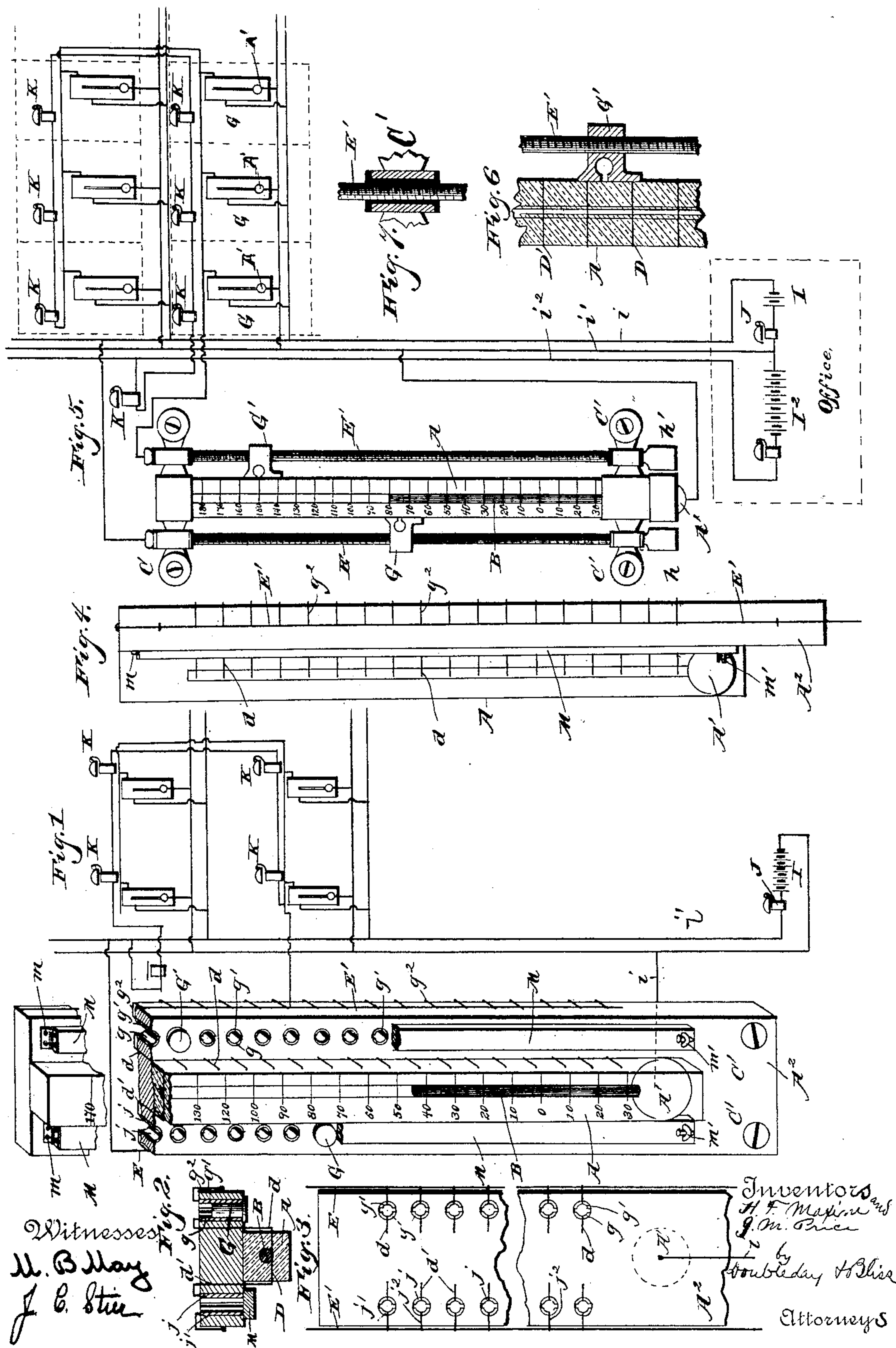


H. F. MAXIM & J. M. PRICE.
THERMAL ALARM.

Patented July 12, 1892.



UNITED STATES PATENT OFFICE.

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THERMAL ALARM.

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To all whom it may concern:

Be it known that we, HOSEA FRANK MAXIM and JESSE M. PRICE, citizens of the United States, residing at Norfolk, in the county of Norfolk and State of Virginia, have invented certain new and useful Improvements in Thermal Alarms, of which the following is a specification, reference being had therein to the accompanying drawings.

