H. G. FRENCH.

ELECTRIC SWITCH.

APPLICATION FILED JULY 31, 1917.

1,337,895. **Patented Apr. 20, 1920.**

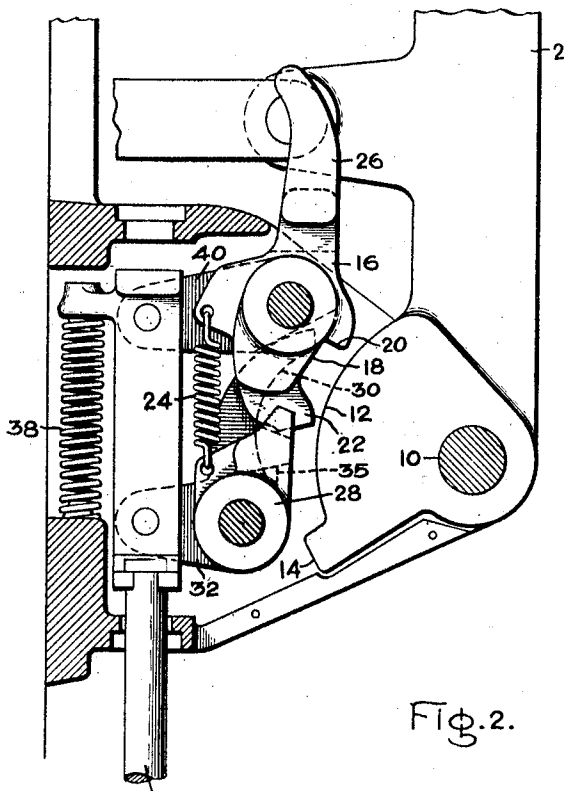


Fig. 2.

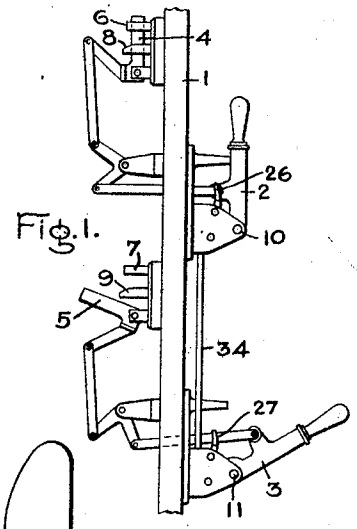


Fig. 1.

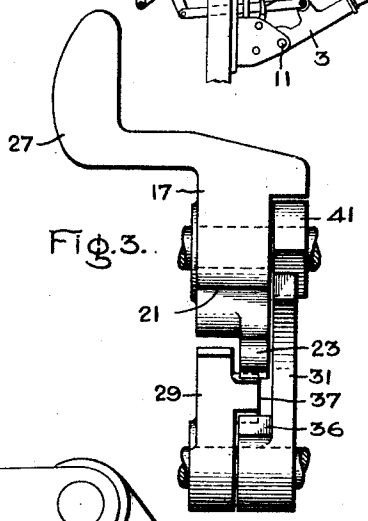
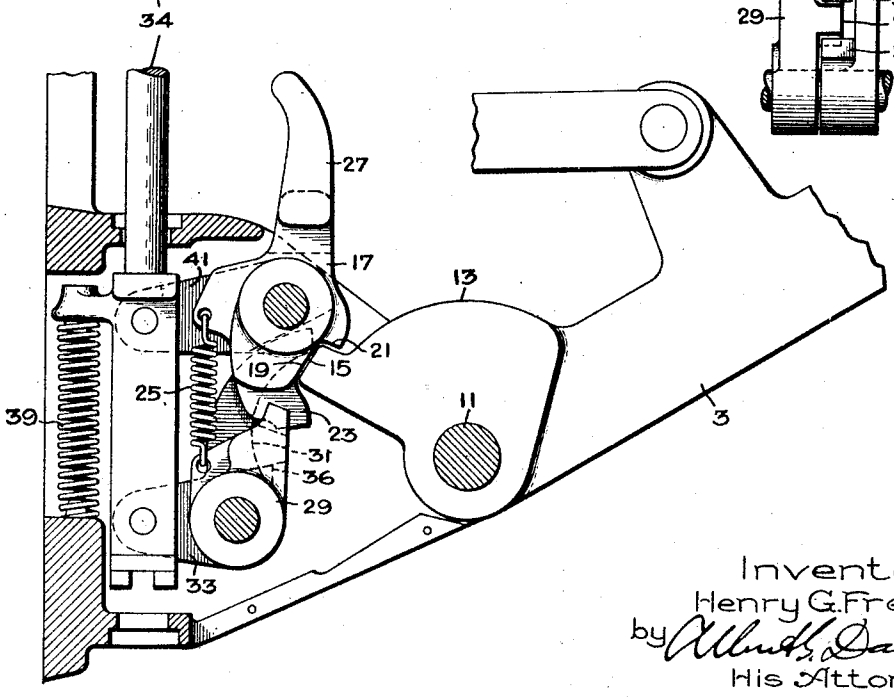


Fig. 3.



