Jan. 11, 1955 A. FOTI 2,699,482

SHUNTLESS GROUNDING SWITCH

Filed Feb. 16, 1951 3 Sheets-Sheet 1

FIG. 1.

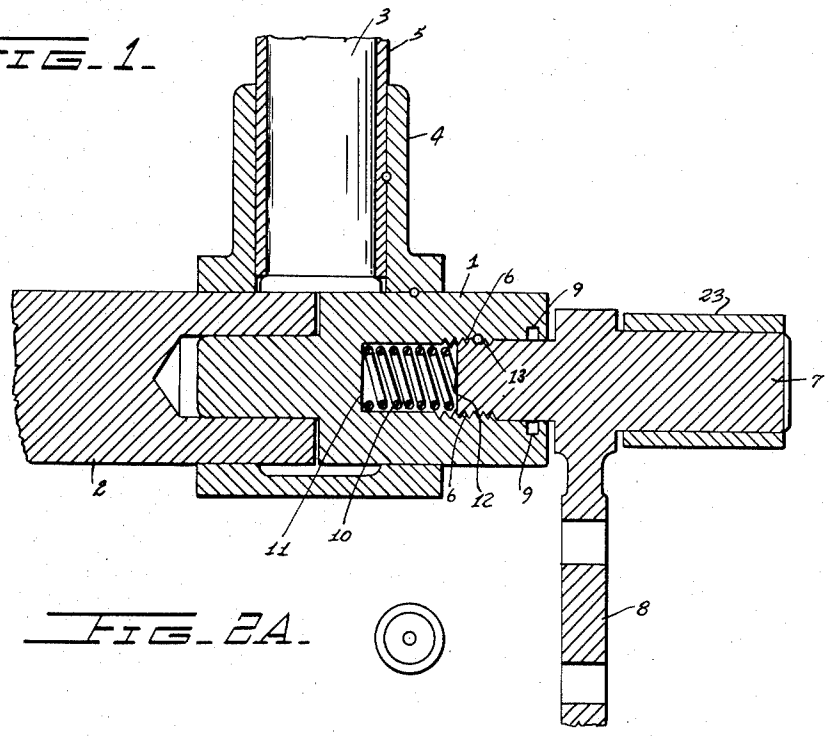
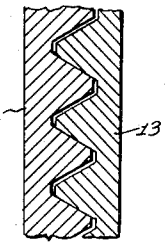


FIG. 2A.

FIG. 2B.



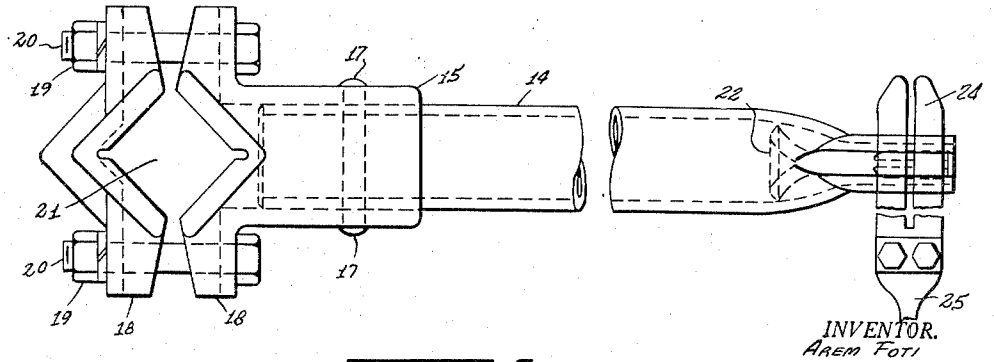


FIG. 3.

