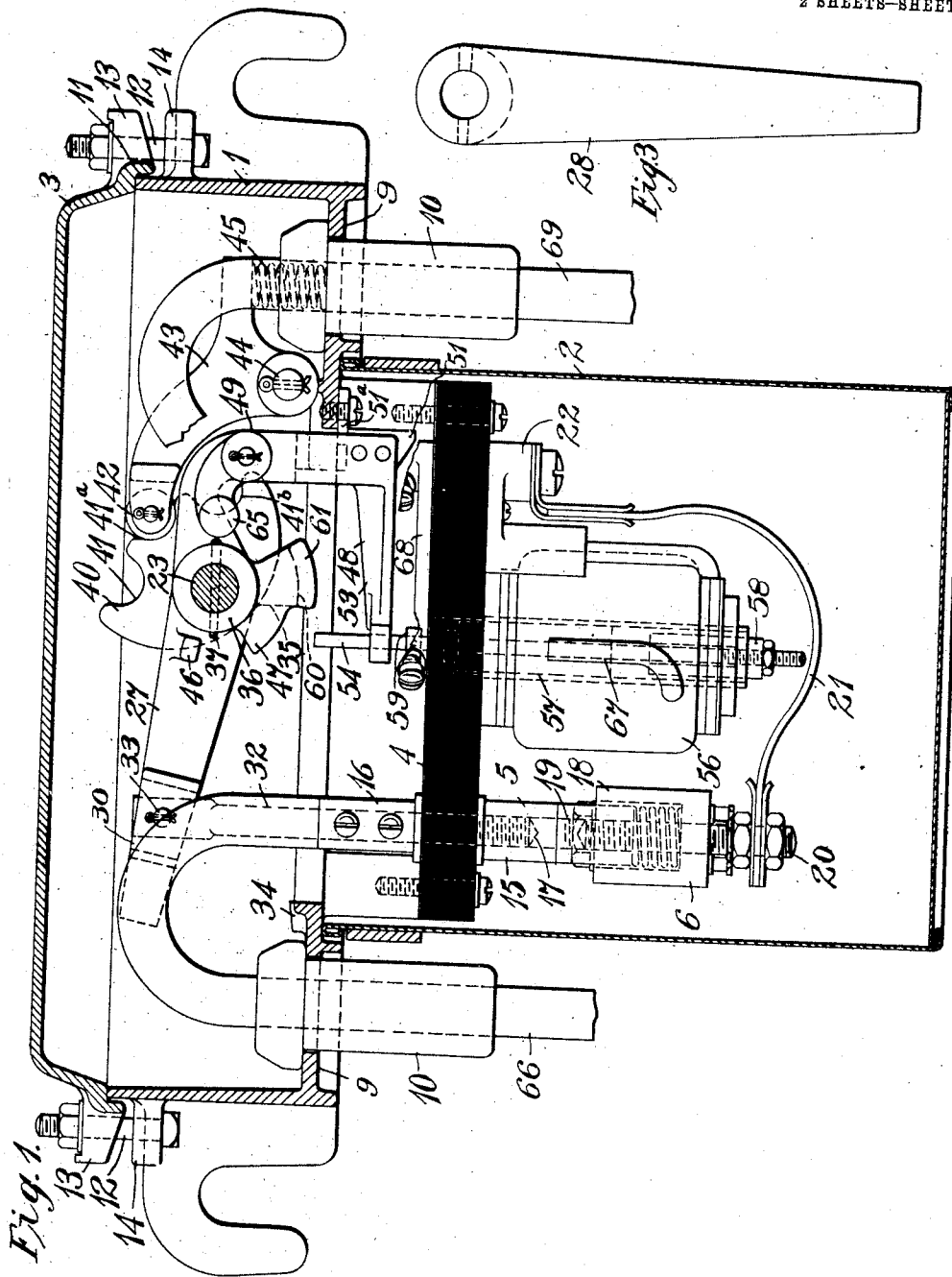


F. W. HARRIS.
SWITCHING DEVICE.
APPLICATION FILED MAY 9, 1908.

981,759.

