March 30, 1965 J. P. WATSON 3,176,098

THERMALLY SENSITIVE SNAP ACTION SWITCH

Original Filed April 2, 1956

FIG. 1

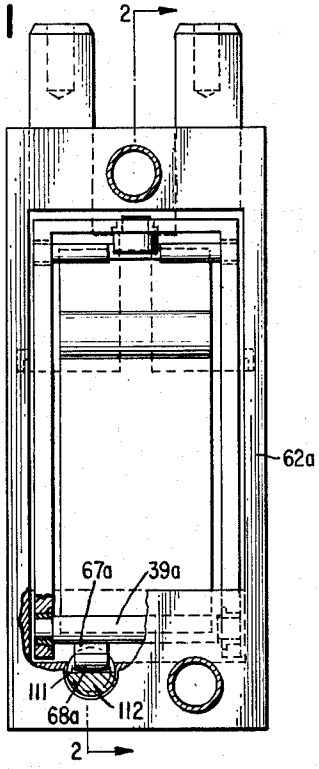


FIG. 2

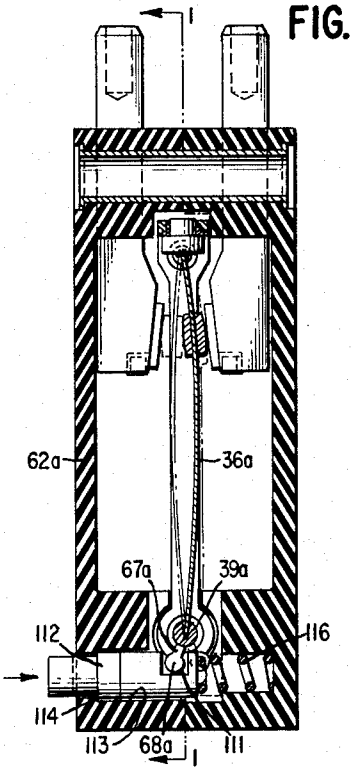


FIG. 3

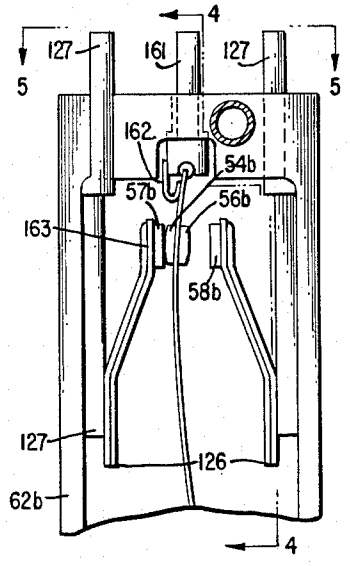


FIG. 5

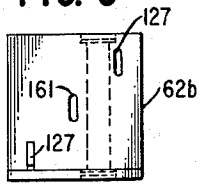
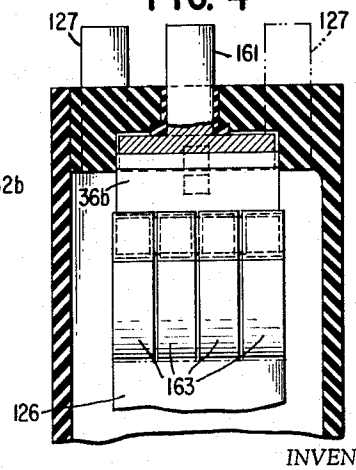


FIG. 4



INVENTOR

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3,176,098

THERMALLY SENSITIVE SNAP ACTION SWITCH

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Original application Apr. 2, 1956, Ser. No. 575,467. Divided and this application Apr. 1, 1960, Ser. No. 24,193

4 Claims. (Cl. 200—113)

This application is a division of my application Serial No. 575,467, filed April 2, 1956, which matured to Patent No. 2,964,602 on December 13, 1960.

It is an object of this invention to provide means for prolonging the contact life of a switch mechanism, thereby making the mechanism capable of standing many millions of circuit openings and resultant arc formations.

It is another object of this invention to provide means for establishing and maintaining equalized current distribution over the entire surface of electrical contacts regardless of size.

While the present invention is shown and described as used in a snap-action switch, it will be obvious that it can be effectively used in conjunction with many other devices.

In accordance with these and other objects which will become apparent hereinafter, a preferred form of the present invention will now be described in connection with the accompanying drawings wherein:

FIG. 1 is a full length section taken on line **1**—**1** of FIG. 2, of one type of switch in which the present invention may be incorporated.

FIG. 2 is a cross section taken on line **2**—**2** in FIG. 1.

FIG. 3 is a fragmentary longitudinal section of a modified form of switch having contacts constructed in accordance with the present invention.

FIG. 4 is a fragmentary section taken on line 4—4 in FIG. 3.

FIG. 5 is a full end view as seen from line 5—5 in FIG. 3.

