Jan. 23, 1923. 1,443,136.

F. C. LA MAR.

THERMOSTATIC INDICATOR FOR ELECTRIC FUSES.

FILED JUNE 7, 1920.

Fig. 1.

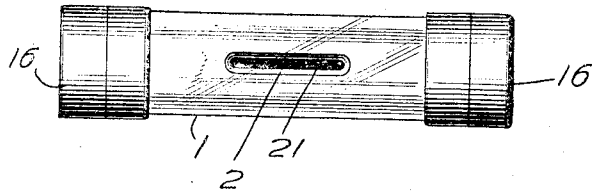


Fig. 2.

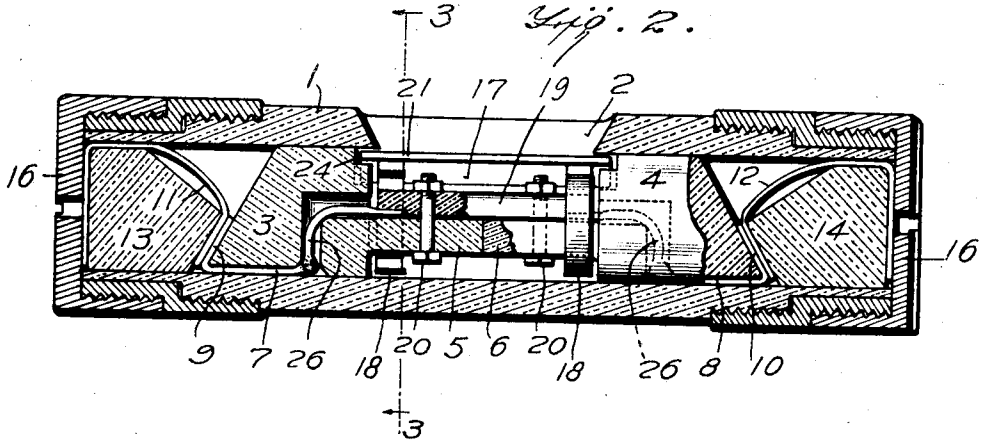


Fig. 3.

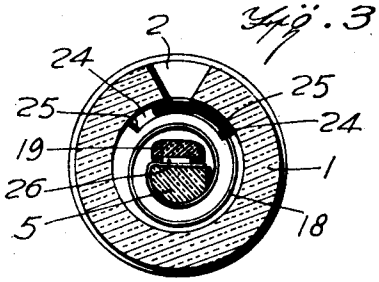
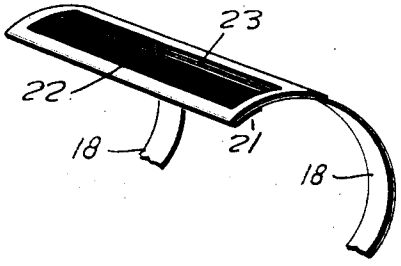


Fig. 4.



INVENTOR.

FRANK C. LA MAR,

BY

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Patented Jan. 23, 1923. 1,443,136

UNITED STATES PATENT OFFICE.

FRANK C. LA MAR, OF PITTSBURGH, PENNSYLVANIA.

THERMOSTATIC INDICATOR FOR ELECTRIC FUSES.

Application filed June 7, 1920. Serial No. 387,018.

To all whom it may concern:

Be it known that I, FRANK C. LA MAR, a citizen of the United States, residing at Pittsburgh, in the county of Allegheny and State of Pennsylvania, have invented a certain new and useful Improvement in Thermostatic Indicators for Electric Fuses, of which the following is a specification.

This invention relates to electric fuses.

The object of the invention is to provide such fuses with an indicating device or attachment, which is simple and economical in construction, and also efficient and positive in operation, and the purpose of which is to positively notify an operator or attendant whether the circuit in which the fuse is placed as a protecting medium is open or closed, and thereby avoid all danger of injury to the operator or attendant from electric shock in attempting to repair or adjust the machinery operated by the current passing through the fuse and also to notify the operator or attendant when the fuse is blown-out so the fuse may be removed for refilling or reloading without danger of shock, and also avoid loss of time and delay in locating a particular fuse, which has blown-out or become ruptured in service.