Patented Jan. 17, 1911.

2 SHEETS—SHEET 1.



WITNESSES:

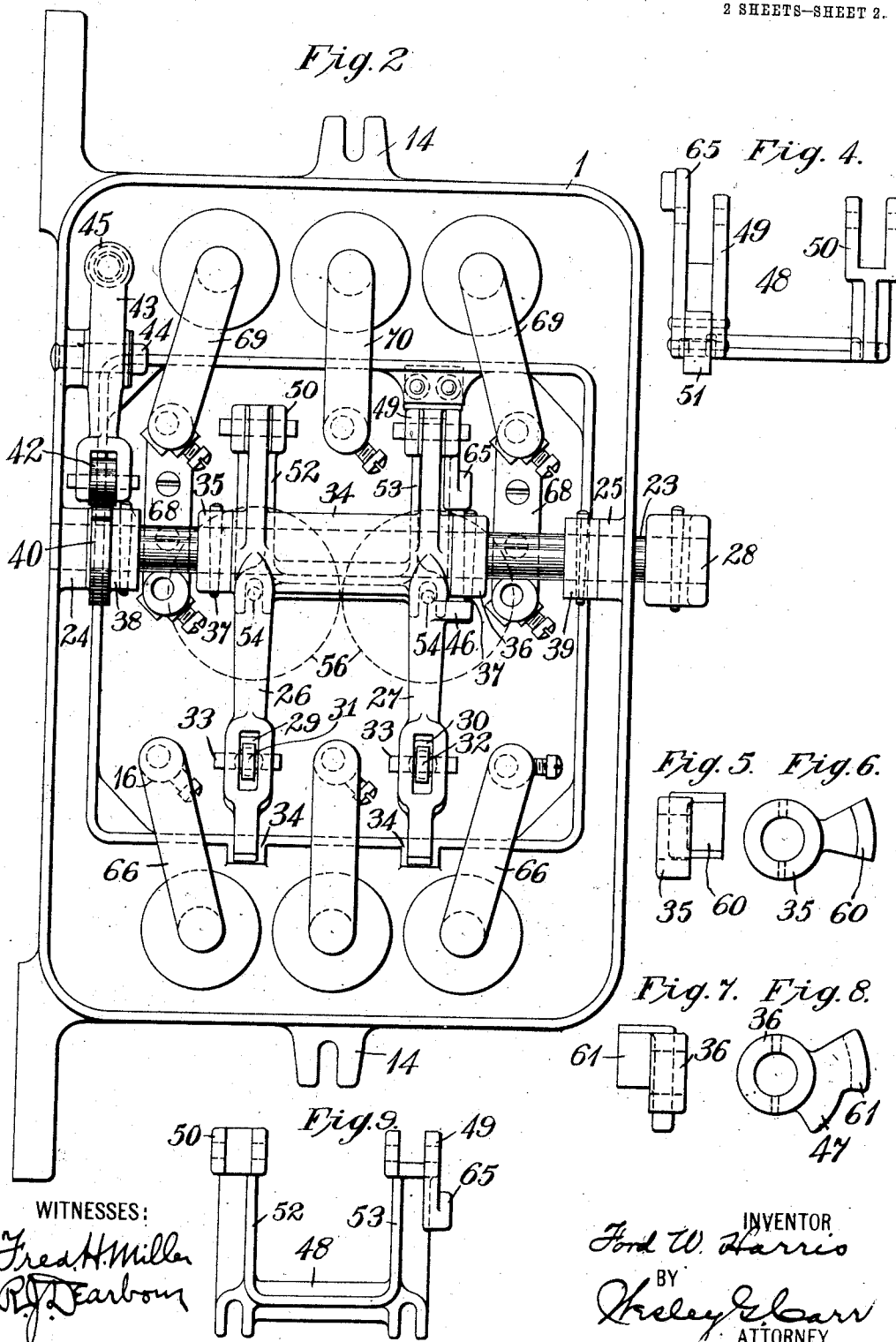
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981,759.

