

March 3, 1970

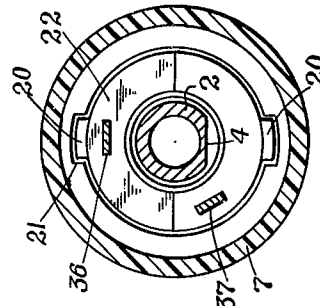
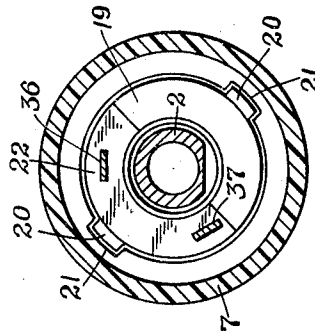
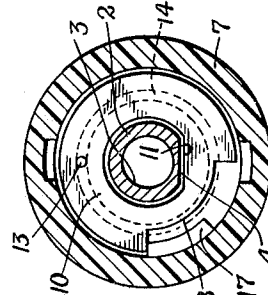
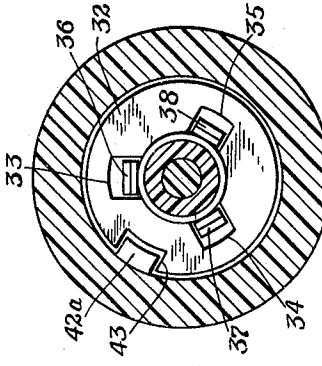
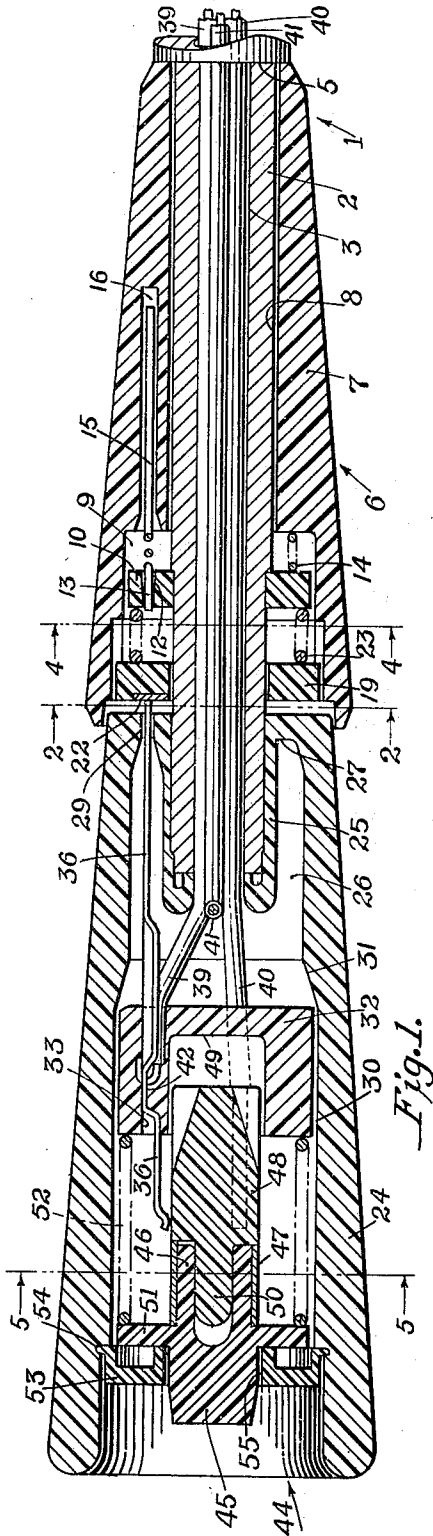
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3,499,125