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Jan. 11, 1955 A. FOTI 2,699,482

SHUNTLESS GROUNDING SWITCH

Filed Feb. 16, 1951 3 Sheets-Sheet 2

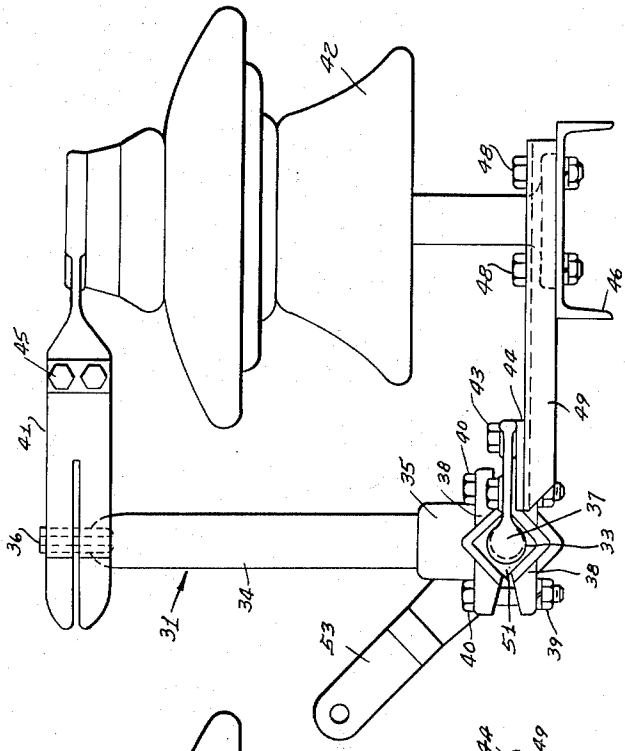


FIG. 5.

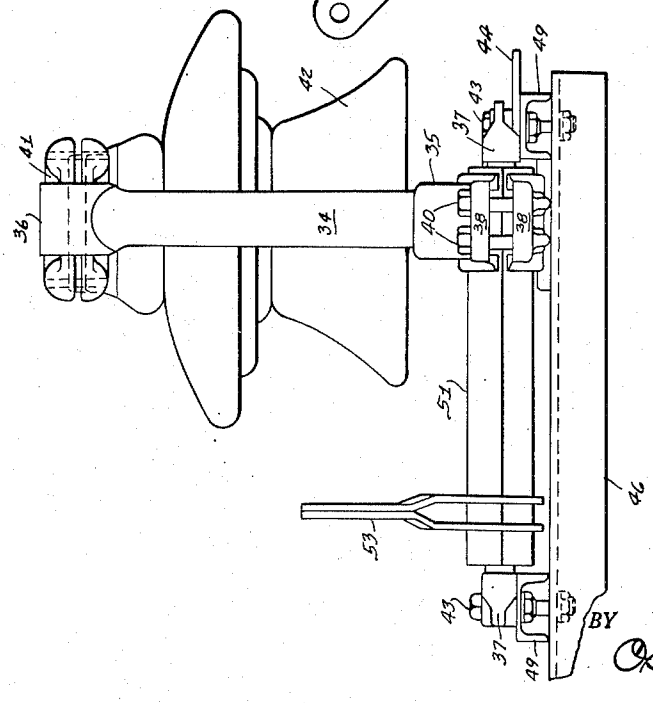


FIG. 4.

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Jan. 11, 1955 A. FOTI 2,699,482

SHUNTLESS GROUNDING SWITCH

Filed Feb. 16, 1951 3 Sheets-Sheet 3

FIG. 6.

