Dec. 22, 1931. C. AALBORG 1,837,248

DISCONNECTING SWITCH

Filed March 2, 1926 3 Sheets-Sheet 1

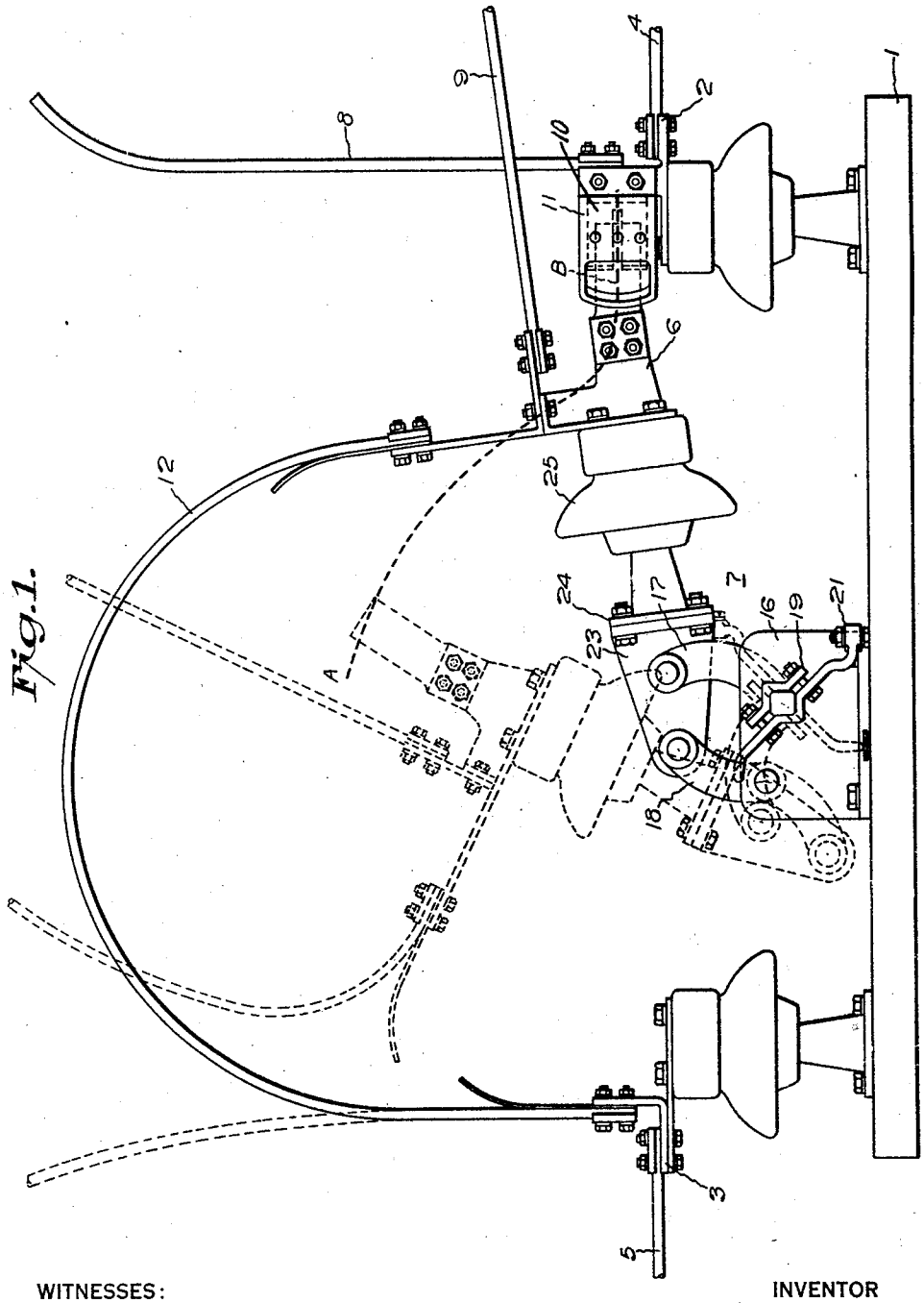


Fig. 1.