ELECTRIC SWITCH HAVING FIXED CONTACTS ENGAGEABLE BY
ROTATABLE AND LINEARLY MOVABLE BRIDGING MEMBERS

Filed Jan. 3, 1967

2 Sheets-Sheet 1



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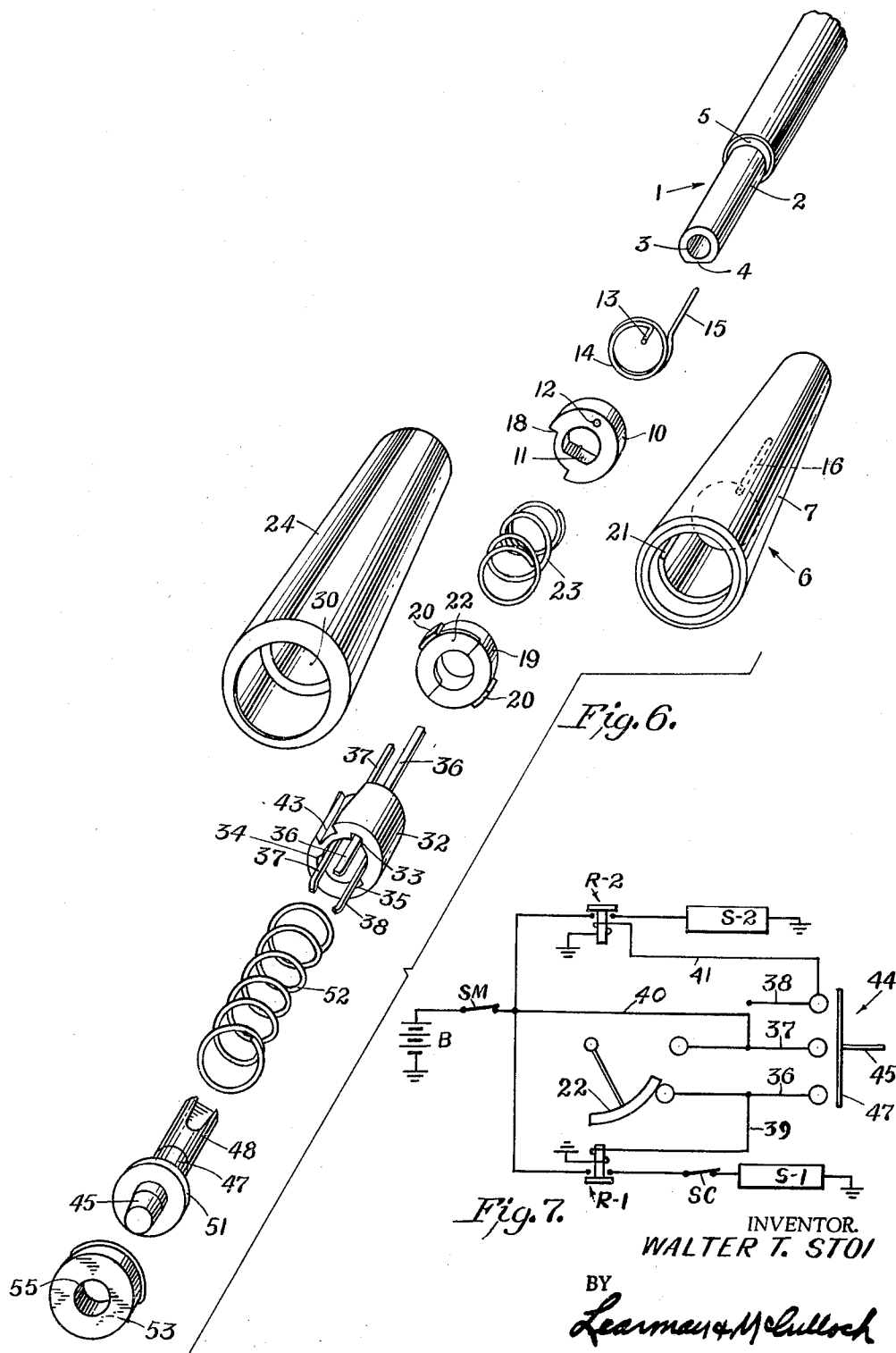


Fig. 7.

