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54 **Manually operable high voltage air break switch.**

57 A manual high voltage air break switch for overhead use comprises a pair of mutually spaced terminal connectors (6) each having a hinged contact terminal member (16). A switch arm (24) is secured to and between the interfacing terminal members (16) by means of vertical clamp bolts (20) having eye shaped head portions (22), which are easy to seize and to rotate by means of a hook end on a long, insulated servicing rod. A high contact pressure is obtainable with the use of the clamp bolts, and yet either end of the switch arm is easy to disconnect and to swing down about the opposite hinge connection (14). In its swung down position the respective switch arm end may engage a grounded holding structure (26) such that the high voltage lines on either side of the switch may be optionally grounded. Due to the lack of ordinary spring contacts the switch will be practically maintenance free.

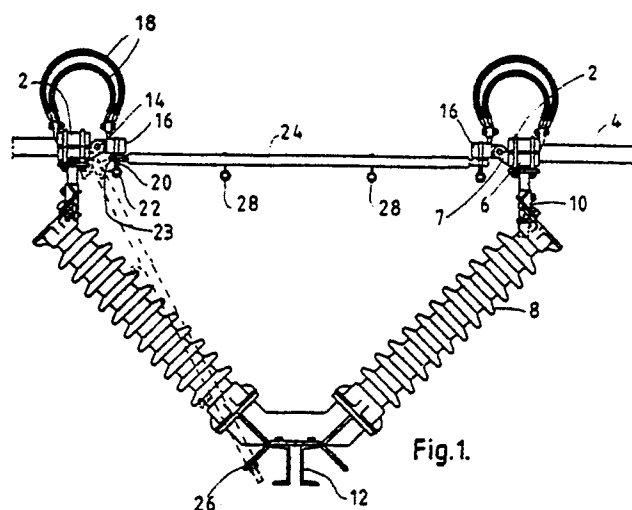


Fig. 1.

Manually operable high voltage air break switch.

The present invention relates to a manually operable high voltage air break switch of the type specified in the introductory clause of claim 1. Such switches may be used particularly at places where they are not operated frequently, whereby power operated switches would be far too expensive for the purpose. The switch arm may be operated with the use of an insulated servicing rod so as to be switchable even while there is high tension on the conductor parts.

It is the purpose of the invention to provide a switch of this type, which is of a simple design and is operationally advantageous, and this is achieved by the features stated in the characterizing clause of claim 1. It has been conventional practice to make use of contact parts of the knife and spring type, whereby it has been sufficient to merely pull out or down the end of the switch arm from the contact springs by a pull in the servicing rod, but the spring pressure has to be considerable, and particularly the reclosing of the switch can be difficult to work out by a pressure through a long rod. By the invention the contact parts may be two blocks, which are caused to engage each other and to be forced together by a turning of the clamp bolt, which is easy to effect through the servicing rod, even so as to obtain a very safe contact pressure. With this arrangement a further important advantage is obtained, viz. that the switch will be practically maintenance free, while the conventional switches have to be checked, cleaned and adjusted from time to time, and it is rather inconvenient to have to switch out a section of the high voltage network just for this purpose.

The said contactor arrangement is mechanically very simple, and when it is provided at both ends of the switch arm it will be possible to let the swung out switch arm remain electrically connected optionally with one or the other of the relevant high voltage lines, whereby, when the switch arm is disengaged from any one of the two lines the other line is easily connectable to the ground through the switch arm. Thus, the advantageous possibility of grounding any one of the lines with the switch arm disconnected from the other line is obtained in a very easy manner.

For facilitating the reclosing of the switch arm the said contact terminals may be provided with protruding catching portions for receiving the free switch arm end and guiding it towards a well defined position, in which the clamp bolt on the switch arm registers with the hole into which it is to be screwed. The same catching and guiding portions are readily applicable as an arcing contact.

Because the switch arm has a considerable length it will be reasonably easy to swing out or down about the selected pivot connection, even if the latter is rather tight. On the other hand, a tight pivot will incur the advantage that the disconnected contact terminal will be unable to pivot away from the position in which it is left by the disconnected switch arm, such that it will still assume this position, i.e. a correct receiving position, when the switch arm is to be reconnected to the contact terminal. If required, of course, a snap lock of the like may be arranged for increasing the stability of the disconnected contact terminal without generally obstructing the intentional pivotability thereof.

In the following the invention is described in more detail with reference to the drawing in which:-

Fig. 1 is a front view of an air break switch according to the invention, while

Fig. 2 is an end view thereof.

The switch shown comprises two opposed terminal connectors 2 for respective high voltage wires or bars 4. These connectors 2 comprise a stationary clamp 6 for receiving the conductor 4, these clamps being secured to an underlying support structure including a pair of insulators 8 each having a top fitting 10 for holding the clamp 6, while at their lower ends the insulators are secured to a central chassis 12, which is electrically grounded. The chassis 12 may be a railing extending past more switches of the illustrated design.

