May 11, 1965 L. C. COBBETT 3,183,335

HIGH PRESSURE CONTACT SWITCH WITH ROTATABLE LOCKING MEANS

Filed March 23, 1962 2 Sheets-Sheet 1

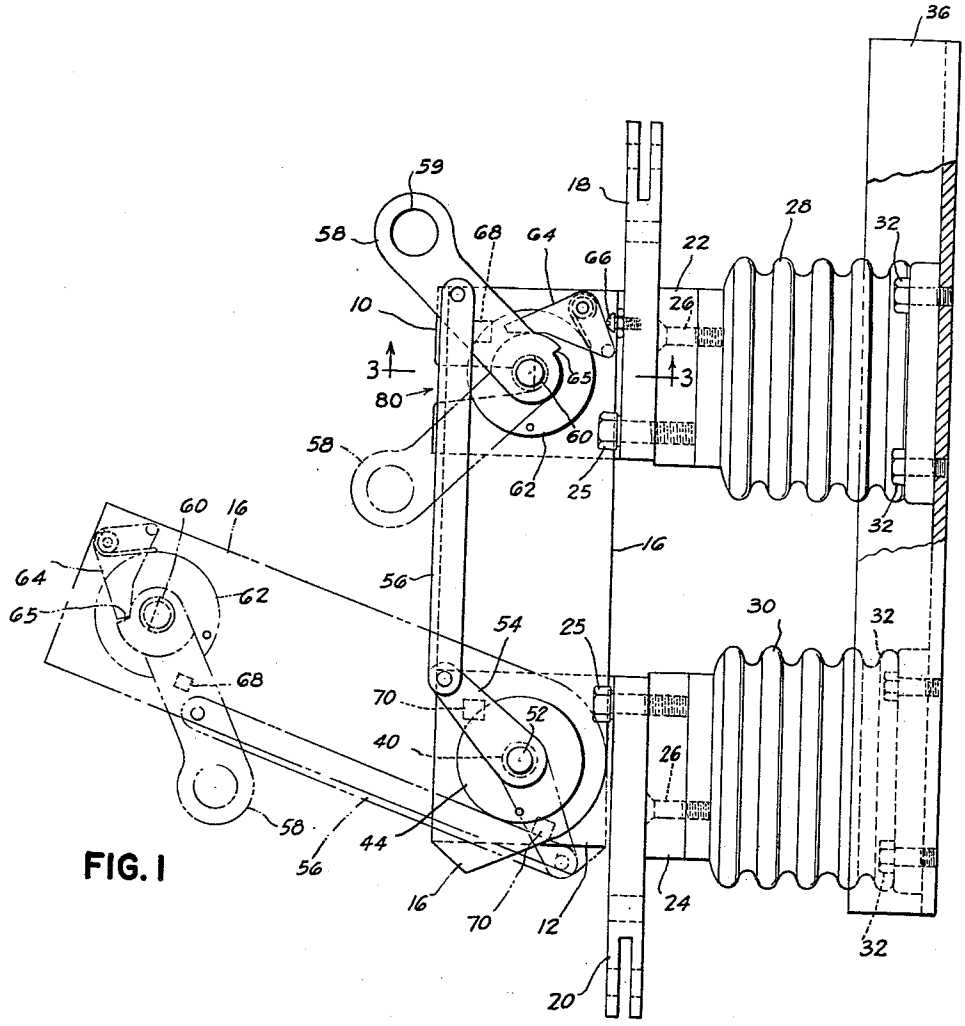


FIG. 1

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2 Sheets-Sheet 2

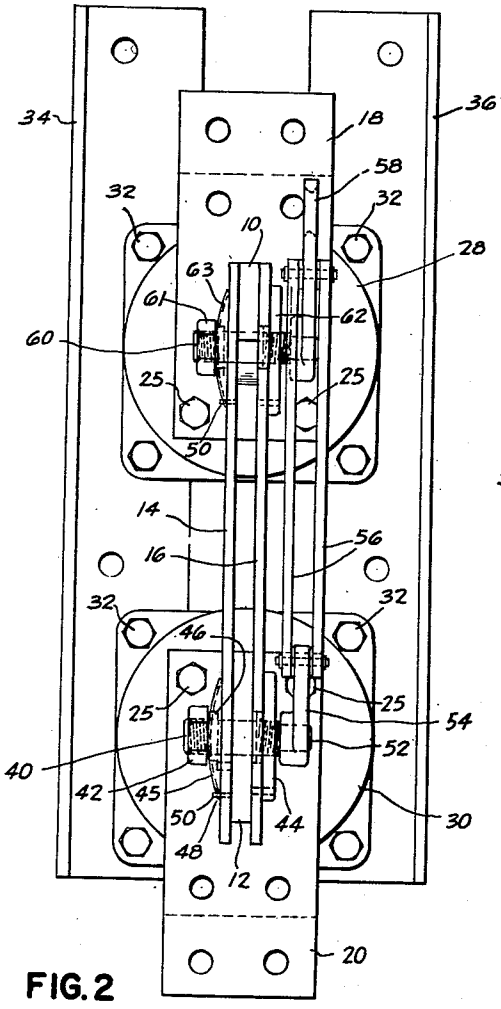


FIG. 2

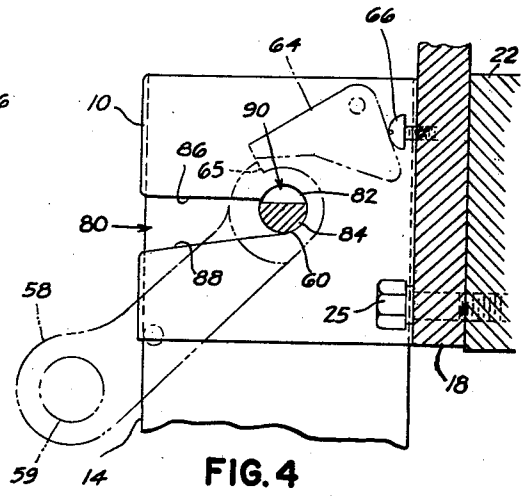


FIG. 4