Another object of the invention is to provide an indicator for an electric fuse which is permanent and continuous in operation and needs no repair or replacement of parts, a difficulty which is common in the indicators now in use on some types of electric fuses. So far as I as aware I am the first to provide an indicator for electric fuses which constitutes a permanent attachment for the fuse and which will continuously indicate positively the flow or interruption of current through the circuit in which the fuse is placed.

With this understanding of the broad principle and purpose of the invention, it will be stated that the invention is particularly designed for use in connection with what are known as refillable fuses and is applicable to any of the well known fuses of this type, and I have shown herein the indicator forming the subject of this invention applied to a refillable fuse of the construction and principle of that type described and claimed in my co-pending application filed June 3, 1920.

In an application for patent for indicators for electric fuses filed concurrently herewith I have shown a fuse of this general type including an electrically operated indicator wherein the indicator mechanism is controlled or operated by a solenoid or electromagnet connected in circuit with the fuse element, and the object of this invention is to provide an electrically operated thermostatic indicator instead of the solenoid or electro-magnetically operated indicator of the application filed concurrently herewith, although I have presented in said application claims broad enough to cover either form of the indicator involved in the principle of the invention.

The invention, therefore, consists in an electric fuse, comprising a casing, a fuse element fixed in said casing, and an electrically operated thermostatic indicator connected in circuit with the fuse element, and also in the details of construction, combination and arrangement of parts, all substantially as I will proceed now more particularly to set forth and finally claim.

In the accompanying drawings, illustrating the invention, in the several views of which like parts are similarly designated, Figure 1 is an elevation of the fuse. Fig. 2 is a longitudinal section of the fuse on a larger scale. Fig. 3 is a transverse section, taken substantially in the plane of line 3—3, Fig. 2, and looking in the direction of the arrows, and Fig. 4 is a partial perspective view of the thermostatic indicator.

In the drawings, 1 is the casing, having an elongated opening 2 in its side. 3 and 4 are portions of a two-part plug member of suitable insulating or refractory material adapted to be permanently or otherwise securely fastened upon the inside of the casing about centrally thereof. These portions 3 and 4 of the plug are similar in construction and comprise solid block-like end portions having their outer faces beveled, and inwardly projecting, reduced and narrowed portions 5 and 6 at their inner faces adapted to abut at their ends when the parts are placed in the casing as herein shown, and serve as a support for the thermostat to be described.

7 and 8 represent portions of the main fixed fuse element fitted upon said blocks and having their terminal portions 9 and 10 extended beyond the blocks and bent into engagement with the beveled ends of the plug blocks and adapted to be engaged by the removable fuse elements 11 and 12 fitted upon blocks 13 and 14 in the ends of the casing and held in place by end ferrules 16

and 16, all substantially as in my applications referred to.

The construction and arrangement of the fixed fuse supporting plug, as above described affords a space or chamber 17 between the block shaped ends 3 and 4 of the plug in which is located an electrically controlled or operated thermostatic indicator which may be of any suitable construction and arrangement to serve the purpose of this invention.

As herein shown the thermostat comprises two volute thermostatic members 18 fitted upon the projecting portions 5 and 6 of the plug members 3 and 4 and having their inner ends clamped upon the said projecting portions 5 and 6 adjacent to the inner faces of the plug members, by means of an insulating bar 19 and bolts 20 passing through the bar and projecting portions of the plug members. The outer free ends of the volute thermostatic members 18 are connected by a narrow plate or bar 21, and the upper surface of said plate or bar is provided with distinctively parallel colored portions 22 and 23 such as black and red, respectively, or any other marks or characters to indicate "on" and "off," and when assembled in the fuse this plate or bar 21 will be adjacent to the opening 2 in the casing and normally expose the black portion of the plate or bar. The ends of the bar or plate 21 project beyond the volute thermostats and extend into notches or cutaway portions 24 at the edges of the inner fuses of the plug members, the ends 25 of said notches or cutaway portions serving as stops to limit the movements of the indicating plate or bar in the operation of the device.

The inner ends of the volute thermostatic members 18 are connected in circuit with the main or fixed fuse elements 7 and 8 by metallic connections 26 clamped by the bar 19 or otherwise held in contact with the ends of the thermostats, and soldered or otherwise electrically connected with the main or fixed fuse elements.

