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D. HILGENBERG

1,950,240

CIRCUIT CLOSER

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Fig. 1.

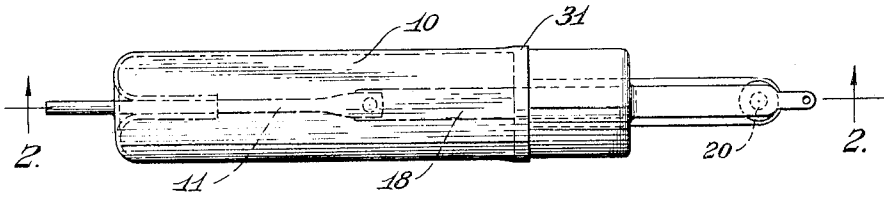
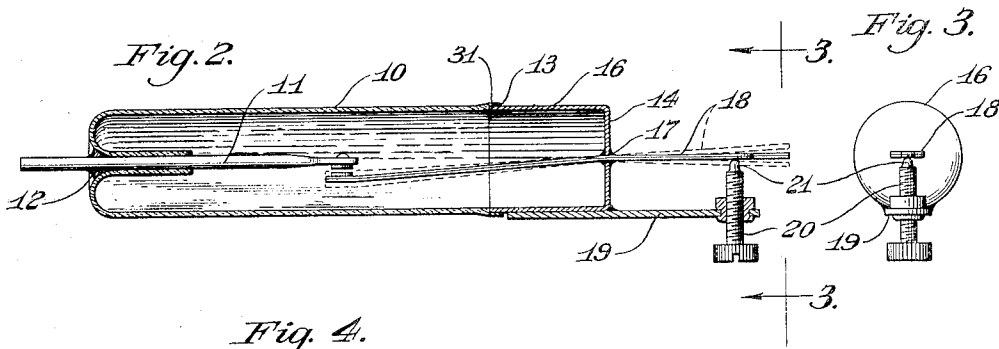


Fig. 4.

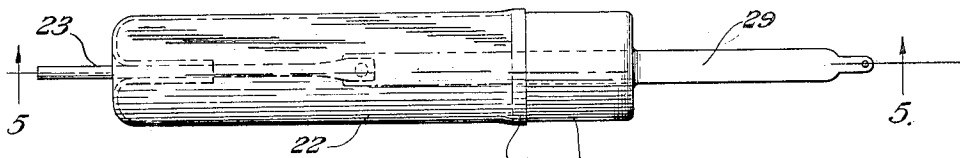
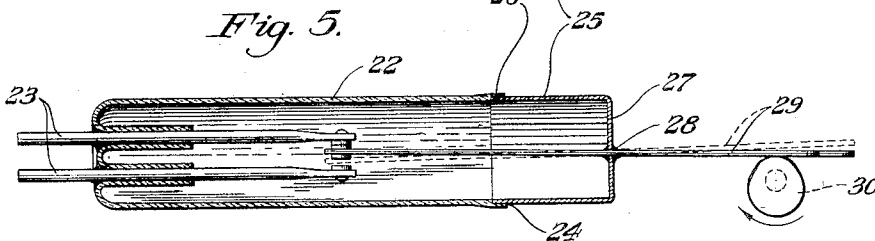


Fig. 5.



David Hilgenberg.
INVENTOR

BY *Victor J. Evans & Co.*

HIS ATTORNEYS

UNITED STATES PATENT OFFICE

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CIRCUIT CLOSER

David Hilgenberg, Chicago, Ill.

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4 Claims. (Cl. 200—138)

This invention relates to certain novel improvements in circuit closers, and has for its principal object the provision of an improved construction of this character which will be highly efficient in use and economical in manufacture.

It is an object of this invention to provide an improved circuit opener and closer and to construct the same so as to avoid certain disadvantages of the mercury type of circuit closer hereinafter referred to.

Another object of the invention is to provide an improved temperature-responsive circuit maker and breaker.

A further object of the invention is to provide a novel mounting for the circuit-closing element and to provide in combination therewith novel means for adjusting the circuit-closing element relative to a fixed contact member or members so that the circuit-closing element will make and break circuit at preselected temperatures.

A further object of the invention is to provide a novel flexible diaphragm for mounting a circuit-closing element which may be a temperature-responsive member, in a casing and to construct said mounting so that it will permit movement of the circuit-closing element relative to a fixed contact member or members while still forming an hermetical seal for the casing of which the mounting forms a part.

Other objects will appear hereinafter.

The invention consists in the novel combination and arrangement of parts to be hereinafter described and claimed.

The invention will be best understood by reference to the accompanying drawing, showing the preferred form of construction and in which:

Fig. 1 is a top plan view of a preferred form of the invention;

Fig. 2 is a longitudinal sectional view on line 2—2 in Fig. 1;

Fig. 3 is an end elevational view on line 3—3 in Fig. 2;

Fig. 4 is a top plan view of a modification of the invention; and

Fig. 5 is a longitudinal sectional view on line 5—5 in Fig. 4.

