Sept. 26, 1944. A. H. LAIDIG 2,359,124

LAMP HOLDER

Filed Aug. 26, 1943

Fig. 1.

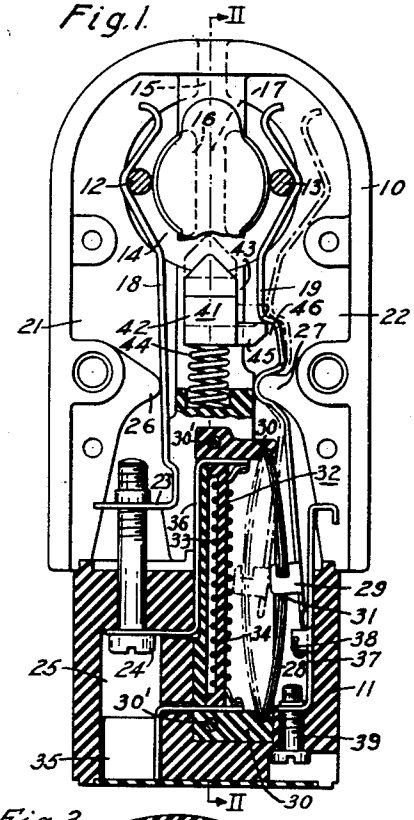


Fig. 2.

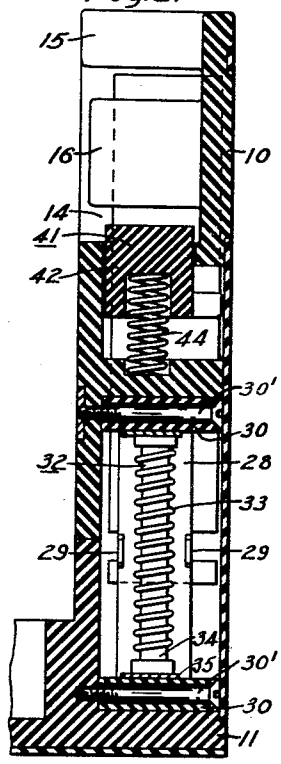


Fig. 3.

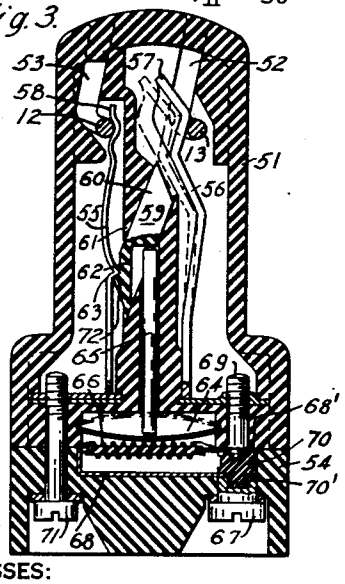
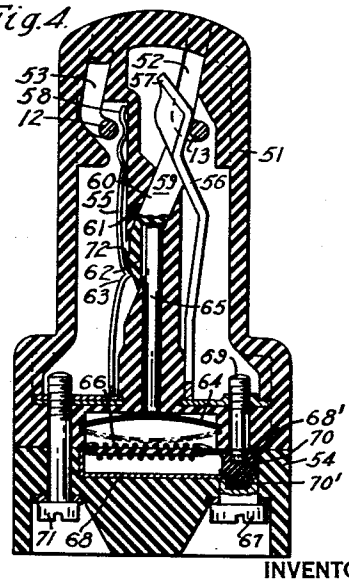


Fig. 4.



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UNITED STATES PATENT OFFICE

2,359,124

LAMP HOLDER

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19 Claims. (Cl. 200—122)

My invention relates, generally, to lamp holders or sockets of the type commonly used with double-ended electric discharge devices, such as fluorescent lamps, and, more particularly, to a lamp holder which is operable to interrupt the energizing circuit of the lamp in response to an abnormal operating condition, such as results when a lamp becomes deactivated, and fails to start upon repeated attempts effected by successive operations of the starting circuit.

Repeated unsuccessful attempts of the lamp to start frequently results in overheating and consequent damage to the starting circuit, due to the excessive flow of current during the starting period, as compared to the normal operating current of the lamp.

