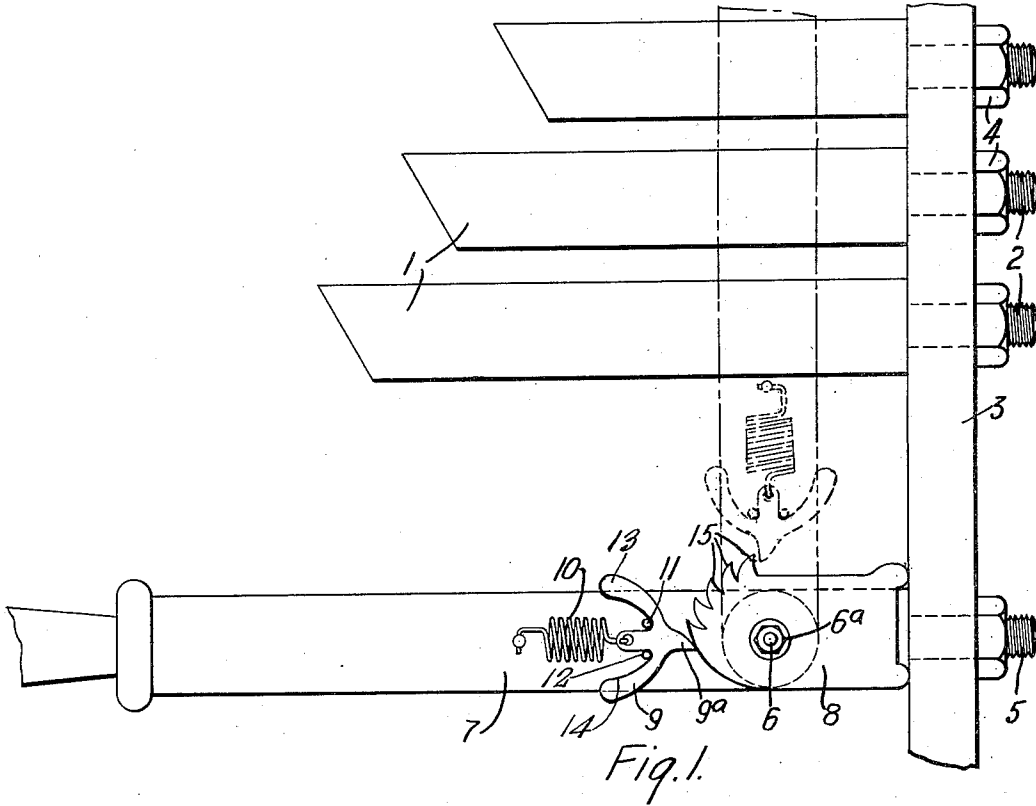
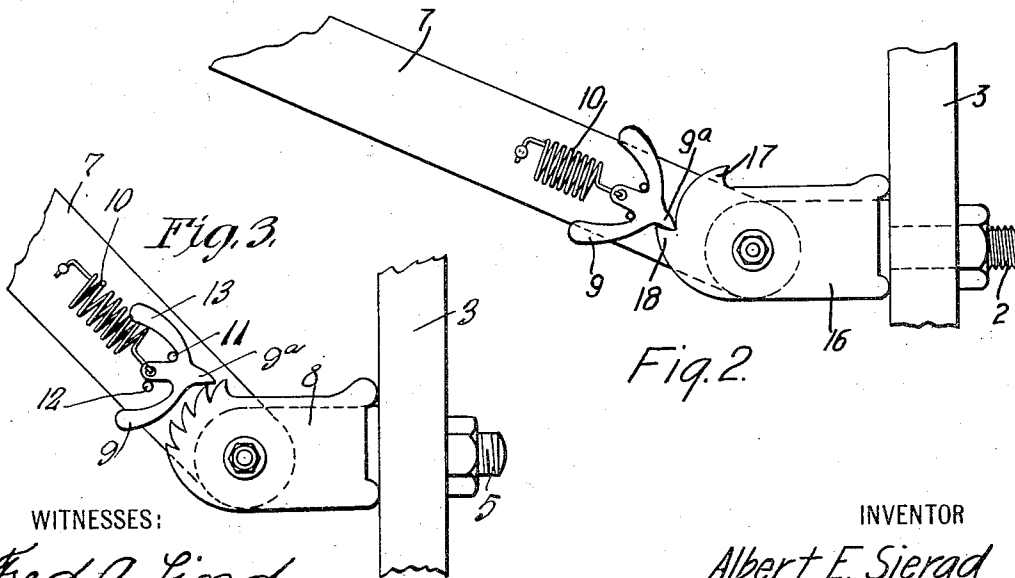


