July 3, 1951 I. A. PAIGE 2,558,908

CIRCUIT BREAKER SWITCH

Filed Feb. 9, 1946

Fig. 1

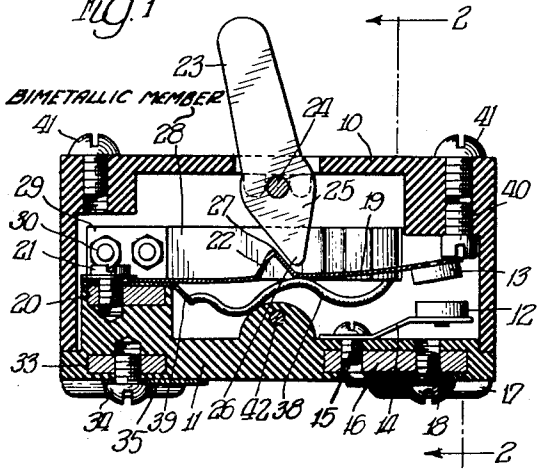


Fig. 2.

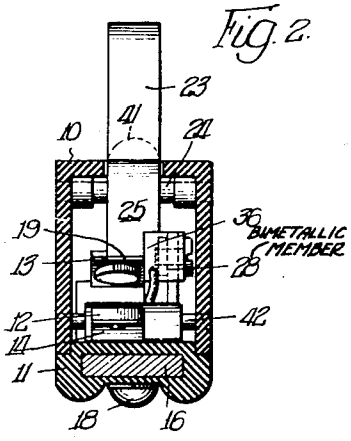


Fig. 3.

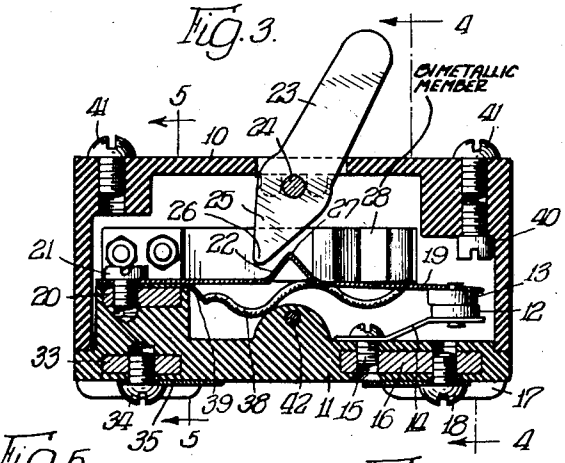


Fig. 4

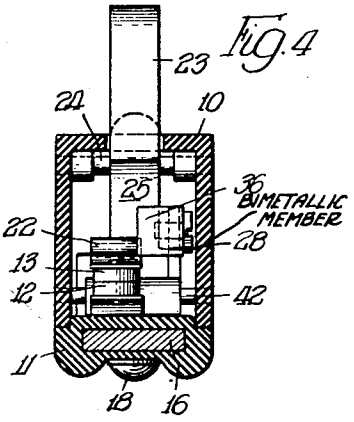


Fig. 5.

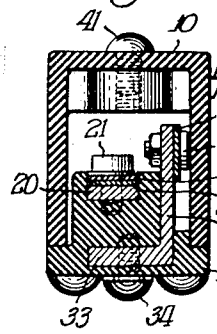
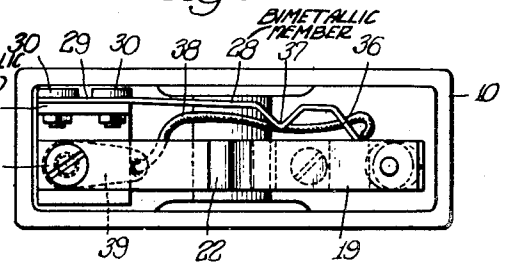


Fig. 6.



INVENTOR.
Isaac A. Paige,
BY
Cromwell, Greist & Worden
Attys.