Therefore, the object of my invention, generally stated, is to provide a lamp holder of the character described, which shall be of simple and durable construction, which may be economically manufactured, and which shall function to automatically open the lamp circuit in response to an abnormal operating condition thereof.

A more specific object of my invention is to provide for protecting the starting and operating circuit of an electric discharge device, by utilizing a holder for the device which shall function, in response to an abnormal operating condition, to positively interrupt the energizing circuit of the device, and maintain the circuit in open condition until the cause of such abnormal condition has been remedied.

Another object of my invention is to provide a lamp holder of the character described, which embodies a current responsive means operable to effect movement of one of the contact fingers of the holder out of engagement with an associated contact pin of the lamp, to interrupt the lamp circuit in response to an abnormal operating condition.

A further object of my invention is to provide a lamp holder of the character described, wherein provision is made to automatically latch the disengaged contact finger in its disengaged position, and effect the release thereof to its normal operating position in response to a predetermined movement of the lamp within the holder.

Another object of the invention is to provide a holder of the character described, wherein the movable contact finger is actuated out of engagement with its associated contact pin of the lamp by means of a thermal actuating device responsive to excessive lamp current.

These and other objects of my invention will become more apparent from the following detailed description when read in conjunction with the drawing, in which:

Figure 1 is a back view, in elevation and partly in section, of a lamp holder and starter socket with the back cover removed, embodying the principal features of one form of my invention;

Fig. 2 is a side elevational view, in section, of the lamp holder and socket of Fig. 1, taken along lines II—II thereof;

Fig. 3 is a back view, in elevation and partly in section, of a lamp holder and starter socket of a different type, embodying the principal features of another form of my invention; and

Fig. 4 is a similar view, showing the elements of the lamp holder in their various positions, after the holder has functioned to interrupt the lamp circuit.

Referring to Figures 1 and 2, the lamp holder shown comprises a shell type housing 10 of insulating material, and a base member 11 which may be a portion of a socket or adapter for the starting switch (not shown) which is usually a part of the starting and operating circuit of the lamp.

The housing 10 is provided on its front face with suitable slots to receive the contact pins 12 and 13 of the lamp. In this instance, there is provided an annular slot 14 merging into a straight slot 15, extending to the upper edge of the housing, as shown in dotted lines. A guide stud 16 is disposed within the annular slot, and is also provided with a straight slot 17 in alignment with the upper slot 15. By means of this arrangement, the contact pins 12 and 13 may be inserted laterally, through the slots 15 and 17, and then rotated in the annular slot into engagement with the free contact making ends of a pair of contact fingers 18 and 19 mounted within the housing, as shown.

As shown in Fig. 1, the contact fingers 18 and 19 are in the form of elongated spring members positioned in the side recesses 21 and 22, so that their free ends extend upwardly within the housing, in cooperating relation with the slots 14, 15, and 17. In this position, the free ends of the contact fingers engage the contact pins 12 and 13 of the lamp, and are forced apart as the pins are rotated into locking position within the holder.

The contact spring 18 is provided with a bent mounting portion 23, secured to the housing by a screw 24 extending upwardly through an opening in the base member 11, communicating with a recess 25. The shank or intermediate portion of finger 18 engages an abutment 26 on the in-

side of the housing, which functions as a fulcrum for the finger.

The other cooperating contact finger 19 is so constructed, and is so mounted within the housing and asociated with other elements to be described, that it also functions as a switch to interrupt the lamp circuit under certain operating conditions. In this instance, the finger 19 is pivotally mounted for tilting movement toward and away from its associated contact pin 13. This finger is provided with a bent portion intermediate its ends, which engages an abutment 27 which functions as a pivot or fulcrum for the finger.

In order to provide for retaining the movable finger 19 in a normal operating position, as shown in full lines, and for actuating it to a disengaged position, as shown in dotted lines, the lower end thereof is connected to an actuating device in the form of a bimetallic member 28. This member is mounted within the housing and base on supporting blocks of insulating material 30 attached to the housing and base by screws 30' for movement between the two positions, as shown in full and dotted lines, and the lower end of the contact finger is connected thereto by means of hook members 29, engaging slots 31 in member 28. Any other suitable connection may be used.