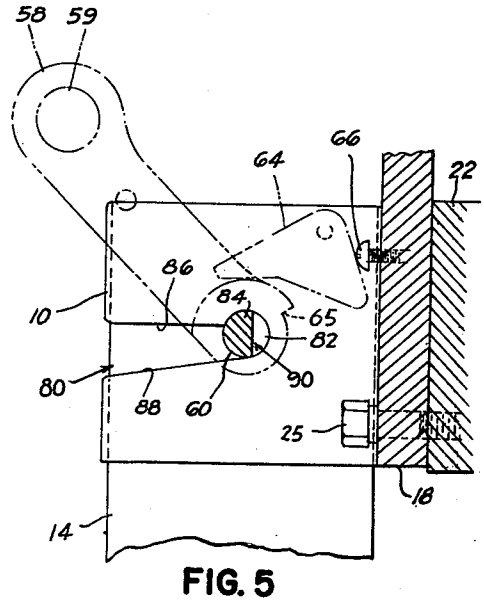


FIG. 5

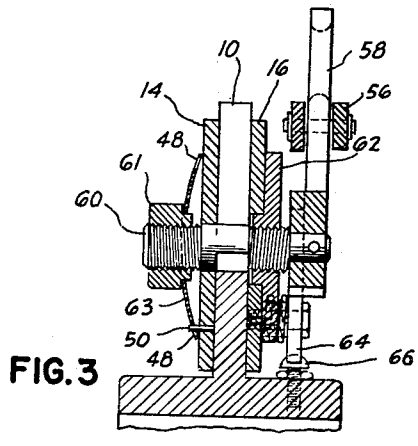


FIG. 3

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HIGH PRESSURE CONTACT SWITCH WITH ROTATABLE LOCKING MEANS

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7 Claims. (Cl. 200—170)

This invention relates to an electrical switch and more particularly to a high pressure contact switch.