Patented July 3, 1951

2,558,908

UNITED STATES PATENT OFFICE

2,558,908

CIRCUIT BREAKER SWITCH

Isaac A. Paige, Chicago, Ill.

Application February 9, 1946, Serial No. 646,627

6 Claims. (Cl. 200—116)

1

My invention is concerned with improvements in a circuit breaker switch.

It is an object of my invention to provide a circuit breaker switch device having means responsive to a current overload for automatically operating the device to break the circuit in which it is used and snap action means for manually operating the device to reestablish the circuit when the current is normal and for thereafter operating the device as a snap switch.

It is an object of my invention to provide a device incorporating therein a circuit breaker element of the thermally responsive type in which relatively movable switch contact elements are brought into engagement by a manually operated lever and normally held in engagement by the thermally responsive element, the manually operated lever being so arranged that it is practically impossible to hold the contact elements in engagement by operation of the lever, following movement of the thermally responsive element out of normal holding relation with the contact elements in response to a current overload.

It is a further object of my invention to provide a circuit breaker switch comprising two relatively movable contact members, a manually operated actuating lever and a thermally responsive element which normally holds the contact members in contacting relation and which is engageable by the actuating lever whereby the actuating lever may be operated to release the contact members and simultaneously move the thermally responsive element out of holding relation therewith, the thermally responsive member being movable out of holding relation in response to a current overload on the switch to break the circuit, and the actuating lever being operable to reset the contact members in contacting relation with the thermally responsive member in holding relation when the current is normal.

A further object of my invention is to provide a circuit breaker switch which may be inexpensively manufactured using a relatively few parts, which is well constructed to withstand hard usage, and which is simple to operate.

These and other objects will be apparent from a description of the preferred form of my invention as shown, by way of illustration, in the accompanying drawings, wherein:

Fig. 1 is a longitudinal vertical section through my circuit breaker switch device;

Fig. 2 is a section taken on the line 2—2 of Fig. 1;

2

Fig. 3 is a vertical longitudinal section similar to Fig. 1 showing the operating elements in a different position;

Fig. 4 is a section on line 4—4 of Fig. 3;

Fig. 5 is a section on the line 5—5 of Fig. 3; and

Fig. 6 is a plan of my device with the top of the case removed.

The preferred form of my circuit breaker switch as illustrated in the drawings, is similar to an ordinary snap actuated type wall switch or the like. The switch elements are enclosed in a two-part casing consisting of a top 10 and a base 11. The casing may be constructed of any material having good dielectric properties such as well known plastic materials.

The main elements of my switch are mounted on the base 11 and comprise two contact members 12 and 13 located at one end of the base. Contact member 12 is resiliently mounted on a short leaf spring 14 which is connected by a screw 15 to a small base plate 16 embedded in the base 11. An exteriorly arranged terminal connection 17 is secured on the base 11 and connected to a plate 16 by a screw 18. Contact member 12 may be regarded as a fixed contact member since it is mounted on the spring 14 merely to insure a good contact with the movable contact member 13.

Contact member 13 is mounted for movement relative to the contact member 12 by means of leaf spring 19 which is anchored, at the opposite end of the base plate 11, to a small metal plate 20 by means of a set screw 21. The leaf spring 19 is shaped to provide intermediate its ends an inverted V-shaped projection 22.

An actuating lever member 23 is pivotally mounted at 24 in the top portion 10 of the casing and provided with a V-shaped arm or portion 25 arranged to engage the V-shaped portion 22 of the spring 19. When the actuating member 23 is moved about the pivot 24 the peak or end 26 of the portion 25 slides up the side and passes over the peak or end 27 of the V-shaped projection 22 of the leaf spring 19 with a snap action. When the end 26 is on either side of the projection 22 on the leaf spring 19 the contact members 12 and 13 may be separated as shown in Fig. 1. Contact members 12 and 13 will be brought together into contacting relation when the end 26 of the V-shaped arm 25 engages the end 27 of the projection 22, but the configuration of these members is such that it is practically impossible to hold the actuator 23 with the ends 26 and 27 in engagement.

