

Sept. 19, 1944.

A. J. TICKELL

2,358,425

WARNING SIGNAL FOR REFRIGERATORS AND THE LIKE

Filed Oct. 27, 1941

Fig. 1.

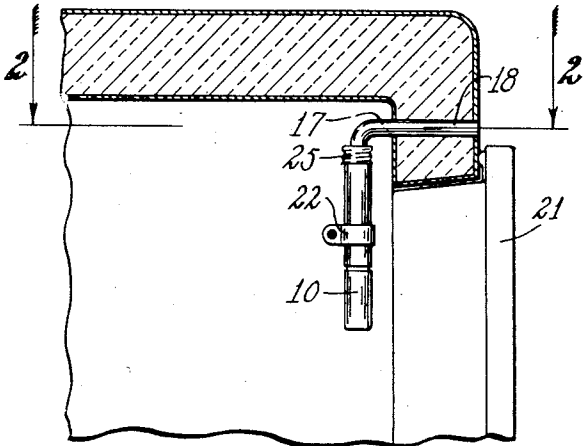


Fig. 2.

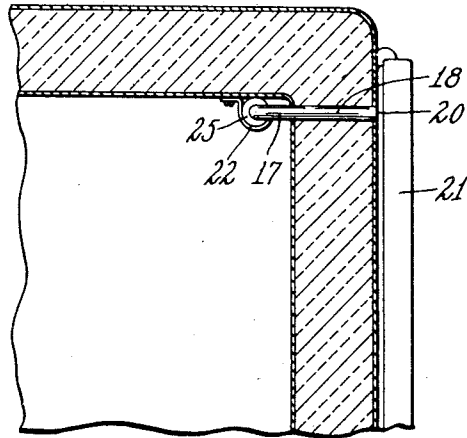


Fig. 3.

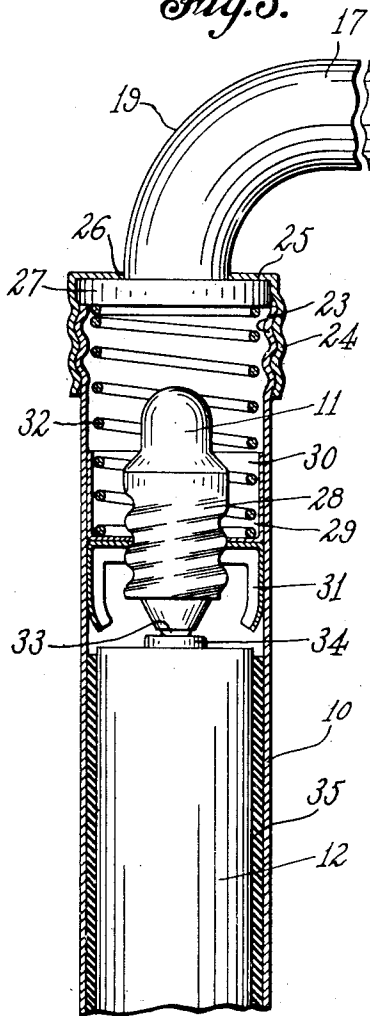
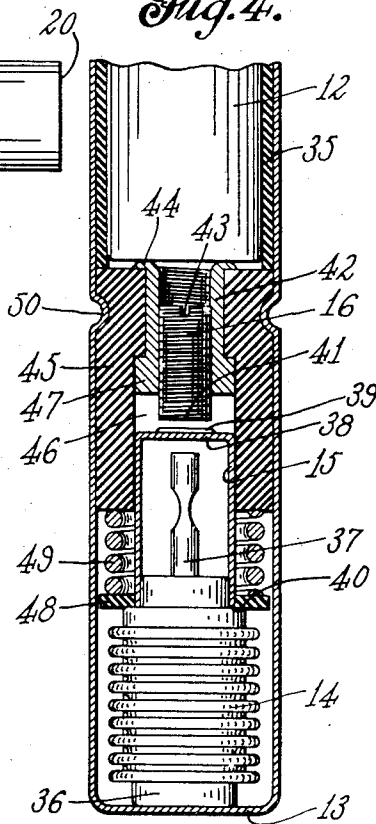


Fig. 4.



Inventor

Arthur J. Tickell,

By *Rockwell & Bachelder*

Attorneys

UNITED STATES PATENT OFFICE

2,358,425

WARNING SIGNAL FOR REFRIGERATORS AND THE LIKE

Arthur J. Tickell, Bethany, Conn., assignor of
one-half to John J. Leary, New Haven, Conn.