10 This invention relates to improvements in electric alarms which are caused to act by the automatic closing of contacts in a mercury thermometer. The thermal alarms of this sort which have been heretofore used have
15 been of one or the other of two sorts. In one case contact-wires are extended from the center of the mercury-tube backward through the glass to the exterior and are connected to wires which are carried to a series of switch-
20 points, and by means of a rotary switch the current from one side of the battery can be taken to an upper or lower point on the tube, according to the point to which the switch is turned. When this plan of construction is
25 followed, the number of points at which current can be delivered to the mercury in the tube is limited, or else the switch mechanism must be made complicated by having a large number of wires and switch-points. In the
30 other case use has been made of contact-wires extending from the interior of the glass tube directly to the front in conjunction with a vertically-sliding contact lying against the front of the glass and supported by a guide-
35 rod placed vertically alongside of and parallel with the tube. In using these it has been found that the vertically-sliding part does not have at all times an assured contact with the metal points secured to the glass, and such
40 contact is necessary in order to have an alarm system on which reliance can be placed. If the outside contact be pressed against the tube, there is danger of breaking the glass.

Thermal alarms of both the above sorts
45 have been so constructed that only a single alarm could be provided for, and one of the objects of the present invention is to provide for two or more distinct and separate calls—that is, calls which shall indicate not only
50 that a given relatively low temperature has been attained, but also that subsequently a

higher point has been reached. To illustrate: In a hotel, for instance, it is desirable to not only have an automatic alarm which shall at the office or at some equally suitable point 55 indicate that a predetermined relatively low temperature—say 75° Fahrenheit—has been attained in any of the numerous apartments, but also have an alarm system which, should a relatively higher temperature—say 150° 60 Fahrenheit—be attained in any of the apartments, will sound a general alarm in all of the apartments. This is desirable, also, in each of many large factories, business-buildings, dwellings, &c. 65

Figure 1 is a view showing in perspective some parts and showing diagrammatically other parts of apparatus by which our invention can be applied. Fig. 2 is a cross-section of the thermometer in Fig. 1. Fig. 3 is a 70 partial back view of the thermometer. Fig. 4 is a side or edge view. Fig. 5 shows a modification also embodying the invention. Fig. 6 is a partial vertical section of the thermometer in Fig. 5. Fig. 7 is a section of one of 75 the insulated brackets.

In the drawings, A represents the tube, and A' the bulb, of a thermometer having mercury, as at B. In many respects it is similar to those commonly in use. It is shown as being 80 held by top and bottom screws or brackets C C'.

At D D' there are metallic contacts in the glass. As shown in Fig. 1, they extend laterally from the mercury-chamber through the 85 glass to the sides and are connected to conductors $d d'$, which pass back through the wooden or other suitable back piece A². The conductors $d d$ are secured to terminals $g g$, and the conductors d' are secured to a series 90 of terminals j . Opposite to the terminal g there are terminals g' , those at g and those at g' being arranged in pairs, those of each pair being inserted into a socket in the wooden or other back piece A². The terminals g' are 95 respectively connected by conductors g^2 to a main conductor E, connected to a battery. The terminals j are arranged in a manner similar to that above described in relation to a series of terminals j' , which are connected 100 by conductors j^2 to a wire or main conductor E', connected to the battery.

i is a wire connected to the mercury at A' , and also connected to the battery.

G G' are metallic pins adapted to be inserted into any of the above-described series of sockets and to connect the metallic pieces therein, as at $j j'$ or at $g g'$. Preferably the sockets, together with the terminals $g g'$ and $j j'$, extend to the front surface of the back plate A^2 , so that the pins G G' can be readily inserted from the front.

To prevent any tampering with the pins and to guard against any accidental displacement thereof, as well as hold them firmly in electrical contact with the adjacent terminals, we employ guard-bars M M , which can be secured in any suitable way. We prefer to hinge them, as at $m m$, and provide them with catches at $m' m'$. Key-locks can be used, if desired.

The means herein provided for holding the contact-pins firmly in place make the present device superior to those in each of which use is made of an exposed contact supported in front of the tube and held more or less loosely by a spring or set-screw.

The contact-pin G is shown as being arranged to close the circuit when the mercury reaches a relatively low point in the scale, and at such time it is available to indicate at some central point—as the office of the building—that the said low degree of temperature has been reached at one or another distant point, which degree of temperature will ordinarily be the highest desirable for the purpose of keeping the building suitably warm, and as soon as the call sounds it is ordinarily expected that steps will be taken to prevent that degree from being passed. It is not necessary that an alarm or call indicating this fact should be sounded in the various apartments or parts of the building.

The contact-pin G' is shown as adjusted for a considerably higher temperature—namely, one that may be regarded as a danger-point—and which degree should ordinarily be as high as possible, so as to prevent undue apprehension or even panic, for, as will be described, this contact is adapted to close a circuit, which will cause the sounding of an alarm at each of a series of apartments, or what may be termed a “general alarm.”

