Dec. 25, 1934. H. H. DODGE 1,985,340

ELECTRIC CONTACT DEVICE FOR AUTOMATIC OPERATION OF MECHANISMS

Filed Feb. 20, 1933 2 Sheets-Sheet 1

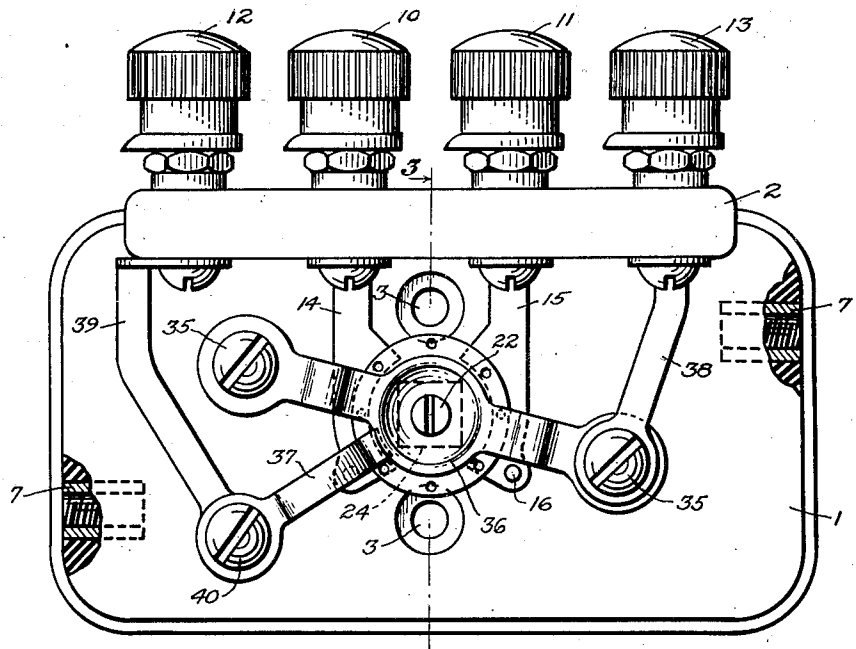


Fig. 1

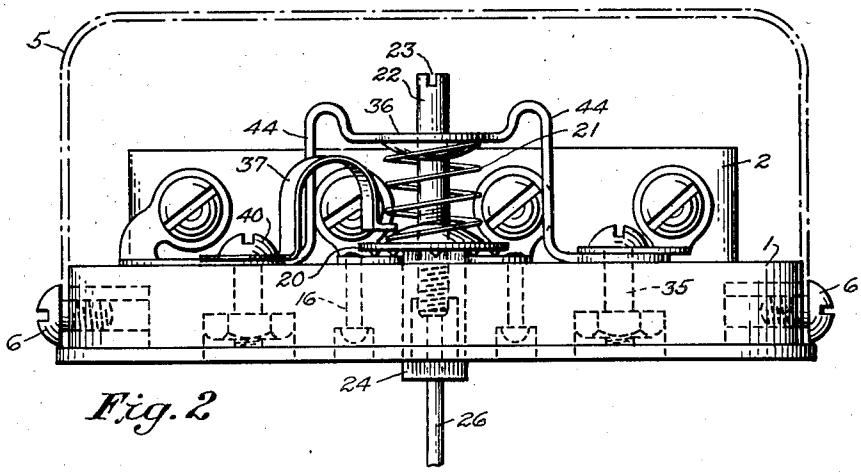


Fig. 2

H. H. Dodge
Inventor

by

Attorney

Dec. 25, 1934. H. H. DODGE 1,985,340

ELECTRIC CONTACT DEVICE FOR AUTOMATIC OPERATION OF MECHANISMS

Filed Feb. 20, 1933 2 Sheets-Sheet 2

Fig. 4

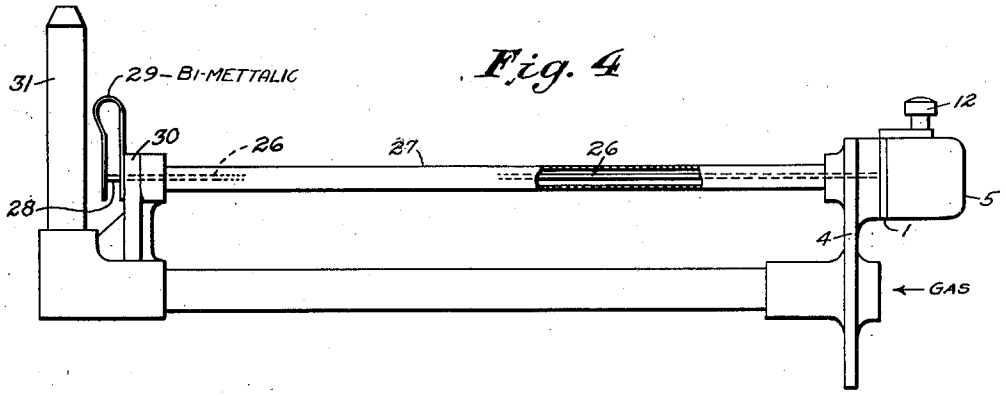


Fig. 5

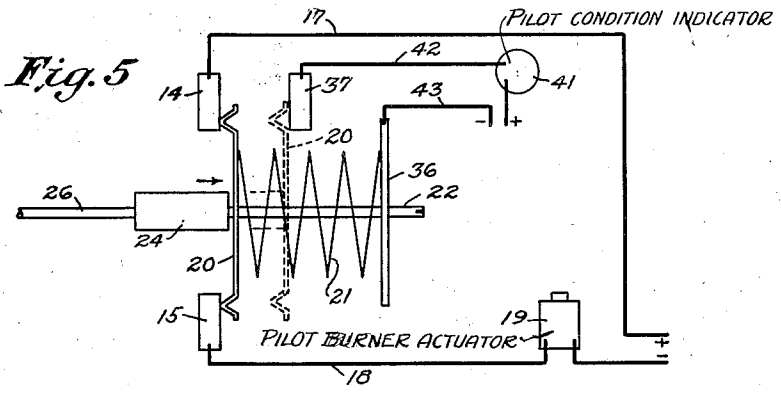
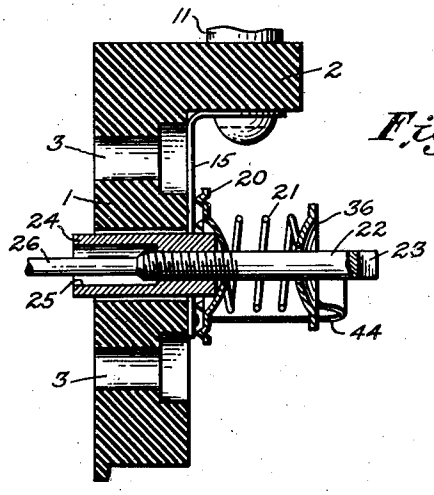


Fig. 3



H. H. Dodge
Inventor

by

Attorney

Patented Dec. 25, 1934 1,985,340

UNITED STATES PATENT OFFICE

1,985,340

ELECTRIC CONTACT DEVICE FOR AUTOMATIC OPERATION OF MECHANISMS

Harry H. Dodge, Williamsport, Pa., assignor to J. H. McCormick & Co., Williamsport, Pa., a corporation of Pennsylvania

Application February 20, 1933, Serial No. 657,700

7 Claims. (Cl. 200—138)

This invention relates to electric contact devices for automatic operation of mechanisms and has for its object to provide a construction which is compact, cheap to manufacture, simple in operation, and more efficient in use than those heretofore proposed.

With these and other objects in view the invention resides in the novel details of construction and arrangements of parts as will appear more fully hereinafter and be particularly pointed out in the claims.

Referring to the accompanying drawings forming a part of this specification in which like numerals designate like parts in all the views,—

Fig. 1 is a face view of the switch block;

Fig. 2 is a bottom plan view of the parts shown in Fig. 1;

Fig. 3 is a vertical sectional view taken as on the line 3—3 of Fig. 1 and looking in the direction of the arrows;

Fig. 4 is a diagrammatic illustration of a pilot burner assembly with which this device is intended for use; and

Fig. 5 is a wiring diagram of the apparatus.

