Nov. 13, 1928. 1,691,252

G. B. REISBACH

ELECTRIC SWITCH

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Fig. 2.

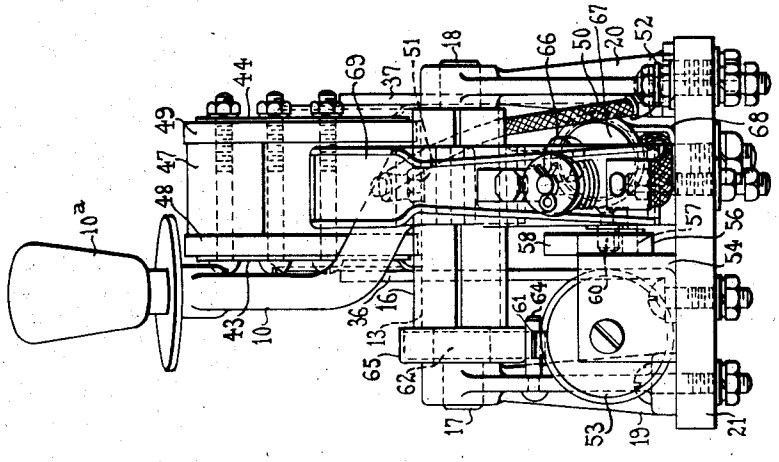
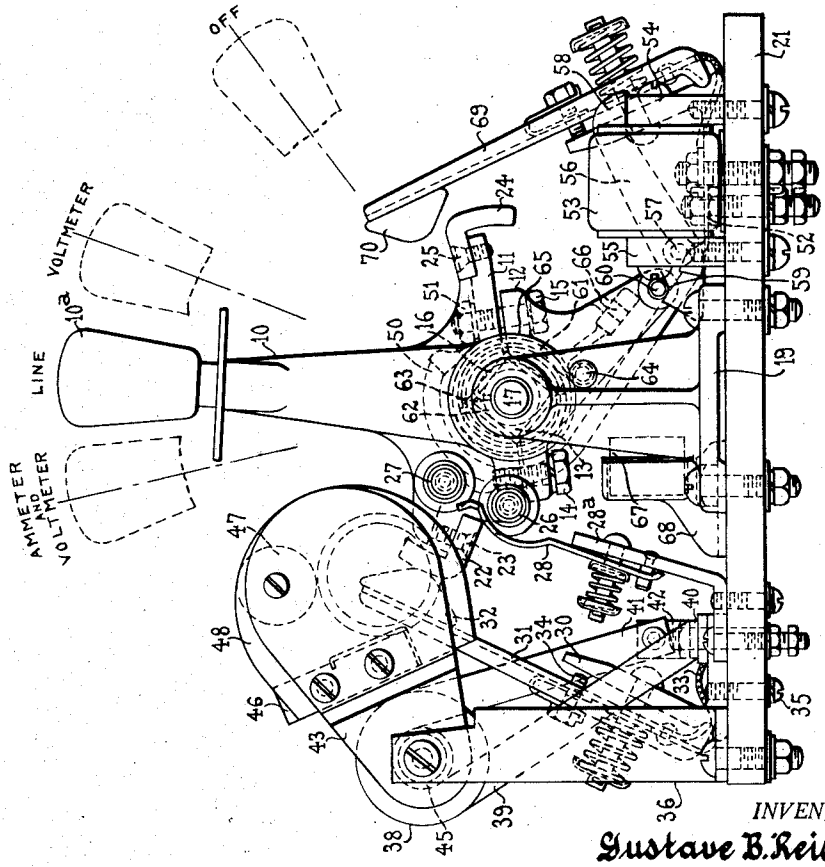


Fig. 1.



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Fig. 3.

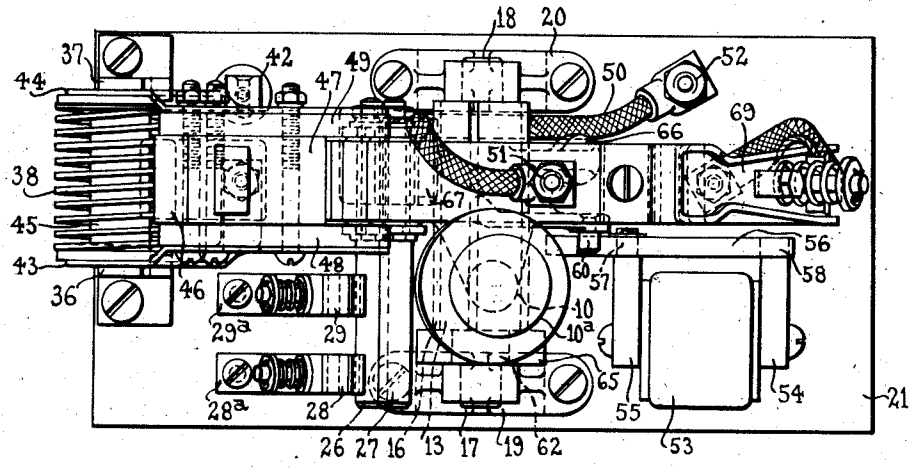


Fig. 4.