Application October 27, 1941, Serial No. 416,647

3 Claims. (Cl. 177—311)

This invention relates to a warning signal device especially applicable to refrigerators, for giving quick and ample warning of a temperature rise beyond a predetermined limit within the refrigerating chamber. The device is of the same general class as that disclosed in my application Serial No. 259,004 now Patent No. 2,302,072, dated November 17, 1942, filed February 28, 1939.

One of the objects of my invention is to provide a device of simple, inexpensive nature whereby a visual signal of the temperature rise will be given exteriorly of the refrigerator.

Another object is to provide a small, inexpensive, portable device of the battery type which can be easily installed in position relatively to a refrigerating chamber and its associated wall so as to give a light signal which when flashed is readily visible from the exterior of the refrigerator.

Another object is to provide improved arrangement of the interior parts of the signal device, including the dry cell and the thermostatic controlling element.

To these and other ends the invention consists in the novel features and combinations of parts to be hereinafter described and claimed.

In the accompanying drawing:

Fig. 1 is a vertical sectional view of a portion of a domestic refrigerator showing one of my signal devices mounted within the refrigerating chamber;

Fig. 2 is a horizontal sectional view taken on line 2—2 of Fig. 1;

Fig. 3 is a longitudinal sectional view on a considerably enlarged scale of the upper portion of the signal device shown in Fig. 1; and

Fig. 4 is a similar view showing the lower portion of the signal device.

In its preferred form, as shown in Figs. 3 and 4, the signal device of my invention is a small, readily portable device comparable in size and appearance to a small, battery-operated flashlight, and comprising an elongated tubular casing equipped interiorly near the upper end with a miniature electric light bulb. Below this bulb within the casing is a small dry cell, suitably insulated from the metallic wall of the casing and having a contact disposed against one of the contacts of the light bulb. Below this dry cell, and disposed between it and the lower closed end of the casing, is an actuator assembly including a gas-filled thermostatic bellows and a contact member adapted to be contacted by a part carried by the bellows when the temperature rises to a predetermined point in order to

close the bulb circuit and cause the lighting of the incandescent bulb. When the temperature is again lowered, the bellows contracts, and this serves to break the electrical contact and interrupt the dry cell circuit so that the light of the incandescent bulb will be cut off.

In the drawing, the metallic tubular casing above mentioned is shown at 10, the small incandescent bulb in the upper portion thereof at 11, and the dry cell at 12. The closed lower end of the casing is shown at 13, and within the casing and between this lower end and the lower end of dry cell 12 is the actuator assembly previously mentioned, including the gas-filled bellows 14. The bellows 14 is provided at its upper part with a neck portion 15 which, when the bellows is expanded to a certain degree, makes contact with an adjustable contact member 16. When contact is made, the electrical circuit, which includes the light bulb, is established in the manner hereinafter described, and the bulb will be lighted so as to provide a warning signal.

For making the warning signal visible at the exterior of the refrigerator, the signal device has associated with its upper end portion, in which the incandescent bulb is located, a light-transmitting rod or pencil of a material which will permit the passage of light rays at any angle. Preferably I employ a pencil of methyl methacrylate of the kind marketed as "Lucite." In mounting the device in association with the refrigerator, I prefer to employ a light-transmitting pencil 17, such as shown in the drawing, having a long portion 18 extended through a suitable hole or bore in one of the side walls of the refrigerator chamber and acting as a plug for said hole. Adjacent its connection with the upper end of the casing 10, the pencil 17 has a bend or elbow 19 therein so that the main portion of the pencil extends substantially at right angles to the casing. In this arrangement, which is shown by way of example, the casing 10 is vertically arranged, and the main portion of the light-transmitting pencil horizontally arranged, and the pencil has an elbow fastened to the upper end of the casing 10 in such relation that rays of light emanating from the bulb 11 will be visible from the exterior of the refrigerator, owing to the disposition of the body of the pencil in the opening formed in the side wall of the refrigerator. In this particular case the free end of the pencil 17, which is indicated at 20, is substantially flush with the outer surface of the refrigerator side wall, and in this particular case the pencil has its body disposed above the door

21, which may be the usual front door of the refrigerator, although there may be variation in this respect. Also in this particular case the casing of the signal device is located in a corner portion of the refrigerator chamber, as will be seen from Fig. 2, and the metallic casing of the device is held in contact with the inner surface of the refrigerator chamber by means such as metal clip 22, but variation may be made in this respect also.

It is important to note, however, that if the clip 22 be not employed, other means should be used for insuring effective heat transfer between the casing 10 and the inner surface of the refrigerator chamber or other part subjected to the cold of the refrigerator chamber, so that the temperature of casing 10 will be approximately that of the inner surface of the refrigerator chamber, and so that the temperature of the signal device casing will not be subject to sudden rise from such causes as, for example, the opening of the door 21 from time to time.

