

Feb. 25, 1930.

A. J. BOWIE

1,748,752

ELECTRIC SWITCH

Filed March 28, 1922

3 Sheets-Sheet 1

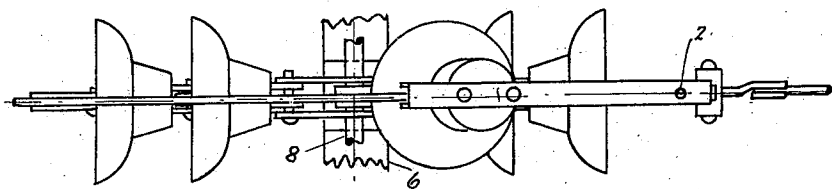


Fig. 1

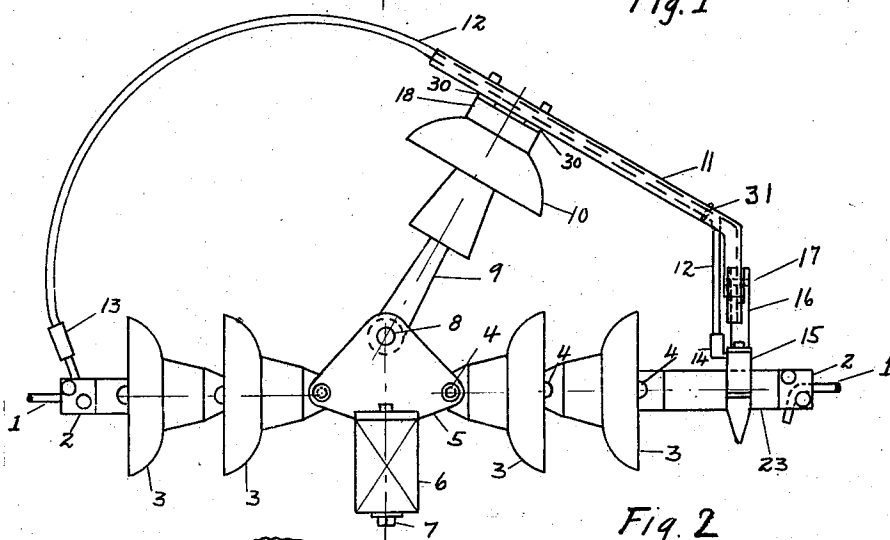


Fig. 2

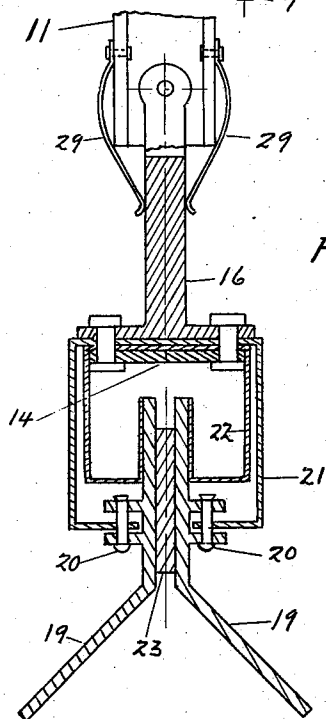


Fig. 3

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3 Sheets-Sheet 2