A heater 32 comprising a resistance wire 33, wound upon an insulating member 34, is mounted adjacent the bimetallic member 28 between the supporting blocks 30 to cause it to function in a well known manner, to actuate the contact finger 19. The heater 32 is so constructed that, during normal operation of the lamp, the heat developed thereby will not be sufficient to actuate the bimetallic member 28 from its normal position, so that this member retains the lower end of the contact finger 19 in a fixed position, such that the upper end of the finger engages the lamp pin 13 with the proper amount of pressure. However, in the event that the heater 32 is subjected to an abnormal current, such as results when a lamp becomes deactivated, sufficient heat is developed to actuate the bimetallic member 28 to its dotted position, thereby tilting the free end of the contact finger 19 away from the lamp pin 13, to instantly interrupt the lamp circuit.

The bimetallic member 28 and its associated heater 32 may be termed a current responsive or thermal actuating means for the contact finger. The advantage in using a thermal device of this kind is that it functions to give the finger a snap action to quickly break the circuit. Any other suitable current responsive device may be utilized to control the movement of the contact finger under abnormal operating conditions.

In this instance, the heater 32 is connected in the circuit in series with the contact finger 18. The lower end of the resistance wire 33 is connected to a terminal member 35 in the base 11, and the upper end of the resistance wire is connected to a connector member 36, engaging the screw 24.

The other contact finger 19 is connected in the lamp circuit by means of the terminal screw 39, which engages another connector member 37, which is connected to the lower end of the contact finger by means of a flexible wire 38.

In order to provide for latching the movable contact finger 19 in its opened position, a spring biased latching device 41 is provided. This device comprises a latch member 42 which is mounted for vertical sliding movement in a suitable slot 43 in the housing, and is biased to a latching position by means of a spring 44. The latch member 42 is provided with a protruding portion 45 which engages a notch 46 in the contact finger, to hold the latch in a retracted position when the finger is in its normal operating position.

It will be apparent that, when the contact finger 19 is actuated as described, the latch member 42 will be released and moved to its latching position, in which position the protruding portion 45 will engage the upper end of the contact finger, to retain it in its disengaged position, as shown in dotted lines.

When the latch member 42 is in this position, the upper end thereof, which is provided with sloping faces, is in a position to be engaged by either one of the contact pins 12 and 13 as the lamp is rotated within the holder, when removing it for replacement purposes. When either one of the contact pins engage the upper end of the latch member, it is forced downwardly against the pressure of spring 44 in the notch portion 46, so that the contact finger is released to its normal operating position. When the lamp circuit has been interrupted a sufficient length of time cooling of the bimetallic member 28 results, so that it returns to its normal position; however, the heater 32 is not operatively connected in the series heating circuit for the lamp electrodes until the contact finger 19 is released by the latch member 45.

In view of the foregoing description of this embodiment of the invention, it will be apparent that this device functions as a snap-acting switch, and eliminates the use of a separate switch for controlling the lamp circuit. In view of the fact that the lamp circuit is maintained open until the lamp is removed, no current is consumed by the heater during the time the deactivated lamp remains in the holder.

Figs. 3 and 4 illustrate the manner in which my invention may be applied to a lamp holder of a different type commonly known as a straight-push type, as distinguished from the type shown in Figs. 1 and 2 which is commonly referred to as the twist-turn type. This holder likewise comprises a shell-type housing 51 of insulating material, provided with J-shaped slots 52 and 53 in the face thereof, to receive the lamp pins 12 and 13.

As shown, the housing 51 is mounted upon a base 54 which may be the socket or adapter for a starting switch (not shown). Mounted within the housing is a pair of contact fingers 55 and 56, having their free ends so disposed with respect to the ends of the J-shaped slots that they are engaged by the lamp pins when they are inserted into the holder.

In the particular holder illustrated, the contact fingers 55 and 56 are of unequal stiffness. Contact finger 56 is the stiffer or stronger finger, and has a bent-over end portion 57 which is engaged by the lamp pin 13 as it travels down the slot 52. The shape of this end portion is such that this contact finger is first urged to the left, and then moved to the right as it forces the pin 13 into the end of the slot in its normal position, shown in Fig. 3.

The contact finger 55 is more slender and, therefore, of lesser stiffness than the contact finger 56, and has its free end 58 normally positioned over the end of the slot 53, so that the contact pin 12 merely engages the finger and

urges it sidewise, so as to subject the finger to a slight tension.