In the switch shown in FIGS. 1 and 2 the lower pivot shaft **39***a* is provided with a single transverse arm **67***a* extending downwardly therefrom as shown in FIG. 2. At the end of the arm **67***a* is a ball **68***a* which rides in a notch **111** formed transversely in a push button member **112** mounted for reciprocation within the case or housing **62***a* substantially transverse of the pivot shaft **39***a*. The push button **112** reciprocates in a bore **113** and is prevented from coming completely out of the case **62***a* by interengaging shoulders between the button **112** and the bore **113**, shown at **114**. A compression spring **116** biases the push button **112** to its outward position such that the shaft **39***a* is maintained in its clockwise position and the leaf **36***a* is consequently maintained in its right hand position.

When the pushbutton **112** is operated by being pushed to the right in FIG. 2, the shaft **39***a* is rotated slightly or oscillated counterclockwise, thereby snapping the leaf **36***a* to the left, where it remains as long as the pushbutton is held in. When the button **112** is released, the spring **116** returns it to the left and the leaf **36***a* snaps back again to its right hand position.

The circuitry of this version of the switch is not here described since it forms no part of this invention. For a more complete description of this type of switch please see the above mentioned U.S. Patent No. 2,964,602.

The embodiment of the switch shown in FIGS. 3–5 is modified to include the present invention. The movable arm, in this case the leaf **36***b*, is a current carrying member and must be electrically connected to a center terminal **161**. In order to avoid passing current down the length of the leaf, contact to the leaf is made at the upper end, and since it is undesirable, although possible, to transmit current through the bearing surface at the upper end of

the leaf **36***b*, a flexible pigtail **162** is provided, bypassing this bearing surface and connecting the upper end of the leaf **36***b* and the center terminal **161**.

In the embodiment of the invention here shown, the stationary contact member, **57***b* for example, actually consists of a plurality, in this case four, parallel connected contacts mounted on the upper end of four fingers **163** formed at the upper end of a bi-metallic ply stationary contact member **126**. The contact **126** is secured physically and electrically to the terminal **127** which extends upwardly out of the case **62***b*. The bi-metallic fingers **163** are somewhat resilient, so that when the contact **54***b*, which spans all of the fingers **163**, bears against them, each finger gives slightly until the aggregate resistance of all of the fingers equals the pressure exerted by the leaf **36***b* through the contact **54***b*.

Each of the fingers **163** constitutes a thermally sensitive means for individually moving its respective contact away from the contact **54***b* in dependence upon increase in temperature in the particular finger **163**. The fingers **163** thus share the current load in proportion to the pressure with which they bear against the contacts **54***b*. The finger **163** taking the greatest load will, of course heat the most and the bi-metallic action will cause that finger to withdraw from the contact **54***b* thus lessening the current through that particular finger. In this way, a self-acting compensating effect is achieved whereby the current flow and hence the amount of arcing at each of the four contacts **57***b* is equalized. This has the salutary effect of providing substantially continuous contact over large areas without the necessity of precisely fitting the engaging contacts to one another; and of preventing any one contact from carrying an undue share of the load with consequent burning and pitting.

While the instant invention has been shown and described herein in what is conceived to be the most practical and preferred embodiment, it is recognized that departures may be made therefrom within the scope of the invention, which is therefore not to be limited to the details disclosed herein, but is to be afforded the full scope of the claims.

What is claimed is:

1. Switch mechanism comprising a pair of contact means mounted for engagement and disengagement to make and break an electric circuit, at least one of said contact means comprising a plurality of contacts, each being biased into resilient pressure contact with the other contact means, and thermally sensitive means for individually moving said contacts away from said other contact means in response to temperature generated by current flowing through each of said plurality of contacts to individually regulate said resilient contact pressure between said plurality of contacts and said other contact means, thereby to tend to equalize flow of current through the several said contacts.

2. Switch mechanism in accordance with claim 1 wherein said thermally sensitive means comprises a plurality of spaced bi-metallic fingers each having one of said plurality of contacts mounted on adjacent ends thereof, said fingers being arranged to individually and selectively bend away slightly from said other contact means in response to temperature increase in such finger, thereby to tend to equalize flow of current through the several fingers.

3. Switch mechanism comprising a pair of contact means mounted for engagement and disengagement, to make and break an electric circuit, one of said contact means comprising a plurality of parallel thermally responsive fingers, each finger being connected at one end to a first switch termination of said circuit and each finger being provided at its other end with individual contacts, the other contact means comprising bridging contact por-

tions making bridging contact between the contacts on different ones of said contact fingers, said fingers being thermally sensitive to move in a direction away from said other contact means to an increasing degree in response to elevation of the temperature thereof as a result of current flow therethrough, thereby to regulate the contact pressure between the contacts on said individual ones of said contact fingers and said other contact means to equalize the flow of current through the several contacts when in engagement.

4. Switch mechanism in accordance with claim 3 wherein said fingers are formed of bi-metallic ply for causing said fingers to individually and selectively bend away slightly from said other contact means in response to temperature increase in such finger, thereby to tend to equalize flow of current through the several fingers.

References Cited by the Examiner

UNITED STATES PATENTS

1,216,420	2/17	Dodgson	200—146
1,401,492	12/21	Replogle	200—113
2,498,039	2/50	Gunn.	

FOREIGN PATENTS

157,802	1/05	Germany.

OTHER REFERENCES

Vogl: German application V5581, Oct. 20, 1955 (KL 36C 11,02).

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