

W. P. ALLEN.
ELECTRICAL THERMOSTAT.
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1,000,482.

Patented Aug. 15, 1911.

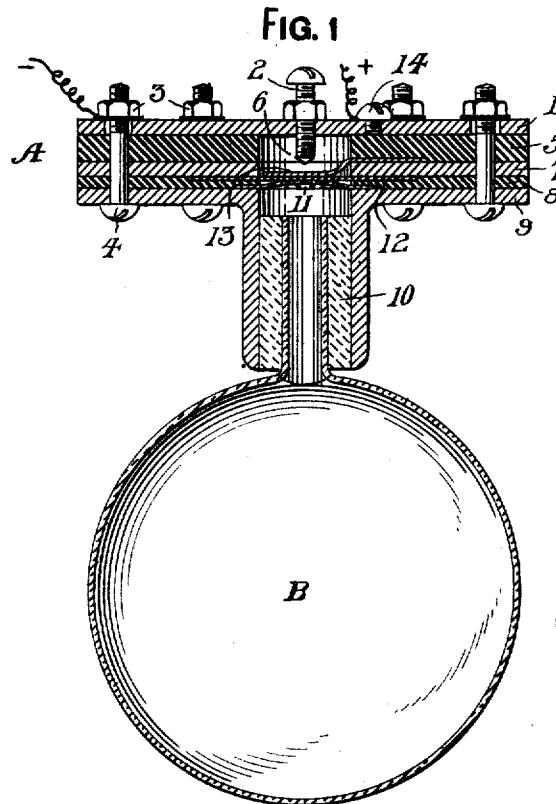


FIG. 3



FIG. 4

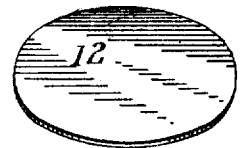
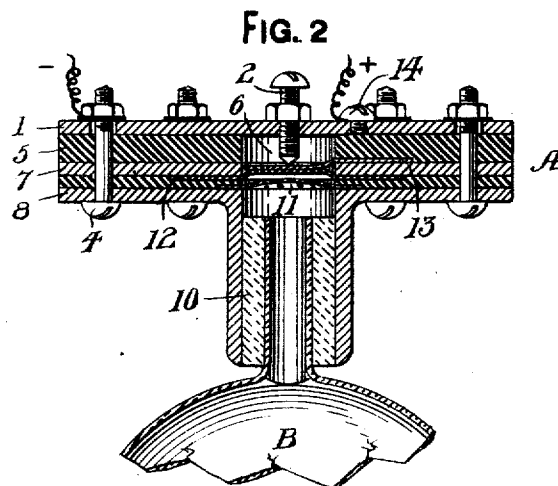
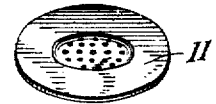


FIG. 5



WITNESSES

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ELECTRICAL THERMOSTAT.

1,000,482.

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To all whom it may concern:

Be it known that I, WILLIAM P. ALLEN, a citizen of the United States, and resident of Moon township, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Electrical Thermostats, of which the following is a specification.

My invention has for its primary object the provision of a thermostat to be in circuit with suitable electrical energy, and adapted to give notice of any sudden changes in temperature, due principally to the breaking out of fire, by causing an alarm to be automatically sounded, or a signal light to be shown.

The device hereinafter specifically described, and shown in the accompanying drawing, is illustrative of one form, and when suitably positioned, preferably in the highest part of a room, loft, or cellar, and connected electrically in a well known manner to a battery, or other source of energy, will quickly respond to any marked rise of temperature.

The fundamental feature of my invention consists in the utilization of expansion of a confined body of air, inclosed in a comparatively thin envelop, acting against a smaller and cooler body of non-expanding confined air, to automatically operate a nonmetallic diaphragm, thereby lifting a suitable metallic contact member, completing the normally broken circuit and sounding an alarm or giving other due notice of impending danger from breaking out of fire.

