Jan. 24, 1950 J. F. CONRAD 2,495,569

TROLLEY SECTION SWITCH

Filed April 21, 1947 2 Sheets-Sheet 1

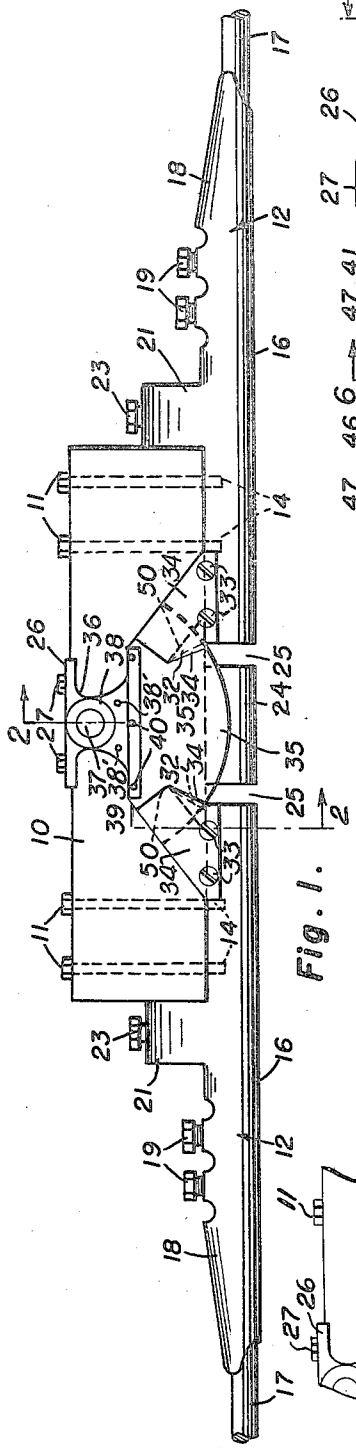


Fig. 1.

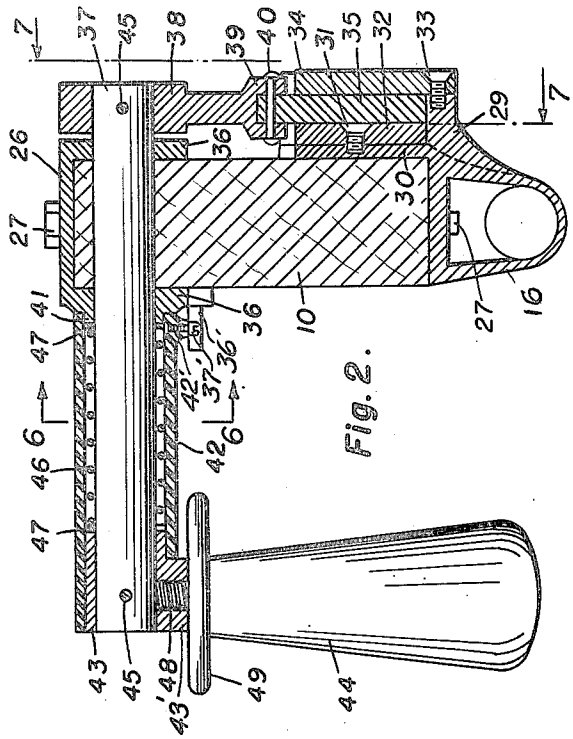


Fig. 2.

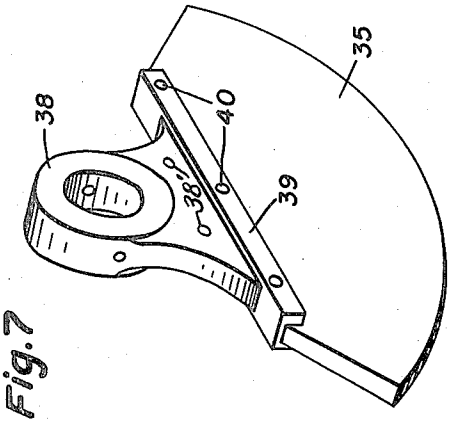


Fig. 5.

