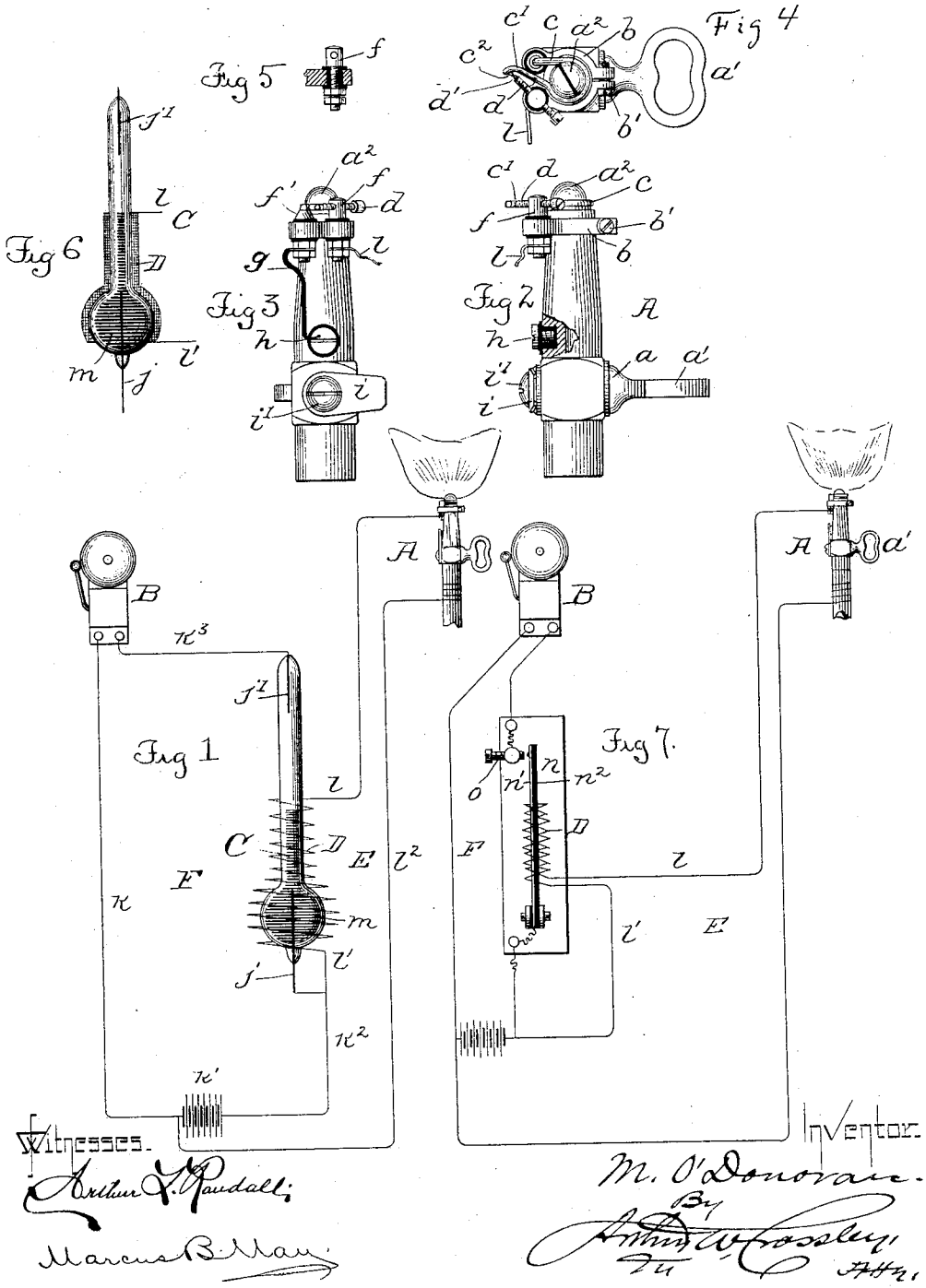
(No Model.)

M. O'DONOVAN.

DEVICE FOR INDICATING ESCAPE OF GAS.

