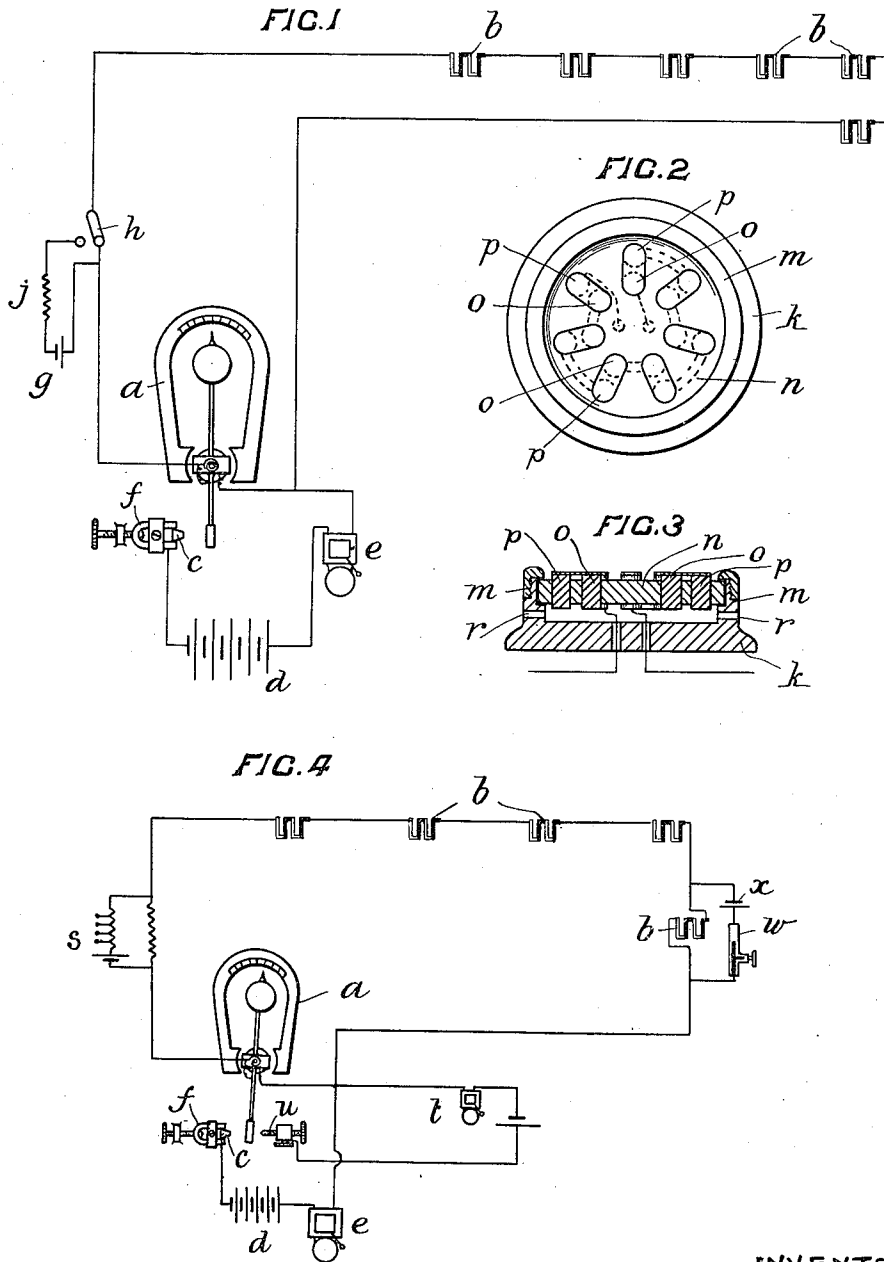


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FIRE ALARM.
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989,420.

Patented Apr. 11, 1911.



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FIRE-ALARM.

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To all whom it may concern:

Be it known that I, LOUIS TASMAN REICHEL, subject of the King of Great Britain, residing at Wellington, New Zealand, have invented a new and useful Improved Fire-Alarm; and I do hereby declare the following to be a full, clear, and exact description of the same.

