

July 7, 1925.

1,544,549

S. G. BARNETT

THERMOSTATIC INSTRUMENT

Filed April 14, 1922

Fig. 1.

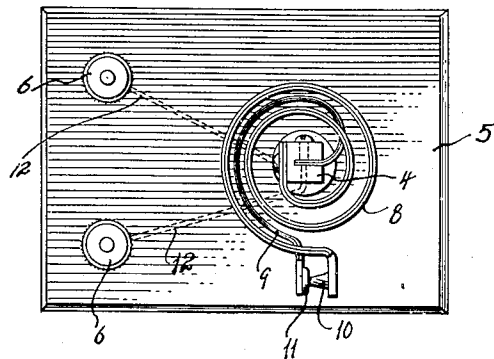
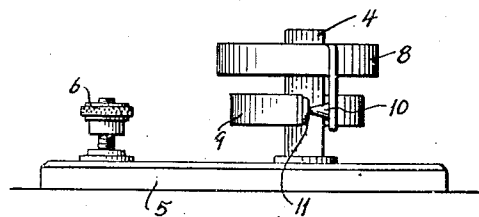


Fig. 2.



Inventor

Stockton G. Barnett

By *his* Attorney

Chas. F. Wane

UNITED STATES PATENT OFFICE.

STOCKTON G. BARNETT, OF NEW YORK, N. Y.

THERMOSTATIC INSTRUMENT.

Application filed April 14, 1922. Serial No. 552,637.

To all whom it may concern:

Be it known that I, STOCKTON G. BARNETT, a citizen of the United States, residing at No. 63 Morningside Avenue, New York, county and State of New York, have invented certain new and useful Improvements in Thermostatic Instruments; 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.

This invention relates to thermostats, and more particularly to improvements in compensating thermostats useful in detecting rapid temperature variations.

Primarily, the object is to produce apparatus generally useful in fire alarm systems, and useful even in fire extinguishing or sprinkler systems; and more particularly it is an object to produce a compensating temperature detector which uniformly functions to sound a fire alarm in all temperatures whether warm or cold, and which similarly appropriately functions to sound an alarm even though the daily or seasonable weather temperature conditions may rapidly change.

It is common practice to use a bimetallic heat sensitive element, commonly known as a thermostatic bar, to perform a variety of purposes, as for example to detect a temperature change; and this was a comparatively simple undertaking where it was sought only to detect or catch any predetermined fixed point of temperature because the thermostatic bar deflected as the temperature increased and broke or made contact on an electrical alarm or signal circuit. The development of this art was quickly impeded as it was conceived, due to the unfailing capacity of the thermostat to untimely produce false signals or alarms when subjected to seasonal increases in temperature, or other comparatively slow temperature increases due to industrial conditions or heating systems. By adjusting the thermostat to operate at a high temperature, this difficulty was overcome, but such adjustment introduced a fatal delay as to actual fires, because the fire gained headway before the thermostat functioned. Practically the whole value in protection from damage by fire is in the ability of a fire device or system to operate its alarm while the fire is in

its incipient stage; and my improved thermostat performs this object.

On the other hand, fixed temperature thermostats, as known in the art, when set to give a quick alarm of fire so as to detect the fire in its incipient stage, will necessarily give false alarms and particularly so when the thermostat and alarm system is used in the wintertime in unheated buildings, for in such a situation there necessarily arises seasonable and weather temperature changes to which the old fixed type thermostat cannot adapt itself, with the result that when such seasonable temperature changes occur the alarm prematurely sounds. The old devices thus have characteristics which make them either too slow to be efficient or too fast for service, and therefore, presently known thermostats are so erratic that they are not useful in fire alarm systems.

Inventors and engineers have long sought to so construct and combine thermostatic parts as will cause the device to quickly produce an alarm or signal upon sudden temperature variations, such as are caused by fire; and which at the same time will dependably follow-up daily and seasonable temperature and weather fluctuations yet steadfastly remain inert, without alarming; and to accomplish this purpose is to provide a successful fire thermostatic detector capable of valuable use in fire alarm systems, and until such is attained thermostats cannot be successfully used in fire control and alarm systems.