It is also desired to call attention to the fact that in the form of the device above described, the laterally extending portion of the light-transmitting pencil at least assists in positioning the signal device in operative position relatively to the refrigerator, because of the engagement of a part of the pencil in an opening of substantially the same size provided in the wall of the refrigerator for that purpose. The signal device is suspended from a bent part of the pencil in the particular form shown. The positioning of the signal device in operative position may or may not be assisted by means such as the clip 22.

It is also desired to point out that, owing to the provision of the hole in the side wall of the refrigerator, thermal insulation within the hole is required for preventing rise of temperature within the refrigerator chamber, and thermal insulation of the signal device casing is also required so as to prevent the external temperature from influencing it directly. Thermal insulation for these purposes of a very satisfactory character and degree is provided by making the pencil of the synthetic resin material previously mentioned, namely, the methyl metacrylate, the thermal insulation being an important characteristic in addition to the light-transmitting characteristic.

The light-transmitting pencil is preferably arranged in a detachable manner in light-receiving relation to the incandescent bulb 11 in an appropriate manner. In the example shown, the casing 10 is open at its upper end and provided in the region adjacent the open extremity with screw threads 23 engaged by corresponding threads 24 at the inner surface of a removable cap member 25. This cap member has an opening 26 through which the body of the pencil extends, and within the cap the pencil is provided with an enlarged portion or flange 27 adapted to be held removably by the cap in position on or against the open mouth portion of casing 10.

The incandescent bulb 11 has an external threaded metallic base or shell portion 28 supported by its threads in a two-part slidable socket 29 having an upper part 30 and a lower part 31, making electrical contact with the metallic side wall of the casing. A coil spring 32, interposed between flange 27 and the bottom of the bulb-supporting part 30, urges the removable bulb support in a downward direction in the casing, and thus holds the contact member 33 on the lower end of the bulb unit against the con-

tact member 34 of the dry cell 12. The lower or inner contact 33 of the bulb is, of course, insulated in the usual way from the outer threaded shell part or contact 28, which is in electrical connection with the metal casing wall. The spring 32 also acts in a direction toward dry cell 12 to hold said cell in operative relation to the actuating assembly in the lower or rear end of casing 10.

The dry cell 12 is insulated from the wall of casing 10 by means such as a paper cover 35.

The bellows 14, previously mentioned, has an expandable metal wall and is filled with a suitable gas. At its lower or rear end the bellows has a small extension 36 in contact with the bottom or rear wall of casing 10. At its opposite end the bellows is provided with a neck 37 by means of which the gas is introduced, this neck being sealed in the customary manner. The neck 37 is disposed in the neck portion 15, previously mentioned. The neck 15 is closed at its upper or front portion, as indicated at 38, and there provided with an external contact face 39. The rear end of neck 15 has an edge portion 40 suitably secured to the body of the bellows.

The contact surface 39 on neck 15 is adapted to make contact, when the bellows is expanded to a predetermined degree, with the lower or inner end 41 of contact member 16, previously mentioned. The contact member 16 is provided with an external thread engaging an internal thread in a metal tubular portion 42. At its front or upper end the contact member 16 is provided with a groove 43 so that by introducing a screw driver into the upper part of the casing the contact member 16 can be adjusted longitudinally to bring it to the required spacing with respect to the contact surface 39 carried by the bellows. At its front or upper end the tubular part 42 is spun over, as shown at 44, so as to fix member 42 in position with respect to an outer insulating body 45. This insulating body 45 can be conveniently formed of paper or fiber, and it serves as a means for holding the member 42 in position, and also as a means for guiding the neck portion 15 of the bellows. For this purpose the insulating body 45 has a longitudinal bore 46, in which bore the neck 15 and the member 42 are positioned, the member 42 being secured in the upper part of this bore by the spun-over portion 44 at the top, and by a shoulder 47 at the lower part of member 42. The spun-over part 44 of member 42 is in engagement with the bottom of dry cell 12.

In front of the body of the bellows 14 and in a region adjacent the base of the neck portion 15, an outstanding flange 48 is supported against the bellows in an appropriate manner. A helical spring 49 interposed between this flange 48 and the rear or lower part of insulating body 45 normally maintains the rear or lower part of the bellows against the rear or lower wall of casing 10.

The insulating body 45 is fixed in position within the casing 10 lengthwise of the casing by suitable means, as by spinning a groove 50 into the casing, whereby metal is displaced from the side wall of the casing to extend into the insulating body and lock it against endwise movement.

