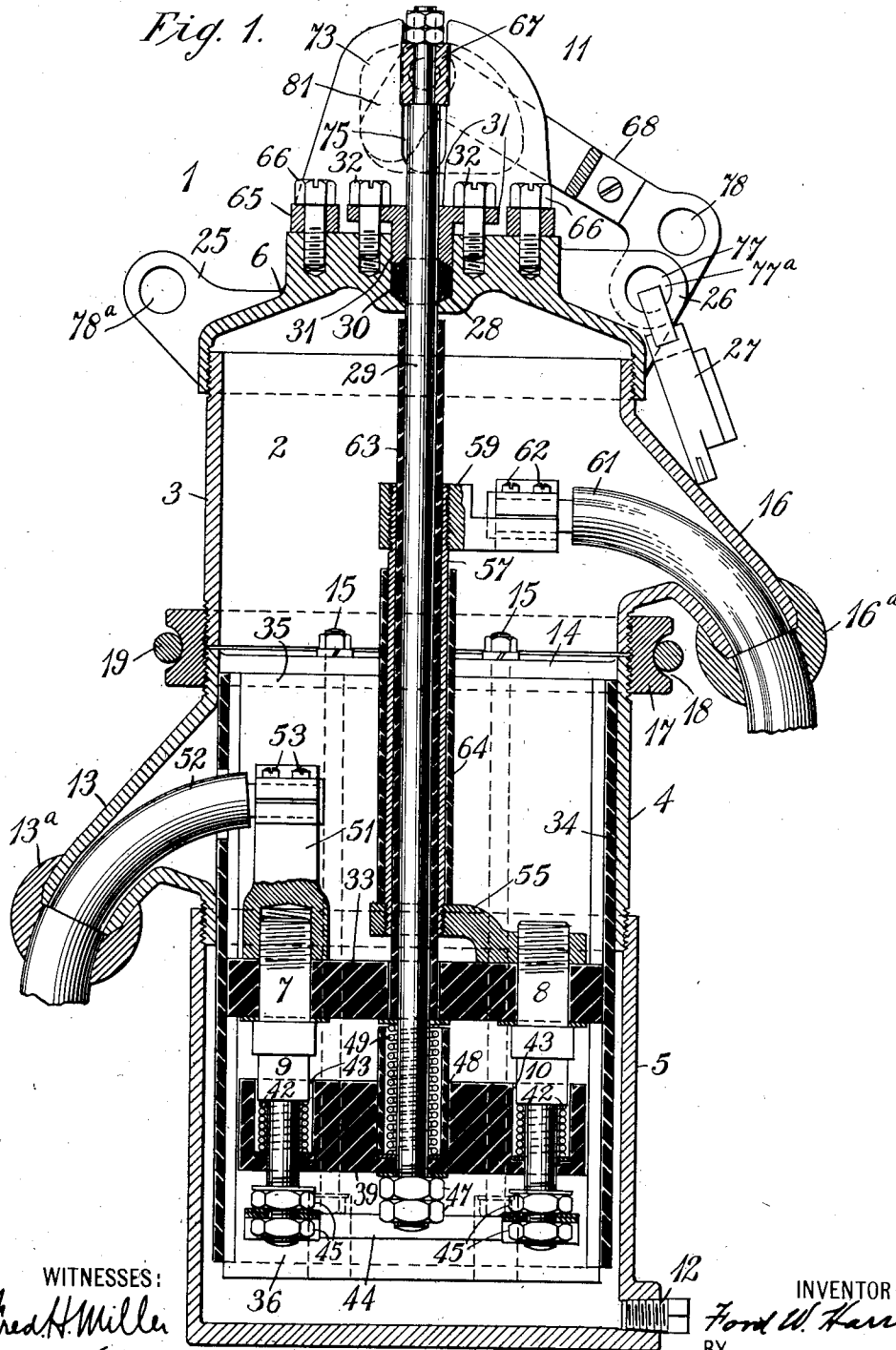


F. W. HARRIS.
CIRCUIT INTERRUPTER.
APPLICATION FILED OCT. 8, 1910.

996,851.

Patented July 4, 1911.

