April 28, 1931. H. G. MACDONALD 1,802,768

LATCH FOR OIL BREAKERS

Filed Dec. 27, 1926 2 Sheets-Sheet 1

Fig. 1.

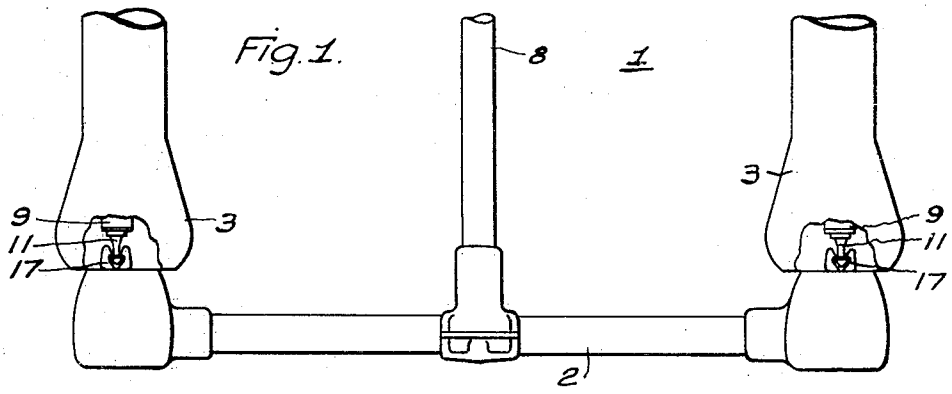


Fig. 2.

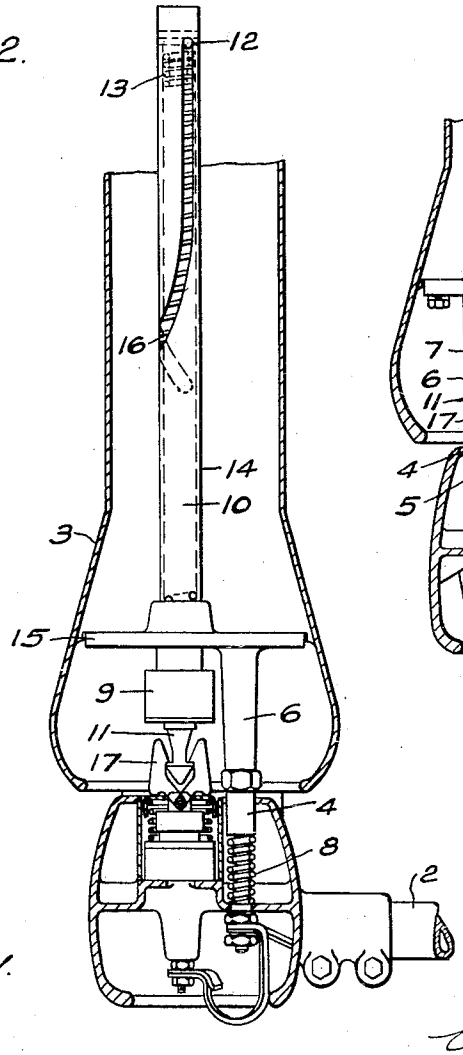
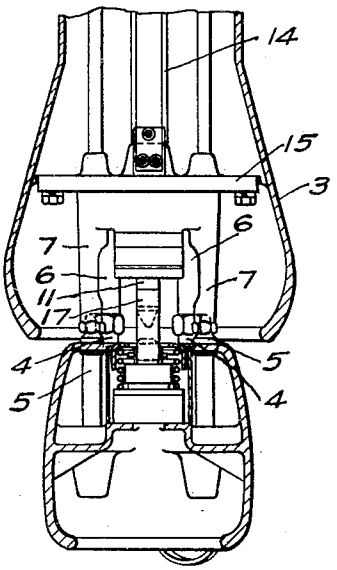


Fig. 3.



WITNESSES:
E. A. McCloskey.
P. F. Tribold

INVENTOR
Howard G. MacDonald.
BY
Wesley G. Carr
ATTORNEY

April 28, 1931. H. G. MACDONALD 1,802,768

LATCH FOR OIL BREAKERS

Filed Dec. 27, 1926 2 Sheets-Sheet 2

Fig. 4.