The invention has for an object to provide a novel and improved high pressure contact switch of the type having a hingedly connected movable blade and in which provision is made for reducing to a minimum the clip and hinge friction during movement of the blade into and out of circuit closing position and for tightly clamping the blade into high pressure contact with the switch elements after the blade has been moved into circuit closing position.

A further object of the invention is to provide a novel and improved high pressure contact switch of the character specified wherein provision is made for mechanically locking the switch in its circuit closing position in a novel and efficient manner.

With these general objects in view and such others as may hereinafter appear, the invention consists in the high pressure contact switch hereinafter described and particularly defined in the claims at the end of this specification.

In the drawings illustrating the preferred embodiment of the invention:

FIG. 1 is a side elevation of a high pressure contact switch embodying the present invention;

FIG. 2 is a front elevation of the same;

FIG. 3 is a cross sectional view taken on the line 3—3 of FIG. 1; and

FIGS. 4 and 5 are detail views partly in cross section illustrating locking mechanism in different positions of operation.

In general the present invention contemplates a high pressure contact switch having a pair of stationary contacts and a movable blade member hingedly connected to one of the stationary contacts and arranged to be rocked into circuit closing position with the other stationary contact member. The illustrated switch includes a double bladed switch member arranged to embrace the stationary contacts, and provision is made for permitting the double bladed member to rock freely into circuit closing position with a minimum of friction and to thereafter clamp the blades against the sides of the stationary contacts to provide a high pressure contact between the switch members. Provision is also made in the preferred embodiment of the invention for locking the switch in its circuit closing position to prevent inadvertent disconnection of the same.

Referring now to the drawings, 10, 12 comprise spaced stationary contacts, and 14, 16 comprise spaced blade members arranged to embrace the stationary contact members and which are pivotally mounted on the stationary contact member 12 for rocking movement into and out of circuit closing engagement with the contact member 10. The contact members 10, 12 are formed integrally with the terminal portions 18, 20, respectively, which are adapted for connection to the power cables, not shown, and are secured to metal spacers 22, 24 by bolts 25. The spacers 22, 24 are secured by screws 26 to conventional insulators 28, 30, respectively, which are attached by bolts 32 to spaced angle iron brackets 34, 36 adapted to be connected to a suitable support.

As herein illustrated, the blades 14, 16 are hingedly connected to the stationary contact 12 by a bolt 40 having a right hand threaded portion on one side for cooperation with a nut 42, and a left hand threaded portion on the other side for cooperation with a flange member 44 secured to the blade member 16. A dish shaped spring washer 45 is interposed between the nut 42 and the blade 14. The nut is provided with a reduced diameter extension 46 having opposed flatted portions which may be extended into a suitable opening in the spring washer to prevent relative rotation between the nut and the washer, and the washer may be provided with notched portions 48 at its periphery for cooperation with one or more pins 50 extended from the blade 14 to prevent rotation of the spring washer relative to the blade. A reduced diameter end 52 of the bolt 40 is provided with an arm 54 fast thereon which is connected by parallel links 56 to an operating arm 58 fast on the reduced diameter end of a similar bolt structure 60 carried by the free end of the double blade members 14, 16. As shown in cross section in FIG. 3, the bolt 60 is provided with right and left hand threaded portions for cooperation with a nut 61 and a flanged member 62, respectively. A similar dish shaped spring washer 63 is interposed between the nut and the blade member; the nut and spring washer are held from relative rotation; and the spring washer is held to prevent rotation relative to the blade member in a manner similar to that described with relation to the bolt structure 40 at the hinged end of the blade members. The operating arm 58 is provided with an opening 59 at its extended end for receiving a suitable hook for operating the switch.