2 SHEETS—SHEET 1.



WITNESSES:

Fred H. Miller
D. A. Mace

INVENTOR

Ford W. Harris

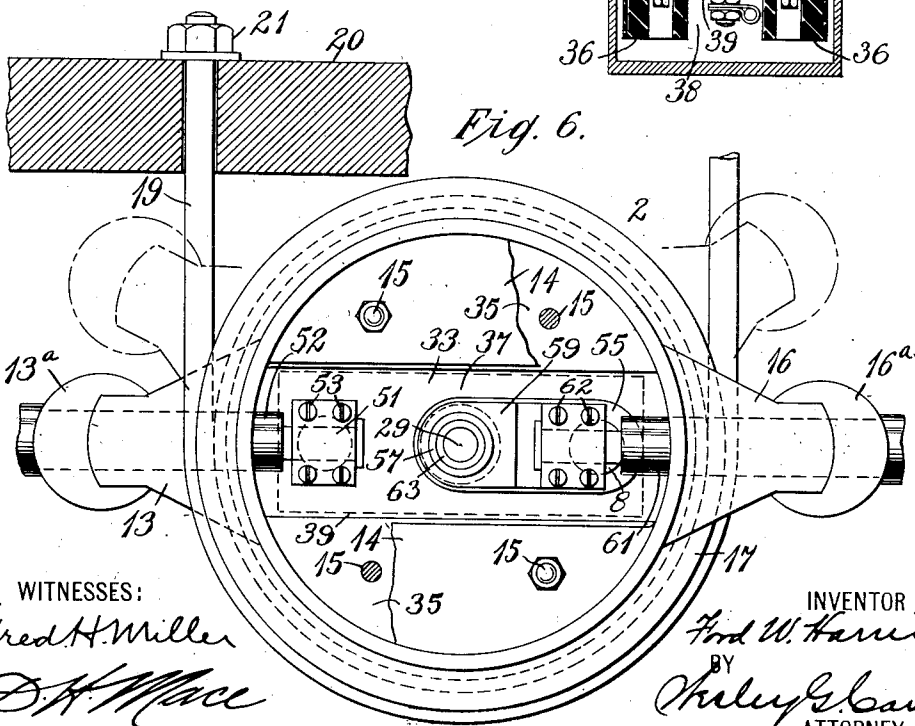
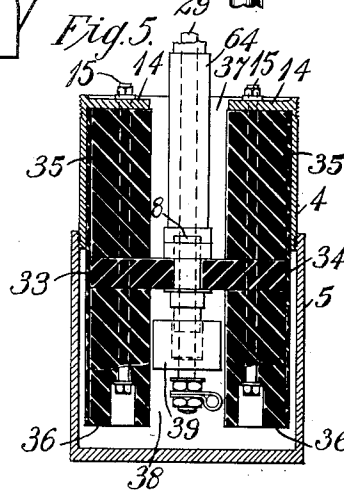
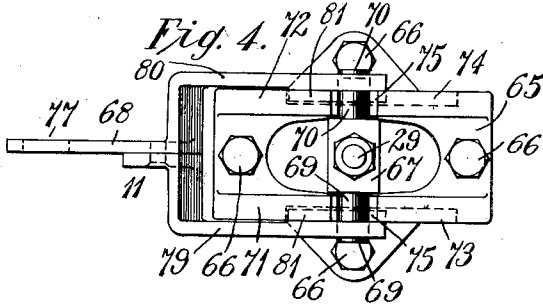
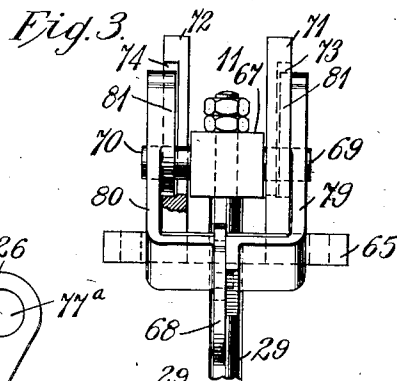
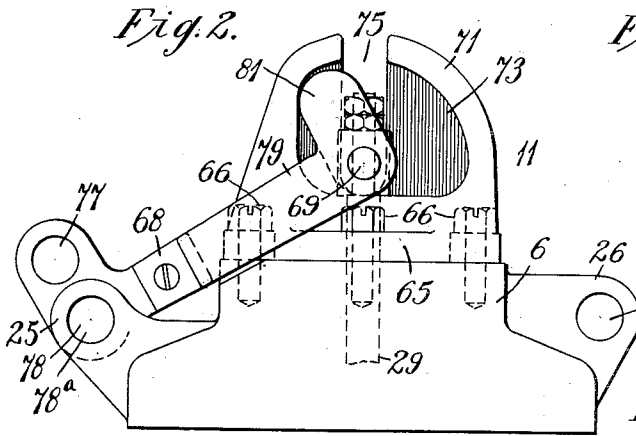
BY