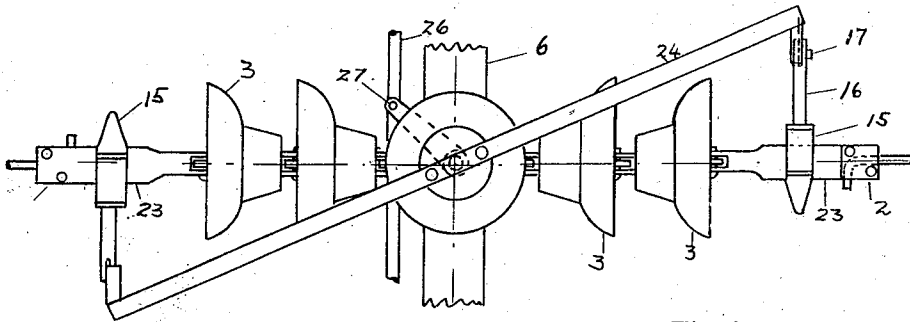


Fig 4

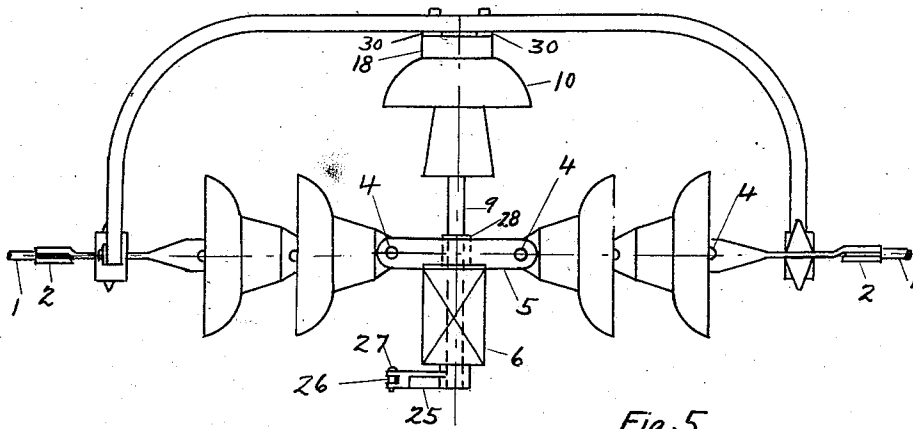


Fig 5

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3 Sheets-Sheet 3

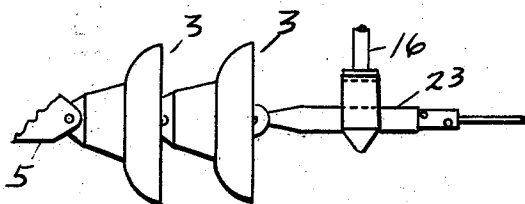


Fig. 8

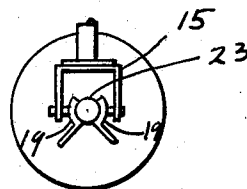


Fig. 9

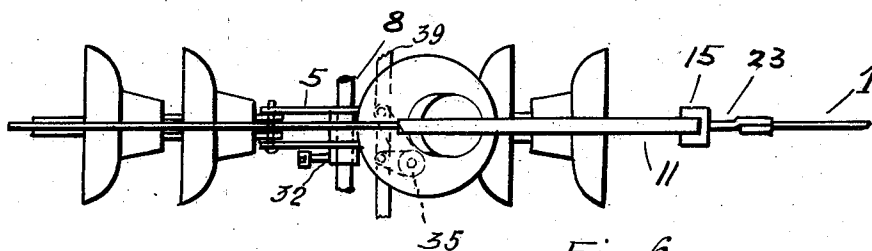


Fig. 6.