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UNITED STATES PATENT OFFICE.

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ELECTRIC SWITCH.

1,337,895. Specification of Letters Patent. Patented Apr. 20, 1920.

Application filed July 31, 1917. Serial No. 183,773.

To all whom it may concern:

Be it known that I, HENRY G. FRENCH, a citizen of the United States, residing at Schenectady, in the county of Schenectady, State of New York, have invented certain new and useful Improvements in Electric Switches, of which the following is a specification.

My invention relates to electric switches and has for its object to provide a switch of the field discharge type which cannot be opened without properly performing its field discharging function and which may be operatively related to a second switch in such a manner that both switches may be opened but only one switch can be closed at the same time.

The novel features which I believe to be characteristic of my invention will be definitely indicated in the claims appended hereto while the features of construction and mode of operation will be understood by reference to the following description taken in connection with the accompanying drawings, in which:

Figure 1 is a side elevation of two cooperating electric switches of the field discharge type embodying the features of my invention, Fig. 2 is a side elevation of the control mechanism for the switches shown in Fig. 1, and Fig. 3 is a front elevation of the control mechanism of one switch in switch opening position and with the operating member for the switch removed.

In Fig. 1 I have shown two electric switches of the field discharge type mounted one above the other on a support 1 and comprising operating levers or members 2 and 3 mounted on the front of support 1. The operating levers control through suitable mechanism, movable contact blades or members 4 and 5 respectively mounted on the back of support 1, and coöperating with main fixed contacts 6 and 7 and with field discharge or auxiliary contacts 8 and 9 respectively. In switch closing position, the movable contacts 4 and 5 engage both fixed contacts 6 and 7 respectively, and auxiliary contacts 8 and 9 respectively, while in a position intermediate switch closing and opening positions or in field discharging position, the movable contacts 4 and 5 engage only the auxiliary contacts 8 and 9, respectively.

As best shown in Fig. 2, the operating members 2 and 3 are pivotally mounted on shafts 10 and 11 respectively, and have arcual portions 12 and 13 respectively, carrying lugs 14 and 15 respectively. Coöperating with the lugs 14 and 15 of each operating member are separate pivotally mounted latching members 16 and 17 respectively, having latching recesses 18 and 19 respectively, provided with shoulders 20 and 21 respectively and 22 and 23 respectively. The latching members 16 and 17 are biased, by means of springs 24 and 25 respectively, to latching position or a position in which their shoulders 22 and 23 extend into the path of movement of the lugs 14 and 15 respectively, in such a manner as to prevent the free or direct movement of the operating members 2 and 3 respectively, from switch closing to switch opening positions. The latching members are movable to releasing position or into a position to move their shoulders 22 and 23 out of the path of movement of the lugs 14 and 15 respectively by arms 26 and 27 respectively which are offset as best shown in Fig. 3 and which are adapted to be hand operated. As will be later described these latching members provide means for restraining the operating members 2 and 3 in a position intermediate switch closing and opening positions when moving in switch closing direction so that the movable contacts 4 and 5 will remain in engagement with auxiliary contacts 8 and 9 a sufficient time to properly discharge the field before the latching members 16 and 17 are moved to releasing position.

For preventing both operating members 2 and 3 from being movable to switch closing position at the same time or to prevent both switches from being closed at the same time, I provide an interlocking mechanism between the operating members. This mechanism comprises pivotally mounted stop members 28 and 29 biased by springs 24 and 25 respectively, to move into the path of movement of the lugs 14 and 15 carried by operating members 2 and 3 in a manner to prevent the operating members from moving into switch closing position. Independently movable on the same shaft with the stops 28 and 29, are control members which are in the form of bell crank

levers having arms 30 and 31, operatively related to the lugs 14 and 15 respectively and arms 32 and 33 pivotally connected to a common interconnecting rod 34. The control members have offset portions 35 and 36, which coöperate with similar portions on stops 28 and 29, to control the movement of the stops, the offset portion 37 for the stop 29 being best shown in Fig. 3. The controlling members are simultaneously movable and biased to move their arms 30 and 31 into engagement with the arcual portions 12 and 13 respectively of the operating members, by springs 38 and 39 acting upon the longitudinal movable rod 34 but are held in a restrained position by either lugs 14 or 15 when their respective operating members 2 or 3 are in switch opening position. In restrained position, the offset portions of the control members engage the coöperating portions of the stops and thereby hold the stops 28 and 29 in restrained or inoperative position. When the stop control members are released, the stops 28 and 29 are correspondingly released and are movable into operating member engaging position. Serving as a guide for the longitudinal movable rod 34, are guide links 40 and 41 pivotally movable on the same shaft with latching members 16 and 17 respectively, independent thereof and pivotally connected to the rod 34.