This invention is particularly adapted for use with burners utilizing gas or other fuel and wherein there is employed a pilot burner which is intended to burn constantly and which furnishes the means for igniting the fuel when the burner proper is automatically put in operation as a result of temperature changes.

It is particularly adapted in such an assembly not only to automatically cut off the flow of gas to the pilot burner and/or the fuel burner when the pilot light goes out, but it also is adapted to control a circuit to give an alarm, either visual or audible, when said pilot light has become extinguished, thereby notifying an attendant or other person of the state of pilot condition.

The device comprises a block 1 of electrical insulation upon which is integrally or otherwise mounted a shelf 2, the latter disposed at substantially right angles to the formation of the block 1 and extending from a face thereof as clearly indicated in Fig. 3. Suitable openings 3 are provided for bolts for securing the block to any suitable support such as the plate 4 of the pilot burner assembly shown in Fig. 4. A cover 5 is indicated in dot and dash lines in Fig. 2 which is secured in place in any suitable manner such as by the screws 6 threaded into bushings 7 moulded in the mounting block 1.

The shelf 2 is drilled to receive a plurality of binding posts of which preferably there are four, the posts 10 and 11 being used in a circuit associated with means for cutting off the flow of gas to the pilot when the pilot light has become extinguished, and the other pair of posts 12 and 13 being used in an independent electric circuit associated with the alarm hereinbefore mentioned. The binding posts 10 and 11 are connected as shown to the pair of pilot contact strips 14 and 15 which are similar but oppositely formed.

Each strip extends downwardly, having its lower end secured to the mounting block 1 as by a rivet 16, and each strip has an arcuately formed edge facing the other strip so that, when the strips are in place, these arcuate edges may circularly encompass the push rod assembly later to be described.

With reference to Fig. 5 it will be seen that the contact strip 14 is connected as by the wire 17 to a source of current, and that the other contact strip 15 is connected as by the wire 18 to said source with any suitable mechanism generally indicated by the numeral 19 interposed in the circuit, said mechanism adapted to operate a valve in the gas line connection to the pilot burner to reduce the flow of gas therethrough or to close said valve when the circuit is broken. The circuit in said diagram is shown in closed relation by virtue of a contact ring 20 bridging the contact strips 14 and 15 and pressed against said strips by a light coil spring 21, in which relationship the pilot burner actuator 19 permits free flow of gas to the pilot.

The contact ring 20 is preferably stamped from sheet metal with its central portion pressed out of the plane of the ring proper so as to form a rounded or dome-shaped center which is apertured to receive therethrough the adjusting screw 22 which latter is provided with a kerf 23 in the outer end thereof to receive the blade of an instrument for turning said screw. The edge portion of the ring is provided with a plurality of spaced pointed projections extending from a face of the ring toward the faces of the pilot contact strips 14 and 15 to make better electrical contact therewith as well as to prevent sticking. The inner end of the screw is threaded for a considerable distance and engages the adjusting block 24 which is of a length to pass completely through the mounting block 1. This adjusting block is formed with flat sides, being shown of square cross sectional shape in Fig. 1, to prevent turning of said block but the opening therefor in the mounting block is sufficiently greater than the dimension of the adjusting block to permit ready longitudinal movement of the latter in the former. Preferably the adjusting block is centrally drilled to provide a

cavity 25 to receive therein the end of the push rod 26 so that the end of said rod may contact the threaded end of the adjusting screw 22.

The push rod 26 is of suitable length to extend through a tubular protecting casing 27 into the furnace where its end 28 is adapted to contact the free end of a looped bi-metal thermal strip 29, the other end of said strip being secured to a standard 30 associated with the pilot burner 31. In other words, and as will be clear from Fig. 4, the pilot burner has the thermal strip 29 closely mounted adjacent thereto so that the heat of the flame of said pilot may flex the strip, expanding it to cause the free end of said strip to move away from the fixed end thereof. This permits the light spring 21 to force the ring 20 into contact with both pilot contact strips 14 and 15, thereby closing the circuit hereinbefore described. Also the spring 21 and ring 20 force the adjusting block 24 to the left as seen in Fig. 3, and this in turn permits the push rod 26 to extend likewise to the left to keep its end 28 in contact with the heated or expanded thermal strip.