No. 589,745. Patented Sept. 7, 1897.



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UNITED STATES PATENT OFFICE.

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DEVICE FOR INDICATING ESCAPE OF GAS.

SPECIFICATION forming part of Letters Patent No. 589,745, dated September 7, 1897.

Application filed May 24, 1895. Renewed January 25, 1897. Serial No. 620,682. (No model.)

To all whom it may concern:

Be it known that I, MICHAEL O'DONOVAN, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Devices for Indicating the Escape of Gas, of which the following is a specification.

This invention has relation to that class of devices for annunciating the extinguishment of a gas-flame in which a thermostat or equivalent device is mounted in proximity to the gas-burner and is adapted to be electrically connected with an alarm or annunciator when the flame is extinguished without the flow of gas being cut off.

Among the various objects which I desire to attain by my invention are the provision of a device which may be attached to a burner of the ordinary construction without rendering it unsightly and clumsy in appearance, the provision of an attachment having no projecting arms or devices which are liable to be broken off or bent out of shape or which act to diminish the illuminating power of the flame, and the provision of a device which is so cheap and easily constructed that it may be manufactured without great expense.

Another object at which I aim is to prevent the operating of the annunciator when the gas is first ignited and before the flame has had time to affect the thermostat.

The invention therefore consists of a thermostat mounted upon a burner where it will be affected by the heat of the flame and placed in an electric circuit for operating the annunciator, the circuit being closed or opened by the turning of the key or plug of the burner, so as to permit the escape of the gas or cut off its flow.

It also consists of a device adapted to be affected by the current in the circuit and adapted to prevent the annunciator from being operated when the circuit is first closed by the opening of the burner-valve until it is again closed by the accidental extinguishment of the flame without cutting off the flow of the gas.

It further consists in placing a resistance-coil in the thermostat-circuit, which is adapted, by its thermal variation when said circuit is closed, to affect a supplemental thermometer or thermostat in a second circuit and thereby cause the closing of the said second circuit for operating the annunciator which is placed therein.

My invention also consists in the additional features of construction and arrangement which are hereinafter described, and pointed out in the claims hereto appended.

Reference is to be had to the annexed drawings and to the letters marked thereon, forming a part of this specification, the same letters designating the same parts or features, as the case may be, wherever they occur.

In the drawings, Figure 1 is a diagrammatic view illustrating my invention and the various parts thereof. Fig. 2 is a side view of the burner with the thermostat and switch affixed and their electrical connection attached thereto. Fig. 3 is a front view of the same. Fig. 4 is a top plan view of the same, illustrating more clearly the thermostat and the adjusting-screw. Fig. 5 is a detail view of the binding-post upon which the adjusting-screw is mounted. Fig. 6 is a view of the supplemental thermostat, the wires of the resistance-coil being shown in section. Fig. 7 is a diagrammatic view illustrating how a different form of thermostat may be employed for closing the indicator-circuit.

Referring to the drawings, the burner is indicated as a whole by A, it being of ordinary construction and having a valve a, a key a', and a tip a^2, which latter may be of any non-conducting material, such as lava. Encircling the burner slightly below the tip is a split collar b, having its ends united by a screw b' and upon which is mounted the thermostat c and the adjustable contact-screw d. The thermostat is formed of a suitable expansible substance, such as copper, and has one end rigidly secured in the end of a binding-post f', which extends through a lug on the collar b, and is threaded to receive nuts, between which the end of a wire is clamped. The thermostat extends part way around the tip a^2 and lies closely in the groove formed therein, so as to be affected by the heat of the tip when the gas is ignited. It has an outwardly-extending arm c', which projects but a short distance beyond the collar and which is provided with a platinum contact-tip c^2.

When the thermostat is not expanded, its point is in contact with the platinum point d' on the screw d, which latter extends through a threaded aperture in a post f, which projects vertically through a lug formed on the collar and is provided with nuts to clamp a wire thereto. Both of the binding-posts f and f' are insulated from the collar, as is shown on the drawings.