It was known that a compensating thermostat would be useful in this new field of endeavor; and by "thermostatic compensation" is meant the ability of a thermostat to move up or down, follow-up so to speak, all slow temperature changes, known as weather or seasonal changes, without opening or closing a circuit, where at the same time it will produce an alarm if a quick temperature change occurs. Engineers and inventors have, it appears, correct theoretical knowledge of what apparatus is needed to carry out the purposes in view, but however such physical apparatus has not been forthcoming, because no one as yet has produced a thermostat which will adapt itself to weather and season temperature fluctuations without at the same time producing a false alarm,

and which will, conversely, produce an alarm without compensating. Apparatus has of course been produced and tried, but found missing in the one particular if sufficient in the other.

The object of my invention is to produce a compensating thermostatic circuit closer or a temperature detector which embodies such improvements in design, arrangement, and construction of parts as will enable it to dependably compensate and follow-up all daily, weather, and seasonable temperature changes, and at the same time remain in such a state of readiness that a quick temperature variation, as for example one caused by fire, will nearly instantly cause the device to alarm.

An additional object of my invention is to so improve upon the Maxim Patent 578,345 that I am able to produce a thermal circuit closer or temperature detector which employs thermostatic bars of unequal sizes, but nevertheless will dependably compensate and actually perform that desirable purpose which others have sought to accomplish.

The accompanying drawings illustrate one embodiment of my invention, and though there is described a preferred form of construction and arrangement of parts, I claim the right of protection as to such changes as obviously come within the scope of my invention.

In the drawings, Figure 1 illustrates a plan view of the compensating thermostatic temperature detector; and Figure 2 shows a side view thereof.

Referring now more particularly to the drawings for a detailed description of the invention there is shown a post 4 made of insulating material supported on a base 5; and the base has terminal posts 6 by which this instrument is connected into an electrical fire alarm or sprinkler circuit.

A spirally formed thermostatic element 8 has its inner end anchored to the post and its outer free end left unobstructed to travel substantially concentric to the post; and another thermostatic element 9 has one end anchored to the post and its other end arranged movable near the free extremity of the first named thermostatic bar. One of the bars, in this instance 8, has a down turned end so as to bring its contact part 10 in alignment with the contact head 11 of the other bar, and in this arrangement the contact points 10 and 11 are arranged in close relation. Each binding post 6 is connected through a wire or bar 12 with the respective thermostatic parts so that the instrument can be connected into an electric circuit and act as a switch to hold said circuit open during the time the contact points 10 and 11 are held in spaced relation.

An important feature of this invention resides in the definite size and predetermined relation existing between both the linear dimension and the thickness dimension of the two parts where the breadth of the parts preferably remain constant. The two heat sensitive elements 8 and 9 are constructed of bimetallic stock equal in breadth or width. But, however, the element 8, being the longer one, is made of heavier material, that is to say, it is made of stock somewhat thicker in cross section than the part 9. The fact that the longer part is made of heavier stock or material gives it the characteristic of slowly acquiring the temperature of the surrounding atmosphere, and consequently this bar acts and deflects comparatively slowly in movement.

The thermostatic bar 9, being shorter in length than the other bar, is made comparatively light in cross section, and is much thinner than the other bar; and this construction provides the shorter bar with a capacity for very rapidly attaining the temperature of the surrounding medium of air which causes it to be quickly effected by quick temperature changes such as would be caused by fire thereby causing the bar 9 to rapidly deflect when subjected to the quick temperature variations.

It is desirable to make one bar of heavier stock than the other in order that when the temperature quickly rises due to a fire, the quick acting element 9 may move its head 11 away from the point 10 on the bar 8 and thereby open the circuit, for it is readily seen that in case both bars were made of light material, they would both deflect with the same celerity, and the purpose of this instrument would be defeated. Then again, it is found, when a gradual temperature variation such as may occur from day to day in season, that a light and heavy thermostatic bar will gradually, at about the same rate of absorption, attain or acquire the same temperature as the surrounding atmosphere so that both bars will be stimulated and become equally active at substantially the same time when effected by this gradual temperature change. This last described characteristic is necessary if the instrument is to be successful, because possessed of this characteristic, the instrument will compensate, follow-up, or adjust itself to the slow temperature variations, and at the same time will not erratically open the circuit, or, in case of open circuit instruments, will not erratically close the circuit.