The adjusting screw 22 is turned by a suitable instrument to create the necessary adjustment of these parts so that when the thermal strip is so expanded, the contact ring 20 will close said circuit. On the other hand, when the pilot light goes out, the thermal strip will cool and therefore will contract or flex in the opposite direction so that its free end will move toward its fixed end, and this causes a reverse movement of the push rod which in turn disengages the contact ring 20 from the pilot contact strips 14 and 15, thereby opening said circuit. As hereinbefore stated, the spring 21 is of light construction, and therefore exerts no tension or pressure which is greater than the tension created by the contracting thermal strip.

The block 1 has mounted thereupon a spring support, of general inverted U-shape as seen in Fig. 2, the ends of said support being secured to said block by a pair of identical bolts 35. The middle portion 36 of this support is therefore seen to be spaced considerably from the face of the mounting block 1 by the standard portions 44 of said support. Said middle portion 36 has its center dished or bowed to provide a dome formation similar to that of the contact ring 20, the two domed portions of these members facing each other to provide seats for positioning the spring 21, and the adjusting screw 22 has a sliding fit within an aperture in the dome portion 36.

It will be clearly seen from Fig. 1 that this spring support is disposed obliquely on the face of the mounting block 1 to provide ample clearance for the alarm contact member 37, presently to be described. One of the bolts 35 secures one end of a bus bar or connection strip 38, the other end of which is integrally secured to the binding post 13.

The binding post 12 has rigidly secured thereto one end of a second bus bar or connection strip 39, the other end of which is secured by a bolt 40, carried by the mounting block 1, in metallic and electric contact with the fixed end of the alarm contact member 37. This member has its free end disposed closely adjacent the contact ring 20 on the side thereof opposite to the pilot contact strips 14 and 15 so that, when said ring is moved by the push rod 26, contact may be made with the end of said member. In order that there be no rigidity in this circuit closing contact, the member 37 is provided with an appreciable arch as clearly shown in Fig. 2 so that its free end may yield somewhat when contacted by the ring 20.

With reference to Fig. 5 it will now be seen that when the ring 20 is moved away from the pilot contact strips 14 and 15 and into the dotted line position shown in said figure, the edge portion of said ring will come to rest against the free end of the alarm contact member 37. When this occurs current may flow from a suitable source through the alarm, generally indicated by the numeral 41, over the wire 42 through the alarm contact 27 into the ring 20 and thence through the spring 21 into the spring support 36 and over the wire 43 back to the source.

It will thus be seen that the alarm contact 37 and the two pilot contact strips 14 and 15 are each and all insulatedly mounted, not only with respect to each other but with respect to the rest of the mechanism, and therefore neither of the two circuits can be closed except when the contact ring 20 is in one of its two limiting positions. The wires 17, 18, 42 and 43, have not been shown in Figs. 1, 2 and 3 for the sake of clearness, but it will be readily understood how they will be connected on the posts provided therefor by reference to the wiring diagram.

What is claimed is:—

1. In an electric circuit breaker the combination of a base of insulating material; a pair of spaced contacts fixed upon one surface of said base; a rod reciprocable through said base between said contacts, said rod moved in one of its directions by an external force; a metallic member carried by said rod and adjustable axially thereof, said member adapted to close said contacts when said rod is moved in the other of its directions; a metallic guide bracket fixed to said base and slidingly receiving an end of said rod; a spring disposed about said rod and electrically and operatively connecting said bracket and said member, said spring for moving the rod in said other of its directions; and a single contact fixed to said base and having a free end disposed between said member and said bracket, said end spaced from the plane of the pair of contacts; and adapted to make contact with said member upon movement of said rod under the urge of the external force.

2. In an electric circuit breaker the combination of a base of insulating material; a pair of spaced contacts having arcuate edge portions fixed upon one surface of said base; a rod reciprocable through said base between the arcuately formed portions of said contacts, said rod moved in one of its directions by an external force; a metallic member carried by said rod and adjustable axially thereof, said member having a circular edge portion adapted to contact and electrically close the arcuate portions of said contacts when said rod is moved in the other of its directions; a metallic guide bracket fixed to said base and slidingly receiving an end of said rod; a spring disposed about said rod and electrically and operatively connecting said bracket and said member, said spring for moving the rod in said other of its directions; and a single contact fixed to said base and having a free end disposed between said member and said bracket, said end spaced from the plane of the pair of contacts; and adapted to make contact with said member upon movement of said rod under the urge of the external force.