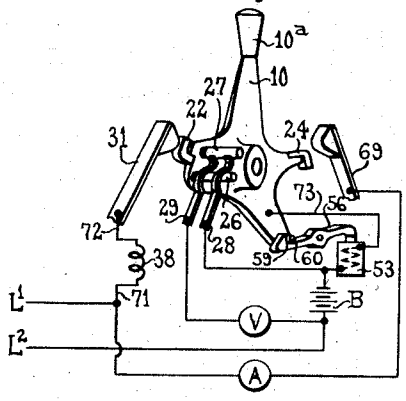


Fig. 5.

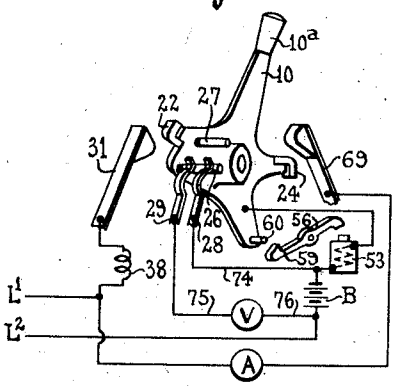
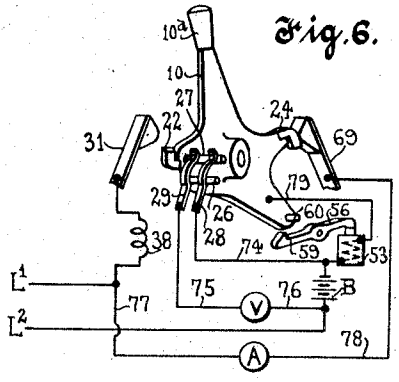


Fig. 6.



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UNITED STATES PATENT OFFICE.

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ELECTRIC SWITCH.

Application filed November 9, 1925. Serial No 67,752.

This invention relates to improvements in electric switches, and more particularly to manually operable switches for battery charging equipment.

An object of the invention is to provide a strong and reliable switch adapted to commutate the various circuits employed in battery charging operations.

Another object is to provide a switch which is biased to a given inoperative position and movable to given operative positions at will.

Another object is to provide means for automatically maintaining the switch in a given operative position, but subject to release under predetermined electrical conditions.

Another object is to provide a switch enabling establishment of line connections for the battery without requiring completion of certain of the auxiliary circuits.

Another object is to provide a switch operable to sequentially provide voltmeter connections, line connections and joint ammeter and voltmeter connections.

Another object is to provide a switch having an electromagnetically operable latch adapted to hold the same in position to provide line connections for the battery, but subject to release by said latch upon failure of line voltage.

Other objects and advantages of the invention will hereinafter appear.

The accompanying drawing illustrates an embodiment of the invention which will now be described, it being understood that the device illustrated is susceptible of various changes without departing from the spirit and scope of my invention as defined in the appended claims.

In the drawing, Figure 1 is a side elevational view of a switch constructed in accordance with my invention;

Fig. 2 is an end elevational view of the switch shown in Fig. 1;

Fig. 3 is a top plan view thereof; and

Figs. 4, 5 and 6 are schematic and diagrammatic views illustrating various circuit commutations effected by the switch in different operative positions thereof.

Referring to the drawing, and more particularly to Figs. 1, 2 and 3, the numeral 10 designates a lever having separated portions 11 and 12 which are adapted to be clamped together around a squared shaft 13 by means of suitable screws or bolts 14 and 15, but insulated from said shaft by means of laminated insulating material as indicated at 16. Shaft 13 is provided with cylindrical end portions 17 and 18 to be supported in suitable bearing brackets 19 and 20, the latter being bolted, as shown, or otherwise secured to an insulating base or panel 21. Lever 10 is provided with a suitable knob or handle 10^a of wood or other insulating material.