The clamps 6 are provided with rigid hinge parts 7, which, through hinge pins 14, are connected with external hinge parts 16 facing each other and each being in fixed electrical connection with the associated clamp 6 through one or more flexible cables 18. The hinge parts 16 as constituting the said contact terminals have a screw hole for receiving a vertical clamp bolt 20, the lower head end of which is made as or provided with an eye member 22. The clamp bolt 20 projects through a hole in an end portion 23 of a switch arm 24 such that this arm may be fixed to and between the opposed hinge parts 16 and thus constitute a safe electrical connection between the connector clamps 6 and therewith between the high voltage conductors 4.

When it is desired to break this connection at one side or the other of the switch it will be sufficient to make use of the mentioned insulated servicing rod, which may have a hook end member which is engageable with the eye member 22 on the selected clamp bolt 20, whereby the bolt may be screwed out of its connection with the hinge part 16, whereafter the disconnected end of the switch arm 24 may be pulled downwardly, the

switch arm hereby pivoting about the hinge pin 14 adjacent the opposite end thereof, where the bolt connection between the switch arm end and the hinge part 16 is maintained. In practice it has been found advisable to unscrew the bolt at this end just slightly, e.g. one half turn, before effecting the disconnection of the other end of the switch arm 24.

Inasfar as a good electrical connection between the respective pairs of hinge parts 6 and 16 is secured through the flexible cables 18 the hinges themselves may show a relatively low friction such that the released switch arm 24 may swing down by its own weight and hereby be brought to rest against a carrier hook 26 connected with the grounded chassis rail 12.

As already mentioned, however, the hinge friction should preferably be high enough to make sure that the hinge part 16 at the disconnected end of the switch arm will remain in its horizontal position such that it will be ready to receive the released switch arm end by renewed connection thereof.

In the embodiment shown the switch arm 24 is a little too long to be readily swingable into a carrying engagement with the carrier hook 26, inasfar as it will first hit against the top side of the chassis beam 12. For enabling the required further swinging down of the switch arm it will be necessary to effect a lengthwise displacement of the switch arm, this being possible by the said slight loosening of the opposite clamp bolt 20. Hereby the free end of the switch arm 24 will be displaceable just sufficiently to enable it to pass the top edge of the chassis beam 12 and to be laid down into the carrier hook 26, whereafter the switch arm cannot unintentionally be swung upwardly to touch the overlying high voltage system. It will be understood, however, that a corresponding locking of the switch arm in its swung down position will be achievable in many other ways, e.g. by swinging down the switch arm into a snap locking eye portion. Preferably, even a good ground connection should be ensured at the same time.

The switch arm 24 may be provided with one or more eye members 28 usable e.g. by an assistant operator for the pivoting of the switch arm both upwardly and downwardly. In practice a single eye member 28 midways on the arm will be sufficient.

On the hinge parts or connector terminals 16 may be arranged, in a manner not shown, downwardly projecting lateral guide members for guiding the return movement of the disconnected end of the switch arm 24 towards the respective connector terminal 16, such that the operator will have no problems in guiding the arm end into the exact position, in which the clamp bolt may be screwed

into the connector terminal 16, as the lower opening between the guide members may be relatively broad. The same guide members will additionally serve as arcing contacts.

The clamp bolts 20 should not necessarily be ordinary threaded screws, as other kinds of clamps might be used, e.g. eccentric clamps or clamps for introduction through keyhole openings. It is of course important that a reasonably high contact pressure be achieved.

It will be appreciated that the switch is of an "open" and simple design such that it will not require periodical inspection with associated operation checks.

Claims

1. A manually operable high voltage air break switch, comprising a pair of mutually spaced terminal connectors for respective high voltage wires or bus bar ends and an intermediate switch arm extending between opposed contact terminals associated with the respective terminal connectors, said switch arm being operable to break and reestablish the electrical connection between the terminal connectors, characterized in that the switch arm is at both ends releasably connected with the respective contact terminals by means of clamp bolts having head portions, which are shaped so as to be easily seizable and screwable by means of servicing rod, said contact terminals being coupled to their associated terminal connectors through a pivot connection so as to enable the switch arm to be disconnected optionally at either end and swung away from its connecting position about the pivot connection adjacent the respective opposite end of the switch arm.

2. A switch according to claim 1, characterized in that the pivot connections are sufficiently tight or additionally stabilized in the normal positions of the contact terminals to make the latter selfstabilized whenever disconnected.

3. A switch according to claim 1, characterized in that the contact terminals are provided with downwardly projecting, diverging lateral guide members for the respective switch arm ends, said guide members also serving as arcing contacts.

4. A switch according to claim 1, characterized in that underneath the switch arm there is arranged a groundable structure for receiving either disconnected end of the switch arm, preferably with a releasable locking engagement therewith.

