Nov. 14, 1939. C. A. FOX 2,179,484

ELECTRICAL SWITCH

Filed Dec. 14, 1936

Fig. 1

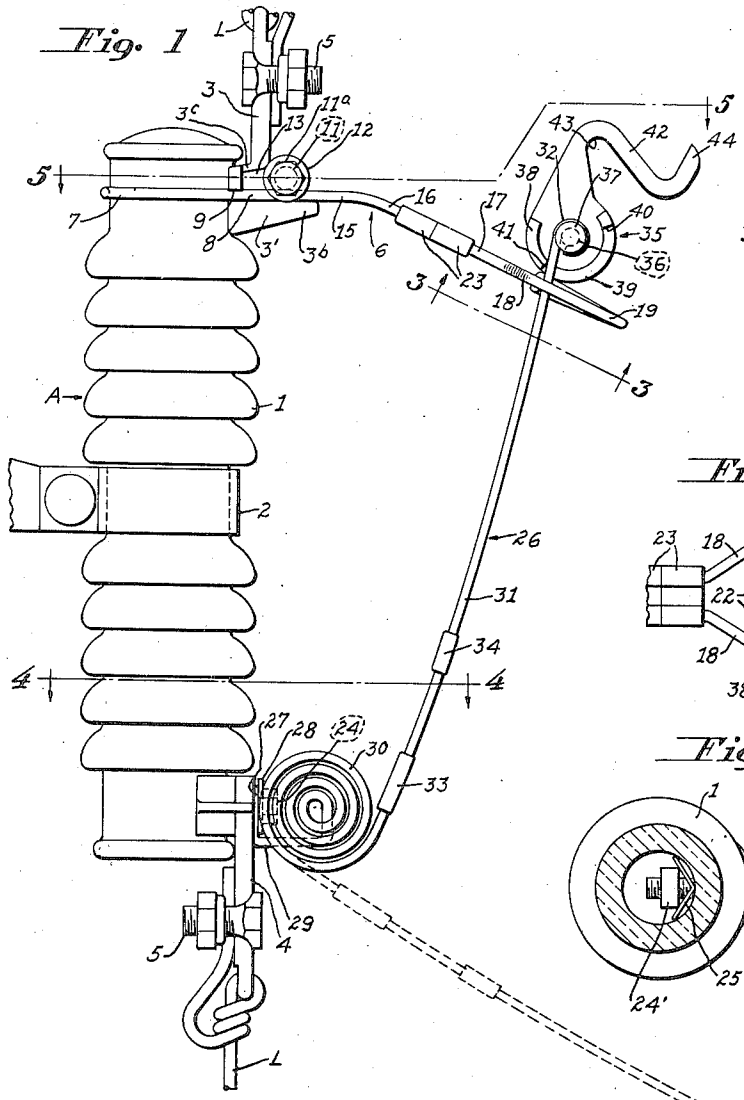


Fig. 2

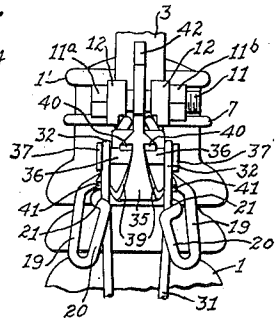


Fig. 3

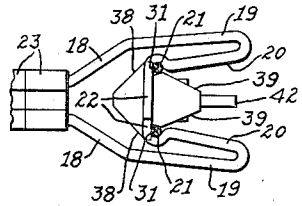


Fig. 4

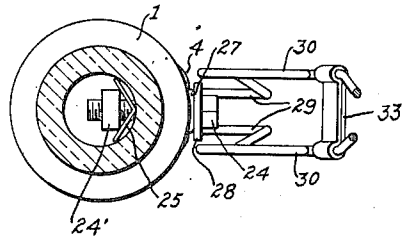
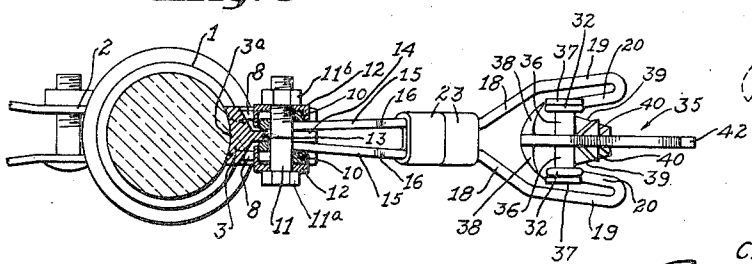


Fig. 5



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ELECTRICAL SWITCH

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Application December 14, 1936, Serial No. 115,675

12 Claims. (Cl. 200—169)

This invention relates generally to electrical switches and more specifically to an improved disconnect switch adapted particularly for use on signal circuits, rural and other electrical lines where the primary load does not exceed twenty five amperes, and high line telephone circuits, the predominant object of the invention being to provide an improved device of this type which, although of extreme simple and economical construction, performs its intended function in a highly efficient manner.