The device will be self adjusting under ordinary or normal conditions of atmosphere or barometric changes, and is therefore capable of great sensitiveness in responding to sudden rises of temperature.

My invention further has for its object the novel constructive features shown in the accompanying drawing, in which:

Figure 1 is a vertical section of the assembled device in somewhat enlarged formation in order to more clearly show the relative positions of the movable parts, with the circuit broken: Fig. 2 is a fragmental sectional view, also somewhat enlarged, of the head of the device, showing the circuit closed: Fig. 3 is a detail view of a thin metallic contacting member: Fig. 4 is a similar view of a non-metallic diaphragm, and Fig. 5 a perforated centrally concaved disk made of any suitable material.

The head portion of the device, which houses the movable parts, designated generally by the capital letter A, is made up in a laminated formation, and involves alternating metallic and non-metallic or insulating disks suitably held together, also a depending neck portion for receiving and retaining the globular body B.

The top metal disk of the said head portion, designated by the numeral 1, is connected to one pole of the battery, not shown, and carries the centrally disposed regulating screw 2, also provides a seat for the insulated securing nuts 3—3, engaging the threaded bolts 4—4, which latter members do not engage with said disk but have sufficient clearance, as shown.

Under the disk 1 is an insulating member 5 having a central aperture 6, and immediately below said member 5 is a metallic disk 7, which also has a central opening registering with the aperture 6; the two apertures forming the upper air chamber. Following the said disk 7 comes another insulating disk 8, and immediately below another metallic disk 9. This latter member is provided with a centrally-disposed hollow neck portion 10, which receives and retains, by any suitable means, but preferably the cementing means shown, the upper reduced neck of the globular member B. Positioned directly over the mouth of the said neck portion, and confined between the disks 8 and 9, is a perforated plate 11, shown in Fig. 5, which may be of any desired material, the central portion of which is preferably made with a slight concavity. Normally seated on top of the said member 11, and in engagement therewith, is an elastic diaphragm 12, shown in Fig. 4, preferably made of soft yielding rubber, which member is confined between the disks 7 and 8. A metallic contact piece 13, shown in Fig. 3, seated between the disks 5 and 7, and engaging the said diaphragm, completes the principal detailed construction of my invention.

Commencing with the metallic disk 7, and including the securing bolts 4, all the construction below the disk 5 is on one side of the electric circuit, being connected to one pole of the battery, the plate 1, which forms the connection with the opposite side of the circuit, being insulated from the remaining part before mentioned, and connected to the opposite pole of said battery, not shown

however, but indicated by wires running from one of the posts 4, and from a set screw 14.

In order to complete the normally broken circuit, in which case the respective parts are in the positions shown in Fig. 1, it becomes necessary to bring the member 13 into contact with the adjustable set screw 2, and this is accomplished in the following manner: The member B being air tight, and composed of a thin material, preferably glass, is first affected by any sudden rise of temperature, which will cause the air confined in said globe B to expand in proportion to the rapidity of the change in temperature of the surrounding atmosphere. This suddenly expanded confined air acts immediately to force up the thin elastic diaphragm 12, and by so doing lifts the contact piece 13 into engagement with the lower end of the screw 2, as shown in Fig. 2, when the electric circuit will be completed, and the alarm or signal light, not shown, which will be in circuit with the battery and thermostat, sounded or flashed, as the case might be. The air confined in the smaller upper chamber 6, above the diaphragm 12, is not affected by sudden changes of temperature, owing to the surrounding materials which protect said chamber, and keep the air therein comparatively cool, hence when the air surrounding the thermostat becomes suddenly heated, the air confined in the thin globe B readily expands in sympathy, and meeting with no counter resistance or expansion from the air confined in the small upper chamber, a pressure sufficient to move the diaphragm upward and raise the contact 13 naturally follows.

A feature of my invention, which materially affects its sensitive nature, is the comparatively small area involved in the diaphragm that is exposed to the action of the expanded air, a very slight expansion from below, and concentrated on the diaphragm, being sufficient to raise said member 12.

