

C. CHRISTENSEN.
ELECTRIC SWITCH.
APPLICATION FILED JULY 5, 1917.

1,349,873.

Patented Aug. 17, 1920.

FIG. 1.

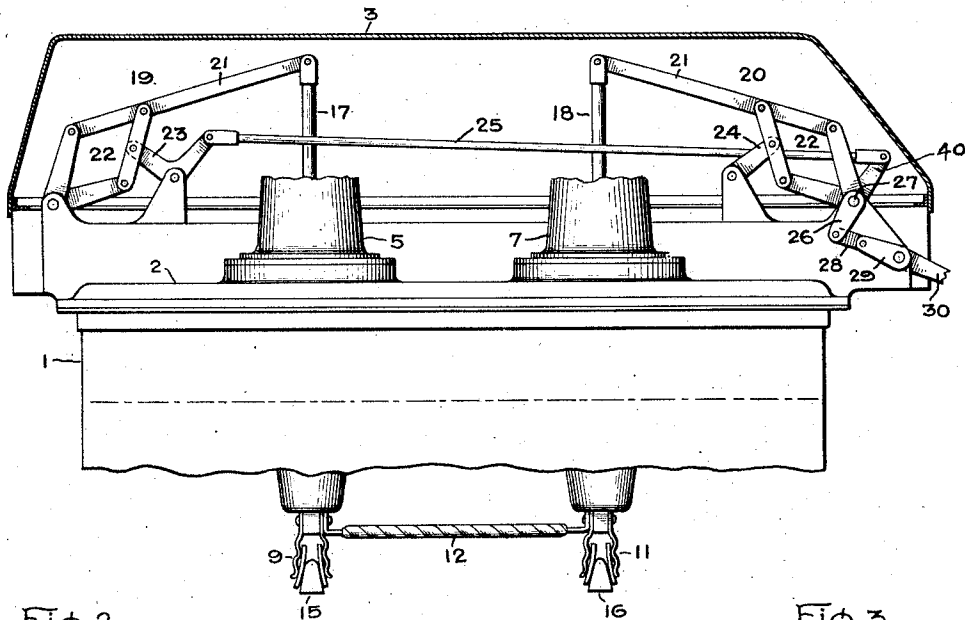


FIG. 2.

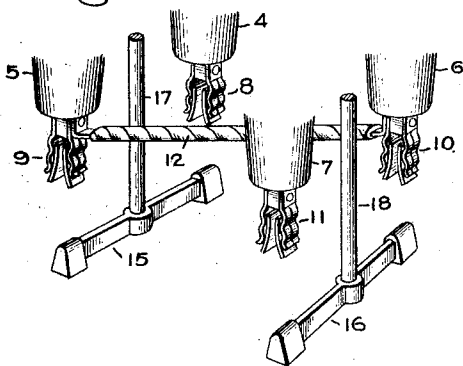
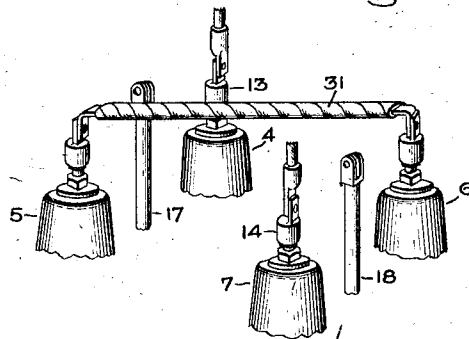


FIG. 3.



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UNITED STATES PATENT OFFICE.

CHRISTEN CHRISTENSEN, OF SCHENECTADY, NEW YORK, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

ELECTRIC SWITCH.

1,349,873.

Specification of Letters Patent.

Patented Aug. 17, 1920.

Application filed July 5, 1917. Serial No. 178,558.

To all whom it may concern:

Be it known that I, CHRISTEN CHRISTENSEN, a citizen of the United States, residing at Schenectady, 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 an improved electric switch of the oil-break type in which a plurality of breaks occur in a common oil receptacle and in which the multiple breaks occur simultaneously.