In this embodiment of the invention, the latching device, shown generally at 59, functions both as a latch and a fulcrum for the finger 55. The latching device comprises a latch member 60 in the form of an elongated bar slidably disposed within an inclined slot 61 in the rib portion 62 of the housing. The latch member is provided at its lower end with a notch 72 which engages a lug or locking portion 63 on the contact finger 55. This engagement of the finger with the latch member provides a fulcrum or pivot point for the contact finger 55 when it is urged sidewise by its associated lamp pin 12.

In order to provide for releasing the latch member 60 in response to an abnormal circuit condition, a bimetallic member 64 is mounted within the base portion of the housing, as shown, and is so positioned with respect to the latch member that it may function to actuate it through the pin 65, which is mounted in sliding relation in a suitable vertical slot in the rib portion 62. The bimetallic member 64 is actuated by means of a suitable heater element 66 which is positioned adjacent thereto, as shown, and connected in series circuit relation with the contact finger 56, through the terminal nut 67, connector 68, resistance 66, connector 68' and contact stud 69 which engages the mounting portion of the finger 56. The lower threaded end of stud 69 is screwed into an insulator block 70 which is provided at its lower end with a threaded portion 70' to receive the terminal nut 67. The mounting portion of the other finger 55 is connected in the circuit, through the terminal screw 71. This screw also functions to attach the housing 51 to the base member 54.

When the current through the lamp circuit becomes excessive, the bimetallic member functions to actuate the latch member 60, so as to disengage the notch portion thereof from the finger 55. This permits the finger to move sidewise (to the right as shown in Fig. 4) out of engagement with its associated contact pin 12, and thereby interrupts the lamp circuit.

In this instance, the latch member 60 is reset to its normal position through the sidewise movement of the other contact finger 56, such as results when the lamp pins are rotated and moved upwardly out of the J-shaped slots. This movement actuates the contact finger 56 sidewise (to the left) to the position shown in dotted lines, and thereby urges the latch member 60 downwardly into latching position, where it again functions to hold the contact finger 55 in its proper contact-making position.

The released or unlatched positions of the various parts of the holder are shown in Fig. 4. This shows that the latch member 60, when released, engages the flat surface of the contact finger 56 while it is still in its normal operating position so that, as soon as this finger is moved sidewise by the pin 13, the latch member is moved downwardly.

While I have shown and described my invention as it may be applied to lamp holders of two different types, it is apparent that it may be applied to a lamp holder of any type embodying contact fingers which may be moved out of and into engagement with the associated contact pins of the lamp. This device functions to positively protect the starting and operating circuit of the lamp, without the use of additional protective equipment. Any suitable type of device may be utilized to actuate the movable contact finger as in Fig. 1, or the movable latch as in Fig. 3, so long as it functions in response to the excessive current drawn by the lamp, when attempting to operate under abnormal conditions.

While I have disclosed specific and practical embodiments of my invention, it will be apparent that various changes and modifications may be made therein, without departing from the principles of the invention as disclosed.

I claim as my invention:

1. A connector device comprising, a housing, a pair of contact fingers mounted in spaced relation within the housing to be engaged by spaced contact pins of a device to be connected in a circuit, one of said contact fingers having a normal operating position where it is engaged by its associated contact pin and being movable out of engagement therewith to interrupt the circuit to said device, and current-responsive means operatively associated with said one contact finger for effecting movement thereof to its disengaged position.

2. A holder for double-ended electric discharge devices comprising, a housing containing a pair of contact fingers disposed to be engaged by the contact pins of the device, and current-responsive means operatively connected with one of said contact fingers for actuating said finger out of engagement with its associated contact pin.

3. A holder for double-ended electric discharge devices comprising, a housing containing a pair of contact fingers disposed to be engaged by the contact pins of the device, and thermal-responsive means mounted within the housing operable to effect disengagement of one of said contact fingers from its associated contact pin in response to predetermined current flow in the energizing circuit of the discharge device.

4. A lamp holder for use with electric discharge lamps having contact pins at the ends thereof comprising, a housing, a pair of contact members mounted within the housing disposed to be engaged by the lamp pins, one of said contact members being mounted for movement relative to its associated contact pin, and current-responsive means mounted within the housing operable to actuate said movably-mounted contact member out of engagement with its associated contact pin to interrupt the lamp circuit.

