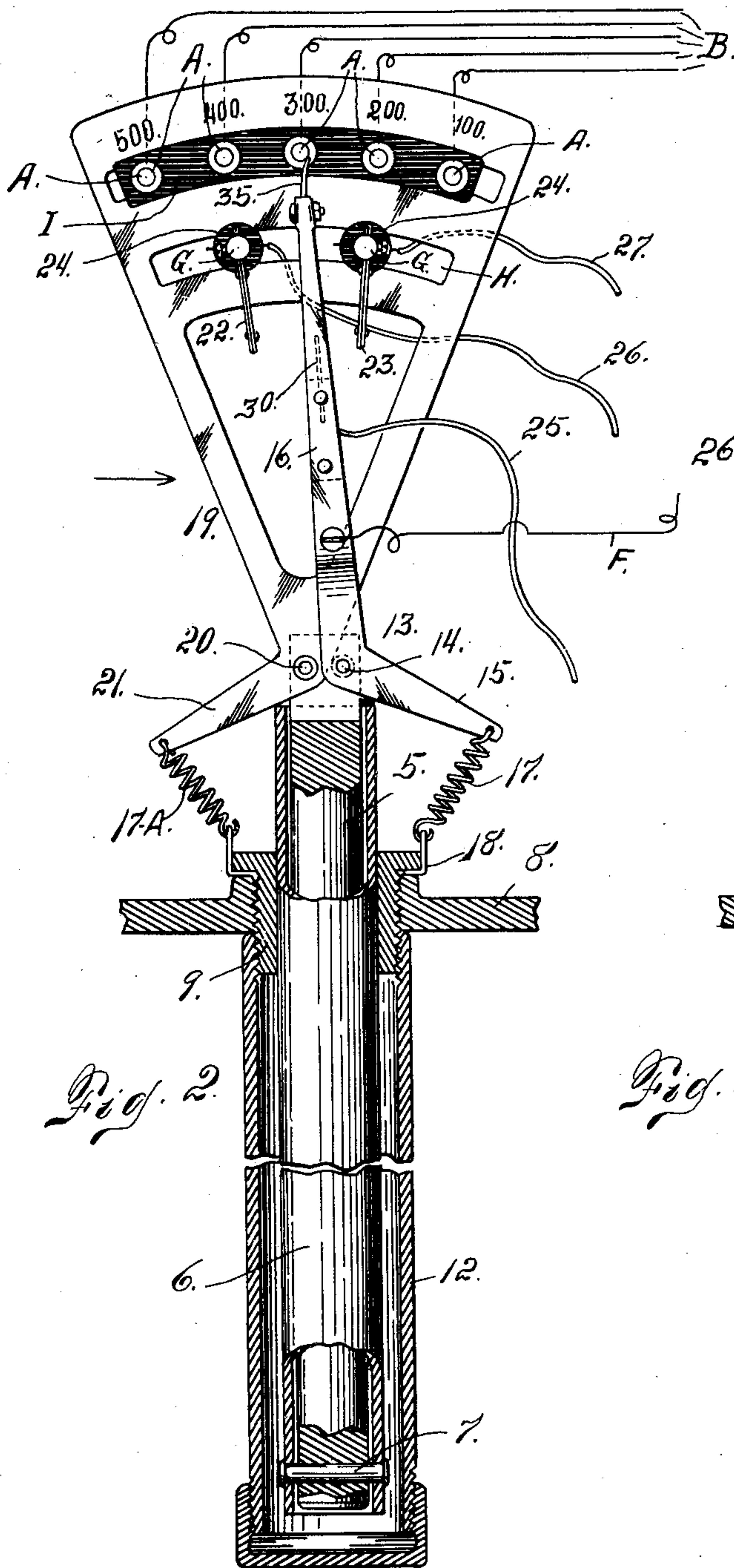


Fig. 2.