In previous types of multiple break, oil type switches, the breaks have occurred in separate oil vessels, and due to the structure of the switches it has been difficult to operate the same so that the breaks would occur simultaneously, the initial break taking place under the full capacity of the circuit and under currents causing heavy explosions beneath the oil and burning of the contacts.

In my improved multiple break switch, two double break switch elements are combined in a common oil vessel, each element having a separate actuating mechanism, which mechanisms are interlocked or interconnected so that both move in synchronism to cause the four breaks to always occur simultaneously in series. For controlling the interconnected mechanisms, I provide a common control or operating means.

The novel features which I believe to be characteristic of my invention will be 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 shows a front elevation of an electric switch embodying the features of my invention; Fig. 2 is a perspective view of the connection for the contacts of the switch, and Fig. 3 is a modification showing an alternate connection.

In Fig. 1 the switch of my invention comprises an oil tank 1 provided with a cover 2 and casing 3. Within the casing 3 is mounted two switch elements, each comprising a pair of insulating bushings 4, 5 and 6, 7 which extend into the oil tank 1 and carry the usual fixed contact members 8, 9, 10 and 11 respectively located beneath the surface

of the oil. One fixed contact of each pair or of each switch element is connected with one terminal for the switch carried by one of the bushings 4 or 5 and 6 or 7, and the other fixed contacts for each switch element are connected together by a permanent connection or conductor 12 to connect the contacts of each switch element in series and provide a switch having four breaks in series. The arrangement of the bushings and contacts are best shown in Fig. 2 in which contacts 8 and 11 are connected to the terminals of the switch through the usual conducting rods carried by the bushings 4 and 7, respectively, such terminals 13 and 14 being shown in Fig. 3. The contacts 9 and 10 are connected by conductor 12. Coöperating with each pair of fixed contacts 8, 9 and 10, 11 are movable bridging or contact members 15 and 16, respectively, which are carried by insulating operating rods 17 and 18 longitudinally movable between the bushings 4, 5 and 6, 7, respectively, by separate actuating mechanisms 19 and 20, respectively. These mechanisms 19 and 20 are oppositely mounted on the cover 2 of the oil vessel 1 within the casing 3 and each control the two breaks made by the disengagement of movable contact 15 with fixed contacts 8 and 9 and the disengagement of movable contact 16 with fixed contacts 10 and 11, respectively. These actuating mechanisms 19 and 20 comprise actuating arms 21 secured at one end to the operating rods 17 and 18 which are movable thereby with a straight line motion by suitable parallel motion mechanism 22 including guide links 23 and 24, respectively. The guide link 23 for actuating mechanism 19 is preferably made in the form of bell crank.

In order that the movable bridging members 15 and 16 may disengage with their cooperate fixed contacts 8, 9 and 10, 11 simultaneously to produce four breaks in series, the separate actuating mechanisms 19 and 20 controlling the movable contacts 15 and 16 are arranged to move simultaneously or in synchronism by an interlocking or connecting member 25 between the mechanisms 19 and 20. This connecting member or rod 25 is pivotally secured at one end to the bell crank member 23 of actuating mechanism 19 and at the other end to an arm 40 secured to shaft 27, to which shaft, the operating link 26 of actuating mechanism 20 is

connected, so that the movement of one actuating mechanism is transmitted to the other mechanism and both mechanisms move in unison, the movement of the mechanisms causing a reciprocatory movement of the member 25.

For controlling the switch, I provide a common operating mechanism connected to one of the actuating mechanisms 19 or 20, for instance, to mechanism 20 as shown in Fig. 1. This operating mechanism may be of the general type well known in the oil switch art and may comprise, for example, an operating link 26 adapted to rotate a shaft 27 operatively related to the actuating mechanism 20, the movement of the operating link 26 taking place through a toggle 28, 29 controlled by an operating arm 30, only a portion of which is shown, which may be either hand or solenoid operated.