5. In a holder for electric discharge devices having contact pins at the ends thereof, a housing, a pair of contact members mounted in the housing in spaced relation to receive the contact pins of the discharge device when inserted therein, and current-responsive means connected to one of said contact members and operable to actuate said contact member out of engagement with its associated contact pin, thereby to interrupt the circuit through the discharge device in response to the flow of abnormal energizing current.

6. A holder for double-ended electric discharge devices having a pair of spaced contact pins at each end comprising, a housing, a pair of contact fingers mounted within the housing disposed to be engaged by the contact pins of the device, current-responsive means operatively connected with one of said contact fingers for actuating said finger out of engagement with its associated contact pins, and latch means operable to retain said contact finger in its actuated position.

7. A holder for double-ended electric dis-

charge devices having a pair of spaced contact pins at each end comprising, a housing, a pair of contact fingers mounted within the housing disposed to be engaged by the contact pins of the device, current-responsive means operatively connected with one of said contact fingers for actuating said finger out of engagement with its associated contact pins, and spring-biased latch means operable from a normal position in response to the movement of said actuated contact finger for retaining said contact finger in its actuated position, said latch means being operable to its normal position to release said contact finger in response to a predetermined movement of one of the contact pins of the device within the housing.

8. A holder for double-ended electric discharge devices having a pair of spaced contact pins at each end thereof comprising, a housing, a pair of contact fingers within the housing disposed to be engaged by the contact pins of the device, one of said contact fingers being mounted for movement out of engagement with its associated contact pin, and current-responsive means operatively connected to said one contact finger for actuating said finger out of engagement with its associated contact pin.

9. A holder for double-ended electric discharge devices having a pair of spaced contact pins at each end thereof comprising, a housing, a pair of contact fingers within the housing disposed to be engaged by the contact pins of the device, one of said contact fingers being pivotally mounted whereby the contact making end thereof may be actuated out of engagement with its associated contact pin, and current-responsive actuating means operatively connected to the opposite end of said contact finger for effecting pivotal movement of said contact finger.

10. A holder for double-ended electric discharge devices having a pair of spaced contact pins at each end thereof comprising, a housing, a pair of contact fingers within the housing disposed to be engaged by the contact pins of the device, one of said contact fingers being pivotally mounted intermediate its ends whereby the contact making end of the finger may be actuated out of engagement with its associated contact pin, thermal means operatively connected with the opposite end of said finger normally functioning to hold said finger in contact making position and operable in response to predetermined current flow in the energizing circuit of the device to actuate the finger to move the contact making end thereof out of engagement with its associated contact pin.

11. A holder for double-ended electric discharge devices having a pair of spaced contact pins at each end thereof comprising, a housing, a pair of contact fingers within the housing disposed to be engaged by the contact pins of the device, one of said contact fingers being mounted for movement out of engagement with its associated contact pin, and current-responsive means operatively connected to said one contact finger for actuating said finger out of engagement with its associated contact pin and latch means operable in response to the movement of said finger for retaining the finger in its actuated position.

12. A holder for double-ended electric discharge devices and the like having a pair of spaced contact pins at the opposite ends thereof comprising, a housing of insulating material, a pair of elongated resilient contact members mounted therein in spaced relation to be engaged by the contact pins of the device when inserted into the holder, one of said contact members being rigidly mounted within the housing and the other of said contact members being mounted for tilting movement about a fulcrum portion on the inside of the housing whereby the upper contact making end of said contact member may be actuated out of engagement with its associated contact pin, a bimetallic device mounted within the housing adjacent the lower end of said contact member and operatively connected thereto, said bimetallic device having a normal operating position such as to retain said contact member in its normal contact making position and an operated position such as to actuate said contact member out of engagement with its associated contact pin, and a heating element mounted adjacent the bimetallic device and connected in circuit relation with one of the contact members of the holder, whereby said bimetallic device is actuated to its operated position in response to a predetermined current flow.