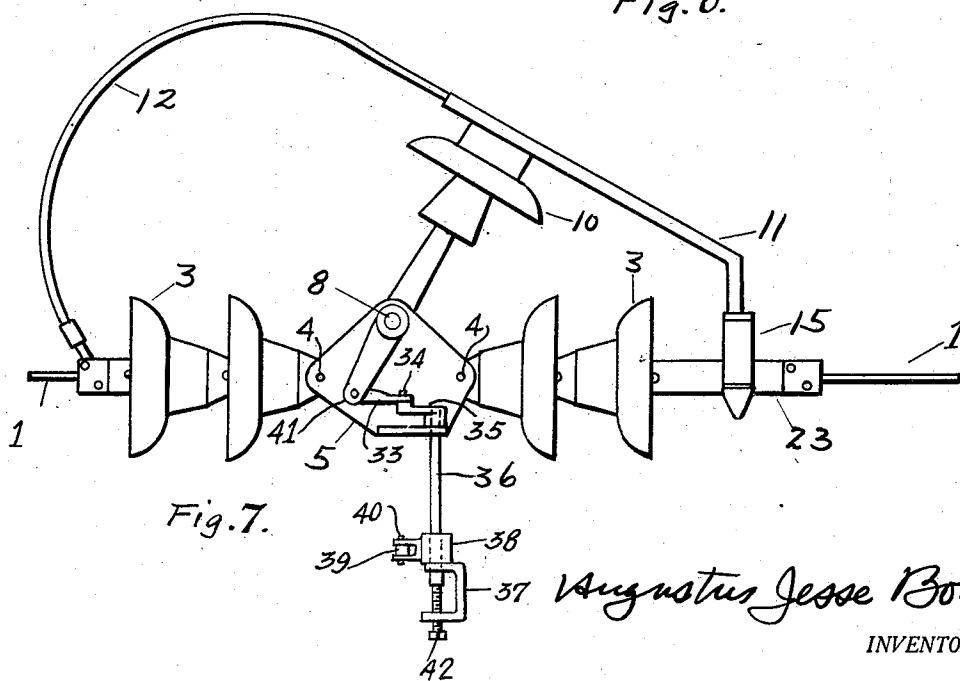


Fig. 7.

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UNITED STATES PATENT OFFICE

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ELECTRIC SWITCH

Application filed March 28, 1922. Serial No. 547,519.

This invention relates to improvements in electric switches. One of the important principles of the invention lies in the use of suspension insulators for supporting the blades or the clips of the switch. The present commercial suspension insulators consist of a plurality of insulators each with metal cap and pin, arranged with suitable flexible joints between the different insulators, and between the insulators and the supports to which they are attached, and also the connection for the line wire. It is one object of the invention to use corresponding insulators, which are flexibly connected, and to have the mechanism cooperating therewith adapt itself readily to the varying positions of the line end of these insulators in such a manner as always to secure the proper engagement of parts and accommodation to the necessary motions either vertically or laterally to which the line at the insulator attachment may be subjected; also to avoid any unnecessary strain therefrom on the balance of the switch parts. While it is true that suspension insulators have been heretofore used in a modified degree for a general purpose of this nature, this use has involved the addition of wedges or other devices to make the suspension units of the string practically rigid, and thus one of the main advantages of the suspension unit, namely, flexibility, is done away with. In my invention there is no necessity of any such device and suspension insulators are readily adaptable in their customary or flexible arrangement. This obviates all bending strains, which are objectionable, being imposed on these insulators, and allows for ready replacements when necessary by the use of a standard product in common use.

In the previously made switches where suspension insulators made rigid by wedges were used, these insulators in general carried an arm projecting radially from the axis of the insulator, whereon switch clips were attached, the switch clip being a considerable distance above the axis of the line. In my invention I have the switch blade attached between the line and insulator next to the line, the center of this switch blade being substantially the axis of the line. Under

these conditions the switch blade will move upward or downward or sidewise with the line, and the blade is also liable to some angularity from the normal position, the amount of angularity being limited by the construction of the suspension insulators. Cooperating with this blade is a switch clip with self-aligning contact faces, adapted to align itself to any position of the switch blade. Attached to this clip is a pivoted arm, the pivot being substantially parallel to the axis of the line, allowing the switch clip to swing laterally and to accommodate itself to any lateral displacement of the line. The clip and supporting piece, in turn, are operated by a moving insulator effecting the operation of the switch for making or breaking the circuit. With this construction it is quite important that the axis of the line and the center of the switch blade substantially coincide, in order to minimize the distance laterally or torsionally which the clip must move to engage the blade.

Fig. 1 shows a plan view of the preferred form of the invention.

Fig. 2 shows a side elevation thereof.

Fig. 3 shows a cross sectional view of the clip with the blade in position.

Fig. 4 shows a plan view of a modified form of switch.

Fig. 5 shows a side elevation of Fig. 4.

Fig. 6 shows a plan view and Fig. 7 shows a side elevation of a center supporting framework base incorporated in a suspended switch inserted in a line.