A contact element 22 is secured to lever 10 at one side thereof by means of a screw 23, and a contact element 24 is secured to the opposite side of said lever by means of a screw 25. Also secured to but insulated from the lever 10 are a pair of spaced conductive members or projections 26 and 27, which are individually adapted in certain angular positions of said lever to bridge the auxiliary contact fingers 28 and 29,—the latter being best shown in Fig. 3. Inward movement of contact fingers 28 and 29 is limited by the respective upper ends of suitable supporting and terminal members 28^a and 29^a.

Resiliently mounted in a well known manner upon a suitable supporting bracket 30 is a contact finger 31, the latter having a contact portion 32 located in the path of movement of contact element 22 and a flexible lead wire 33 for connecting the same in circuit. A screw 34 provides for adjustment of the normal angular position of the contact finger 31. As shown, the bracket 30 is secured to base 21 by means of the screw 35. Mounted upon brackets 36 and 37 adjacent to the contact element 22 and contact 32 is a magnetic blow-out device of usual construction, said device comprising a coil 38 having one end 39 thereof connected with the flexible lead 33, as indicated at 40, whereas the other end 41 of said coil is connected to a circuit terminal 42. The pole pieces 43 and 44 are provided with suitable spacing elements 45, 46 and 47, arc shields 48 and 49 of insulating material being located upon the adjacent faces of said pole pieces.

A flexible conductor 50 is mechanically and electrically connected to the body portion of the lever 10 by means of the nut 51, the other end of said conductor being provided with a suitable terminal connection 52, a low current release coil 53 being connected in series with said conductor 50 in any suitable manner (not shown). Said coil is provided with pole pieces 54 and 55, the latter having an arma-

ture 56 pivoted thereto as indicated at 57, the upper end 58 of said armature being arranged to be attracted to the pole piece 54. The lower end of said armature is curved or notched as indicated at 59, whereby upon energization of coil 53 said notched portion is moved into the path of a pin or projection 60 on the lower section 12 of lever 10. Said lever is thus held in the position illustrated in Figs. 1, 2 and 3 of the drawing, against the action of a coil spring 61; one end of said spring being secured to an intermediate cylindrical portion 62 of shaft 13 as indicated at 63 (Fig. 1), whereas the other end of said spring is secured to a projection or pin 64 on bracket 19. Spring 61 is preferably enclosed within a cup-shaped member 65, said member having a slot in the periphery thereof to permit winding and unwinding movement of the spring.

Switch lever 10 is thus biased to the off position indicated in dotted lines at the right-hand side of Fig. 1, reverse movement beyond this position being prevented by engagement of a lug or projection 66 on portion 12 thereof with a resilient or elastic block 67 suitably carried by a bracket 68 secured to base 21.

The contact finger 69 at the right-hand side of Fig. 1 is provided with a contact portion 70 which is adapted to provide ammeter connections when lever 10 is moved to the extreme left-hand position shown in dotted lines in Fig. 1,—auxiliary contact fingers 28 and 29 being also bridged by member 27 in this position of the lever whereby ammeter and voltmeter connections are jointly effected. Contact finger 69 is in all substantial respects like contact finger 31, and hence further description thereof is deemed unnecessary.

Referring now to Fig. 4, the same illustrates diagrammatically the manner of effecting line connections for the battery with the lever 10 in the position illustrated in full lines in Figs. 1, 2 and 3. In this position of the lever contact element 22 is in engagement with contact finger 31, thus completing the charging circuit, which may be traced from line L^1 by conductor 71 through the electromagnetic blow-out coil 38, by conductor 72 through contact finger 31 to contact element 22, thence through the body of lever 10, by conductor 73 through coil 53 of the electromagnetic latching device, and through the battery B to line L^2. Coil 53 being energized armature 56 is attracted, thereby effecting engagement of the notched portion 59 thereof with the pin 60 of lever 10 to maintain the latter in such operative position pending failure of line voltage or reduction in current, or further movement of said lever by hand. As will be apparent from Figs. 1 to 4, auxiliary contact fingers 28 and 29 and contact finger 69 are out of engagement with their cooperating contacts in this position of lever 10.

With lever 10 in the position illustrated in Fig. 5 a voltmeter circuit is provided for the battery, which circuit may be traced from one side of the battery B, by conductor 74 through auxiliary contact finger 28, through bridging contact member 26 to the other auxiliary contact finger 29, by conductor 75 through voltmeter V, and thence by conductor 76 to the other side of the battery. No other circuit is completed in this position of lever 10.

