Aug. 14, 1934. C. H. FLURSCHEIM 1,970,421

ELECTRIC SWITCH

Filed Nov. 2, 1932

Fig. 1.

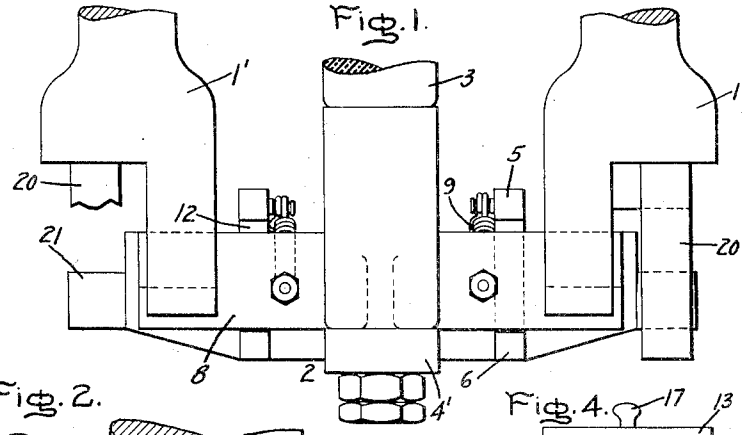


Fig. 2.

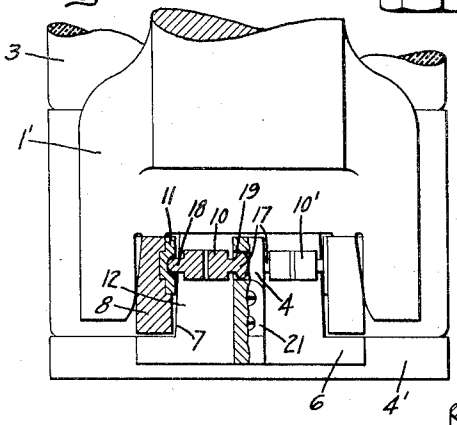


Fig. 4.

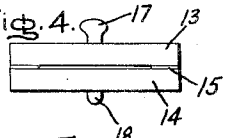


Fig. 5.

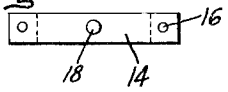
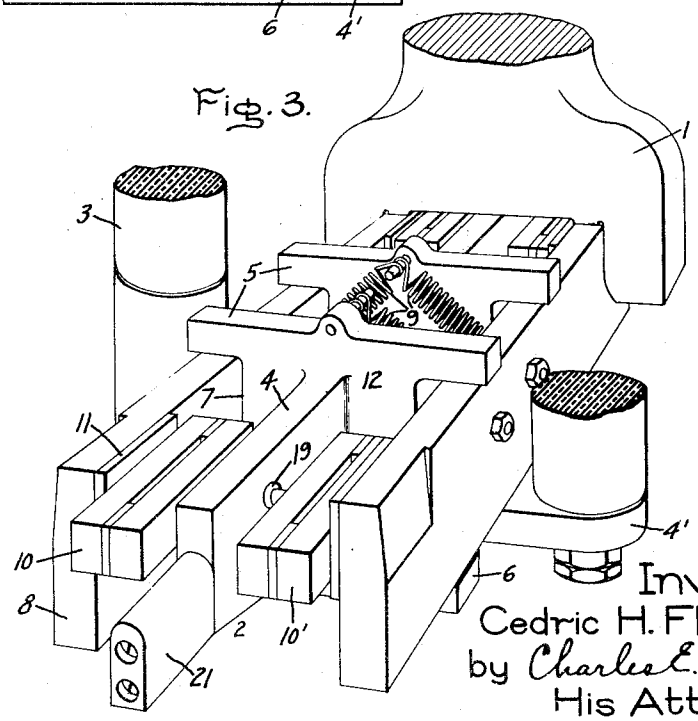


Fig. 3.



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ELECTRIC SWITCH

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Application November 2, 1932, Serial No. 640,745
In Great Britain November 24, 1931

5 Claims. (Cl. 200—170)

My invention relates to electric switches or circuit breakers of the heavy duty type.

In heavy duty circuit breakers having large current carrying capacity the resistance at the coacting contact surfaces may assume considerable importance since excessive heating results if the contact resistance is not within a certain value. It has been found that the contact resistance may be greatly reduced by increasing the contact pressure and to this end high pressure line or point contact between the coacting contact members has been proposed.