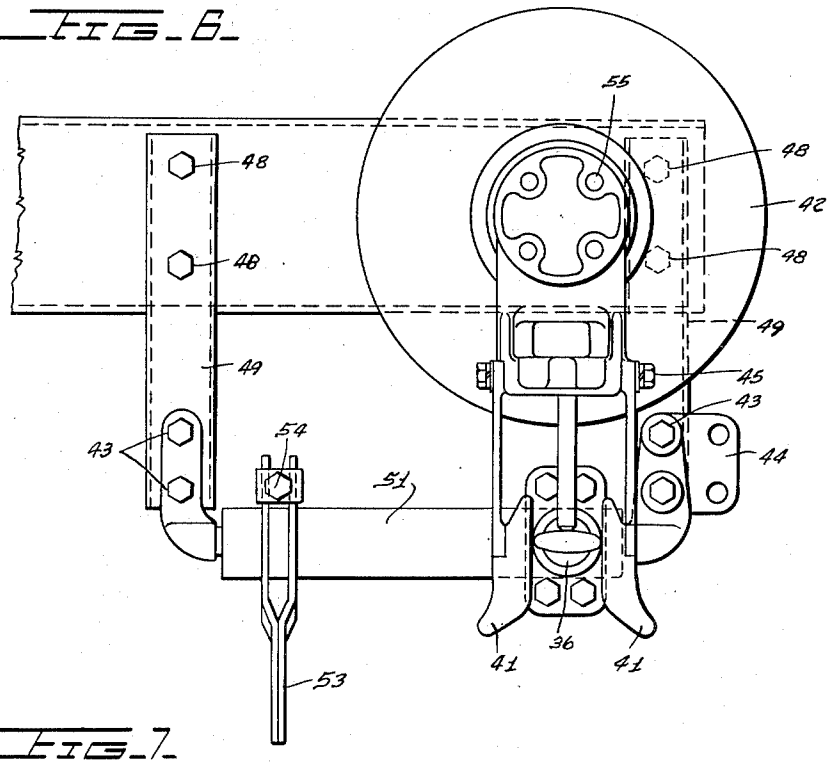


FIG. 7.

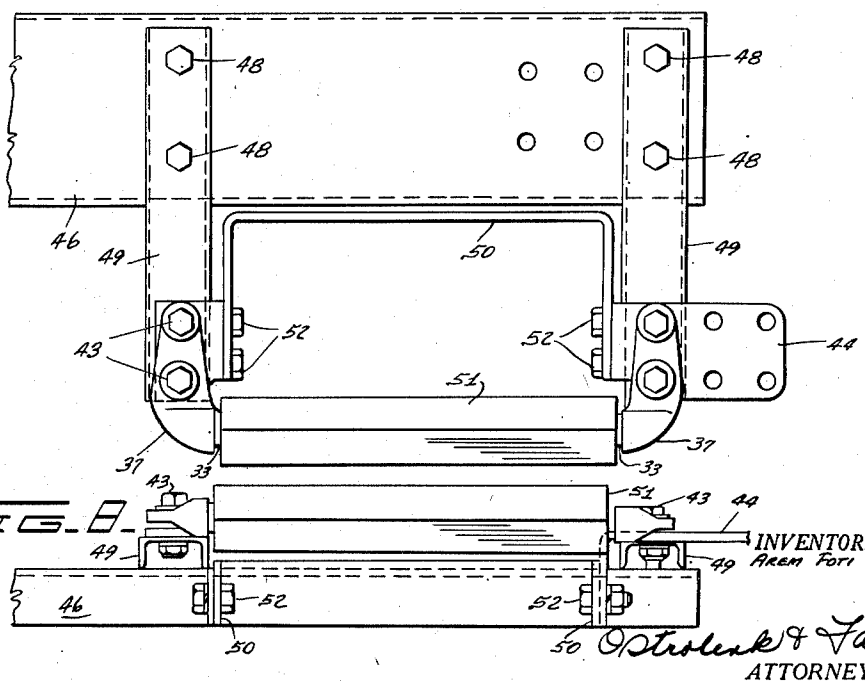


FIG. 8.

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United States Patent Office 2,699,482 Patented Jan. 11, 1955

2,699,482

SHUNTLESS GROUNDING SWITCH

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Application February 16, 1951, Serial No. 211,373

7 Claims. (Cl. 200—162)

My present invention relates to grounding switches and more particularly to a grounding switch having an angularly movable contact arm rotatably mounted on a base or terminal wherein the current path from the base or terminal to the arm is through the rotatable mounting elements rather than through a separate braid or flex.

The type of current carrying connection used is that generally disclosed in application Serial Number 145,389, the present rotatable current carrying substitute for a braid or flex comprising a modification of that shown in the said application.