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2 SHEETS-SHEET 2.



UNITED STATES PATENT OFFICE.

FORD W. HARRIS, OF WILKINSBURG, PENNSYLVANIA, ASSIGNOR, BY MESNE ASSIGNMENTS, TO WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY, OF EAST PITTSBURG, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

SWITCHING DEVICE.

981,759.

Specification of Letters Patent.

Patented Jan. 17, 1911.

Application filed May 9, 1908. Serial No. 431,817.

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 Switching Devices, of which the following is a specification.

My invention relates to electric switching devices or controllers, and it has special reference to automatic interrupters for relatively high-voltage circuits.

The object of my invention is to provide a device of the class above indicated that shall be simple and durable in construction, effective and reliable in operation and adapted for out-door service.

My improved switching device is inclosed in a weather-proof casing, is compact in arrangement and is specially well fitted for governing the supply circuits of electric motors.

It comprises, in general, stationary and movable contact members, a handle lever and an operating shaft, operating levers mounted on the shaft, an electro-responsive release mechanism, and means for accentuating a plurality of handle lever positions in which the interrupter may be either dependent upon the action of the automatic release mechanism or rendered entirely independent thereof.

While the circuit interrupter is not intended for a motor-starting controller, it may be used to advantage, in connection with a simple starting switch, as an overload release circuit interrupter and as a line switch for completing the motor-supply circuit to the terminals of the starting switch.

Figure 1 of the accompanying drawings is a side elevation of a switching device or circuit controller constructed in accordance with my invention, the inclosing casing being in section to disclose the operating parts. Fig. 2 is a plan view, with the cover removed, of the device shown in Fig. 1, and Figs. 3, 4, 5, 6, 7, 8 and 9 are detail views of the operating parts.

The device illustrated in the drawings comprises a hollow supporting frame or casting 1, a fluid-containing tank 2, a cover 3, an insulating plate or slab 4, a plurality of stationary contact members 5 secured thereto, a movable contact-bearing member

6, an operating mechanism and a release mechanism.

The tank 2 is secured to the frame 1 by any suitable means and is over-hung by it so that a ledge 9 is provided in which bushings 10 of insulating material may be supported.

The cover 3 is provided with a flange 11 which slightly over-hangs the upper edge of the frame and the two parts are firmly clamped together by bolts 12 that engage suitable projections 13 and 14 on the cover and the frame.

The stationary contact members 5 comprise substantially cylindrical contact blocks 15 which are clamped to the bottom surface of the insulating plate 4 by terminal members 16, the latter being adapted to receive the circuit leads above the insulating plate and being provided with screw-threaded projections 17 that extend through the plate and engage the blocks 15.

The movable contact-bearing member 6 comprises a cross bar 18 of wood or other suitable insulating material to which contact blocks 19 are resiliently secured, in a well known manner, each contact block being provided with a shank 20 which extends downwardly through the bar 18 and to which one end of a flexible shunt 21 is secured. The opposite end of the shunt is connected to a terminal member 22 on the under side of the insulating plate 4.

The operating mechanism comprises a horizontal shaft 23 which is rotatably mounted in bearings 24 and 25 provided in the walls of the frame 1, a pair of operating levers 26 and 27 which are rotatably mounted on the shaft 23 and a handle lever 28 which is secured to one end of the shaft 23 which projects through the casing.

The levers 26 and 27 are provided, respectively, with openings 29 and 30 and are operatively connected to the movable contact-bearing bar 18 by links 31 and 32, the upper ends of which are pivotally suspended in the openings 29 and 30 by means of pins 33. The points of connection between the links and the levers are near corresponding ends of the levers, the extreme ends of which are adapted to engage stop projections 34 on the frame 1 when the stationary and movable contact members are separated to a maximum degree.