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ELECTRIC SWITCH HAVING FIXED CONTACTS ENGAGEABLE BY ROTATABLE AND LINEARLY MOVABLE BRIDGING MEMBERS

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15 Claims

ABSTRACT OF THE DISCLOSURE

An electrical switch having a support on which is mounted a rotatable bridging conductor and an axially movable bridging conductor, the bridging conductors being selectively engageable with common fixed contacts.

This invention relates to electrical switches and more particularly to an electrical switch construction having an elongated support on which is arranged a plurality of axially extending, circumferentially spaced, fixed contact members, selected ones of which may be bridged by a rotatable conductor carried by the support in abutting relation with corresponding ends of the fixed contacts, the opposite ends of the fixed contacts being adapted to be bridged by a linearly reciprocable conductor carried by the support for movements axially thereof.

An object of this invention is to provide a combined rotary and reciprocating switch utilizing contacts that are common both to the rotary and to the reciprocating contacts.

Another object of this invention is to provide a switch construction of the character referred to and which lends itself to installation on a support member which performs other functions besides that of supporting the switch. For example, a switch constructed according to the invention may be supported by the operating handle of a vehicle direction signaling device.

A further object of the invention is to provide a switch construction of the kind described and wherein the engageable and disengageable contacts have wiping engagement so as to assure the excellent electrical characteristics over a long period of time.

Other objects and advantages of the invention will be pointed out in detail or will become apparent from the following description when it is considered in conjunction with the appended claims and the accompanying drawings, in which:

FIGURE 1 is a longitudinal sectional view of a switch and support structure according to the invention and illustrating the parts in their normal positions;

FIGURE 2 is a sectional view taken on the line 2—2 of FIGURE 1;

FIGURE 3 is a view similar to FIGURE 2, but illustrating the rotary bridging member in an adjusted position;

FIGURE 4 is a sectional view taken on the line 4—4 of FIGURE 1;

FIGURE 5 is a sectional view taken on the line 5—5 of FIGURE 1;

FIGURE 6 is an exploded view of the switch and supporting structure; and

FIGURE 7 is a schematic circuit diagram.

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Apparatus constructed in accordance with the invention is illustrated as being supported by a vehicle direction signal operating lever 1 having a metal shaft 2 provided with a longitudinally extending bore 3. Adjacent its outer end, the shaft 2 is provided with a flat, external surface 4. Adjacent the opposite end of the shaft 2, i.e., the end which is adapted to be secured to the direction signal device, the shaft is enlarged to provide a shoulder 5.

A rotatable operating member or thimble 6 is loosely mounted on the shaft 2 and comprises a generally frustoconical body 7 formed of suitable insulating material and having a longitudinally extending bore 8 in which the shaft 2 is accommodated. The smaller end of the body 7 seats against the shoulder 5, and the opposite end of the body is provided with an enlarged chamber 9. An annular, nonconductive anchor ring 10 is accommodated in the chamber 9 and has a flat-sided bore 11 which is fitted on the correspondingly shaped portion 4 of the shaft 2 so as to be nonrotatably fixed to the shaft. The ring 10 has an axial opening 12 therein in which is accommodated an upturned end 13 of a torsion spring 14, the opposite end 15 of which is received in a bore 16 formed in the body 7. The arrangement is such that the spring 14 reacts between the anchor ring 10 and the body 7 so as constantly to urge the latter to rotate in a clockwise direction, as viewed in FIGURE 4, but the body 7 is manually rotatable in a counterclockwise direction. A rib 17 forming an integral part of the body 7 projects into the chamber 9 and is accommodated in a notch 18 formed in the anchor ring 10, the opposite ends of the notch cooperating with the opposite ends of the rib 17 to limit rotation of the body 7 to substantially 45°.