In Fig. 1 the switch parts are shown in their closed position. When the operating mechanism is moved to switch opening position, the actuating mechanisms 19 and 20 are both moved in synchronism by means of connecting member 25 and the movable contact members 15 and 16 simultaneously moved out of engagement with their respective fixed contacts 8, 9 and 10, 11 to produce four breaks in series as is well understood in the art.

In Fig. 3, I have shown a construction for obtaining four breaks in series which instead of using a conductor 12 between the fixed contacts 9 and 10 inside the oil vessel as shown in Fig. 2, a conductor 31 is connected outside the oil vessel between two terminal members 32 and 33 carried by the bushings 5 and 6, respectively, and in conductive relation with the contacts 9 and 10, respectively.

In accordance with the provisions of the patent statutes, I have described the principle of operation of my invention, together with the apparatus which I now consider to represent the best embodiment thereof; but I desire to have it understood that the apparatus shown is only illustrative, and that the invention can be carried out by other means.

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

1. An electric switch comprising two pairs of fixed contacts, separate movable contacts cooperating with each pair of fixed contacts, means for connecting said contacts in series, a common vessel containing oil inclosing said contacts, separate actuating mechanisms for independently controlling said movable contacts supported by said oil vessel, and means for moving said independent actuating mechanisms in synchronism whereby as the switch opens four breaks simultaneously occur in series.

2. An electric switch comprising two pairs

of fixed contacts, separate movable contacts adapted to connect each pair of fixed contacts, a common vessel containing oil inclosing said contacts, a permanent conductor between one of each pair of fixed contacts, separate actuating mechanisms for independently controlling said movable contacts supported by said independent oil vessel, and a member interconnecting said actuating mechanisms for causing them to move in synchronism whereby said movable contacts simultaneously break engagement with their fixed contacts to provide four breaks in series.

3. In an electric switch, the combination with two pairs of fixed contacts, movable contact members adapted to engage each pair of fixed contacts, a permanent connection in conductive relation with one of each of said pairs of contacts, a circuit terminal connected with the other one of each of said pairs of fixed contacts, a common vessel containing oil inclosing said contacts, separate actuating mechanisms for independently controlling said movable contact members oppositely disposed on the top of said oil vessel, a common operating means for said mechanisms, and a member interconnecting said independent actuating mechanisms to cause said mechanisms to move in synchronism whereby as said switch opens said movable contacts simultaneously disengage with their respective fixed contacts to produce four breaks in series.

4. In an electric switch, the combination with two switch elements each element including cooperating fixed and movable contacts and an independent actuating mechanism therefor, of means for connecting said contacts in series, a common vessel containing oil inclosing the contacts of said switch elements, a cover for said oil vessel upon which the actuating mechanisms for said switch elements are oppositely mounted, a common operating means for said mechanisms, and a connection between said independent actuating mechanisms for moving them in synchronism.

5. An electric switch comprising two switch elements each comprising cooperating fixed and movable contacts and an independent actuating mechanism therefor, of a connection between said contacts to provide four breaks in series, a common vessel containing oil inclosing said contacts, an operating means in common to said actuating mechanism, and a rigid connection between said actuating mechanisms for moving the same in synchronism whereby as the switch is opened four breaks occur simultaneously in series.

6. A four break electric switch comprising two independently movable contact members, a pair of fixed contacts cooperating with each of said movable contacts, a per-

manent connection between one of each of
said pairs of contacts, a common vessel con-
taining oil inclosing said coöperating con-
tacts, separate mechanisms for controlling
5 said movable contacts carried by said oil ves-
sel, and a connecting rod between said
mechanisms for moving them in synchron-
nism.

7. In an oil break switch, the combination
10 with two switch elements each comprising
coöperating fixed and movable contact mem-
bers, and an independent actuating mecha-

nism therefor, of a common oil vessel for in-
closing said contact members, means con-
necting the contacts of said switch elements 15
in series and means interconnecting the oper-
ating mechanisms of said switches to cause
their movement in synchronism whereby a
plurality of breaks occur simultaneously in
series as the switch is opened. 20

In witness whereof I have hereunto set my
hand this 29th day of June, 1917.

CHRISTEN CHRISTENSEN.