The primary object of my invention is therefore to provide an operating shaft for a grounding switch which performs two important functions simultaneously, namely, to serve as a means for actuating the blade in an angular path to open or close the switch, and to function as a hinge contact member of the switch.

This makes the presence of a shunt or flexible connection from the switch blade to the blade terminal unnecessary and eliminates the hazards encountered by flexible connections due to erosion and corrosion caused by air contamination.

Another object of this invention is to provide a hinge casting that serves not only as a hinge contact but also as a bearing for the operating shaft and as a terminal surface as well.

These and other objects of my invention will be apparent from the following specifications, when taken with the accompanying drawings, in which:

Figure 1 is a sectional view of the current carrying portion of the slam type shuntless grounding switch of this invention at the hinge end.

Figure 2*a* is a schematic connection showing the contact engagement achieved by the threaded hinge of Figure 1.

Figure 2*b* is a schematic view of an annular contact showing the similarity in principle between the threaded hinge contact of Figure 1 and the annular contact.

Figure 3 is a side view of the grounding switch blade assembly and jaws of the slam type shuntless grounding switch of this invention for 600 amps.

Figure 4 is a front view of the slam type shuntless grounding switch of this invention for 1200 amps.

Figure 5 is a side view of the slam type shuntless grounding switch of this invention for 1200 amps.

Figure 6 is a plan view of the slam type shuntless grounding switch of this invention for 1200 amps.

Figure 7 is a plan view of the hinge assembly of the slam type shuntless grounding switch of this invention for 1200 amps., showing a U-shaped jumper and its connections.

Figure 8 is a front view of the hinge assembly of the slam type shuntless grounding switch of this invention for 1200 amps., showing a U-shaped jumper and its connections.

Referring first to Figure 1, the hinge assembly includes the hinge contact bar **1**, the square steel shaft **2**, the contact hinge terminal casting **7**.

Current flows from the blade tube **3** through knurled press fit to the blade socket casting **4**, a clamped fit between blade socket **4** and hinge contact bar **1**, and through pressure loaded threaded contact **6**, from hinge contact bar **1** to contact hinge terminal casting **7** and from there to the terminal pad **8**. The terminal pad **8** at the hinge end of the switch may be made to employ terminal connections readily and economically.

The hinge contact bar for a 600 amps. switch is 1½" square section bar of commercial bronze and is pressed into the 1½" square steel shaft **2**.

For a 1200 amperes switch shown in Figures 4, 5, 6, 7, and 8, the operating shaft **51** is a one piece commercial bronze 1½" square bar with threaded hole **33** in each end to accommodate a contact hinge terminal casting **37** at each end. A U-shaped solid jumper **50** from the one contact hinge terminal casting, tying the two hinge terminal castings **37** together by means of bolts and nuts **52**, for instance, would make the hinge portions of the switch capable of performing at 1200 amperes.

For standardization of parts and/or for economy, the 1200 amperes one piece commercial bronze 1½" square bar could be used as a combined operating shaft and hinge contact bar for both 600 and 1200 amperes switches. The inventor's preference is a one piece bar and the use of a one piece bar is from now on assumed.

The operating shaft portion of the switch which is combined with the hinge contact **1** may be employed not only on "shuntless slam type" switches but also on Railway and Industrial Engineering Co. type A grounding switches. The operating shaft **2** or **51** may be made any convenient length and may be mounted on either the right or left-hand side of the main switch base. The crank **53** which actuates the 1½" square shaft may be clamped anywhere along the length of the shaft **51** and likewise when a one-piece commercial bronze operating shaft is used, the blade **34** may be clamped anywhere along the length of the shaft **51** as shown in Figures 4, 5 and 6.

The heavy compression spring **10** bearing between the base of opening **11** and the end **12** of the terminal casting **7** drives the threads **6** of opening **11** into firm engagement with the outer sides of the threads **13** of the contact hinge terminal casting **7**, thus creating the effect of multiple annular contacts as shown in Figure 2*a*. As compared with the well-known annular contact, Figure 2*b*, four times the contact area is available where four threads are in engagement, hence the screw contact is more efficient.

