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HIGH TENSION ELECTRIC SWITCH

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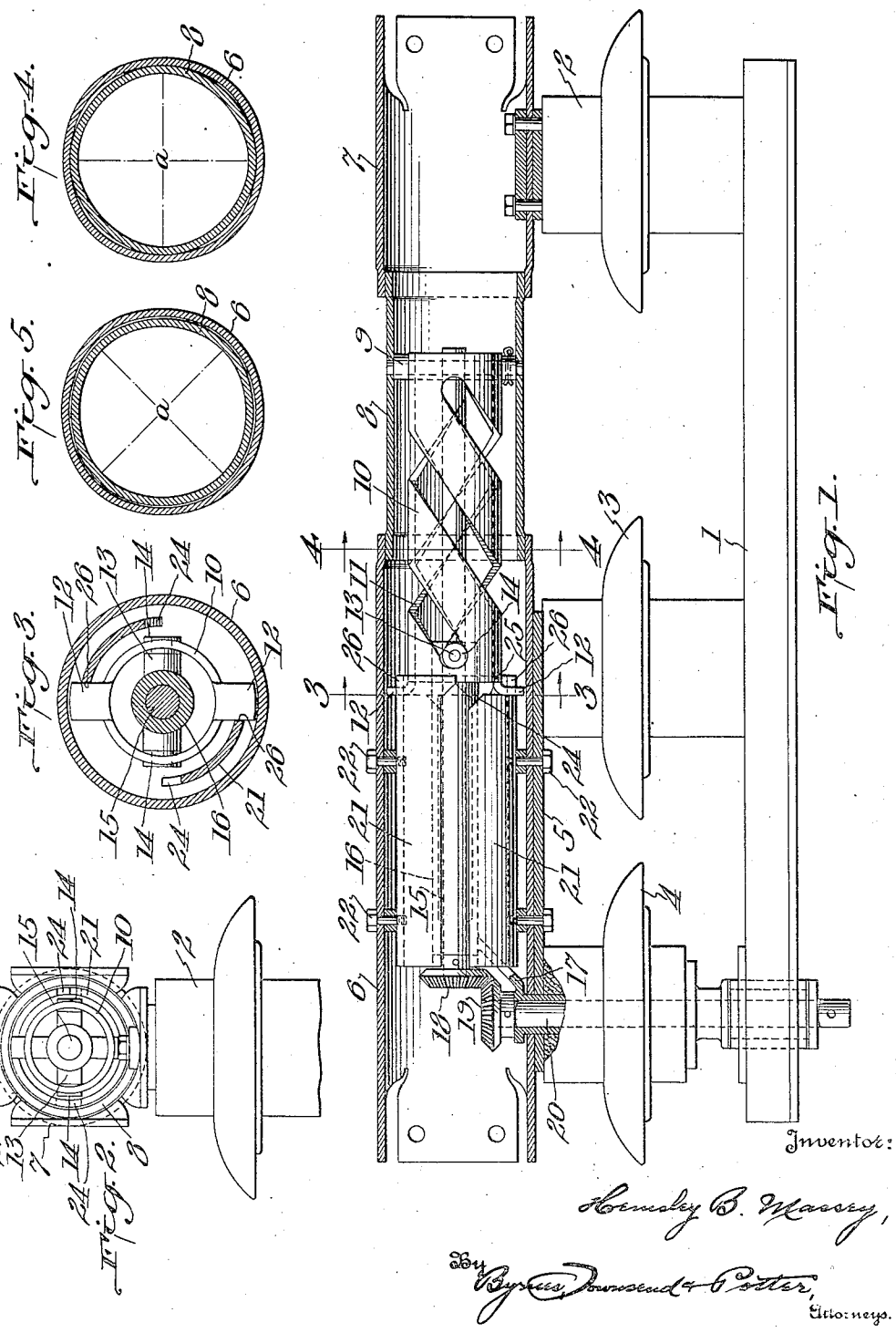

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HIGH TENSION ELECTRIC SWITCH

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This invention relates to a high tension electric switch. In the modern developments relating to conductors for electric current of the order of 3000 amperes or higher, it has been found that separated conductors are especially effective in order to obtain the maximum current capacity. One arrangement which is in use for bus bars or conductors of ratings of 4000 amperes or higher consists of four bars, or four groups of bars arranged as the sides of a hollow square, the spacing of the respective opposed bars or groups of bars being somewhat greater than the width of the bars.

It is an object of this invention to provide a switch especially well adapted to the type of bus bar or conductor arrangement referred to above, or for hollow cylindrical conductors.

Another object of this invention is to provide a switch wherein high pressure contact may be obtained between the movable and stationary parts thereof.