From the description thus far, it will be seen that when the switch is in its circuit closing position and the operating arm 58 is rotated in a clockwise direction both bolt structures 40, 60 will be rotated simultaneously to effect inward movement of the right hand threaded nuts 42, 61 to apply lateral pressure against the blade 14 through the spring washers 45, 63, and inward movement of the left hand threaded flanged members 44, 62 to apply lateral pressure against the blade 16, thus providing a high pressure clamping contact of the blades 14, 16 against both stationary contacts 10, 12. In practice the clamping pressure may be initially adjusted by rotation of the nuts 42, 62 and engagement of the pins 50 with different ones of the peripheral notches in the spring washers. Overtravel and compensation for wear is absorbed by the dished spring washers on each bolt.

In operation a conventional hook stick is engaged in the opening of the operating arm 58 to move the blade structure from the open or dotted line position shown in FIG. 1 to the full line or closed position shown therein. Provision is made for preventing rotation of the operating arm 58 relative to the blade structure during such movement into closed position whereby to permit substantially friction-free movement of the same into such position and to then permit rotation of the operating arm so as to effect the clamping operation after the switch elements are in their circuit closing position. As herein shown, this is accomplished by the provision of a pivotally mounted latch or bell crank 64 carried by the blade member 16 and which is spring urged into engagement with a notch 65, formed on the hub of the operating arm, when the switch is in its disengaged position, as shown in broken lines in FIG. 1, and which is arranged to engage an adjustable stop screw 66 carried by the contact member 10 to rock the latch out of the notch and release the operating arm when the blade structure is moved to its closed position. As herein

shown, both of the arms 54 and 58 are provided with stop projections 68, 70 which are engaged by the parallel links 56 to limit the movement of the linkage in both their open and closed positions. As shown in full lines in FIG. 1, the parallel links engage the stop projections 68 when the switch is in its closed and clamped position and, as shown in broken lines, the parallel links engage the stop projection 70 when in their open and unclamped position. The blade structure is arranged to be rocked through about seventy degrees from its closed to its open position as illustrated. The initial position of the operating arm 58 when the switch is closed and before the arm is rocked through substantially ninety degrees to effect the clamping operation is also shown in broken lines in FIG. 1. When the switch is subsequently opened, the operating arm will be moved through ninety degrees in a counterclockwise direction to unclamp the blade structure before rocking and disengagement of the blade structure occurs.

Provision is also made in the preferred embodiment of the invention for locking the free end of the blade structure in its closed position so as to prevent inadvertent disconnection thereof and also so as to assure that the blade structure is unclamped before the same is disconnected from the contact member 10. As herein illustrated, the stationary contact 10 is provided with a slot 80 terminating in an opening 82 for receiving the intermediate portion 84 of the bolt 60 when the blade structure is moved into closed position. The slot 80 is defined by a horizontal edge 86 parallel to and spaced a short distance from a horizontal center line through the opening 82, and an angular edge 88 tangential to the opening 82 to provide clearance for the intermediate portion 84 when the blade structure is rocked into circuit closing position. The intermediate portion of the bolt 60 is provided with a cutout, as indicated at 90, to permit the intermediate portion to enter the relatively narrow slot 80 and to seat such portion into the opening 82 as shown in FIG. 4. Thereafter, when the operating arm 58 is rotated through ninety degrees to clamp the blade structure to the contact 10, the intermediate portion 84 of the bolt 60 is rotated to the position shown in FIG. 5 to lock the structure in its circuit closing position. Thus, in operation, when the operating arm 58 is engaged to move the blade structure into circuit closing position, the arm 58 will not be rocked until the structure is seated in the opening to release the latch 64 and permit rocking of the arm on its pivot, and during such rocking of the operating arm the blades 14, 16 are simultaneously clamped and locked in circuit closing position. Conversely, when the switch is disconnected, the operating arm 58 is first rocked in a counterclockwise direction to unclamp and unlock the blade structure to permit easy disengagement of the switch.