In addition, by the use of appropriate weatherproofing gasket **9** around the contact hinge terminal and in a suitable annular recess of the hinge contact bar, full weatherproofing and corrosion resistant protection is provided for the current carrying elements which comprise the threads **13** of the hinge terminal **7** and the threads **6** of the hinge contact bar **1**.

On the outside, the hinge terminal casting **7** rests on a suitable outboard bearing support **23**.

Referring now to Figure 3, the blade tube **14** is pressed into the blade socket casting **15** on one end and a contact beaver tail **16** is formed on the other end.

The blade tube **14** is further secured to the blade socket casting **15** by a copper rod **17** riveted on the casting **15**. The casting **15** terminates with clamps **18**, which by means of bolts and nuts **19** and lock washers **20** clamp the shaft in space **21**.

The current flows from the jaw **24** through the contact beaver tail **16**, along the blade tube **14**, the blade socket **15** into the hinge contact bar **1**, to contact hinge terminal **7**, and out through the terminal pads **8** to grounding conductors. There is a solid metal current path from the jaw terminal pad **25** to the hinge terminal pad **8**. There is only one break contact on the switch combined in the maintenance-free hinge contact so that maintenance would be kept to a minimum. Finally, there is no lost motion between operating crank, operating shaft or blade.

The 1200 amps. embodiment of the slam type shuntless grounding switch of my invention is shown in Figures 4, 5, 6, 7 and 8. A channel **46** supports jaw insulator **42** and the blade assembly **31** by means of extensions **49** secured to channel **46** by bolts and nuts **48**. A pair of jaws **41** with jaw terminals **55** are mounted on insulator **42**. Jaws **41** are biased toward each other by means of screws **45**. Jaws **41** receive in the switch closed position the beaver tail contacts **36** of the blade assembly **31** which consists of the said contacts **36**, of a tubular blade **34** surrounded at the hinge end by the blade socket cast-

ing 35, and clamps 38 which by means of bolts and nuts 39 clamp shaft 51 in space 33.

Shaft 51 is a square shaft having two functions, namely, that of operating shaft through crank means 53 and of hinge contact bar is more fully explained in connection with embodiments shown in Figures 1 and 3.

This hinge contact bar 51 has a threaded recess 33 at each end which is engaged by contact hinges 37 secured to channel 46 through extensions 49 and bolts 43 and 48. The right-hand contact hinge 37 is in direct contact with the hinge terminal path 44.

As above-mentioned, to make this switch capable of performing at 1200 amps., a U-shaped jumper 50 is connected by means of bolts 52 between the two contact hinges 37, thus increasing the cross-section of the current path. Current flows from the jaws terminal path 55 to the jaws 41 in beaver tail contact 36, then to the blade 34 and through knurled press fit to the blade socket casting 35, then through contact bar 51 to contact hinges 37 and hinge terminal path 44, also through U-shaped jumper 50.

Although I have described a preferred manner for carrying out my invention, I am aware that modifications are entirely possible with physical construction thereof and accordingly I do not intend to be limited except as set forth in the following claims.

I claim:

1. A disconnect switch having a terminal and a movable contact arm, said contact arm being angularly movable with respect to said terminal; a current carrying connection between said terminal and said movable contact arm; said contact arm having angular movement around said terminal, said contact arm including a current carrying hinge bar; a threaded extension of said terminal; a cylindrical recess in the said hinge bar having a partly threaded surface receiving said threaded extension of said terminal, the surface-to-surface engagement of annular portions of said threads forming the said current carrying connection, means for biasing said extension in one direction in said cylindrical recess and effecting a close engagement between the surfaces of said threads on one side of each thread, the surface-to-surface engagement of annular portions of said threads forming the said current carrying connection.