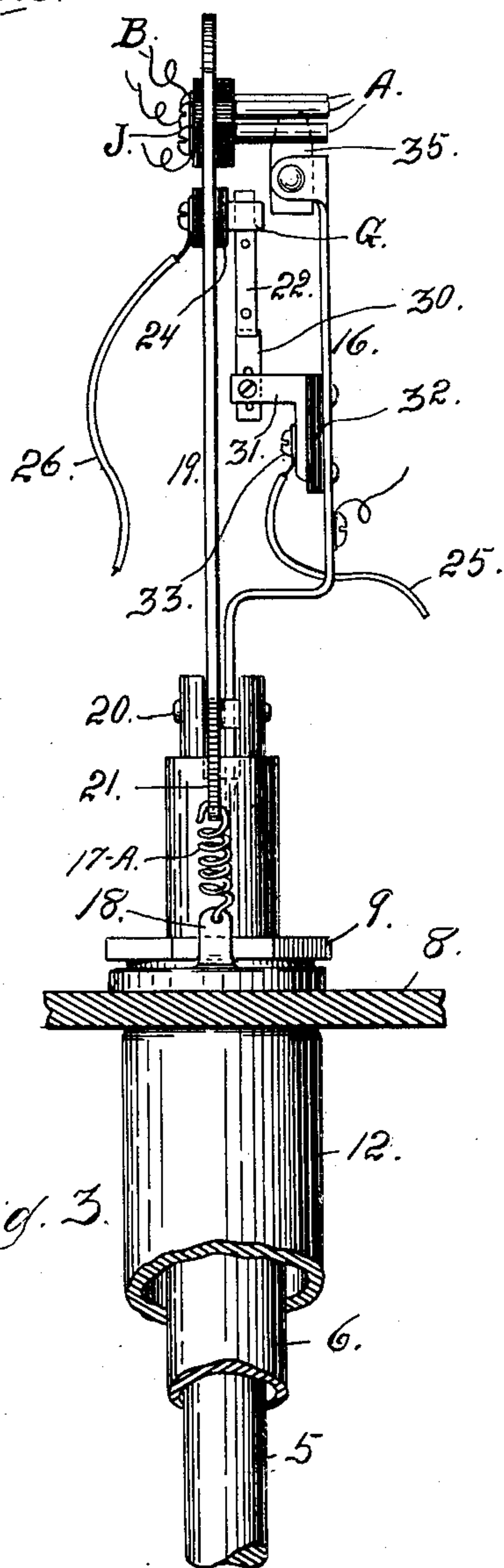


Fig. 3.

Witnesses  
Otto E. Hoddick.  
Dena Nelson.

P. A. Brown.  
Inventor  
By, *Alb. Brown*  
Attorney



# UNITED STATES PATENT OFFICE.

PEABODY A. BROWN, OF DENVER, COLORADO.

## THERMOSTAT.

No. 889,355.

Specification of Letters Patent.

Patented June 2, 1908.

Application filed September 4, 1906. Serial No. 333,044.

*To all whom it may concern:*

Be it known that I, PEABODY A. BROWN, a citizen of the United States, residing at the city and county of Denver and State of Colorado, have invented certain new and useful Improvements in Thermostats; and I do declare the following to be a full, clear, and exact description of the invention, such as it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

My invention relates to improvements in thermostats, my object being more especially to provide a thermostat adapted for use in regulating high temperatures.

This device while capable of use in many different relations is peculiarly adapted for regulating the temperature of liquids as molten metal, water in a boiler or fluids of any kind more especially where the fluid is confined within a closed receptacle. An annunciator may be used in connection with the thermostat, whereby the temperature in the vicinity of the body of the instrument may be indicated at any desired location as in the office of the plant which may be any desired distance away from the material whose temperature is to be regulated.

Having briefly outlined the function of my improved device, I will proceed to describe the same in detail reference being made to the accompanying drawing in which is illustrated an embodiment thereof.

In this drawing, Figure 1 is a view showing my improved thermostat in elevation and in connection with a receptacle containing liquid, presumably molten metal, the said receptacle and its surrounding casing being shown in section. Fig. 2 is a detail view of the thermostat shown on a larger scale and partially in section. Fig. 3 is a view partly broken away looking in the direction of the arrow in Fig. 2.

The same reference characters indicate the same parts in all the views.