Now inasmuch as it is found necessary to make one of the bars of thin light stock in order to detect fires as above described, and inasmuch as it is essential that the two bars deflect equally in rate of travel during slow

temperature changes, it then becomes necessary to construct the two bars with a definitely related differential length and thickness ratio; and by extended study and experimentation it is found that if a thin bar 9 is made somewhat shorter than a heavy bar 8, and if the said long bar 8 is made considerably thicker than the said thin bar 9, that the resulting performance of the instrument, as respects slow gradual temperature changes, is of such character that both contact points 10 and 11 travel at substantially the same rate of speed and through substantially the same distance for unit slow gradual temperature variations.

In the actual construction of this compensating thermostat and in order to enable one to practice the invention, I make, in some types of the device, one part substantially six inches (6") long and fifty thousandths inches (.050") thick; and for the other part, I make it one and eight tenths inches (1.8") long and fifteen thousandths inches (.015") thick, or some such appropriate length and thickness as will bear equivalent ratio to these figures.

It is also to be noted that the accompanying drawings show a closed circuit instrument, but an open circuit instrument can just as successfully be produced by following the plan of my invention.

Therefore an instrument built in accordance with the plans of this invention is capable of quickly detecting fire temperature, and in addition thereto, is capable of compensating or following-up the gradual daily or seasonable temperature variations without causing the circuit to sound an alarm.

Having thus described the invention, what I claim is:

1. A compensating thermostat comprising two bimetallic heat sensitive parts adapted to open or close a circuit by deflection, the parts having substantially an unequal length ratio of six inches (6") to one and eight-tenth inches (1.8"), and having an unequal thickness ratio of fifty thousandths inches (.050") to fifteen thousandths inches (.015") whereby both parts deflect substantially equally when influenced by slow temperature variations and unequally when influenced by sudden temperature rises, and electrical contacts operated by the parts.

2. A compensating thermostatic quick change temperature detector comprising bi-

metallic heat sensitive elements having unequal length ratio and unequal thickness ratio, contact points carried thereon, said ratios causing the rate of travel of the longer element to substantially equal and compensate to that of the shorter element when subjected to gradual temperature changes thereby rendering inoperative the contacts, said ratios causing the rate of travel of the shorter one to be more rapid than the longer one when subjected to a rapid temperature variation thereby rendering the contacts operable.

3. A compensating thermostat quick change temperature detector having a long spiral bimetallic part, a contact head made on the end thereof, a short spiral bimetallic part, a contact head on the end thereof, said long and short spirals being disposed in parallel planes, said long spiral made of thicker stock than short spiral whereby it compensates to and attains the same rate of travel as the short spiral when a slow gradual temperature variation occurs and does not when a quick temperature variation occurs.

4. A compensating thermostat quick change detector comprising heat sensitive bimetallic parts, contacts carried thereon, the comparative structure of the bimetallic parts being such that one part is made of light weight thin stock to impart thereto a high rate of temperature absorption to cause this part to quickly deflect at high speed when subjected to quick temperature changes thus operating the contacts, and said light weight thin part being constructed relatively short in length to cause it to substantially equal and compensate in speed to that of the other part when subjected to slow temperature variations thereby not operating aforesaid contacts, the said other bimetallic part being constructed of thick heavy stock to impart thereto a slow rate of temperature absorption whereby it lags or deflects slowly in speed when subjected to quick temperature changes thus contributing to the aforesaid operation of the contacts, said thick heavy part being made of substantial length to enable it to deflect equally in speed to that of the first named part when subjected to slow temperature changes thus aiding in maintaining the aforesaid inoperativeness of the contacts.

In testimony whereof I affix my signature.

STOCKTON G. BARNETT.