W. G. NAGEL.
CIRCUIT BREAKER FOR ELECTRICALLY HEATED DEVICES.
APPLICATION FILED FEB. 11, 1909.

948,704.
Patented Feb. 8, 1910.
2 SHEETS—SHEET 1.

Fig. 1

Fig. 2

Fig. 3

Witnesses.
Nagle B. Kurtz
Mattie Hammer

Inventor.
William G. Nagel.
By Brown & Brown,
Kattys.
UNITED STATES PATENT OFFICE.

WILLIAM G. NAGEL, OF TOLEDO, OHIO.

CIRCUIT-BREAKER FOR ELECTRICALLY-HEATED DEVICES.


To all whom it may concern:

Be it known that I, William G. Nagel, a citizen of the United States, and a resident of Toledo, in the county of Lucas and State of Ohio, have invented a certain new and useful Circuit-Breaker for Electrically-Heated Devices; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, referring to the accompanying drawings, in which:

Figure 1 is a plan of an iron embodying one form of my invention, with a portion of the top thereof broken away. Fig. 2 is a side elevation of the same with the iron in partial section on the line $x-x$ in Fig. 1. Fig. 3 is an enlarged side view of the fuse shown in Figs. 1 and 2, with its end portions in section. Fig. 4 is a plan of an iron provided with a modified form of my invention, and with a portion of the top casing thereof broken away. Fig. 5 is a side view thereof in section on the line $y-y$ in Fig. 4, and Fig. 6 is an enlarged central longitudinal section of the form of fuse shown in Figs. 4 and 5.

Referring to Figs. 1 and 2, in which the preferred form of my invention is shown, 1 designates an iron, which may be of any suitable construction, and is hollow or provided with an interior chamber 2 for receiving any suitable form of heat translating device, as is conventionally indicated by the resistance coil 3.

Located within the chamber 2, preferably at the rear end thereof, is a fuse tube or shell 4, which is removably held in upright position therein by being gripped at its upper end between contact fingers or members 5, 6, one or both of which may be of spring material or yeldable to adapt them to cooperate to yieldingly grip the tube. The finger 5 is shown as being attached to the rear wall of the chamber 2 and has an end angled, as at 5' Fig. 1, and connected to a terminal 7, which insulatingly projects through said rear wall into a plug-socket 8. The finger 6 is shown as projecting upwardly from a pedestal 9 within the chamber 2, to which pedestal it is insulatingly secured, and as connecting to one end of the resistance coil 3. The other end of the resistance coil connects to a conductor member 10, which in turn attaches to a terminal 7', which projects within the socket 8 and is of opposite polarity to the terminal 7, thus enabling a current to flow from one terminal to the other through said conductor parts when the fingers 5, 6 are in electrical connection through the medium of the fuse 4.

While the fuse-shell 4 may be of any suitable construction, a simple form of the same is shown in Figs. 1, 2 and 3, and consists of four like parts 11 secured together in the form of an oblong shell and spaced from each other by insulation strips or gaskets 12 and 18, which divide the shell both longitudi-
finally and transversely into two corresponding parts. Disposed within an end of this shell is a fusible alloy or substance, which adheres to the interior of the shell at such end and forms an electrical conductor between the two parts 11, 11, which are transversely spaced by the insulation 12 and disposed on the same side of the insulation 13 with the alloy. The fuse shell when in use is intended to stand upright with the fingers 5, 6 in contact with the opposed parts, 11, 11 of the upper end whereby to electrically connect such parts. It is thus apparent that when the alloy is fused by heat conducted thereto from the interior of the chamber 2 or the walls thereof, it will drop by gravity to the lower end of the shell, thus breaking the electrical connection between the parts 11, 11 of the upper half and electrically connecting the parts 11, 11 of the lower half of the shell to adapt the shell for use again when inverted to place the alloy-connected parts 11 in contact with the fingers 5, 6. To facilitate a removal or insertion of the shell 4 relative to the chamber 2, the chamber top is provided with an opening above the shell, which opening is closed by a screw-cap 15.

In the operation of this form of my invention it is apparent that when a plug, the electric terminals of which have connection with a source of electrical supply, is inserted into the socket 8 in proper contact with the terminals 7, 7' and a fuse tube or shell 4 is in proper contact with the contact fingers 5, 6 with the alloy at its upper end, a circuit will flow through the terminal 7, finger 5, upper parts 11, 11 and connecting alloy 14 of the shell, finger 6, resistance 3, member 10 and terminal 7', or vice versa, according to the direction of flow of the current. Should the iron become heated to a predetermined degree at which the alloy is adapted to fuse, the heat communicated to the shell therefrom will effect such fusing and a consequent breaking of the heating circuit due to the alloy dropping to the lower end of the shell. To again close the circuit it is only necessary to invert the fuse-shell, thus placing the parts 11, 11, which are electrically connected by the alloy, in contact with the fingers 5, 6.