Fig. 8 shows a side view and Fig. 9 an end elevation of a switch with a cylindrical contact bar 23, which is the blade of the switch, the contact clip faces engaging therewith.

1—1 are lines entering and leaving the switch.

2—2 are equipment adjustments thereof.

3—3 are suspension insulators attached to pins 4, 4.

5, is the base on which the switch parts are mounted;

6, is a cross-arm for supporting base 5, by bolts 7;

8, is a rock shaft;

9, is an insulator pin;

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75

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95

100

10, is an operating insulator provided with cap 18;

11, is an arm attached by bolts to cap 18;

12, is a flexible conductor attached to one line by connector 13, and at the other end to lug 14 and clip 15. This clip is supported by arm 16 supported flexibly on pin 17.

19, 19, are clip faces and are provided with pins 20, 20, which pass through clearance holes in spring piece 21, rigidly attached to piece 16; the spring forces the faces 19, 19 together to contact with the blade and the free motion in the holes for pins 20, 20 allows ready alignment of the faces to the blade.

Member 16 is the member which is freely movable about the pin in member 11 and the pins 20, 20 fitting loosely in the clip faces 19, 19 allow them to be self-aligning. Member 21 which is a spring applies pressure to the jaws 19, 19 to secure proper blade contact.

22, is a flexible conductor attaching clip faces 19, 19 to lug 14.

23 is the switch blade.

29, 29, are springs attached to arm 11; 30, 30, are brass washers or distance pieces.

In Figs. 4 and 5, 24 is the switch arm; 25 is a crank attached to pin 9; and 26 is a connecting rod for operating the different poles of the switch simultaneously, connected to crank 25 by pin 27; 28, is a collar attached to pin 9 and supporting the same on base 5.

The operation is as follows:

In closing the switch, the clips are provided with long horns adapted to engage blade 23 in whatever position it may assume. Arm 11, as shown is of channel section and supports flexibly arm 16, which is free to move except for the light springs 29, 29, or for the spring of conductor 12, which tend to centralize lightly the position of arm 16, and at the same time allow it to yield to the required position of blade 23, as governed by the line positions. The clip faces of 19 being supported by flexible connections through pins 20, allow for extremely wide variations of angular position of the blade 23 in any direction and insure under the worst conditions, within limits, absolutely parallel contact. The swing of arm 16 is limited to a certain degree by the flanges of the channel 11. The rear end of the switch which is connected through flexible conductor 12, allows for the operation through the bending of this conductor, which is sufficiently stiff to insure against material motion other than that required for operation. The different poles of the switch are connected to rock shaft 8 for simultaneous operation. When this shaft is turned in an anti-clockwise direction, the pin 9, insulator 10 and arm 11, with clip 15, are rotated correspondingly, opening the circuit. The construction lends itself readily to exceptionally good protection against weather conditions, since the clip points vertically downward, and

may be thoroughly housed, with the exception of a small slot for the entering blade.

Figs. 4 and 5 show a modified form of the invention, consisting of a double break switch, insulator 10, being operated by rotation around a vertical axis, the clips and blade in this case being arranged horizontally instead of vertically. The switch is opened by rotation of the insulator pin in an anti-clockwise direction, the general operation being obvious.

The arm 11, may be used as part of the conductor, or else cable may be run through as shown in Fig. 2. In this event, if arm 11 be made of iron channel, brass washers 30, 30, are inserted to prevent a closed magnetic circuit around the conductor.

Conductor 12, is attached to arm 11, by fastening 31. The spring of the conductor may be ample to centralize the position of piece 16, but if this is not sufficient the springs 29, 29 may be used. While the invention shows the blades attached to the line, it could, of course, be inverted by having the clip attached to the line and the blade attached to arm 16, though in general this would not be desirable.

One application of this invention is in the case of switches wherein the base or other construction is not rigid, and wherein some of the parts are subjected to more or less movement in relation to the other parts. In this connection the self-aligning clip with swivel arm may be used to good advantage, with any type of insulator for the switch, either using the suspension or pin type insulator.