It is a further object to provide a switch of this type in which the mechanism for opening and closing the switch and for obtaining high pressure contact and releasing such high pressure is simple and not easily deranged in operation.

These and further objects will be apparent from the following description when taken in connection with the accompanying drawings wherein:

Fig. 1 is a side elevation partly in section of this switch,

Fig. 2 is an end elevation thereof,

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

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

Fig. 5 is a section similar to Fig. 4, with the contacts in a different position.

Referring to the drawings, a base 1 is suitably supported, said base carrying three spaced stationary insulators 2, 3 and 4. Insulators 3 and 4 have secured thereto a plate 5 carrying a fixed contact 6, which contact is in the form of a hollow cylinder. The left hand end of cylindrical contact 6 is slotted at four spaced points, the sections thus made being flattened and perforated to have secured thereto spaced bus bars or conductors in the form of a hollow square.

Insulator 2 has secured thereto a similar cylindrical contact 7, the right hand end of which is slotted similar to contact 6, for a similar purpose. It will be obvious that contacts 6 and 7 could be used without slotting the same, a cylindrical conductor being clamped thereto, or three, five or any number of slots could be provided so that the ends would cooperate with a triangular, pentagonal or other shaped conductor.

The space between contacts 6 and 7 is adapted to be bridged by a reciprocating conductor or movable contact 8 which is in the form of a hollow cylinder. Contact 8 telescopes within contacts 6 and 7, one end thereof entering contact 7 when the switch is closed. Contact 8 has secured therein a crosspin 9 which supports a smaller cylinder 10 within contact 6. This cylinder 10 has two helical slots 11 therein.

Cylinder 10 extends beyond movable contact 8 and has two tongues 12 thereon which are bent outwardly. Working in the helical slots 11 in cylinder 10 are rollers 14 mounted on the ends of a trunnion 13. This trunnion 13 is secured to the end of a rotary shaft 15 which is mounted in a guide sleeve 16, this guide sleeve being carried by an arm 17.

The rotary shaft 15 has a miter gear 18 secured to its opposite end meshing with a similar gear 19. Gear 19 is secured to a shaft 20 which passes through insulator 4 to a point below the base 1. Any suitable means such as a crank arm may be secured to the lower end of shaft 20 for rotating the same.

Two arcuate shaped guiding members 21 are secured within the stationary contact 6 by bolts 22 in spaced relation to the inner surface of contact 6. The longitudinal edges

of these guiding members 21 are spaced from one another to provide longitudinal slots 23 therebetween, these slots 23 being slightly wider than tongues 12 on cylinder 10. Guiding members 22 terminate adjacent tongues 12 in sloping faces 24 connecting guide slots 23 with surfaces 25 which are perpendicular to slots 23. Tongues 26 project beyond surfaces 25, these tongues having faces sloping parallel to surfaces 24 to thus form in effect an angle continuation of guide slots 23.

As seen in Figs. 4 and 5, the end of stationary contact 6 and one end of movable contact 8 are deformed out of round to provide four contact areas when movable contact 8 is rotated. In Fig. 4 the points marked *a* on movable member 8 are in engagement with correspondingly deformed portions on stationary contact 6. In Fig. 5, points *a* are shown as rotated 45° so as to clear the correspondingly deformed portions on contact 6. The end of stationary contact 7 and the right hand end of movable contact 8 are deformed in a similar manner, so that when movable contact 8 is rotated to the position shown in Fig. 4, four points of contact are established at each end of the movable contact, these points of contact being under high pressure.

The operation is as follows: Assuming the switch is closed as shown in Fig. 1, the movable contact 8 engages contacts 6 and 7 at the deformed portions *a*. If the shaft 20 is now turned, rotation is imparted to shaft 15 to thus turn trunnion 13 carrying rollers 14. The cylinder 10 is thereby rotated since the trunnion 13 is fixed against longitudinal movement. and longitudinal movement of the cylinder 10 with respect to the trunnion 13 is prevented by the engagement of the tongues 12 with the surfaces 25 of the guide members 21. These tongues 12 ride along surfaces 25 for approximately 45° of rotation of cylinder 10, thus rotating movable blade 8 from the position shown in Fig. 4 to that shown in Fig. 5. The high pressure contact between the movable contact 8 and stationary contacts 6 and 7 is thus broken. When tongues 12 on cylinder 10 reach the angled continuations of slots 23 they enter these slots, being guided therein by the sloping face parallel to face 24. Continued rotation of shaft 20 causes cylinder 10 to move to the left, since trunnion 13 is caused to travel in slots 11 in cylinder 10. Cylinder 10 thus telescopes within arcuate guides 21 and contact 8 telescopes within contact 6, to thus open the switch.