A principal object of my invention is the provision of an improved heavy duty circuit breaker of the aforesaid type wherein the coacting contacts are forced into high pressure engagement in the closed circuit position.

My invention will be more fully set forth in the following description referring to the accompanying drawing, and the features of novelty which characterize my invention will be pointed out with particularity in the claims annexed to and forming a part of this specification.

Referring to the drawing, Fig. 1 illustrates my invention as applied, by way of example, to a single-phase, double-break circuit breaker; Fig. 2 is an end elevation, partly in section, of the aforesaid contact assembly; Fig. 3 is a detailed perspective view of the assembly with one stationary contact removed, and Figs. 4 and 5 show in plan and elevation, respectively, one of the mechanical elements employed in the assembly.

In accordance with a preferred form of my invention, the switch contacts are arranged so that during the initial part of the relative circuit closing movement of the contacts a switch blade or bridging member is inserted within coacting switch jaws. During the latter part of the relative movement of the contacts the switch blade is caused to expand laterally, or alternatively, the switch jaws are caused to contract in order to produce high contact pressure at the coacting contact surfaces. The expansion of the switch blade or the contraction of the switch jaws, as the case may be, may be initiated by engagement of one contact with a stop carried on the other contact or on the supporting frame structure therefor.

In practising the invention, the switch may be provided with one or more mechanical purchase devices, such as toggle mechanisms, lever systems or cams, which are operated by the switch actuating member during the final part of its operating movement for bringing the contacts into engagement, to apply force for expanding the switch blade or contracting the switch jaws, as the case may be.

Referring more particularly to Fig. 1 of the drawing, the single-phase, double-break oil circuit breaker illustrated comprises two stationary contacts 1 and 1', each of said contacts being provided with rigid depending jaws. The coacting bridging contact assembly 2 is provided with operating means as draw-rods 3 of insulating material which are secured to projections 4' on a main cross-frame 4. The aforesaid relatively movable contact structure is suitably mounted within the usual oil-containing tank (not shown) and the operating rods 3 are actuated in any suitable manner to cause vertical reciprocal movement of the bridging structure 2.

The cross-frame 4 has on each side U-shaped projections 12 providing limiting stops 5, 6 and 7 for the upward, downward and inward movements, respectively, relatively to the cross-frame 4 of a pair of current carrying straps or bars 8. A strap 8 is mounted on each side of the cross-frame and is resiliently constrained by tension springs 9 in an upward and inward direction towards the stops 5 and 12 respectively.

For the purpose of forcing the conducting straps 8 into high pressure contact engagement with the coacting stationary contacts, pairs of toggles 10 and 10' are provided at each end of the main cross-frame 4. These toggles are pivoted at their outer ends in the current carrying straps 8 and at their inner ends in the cross-frame 4 so that they are free to rotate about horizontal axes when the cross frame is moved vertically. The toggles as shown in detail in Figs. 4 and 5 are constructed of two strips 13 and 14 secured together as by pins 16 at their ends with short adjustable spacing pieces 15 between their ends. The strips 13 and 14 are thus free to deflect slightly at the center when the toggle is under compression, thereby providing a certain amount of resiliency within each toggle member. The length of the toggles may be adjusted to give the desired compression and contact pressure on the contacts by altering the adjustable spacing pieces 15.

For the purpose of positioning the toggle members spherical headed pivot pins 17 and 18 project outwardly from the center of each of the toggle strips 13 and 14 respectively. The pins 18 cooperate with the current carrying straps 8 and, as shown in Fig. 2, bear at the center of these straps in recesses formed in hardened thrust plates 11 attached to the straps. The

opposite pivot pins 17 of each toggle pass through holes 19 in the main cross-frame 4 and abut each other, the holes 19 allowing a small amount of horizontal movement of the pins to provide for self-alignment of the contacts and being substantially opposite the center line of the current carrying straps 8 when in the closed position of the circuit breaker.

Arcing contacts 20 of conventional design are secured to the stationary contacts, and coacting removable arcing contacts 21 are provided at the ends of the main conducting cross-frame 4.

In operation when the circuit breaker is in the open circuit position, the moving contact assembly 2 is clear of and beneath the fixed contacts 1 and 1', and the conducting straps 8 are held against the top and inner stops 5 and 7 respectively of the U-shaped projections 12 by the springs 9. These springs are of sufficient strength to maintain the straps 8 in this position while the moving contact 2 is being accelerated during the closing operation. When the straps 8 are against these stops 5 and 7 the overall width of the moving bridging contact is less than the space between the rigid jaws of the fixed contacts 1 and 1', and the toggles 10 and 10' are tilted downwardly at their abutting ends relatively to each other.