W. L. Shaw
ATTORNEY

996,851.

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2 SHEETS—SHEET 2.



WITNESSES:
Fred H. Miller
D. H. Mace

INVENTOR
Fred W. Harris
BY
Chas. E. Shaw
ATTORNEY

UNITED STATES PATENT OFFICE.

FORD W. HARRIS, OF WILKINSBURG, PENNSYLVANIA, ASSIGNOR TO WESTINGHOUSE ELECTRIC AND MANUFACTURING COMPANY, A CORPORATION OF PENNSYLVANIA.

CIRCUIT-INTERRUPTER.

996,851.

Specification of Letters Patent.

Patented July 4, 1911.

Application filed October 8, 1910. Serial No. 586,092.

To all whom it may concern:

Be it known that I, FORD W. HARRIS, a citizen of the United States, and a resident of Wilksburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Circuit-Interrupters, of which the following is a specification.

My invention relates to circuit interrupters of the oil-immersed type, and it has for its object to provide a device of the above-indicated class which shall be compact and durable in construction and particularly adapted for use in manholes of an underground cable system.

In underground systems which embody heavy lead covered cables, much difficulty is often encountered in making suitable connections with the various types of apparatus which are usually located within the manholes, on account of the limited and cramped quarters. It is to lessen such difficulties that my invention is particularly adapted.

According to my invention, I provide a water-tight circuit interrupter, of the man-hole type, which is so constructed that the cable outlets may be independently turned about the axis of the interrupter to any convenient angle, in order to facilitate the work of making connections. Furthermore, the interrupter is provided with particularly simple and effective operating mechanism, the operating lever of which may also be turned to any convenient angle and may be locked in either its open or its closed position.

In the accompanying drawings, Figure 1 is a view, partially in vertical section and partially in elevation, of a circuit interrupter constructed in accordance with my invention. Fig. 2 is a face view, Fig. 3 a view in elevation, at right angles to that of Fig. 2, and Fig. 4 a plan view of the operating mechanism shown in Fig. 1. Fig. 5 is a view, partially in section and partially in elevation, of the lower portion of the circuit interrupter shown in Fig. 1, the sectional plane being taken at right angles to that in Fig. 1. Fig. 6 is a plan view of the circuit interrupter shown in Fig. 1, with the cover removed.

Referring to the drawings in detail, a circuit interrupter 1 comprises a liquid-containing tank 2 composed of a plurality of relatively movable and substantially cylindrical sections 3, 4 and 5 and a cover 6, a plurality of stationary contact terminals 7 and 8, a plurality of movable contact terminals 9 and 10, adapted to cooperate therewith, and an operating mechanism 11 for effecting engagement between said stationary and movable contact terminals.

The lower section 5 of the inclosing tank 2 is provided with a drain outlet 12 and is adapted to be screwed upon section 4, which is provided with a cable outlet projection 13. Section 4 is also provided with flanges or webs 14 from which the stationary contact terminals 7 and 8 are rigidly suspended, by means of tie rods 15. Section 3 is likewise provided with a suitable cable outlet projection 16 and is adapted to rest upon the upper edge of section 4 and to be secured thereto by means of an annular member 17 which is screwed upon both of said sections. The annular member 17 is provided with a groove 18 to receive a U-shaped member 19 the ends of which are fastened to a supporting wall or member 20, by means of nuts 21, only one of which is shown.