3. In an electric circuit breaker the combination of a base of insulating material; a pair of spaced contacts fixed upon one surface of said base; a

rod reciprocable through said base between said contacts, said rod moved in one of its directions by an external force; a metallic member carried by said rod and adjustable axially thereof, said member adapted to close said contacts when said rod is moved in the other of its directions; a metallic guide bracket substantially of U-shape fixed to said base, with the bottom of the U straddling the pair of contacts as well as disposed substantially parallel to the plane of said contacts, and slidingly receiving an end of said rod; a spring disposed about said rod within the confines of the U-shaped bracket, and electrically and operatively connecting said bracket and said member, said spring for moving the rod in said other of its directions; and a single contact fixed to said base and having a free end disposed between said member and the bottom of the U of said bracket, said end spaced from the plane of the pair of contacts; and adapted to make contact with said member upon movement of said rod under the urge of the external force.

4. In an electric circuit breaker the combination of a base of insulating material; a pair of spaced contacts fixed upon one surface of said base; a rod reciprocable through said base between said contacts, said rod moved in one of its directions by an external force; a metallic member carried by said rod and adjustable axially thereof, said member adapted to close said contacts when said rod is moved in the other of its directions; a metallic guide bracket fixed to said base and slidingly receiving an end of said rod; a spring disposed about said rod and electrically and operatively connecting said bracket and said member, said spring for moving the rod in said other of its directions; and a single contact fixed at one end to said base, the remainder bent hook-like in a direction away from the supporting surface of the base and terminating in a free end disposed between said member and said bracket, said end spaced from the plane of the pair of contacts; and adapted to make contact with said member upon movement of said rod under the urge of the external force.

5. In an electric circuit breaker the combination of a base of insulating material; a pair of spaced contacts fixed upon one surface of said base; a rod reciprocable through said base between said contacts, said rod moved in one of its directions by an external force; a metallic member carried by said rod and adjustable axially thereof, said member adapted to close said contacts when said rod is moved in the other of its directions; a metallic guide bracket fixed to said base and slidingly receiving an end of said rod; a spring disposed about said rod and electrically and operatively connecting said bracket and said member, said spring for moving the rod in said other of its directions; and a single contact fixed at one end to said base, the remainder bent hook like in a direction away from the supporting surface of the base and terminating in a free resilient end disposed between said member and said bracket, said end spaced from the plane of the pair of contacts; and adapted to make contact with said member upon movement of said rod under the urge of the external force.

6. In an electric circuit breaker the combination of a base of insulating material; a pair of spaced contacts carried by said base; a rod reciprocable between said contacts, said rod moved in one of its directions by an external force; a metallic member carried by said rod and adapted to close said contacts when said rod is moved in the other of its directions; a metallic guide bracket slidingly receiving an end of said rod; a spring electrically and operatively connecting said bracket and said member, said spring for moving the rod in said other of its directions; and a single contact fixed to said base and having a free end disposed between said member and said bracket, said end spaced from the plane of the pair of contacts; and adapted to make contact with said member upon movement of said rod under the urge of the external force.

7. In an electric circuit breaker the combination of a base of insulating material; a pair of spaced contacts carried by said base; a rod reciprocable between said contacts, said rod moved in one of its directions by an external force; a metallic member carried by said rod and adapted to close said contacts when said rod is moved in the other of its directions; a metallic guide bracket slidingly receiving an end of said rod; a spring electrically and operatively connecting said bracket and said member, said spring for moving the rod in said other of its directions; and a single contact fixed at one end to said base, the remainder bent hook-like in a direction away from the supporting surface of the base and terminating in a free resilient end disposed between said member and said bracket, said end spaced from the plane of the pair of contacts; and adapted to make contact with said member upon movement of said rod under the urge of the external force.

HARRY H. DODGE.