A. E. SIERAD.
 RESTRAINING DEVICE FOR ELECTRIC SWITCHES.
 APPLICATION FILED AUG. 7, 1914.

1,253,286.

Patented Jan. 15, 1918.



WITNESSES:

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RESTRAINING DEVICE FOR ELECTRIC SWITCHES.

1,253,286.

Specification of Letters Patent.

Patented Jan. 15, 1918.

Application filed August 7, 1914. Serial No. 855,564.

To all whom it may concern:

Be it known that I, ALBERT E. SIERAD, a citizen of the United States, and a resident of Pittsburgh, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Restraining Devices for Electric Switches, of which the following is a specification.

My invention relates to restraining devices for switches and particularly to means for preventing the opening of electrical switches until a predetermined closed position has been reached.

The object of my invention is to provide a starting switch with means for preventing the opening of the same before a predetermined closed position has been reached.

Heretofore dynamo-electric machines have been started by switches comprising a plurality of stationary contact jaws of various lengths arranged one above the other and a movable knife blade member that engages the stationary contact jaws successively. A rush of current traverses the machines being started, when the movable knife blade member engages the first stationary contact jaw. If the contact members are disengaged at this instant an arc will be drawn that may be of sufficient magnitude to cause a short circuit between the remaining stationary contact jaws. A short circuit of this kind would have substantially the same effect as starting the dynamo-electric machine without using resistance and thus would be injurious to the same.

I have provided a pawl and ratchet device to cooperate with starting switches of the hereinbefore mentioned type for preventing the disengagement of the contact members until a predetermined position of the movable contact member is reached or until the dynamo-electric machine has reached such speed that the current traversing the switch is relatively small.

Figure 1 of the accompanying drawings is a fragmentary side elevational view of a switch embodying my invention, Fig. 2 is a fragmentary side elevational view of a switch embodying a modified form of my invention, and Fig. 3 is a view of the switch

shown in Fig. 1 when the movable knife-blade member has been partially opened.

A plurality of stationary contact jaws 1 of various lengths, having screw threaded projections 2 on their inner ends, may be attached to a base member 3 by a plurality of nuts 4, substantially as shown. A supporting stud 5 is also mounted upon the base member 3 and is provided with a pin 6 upon which is pivoted a movable contact or knife-blade member 7. A stationary ratchet member 8 is attached to the stud 5 by a nut 6^a upon the pin 6. The ratchet member 8 cooperates with a movable pawl member 9 that is resiliently attached to the movable contact member 7 by a spring 10.

The spring 10 is arranged to maintain the pawl 9 normally in engagement with two pins 11 and 12 that respectively bear upon its inner surfaces 13 and 14. A projection 9^a from the pawl 9 is adapted to engage any one of a plurality of teeth 15 with which the ratchet member 8 is provided. The projection 9^a is provided with one convex surface and one substantially straight or convex surface. The teeth 15 are of substantially the same shape as saw teeth, each having one surface that is convex and another that is concave.

When the movable contact member 7 is moved into engagement with the first stationary contact jaw 1, the projection 9^a engages the first tooth 15 of the member 8 and pivots around the pin 12 against the tension of the spring 10. In this manner, the convex surface of the projection 9^a moves over the convex surfaces of the teeth 15 to permit the movable contact member 7 to be moved to its closed position. However, if an attempt is made to open the switch before the last tooth 15 is reached, the straight or concave surface of the projection 9^a will engage the concave surface of one of the teeth 15 to prevent counter-clockwise movement.