13. A holder for double-ended electric discharge devices and the like having a pair of spaced contact pins at the opposite ends thereof comprising, a housing of insulated material, a pair of elongated resilient contact members mounted therein in spaced relation to be engaged by the contact pins of the device when inserted into the holder, one of said contact members being rigidly mounted within the housing and the other of said contact members being mounted for tilting movement about a fulcrum portion on the inside of the housing whereby the upper contact making end of said contact member may be actuated out of engagement with its associated contact pin, a bimetallic device mounted within the housing adjacent the lower end of said contact member and operatively connected thereto, said bimetallic device having a normal operating position such as to retain said contact member in its normal contact making position and an operated position such as to actuate said contact member out of engagement with its associated contact pin, a heating element mounted adjacent the bimetallic device and connected in circuit relation with one of the contact members of the holder, whereby said bimetallic device is actuated to its operated position in response to a predetermined current flow, and a spring-biased latch member mounted adjacent the movable contact member operable in response to the movement thereof to its disengaged position to releasably hold said contact member in said disengaged position.

14. A holder for double-ended electric discharge devices having contact pins at the ends thereof comprising, a housing, a pair of contact springs within the housing disposed to receive the contact pins of the lamp, one of said contact fingers being retained in normal contact making position by releasable latch means and biased to disengage its associated contact pin upon being released by said latch means, and current-responsive means operable to effect actuation of said latch means to release its associated contact finger.

15. A holder for double-ended electric discharge devices having contact pins at the ends thereof comprising, a housing, a pair of contact springs within the housing disposed to receive

the contact pins of the lamp, one of said contact fingers being retained in normal contact making position by releasable latch means and biased to disengage its associated contact pin upon being released by said latch means, and current-responsive means operable to effect actuation of said latch means to release its associated contact finger, said latch means being operable to a reset position to return and retain its associated contact finger in its normal contact making position in response to predetermined movement of the contact pins of the lamp within the holder.

16. A lamp holder for double-ended electric discharge lamps or the like having a pair of spaced contact pins at each end thereof comprising, a housing of insulating material, a pair of contact fingers mounted within the housing and having their free ends spaced to receive the contact pins of the lamp when inserted into the holder, a movable latch member slidably mounted within the housing and having a normal position retaining one of the contact fingers in contact making position and operable to release said one contact finger to a noncontact making position, and current-responsive means operable to actuate the latch member to a released position in response to a predetermined flow of current through one of the contact fingers, said latch member when in its released position having one end thereof in engagement with the other contact finger, whereby the movement of said other contact finger resulting from a predetermined movement of the lamp pins within the holder returns the latch member to its normal position.

17. A holder for double-ended electric discharge devices having contact pins at the ends thereof comprising, a housing of insulating material having a pair of contact fingers mounted therein with their free ends disposed for engagement by the contact pins of the discharge device when inserted in the holder, one of said contact fingers being normally biased to a position where it will not engage its associated contact pin, latch means mounted within the housing normally operable to hold said contact finger in a position to engage its associated contact pin and movable toward the other contact finger, thermal means operable to actuate said latch means to release its associated contact finger in response to predetermined current flow through one of said contact fingers, said latch means being disposed for actuation to a reset position by the movement of said other contact finger resulting from predetermined movement of its associated contact pin.

18. A holder for double-ended electric discharge devices having contact pins at the ends thereof comprising, a housing of insulating material having a pair of contact fingers mounted therein with their free ends disposed for engagement by the contact pins of the discharge device when inserted in the holder, one of said contact fingers being normally biased to a position where it will not engage its associated contact pin, a latch member slidably mounted in the housing between said contact fingers, one end of said latch member normally engaging said one contact finger to retain it in contact making position, a bimetallic member for actuating said latch member to release its associated contact finger, and a heater element for said bimetallic member connected in circuit relation with one of the contact fingers.

19. A holder for double-ended electric discharge devices having contact pins at the ends thereof comprising, a housing of insulating material having a pair of contact fingers mounted therein with their free ends disposed for engagement by the contact pins of the discharge device when inserted in the holder, one of said contact fingers being normally biased to a position where it will not engage its associated contact pin, a latch member slidably mounted within the housing in an inclined slot between the contact fingers and having its opposite ends positioned adjacent said contact fingers, the lower end of said latch member being notched to engage a protruding portion on said one contact finger, whereby said latch member normally functions to retain said one contact finger in contact making position, and is movable in said slot to disengage said one contact finger and engage the other contact finger, and means for actuating said latch member from its normal position including an actuating pin connected to a bimetallic member and a heater for said bimetallic member connected in series circuit relation with one of the contact fingers.

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