Where signal lines are on the same pole or other supporting structure with high voltage lines it is often necessary to provide sectionalizing switches in the signal circuit and while these circuits, operating at a very low current, do not require heavy switching equipment it has been necessary heretofore to purchase and use relatively heavy equipment due to the fact that the desirable lighter equipment was not available. Also prior to this invention it was thought that regardless of the current carrying capacity it was necessary to use relatively large switches in this connection in order to withstand mechanical abuse and bad weather conditions.

The improved disconnect switch disclosed herein was devised to provide an efficiently operating switch which although of extremely simple, light and economical construction is capable of withstanding all of the mechanical abuses and the bad weather conditions to which switches of this type are ordinarily subjected.

Fig. 1 is a side elevation of the improved switch with the supporting bracket and the incoming and outgoing lines associated therewith broken away, and with the blade of the switch shown by full lines in the closed switch position and by dotted lines in the open switch position.

Fig. 2 is a fragmentary front elevation of the upper portion of the switch.

Fig. 3 is a section on line 3—3 of Fig. 1.

Fig. 4 is a section on line 4—4 of Fig. 1.

Fig. 5 is a section on line 5—5 of Fig. 1.

In the drawing, wherein is shown for the purpose of illustration, merely, one embodiment of the invention A designates in Fig. 1 the improved switch generally. The switch A comprises an insulator 1 which is preferably, though not necessarily, of the post type. The insulator has fixed to it at its approximate longitudinal center a suitable supporting bracket 2 which is adapted to be attached to a crossarm or other suitable supporting element.

Fixed to the insulator 1 at the upper end thereof is the upper terminal 3 and secured to said insulator at its lower end is the lower terminal 4 of the switch, said upper and lower terminals having connected to them through the instrumentality of suitable connectors 5 the incoming and outgoing lines L of the circuit with which the switch is associated. The upper terminal is attached to the insulator by the upper contact 6 of the switch. This upper contact is formed of heavy wire and it includes a portion 7 which embraces the upper portion of the insulator. The opposed portions 8 of the upper contact which extend forwardly from the insulator-embracing portion 7 of said contact are disposed in notches or depressions 9 formed at opposite sides of the lower portion 3' of the upper terminal 3. It is to be noted that the lower portion 3' of the upper terminal is provided with a curved face 3a (Fig. 5) which contacts with the face of the insulator. Also the bottom part of the lower portion of the upper terminal extends forwardly a considerable distance as shown to the best advantage in Fig. 1 wherein the forwardly extended bottom part of the upper terminal is designated by the reference character 3b. The top upwardly extended portion of the upper terminal 3 is spaced forwardly of the rear curved face 3a and said top portion is joined to the lower portion of the upper terminal by a portion 3c.

The forwardly extended portions 8 of the upper contact are provided with coiled portions to provide eyes 10 which are alined with each other transversely of the switch, and extended through these eyes is a bolt 11. The bolt 11 is provided with a head 11a at one end and a nut 11b at the opposite end, and arranged on the bolt in contact with the inner faces of the head and nut thereof is a pair of cups 12 which receive the eyes 10. The lower portion 3' of the upper terminal 3 is provided with a forwardly extended web 13 which serves to separate the eyes 10 and also the forwardly extended bottom part of the lower portion 3b of the upper terminal is provided on its top face with an upwardly extended web 14 that serves to separate the opposed forwardly extended portions 15 of the upper contact which are located forwardly of the eyes 10.

The forwardly extended opposed portions 15 of the upper contact are bent at 16 to provide downwardly inclined portions 17 which adjacent to the outer end of the upper contact are flared outwardly as indicated at 18 in Figs. 3 and 5. Extending forwardly from the forward ends of these flared portions 18 are opposed slightly divergent portions 19 which terminate at the forward end of the upper contact where the element

of which the upper contact is formed is bent to provide rearwardly extended portions 20. At the rear ends of the portions 20 the element of which the upper contact is formed is bent to provide pockets 21, portions 22 of the upper contact being extended from said pockets laterally of the switch in overlapping relation as shown in Fig. 3. The overlapping portions 22 of the upper contact are not connected together and in order to prevent undue movement of the opposed side portions of the upper contact toward and from each other a pair of clips 23 is associated with said opposed portions. The opposed side portions of the clips embrace the opposed portions of the upper contact and the intermediate portions of the clips bridge the space between the opposed portions of the contact so as to attach said contact portions together.