In Figs. 4, 5 and 6, in which a slightly modified form of my invention is shown, A designates the iron; B the chamber therein in which the heat translating device or coil C is located; D a socket or opening in the top of the iron, contiguous to which are disposed the terminals E, E'; F a conductor connecting one terminal with an end of the coil C; G a conductor connecting at one end to the other end of said coil and having its other end connected to the forked spring contact fingers H, H between which the fuse-tube or shell is gripped, and I the fuse-tube or shell. This shell is inserted into the chamber B through an opening a in the rear end of the iron and is shown as resting on a slightly elevated portion b' or the bottom of the chamber, which portion has a surface groove c extending inwardly from the opening.

The fuse tube or shell I is shown as comprising a tubular insulation member d, the ends of which are inserted into conductor sockets or caps e, e, which sockets in turn have their outer end portions inclosed by sockets or caps f, f, of insulating material. The inner end portions of the sockets e, e, are insulatingly spaced from each other but project beyond the inner ends of the sockets f, f, a sufficient distance to afford contact surfaces at either end of the tube for the contact fingers H, H. Conductor buttons g, which are headed at each end, pass through central apertures in the insulation sockets f and larger apertures h in the ends of the sockets e, whereby the walls of said latter apertures are spaced therefrom, as shown. Electrical connection is afforded between the socket e and button g at one end of the tube by a fusible alloy i at such end, which, when fused drops to the opposite end of the tube and connects the socket e and button g at such end.

When the fuse-tube is positioned within the chamber B the button at the upper end thereof has contact with a finger J, which projects from an insulation block k, secured to the under side of the chamber top, and connects through a conductor K with the terminal E'. It is thus seen that when the fuse tube is gripped by the fingers H, H with the alloy end up, a circuit will be closed between the two terminals E E' through the conductor F, coil C, conductor G, contact fingers H, H, upper part of e, alloy i and upper button g of the fuse tube, and conductor K. To provide a visual means of determining if the circuit between the terminals E, E' is closed, I make the shanks of the buttons g of sufficient length to permit the buttons g to have limited longitudinal movements in the ends of the tubes. As gravity will cause the lower free button to project from the tube end it will be soldered in this position when the alloy at the upper end of the tube fuses and drops upon the same. As the upper button becomes free by the dropping of the alloy therefrom it will be apparent that it can be readily perceived which button is electrically connected to the socket e at the end therewith, or if the alloy at the upper end of the tube has fused. When the shell is inserted into the opening of the iron the projected end of the lower button is intended to work in the groove c in the raised portion b on which the fuse tube rests.

L designates a handle which is attached to
the fuse tube I and is intended to project from the opening a when the tube is inserted therein, thus facilitating an insertion or withdrawal of the tube.

I wish it understood that my invention is not limited to any specific arrangement or construction of the parts except in so far as such limitations are specified in the claims.

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

1. In an apparatus of the class described, a heat cartridge having a body of softenable or fusible material normally held in suspense therein, and means movably carried by the cartridge and held fixed relative thereto by such material when in normal position.

2. In an apparatus of the class described, a reversible fuse-shell, a fusible substance normally held in suspense therein but released by excessive heat conditions, means at the lower end of the shell whereby the normal condition of the shell may be restored upon being reversed after a descent of said substance, and indicator means movably carried at each end of the shell and fixed against movement relative thereto by said substance when at the end therewith.

3. The combination with an electric circuit, of a protective device included therein and comprising a reversible cartridge having contact pins movably projected through its ends and a mass of softenable material confined therein, held normally in suspense and soldering the upper pin in fixed position relative to the cartridge, said material being released by the presence of undue external heat and on descending adapted to open the circuit and fix the lower pin relative to the cartridge.

4. The combination with an electric circuit, of a protective device included therein and comprising a shell, contact parts carried by the shell for movements relative thereto and to each other, and a mass of softenable material confined within the shell, held normally in suspense and soldering one contact part against movement relative to the shell, said material being released by the presence of undue heat and on descending opening the circuit and securing the other contact part in fixed operative relation to the shell, whereby the device is reversible after each operation.

In testimony whereof I have hereunto signed my name to this specification in the presence of two subscribing witnesses.

WILLIAM G. NAGEL.

Witnesses:
C. W. OWEN,
HAZEL B. HITT.