WITNESSES:

G. S. Neilson

Lester J. Budlong

INVENTOR

Christian Aalborg

BY

Wesley Gearr

ATTORNEY

Dec. 22, 1931. C. AALBORG 1,837,248

DISCONNECTING SWITCH

Filed March 2, 1926 3 Sheets-Sheet 2

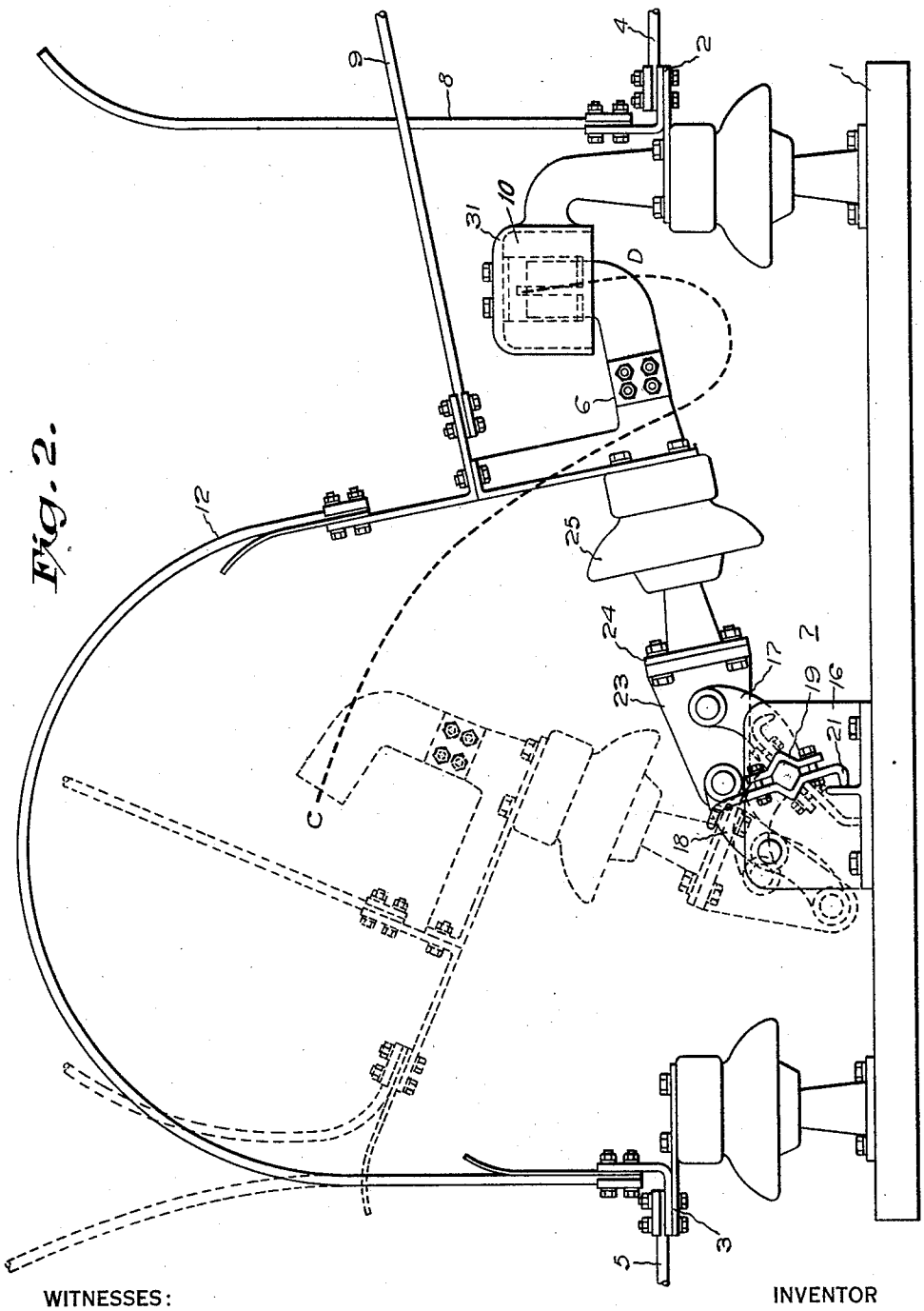


Fig. 2.

WITNESSES:

G. S. Neilson

Lester J. Dudley.