It is to be noted that the upper contact of the improved switch is formed from a single piece of relatively heavy wire, said piece of wire terminating at its opposite ends in the overlapping portions 22. In applying the upper terminal and the upper contact to the insulator 1 the bolt 11 is removed which allows the opposed portions of the contact to be spread so that the insulator-embracing portion will pass downwardly over the enlarged flange portion 1' at the upper end of the insulator 1. When the upper terminal 3 has been arranged in place relative to the insulator 1 and the upper contact has been passed over the upper end of the insulator as described and has been properly associated with the upper terminal, the bolt 11 is arranged in place with the cups 12 associated therewith. The nut of the bolt is then screwed inwardly on the bolt to draw the cups 12 and the eyes 10 of the upper contact inwardly with respect to each other whereby the insulator-embracing portion of the upper contact is caused to tightly grip the insulator to secure the upper contact thereto. Also because portions of the upper contact extend through the depressions 9 of the upper terminal and because other upper contact portions are forced into close contact with the web portions 13 and 14 of the upper terminal 3 by the bolt 11, said upper terminal is securely fixed to the upper contact with the curved face 3a of said upper terminal in close engagement with the face of the insulator 1.

With regard now to the lower terminal 4, this terminal is secured to the insulator 1 by a bolt 24 which passes through an aperture formed through the wall of the insulator and has associated therewith within the central opening of the insulator a nut 24' and a washer 25. The blade 26 of the switch is secured to the insulator by said bolt 24, said blade being formed from a single piece of relatively heavy wire and having an upwardly extended loop portion 27 through which the bolt passes and which is frictionally gripped by a washer 28 which is forced into close contact with said loop portion by the head of the bolt. Extended outwardly from the lower end of the loop portion 27 are opposed blade portions 29 which merge into opposed coiled portions 30 of the blade 26 that provide the blade with the required spring and resiliency, and extended from said coiled portions are opposed elongated blade portions 31 which are provided at their outer ends with opposed and alined eyes 32. In order to prevent the opposed, elongated blade portions 31 from moving unduly toward and from each other said blade portions are attached together by clips 33 and 34 similar to the clips 23 already described herein.

Supported at the outer end of the blade 26 of the switch is a locking device which comprises an element 35 which is provided with trunnions 36 extended outwardly in opposite directions from the opposed side faces of the element. The trunnions extend through the eyes 32 of the opposed portions 31 of the blade 26 so that the element 35 is rotatably supported by said eyes, and the trunnions are provided at their outer ends with flange elements 37 riveted or otherwise secured thereto which prevent displacement of the eyes 32 from the trunnions. It is important to note that the trunnions are of sufficient length to permit the eyes 32 to move longitudinally of said trunnions in a manner and for a purpose to be hereinafter set forth. At opposite sides of the element 35 laterally extended, arcuate portions 38 are provided on which are formed cam faces 39, each of said cam faces being provided at its opposite ends with abutment faces 40 and 41. It will be noted by referring to Fig. 2 that the low spots of the cam faces are at the ends at which the abutment faces 40 are located and that the high spots of the cams are at the location of the abutment faces 41. The element 35 is provided with a hook-shaped portion 42 which provides a seat 43 adapted to receive a tool employed in closing the switch, and also said element is provided with an extension 44 adapted to be engaged by a tool to open the switch.

When, in the use of the improved switch, it is desired to move the blade 26 from the open switch position in which it is shown by dotted lines in Fig. 1 to the closed switch position in which said blade is shown by full lines in said view, the prong of an ordinary switch stick is placed in the seat 43 of the locking element 35. The outer end of the blade is then moved upwardly with the aid of the switch stick toward the upper contact and during such movement the locking element is rotated with respect to the eyes 32. When the blade 26 is in its lowered or open switch position as shown by dotted lines in Fig. 1 the opposed, elongated side portions of the blade contact with the low portions of the cam faces 39 as the resiliency of said elongated blade portions tends to move the outer end portions of said blade portions toward each other. Now when the locking element is rotated during movement of the outer end of the blade toward the upper contact 6 because of engagement therewith of a switch stick as described the rotary movement of the locking element causes the cam faces to move the opposed, elongated blade portions outwardly away from each other. This is the condition which exists as the outer end of the blade approaches the upper contact 6, and as the outer end of the blade 26 is forced between the inclined, resilient portions 20 of the upper contact these portions 20 will be spread by the elongated blade portions passing therebetween and when the end of the closing stroke of the blade is reached the elongated opposed blade portions will snap into the pockets 21 with the result that the blade will be mechanically locked to the upper contact and electrically connected thereto.