Also accommodated in the chamber 9 and rotatably mounted on the shaft 2 is a nonconductive carrier ring 19 having a pair of radially extending ears 20 which are accommodated in axially extending slots 21 formed in the body 7 adjacent the larger end thereof. The ears 20 and the slots 21 form a driving connection between the body 7 and the carrier 19 so as to impart rotation to the latter in response to rotation of the body. Secured to the left-hand or outer surface of the carrier 19 is an arcuate, flat, conductive bridging member 22 for a purpose presently to be explained. The carrier 19 is spaced from and constantly urged away from the anchor ring 10 by a compression spring 23 which is accommodated in the chamber 9 and surrounds the shaft 2.

Fixed to the free or outer end of the shaft 2 is a hollow, nonconductive, frustoconical handle 24 having an annular mounting sleeve 25 at its smaller end which has an interference fit with the shaft 2. The sleeve 25, together with the outer wall of the handle 24, forms an annular chamber 26 having an end wall 27 which is apertured in two places, one of which is shown at 29 in FIGURE 1.

The handle 24 has an enlarged chamber 30 adjacent its larger end and which communicates with the chamber 26 via a tapered neck 31. Accommodated in the chamber 30 and bearing against the neck 31 is a generally cylindrical mounting block or carrier 32 formed of insulating material and having three axially extending passages 33, 34 and 35 (FIGURE 5) extending therethrough. Fixed in the passage 33 is an elongated, conductive blade or contact 36, and an identical contact 37 is secured in the passage 34. A blade contact 38 is secured in the passage 35 and is similar to the contacts 36 and 37 except that it may be shorter in length. To the contact 36 is anchored one end of a conductive wire 39, and similar wires 40 and 41 are anchored to the contacts 37 and 38, respec-

tively. The wires extend through the bore 3 of the shaft 2 for connection to apparatus to be operated. The contacts 36-38 are spaced uniformly from one another circumferentially about the axis of the shaft 2, and each of the contacts is crimped as at 42 so as to preclude longitudinal displacement relative to the carrier 32.

As is best indicated in FIGURES 1, 2 and 3, the contact blades 36 and 37 are of such length as to extend through the apertures 29 and project beyond the smaller end of the handle 24. The contacts 36 and 37 are of such length that they abut the carrier 19 so as to be capable of being bridged by the bridging member 22. The blades 36 and 37 and the apertures 29 are so arranged as to be in alignment with one another, and misalignment is precluded by an inwardly projecting rib 42a on the handle 24 which is accommodated in a slot 43 formed in the carrier 32.

Linearly movable operating means 44 is carried by the handle 24 and comprises a nonconductive plunger 45 having a hollow stem 46 around which is secured an electrically conductive sleeve or bridging member 47. A guide body 48 is slidably accommodated in a recess 49 formed in the carrier 32 and has an axially extending projection 50 which is press fitted into the hollow stem 46. Between its ends the plunger 45 is provided with a flange 51 against which one end of a compression spring 52 seats, the opposite end of the spring bearing against the carrier 32 so as to maintain the latter snugly against the neck 31 and to bias the plunger 45 away from the carrier 32 to a projected position. The extent of projection of the plunger 45 is limited by a snap ring 53 that is accommodated in a groove 54 formed in the handle 24 and which is provided with a central opening 55 through which the plunger 45 may extend.

The construction and arrangement of the operating member 44 are such that manual displacement of the plunger 45 to the right from the position shown in FIGURE 1 will cause the conductive sleeve 47 to nest with and bridge each of the contacts 36, 37 and 38. Upon release of the plunger 45, the latter, together with the conductive sleeve 47, will be restored to its original position.

The arrangement of the several conductive parts of the switch may vary according to the kinds of apparatus to be operated. In the disclosed embodiment, however, the conductive parts are so arranged that in their normal or inactive positions the contact 36 constantly engages the bridging member 22, the contact 37 is free of the bridging member, and the contacts 36, 37 and 38 are free of the bridging member 47. In this arrangement, counterclockwise rotation of the body 7 from the position shown in FIGURE 2 to the position shown in FIGURE 3 will enable the bridging member 22 to engage both of the contacts 36 and 37.