This invention relates to improved means that have been devised for the purpose of sounding an alarm upon a sudden rise of temperature, such as would be occasioned by an outbreak of fire, taking place.

The invention is applicable to buildings, ships' holds, mines or other inclosed areas, and may be arranged to sound an alarm at any distance away from such area.

The invention consists in the utilization of a thermopile to produce a current of electricity sufficiently strong to actuate a galvanometer which, in turn, will cause an electric alarm circuit to be closed when the galvanometer pointer has been deflected a certain regulated distance.

The thermopile will be so constructed that it may be secured upon a ceiling or wall of a building, and any desired number of such thermopiles may be arranged in series with the galvanometer. The thermopile will be also so formed that a current of sufficient strength to actuate the galvanometer pointer the required amount, will only be generated upon a sudden rise of temperature occurring in its vicinity.

In order, however, that the invention may be properly understood, reference will be made to the accompanying sheet of drawings, in which,—

Figure 1 is a diagram illustrating the arrangement of the parts and circuits making up the alarm. Figs. 2 and 3 are respectively plan and sectional elevation of an approved form of thermopile for use in conjunction with this invention. Fig. 4 is a diagram of an alternative arrangement of circuits in which provision is made for the ringing of a bell should the thermopile circuit, through any cause be broken, and also for the closing of the fire alarm circuit upon the surrounding temperature reaching any predetermined degree (whether the rise of temperature be slow or fast).

In carrying out the invention, a galvanometer *a* preferably of the "moving coil" type, is placed at any desired point, and a

number of thermopiles *b* are arranged around the room, or throughout a number of rooms if so desired. These thermopiles are arranged in series circuit with the galvanometer, so that upon a current being created in any one of them, the pointer of the galvanometer will be deflected proportionately with the strength of the current.

Arranged in a position adjacent to the lower end of the galvanometer pointer, is an adjustable terminal *c* arranged in circuit with a battery *d* and a bell *e*, such battery and bell being also arranged to complete circuit through the galvanometer pointer, when the pointer is deflected sufficiently to cause it to move over and engage with the terminal *c*, the moving coil being connected to the pointer. The alarm circuit will then be completed, and the bell caused to sound.

The terminal *c* of non-magnetic material is preferably formed as part of, or attached to a permanent magnet *f*, which will serve to pull the galvanometer pointer into close contact with the terminal when it moves to a position within the influence of the magnet. For this purpose, the end of such pointer will be made of iron. Thus, an effectual contact is assured, and any liability of such contact being hindered by the pressure of dust upon the points, prevented.

In order to provide for the testing of the installation at any time, a battery *g* (Fig. 1) is provided, which battery may be caused to send a current through the thermopile circuit by the operation of a two way switch *h*. Suitable resistances *j* are provided, whereby the current sent through this circuit may be weakened to such a degree as to prevent injury to the galvanometer. Instead of the battery, a thermopile may be employed to generate the desired current.

The form of thermopile shown in the drawings consists of a base piece *k* of wood or other non-conducting material, to the surface of which a casing *m* is attached. Within the casing is arranged a disk *n* of plaster of Paris or other like plastic insulating material in which are embedded a number of cores *o—p* of two different metals connected together on the well known thermopile principle. The metals preferably employed in this invention are bismuth and Clammond alloy or antimony, which have high thermo-electric values. These cores are so arranged that their outer ends

will project beyond the outer surface of the disk *n* while their inner ends will lie behind such disk. Consequently, the outer ends will be fully exposed to the sudden heat given off by an outburst of flames while the inner ends will be protected therefrom, thus causing the thermo current to be generated.

By using in the thermopiles, metals such as bismuth, antimony, Clammond alloy; or nickel, which have a high thermo-electric value, and at the same time making the blocks of metal short and thick, thereby reducing the internal electrical resistance of the thermopiles, in combination with a low resistance galvanometer, a few degrees sudden rise of temperature will cause sufficient flow of current to operate the alarm.

Any gradual rise in the temperature will cause the whole appliance to be heated so that no current will be generated, or at most, only a slight one not sufficient to deflect the galvanometer pointer the required amount to close the alarm circuit. If necessary for this purpose, the sides of the casing *m* may have apertures *r* formed in them to allow of the surrounding atmosphere having free access to the back ends of the cores *o* and *p*.