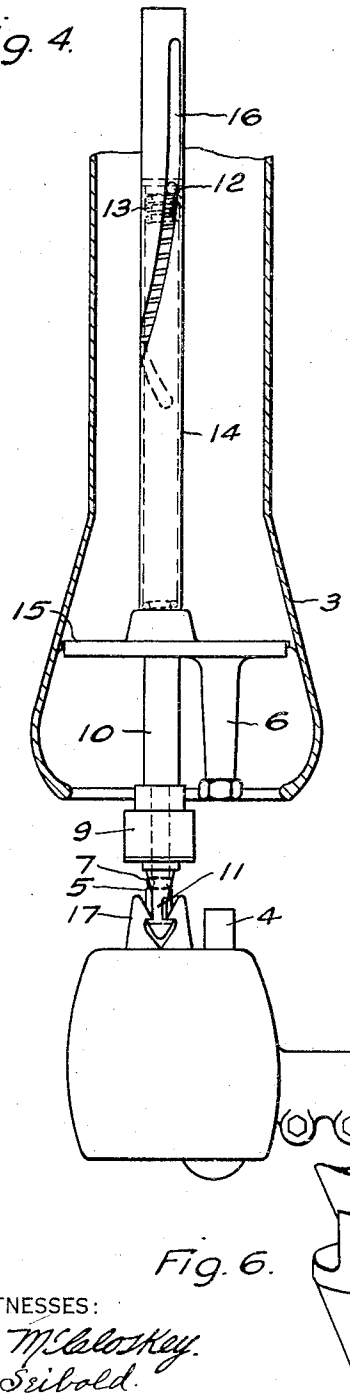


Fig. 5.

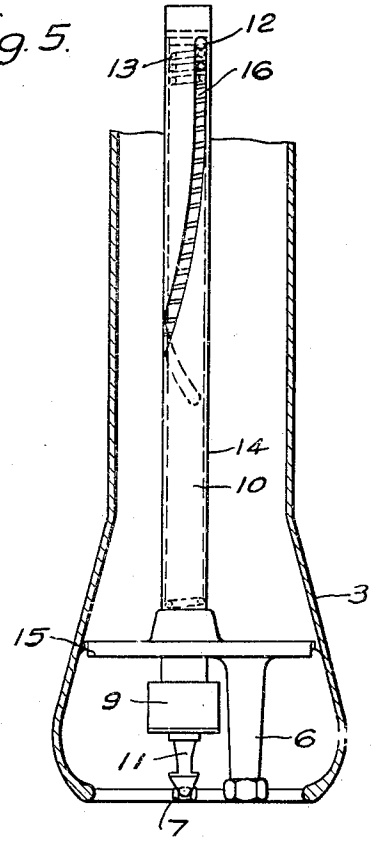
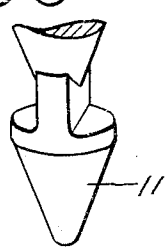
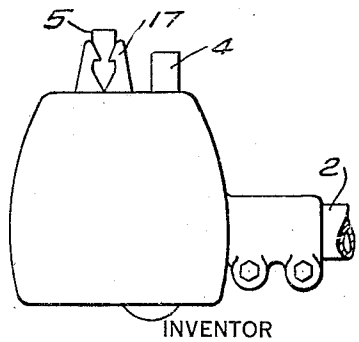


Fig. 6.





WITNESSES:

E. A. McCloskey.

P. F. Seibold.

INVENTOR

Howard G. MacDonald.

BY

Wesley G. Carr

ATTORNEY

Patented Apr. 28, 1931 1,802,768

UNITED STATES PATENT OFFICE

HOWARD G. MACDONALD, OF MURRYSVILLE, PENNSYLVANIA, ASSIGNOR TO WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY, A CORPORATION OF PENNSYLVANIA

LATCH FOR OIL BREAKERS

Application filed December 27, 1926. Serial No. 157,319.

My invention relates to oil immersed circuit interrupters and particularly to the arcing contact members therefor.

One object of my invention is to provide a circuit interrupter that shall have the final separation of the contact members take place at a high rate of speed.

Another object of my invention is to provide a circuit interrupter that shall prevent premature opening of the arcing contact members by having the arcing contact members mechanically latched together.

Another object of my invention is to provide a circuit interrupter that shall have the arcing contact members latched together for a definite part of their opening movement, which latched movement bears a predetermined relation to the movement of the main contact members.

Another object of my invention is to provide a circuit interrupter that shall have its arcing contact members latched together during the initial opening movement of the main contact members, for storing energy to accelerate their separation after their release by the latching means, during the final opening of the main contact members.

A further object of my invention is to provide a circuit interrupter that shall have the contact elements accelerated in opposite directions upon the release of the arcing contact members for their separation at a high rate of speed.

Referring to the accompanying drawings:

Fig. 1 is a view in elevation of the bridging member and the cooperating stationary contact members of a circuit interrupter.

Fig. 2 is a view, partially in section and partially in elevation, of the main contact members and the latching elements of a circuit interrupter embodying my invention in closed position.

Fig. 3 is an enlarged view of a portion of the structure, as shown in Fig. 2, taken at an angle of 90 degrees thereto.

Fig. 4 is a similar view to Fig. 2, showing the relative positions of the several parts at an intermediate stage in the opening operation of the circuit interrupter.

