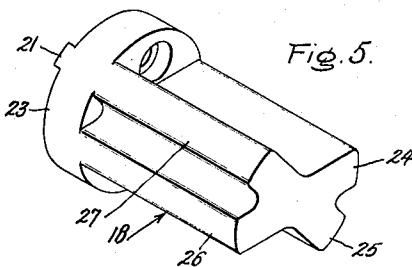
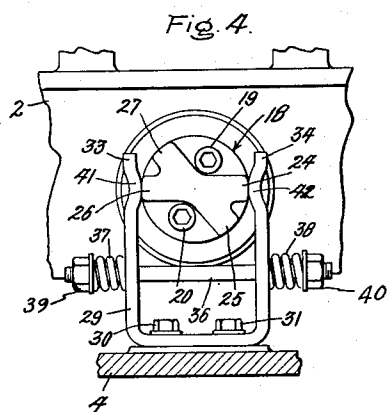
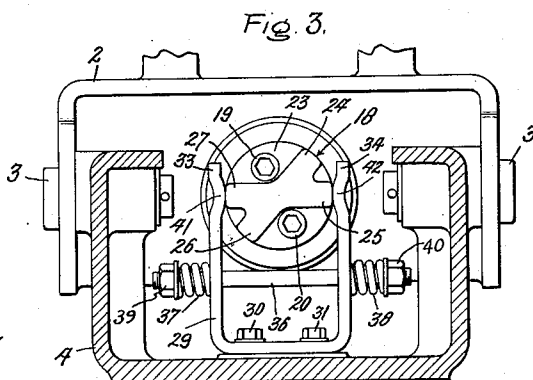
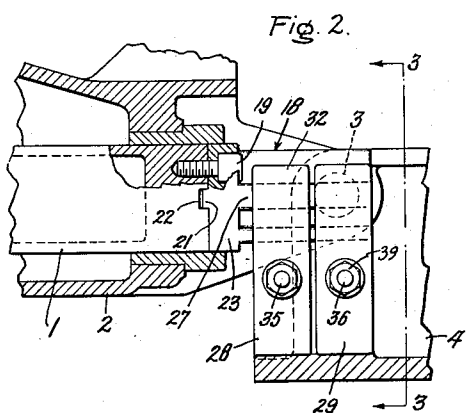
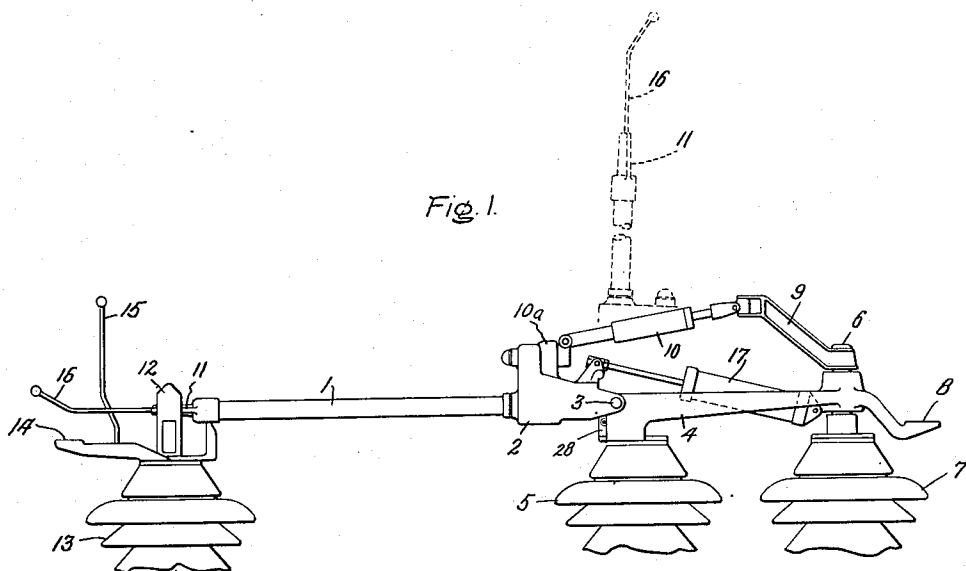


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PIVOT END CONTACT FOR ELECTRIC DISCONNECTING SWITCHES

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PIVOT END CONTACT FOR ELECTRIC
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My invention relates to electric disconnecting switches of the dual axis high contact pressure, outdoor type and more particularly to the electrical contacts at the dual axis pivoted end of the circuit controlling blade members of such switches.