A thermally responsive element in the form of a bimetallic member 28 is provided with one end 29 anchored by screws 30 to a vertical portion 31 of an angle plate 32. The base 33 of the plate 32 is connected by a screw 34 to an exteriorly arranged terminal connection 35. The bimetallic element 28 is inturned at the free end to provide the angle portion 36 and shaped intermediate its ends to provide a V-shaped projecting portion 37. The plate 28 is normally urged toward the leaf spring 19 and when the contacts 12 and 13 are in contacting relation as shown in Figs. 3 and 4 the normal tension in the bimetallic element 28 positions the angle portion 36 over the spring 19 and holds the contact members 12 and 13 in engaging relation. When the contact members 12 and 13 are separated the edge of the angle portion 36 of the element 28 is urged against the side of the leaf spring 19. The V-shaped portion 37 projects into the path of movement of the end 25 of the actuator lever 23 so that when the lever 23 is moved from the position shown in Fig. 3 to the position shown in Fig. 1 the end 36 of the element 28 is moved out of holding relation with the spring 19 and the contacts 12 and 13 separate due to the tension in the spring 19.

The switch is shown in open or released position in Fig. 1 with the contact members separated. By moving the actuating lever 23 to the position shown in Fig. 3 the contacts 12 and 13 are brought into engaging relation and the end 36 of the bimetallic element 28 is moved, by the tension in the element 28, into holding position above the spring 19 to thereby normally prevent the separation of the contacts 12 and 13. The switch elements are then in the closed position (Fig. 3) in which they will remain until the bimetallic element 28 is actuated in response to a current overload or until the actuating lever 23 is moved to the open position (Fig. 1) to manually release contact members 12, 13.

When the switch is closed and the current in the circuit exceeds a predetermined value the bimetallic element 28 will react to the current overload and move the end 36 away from holding position over spring 19 allowing contact menbers 12, 13 to separate and break the circuit. The bimetallic element 28 may be so designed that it will react and move the end 36 to open position when the current exceeds the proper predetermined maximum value for the particular circuit in which the switch is designed to be used. After the element 28 responds to a current overload and moves out of holding position allowing the contacts 12 and 13 to separate, the switch may be reset by moving the actuator end 25 from the position shown in Fig. 3 to the position shown in Fig. 1 and then moving it back to the position shown in Fig. 3, provided, of course, that the current in the circuit has been reduced to the proper value.

The switch contacts 12 and 13 may be manually separated by movement of the actuator end 25 from the position shown in Fig. 3 to the position shown in Fig. 1, the projection 37 on the element 28 being engaged by the actuator end 25 to move the end portion 36 out of holding relation with the spring 19.

A short length of insulated wire 38 is connected at one end to the end 36 of the bimetallic element 28 and at its other end to a small metal connecting element 39 which is clamped between the spring 19 and the metal plate 20 by the set screw 21. This prevents arcing between the end 36 and spring 19 when these members are separated by operation of the lever 23.

The top of the case 10 is provided with a set screw 40 located above contact member 13 which functions as an adjustable stop to limit the movement of that end of the spring 19. Screws 41 may be provided in the top 10 of the casing to secure the device to a panel or other support. The top 10 and base 11 of the casing may be secured together by a pin 42.

When my device is used to control the flow of current in a circuit which includes instruments, for example, which are liable to become damaged when subjected to a current overload, the thermally responsive element 28 will automatically prevent injury to such instruments by breaking the circuit when a current overload develops after the circuit is closed. The snap action of the manually operating lever prevents the operator from manually holding the contacts in engagement when there is a current overload at the time the circuit is closed, and thus prevents damage in the circuit which might otherwise occur due to an initial current overload.