The cover plate 6 is adapted to be screwed to the upper edge of section 3 and is provided with ears 25 and 26 to either of which the operating lever may be secured by means of a lock 27.

In order to provide a water-tight casing, all of the threaded joints are filled with a gum (not shown) and the cover 6 is further provided with a stuffing box 28 of the usual type through which a centrally located operating rod 29 projects. Suitable packing material 30 is disposed about the shaft or operating rod 29 within the stuffing box 28 and a member 31 is provided which is adapted to be forced into position by means of bolts 32.

The stationary contact terminals 7 and 8 are secured to a circular disk 33 of impregnated wood which is adapted to fit tightly within a cylinder 34 of insulating material which serves as a lining for the sections 4 and 5. The disk 33 is rigidly secured to the flanges 14 of section 4 by means of the tie rods 15, suitable spacing blocks 35 being interposed between the flanges 14 and the disk 33, and similar spacing blocks 36 being provided which extend downwardly from disk 33 and are likewise secured in position by means of the tie rods 15. All of the spacing blocks are of like construction and are

segmental in horizontal cross section. The spacing blocks 35 are disposed so as to provide an opening 37 to accommodate the shaft 29, and a similar opening 38 is provided between the lower spacing blocks 36 to accommodate a supporting member 39 with which the movable contact terminals 9 and 10 are associated.

The stationary contact terminal 7 extends through the disk 33 and is screwed into the bottom portion of a terminal block 51 of conducting material, the upper portion of which is secured to a cable 52 by means of screws 53. The stationary contact terminal 8 likewise extends through the disk 33 and is screwed into the outer end of an arm 55 of conducting material, the inner end of which is adapted to be screw-threaded to the lower end of a tube 57 of conducting material which surrounds the operating shaft 29. The upper end of the tube 57 is screwed into a terminal block 59, the outer end of which is adapted to be connected to a cable 61 by means of screws 62. The tube 57 is insulated from the operating rod 29 by means of a tube 63 of insulating material and from the adjacent flanges 14 by an insulating tube 64. Cables 52 and 61 are respectively secured to cable outlet projections 13 and 16 by means of wiped joints 13^a and 16^a.

The movable contact terminals 9 and 10 are of like structure and are of the usual butt-contact type. Each of said terminals is adapted to rest upon a coil spring 42 which is disposed within a suitable recess 43 in the supporting member 39. A strap conductor 44 is adapted to be connected between contact terminals 9 and 10 and is secured thereto by means of suitable lock nuts 45.

The supporting member 39 is located between the lower spacing blocks 36, which serve as guides to maintain the stationary and movable contact terminals in alinement. The supporting member 39 is suspended from the operating rod 29 and is secured thereto by lock nuts 47. A centrally located recess 48 is provided in the supporting member 39, in which is disposed a coil spring 49 which is adapted to disengage the stationary and movable contact terminals when the operating mechanism is released.

The operating mechanism 11 comprises a bracket member 65 which is bolted to the cover 6 by means of bolts 66, a trunnion member 67 which is secured to the upper end of the operating rod 29, and an operating lever 68 which is pivotally supported on trunnion extensions 69 and 70 of the member 67. The bracket member 65 is provided with two parallel upwardly extending side members 71 and 72, the outer sides of which are provided with cam recesses 73 and 74. Slots 75 are likewise provided in the side members 71 and 72 to serve as guides for

the extensions 69 and 70 of the trunnion member 67.

The outer end of the operating lever 68 is provided with holes 77 and 78 which are adapted to register with similar holes 77^a and 78^a in the ears 25 and 26, respectively, of the cover 6, when the lever 68 is in the one or the other of its extreme positions. The inner portion of the operating lever 68 comprises two arms 79 and 80, each of which is provided with a laterally projecting portion 81. The projecting portions 81 are adapted to extend into the cam recesses 73 and 74 to cooperate therewith in the operation of the movable contact members. The shape of the cam recesses 73 and 74, and the form and proportions of the laterally projecting portions 81, are so chosen as to effect a vertical movement of the operating rod as the lever 68 is moved to either of its extreme positions.