Such high contact pressure disconnecting switches usually involve pivotally supporting one end of a blade member on a stationary insulator stack with an associated operating mechanism to swing the free end of blade about the transverse pivot axis into position between the spaced fingers of a U-shaped stationary contact mounted on another insulator stack. The blade is then rotated by the operating mechanism about its longitudinal axis into high pressure engagement with the jaws of the contact. The operating mechanism for producing such dual axis rotatable blade movement comprises, in general, a rotatably mounted stack of insulators on which is mounted a crank coupled in cam arrangement to the blade through a link forming a toggle with the crank. In order to provide circuit continuity at the pivoted end of the blade without the use of flexible leads and the like, the pivoted end of the blade is usually allowed to travel over its limited swinging path and through the necessary axial rotation while the pivoted end thereof is maintained in electrical contact within the spring biased fingers of a second U-shaped stationary contact.

Because of the severe operating conditions imposed upon disconnecting switches of the type described, it is possible for ice, dirt from smoke, grease from the operating mechanism, or other extraneous matter to be deposited upon the end of the blade which engages the second stationary contact, on the finger surfaces, or perhaps at the meeting line of the blade and stationary contact fingers. Thus, such matter may be carried between the contact fingers of the blade end, when the blade undergoes its respective motions, and cause severe burning and pitting of the contacting surfaces.

It is, therefore, an object of my invention to provide a new and improved blade member for a dual axis disconnecting switch providing better contact cleaning and extraneous matter disposing action at the pivoted end thereof.

It is another object of my invention to provide a dual axis disconnecting switch blade having at its pivoted end multiple contact means capable of affording a multiple contact wiping and extraneous matter disposing action.

It is another object of my invention to pro-

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vide a dual axis disconnecting switch blade shaped at its pivoted end to substantially eliminate contact burning and pitting due to extraneous matter.

It is still another object of my invention to provide a terminal contact fitting for the pivoted end of a dual axis disconnecting switch blade which may be readily replaced, in the event that excessive wear or damage occurs thereto, without replacing the whole blade.

In carrying out my invention I provide a contact terminal fitting mounted upon the pivoted end of a dual axis disconnecting switch blade. As the blade travels through its successive operating motions of swinging about the transverse pivot axis and rotating about its longitudinal axis, the terminal fitting slides between the fingers of a stationary contact, preferably of a U-shaped configuration. The terminal fitting forms a coaxial extension of the switch blade and is made essentially X-shaped in cross section coaxial with the longitudinal axis of the blade, that is, to have four or more ridges extending axially thereon. When the blade is at one limit of its rotational travel, one pair of diametrically opposed ridges forming one bar of the X engages the fingers of the stationary contact. As the blade is rotated to its other rotational limit, the engaging ridges of the fitting wipe the fingers free of any extraneous matter and another pair of diametrically opposed ridges forming the other bar of the X slides into clean contact with the fingers.

The novel features and scope of my invention are pointed out with particularity in the appended claims. For a better understanding of my invention, however, and for further objects and advantages thereof, reference should be had to the following description taken in connection with the accompanying drawing.

In the drawing Fig. 1 is a side elevation of a dual axis disconnecting switch embodying my invention; Fig. 2 is an enlarged sectional view of a part of the switch shown in Fig. 1 illustrating more clearly the particular features of my invention; Fig. 3 is a cutaway view of a part of the switch taken along line 3-3 in Fig. 2; Fig. 4 is similar to Fig. 3 except that it illustrates the switch blade and contact terminal fitting in a different rotational position; and Fig. 5 is a perspective view of a preferred embodiment of the contact terminal fitting of my invention.