As in my concurrent application filed herewith, the thermostatic elements and their connections with the main fuse elements will be of a greater load carrying capacity than the main fuse elements, in order to protect the thermostatic indicator from injury in case of a blow out due to overloading the fuse with removable end fuse elements of greater load carrying capacity than the main fuse elements, as has been clearly defined and for the purpose as set forth in my said application.

With the fuse of the present invention, it is obvious that when in use and the current turned on, the current will pass through the thermostatic elements and cause them to expand and by their torsional action will move the indicating bar 21 until the red portion thereon will be exposed at the opening 2 in the casing and stopped or held in such position by engaging the ends 25 of the notches 24 in the plug, and thus indicate that the current is on and thus notifying the attendant of danger and avoiding injury, or accident by shock in attempting to remove or adjust the fuse. When the current is turned off, the thermostatic elements will relax or return to their normal position and move the bar or plate 21 so that its black portion will be exposed at the opening in the casing, thus indicating that the current is off. These operations are repeated as many times as the current traversing the fuse is turned on and off, thus making a permanent indicator for the off and on conditions of the current passing through the fuse.

Should the fuse be blown by an excess current, the removable end fuses will be ruptured and the circuit broken thereby, and the thermostatic indicator be thrown out of circuit and the indicator bar returned to normal position with its black portion exposed at the opening in the casing to indicate that the fuse had been blown and requires new or fresh removable end fuse elements.

In refilling the fuse, should it be reloaded with end fuse elements of greater carrying capacity than the main or permanently fixed fuse element and the current turned on and the fuse subjected to an overload or short circuit, the main or fixed fuse element would be blown out or ruptured and open the circuit and permanently destroying the fuse against further use, thus causing the thermostatic indicator to relax and return the indicating bar to bring its black portion opposite the opening in the casing and thus indicate that the fuse has been blown.

Thus, it will be observed that I have provided a fuse which is absolutely safe and protective against the possibility of overloading, which as is well known is the serious objection and dangerous element existing in fuses of this sort now in common use.

I do not wish to be understood as limiting this invention to the specific details of construction herein shown and described, as the same may be altered in various particulars, and still be within the scope of the appended claims.

What I claim is:—

1. An electric fuse, comprising a casing, a fuse element fixed in said casing, and an electrically operated thermostatic indicator connected in circuit with said fuse element to indicate the off and on conditions of the current passing through said fuse.

2. An electric fuse, comprising a casing having an opening therein, a fuse element fixed in said casing, and an electrically operated thermostatic indicator located in the casing and connected in circuit with the fuse element and adapted to indicate the off and

on conditions of the current passing through said fuse at the opening in the casing.

3. An electric fuse, comprising a casing having an opening therein, a plug of insulating material fixed in said casing, and having a recess between its ends, a fuse element mounted in said plug and having its terminals exposed at the opposite ends of said plug, an electrically operated thermostatic indicator fitted in the recess in said plug and connected in circuit with the fuse element, whereby the indicator is operated by the current passing through the fuse to indicate the off and on conditions of the current at the opening in the casing.

4. An electric fuse, comprising a casing having an opening therein, a plug of insulating material comprising two like or similar members adapted to be fitted in the ends of the casing and having reduced inwardly projecting abutting portions adapted to form a recess between the ends of the plug, main fuse elements carried by the plug members and having their terminals exposed at the outer ends thereof, an electrically operated thermostatic indicator fitted in the recess between said plug members and supported therein by the inwardly projecting portions of said members and electrically connected with said fuse elements, and removable fuse elements adapted to be inserted in the ends of the casing and contacting with the terminals of the main fuse elements, the said thermostatic indicator adapted to be operated by the current passing through the fuse to indicate the off and on conditions of the current at the opening in said casing.

5. In an electric fuse, a casing having an opening therein, a fuse element fixed in said casing, and a thermostatically operated indicating mechanism mounted in said casing and comprising two volute thermostatic members supported at their inner ends in spaced relation, and an indicating bar or plate connecting the outer ends of said thermostatic members and arranged adjacent to the opening in the casing, said thermostatic members being connected in circuit with the fuse element, whereby said indicating bar or plate will be moved with relation to the opening in the casing by the expansion and contraction of the thermostatic members when the current passing through the fuse is on and off.

In testimony whereof I have hereunto set my name this 7th day of June, A. D. 1920.

FRANK C. LA MAR.