The post f' for the thermostat is connected by an insulated wire g to a flat contact h, which consists of a screw extending into the side of and suitably insulated from the burner. On the end of the valve a I mount a flat metallic switch-arm i, held in place thereon by the screw i' and arranged so that when the valve is turned so as to permit gas to flow through the burner the arm will be in electrical contact with the contact h.

Having now described the thermostat on the burner and its adjacent coöperative parts, I will proceed to describe how it operates to sound an alarm or otherwise indicate that the flame has been blown out or that the valve is open without the gas being ignited.

B indicates an indicator or alarm, which, for example, I have shown as a magneto-electric bell, which is caused to sound by the closing of its circuit, but it may be any of the ordinary annunciators now in use.

C is a mercurial thermostat formed of a non-conducting bulb and tube partially filled with mercury or other conducting fluid and having a wire or contact j inserted in the bulb and a wire or contact j' inserted in the tube. The contacts j and j' are connected with the binding-posts of the alarm by wires k k^3 k^2, there being a battery, as shown, at k'. The wire or contact j' is inserted into the tube at such a distance from the mercury when the latter indicates a normal temperature that the latter has to rise to a considerable extent to complete the circuit by contacting with it. Preferably I so adjust the contact j' that the mercury will not rise to the desired distance until it reaches a temperature of, say, from 100° to 125°.

D indicates a resistance-coil formed of wire of a very fine gage wrapped in three or more layers around the bulb and a portion of the tube of the thermostat c and having its ends connected to the wires l and l', respectively. The wire l^2 is connected with the gas-burner in any suitable way, and wire l' is connected by wire k^2 to the battery k'.

The wire l extends from the resistance-coil to the thermostat on the burner and is attached thereto by means of binding-screws, as shown in Figs. 2 and 3. The resistance-coil is of such a nature that when its circuit has been closed its wires become heated, and their heat is communicated to the mercury in the bulb and the latter immediately begins to rise in the tube.

When the valve in the burner is closed, the circuit E (which comprises the coil D, the wire l', wire k^3, battery k', wire l^2, burner A, arm i, contact h, wire g, binding-post f', thermostat c, screw d, and wire l) is open for the reason that the arm i has been moved away from the contact-screw h, and the circuit F (which comprises the mercury m, contact j, wire k^2, battery k', wire k, alarm B, wire k^3, and contact j') is also open, since the mercury is at a normal temperature and at a point considerably below contact j'.

When it is desired to light the gas, the key a' is turned and the gas is ignited in the usual way. The turning of the valve partially rotates the arm i, so as to touch the contact h and thereby close the circuit E, the platinum point c^2 on the thermostat c being normally in contact with the point of the screw d. This does not affect the alarm, for the reason that before the resistance-coil has heated the mercury to the extent required to cause it to rise in the tube far enough to make contact with the wire j' the circuit E will be opened by the expansion of the thermostat c, due to the flame at the tip, which expansion of the thermostat carries the point c^2 away from the point d' of the screw, thus breaking the contact.

Should the flame be blown out by the wind or by a person unaccustomed to the use of gas, or be extinguished in any other way than by closing the valve, the cooling of the thermostat c and the resulting contraction thereof will cause the points c^2 and d' to make contact and the circuit E will be again closed. The current of electricity flowing through the resistance-coil will heat the wires thereof, and the heat becoming communicated to the bulb and tube and the mercury therein the latter will be caused to rise until it reaches the contact j', whereupon a current will be immediately established in circuit E and the alarm B will continue to sound until the valve a of the burner is closed and the arm i is moved away from contact h, as is now obvious. A current would also be established in circuits E and F if the key a' were accidentally turned without the gas being ignited.

By providing the two circuits E and F and the supplemental thermostat C under the influence of the resistance-coil D, I obviate one of the greatest difficulties and inconveniences to be met with in the use of alarms for the notifying of the escape of gas. Heretofore the alarm was placed in the thermostat-circuit and every time the gas was ignited the alarm was sounded, so that at times it was impossible to tell whether the gas was being lighted or had been accidentally extinguished without the valve being closed.