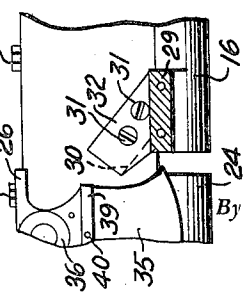


Fig. 7

Inventor

John Francis Conrad

By Clarence A. O'Brien and Harvey B. Jacobson

Attorneys

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TROLLEY SECTION SWITCH

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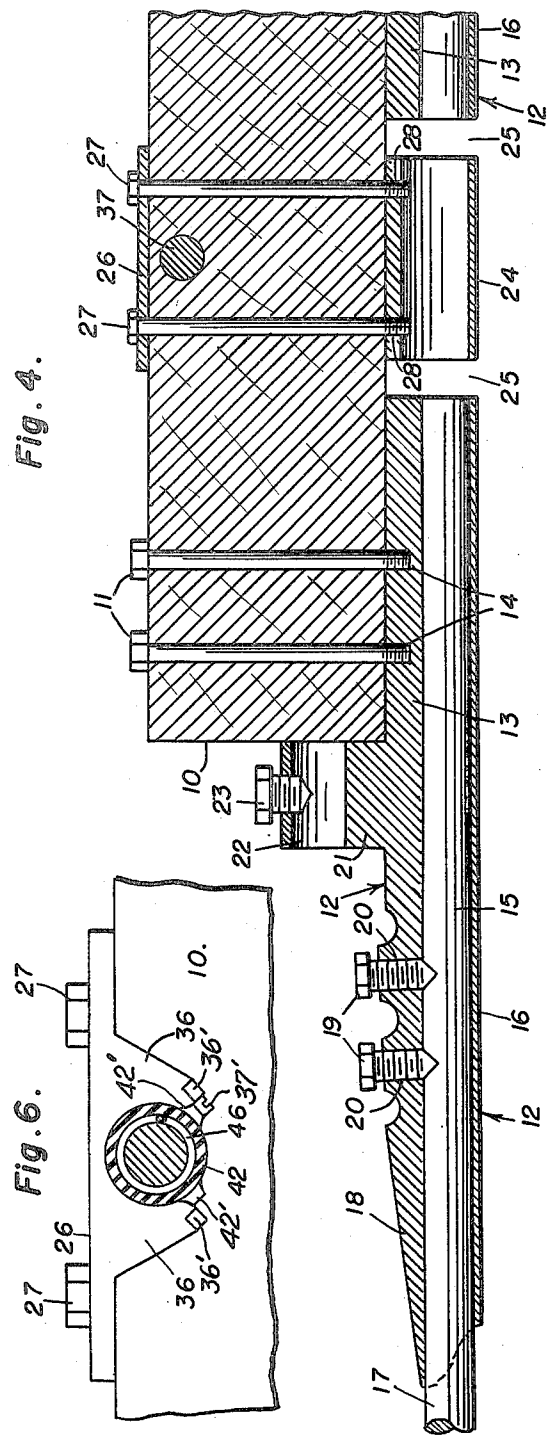


Fig. 4.

Fig. 6.

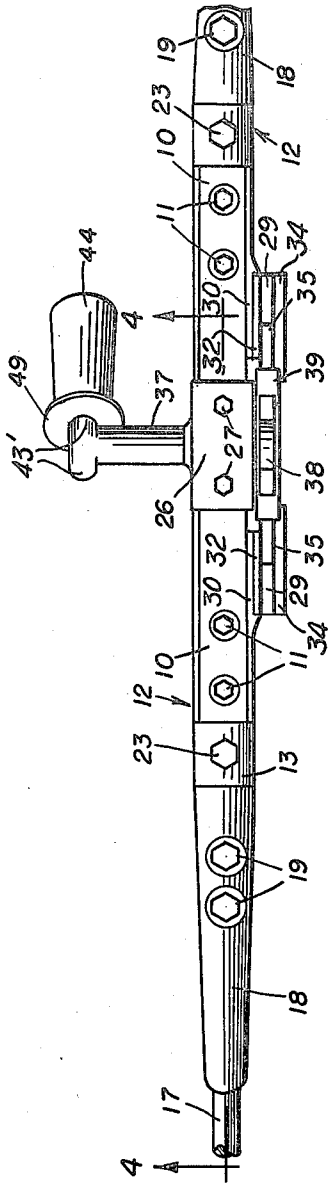


Fig. 3.

Inventor

John Francis Conrad

By Clarence A. O'Brien and Harvey B. Jacobson

Attorneys

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TROLLEY SECTION SWITCH

John Francis Conrad, Ebensburg, Pa.

Application April 21, 1947, Serial No. 742,791

1 Claim. (Cl. 191—39)

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This invention relates to an improved section of trolley switch for underground use, especially as used in connection with cars in mines, and more particularly coal mines.

The object of this invention is to provide a novel construction and arrangement of switch with a rotating motion, and is designed to close or open either right or left hand and which when opened under a load, causes the arcing to take place on the opposite side from the handle, thereby protecting the operator.

Another object of the invention is to provide a switch which will require less than one third the copper required in an ordinary conventional type of switch and in which the operator is considerably less exposed to live parts which make it safer to operate in addition to being of higher efficiency not only because the current has a much shorter path to travel, but because the blade is under constant spring pressure and the capacity of the blade is greater than the conventional types of switches.