The contact 13 will be constructed of a very thin material, such as copper foil, and will therefore offer practically no resistance to the upward movement of said diaphragm.

Any required sensitiveness can be secured by the adjustable screw 2, the closer its lower contact point is brought to the contact 13 the less distance the diaphragm will have to be raised before the electric circuit is completed. In this manner I am enabled to set the device so that a very slight sudden rise in temperature will be sufficient to give the required signal of the breaking out of fire.

By use of the perforated member 11 it is possible to derive a more even distribution of the expanded air in order to exert a lifting pressure against the diaphragm 12,

said expanded air being deflected by the perforated formation of the member 11.

The device here shown and described is moreover capable of self-adjustment under normal conditions and barometric changes of atmospheric pressure, from the fact that the temperature of the air confined in both the large globular body B and small upper chamber 6 will be approximately equalized during the gradual fluctuation of the surrounding atmosphere. The device will therefore be operative only in the event of a sudden and spontaneous rise in the temperature, due principally to the breaking out of fire, in which case the air in the thinly constructed body B will first become affected, and will expand rapidly in proportion to the advance in temperature. The air confined above the diaphragm in the chamber 6 is not thus affected by the surrounding atmospheric change owing to the protection it receives from the comparatively heavy material surrounding said chamber, which makes said chamber air tight, and precludes any immediate change in temperature of said confined air, and therefore no counter pressure is met when the suddenly expanded air from the body B acts to raise the diaphragm and lift the member 13 in circuit completing contact with the adjustable screw 2.

The device will give quicker action and respond more readily when the surrounding atmosphere is cold, owing to the fact that a sudden increase in temperature will affect the confined air in the body B quicker than would be the case if said surrounding atmosphere were comparatively warm.

What I claim as new and desire to secure by Letters Patent, is:

1. A thermostat electrically connected involving a head and depending hollow body portion, said head carrying an adjustable contact member, and having a small inner air-tight chamber, the confined air therein not being affected by sudden changes of temperature owing to the comparatively heavy material surrounding said chamber, said body portion being constructed of a heat penetrating material adapted to cause a rapid expansion of the confined air, due to a sudden rise in temperature; a non-metallic elastic diaphragm positioned in the head and forming the lower wall of said air tight chamber; a metallic contact piece above the diaphragm adapted to be raised to circuit completing position in response to the pressure of the expanded air from below acting on said diaphragm.

2. A thermostat in circuit with electric energy having a head portion constructed of a comparatively heavy material involving an inner air tight chamber of small proportion, a non-metallic diaphragm forming the

lower wall of said air chamber, a metallic contact piece above the diaphragm, and an adjustable contact member; a hollow air tight body portion constructed of a heat penetrating material connected to and depending from the head adapted to cause a rapid expansion of the confined air due to a sudden rise in temperature thereby exerting a pressure on the said diaphragm and lifting the contact piece into circuit completing engagement with the said adjustable contact member.

3. A thermostat having a head portion of laminated construction involving alternating metallic and insulating non-metallic disks, and an air tight chamber of small capacity; an air tight body portion of heat penetrating material connected to and depending from said head; a non-metallic elastic diaphragm seated in the head above the said body portion and forming the lower wall of said air tight chamber; a metallic contact member above the diaphragm; electric connection from the top of said head to one pole of the battery, and another con-

nection from the said contact member through the head to the other pole of said battery.

4. A thermostat in circuit with electric energy involving a head portion in which is provided a comparatively small air-tight chamber, the air therein not being affected by sudden changes in the temperature by reason of the thickness of the walls surrounding said air chamber; a hollow body portion secured to the said head composed of any suitable heat penetrating material; a diaphragm positioned between the head and body portions and forming the lower wall of said air chamber; and a contact piece adapted to be brought into circuit completing position when the expanded air from the body portion acts to raise said diaphragm.

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

WILLIAM P. ALLEN.

Witnesses:

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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."