INVENTOR

Christian Aalborg

BY

Wesley G. Carr

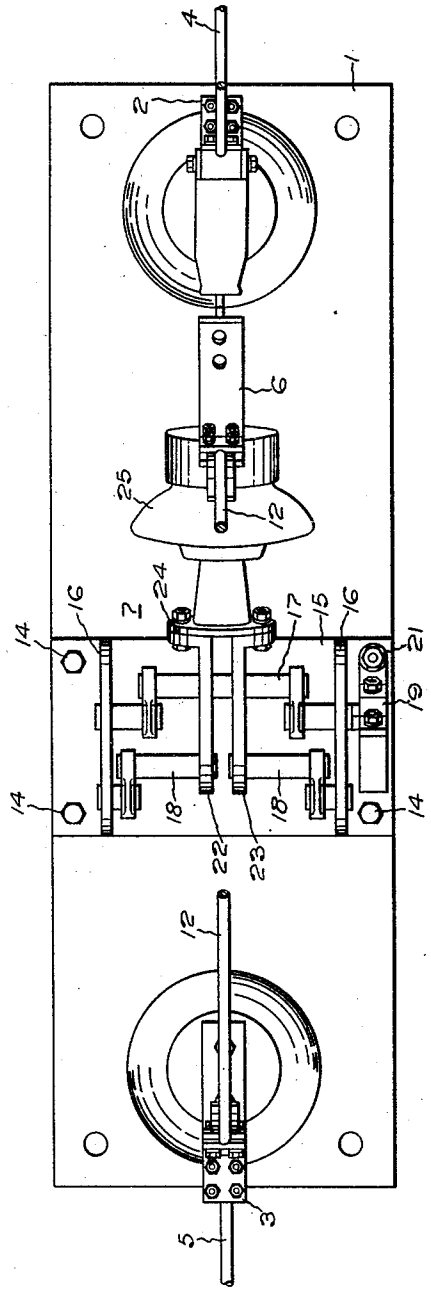
ATTORNEY

Dec. 22, 1931. C. AALBORG 1,837,248

DISCONNECTING SWITCH

Filed March 2, 1926 3 Sheets-Sheet 3

Fig. 3.



WITNESSES:

G. S. Neilson

Lester J. Aalborg

INVENTOR

Christian Aalborg

BY

Wesley G. Carr

ATTORNEY

Patented Dec. 22, 1931 1,837,248

UNITED STATES PATENT OFFICE

CHRISTIAN AALBORG, OF PITTSBURGH, PENNSYLVANIA, ASSIGNOR TO WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY, A CORPORATION OF PENNSYLVANIA

DISCONNECTING SWITCH

Application filed March 2, 1926. Serial No. 91,775.

My invention relates to electric protective devices and particularly to disconnecting switches.

One object of my invention is to provide a disconnecting switch, the movable contact member of which shall approach the stationary contact member along an irregular path.

Another object of my invention is to provide a disconnecting switch in which the movable contact member shall engage a stationary contact member with a motion that shall preclude the interposition of a coating of ice therebetween.

A further object of my invention is to provide a disconnecting switch having a movable contact member which may engage a stationary contact member with either a straightline motion or an angular upward motion.

In the operation of disconnecting switches, trouble is frequently experienced by reason of the interposition of a coating of ice between the relatively movable contact members when they are brought together. This is especially true where the stationary contact member faces upwardly or outwardly so as to be exposed to snow and rain. I propose to eliminate the foregoing difficulty by causing the movable contact member to engage the stationary contact member either along a side face or from beneath so that any rain or snow will have a tendency to fall away from the contact faces rather than collect thereon. I accomplish the foregoing result by so mounting the movable contact member that it moves along an irregular curve with reference to the base of the switch, rather than in the arc of a circle as is customary with switches of this type.

In the accompanying drawings, Fig. 1 is a side view of my disconnecting switch showing in dotted lines one path of travel that may be taken by the moving contact member.

Fig. 2 is a similar view of the disconnecting switch showing the path of travel taken by the contact member in order to engage the stationary contact member from beneath, and

Fig. 3 is a plan view of the disconnecting switch shown in Figs. 1 and 2, the arcing horns being omitted.