An alternative method of construction consists in having the blade 23 cylindrical instead of flat. Fig. 8 shows a side elevation and Fig. 9 an end view of a blade and clip wherein the blade is round instead of flat. With this construction the clip would have two self-aligning contact shoes to fit the cylindrical surface. The torsion of the line would not affect the contact under any circumstances, but it would be necessary to have the axis of the blade and the clip coincide. With varying sags in the line this could be accomplished by putting a downward tension on each line so as to cause all clips to bottom by striking the base of the clip on the top of the blade, or else by having a spring or corresponding arrangement in the mechanism supporting the clip. For example, in Fig. 2, if arm 11 were flexible in a vertical plane the spring of this arm might be used to equalize the contacts for all three lines. In general the flat blade, however, is preferable.

Fig. 6, shows a plan view of the operating mechanism of either a single pole or a multiple pole switch, and Fig. 7 shows an elevation of the same. 32, is a lever attached to shaft 8, the general construction being similar to that shown in Figs. 1 and 2. 33, is a connecting rod connecting lever 32, through pin 41, to

crank 35, through pin 34. 36 is an operating vertical shaft attached to crank 35 and supported in fixed bearing 37, by any desired means. 42, is an adjusting screw for fixing as desired the position of the end of shaft 36, whereby part of the weight may be suspended from the line, and the balance taken on said screw. Proper suspension of part of the weight from the line assures stability of the structure. The bearing of shaft 36, in support 37, is flexible so that the line and switch members may swing freely to any desired position as determined by wind conditions, without cramping the shaft. For multipole operation crank 38, is attached to shaft 36, and the poles are connected together by connecting rod 39, secured to crank 38, by pin 40. In closed position crank 35, as shown is on dead center giving maximum leverage, and preventing any differential swaying of the lines causing any material motion of the blades in closed position, through connecting rod 39. This connecting rod is placed practically at the level of support 37, thus minimizing the effect of line sway on switch position.

The construction shown in Figs. 4 and 5, may be similarly applied to single or multipole construction by extending the shaft 36, and making it a continuation of pin 9, to which it is attached. The construction is then a continuation of pin 9, to support 37, the operation being obvious.

What I claim is:

1. In an electric switch a pair of relatively movable contacts, an insulator mounted on a shaft, a member attached to said insulator and supporting one of said contacts, a supporting base, a second insulator attached to said base, the second contact being attached to said second insulator, the axis of said second contact and said second insulator being in substantial alignment, the motion of said first insulator about the axis of said shaft operating the switch.

2. In an electric switch a pair of relatively movable contacts, an insulator mounted on a shaft, a member attached to said insulator and supporting one of said contacts, a supporting base, a second insulator flexibly attached to said base, the second contact being attached to said second insulator, the motion of said first insulator about the axis of said shaft operating the switch, one of said contacts being freely movable in a direction transverse to the axis or plane of said contacts when in engagement and adapted to secure thereby proper engagement of said contacts.

3. In an electric switch a pair of relatively movable contacts comprising a clip and blade respectively, an insulator mounted on a shaft, a member on which said clip is mounted, said member being freely movable in a direction transverse to the axis or plane of said con-

tacts when in engagement, and adapted to secure proper co-operation of said contacts, said member being operatively driven by said insulator, in combination with a supporting base, an insulator mounted on said base, and carrying attached thereto the said blade, the motion of said first insulator about the axis of said shaft operating the switch.

4. The combination with wires for conducting electrical energy, of a plurality of insulators flexibly joined with one another and with said wires, an elongated contact member serving as a means of connection between one of the wires and one of the insulators, which contact member has its longitudinal axis in substantial alignment with the axis of the wire and the axis of the insulators, a movable switch member connected with the other wire, and means for moving said movable switch member into and out of contact with the contact member.

In witness whereof I affix my signature.
AUGUSTUS JESSE BOWIE.