Another outstanding advantage of the switch is the fact that it opens and closes parallel with the trolley wire instead of operating at right angles to the wire, thus making it more compact and easier to operate with the operating handle hanging downwardly, instead of extending outwardly in a horizontal position at right angles to the switch block and saddle with the switch blade disposed horizontally as in conventional switches, the switch blade in the present improved switch swinging vertically on a horizontal axis and lending the device to more simple, durable, rigid and economical construction, repair and replacement of parts.

Other objects and advantages reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming part hereof, wherein like numerals refer to like parts throughout, and in which:

Figure 1 is a side elevation of an improved section trolley switch constructed in accordance with the invention;

Figure 2 is an enlarged vertical sectional view taken on the section line of 2—2 of Figure 1;

Figure 3 is a top plan view of the structure which is shown in Figure 1;

Figure 4 is a vertical sectional view taken on the line 4—4 of Figure 3;

Figure 5 is a perspective view showing the switch blade;

Figure 6 is a fragmentary sectional view taken on the line 6—6 of Figure 2, and

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Figure 7 is a fragmentary sectional view taken on the line 7—7 of Figure 2.

Referring to the drawings in detail, in which like reference characters designate corresponding parts throughout the several views, my improved section trolley switch is shown as comprising an elongated di-electric body shown in the form of an elongated rectangular wood block 10 relatively flat and wide in the direction of a vertical dimension and as such, designed primarily for use in connection with 250 to 550 volt D. C. circuit for use underground or otherwise. Secured to and extending from opposite ends horizontally of the block 10 as by means of vertical screws 11 extending down through the block from the top vertically and in spaced relation longitudinally of the block adjacent each end, are cable connectors or sockets 12 of copper or other current conductive metal having each a top wall 13 which extends beneath the block at a suitable distance and is provided with threaded sockets 14 for engagement by the threaded ends of the bolts or screws 11 and formed with channels or sockets 15 extending longitudinally thereof at the bottom forming channel shaped or tubular portions or sections 16 for connection with trolley wires 17 extending thereinto from the outwardly tapered ends 18 of the connectors. Clamping or set screws 19 operate through threaded holes 20 in the wall 13 to engage the trolley wire ends and detachably or securely connect the same to the switch at the connectors 12. The connectors 12 at their top walls 13 are formed with vertical lugs or projections 21 forming shoulders abutting the ends of the block 10 and provided with sockets 22 longitudinally thereof, for connection with feed cables held in position by binding and clamping screws 23 supplying current to the switch.

Between the inner ends of the connectors 12 and spaced therefrom is a bronzecast center piece 24 forming air gaps 25 at each end thereof and between said ends and the inner ends of the connectors. The center piece 24 is secured in position in connection with a saddle 26, preferably of flanged bronze, channeled to fit over the top edge of the block 10 and having suitable holes for receiving securing screws or bolts 27 therethrough as well as vertically downwardly through the block in the direction of its height or width and centrally of its thickness for engagement with apertures or sockets 28 in the top of the center piece 24 to connect the three parts. The connectors 12 form an underrun, in conjunction with the center piece 24, and the

connectors or sockets 12 at their inner ends of top walls 13 are each provided with a lateral horizontal projection or shelf 29 extending outwardly at one side and formed with an integral vertical flange 30 which may be separate from or cast integral with the underrun connectors 12 and disposed against block 10 adjacent but spaced from center piece 24 and inclined over the air gaps 25. Secured against the outer face of each flange 30 detachably as by means of fastening screws 31 is a renewable copper contact plate 32 resting on each shelf or projecting ledge 29 and retained in position thereby. Secured against the outer edge of each projection or shelf 29 as by means of fastening screws 33 is a similar contact plate 34 disposed in spaced parallel relation to the contact plate 32 and designed to co-operate and be connected by a segmental copper contact blade 35 which swings in the space therebetween and engages the same.

Disposed through the depending side flanges 36 of the saddle 26 and through an aligned bore through the wood block 10 so that the semicircular flanges of the saddle form bearings, is a horizontal shaft 37 on one end of which is fixed a rocker 38 spaced from the flange of the saddle adjacent thereto and provided with a horizontal bottom channel 39 receiving the corresponding truncated upper edge of the segmental blade 35 therein for connection therethrough by suitable fastenings such as rivets 40 to rigidly secure the blade to the rocker. The blade thus takes an arcuate form, especially at its outer or bottom edge, in order to swing between the contacts 32 and 34 on the shaft 37 as a horizontal pivot axis. Thus, the switch has a rotating motion and is designed to close or open right or left hand, so that when the switch is opened under a load, the arcing takes place on one side only or opposite the operating handle of the switch to be later described, thereby protecting the operator. Moreover, the parts are constructed in such a simple manner that less than one-third of the copper required in the conventional type of switch, is necessary. In addition to the fact that the switch opens and closes parallel with the trolley wire instead of at right angles to the wire or horizontally, making the structure more compact and less likely to cause injury to the operator.