It will be understood that in the normal condition of the signal device the dry cell 12 will be inoperative, because of its complete insulation from the metal casing by means of the paper cover or wrapper 35 and the insulating body 45, which latter under normal circumstances serves

as an insulating mounting for insulating the tubular member 42, in which the contact member 16 is held. However, as the bellows 14 is held with its rear or lower end in contact with the casing at all times, as a result of the action of spring 49, the circuit including the incandescent bulb and the dry cell will be closed whenever the contact portion 39 carried by the bellows is brought by the lengthwise expansion of the bellows into contact with the contact member 16. This action will take place when the temperature within the casing 10 rises to a predetermined degree. The temperature at which the incandescent bulb will be lighted can obviously be adjusted by adjustment of the adjustable contact member 16. When the device is used in connection with the refrigeration of ordinary foods, the adjustment can be such, for example, as to establish contact between the bellows extension and the contact member 16 when the temperature rises, say to 45° Fahrenheit. When this temperature is reached the bulb 11 is lighted and the light rays are sent through the pencil 17 so as to be visible from the exterior of the refrigerator. If desired the pencil can be of a red color so as to transmit a red light. Thus in the example illustrated a red light can be seen at the front of the refrigerator above the door when the temperature within the refrigerator chamber rises to a predetermined degree. By the illumination of the bulb an indication of the break-down or improper working of the refrigerating means or the melting away of ice is given at once, so that there will be less likelihood of the loss of food.

The circuit of the bulb will of course be interrupted again upon fall of temperature again to the predetermined limit after the condition of break-down or the like has been rectified.

It is of distinct advantage to be able to vary the point at which the signal will operate by adjustment of the longitudinally movable contact member 16, or its equivalent. It is also of distinct advantage to have the dry cell and the cooperating thermostatic element maintained in a predetermined relationship to each other within the casing of the signal device. It is, of course, of manifest advantage to be able, by the use of simple means, to send a warning signal to the exterior of the refrigerator chamber, or to the exterior of the refrigerator. The signal device as furnished for installation in refrigerators is quite inexpensive, as it is of relatively simple construction, and the installation in a refrigerator can be effected conveniently and at slight expense. It is not necessary in all cases to have a bend in the light-transmitting pencil, but in certain cases it is of distinct advantage, as it assists in holding the signal device in place and makes for a convenient disposal of the small casing of the signal device within the refrigerator in many instances. The action of the light-transmitting pencil of synthetic resin as regards thermal insulation, as above explained, is of distinct advantage in many instances because that material prevents ready transfer of heat through the hole in the refrigerator wall from the exterior of the refrigerator to the interior, and because such material, carried by the signal device casing at one end, can act as a thermally insulating support for

said casing in a region otherwise exposed to heating.

While I have shown but a single embodiment of my invention, it will be understood that the invention can take various embodiments, and that various changes in the organization of parts and in the details can be made without departing from the principles of the invention or the scope of the claims.

What I claim is:

1. A warning signal device for refrigerators and the like, comprising a small casing adapted to be inserted into and removed from a refrigerating chamber, an incandescent bulb carried thereby, a dry cell battery within the casing, a thermostatic element within the casing for closing the light circuit when the temperature within the casing passes a predetermined upper limit and interrupting the circuit when the temperature again reaches said limit, and a light-transmitting pencil supported on the casing and having one end in light-receiving relation to said bulb and provided with a bent portion for transmitting the rays of said bulb at an angle, said casing being suspended within the chamber from said bent portion and said pencil being engaged with an opening through the chamber wall.

2. A warning signal device for refrigerators and the like formed as a portable unit and particularly intended for use in a refrigerator having a hole through the wall of the refrigerating chamber, said unit comprising a small casing adapted to be inserted into and removed from the refrigerating chamber, an incandescent bulb carried by the casing interiorly thereof, a dry cell within the casing, a thermostatic element within the casing for closing the light circuit when the temperature within the casing passes a predetermined upper limit, said casing being of heat-conducting material and being disposed in heat-conducting relationship to the inner surface portion of the chamber, and a projecting light-transmitting pencil also forming a part of said unit and having one end in light-receiving relation to said bulb, said pencil being disposed in the hole through the chamber wall so that the light is visible from the exterior of the refrigerator.

3. A warning signal device for refrigerators and the like, comprising a small casing of elongated shape and of heat conducting material, an incandescent bulb located within the casing, a dry-cell battery within the casing, a thermostatic element within the casing for closing the light circuit when the temperature within the casing passes a predetermined upper limit and interrupting the circuit when the temperature falls to said limit, a pencil of light-transmitting material having one end in light-receiving relation to said bulb and a portion of said pencil projecting from one end of the casing, said casing being disposed in a refrigerating chamber having a hole in the wall thereof and said projecting portion of the pencil being disposed in said hole so as to carry rays of light to the exterior of the chamber when the predetermined upper temperature limit is exceeded, and means for detachably securing said pencil to said casing.

ARTHUR J. TICKELL.