The operation of my switching device may be described as follows: Assume the two cooperating switches are both in switch opening position as shown by the position of operating member 3. In this position, the lugs 14 and 15 engage the recesses 18 and 19 of the latching members 16 and 17 respectively and are limited in their switch opening movement by engagement with shoulders 20 and 21 respectively. In this position, the lugs 14 and 15 engage the arms 30 and 31 respectively to hold the stop controlling members in restrained position against the action of springs 38 and 39. The control members, in restrained position, have their offset portions in engagement with the cooperating offset portions of stops 28 and 29 respectively and thereby act to hold the stops 28 and 29 in a restrained position and out of the paths of movement of the operating members 2 and 3. It is desired to close one switch, for instance, that controlled by operating members 2. Operating member 2 is moved in switch closing direction and in so moving its lug 14 rides along the shoulder 22 of latch 16, moving the latch about its pivot against the bias of spring 24. As operating member 3 is still in switch opening position, its lug 15 still engages the arm 31 of its stop controlling members and holds it in restrained position and through the connecting rod 34, arm 30 of the other stop controlling member and the stop 28 are held in restrained position. Operating member 2 is thereby free to move into switch closing position as shown in Fig. 2.

If operating member 3 is now moved in switch closing direction while operating member 2 is in switch closing position, the initial movement of the member 3 carries its lug 15 past the end of arm 31 of its stop controlling member, thereby releasing the member which moves under the action of springs 38 and 39 into engagement with the arcual portion 13 of the operating member 3. Simultaneously, the controlling member corresponding to operating member 2 is moved to releasing position by the movement of rod 34. The simultaneous movement of both stop controlling members to releasing position releases the stop members 28 and 29 which move under the action of their springs 24 and 25 into a position in the paths of closing movement of operating members 2 and 3. By continuing the movement of operating arm 3, therefore, in switch closing direction, the lug 15 rides along the shoulder 23 of latched member 17 rotating the latching member about its pivot and then engages the stop 29 which prevents further movement of the operating member in switch closing direction. In order to move operating member 3 into switch closing position, the stop 29 must be held by its controlling member in restrained position. This cannot be accomplished until operating member 2 is moved to switch opening position. When this member is moved in switch opening direction the contact blade 4 first breaks engagement with fixed contact 6 but is still in engagement with the auxiliary or field discharging contact 8, when the lug 14 of the operating member 2 engages the shoulder 22 of the latching member 16 and is restrained in this field discharging position intermediate circuit opening and closing positions. In order to permit the operating member 2 to move on into switch opening position, the shoulder 22 must be moved out of the path of lug 14 which is accomplished by moving the latched member 16 by hand to releasing position by means of the arm 26. While the member 16 is held in releasing position, the operating member 2 with its lug 14 can then be moved into the latching recess 18 of the latch 16 and engages shoulder 20 which limits the movement of the operating member in switch opening direction. In this position, engagement is broken with auxiliary contact 8 and arm 30 of the controlling member is engaged and held by lug 14 in restrained position holding at the same time stop 28 in restrained position and through rod 34 the other controlling member and its stop 29 is also held in restrained position permitting the operating member 3 to be

moved freely into switch closing position. If the operating member 2 is now moved in switch closing direction it is locked against movement in the same manner as described relative to operating member 3.

It will be apparent that instead of mounting my switches one above the other on the support 1, the switches may be mounted side by side and the two stop controlling levers mounted on opposite ends of the same connecting rod and the same interlocking means will be operative to prevent the closing of either switch while the other is in closed position.

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

1. In an electric switch, the combination with a main fixed contact, an auxiliary fixed contact, a movable contact engaging both said main and auxiliary contacts in circuit closing position and engaging only said auxiliary contact in a position intermediate circuit closing and circuit opening positions, and means normally biased in position to restrain said movable contact in said intermediate position but movable to release said contact to permit it to move on into circuit opening position.

2. In an electric switch, the combination with a main fixed contact, a movable contact member, an operating member controlling said movable contact, a latch inoperative in response to the movement of said operating member in switch closing direction but biased to operate in response to the movement of said member in switch opening direction to restrain said operating member in a position intermediate circuit closing and opening positions, and an auxiliary fixed contact engaged by said movable contact when said operating member is in intermediate position.

3. In a field discharge switch, the combination with main fixed contacts, field discharge contacts, a movable contact engaging both said contacts in switch closing position and only said discharge contacts in field discharging position, an operating member controlling said movable contact, means biased to prevent the free movement of said member from switch closing through field discharging to switch opening position but permitting a free movement in the reverse direction, and means including said first mentioned means for limiting the movement of said operating member in switch opening direction.

4. In combination with two electric switches, separate operating members therefor having an intermediate position between switch closing and opening positions, independent latches biased to restrain said members in said intermediate position when moving in switch opening direction and to permit said members to move unrestrained in switch closing direction, and means rendered operative by the movement of either operating member to switch closing position to prevent the movement of the second operating member to switch closing position.

In witness whereof, I have hereunto set my hand this 30th day of July, 1917.

HENRY G. FRENCH.