While I have referred to specific details of construction and specific materials in describing the preferred form of my device, it will be understood that other details of construction and other materials may be resorted to within the scope of my invention.

I claim:

1. A circuit breaker switch comprising relatively movable contact members, a leaf spring mounting one of said contact members, a manual actuator pivotally mounted adjacent said leaf spring, a projection on said leaf spring engageable by said actuator whereby when said actuator is positioned on either side of said projection said contact members will be disengaged and when said actuator is engaged with said projection said contacts will be engaged, said projection and said actuator being so shaped that they will not be normally held in engagement with each other, a resiliently mounted bimetallic member normally urged to a position in engagement with said leaf spring, a projection on said bimetallic member engageable by said actuator at one end of its path of movement to move said bimetallic member out of engagement with said leaf spring.

2. A circuit breaker switch as recited in claim 1 wherein an electrical connecting member is provided between said leaf spring and the end of said bimetallic member to prevent arcing when the members are separated.

3. A circuit breaker switch device comprising a casing having a base and a top, a relatively fixed contact member mounted on one end of said base, a terminal connecting member connected to said fixed contact member, a relatively movable contact member, a resilient supporting element for said movable contact member anchored at the other end of said base, a thermally responsive element supported on said base with a free end normally positioned above and in holding relation with said supporting element, another terminal connecting member connected to said thermally responsive member, means pivotally mounted in said casing top and engageable with said supporting element and said thermally responsive element for manually engaging and disengaging said contact members and for moving said thermally responsive element to position its free end in non-holding relation with said supporting element.

4. A device as claimed in claim 3 wherein there is provided an electrical connecting element between said resilient supporting element and the free end of said thermally responsive element to prevent arcing between said elements when they are moved out of engagement with each other.

5. A circuit breaker switch comprising a fixed contact, a movable contact, a leaf spring fixedly secured at one end and having said movable contact mounted on the other end, an inverted V-shaped projection intermediate the ends of said leaf spring, a manually operated actuator having a V-shaped end movably mounted adjacent said leaf spring, said projection on said leaf spring normally projecting into the path of movement of said actuator end whereby engagement of said projection by said end of said actuator moves said movable contact into engagement with said fixed contact, a bimetallic member mounted for movement at right angles to the path of movement of the free end of said leaf spring, said bimetallic member normally positioned in holding engagement with said leaf spring when said contacts are in engagement, and a V-shaped projection on said bimetallic member projecting into the path of movement of said actuator, whereby said contacts may be brought into engagement by operation of said actuator and held in engagement by said bimetallic member, said bimetallic member being movable in response to an increase in the current to release said contacts from engagement and being movable out of engagement with said leaf spring by operation of said actuator to manually release said contacts.

6. An electrical switch device comprising a relatively fixed contact member, a relatively movable contact member, spring means mounting said movable contact member, a thermally responsive means normally engaging said spring mounting means and holding said contact members in engaged position, said thermally responsive means being movable in response to a current overload to automatically disengage said spring mounting means and thereby release said contact members, and means for manually controlling both said spring mounting means and said thermally responsive means, said manual control means being mounted for movement in one direction to engage said spring means only whereby to move said contact members from disengaged to engaged position and to permit said thermally responsive member to move into normal position in engagement with said spring mounting means, and said manual control means being mounted for movement in the other direction to engage said spring mounting means and said thermally responsive means whereby to release said contact members from engaged position when they are held in such position by said thermally responsive means.

ISAAC A. PAIGE.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,294,045	Cavanagh	Feb. 11, 1919
1,416,263	Campbell	May 16, 1922
1,520,526	Berg	Dec. 23, 1924
2,080,799	Wiegand	May 18, 1937
2,198,358	Vaughan	Apr. 23, 1940
2,225,692	Fisher	Dec. 24, 1940
2,228,523	Johnson	Jan. 14, 1941