The levers 26 and 27 are integral parts of

a single structure having a common hub 34 or are rigidly connected together so that their operation is concurrent. Adjustment of the hub 34 along the shaft 23 is prevented by collars 35 and 36 which are secured to the shaft 23 by pins 37, and collars 38 and 39 are similarly secured to the shaft 23 adjacent to the bearings 24 and 25 in order to prevent longitudinal movement of the shaft.

The collar 38 is provided with a disk segment 40 having three recesses or notches 41, 41^a and 41^b to be engaged by a roller 42 that forms a part of an accentuating lever 43. The lever 43 is rotatably mounted on a pin shaft 44 which projects inwardly from the frame 1 and the roller 42 is forced into one or another of the notches in the segment 40 by means of a spring 45.

The lever 27 is provided with a laterally projecting lug 46 which may be engaged by a projection 47 on the collar 36, an operative connection being thereby effected between the shaft 23 and the levers 26 and 27.

The release mechanism comprises a bell crank lever 48 provided with two arms 49 and 50 having bifurcated outer ends which are pivotally fastened to the free ends of the levers 26 and 27. The bell crank lever 48 is further provided with a latch 51 which is adapted to engage a projection 51^a on the frame 1 (said projection being preferably constructed of hardened steel), and with a second pair of arms 52 and 53, the ends of which are also bifurcated to receive the upper ends of striker or hammer rods 54. Release magnet coils 56 are provided with stationary core members 57 and with movable core members 58 which are suspended from the lower ends of the hammer rods 54, in the usual manner, and are adapted to automatically trip the latch 51. The rods 54 are provided with collars 59 which engage the ends of the arms 52 and 53 when the current traversing the coils 56 exceeds a predetermined amount.

The collars 35 and 36 are also provided, respectively, with projections 60 and 61 which prevent the upward movement of the hammer rods 54 when the shaft 23 occupies a position which is accentuated by the engagement of the roller 42 with the notch 41 of the segment 40.

The operation of the device is as follows; (assuming that the breaker occupies its open-circuit position and that the roller 42 engages notch 41^b of the segment 40) if the handle lever 28 and the shaft 23 are rotated in a clockwise direction, the arrangement of parts being considered as shown in Fig. 1; this rotative movement will be imparted to levers 26 and 27, since the projection 47 on the collar 36 engages the projection 46, and the movable contact-bearing member 6 will be raised until the contact members 19 are forced into engagement with the stationary

contact members 15. The latch 51 now engages the projection 51^a and the breaker occupies the position in which the roller 42 engages the notch 41 of the segment 40. In this position, the projection 61 on the collar 36 and the projection 60 on the collar 35 prevent the upward movement of the hammer rods 54 and the automatic release of the latch 51. If it is desired to render the device susceptible of automatic release by the release magnets, the handle 28 and the shaft 23 may be rotated in the counter clockwise direction to bring the controller into an intermediate position in which the roller 42 engages the notch 41^a of the segment 40. In this position, the contact members are still in engagement with each other but the projections 60 and 61 have been moved out of the line of action of the hammer rods 54 and, consequently, if the current traversing the windings 56 exceeds a predetermined amount, the collars 59 will be moved upwardly and will strike the ends of the arms 52 and 53 and thereby release latch 51 from the projection 51^a. The weight of the moving contact-bearing member 6 and the resiliency of the contact members are sufficient to separate said members from the stationary contact members and to cause the circuits which were formerly completed through the shunts 21, as indicated below, to be interrupted.

In case it is desired to interrupt the circuit independently of the automatic release mechanism, the handle lever 28 and the shaft 23 are operated in a counter clockwise direction until the projection 61 on the collar 35 engages an arm 65 of the bell crank lever 48 and releases the latch 51 from the projection 51^a and the roller 42 occupies notch 41^b of the segment 40.