Upon movement of lever 10 to the position illustrated, in Fig. 6 voltmeter and ammeter circuits are simultaneously provided,—the voltmeter circuit extending from one side of battery B, by conductor 74 through auxiliary contact finger 28, through bridging contact member 27 to the other auxiliary contact finger 29, by conductor 75 through voltmeter V, and thence by conductor 76 to the other side of the battery; whereas the ammeter circuit may be traced from line L^1 by conductor 77 through ammeter A, by conductor 78 through contact finger 69 and contact element 24 through lever 10, and thence by conductor 79 and coil 53 through battery B to line L^2.

It will be apparent from the foregoing that upon movement of lever 10 from the off position the same functions to first complete the voltmeter connections and to thereafter provide line connections for charging the battery, said line connections being automaitcally maintained in the manner aforedescribed; whereas if desired said lever may be moved manually to another operative position to jointly provide ammeter and voltmeter connections for the battery.

If desired the switch elements, exclusive of the handle 10^a may be enclosed within a suitable casing and the latter will preferably be provided with suitable legends indicating the various operative positions of the switch.

What I claim and desire to secure by Letters Patent is:

1. In battery charging equipment, the combination with a battery and variable circuit connections therefor, of a rotatable contact member biased to one extreme position to interrupt said connections and movable to an opposite extreme position to commutate the same, and means for automatically holding said member in an intermediate position wherein the charging circuit of said battery is completed.

2. In battery charging equipment, the combination with a battery and variable circuit connections therefor, of a rotatable contact member biased to one extreme position to interrupt said connections and movable to an opposite extreme position to commutate the same, and means for automatically holding said member in an intermediate position wherein the charging circuit of said battery is completed, said means comprising a coil to be energized in such position of said member to provide for operation of an electro-magnetically operated latching device.

3. In battery charging equipment, the com-

bination with a battery and voltmeter, ammeter and charging circuits therefor, of a rotatable contact member, means for biasing said member to one extreme position for interrupting all of said circuits, means for moving said member to another extreme position for jointly completing said voltmeter and ammeter circuits, said member being also movable to an intermediate position for completing said charging circuit, and electromagnetically operable latching means for maintaining said member in said last mentioned position against the action of said biasing means, said latching means being adapted to release said member under given electrical conditions in the charging circuit.

4. In battery charging equipment, the combination, with a battery and voltmeter, ammeter and charging circuits therefor, of means for sequentially and individually completing said voltmeter and charging circuits and for thereafter simultaneously completing said voltmeter and ammeter circuits, said means comprising a plurality of substantially stationary resilient contact fingers and a rotatable member having contact elements arranged for sequential engagement therewith, means for biasing said member to an inoperative position, and electromagnetically operable means controlled by certain of said contacts for holding said member in certain of its operative positions against the action of said biasing means.

5. In a switch for use in battery charging operations, the combination with a battery and voltmeter, ammeter and charging circuits therefor, of a pluralitv of resiliently mounted contact fingers, a rotatable member having contact elements adapted for engagement with said contact fingers to sequentially provide voltmeter or line connections for the battery or to jointly provide voltmeter and ammeter connections therefor, means for biasing said member to an inoperative position, and an electromagnetic latching device having an operating coil in series with the battery for holding said member in position to provide line connections, said member being thereafter movable manually in either direction against the action of said latch or said biasing means.

6. In a switch for use in battery charging operations, the combination with a battery and voltmeter, ammeter and charging circuits therefor, of a plurality of resiliently mounted contact fingers, a rotatable member having contact elements adapted for engagement with said contact fingers to sequentially provide voltmeter or line connections for the battery or to jointly provide voltmeter and ammeter connections therefor, means for biasing said member to an inoperative position, and an electromagnetic latching device having an operating coil in series with the battery for holding said member in position to provide line connections, said member being thereafter movable manually in either direction against the action of said latch or said biasing means, and being subject to automatic movement to inoperative positon upon release of said latch under low current conditions.

7. In a device of the character described, the combination with a battery and voltmeter, ammeter and charging circuits therefor, of means for completing said charging circuit individually and for completing said voltmeter circuit individually or jointly with said ammeter circuit, said means comprising a manually operable contact member biased to off position and movable to sequentially and individually provide voltmeter and line connections for the battery and thereafter movable to jointly provide voltmeter and ammeter connections, and electromagnetically operable means for holding said member in position to provide line connections but subject to release upon reduction of current below a given minimum value.

In witness whereof, I have hereunto subscribed my name.

GUSTAVE B. REISBACH.