The operating or draw-rods 3 therefore meet with no mechanical resistance during the closing operation until the top faces of the straps 8 meet the fixed contacts 1 and 1' on the face between the jaws and are arrested thereby. The main cross-frame 4 continues to rise with the pulling of the draw-rods 3 and the toggles 10 and 10' become straightened out relatively to one another as shown in Fig. 2, at the same time forcing the straps 8 against the jaws until in the fully closed position the toggles 10 and 10' are in the same straight line or have passed very slightly beyond it.

In the closed circuit position, in the event of a heavy fault or short circuit occurring, the repelling force on the current carrying straps 8 would be resisted by the frictional force between the faces of these straps and the rigid jaws of the fixed contacts 1 and 1', and if this is insufficient, the lower projecting stops 6 of the main cross-frame 4 serve as stops to limit the slip that can occur.

When the breaker is tripped in any well known manner causing lowering of the draw-rods 3, the main cross-frame 4 moves downwards, releasing the toggles 10 and 10'. The current carrying straps 8 now released from pressure are carried downwards as soon as they are met by the upper stops 5 of the U-shaped projections 12 on the main cross-frame 4, the mechanism being then in the correct position for reclosure.

It will, therefore, be apparent that the coacting contact surfaces of a circuit breaker embodying my invention are positively forced into high pressure engagement in accordance with the switch closing operation and are automatically released in accordance with the initial circuit opening movement.

It should be understood that my invention is not limited to specific details of construction and arrangement thereof herein illustrated, and that changes and modfications may occur to one skilled in the art without departing from the spirit of my invention.

What I claim as new and desire to secure by Letters Patent of the United Statets is:

1. An electric circuit breaker comprising relatively movable contacts including a bridging contact having a pair of blades each arranged to engage and interconnect a pair of coacting contacts, operating means supporting said bridging contact, and means including toggle members operatively connected to said operating means and opposite ends of said blades for expanding and forcing the same into high pressure contact with said coacting contacts, said toggle members actuated in accordance with the final circuit closing operation of said breaker.

2. An electric circuit breaker comprising relatively movable contacts including a contact having a supporting frame and a pair of relatively movable blades carried thereby at opposite sides of said frame and parallel therewith arranged to engage and interconnect opposing faces of a coacting contact, and means including toggle members interconnecting said frame and blades for forcing said blades into high pressure contact with said opposing contact faces respectively, engagement of said blades and coacting contact during the final circuit closing operation of said breaker causing straightening and actuation of said toggle members.

3. An electric circuit breaker comprising a stationary contact having spaced depending jaws and a coacting movable contact including a supporting frame and a pair of blades resiliently mounted thereon each arranged to engage and interconnect the inner opposing faces of said stationary contact jaws, and toggle members interconnecting said supporting frame and blades outwardly and into high pressure contact with said jaws respectively, said blades arranged to engage said stationary contact during the final part of the circuit closing operation for causing actuation of said toggle members.

4. An electric circuit breaker comprising a pair of stationary contacts, each having spaced depending jaws, and a movable bridging member coacting therewith including a supporting frame and operating means connected thereto, a pair of blades resiliently mounted for limited movement on opposite sides of said frame, and toggle members interconnecting said frame and blades, each of said blades arranged to engage and interconnect said stationary contacts in advance of said frame so that the final circuit closing movement of said frame is effective to straighten said toggle members causing said blades to be forced against the opposing jaws of said stationary contacts respectively.

5. An electric circuit breaker comprising relatively movable contacts including a contact having a supporting frame and a pair of blades arranged to engage a coacting contact, and means including toggle members operatively connected to said blades and frame for forcing said blades into high pressure engagement with said coacting contact, each of said toggle members comprising a pair of resilient strips arranged in parallel spaced relation, spacing members joining the opposite ends of said strips, and a pin connected to each strip intermediate its length, each of said pins operatively connected to said frame and a blade respectively.

CEDRIC H. FLURSCHEIM.

CERTIFICATE OF CORRECTION. 3

Patent No. 1,970,421. August 14, 1934.

CEDRIC H. FLURSCHEIM.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 2, line 113, claim 3, after "blades" insert for forcing said blades; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 18th day of September, A. D. 1934.

Leslie Frazer

(Seal) Acting Commissioner of Patents.