2. A disconnect switch having a terminal and a movable contact arm, said contact arm being angularly movable with respect to said terminal; a current carrying connection between said terminal and said movable contact arm; said contact arm having angular movement around said terminal, said contact arm including a current carrying hinge bar; a cylindrical recess in the said hinge bar having a partly threaded surface, receiving a threaded extension of the said terminal, the surface-to-surface engagement of annular portions of said threads forming the said current carrying connection, a compression spring in said cylindrical recess biasing said extension in one direction in said hinge bar and effecting a close engagement between the surfaces of said threads on one side of each thread, the surface-to surface engagement of annular portions of said threads forming the said current carrying connection.

3. A disconnect switch having a terminal and a movable contact arm, said contact arm being angularly movable with respect to said terminal; a current carrying connection between said terminal and said movable contact arm; said contact arm having angular movement around said terminal, said contact arm including a current carrying hinge bar; a cylindrical recess in the said hinge bar having a partly threaded surface receiving a threaded extension of the said terminal, the surface to surface engagement of annular portions of said threads forming the said current carrying connection, means biasing said extension in one direction in said cylindrical recess and effecting a close engagement between the surfaces of said threads on one side of each thread; the surface to surface engagement of annular portions of said threads forming the said current carrying connection, means for sealing said engaged annular surfaces of said threads within said cavity.

4. A disconnect switch having a terminal and a movable contact arm, said contact arm being angularly movable with respect to said terminal; a current carrying connection between said terminal and said movable contact arm; said contact arm having angular movement around said terminal, said contact arm including a current carrying hinge bar; a cylindrical recess in the said hinge bar having a partly threaded surface receiving a threaded extension of the said terminal, the surface to surface engagement of annular portions of said threads forming the said current carrying connection, means biasing said extension in one direction in said cylindrical recess and effecting a close engagement between the surfaces of said threads on one side of each thread; the surface to surface engagement of annular portions of said threads forming the said current carrying connection, means for sealing said engaged annular surfaces of said threads within said cavity, the end of said cylindrical recess opposite that which receives the threaded extension being closed and a sealing member between the other end of the said cavity and the said extension; said current carrying threads being enclosed between said closed end and said sealing member.

5. A disconnect switch having a terminal and a movable contact arm, said contact arm being angularly movable with respect to said terminal; a current carrying connection between said terminal and said movable contact arm; said contact arm having angular movement around said terminal, said contact arm including a current carrying hinge bar; a threaded extension of said terminal integral with said terminal; a cylindrical recess in the said hinge bar having a partly threaded surface receiving said threaded extension of the said terminal, the surface-to-surface engagement of annular portions of said threads forming the said current carrying connection, means for biasing said extension in one direction in said cylindrical recess and effecting a close engagement between the surfaces of said threads on one side of each thread, the surface-to-surface engagement of annular portions of said threads forming the said current carrying connection.

6. An electrical disconnect having a terminal and a movable member, said movable member having angular movement with respect to said terminal; a current carrying connection between said terminal and said movable member; said movable member including a current carrying hinge bar; a cylindrical recess in said hinge bar having a threaded surface, receiving a threaded extension of the said terminal, the surface-to-surface engagement of annular portions of said threads forming the said current carrying connection, a compression spring in said cylindrical recess biasing said extension in one direction in said hinge bar and effecting a close engagement between the surfaces of said threads on one side of each thread, the surface to surface engagement of annular portions of said threads forming the said current carrying connection.

7. An electrical disconnect having a terminal and a movable member, said movable member having angular movement with respect to said terminal, a current carrying connection between said terminal and said movable member; said movable member including a current carrying hinge bar; a threaded extension of said terminal integral with said terminal; a cylindrical recess in said hinge bar having a threaded surface receiving said threaded extension of the said terminal, the surface to surface engagement of annular portions of said threads forming the current carrying connection; means for biasing said extension in one direction in said cylindrical recess and effecting close engagement between the surfaces of said threads on one side of each thread, the surface to surface engagement of annular portions of said threads forming the said current carrying connection.

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