When the controller occupies either of the positions accentuated by the engagement of the roller 42 with the notches 41 and 41^a, connections are established from an external circuit through conducting leads 66, contact members 5 and 6 and flexible shunts 21 to terminal members 22. From two of these terminals, circuits are continued through the release magnet coils 56, conductors 67, terminals 68, which are located on the upper surfaces of the plate 4, and leads 69 to the external circuit. From the remaining terminal 22 the circuit is continued directly through a lead 70 to the external circuit.

It will be readily understood by those skilled in the art that a simple switching device may be used for starting an electric motor, and that my improved circuit interrupter may advantageously be connected in the supply circuit in order to protect the motor from excessive overloads. In such cases, it will be desirable to move the operating handle lever of the circuit interrupter

to the position in which the roller 42 engages notch 41, in order to prevent the interruption of the circuit during the acceleration of the motor when the current traversing its windings is usually excessive.

It will be understood that various structural modifications may be effected in the circuit interrupter illustrated without departing from the spirit of my invention, and, consequently, I desire that only such limitations shall be imposed as are indicated in the appended claims.

I claim as my invention:

1. In a circuit interrupter, the combination with stationary and movable contact members, of a latch for holding the contact members in engagement with each other, an automatic latch-tripping mechanism, an operating member and means for locking said operating member in two definite circuit-closing positions, the latch-tripping mechanism being locked by said operating member when in one of said positions.

2. In a circuit-breaker, the combination with stationary and movable contact members, an operating lever fulcrumed at an intermediate point in its length, a latch pivotally suspended from one end of the lever, a shaft operatively connected to the lever, and means dependent upon the position occupied by the shaft for preventing withdrawal of the latch.

3. In a circuit-breaker, the combination with a horizontal shaft, a lever rotatably mounted thereon, means for making movement of the lever in one direction dependent upon movement of the shaft, a latch pivotally suspended from one end of the lever, automatic means for tripping the latch, and means for preventing operation of the latch-tripping means when the shaft is in a certain position.

4. In a circuit-breaker, the combination with a horizontal rotatable shaft, a handle lever secured thereto, means for accentuating a plurality of shaft positions and an operating lever rotatably mounted upon the shaft, of a latch pivotally suspended from one end of the lever for holding the circuit-breaker closed, an electro-responsive trip-

ping mechanism, and means for preventing the operation of the tripping mechanism when the shaft is in a certain position.

5. In a circuit-breaker, the combination with stationary and movable contact members, a rotatable shaft and an operating lever fulcrumed upon the shaft, of a link suspended from one end of the lever and secured to the movable contact member, a latch pivotally suspended from the opposite end of the lever, electro-responsive means for tripping the latch, means for accentuating a plurality of shaft positions, and means for preventing the operation of the tripping mechanism when the shaft is in a certain position.

6. A circuit-breaker comprising stationary and movable contact members, means for holding the members in engagement, automatic release mechanism, an operating shaft, means for accentuating a plurality of shaft positions in which the circuit-breaker is respectively open, closed subject to automatic operation, and closed subject to non-automatic operation, and means interposed by the shaft in its last named position to prevent operation of the release mechanism.

7. In a circuit-breaker, the combination with stationary and movable contact members, a rotatable shaft supported in a horizontal plane, an operating lever rotatably mounted on the shaft, and a link connecting the movable contact member to one end of the lever, of a latch pivotally suspended from the opposite end of the lever for holding the contact members in engagement with each other, electro-responsive means for tripping the latch, a notched disk segment secured to the shaft, an accentuating lever, a spring for holding the accentuating lever in engagement with the segment notches, and an operating handle lever secured to one end of the shaft.

In testimony whereof, I have hereunto subscribed my name this 30th day of April, 1908.

FORD W. HARRIS.

Witnesses:

G. L. CHRISTMAN,
BIRNEY HINES.