In Fig. 7 I have illustrated a different form of thermostat for closing the indicator-circuit. In this case it consists of a thermostat-bar n, composed of two strips n' n^2 of steel and gutta-percha or hard rubber, respectively. It is suitably mounted upon a plate of insulating material, such as wood, and has wrapped upon it three or more coils of fine wire, forming thereon a resistance-coil D similar to that above described. The ends of the coils are

respectively connected to the wires *l l'*. The fixed end of the thermostat-bar is connected to wire *k*, and its free end is adapted to contact with an adjustable screw *o*, which is in circuit with the indicator.

It will be seen that when circuit E remains closed for an appreciable extent of time the resistance-coils will heat the thermostat-bar and cause it to swing so as to make contact with screw *o* and close circuit F.

If desired, the thermostat-bar may be mounted directly upon the bell, where it will be protected from injury. The screw *o* can be adjusted back and forth to suit the exigencies of the case, as will be understood, and, furthermore, if desired, the thermostat may be mounted in the room where the burner is and adjusted so as to be sensitive to slight changes in the temperature of the room, whereby it will not only indicate the escape of gas, but, on the other hand, will indicate the fact if there is a fire in the room. Thus it will be seen that I provide an alarm which will indicate that the room is unduly warm or that gas is escaping, and the janitor can immediately hasten to the room to prevent disaster.

It will be understood that I do not limit myself to the exact devices which I have shown and described, as any means for preventing the sounding of the alarm when the valve is first turned for the lighting of the gas may be employed in connection with a thermostat or equivalent device adapted to be influenced by the gas-flame without departing from my invention.

My invention is especially adapted for use in hotels, apartment-houses, &c., and the circuits may be arranged so that an annunciator in the office will be connected with the thermostats in each room, so as to designate that room in which the gas is escaping through an open valve or in which there is too great heat.

I do not limit myself to the use of the thermostat shown, as any other devices may be employed in its stead which are sensitive to thermal changes and which may therefore be employed in connection with the resistance-coil D.

The device which I attach to the burner it will be seen is exceedingly simple and not liable to be broken or displaced. The thermostat consists of a wire wrapped partially around the tip, so as to be heated thereby as well as by the flame. Both it and its supporting-collar may be readily removed or attached to the burner, so that they can be applied to any burner now in use; and the screw *h* can readily be inserted in the burner within reach of the arm *i*, which can be attached to the valve by unscrewing the ordinary screw *i'* and after putting it in any place driving the screw back in place again. The attachments do not detract from the sightly appearance of the burner, nor are there any parts which project into or over the flame, so as to diminish its illuminating power.

Having thus explained the nature of the invention and described a way of constructing and using the same, though without attempting to set forth all of the forms in which it may be made or all of the modes of its use, it is declared that what is claimed is—

1. A device for operating an indicator to indicate the escape of gas, it comprising in its construction a thermostat adapted to be influenced by the gas-flame, a resistance-coil in circuit with said thermostat, a supplemental thermostat adapted to be influenced by said resistance-coil, and an indicator in circuit with said supplemental thermostat all cooperating substantially as set forth.

2. The combination with an indicator, and a thermostat in circuit therewith, of a resistance-coil on said thermostat, a gas-burner having a valve, a thermostat adapted to be acted on by the flame, and in circuit with the resistance-coil, and a switch for closing the last said circuit and coacting with the valve of the gas-burner, whereby if the valve be turned and the gas be not lighted, the resistance-coil will act upon the first said thermostat to close its circuit and operate the indicator.

3. A gas-burner and a thermostat adapted to be placed in proximity to the flame, in combination with a collar, for supporting it, an adjustable screw normally in contact with the end of said thermostat and mounted on said collar, substantially as set forth.

4. The combination with a gas-burner, a collar thereon, a thermostat mounted on said collar and an adjustable screw also mounted on said collar and contacting with said thermostat, of a contact on the burner, an electrical connection with said thermostat on said screw, and a switch-arm mounted to turn with the valve and in electrical connection with the screw on the thermostat, as set forth.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 12th day of April, A. D. 1895.

MICHAEL O'DONOVAN.

Witnesses:
CHARLES W. BUXTON,
MARCUS B. MAY.