In closing, reverse rotation of shaft 20 causes cylinder 10 and contact 8 to move to the right, tongues 12 moving along slots 23. When tongues 12 leave slots 23 and ride on to surfaces 25, trunnion 13 has reached the left hand end of slots 11. At this point, contact 8 has passed within contact 7 as seen in Fig. 5. Further rotation of shaft 20 causes cylinder 10 to rotate, thus moving deformed portions *a* into high pressure engagement with corresponding portions on contacts 6 and 7.

It will be obvious that means other than a deformation of the contacts may be used for obtaining high pressure contact, such as the use of projecting contact buttons or rivets or ribs which will engage when blade 8 is rotated.

The stationary and movable contacts need not be circular, since the movable contact might be angular, and rotation thereof within the stationary contacts would cause the corners thereof to engage the stationary contacts under high pressure.

Various other modifications may be made in the construction without departing from this invention as expressed in the accompanying claims.

I claim:

1. In a high tension switch, a pair of relatively movable contacts of non-circular cross-section, means for effecting relative movement of said contacts to telescope one contact within the other, and means effective at the end of the closing movement of the switch and at the beginning of the opening movement thereof to rotate one of said contact members about the axis of the telescoped members, whereby a high contact pressure may be established between said contacts.

2. In a high tension switch, two spaced stationary contacts, a reciprocable movable contact for bridging said stationary contacts, said movable contact telescoping within the stationary contacts, and means for imparting to said movable contact a reciprocating movement and a rotary movement about the axis of the movable contact.

3. In a high tension switch, two spaced stationary contacts, a reciprocable movable contact for bridging said stationary contacts, and means for imparting to said movable contact an initial reciprocating movement and a subsequent rotary movement about the axis of the movable contact to close said switch.

4. The structure as in claim 3 wherein said means imparts to said movable contact a rotary movement followed by a reciprocating movement to open said switch.

5. In a high tension switch, two spaced stationary contacts, a reciprocable movable contact telescopically movable within one stationary contact, means for reciprocating said movable contact to a position bridging the space between said stationary contacts, and means for imparting to said movable contact a subsequent rotary movement about its axis of reciprocation to cause a high pressure engagement thereof with the stationary contacts.

6. In a high tension switch, two spaced stationary contacts, a movable contact for bridging the same, a helically slotted member se-

cured to said movable contact and movable therewith, a rotary trunnion within the said helical slot, and restraining means cooperating with said helically slotted member for causing the movable contact to reciprocate during one part of its travel and to rotate during another part of its travel when said rotary trunnion is rotated.

7. In a high tension switch, two spaced stationary contacts, a reciprocable contact for bridging the same, a member rigidly secured to said movable contact and having a helical slot therein, a rotary trunnion within said helical slot for imparting rotation to said member and contact, and restraining means to prevent rotation of said member and contact after a predetermined rotary movement thereof, whereby said member and contact reciprocate.

8. In a high tension switch, two spaced stationary contacts, a reciprocable contact for bridging the same, said movable contacts telescoping within the stationary contacts, a member rigidly secured to said movable contact and having a helical slot therein, a guide finger on said member, guiding and restraining means on one stationary contact for said guide finger for allowing reciprocation only of said member and contact during one part of the closing movement and allowing rotation only during another part of the closing movement, and a rotary trunnion engaged within said helical slot for imparting movement to said movable contact and said member.

9. In a high tension switch, a hollow stationary contact, two arcuate guiding members within said contact and spaced from the inner surface thereof, said guiding members spaced from one another to provide two longitudinal slots, a reciprocable contact for telescoping within said stationary contact, helical slot and trunnion means for advancing and retracting said reciprocable contact, and guide fingers movable with said reciprocable contact and adapted to move in the longitudinal slots to insure reciprocating movement of said contact.

10. The structure as in claim 9 wherein said longitudinal slots are angled adjacent one end thereof to guide said fingers into and out of said slots.

11. In a high tension switch, two spaced stationary contacts, a reciprocable movable contact for bridging said stationary contacts, and means for imparting a reciprocating and rotary movement to said movable contact, said rotary movement causing engagement with both stationary contacts under high pressure.

12. In a high tension switch, a hollow stationary contact of non-circular cross-section, a movable contact having a portion of non-circular cross-section, a guide supporting said movable contact for reciprocating a rotary movement, and operating means for moving said non-circular portion of said movable contact into and out of said hollow stationary contact and for effecting a partial rotation of said movable contact at the end of the closing movement and at the beginning of the opening movement of the switch.

In testimony whereof, I affix my signature.

HEMSLEY B. MASSEY.