Fig. 5 is a view similar to Fig. 2, showing the relative position of the several constituent parts when the circuit interrupter is in the open position.

Fig. 6 is an enlarged view of one portion of the latch in perspective.

My invention comprises in general a circuit-interrupter 1 in which a bridging member 2 extends between terminal members 3 for the purpose of completing or interrupting an electrical circuit therebetween. The bridging member 2 is provided at each end with a pair of main contact members 4 and a pair of auxiliary or arcing contact members 5 that cooperate with a pair of main contact members 6 and a pair of auxiliary arcing contact members 7 in the adjacent terminal member 3.

The pair of main contact members 4 are resiliently supported by springs 8 on the bridging member 2 to insure good contacting surfaces with their cooperating pair of main contact members 6 that are rigidly mounted in the terminal members 3. Likewise, the arcing contact members 5 are biased upwardly by springs disposed in the bridging member 2.

Each of the pairs of arcing contact members 7 constitutes a portion of a moving element 9 which is carried by a rod 10. The rod 10 has a latch 11 at its lower end.

Referring to Fig. 6, the latch 11 is of conical shape with two flattened portions constituting seats for cooperation with a catch hereinafter described and, at the upper end, a tooth 12 protrudes from its side.

The rod 10 is disposed within a coil spring 13 which is contained within a tube 14, that constitutes a portion of the supporting element 3. The spring 13 holds the moving element 9, including the latch 11 and the pair of contact members 7 against a plate 15 of the supporting element 3 when the bridging member 2 is in the open position, and is the means for storing energy for retrieving the element 9 when the latch 11 is released after having been compressed by the initial opening movement of the bridging member 2, as hereinafter described.

A spiral slot 16, disposed within the wall of each tube 14 is parallel to the direction of

the movement of the moving element 9 for a distance equal to a portion of the separating movement of the pair of main contact members 4 and 6, whereupon the parallel slot takes a spiral shape to impart a turning movement to the latch 11 for freeing it from the pairs of auxiliary contact member 7 during the final opening movement of the bridging member 2.

The movement of the bridging member 2 is imparted to the elements 9 through the engagement of each latch 11 with a catch 17 that is carried by the bridging member 2, and which positively locks the pairs of arcing contact members 5 and 7 together.

Acordingly the several latches 11 and the pairs of contact members 7 are carried along with the bridging member 2 on the opening of the circuit interrupter, for such a distance that the spiral slots 16 acting upon the teeth 12, impart a sufficient turning movement to the latches 11 to disengage them from the catches 17. Whereupon the energy stored in the spring 13, due to this movement, is released and the moving elements 9, with the pairs of auxiliary contact members 7 and the rods 10 are retrieved at high speed into engagement with the plates 15, as shown in Fig. 5. At the same time turning movements are imparted to the rods 10 in a reverse direction, thereby resetting the latches 11.

It will be noted from the foregoing description that the release of the latches, and consequently the separation of the pairs of auxiliary contact members 5 and 7, is relative to the amount of separation of the pairs of main contact members 4 and 6. Accordingly the pair of main moving contact members 4 have parted from the pair of main contact members 5, when the turning movement in the latches 11 releases the catches 17 and the pair of contact members 5, whereupon the retrieving of the moving elements 9 by the springs 13 and the remaining movement of the bridging member 2 completes the opening of the circuit interrupter.

With my improved arcing contact members, I am able to interrupt a very heavy current without danger of piting the main contact member, and at the same time, to make the final separation of the auxiliary contact members take place within a relatively few cycles of an alternating current.

It will thus be seen that I have provided a circuit interrupter that has its auxiliary contact members positively latched in their closed position, until the main contact members have separated a substantial distance, after which the auxiliary contact members are separated at high speed due to the acceleration imparted to one of them by the release of the energy stored in the compressed spring.

In view of the foregoing and other objects of my invention, changes may be effected therein without departing from the spirit and scope thereof, as set forth in the appended claims.

I claim as my invention:

1. In a circuit interrupter, the combination with a pair of relatively-movable main contact members, of a pair of auxiliary contact members, one of which is provided with means for turning it about its longitudinal axis during a portion of the operation of circuit interruption and means actuated by the turning movement to permit the separation of the auxiliary contact members.

2. In a circuit interrupter, the combination with a pair of relatively-movable main contact members, of a pair of auxiliary contact members, a member having longitudinal and rotative movements associated with one auxiliary contact member and a latch associated with the other auxiliary contact member adapted to engage said rotatable member during its longitudinal movement and to be liberated therefrom by its said rotative movement.

3. In a circuit interrupter, the combination with a pair of relatively-movable main contact members, of a pair of auxiliary contact members and means for latching them in engagement, and a supporting element for one of the auxiliary contact members having a movement of rotation about its longitudinal axis for unlatching the contact members.