My invention comprises, in general, a base member 1 to which are fastened and insulated therefrom stationary line terminals 2 and 3 for line conductors 4 and 5 between which engagement is completed by a movable or floating contact member 6 that is carried by an actuating and supporting mechanism 7 of such design that the floating contact member 6 may approach a stationary contact member 10 disposed on the terminal 2 along any one of a large number of irregular curves depending upon the design and relative proportions of the component parts of the mechanism 7.

The contact member 10 is provided with an arcing horn 8 that cooperates with an arcing horn 9 mounted on the movable contact member 6. The stationary contact member 10 also supports a weather-proof housing 11, the specific form of which is dependent upon the direction from which it is engaged by the movable contact member 6. The movable contact member 6 is electrically connected to the stationary terminal 3 by means of a looped flexible conductor 12.

Referring particularly to Fig. 3, the mechanism 7 comprises bolts 14 that secure a supporting member 15 to the main base member 1. The supporting member 15 has a pair of upstanding spaced flanges 16 between which extends a crank 17, and from each of which flanges extends a stub crank 18. The crank 17 extends beyond one of the flanges 16 and is engaged by a clamp 19 that is actuated by a rod 21 constituting a portion of any suitable actuating device, not shown. The crank 17 extends through the bifurcations 22 and 23 of a seat member 24 for an insulator 25 upon which the movable contact member 6 is mounted. The stub cranks 18 each extend through the lower portion of one of the bifurcations 22 and 23. The connections between the stub cranks 18 and the crank 17 and the bifurcations 22 and 23 are all sufficiently loose to permit a turning movement between all engaging surfaces.

The curve outlined by the terminal portion of the movable contact member 6 is determined by the relative lengths of the cranks 17 and 18 and the relative distances between

their centers along the flanges 16 and the bifurcated members 22 and 23.

Referring particularly to Fig. 1 and by way of example, with the distance along the members 22 and 23 between the center of their engagement with the cranks 17 and 18 of 2½ inches; the length of the arms of the stub cranks 18 being 3 1/16″; the length of the arm of the crank 17 being 3⅞″; the center line along the flanges 16 between the cranks 17 and 18 being 2⅝″ and the length from the point of engagement of the cranks 18 to the end of the contact element 26 being 17⅛″, it is possible to obtain a movement of the contact element 26 such as shown by the curve AB in Fig. 1.

With the foregoing proportioning and spacing of parts, the floating contact member 6 initially moves along a curve that is approximately centered about the axis of the crank 17, but as the movement is continued to the right of the figure, the curve bends abruptly and further movement is along substantially a straight line during the period of engagement and disengagement between the stationary contact member 10 and the movable contact member 6. The positions of the component parts of the disconnecting switch in the open position of the switch are shown by dotted lines and their positions when the switch is closed are shown by full lines.

It will be seen that the inclination of the moving contact member 6 to the base 1 of the switch shifts through about 45° during such movement but the axis about which the turning movement takes place is not fixed, since the movable contact member 6 moves bodily to the right during the closing movement and to the left during the opening movement of the switch.

In the operation of this form of disconnecting switch from the open to the closed position, the rod 21 is pulled downwardly which causes the crank 17 to turn in a clockwise direction, carrying with it the movable contact member 6. During the turning movement of the crank 17 and the stub cranks 18, their arms move from their relative positions shown in dotted line into substantially parallel relation which movement causes the movable contact member 6 to turn the cranks 18. After the arms of the cranks 17 and 18 reach their position of substantial parallelism, further movement of the crank 17 causes the moving contact member 6 to be carried forward with a substantially straight line motion with a very slight amount of turning movement about the crank 17, whereby the end of the contact member 6 enters the weather-proof housing 11. in substantially a straight line.

Another embodiment of my invention is illustrated by Fig. 2. I have shown a curve CD by which the contact member 6 can move upwardly into engagement with the weather-proof housing 31. In this form of my invention, by way of example the distance between the centers of the cranks 17 and 18 along the members 22 and 23 is 2½″, the length of the arms of the cranks 18 is 2¾″; the length of the arm of crank 17 is 3⅜″; the distances between the centers of the cranks 17 and 18 along the flange 16 is 2⅝″ and the length of the contact member 6 is 17⅛″. Accordingly, by changing the lengths of the arms of cranks 17 and 18 it is possible to secure curves of radically different shape as is shown by the curves AB and CD. By further changing the dimensions of the cranks 17 and 18, it is possible to secure an indefinite number of intermediate curves.