Assuming the operating lever to be in the position shown in Fig. 2, the operating shaft 29 is in its lowest position and the movable contact terminals 9 and 10 are out of engagement with the stationary terminals 7 and 8. In this position the breaker is open. To close the breaker, the lever member 68 is moved to its other extreme position. The operating rod 29 is thereby drawn into its uppermost position by reason of the peculiar shape and relations of the cam recesses 73 and 74, and the projecting portions 81.

It is evident from the construction of the inclosing tank, that the cable outlet projection 16 may be rotated to any desired angle, as indicated by the dotted lines in Fig. 6, and, in so doing, the terminal block 59 turns about the conducting tube 57 independently of the stationary and movable contact terminals, as will be readily understood. The cable outlet projection 13 may similarly be turned to any convenient position, as shown by the dotted lines in Fig. 6, but, as the stationary contact terminals 7 and 8 are rigidly secured to tank section 4, all of the breaker parts are turned with it, while the conducting arm 55 merely rotates about the conducting tube 57. It also is evident that the operating lever 68, and, consequently, the cover 6, may be made to occupy any desired position, independent of the rest of the mechanism.

While I have shown and described a circuit interrupter of specific structure, arrangement and location of parts, many modifications may be effected without departing from the spirit and scope of my invention, and I desire that only such limitations shall be imposed as are indicated in the appended claims.

I claim as my invention:

1. A circuit interrupter comprising a liquid-containing tank composed of a plurality of relatively movable cylindrical sections

fitted tightly together and provided with cable outlets, cooperating stationary and movable contact members located in said tank, and a centrally located rod adapted to operate said movable members, said cooperating contact members being mounted for rotative movement about said shaft.

2. The combination with a circuit interrupter comprising a plurality of stationary and movable cooperative contact members, and an operating mechanism for said movable members, of a water-tight inclosing tank comprising a plurality of relatively movable cylindrical sections adapted to be screwed together, and cable outlet projections associated with separate sections.

3. The combination with a circuit interrupter comprising a plurality of stationary and movable cooperating contact members, a centrally located shaft connected to said movable contact members, and an operating mechanism for said shaft, of an inclosing tank for said parts having suitable cable outlet projections which are adapted to be independently rotated in planes perpendicular to said shaft to any desired positions.

4. The combination with a circuit interrupter comprising a plurality of stationary and movable cooperating contact members, and an operating mechanism for said movable members, of an axially located means for connecting said operating mechanism to said movable members and about which said contact members may have rotative movement, an inclosing tank having relatively rotatable cable outlet projections and a relatively movable cover upon which said operating mechanism is mounted.

5. The combination with an inclosing tank comprising a plurality of relatively movable cylindrical sections adapted to be screwed together, a plurality of stationary contact terminals rigidly secured to, and

suitably insulated from, one of said cylindrical sections, a plurality of movable contact terminals to cooperate with said stationary contact terminals and an operating mechanism therefor, of means for maintaining the cooperating contact terminals in alinement.

6. The combination with stationary and movable contact members adapted to cooperate with each other, a rod rotatably associated with said movable contact members, and a water-tight tank, the cover of which is adapted for rotative movement independently of said tank, of an operating mechanism mounted upon said cover and comprising a lever pivotally supported upon the upper end of said rod and adapted to be moved through substantially 180° and to be locked in either of its extreme positions, and means cooperating with said lever to actuate the movable contact members.

7. The combination with a liquid-containing tank, stationary and movable cooperating contact terminals and a centrally located operating rod to which said movable contact terminals are secured, of an operating mechanism comprising a bracket member having two parallel side pieces provided with cam recesses, a bifurcated operating lever connected to the upper end of said operating rod and having laterally projecting members to cooperate with said cam recesses in order to cause engagement and disengagement of the cooperating contact members as the operating lever is moved from one extreme position to the other.

In testimony whereof, I have hereunto subscribed my name this 29th day of Sept., 1910.

FORD W. HARRIS.

Witnesses:

WILSON L. WRIGHT,
B. B. HINES.