Let the numeral 5 designate a rod and 6 a tube surrounding the rod, the two parts being connected together at the bottom by a pin 7. The two elements 5 and 6 are composed of different substances, that is to say substances possessing the properties of expansion and contraction in unequal degrees. For the purposes of this specification it may

be assumed that the element 5 is composed of iron and the element 6 of brass, the latter being more readily expansible or more sensitive to changes of temperature than the iron. These two elements may be mounted on a stationary support 8 in any suitable manner. As shown in the drawing the tube is fitted into a sleeve 9, the latter being screwed into a plate 8 which may be the top of a pot containing molten metal 10 (see Fig. 1). When the device is used in connection with molten metal or other liquid or fluid whose action would have a tendency to destroy, injure or corrode the brass tube 6, the latter should be surrounded by an outer tube or sheath 12 adapted to protect the softer metal part within. Where the device is used in connection with molten metal, it will be sufficiently sensitive even when surrounded with the outer sheath 12 for all practical purposes.

Upon the upper or outer extremity of the rod 5, is pivotally mounted an indicator 13 which as shown in the drawing has the shape of a bell crank lever fulcrumed at 14 and having two arms 15 and 16, respectively. To the outer extremity of the arm 15 is connected one extremity of a coil spring 17 whose opposite extremity is connected with the stationary support as shown at 18. Also pivotally mounted upon the upper extremity of the rod 5, is a segmental plate 19 the same being pivoted as shown at 20 and provided with a lever arm 21 connected with the stationary support by a spring 17<sup>A</sup>. The two springs 17 and 17<sup>A</sup> are substantially similar, while the lever arms 15 and 21 are similarly arranged and both adapted to rest upon the upper extremity of the tube 6. When the temperatures vary in the vicinity of the instrument, the tube 6 will expand or contract as the case may be to a greater degree than the rod 5. This variation in expansion or contraction, will result in a greater movement relatively of the tube 6 than of the rod 5, whereby the two elements 13 and 19 will be actuated. In case of expansion, the upper extremity of the tube 6 will act upon the two arms 15 and 21 of the instrument, and move the element 13 toward the left and the element 19 toward the right or in the opposite direction.

Upon the upper part of the segment 19, are located two metal contacts 22 and 23, the said contacts being insulated from the body of the plate as shown at 24. Between these two contacts is located a contact 30



mounted on an angle plate 31 carried by the arm 16 but insulated therefrom as shown at 32. The arm 16 is provided at its upper extremity with a flexible contact 35 which acts upon the pins A, electrically connected with an annunciator as hereinafter explained. The contact 30 lies in the path of the contacts 22 and 23 and serves to make and break the motor circuit as hereinafter explained. To the angle plate 31 leads an electrical conductor 25, while the contacts 22 and 23 are connected with conductors 26 and 27 respectively. The conductor 25 leads to a binding screw 33 whereby electrical connection is made with the part 31 and from it to the contact 30. These conductors 25, 26 and 27 are connected with a motor 28, a plug 29 being interposed for the purpose of connecting the instrument with a light or other circuit.

The upper extremity of the segmental member 19 is provided with a series of contact pins A from which lead a series of wires B to a self restoring annunciator C through which the circuit is completed by way of a conductor D and a source of electricity E. From the opposite pole of the battery a conductor F leads to the arm 16 of the lever 13, the circuit being completed through the metal brush 35 and the pins A to the annunciator as heretofore indicated.

The contacts 22 and 23 are mounted on pins G which are adjustable in a slot H formed in the segmental plate 19 whereby the movement of the contact 30 and consequently the arm 16, necessary to close the circuit, in either direction, may be regulated at will.

The pins A are mounted in insulating material I whereby the pins are insulated from each other. The wires B are connected with the pins by means of binding screws J.

As shown in the drawing (see Fig. 1) when the circuit is completed through the motor 28 and the latter is set in motion, a valve 36 is actuated. As shown in the drawing this valve controls the passage of gas through a pipe 37 and terminating at one extremity in a burner 38 located underneath the pot 49 containing the molten metal or other liquid or mobile mass whose temperature is to be regulated. Connected with this valve 36 is an arm 39 to whose outer extremity is attached a connecting rod 40 attached to the motor in operative relation as shown at 41.