It will thus be seen that I have provided a disconnecting switch by which it is possible to secure the engagement between the stationary and movable contact members along an irregular curve, which curve may vary anywhere from the arc of a circle through a straight-line to a positive upward movement during the last portion of the relative travel of the contact members. Such a construction is especially advantageous for use with disconnecting switches where accumulations of snow and ice upon the contact members are to be avoided or overcome.

It is to be understood that such changes in the disposition of the relative parts may be made as will fall within the scope of the appended claims.

I claim as my invention:

1. In a switch structure, a stationary contact member, a floating contact member for cooperation therewith, a base and an insulator mounted on a plurality of cranks pivoted at different points on said base for supporting the floating contact member and means for actuating the floating contact member, the lengths of the cranks and their pivotal connections being so related as to cause the floating member to shift the angle of its inclination relative to the horizontal during movement into and out of engagement with the stationary contact member.

2. In a switch structure, a stationary contact member, a movable contact member for cooperation therewith, a base member, a floating insulator for supporting the movable contact member, said insulator being mounted on the base member adapted by means for causing the movable contact member to shift the angle of its inclination to the horizontal about a progressively moving axis during its movement into and out of engagement with the stationary contact member.

3. In a switch structure, a stationary contact member, a floating contact member for cooperation therewith, said floating contact being fixedly mounted on an insulator, a base member, supporting means for said insulator comprising a pair of link members

mounted on the base member and actuating means for causing the floating contact member to disengage the stationary contact member in a straight line motion and thereafter to move away from it along an irregular curve with respect to the base of the switch.

4. In a switch structure, a switch arm, a movable contact member mounted substantially rigidly thereon, a stationary housing having a fixed contact member positioned therein, the housing having an opening for permitting the movable contact member to engage the fixed contact member and means for moving the switch arm so that the movable contact member moves downwardly out of said opening until it is out of engagement with the stationary contact member and thereafter moving it in a vertical plane.

5. In a device of the character described, a stationary contact member, a movable contact member cooperating therewith, an insulator carrying said movable contact member swingable into and out of circuit closing position, and means for mounting said insulator to move with a combined rotary and translatory movement, comprising pivoted links connected therewith at spaced points and a crank mechanism for swinging said links about their pivots.

6. In a device of the character described, a stationary contact member, a movable contact member and means for moving said movable contact member into and out of engagement with said stationary contact member by a combined swinging and straight line movement, comprising a pair of arms mounted on spaced pivots, an insulator pivotally connected with said pair of arms at spaced points, and means for swinging one of the arms of said pair on its pivot to move said insulator into and out of circuit closing position.

7. In a switch structure, a stationary contact member, a movable contact member for cooperation therewith, said movable contact member being mounted on an insulator, said insulator being supported on a plurality of links so that movement of said links moves said movable contact in a substantially straight line for part of its path of motion and in a curved line for the remainder of its path of motion.

8. In a switch structure, a stationary contact member, a weather-proof housing for said stationary contact member, a movable contact member fixedly secured on an insulator for cooperation with said stationary contact member, and means for moving said movable contact member longitudinally until it is out of said housing and then laterally to a point remote from said stationary contact member.

9. In a switch structure, a stationary contact member, a weather-proof housing for said stationary contact member, said housing having an opening at the bottom, a movable switch arm having a contact member mounted adjacent one end thereof for engaging said stationary contact member through said opening, and means for moving said switch arm so that said end thereof moves downwardly carrying said contact member through said opening and then upwardly and laterally to a point remote from said stationary contact member.

10. In a switch structure, a stationary contact member, a weather-proof housing for said stationary contact member, said housing being closed except for an opening in the bottom thereof, a movable contact member for engaging said stationary contact member through said opening, and means for moving said movable contact member downwardly through said opening and then upwardly and laterally in a curved path to a point remote from said stationary contact member, said means comprising a pair of links pivoted at spaced points at each end.

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

CHRISTIAN AALBORG.