When it is desired to open the switch when it is in the closed switch position the prong of a switch stick is engaged behind the extension 44 and said switch stick is pulled to rotate the locking element 35. This moves the lower portions of the cam faces 39 into contact with opposed elongated blade portions 31 thereby permitting the outer end portions thereof to move

toward each other with the result that said opposed elongated blade portions are withdrawn from the pockets 21 and the tensioned coils 30 of the blade swing the blade rapidly to the open switch position.

I claim:

1. An electrical switch comprising an insulating support, a contact supported by said insulating support, a blade supported by said insulating support for movement into and out of electrical connection with said contact, said blade being provided with resilient portions movable laterally of the axis of said blade toward and from each other and said contact having portions adapted to receive said resilient portions of said blade in locking engagement, and rotary means supported for rotary movement by said blade at a point adjacent to the portion thereof which is moved into and out of electrical connection with said contact for moving said resilient portions of said blade to positions where they may be engaged by said portions of said contact which are adapted to receive them to lock said blade in the closed switch position, and for permitting displacement of said resilient blade portions from said engaging means of the contact to unlock said blade from said contact for movement thereof to the open switch position.

2. An electrical switch comprising an insulating support, a contact supported by said insulating support, a blade supported by said insulating support for movement into and out of electrical connection with said contact, said blade being provided with resilient portions movable laterally of the axis of said blade and said contact having portions adapted to receive said resilient portions of said blade in locking engagement, and rotary means supported by said blade for rotary movement and including an arcuate cam face for moving a resilient portion of said blade to a position where it may be engaged by a portion of said contact which is adapted to receive it to lock said blade in the closed switch position and for permitting displacement of said resilient blade portion from said engaging means of the contact to unlock said blade from said contact or movement thereof to the open switch position.

3. An electrical switch comprising an insulating support, a contact supported by said insulating support, a blade supported by said insulating support for movement into and out of electrical connection with said contact, said blade being provided with resilient portions movable laterally of the axis of said blade and said contact having portions adapted to receive said resilient portions of said blade in locking engagement, and rotary means supported by said blade for rotary movement and including oppositely disposed arcuate cam faces for moving said resilient portions of said blade to positions where they may be engaged by said portions of said contact which are adapted to receive them to lock said blade in the closed switch position and for permitting displacement of said resilient blade portions from said engaging means of the contact to unlock said blade from said contact for movement thereof to the open switch position.

4. An electrical switch comprising an insulating support, a contact supported by said insulating support, a blade supported by said insulating support for movement into and out of electrical connection with said contact, said blade being provided with resilient portions movable laterally of the axis of said blade and said contact having resilient portions adapted to receive said resilient portions of said blade in locking engagement, and rotary means supported by said blade for rotary movement and including oppositely disposed arcuate cam faces for moving said resilient portions of said blade to positions where they may be engaged by said resilient portions of said contact which are adapted to receive them to lock said blade in the closed switch position and for permitting displacement of said resilient blade portions from said engaging means of the contact to unlock said blade from said contact for movement thereof to the open switch position.

5. An electrical switch comprising an insulating support, a contact supported by said insulating support, a blade supported by said insulating support for movement into and out of electrical connection with said contact, said blade being provided with resilient portions movable laterally of the axis of said blade and said contact having resilient portions provided with pockets adapted to receive said resilient portions of said blade in locking engagement, and rotary means supported by said blade for rotary movement and including oppositely disposed arcuate cam faces for moving said resilient portions of said blade to positions where they may be engaged by said resilient portions of said contact which are adapted to receive them to lock said blade in the closed switch position and for permitting displacement of said resilient blade portions from said engaging means of the contact to unlock said blade from said contact for movement thereof to the open switch position.

6. An electrical switch comprising an insulating support, a contact supported by said insulating support, a blade supported by said insulating support for movement into and out of electrical connection with said contact, and provided with a coiled portion which provides the blade with resiliency that tends to move said blade to the open switch position, said blade being provided with resilient portions and said contact having resilient portions provided with pockets adapted to receive said resilient portions of said blade in locking engagement, and rotary means supported by said blade for rotary movement with respect thereto and including oppositely disposed arcuate cam faces for moving said resilient portions of said blade to positions where they may be engaged by said resilient portions of said contact which are adapted to receive them to lock said blade in the closed switch position and for permitting displacement of said resilient blade portions from said engaging means of the contact to unlock said blade from said contact for movement thereof to the open switch position.