Referring now to Fig. 1, I have shown an electric disconnecting switch of the dual axis high contact pressure, outdoor type comprising a cir-

cuit connecting and disconnecting switch blade 1 journaled and supported near its pivoted end within a blade supporting hinge member 2 so as to allow rotation of blade 1 about its longitudinal axis. Hinge member 2, in turn, is pivotally mounted by means of pins 3 on a stationary supporting member such as a cross brace member 4 which is mounted at its left end on a stationary insulator stack 5 (partially shown) and which journals a shaft 6 extending from a rotatably mounted insulator stack 7, partially shown. Stationary cross brace member 4 includes a terminal 8 extending therefrom for connection to an electric circuit, not shown. An operating crank 9 is firmly mounted upon rotatable shaft 6 and universally pivotally connected to a swivel link 10. The swivel link 10 is connected at its other end to a blade rotating mechanism 10a housed in the upper portion of hinge member 2. When the switch is closed and insulator stack 7 is rotated in the proper direction by a suitable crank means, not shown, so that operating crank 9 is rotated about the axis of shaft 6, the swivel link 10 first actuates blade rotating mechanism 10a to cause blade 1 to be rotated a limited amount about its longitudinal axis. This causes a flattened free end 11 of blade 1 to be released from high pressure engagement with the fingers of a preferably U-shaped stationary contact 12 which is mounted upon a stationary insulator stack 13 and provided with a terminal 14 for connection to the electric circuit. Further rotation of insulator stack 7 causes the blade 1 and hinge member 2 to be swung upward through approximately 90 degrees, pivoting about the pins 3, to the open vertical position indicated by the dashed lines in Fig. 1. The switch is closed in exactly the reverse process of that just described. The disconnect switch may also be provided with co-operating arcing horns 15 and 16 mounted respectively on terminal 14 and free end 11 of blade 1. For counterbalancing the blade structure in its swinging movement, an energy-storing means such as a spring-backed piston and cylinder assembly 17 may be linked between cross-brace member 4 and hinge member 2 as shown.

Further detailed description of the salient features and operating characteristics of the disconnecting switch shown in Fig. 1 is not believed to be necessary since the specific features of my invention will be described in connection with Figs. 2, 3, 4 and 5. However, for a better understanding of the general type of switch shown in Fig. 1, reference may be had to U. S. Patent 2,531,165, issued November 21, 1950, to E. Scheuermeyer and assigned to the same assignee as that of the present invention.

Referring now to Figs. 2, 3 and 4 in which the pivoted end of blade 1 is shown in more detail, a terminal contact fitting 18, illustrated more clearly in Fig. 5, is shown fastened by suitable means such as bolts 19 and 20 to extend coaxially from blade 1 and form the pivoted end thereof. A rib 21 may be provided on fitting 18 to engage the surfaces of a diametral slot 22 provided in blade 1 to reduce any shear stress which might be transmitted to bolts 19 and 20 as blade 1 is rotated. The fitting 18 includes a base portion 23, suitably shaped to be fastened to blade 1, and four axially extending ridges 24, 25, 26, and 27 forming a body essentially X-shaped in cross section. Ridges 24 and 26 are diametrically opposed, as are ridges 25 and 27, and the outer surfaces of the ridges are radiused to form surface elements of a cylinder from which the fitting 18

might be made. Ridges 24 and 25 lie at an angle with each other which is the angle through which blade 1 is rotated about its longitudinal axis during opening or closing of the switch.

To make electrical contact with the terminal fitting 18, one or more stationary contacts, preferably U-shaped in configuration, such as contacts 28 and 29, are mounted in aligned relationship, by suitable fasteners such as bolts 30 and 31, within the left end of cross-brace member 4 adjacent the pins 3. Each stationary contact includes a pair of flexible fingers, that is, contact 28 includes finger 32 and a finger not visible in the drawing, and contact 29 includes fingers 33 and 34, which are in high pressure contact with a pair of diametrically opposed ridges on fitting 18. To bias the two fingers of each contact toward one another and insure adjustable high pressure contact thereof with the ridges of fitting 18, fastener means such as shafts 35 and 36 are extended through the fingers, and spring biasing means, such as springs 37 and 38, are secured in compression on the extremities of the shafts. The use of nuts, such as nuts 39 and 40, on threaded shafts 35 and 36 permits the biasing force exerted by springs 37 and 38 to be readily adjustable. To permit the ridges of fitting 18 to be easily rotated into high pressure engagement with the fingers and to provide continuous contact with fitting 18, rounded, smooth, inwardly extending projections 41 and 42 are provided on the fingers.

When the blade 1 is fully closed, as indicated in Figs. 1, 2, and 3, a path of electrical conduction is provided through the switch from terminal 8 through cross-brace member 4, U-shaped contacts 28 and 29, terminal fitting 18, blade 1, and contact 12 to terminal 14.