In Fig. 1 a battery is shown at I . From one of the poles a wire i is taken and connected to the mercury in the thermometer. From the other pole a wire i' is taken through an alarm device at J to the conductor E . As soon as the mercury rises to the contact G the circuit is complete through i and i' and the single call at J is sounded. If there should be no one present at the time of its sounding, or if for any reason the mercury should continue to rise because of an uncontrolled rise in temperature until it reaches the contact G' , all the alarm devices K K K will be sounded, and thereby indicate at all desired points the dangerous temperature at some one or

more places in the building. In such case the same battery-cells are relied on to actuate both the single central alarm and also the general alarms.

In Fig. 2 there is shown an arrangement of the electrical parts which is preferable under some circumstances, as when a large number of thermal indicators and alarm devices are to be used. In such case it is not desirable to have constantly to line a powerful battery, though it is necessary to have such a battery to actuate all of the alarms K K K . A relatively small battery I has its leading-wires i i^2 connected in multiple to the contacts G and the mercury B of all of the series of thermometers, which latter are supposed to be placed, respectively, in the rooms or parts of a building. If the mercury in any such room rises to the contact G , the single central call J will be operated, and under ordinary circumstances the cause of the rise of temperature at that point can be removed; but if the temperature in any room should rise to the predetermined danger-point the mercury will close the circuit $i' i^4$ through a more powerful battery I^2 , in which circuit are placed a series of alarms K K K . Thus while it may be frequently necessary to call the battery I into play, the more powerful one I^2 will remain quiescent and without loss until it is necessary to sound all of the alarms through the circuit of relatively high resistance.

There are many uses to which an apparatus of the kind shown can be put, and for ordinary market purposes we construct them so that they are available not only for indicating high temperatures, but also low ones, so that the devices can be utilized in refrigerators of the various sorts.

In Fig. 5 there is shown another form of thermometer embodying some of the novel features of my invention. In this case the contacts D D' in the glass extend laterally and terminate at the side surfaces, and against them vertically-adjustable contacts G G' are fitted. The latter are held by threaded rods E E' , which are situated at the sides of the tube and are so arranged as to constantly tend to press the parts G G' firmly against the contacts D D' , and thus provide an assured metallic path at all times. The rod E' is insulated from rod E , so that each can form part of a circuit or branch circuit independently of the other. These rods are provided with handles at h h' , whereby they can be rotated so as to carry the contacts G G' up or down to any desired point. It will be seen that the parts G and G' can be adjusted in relation to each other and to the different parts of the thermometer, so as to attain results more or less similar to those attained with the construction first above described.

What we claim is—

1. In a thermal-alarm mechanism, the combination, with a mercury-tube having a contact or conductor permanently connected with

the mercury and a series of contacts normally above the mercury and extending from the mercury-chamber to the outside surface, and a non-conducting back or support A², of a series of pairs of terminals carried by said back or support extending along the tube, the terminals of each pair being insulated from each other and one being connected to a tube-contact and the other to a battery-wire, and a removable pin, as at G, adapted to be clamped between the terminals of one of said pairs, substantially as set forth.

2. In a thermal-alarm mechanism, the combination of a mercury-tube having a conductor permanently connected with the mercury and a series of contacts normally above the mercury but adapted to touch it when it rises, a series of pairs of terminals insulated from each other and having one of each pair connected to one of said tube-contacts and the other connected to a battery-wire, and two adjustable contacts, each adapted to be connected to one of the said pairs of terminals, substantially as set forth.

3. The combination of the mercury-tube A, having contacts D D', the non-conducting back A², having sockets extending from the front to the rear, the insulated terminals in

said sockets, the conductors *g*, *g'*, and E, and the contact-pin G, substantially as set forth.

4. The combination of the mercury-tube having the contacts D D', the terminals *g g'*, the contact G, and the guard for said contact, substantially as set forth.

5. In a thermal-alarm mechanism, the combination of the mercury-tube, the insulating back or support A², the two independent series of pairs of terminals supported on said backs, the series of contacts or conductors extending from the mercury-chamber out through the tube and respectively connected to one of the terminals in each of said pairs, the other terminal of each pair being connected to a battery, and the two independently-adjustable contacts, each adapted to be connected with the terminals of one of said pairs, substantially as and for the purposes set forth.

In testimony whereof we affix our signatures in presence of two witnesses.

H. FRANK MAXIM.
JESSE M. PRICE.

Witnesses:

J. SYDNEY SMITH,
W. H. ROLAND.