7. An electrical switch comprising an insulating support, a contact supported by said insulating support, a blade supported by said insulating support for movement into and out of electrical connection with said contact, and provided with opposed coiled portions which provide the blade with resilience that tends to move said blade to the open switch position, said blade being provided with resilient portions and said contact having resilient portions provided with pockets adapted to receive said resilient portions of said blade in locking engagement, and rotary means supported by said blade for rotary movement with respect thereto and including oppositely disposed arcuate cam faces for moving said resiilent portions of said blade to positions where they may be engaged by said resilient portions of said contact which are adapted to receive them to lock said blade in the closed switch position and for

permitting displacement of said resilient blade portions from said engaging means of the contact to unlock said blade from said contact for movement thereof to the open switch position.

8. An electrical switch comprising an insulating support, a contact supported by said insulating support, a blade supported by said insulating support for movement into and out of electrical connection with said contact, said blade including elongated, substantially parallel resilient portions extended from oppositely disposed coiled portions which provide the blade with resiliency that tends to move the blade to the open switch position, said contact having resilient portions provided with pockets adapted to receive parts of said elongated resilient portions of the blade in locking engagement, and rotary means supported by said blade for rotary movement with respect thereto and including oppositely disposed arcuate cam faces for moving said parts of said elongated resilient portions of the blade to positions where they may be engaged by said pockets to lock said blade in the closed switch position and for permitting displacement of said elongated resilient portions of the blade from said pockets to unlock said blade from said contact for movement thereof to the open switch position.

9. An electrical switch comprising an insulating support, a contact supported by said insulating support, a blade supported by said insulating support for movement into and out of electrical connection with said contact, said blade including elongated, substantially parallel resilient portions extended from oppositely disposed coiled portions which provide the blade with resiliency that tends to move the blade to the open switch position, said contact having resilient portions provided with pockets adapted to receive parts of said elongated, resilient portions of the blade in locking engagement, and rotary means supported by said blade for rotary movement with respect thereto and including oppositely disposed arcuate cam faces for moving said parts of said elongated resilient portions of the blade to positions where they may be engaged by said pockets to lock said blade in the closed switch position and for permitting displacement of said elongated resilient portions of the blade from said pockets to unlock said blade from said contact for movement thereof to the open switch position, said rotary means including parts adapted to be engaged by a tool for moving the blade to the closed switch position and for releasing said blade from the closed switch position.

10. An electrical switch comprising an insulating support, a contact supported by said insulating support, a blade supported by said insulating support for movement into and out of electrical connection with said contact, said blade being provided with resilient portions and said contact having portions adapted to receive said resilient portions of said blade in locking engagement, and means for moving said resilient portions of said blade to positions where they may be engaged by said portions of said contact which are adapted to receive them to lock said blade in the closed switch position and for permitting displacement of said resilient blade portions from said engaging means of the contact to unlock said blade from said contact for movement thereof to the open switch position, said contact being formed from a continuous length of elongated material bent to the required shape and including a continuous portion which embraces a part of said insulating support, and means for drawing said support-embracing portion into gripping contact with said insulating support.

11. An electrical switch comprising an insulating support, a contact supported by said insulating support, a blade supported by said insulating support for movement into and out of electrical connection with said contact, said blade being provided with resilient portions and said contact having portions adapted to receive said resilient portions of said blade in locking engagement, and means for moving said resilient portions of said blade to positions where they may be engaged by said portions of said contact which are adapted to receive them to lock said blade in the closed switch position and for permitting displacement of said resilient blade portions from said engaging means of the contact to unlock said blade from said contact for movement thereof to the open switch position, said contact being formed from a continuous length of elongated material bent to the required shape and including a continuous portion which embraces a part of said insulating support, and means comprising a bolt extended through eyes formed in portions of said contact for drawing said support-embracing portion into gripping contact with said insulating support.

12. An electrical switch comprising an insulating support, a contact supported by said insulating support, a blade supported by said insulating support for movement into and out of electrical connection with said contact, said blade being provided with resilient portions and said contact having resilient portions adapted to receive said resilient portions of said blade in locking engagement, rotary means including oppositely disposed cam faces for moving said resilient portions of said blade to positions where they may be engaged by said resilient portions of said contact which are adapted to receive them to lock said blade in the closed switch position and for permitting displacement of said resilient blade portions from said engaging means of the contact to unlock said blade from said contact for movement thereof to the open switch position, said contact being formed from a continuous length of elongated material bent to the required shape and including a continuous portion which embraces a part of said insulating support, and means comprising a bolt extended through eyes formed in portions of said contact for drawing said support-embracing portion into gripping contact with said insulating support, and a terminal member which is clamped in position with respect to said insulating support by said contact.

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