Assuming for purposes of illustration that the blade 1 and fitting 18 are rotated clockwise about their longitudinal axis, as viewed in Fig. 3, through the angle subtended between ridges 26 and 27 to release the flat end 11 from high pressure engagement with contact 12, the projections 41 and 42 are long enough so that ridges 26 and 24 engage the fingers of contacts 28 and 29 before ridges 27 and 25 break engagement with the fingers. When the blade 1 has been fully rotated through the angles subtended by ridges 26 and 27, fitting 18 is then disposed with ridges 24 and 26 in engagement with the fingers of contacts 28 and 29 as shown by Fig. 4. The blade 1 and hinge member 2 may then be swung upward about pins 3 to open the switch whereupon the axis of blade 1 and fitting 18 is swung approximately to a vertical position. The ridges 24 and 25, nevertheless, remain at all times during the swinging action in high pressure engagement with the fingers of contacts 28 and 29. Thus, direct electrical connection between blade 1 and cross-brace member 4 is never broken and the disconnecting action of the switch takes place entirely at end 11 of blade 1. This is particularly desirable because if such pivot end connection is made after or broken before the respective connection or disconnection at the free end of the blade, arcing might occur at contacts 28 and 29 instead of at arcing horns 15 and 16, and damaging current might flow through link 10 and assembly 17 which, as a rule, are not designed to carry heavy current.

In Fig. 4 the fitting 18 is shown in a position, assumed for purposes of illustration corresponding to a position of free end 11 resting loosely in stationary contact 12, with ridges 24 and 26 en-

gaging the fingers of the contacts 28 and 29. As blade 1 and fitting 18 are rotated counterclockwise about their longitudinal axis to cause high pressure contact between free end 11 and stationary contact 12, the ridges 24 and 26 wipe the inner surfaces of the finger depressions clean of any extraneous matter which might have been deposited thereon. Thus, positive, clean contact with no burning or pitting is assured between ridges 25 and 27 and the fingers when the blade 1 is fully closed as shown in Fig. 3. Moreover, during the rotation of blade 1 on the transverse axis, the ridges 24 and 26 are maintained in rotational wiping engagement with the inwardly extending projections 41 and 42 so as to scrape any dirt, ice or other extraneous matter therefrom. Such extraneous matter can fall freely from all contact surfaces during the rotation of blade 1 on its transverse axis. Likewise, when the ridges 25 and 27 additionally wipe the inwardly extending contact surface projections 41 and 42, any additional extraneous matter removed therefrom can freely fall away particularly during any subsequent rotation of the switch blade 1 on its transverse axis. As a result, such extraneous matter is effectively disposed and prevented from accumulating on any contact surfaces.

It will be apparent that my invention includes the use of a single blade provided at its pivoted end with ridges shown and described hereinbefore for a separate terminal fitting. However, by making the terminal fitting 18 separately and attaching it to the end of the blade, the terminal fitting 18 may be easily replaced without replacing the entire blade should any excessive wear or damage occur to the rubbing surfaces which engage the stationary contacts.

While the present invention has been described by reference to a particular embodiment thereof, it will be understood that numerous modifications may be made by those skilled in the art without actually departing from the invention. I, therefore, aim in the appended claims to cover all such equivalent variations as come within the

true spirit and scope of the foregoing disclosure. What I claim as new and desire to secure by Letters Patent of the United States is:

1. In combination, a switch blade having dual axis pivotal mounting means at one end for rotation of the blade on both a transverse axis and the horizontal axis of the blade, a current conducting terminal mounted on the one end of the blade and having two sets of diametrically opposed ridges extending parallel with the longitudinal axis of the blade, and stationary contacts mounted on opposite sides of the terminal for engaging one set of diametrically opposite ridges therebetween during the rotation of the blade on the transverse axis and the other set of ridges therebetween upon rotation of the blade on the longitudinal axis.

2. In combination, a switch blade having dual axis pivotal mounting means at one end for rotation of the blade on a transverse axis and on the longitudinal axis of the blade, a current conducting terminal mounted on the one end of the blade and having an X-shaped cross section coaxial with the longitudinal axis of the blade, and a U-shaped stationary contact mounted to straddle the terminal for engaging the ends of one bar of the X therebetween during rotation of the blade on the transverse axis and the ends of the other bar of the X therebetween upon rotation of the blade on the longitudinal axis.

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