The apparatus is so constructed, that if we assume that the tube 6 expands and acts on the arms 15 and 21, whereby the elements 13 and 9 are actuated as heretofore explained, the contact 22 and the contact 30 will be made to approach each other, and when these contacts engage, the circuit will be completed through the motor and the valve 36 will be actuated to shut off the gas or diminish the supply as may be desired. At the same time the contact 35 will engage a

pin A corresponding with one of the temperatures indicated by the figures on the upper part of the segmental plate, and the circuit closed through a self-restoring annunciator whereby the temperature of the metal in the pot will be indicated on the annunciator by the change in the position of one of its pointers K. It may be assumed, when the contacts 22 and 23 are adjusted as shown in the drawing, that when the motor circuit is closed by virtue of the expansion of the tube 6, that the contact 35 will engage the pin A corresponding with the four hundred degree mark on the segmental plate, thus indicating on the annunciator that the temperature of the metal in the pot is four hundred degrees. Now the gas or source of fuel supply having been shut off or diminished, as soon as the temperature of the contents of the pot becomes slightly lowered, the tube 6 will contract, sufficiently to allow the elements 13 and 19 acting under the influence of their springs 17 and 17<sup>A</sup>, to move in the opposite direction, or in a direction to separate the contact 30 from the contact 22, and cause the contact 30 and the contact 23 to approach each other until they are in contact, in which event the circuit will be again closed through the motor, and the valve 36 actuated to turn on the gas or fuel supply. The motor may be of any desired construction, and so regulated that as soon as the valve has been closed or opened by the movement of the motor as the case may be, the current will be automatically cut off through the motor whereby further movement will be prevented until there is another change in the elements of the thermostat. It is not thought necessary to go into the details of the construction whereby this is accomplished, since it is old and well known in connection with the use of thermostats for regulating the dampers of furnaces, and valves for various uses.

In case gas is used for fuel which it is assumed is the case, in the construction shown in Fig. 1, and assuming further that the gas is entirely shut off by the movement of the valve 36, in order to make the device automatic, there should of course be a pilot light connected with the apparatus whereby as soon as the gas is turned on it will be automatically lighted. This is another detail construction which it has been thought unnecessary to illustrate in this connection.

In case the instrument is used without the outer sheath 12, it would be necessary or at least highly desirable to have the lower extremity of the tube 6 closed, in order to prevent the surrounding liquid from passing into the said tube.

Having thus described my invention, what I claim is:

1. A thermostat comprising an element composed of two substances possessing the



properties of expansion and contraction in unequal degrees, an electrical circuit, two movable devices carrying contacts located in the circuit, the said devices being arranged to  
5 be simultaneously acted on by one of the substances to cause the said devices to move whereby their contacts are made to approach each other for the purpose of closing the circuit.

10 2. A thermostat comprising an element composed of two substances possessing the qualities of expansion and contraction in unequal degrees, an electrical circuit, two  
15 movable devices carrying contacts located in the circuit, the said devices being arranged to be simultaneously acted on by one of the said substances to impart to the said devices a given movement whereby their contacts are  
20 made to approach each other for the purpose of closing the circuit, and springs connected with the said devices and under tension to give them an opposite movement when opposite thermal conditions exist.

3. The combination with a stationary sup-

port and two electrical circuits, of an element 25 composed of a tube and a rod surrounded thereby, the parts being connected and the rod protruding from the tube, two devices pivotally mounted on the protruding ex-  
30 tremity of the rod, one of the said devices carrying contacts located in the respective circuits, and the other of the said devices carrying a contact connected to be placed in  
35 either circuit according to thermal conditions, springs connecting the said devices with the stationary support and under tension to give them a certain movement, the  
said tube forming a stop to limit the move-  
40 ment of the devices under the influence of the springs, and also serving to act on the said devices to give them an opposite movement.

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

PEABODY A. BROWN

Witnesses:

DENA NELSON,  
A. J. O'BRIEN.