These features are made possible by extending the shaft 37, which is preferably of steel, laterally a considerable distance beyond the opposite side of the switch and block and thickening the adjacent flange 36 to form a good bearing in connection with a reduced end portion 41 receiving a spring retaining sleeve or tubular shell 42 preferably of suitable insulation, over said reduced portion 41 and the attaching sleeve 43 of an insulating operating handle 44 rigidly fixed or pinned to the outer end of the shaft 37 as indicated at 45, in the same manner as the rocker 38 is fixed or pinned to the opposite end of the shaft 37 and so designated. This provides a hollow chamber within the insulating sleeve or tubular shell 42 for a coil spring 46, fitted on the shaft between washers 47 at the end thereof, adjacent the reduced portion 41 and the sleeve 43, in order to exert sufficient resilient tension to maintain the shaft in frictional projection at one end or urging or distending the same in transitory position so that the blade 35 will properly engage the contact plates 32 and 34 at all times to make a good electrical contact and connection. The handle 44, which may be of wood or other insulating or di-electric material, is preferably secured to either of two circular projections or bosses 43' on the sleeve 43 by means of a threaded shank engaging threaded bores in the bosses 43', as indicated at 48, with an interposed relatively large and laterally projecting insulating washer or shield 49, so as to protect the operator from coming in contact at his hands, with any of the electrical parts of the switch when operating the same at the switch blade. In this sense, the washer serves as a flange or guard and stops for the hand.

It is also to be understood that the contact plates 32 and 34 may be formed integral with the connectors and serve as guiding means for the switch blade 35 above or at the center piece, with upwardly and inwardly extending contact arms or plates 32 and 34 on flanges 30 and projections or shelves 29, having inclined portions or bottom edges 50 extending upwardly from the connectors 12 and secured to or formed integral therewith at one side of each flange 36 against block 10 or extending upwardly to a space or center recess therebetween in oppositely inclined positions to conform at their upper inclined edges with the radial ends of the switch blade 35 when in central position, as shown in Figure 1 of the drawings, so as to connect the contacts or plates 32 and 34 and provide a circuit at the switch between the trolley wires connected as described. Of course, a switch blade may be swung to clear either one of the contacts 32 and 34, either right or left, so as to be readily operated with equal facility in either direction and in spaced relation to the block 10 and switch contacts or plates 32 and 34 at either end of blade 35 and at the opposite side of the switch, so that when the switch is opened under a load, the arcing will take place on the opposite side from the handle, thereby protecting the operator. For this purpose, handle 44 is mounted in either boss 43' and flange 36 has spaced outstanding projections or stops 36' cleared by bosses 42' on sleeve 42 having threaded sockets to receive a stop screw 37' in either socket to limit turning of the switch in either direction by engaging a stop 36' at one side when handle 44 is reversed in position in bosses 43' for right or left hand operation or throw. Holes 38' are also provided in rocker 38 to receive a padlock to lock the switch and blade 35 open at either side. Thus, the operator is exposed to considerably less live parts making the switch safer to operate and giving the current a much shorter path to travel. However, since the blade is under constant spring pressure of the spring 46, the capacity of the blade may be greater than in the conventional types. It is to be observed that the switch opens and closes by handle operating in spaced relation to and parallel with the trolley wire, instead of at right angles to the wire, thus leaving the switch relatively flat and compact and less likely to be accidentally opened or closed since the switch handle extends downwardly and operates on a horizontal axis instead of extending laterally outwardly a considerable distance and operating on a vertical axis as is the usual construction.

In view of the foregoing description taken in conjunction with the accompanying drawings it is believed that a clear understanding of the device will be quite apparent to those skilled in this art. A more detailed description is accordingly deemed unnecessary.

It is to be understood, however, that even though there is herein shown and described a

preferred embodiment of the invention the same is susceptible to certain changes fully comprehended by the spirit of the invention as herein described and the scope of the appended claim.

Having described my invention, what I claim as new is:

A trolley section switch comprising a flat base member, trolley wire sections extending along the bottom of said member and spaced apart with confronting ends, lateral shelves on said sections adjacent the confronting ends thereof and extending from one and the same side of said member, separated pairs of laterally spaced contact plates fixed on said shelves in planes parallel to the median plane of said member, a rock shaft journaled in said member transversely thereof, a handle on one end of said shaft for rocking the same, and a switch blade on the other end of said shaft swingable in opposite directions by oscillation of the shaft to bridge said pairs of contacts in either direction in which the same may be swung.

JOHN FRANCIS CONRAD.

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