In the form of the invention shown in Figs. 1 to 3 inclusive, 10 indicates a non-conductive casing within which is a relatively fixed contact member 11 that is hermetically sealed to the casing 11 as at 12. The casing 10 has an open end 13 and to close this open end I provide a closure cap 16 which includes as one wall thereof a flexible metal diaphragm 14. The cap 16 has a pressed fit under an annular flange 31 formed at the open end

of the casing 10. This flange 31 is hermetically sealed to the cap 16 in any suitable manner. The diaphragm 14 is preferably made of a relatively thin sheet of metal for which purpose flexible sheet copper is well suited. The cap 16 is secured to the casing 10 and the casing 10 is then exhausted of air and filled with an inert gas such as nitrogen or argon, after which the casing 10 is sealed in any suitable manner as by sealing off the usual glass teat, not shown.

Mounted between its ends in the diaphragm 14 and secured thereto as by soldering 17 is a temperature-responsive member 18 which may be of any suitable type such, for example, as the bi-metallic type having on opposite sides thereof metals which have unequal coefficients of thermic expansion.

Mounted in a suitable support adjacent the diaphragm 14, as by an arm 19 suitably secured to the cap 16, is an adjustable element or set screw 20 which has an end portion 21 that has bearing engagement with the temperature-responsive strip 18.

The contact member 11 and temperature-responsive member 18 may be associated in any conventional manner with any circuit that it may be desired to make and break at preselected temperatures.

The inner end of the temperature-responsive member 18 may be spaced from the relatively fixed contact member any pre-selected distance within a considerable range of movement by adjusting the element 20 which has the end portion 21 bearing against one end portion of the member 18; the flexibility of the diaphragm 14, to which the member 18 is attached, permitting adjustment and movement of the temperature-responsive member 18 relative to the fixed contact member 11, while at the same time the diaphragm 14 acts as a part of the casing and keeps the same hermetically sealed to prevent oxidation of the members 11 and 18.

The inner end of the member 18 may be spaced from the contact member 11 a preselected distance corresponding to a given temperature at which it is desired to have the member 18 contract and engage contact member 11 to close a circuit which will be broken when the member 18 reaches a temperature sufficient to expand the member 18 and move the same out of engagement with the contact member 11.

In the form of the invention shown in Figs. 4 and 5 a non-conductive casing 22 is provided and this casing may be similar to the casing 10. However, in this form of the invention I provide a pair

of spaced fixed contact members 23 in place of the single contact member 11. The casing 22 has an open end 24 about which is formed an annular flange 26. To close the open end of the casing 22 I provide a closure cap 25 which includes as one wall thereof a flexible diaphragm 27 that is similar to the diaphragm 14. This cap has a pressed fit under the flange 26 and may be hermetically sealed to the casing 22 in any suitable manner. Extended through the diaphragm 27 and secured thereto, as by soldering 28, is a relatively stiff circuit-closing member 29, the inner end portion of which extends between the fixed contact members 23. To contact the inner end portion of the circuit-closing member alternately with the contact members 23 alternately to make and break circuit therewith the outer end portion of the circuit-closing member 29 may be operated in any suitable manner, as by a conventional cam mechanism indicated schematically at 30. When so operated the flexibility of the diaphragm 27 permits the circuit-closing member 29 to be moved sufficiently to engage alternately the contact members 23 while the diaphragm 27 and the mounting of the circuit closing member 29 therein assures an hermetical seal at the end 24 of the casing to prevent admission of air and consequent oxidation of the contact members and circuit-closing member.

To those skilled in the art it will, from the foregoing description of my invention, be apparent that I have provided an improved circuit closer having all the advantages of the commonly used mercury type of circuit closer while avoiding the objectional feature in the latter type which resides in the strong tendency of mercury to oxidize or corrode during use, resulting in unsatisfactory performance.

While I have illustrated and described the preferred form of construction for carrying my invention into effect, this is capable of variation and modification, without departing from the spirit of the invention. I, therefore, do not wish to be limited to the precise details of construction set forth, but desire to avail myself of such variations and modifications as come within the scope of the appended claims.

Having thus described my invention what I claim as new and desire to protect by Letters Patent is:

1. A circuit opening and closing device com-

prising a casing having an opening extending thereinto, a relatively fixed contact member in the casing, a closure member to close said opening including a flexible diaphragm, and a temperature-responsive member extended through and fixed between its end to said diaphragm, said temperature-responsive member being adapted to flex with said diaphragm and having an end portion in said casing adapted to alternately make and break circuit with said contact member.

2. A circuit opening and closing device comprising a casing having an opening extending thereinto, a relatively fixed contact member in the casing, a closure member to close said opening including a flexible diaphragm, a temperature-responsive member extended through and fixed between its ends to said diaphragm, said temperature-responsive member being adapted to flex with said diaphragm and having an end portion in said casing adapted to alternately make and break circuit with said contact member, and an adjustable element having bearing engagement with said temperature-responsive member outside the casing.

3. A circuit opening and closing device, comprising a casing including a wall having a relatively thin flexible metallic portion in the form of a diaphragm, a relatively fixed contact member in the casing, and a temperature-responsive member including a portion attached to said diaphragm; said temperature-responsive member having a portion in said casing adapted to flex with said diaphragm so as alternately to engage with, and to be disengaged from, said fixed contact member.

4. A circuit opening and closing device, comprising a casing including a wall having a relatively thin flexible metallic portion in the form of a diaphragm, a relatively fixed contact member in the casing, a temperature-responsive member extended through, and attached between its ends to, said diaphragm; said temperature-responsive member having a portion in said casing adapted to flex with said diaphragm so as alternately to engage with, and to be disengaged from, said fixed contact member, and an adjustable element having bearing engagement with said temperature-responsive member externally of said casing.

DAVID HILGENBERG.