From the above description it will be seen that the present structure provides a bolted pressure contact switch free from clip and hinge friction during engagement and disengagement of the switch so as to reduce to a minimum the operating forces required for large capacity switches and to assure positive contact at the points of engagement by virtue of the clamping means while simultaneously providing a mechanical interference to prevent withdrawal of the blade structure by virtue of the slot and pin structure. It will be understood that where the term "parallel linkage" occurs in the specification and in the claims it is intended to define a so-called "four bar linkage" or "parallelogram linkage" wherein the pins 40, 60 move simultaneously through the same increment of angular displacement and which results in a gradually increasing applied force on the operating lever 58 as it is moved into locked position.

While the preferred embodiment of the invention has been herein illustrated and described, it will be understood that the invention may be embodied in other forms within the scope of the following claims.

Having thus described the invention, what is claimed is:

1. In an electrical switch, in combination, a pair of spaced contact members, a double blade switch member arranged to embrace said contact members and hingedly connected to one of said contact members, clamping means at said hinged end and at the free end of said switch member, parallel linkage including an operating arm connecting both of said clamping means arranged to effect clamping of the double blade switch member into high pressure engagement with said spaced contact members, means carried by said switch member for preventing clamping movement of said operating arm until the switch member is moved into circuit closing position, and means for locking said switch member in its circuit closing position upon clamping movement of said operating arm, said locking means including a bolt carried by said free end arranged to be rotated to effect the clamping operation, said bolt being received in a narrow slot in its contact member and terminating in an opening of the same diameter as the bolt, said bolt having a cutout portion to permit entrance through the narrow slot into said opening, rotation of the bolt presenting its uncut side to the narrow slot to lock the switch member to its contact.

2. In an electrical switch, in combination, a pair of spaced stationary contact members, a double blade movable switch member arranged to embrace said contact members and hingedly connected to one of said contact members, clamping means including a bolt at said hinged end and a similar bolt at the free end of said switch member, the second contact member having a slot terminating in a pivot opening for receiving the clamping bolt at said free end when the switch member is moved into circuit closing position, each of said bolts having a left hand and a right hand threaded portion for cooperation with relatively stationary threaded elements carried by said switch blades, parallel linkage including an operating arm connecting both of said bolts arranged to be rotated relative to the threaded elements to effect clamping of the double blade switch member into high pressure engagement with both of said contact members upon rocking of said operating arm when the switch member has been moved into circuit closing position, latch means carried by said switch member cooperating with said operating arm arranged to prevent clamping rotation of the same during movement of the switch member into circuit closing position, and stationary means engageable with said latch for releasing said latch when the switch member approaches its seated position to permit the clamping movement when the switch member is seated in its circuit closing position.

3. The combination as defined in claim 2 wherein the slot in said second contact member is narrower than the bolt at said free end, and said bolt is provided with a cutout portion to enable the bolt to pass through said slot and into said pivot opening during movement into circuit closing position, rocking of the operating arm to effect the clamping operation causing rotation of the bolt to present its uncut side to the narrow slot whereby to lock the switch member in circuit closing position simultaneously with the clamping operation.

4. The combination as defined in claim 2 wherein one of the stationary threaded elements cooperating with each bolt comprises a stationary nut adjustably mounted on said switch member relative to said bolt to permit initial adjustment of the clamping pressure.

5. The combination as defined in claim 4 wherein a dish shaped spring washer is interposed between the nut and its blade to absorb any overthrow and to compensate for wear, means for preventing relative rotation between the nut and the spring washer, and means for preventing rotation of the spring washer relative to its blade, said washer being rotatable with the nut to permit said initial adjustment.

6. The combination as defined in claim 2 wherein provision is made for limiting the pivotal movement of said

hingedly connected switch member in its open and closed positions.

7. The combination as defined in claim 2 wherein the latch means comprises a pivotally mounted bell crank having one arm spring urged into latching relation with a notch provided in the hub of said operating arm, the second arm being engageable with a stationary projection from its contact as the switch member approaches its closed position to release the latch and permit said clamping movement.

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