4. In a circuit interrupter, the combination with a pair of relatively-movable main contact members, of a pair of auxiliary contact members and means for latching them in engagement, and a supporting element for one of the auxiliary contact members having a movement of rotation about its longitudinal axis for operating the unlatching means.

5. In a circuit interrupter, the combination with a pair of relatively-movable main contact members, of a pair of auxiliary contact members, means for latching them in engagement, and a supporting element for one of the auxiliary contact members disposed within a housing having a spiral slot into which a portion of the supporting element extends for imparting a turning movement to the supporting element, thereby releasing the latch and permitting the separation of the auxiliary contact members.

6. In a circuit interrupter, the combination with a pair of relatively-movable main contact members, of a pair of auxiliary contact members, means for latching them in engagement, and a supporting element for one of the contact members disposed within a housing having a spiral slot into which a portion of the supporting element extends for imparting a turning movement to the supporting element, thereby releasing the latch and permitting the separation of the auxiliary contact members, and to produce a counter-turning movement of the supporting

element during the retrievement thereof to reset the latch.

7. In a circuit interrupter, the combination with a pair of relatively-movable main contact members, of a pair of auxiliary contact members, means for latching them in engagement, and a supporting element for one of the contact members disposed within a housing having a slot therein that co-operates with a portion of the supporting element, the slot being parallel to the direction of movement of the moving element for a distance equal to part of the separating movement of the main contact members, whereupon the parallel slot takes the form of a spiral, thereby producing a turning movement by its action on the portion of the supporting element guided therein, thereby releasing the latch and the auxiliary contact members, only after the main contact members have opened to a predetermined distance.

8. In a circuit interrupter, the combination with a pair of relatively-movable main contact members, of a pair of auxiliary contact members, means for latching them in engagement comprising a latch and a catch having fingers, the former having two parallel and oppositely disposed recesses that are grasped by the fingers of the catch and means for imparting a turning movement to the latch thereby twisting the recesses from the grasp of the catch and permitting the auxiliary contact members to separate.

9. In a circuit interrupter, the combination with a pair of relatively-movable main contact members, of a pair of auxiliary contact members, and means for latching the auxiliary contact members in engagement comprising a housing having a spiral slot therein, and a supporting element for one of the auxiliary contact members having a tooth at its upper end for co-operation with the spiral slot in the housing for producing a turning movement of the latching means, thereby releasing the auxiliary contact members.

10. In a circuit interrupter, the combination with a pair of relatively-movable main contact members, of a pair of auxiliary contact members, means for latching the auxiliary contact members in engagement comprising a housing having a spiral slot therein, and a supporting element for one of the auxiliary contact members having a tooth at its upper end co-operating with the spiral slot in the housing for producing a turning movement of the latch at a fixed position relative to the opening movement of the main contact members, thereby releasing the auxiliary contact members at a predetermined relative position to the point of separation of the main contact members.

11. In a circuit interrupter, the combination with a pair of relatively-movable main contact members, of a pair of auxiliary contact members, rotatable means for latching the auxiliary contact members in engagement, and means for storing energy during the initial opening movement of the main contact members for retrieving one of the auxiliary contact members and the latching means after their release, and for resetting the latching means while being retrieved.

12. In a circuit interrupter, the combination with a pair of relatively-movable main contact members, of a pair of auxiliary contact members, means for latching the auxiliary contact members in engagement, and a resilient supporting element for one of the auxiliary contact members having a movement of rotation for unlatching the contact members, said resilient supporting element being stressed during the movement of one of the main contact members whereby the auxiliary contact member will be retrieved at high speed and the main contact member will have its opening movement accelerated after the release of the latching member therefrom.

13. In a circuit interrupter, the combination with a pair of relatively-movable main contact members, of a pair of auxiliary contact members, means for latching them in engagement comprising a housing having a spiral slot therein, biasing means, and a supporting element for one of the auxiliary contact members having a tooth at its upper end cooperating with the spiral slot in the housing for producing a turning movement of the latch at a fixed position relative to the opening movement of the main contact members, whereby the auxiliary contact members will be released and will separate with a turning movement and with accelerating movements in opposite directions under the influence of the biasing means.

14. In a circuit interrupter, the combination with a pair of separable contact members, of means for latching them in engagement and a supporting element for one of said contact members having a movement of rotation about its longitudinal axis for operating said latching means.

15. In a circuit interrupter, the combination with a pair of separable contact members, of a member having longitudinal and rotative movements associated with one of said contact members and a latch associated with the other said contact member adapted to engage said rotatable member during its longitudinal movement and to be liberated therefrom by its said rotative movement.

In testimony whereof, I have hereunto subscribed my name this 20th day of December, 1926.

HOWARD G. MACDONALD.