In the arrangement shown in FIGURE 7, the contact 37 is connected by the wire 40 to a battery B via a main switch SM, the contact 36 is connected by the wire 39 to the coil of a holding relay R-1, and the contact 38 is connected by the wire 41 to the coil of a holding relay R-2. The relays R-1 and R-2 are adapted to enable solenoids or other apparatus S-1 and S-2, respectively, to be connected to and disconnected from the battery B. The circuit of the solenoid S-1 also includes a switch SC.

In the operation of the apparatus shown in FIGURE 7, closing of the main switch SM will condition the apparatus for operation, but no action will take place until one of the bridging members 22 or 44 is operated. If the bridging member 22 is rotated to bridge the contacts 36 and 37, the relay R-1 will be energized and locked so as to effect energization of the solenoid S-1, assuming the switch SC is closed. The relay R-1 will remain energized, thereby enabling the member 22 to be restored to its original position without breaking the circuit to the solenoid S-1. The circuit to the solenoid may be broken, however, by opening of either of the switches SM or SC.

If the bridging member 44 is moved to a position in which it bridges all three contacts 36, 37 and 38, both of the relays R-1 and R-2 will be energized and locked so as to effect energization of both solenoids S-1 and S-2. The locking of the relays will enable the solenoid S-2 to remain energized as long as the switch SM is closed, and the relay S-1 to be energized as long as both of the switches SM and SC are closed.

Switches of the kind herein disclosed have many applications, one of which is to control speed regulating devices for vehicles. In such use, the switch SC may be operated by the brake pedal of the vehicle.

The disclosed embodiment is representative of presently preferred forms of the invention but is intended to be illustrative rather than definitive thereof. The invention is defined in the claims.

I claim:

1. A switch construction comprising support means; a plurality of conductive elements carried by said support means; a first bridging member carried by said support means for movements into and out of direct bridging engagement sequentially with selected ones of said elements; and second movable bridging member movable into and out of direct bridging engagement with said elements including all of those engageable by said first bridging member, one of said bridging members being rotatable and the other of said bridging members being reciprocable.

2. The construction set forth in claim 1 wherein said selected ones of said elements engageable by said first bridging member constitute at least two but less than all of said elements.

3. The construction set forth in claim 1 wherein said first bridging member constantly is in engagement with one of said elements.

4. The construction set forth in claim 1 wherein said first movable bridging member is rotatable.

5. The construction set forth in claim 4 including means acting on said rotatable bridging member and urging the latter in one direction of rotation.

6. The construction set forth in claim 1 wherein said second bridging member is linearly movable.

7. The construction set forth in claim 6 including means acting on said linearly movable bridging member and urging the latter in one direction of movement.

8. The construction set forth in claim 1 wherein said conductive elements are three in number.

9. The construction set forth in claim 8 wherein said first bridging member is capable of bridging two only of said conductive elements.

10. A switch construction comprising elongated support means; a plurality of elongated, conductive elements circumferentially spaced about the axis of said support means; a rotatable bridging member mounted on said support means for rotation relative thereto into and out of direct bridging engagement sequentially with selected ones of said elements; and a linearly movable bridging member carried by said support means for movements axially of the latter into and out of direct bridging engagement with said elements including all of those engageable by said rotatable bridging member.

11. The construction set forth in claim 10 wherein said rotatable bridging member is movable axially of said support means for abutting engagement with said elements.

12. The construction set forth in claim 11 including spring means acting on said rotatable bridging member and urging the latter in one direction of rotation.

13. The construction set forth in claim 11 including spring means acting on said rotatable bridging member and urging the latter in a direction axially of said support means and toward abutting engagement with said elements.

14. The construction set forth in claim 10 wherein said linearly movable bridging member is cylindrical and nestable with said elements.

15. The construction set forth in claim 10 including spring means acting on said linearly movable bridging member and urging the latter in one direction of movement axially of said support means.

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