In order to provide against false alarms, caused by the gas or other light being lighted in a room, a scale is fixed under the galvanometer pointer, and serves to show the amount of deflection thereof. The deflections of the pointer due to variable changes of temperature will thereby serve as an indicator that the system is in good working order, and will also serve to indicate the position to which the terminal *c* must be adjusted to provide for the proper working of the system.

The means shown in Fig. 4 for providing for an alarm being sounded should the thermopile circuit be broken, consist in arranging a battery *s* in shunt circuit with the thermopile circuit, so as to send a current permanently through such circuit sufficiently strong to slightly deflect the galvanometer pointer toward the terminal *c* as shown. The strength of this current is governed by suitable resistances. A second bell circuit *t* is arranged in circuit with the galvanometer pointer; and an adjustable terminal *u* arranged upon the opposite side of such pointer. This terminal *u* is so adjusted that when the pointer is at its normal position, it will make contact therewith. Thus, should the thermopile circuit be broken, the galvanometer pointer will swing back to its normal position, thereby closing the bell circuit *t* and causing such bell to sound.

To provide for the alarm being sounded when the temperature surrounding the thermopiles has risen slowly to a certain fixed degree, say for instance, in a ship's hold in case of a smoldering fire, an adjustable thermometer *w* (Fig. 4) adapted to make

contact between two terminals in the well known way, is arranged with a battery *x* in shunt circuit with the thermopile circuit. Thus, when the temperature rises to the predetermined degree, a current will be sent through the thermopile circuit, and the alarm circuit closed in the manner before described. Any approved form of thermostat may be employed in place of the thermometer.

It will be readily understood that a number of galvanometers may be arranged to operate the same alarm circuit, each one being in circuit with a separate thermopile circuit. Thus, provision may be made for an indication being given as to the location of a fire in addition to the sounding of the alarm.

In describing the invention, an ordinary electric bell has been described as part of the alarm circuit, but it will be readily understood that other classes of sonorous signals may be employed without departing from the spirit of the invention.

What I do claim as my invention, and desire to secure by Letters Patent, is,—

1. In fire alarms, in combination, a thermopile, a galvanometer arranged in circuit with the thermopile, a pointer therein, a terminal mounted adjacent to the galvanometer pointer, a magnet near such terminal arranged to act on said pointer and a bell and battery arranged to directly complete circuit with the galvanometer pointer and the terminal.

2. In fire alarms, in combination, a thermopile, a galvanometer arranged in circuit therewith, a battery, *s*, arranged in shunt circuit with a part of the thermopile circuit adapted to send a slight current permanently through said circuit, a bell circuit adapted to be closed by the movement of the galvanometer pointer in one direction, and a second bell circuit adapted to be closed by the movement of said pointer in the reverse direction, substantially as herein specified.

3. In fire alarms, the combination with a thermopile, a galvanometer arranged in circuit therewith and a bell circuit adapted to be closed by the movement of the galvanometer pointer, of a battery and thermostat arranged to complete a shunt circuit with a portion of the thermopile circuit, substantially as specified.

4. In fire alarms, in combination, a thermopile, a galvanometer arranged in circuit with the thermopile, a magnet for influencing movement of the pointer of the galvanometer when that pointer is brought within the field of the magnet, and a bell and battery included in a circuit arranged to be directly closed by said pointer.

5. In a fire alarm, a galvanometer needle, and a circuit for influencing movement of the same, in combination with a magnet for also operating the needle when the lat-

ter is brought within the field of said magnet, an alarm means, and means, located in the path of and governed by the needle, for controlling the alarm means.

- 5 6. In fire alarms, in combination, a thermopile, a galvanometer arranged in circuit with the thermopile, a magnet for influencing movement of the pointer of the galvanometer when that pointer is brought within

the field of the magnet, and an alarm means 10 controlled by the movement of the pointer.

In testimony whereof, I have signed this specification in the presence of two subscribing witnesses.

LOUIS TASMAN REICHEL.

Witnesses:

H. ALEXANDER,
W. M. BORLASE.