After the movable contact member 7 has been moved to its final circuit-closing position, it may be moved to open-circuit position because the member 9 will be free to turn around the pin 11 a sufficient amount to permit the projection 9^a to ride over the

ends of the teeth 15. That is, the concave surface of the projection 9^a will engage the tip or end of the first tooth 15 and will be still further turned about the pin 11 as the contact member 7 is moved, and after it has ridden over a portion of the convex surface of the first tooth, the tip or end of the second tooth will engage the concave surface of the projection 9^a before the spring 10 is permitted to turn it to its normal position. In this manner the projection 9^a will be permitted to ride over the ends of the teeth 15 until the contact member 7 reaches the position shown in the full lines in Fig. 1 of the drawing. When this position is reached, the spring 10 will cause the member 9 to engage the pins 11 and 12, and the contact member 7 may be again moved to its circuit-closing position.

The modification shown in Fig. 2 of the drawing is similar to the form shown in Fig. 1 but embodies a stationary ratchet member 16 that is provided with two teeth 17 and 18 instead of a series of teeth 15. Although the structure shown in Fig. 2 does not prevent disengagement of the member 7 from intermediate contact jaws, it is less expensive than that shown in Fig. 1 and is approximately as effective, since no material harm is likely to be caused by separating the member 7 from intermediate stationary contact members of the switch.

Although I have shown and described a restraining device of a specific structure, it is evident that various modifications in size and in the arrangement and location of parts may be effected within the spirit of my invention, and I desire that such modifications shall be included within its scope.

I claim as my invention:

1. In a switch, the combination with a plurality of stationary contact members, and a movable contact member, of means for automatically permitting unobstructed movement of the movable contact member in one direction and to preclude its movement in the other direction until it has moved a predetermined distance.

2. In a switch, the combination with a plurality of stationary contact members, and a movable contact member, of means for automatically preventing the movement of the movable contact member in one direction until it has moved a predetermined distance in the other direction.

3. In a switch, the combination with a plurality of stationary contact members, and a movable contact member for successively engaging the same, of a relatively movable pawl operatively connected to the movable contact member, and a stationary ratchet member, said pawl and ratchet being adapted to so cooperate that the movable contact member may be freely moved in one direction to engage the stationary contact mem-

bers and is precluded from moving in the other direction until it has engaged a predetermined number of stationary contact members.

4. In a switch, the combination with a plurality of stationary contact members, and a movable contact member for successively engaging the same, of a pawl and ratchet means for automatically preventing the movement of the movable contact member in a reverse direction until a predetermined number of the stationary contact members have been engaged.

5. In a switch, the combination with a plurality of stationary contact members, and a movable contact member, of a ratchet and pawl means for automatically preventing the movement of the movable contact member in one direction until it has moved a predetermined distance in the other direction.

6. In a starting switch, the combination with a plurality of stationary contact members, and a movable contact member for successively engaging the same, of automatic means for preventing the movement of the said movable contact member in a reverse direction until a predetermined number of the stationary contact members have been engaged.

7. In a switch, the combination with stationary contact members, and a movable contact member, of a stationary ratchet member, a pawl member attached to the said movable contact member for engaging the stationary ratchet member, the faces of the said pawl and ratchet members being so formed that movement of the movable contact member in one direction is prevented until it has been moved in the other direction a predetermined distance.

8. In a switch, the combination with stationary contact members, and a movable contact member, of a stationary ratchet member, a pawl member resiliently mounted on the said movable contact member and movable relatively thereto, the faces of the said pawl and ratchet members being so formed that they automatically cooperate to preclude movement of the movable contact member in one direction until the movable contact member is moved to a predetermined position in the other direction.

9. In a switch, the combination with cooperating movable and stationary contact members, of a stationary ratchet member and a movable pawl therefor attached to the movable contact member, said pawl being adapted to so cooperate with the ratchet member that the switch may be closed but cannot be opened until the movable contact member is moved to a predetermined closed position.

10. In a switch, the combination with a plurality of stationary contact members, and

a movable contact member for successively engaging the same, of a stationary ratchet member, and a pawl adapted to become so wedged between the ratchet member and the
5 movable contact member that disengagement of the contact members is precluded until the movable contact member is moved to a predetermined closed position.

In testimony whereof, I have hereunto subscribed my name this 31st day of July, 1914.

ALBERT E. SIERAD.

Witnesses:

B. B. HINES,
M. C. MERZ.