Sept. 13, 1932. H. A. DOUGLAS 1,876,874

ELECTRIC SWITCH

Filed Dec. 16, 1929

Fig. 1.

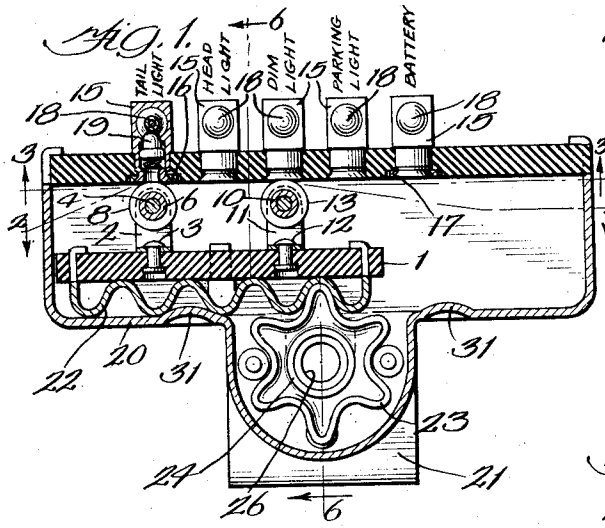


Fig. 5.

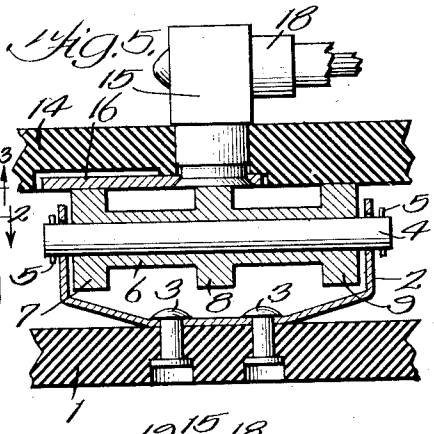


Fig. 6.

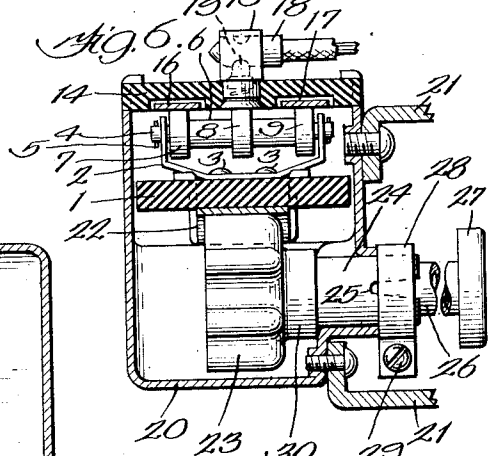


Fig. 2.

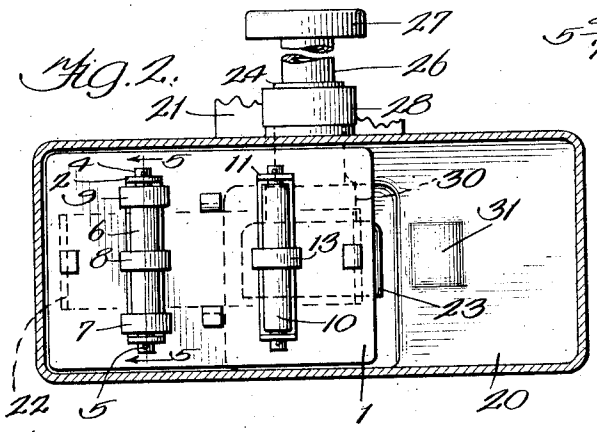


Fig. 3.

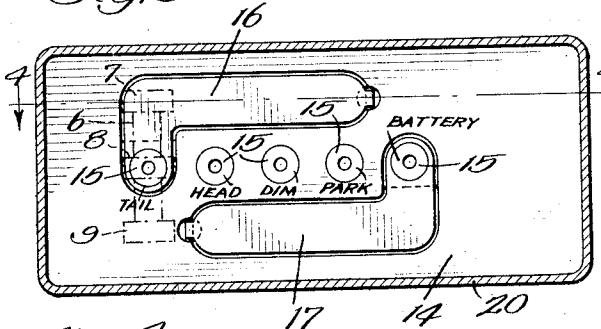


Fig. 7.

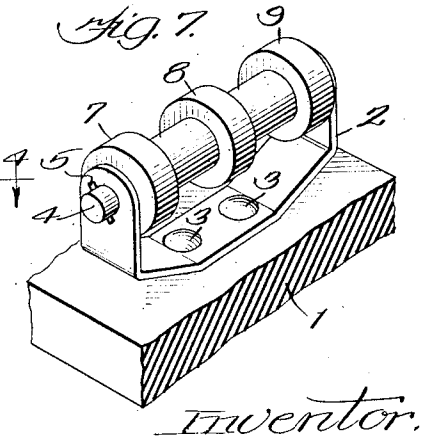
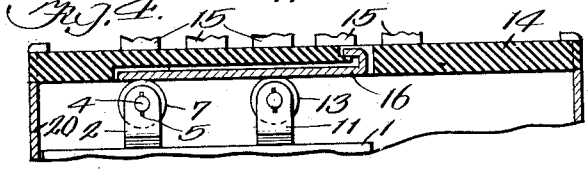


Fig. 4.



Inventor:
Harry A. Douglas
By A. L. Bragg Atty.

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UNITED STATES PATENT OFFICE

HARRY A. DOUGLAS, OF BRONSON, MICHIGAN

ELECTRIC SWITCH

Application filed December 16, 1929. Serial No. 414,490.

My invention relates to electric switches. In carrying out my invention one member of the switch is inclusive of a roller and the second member of the switch is inclusive of a plurality of contacts individual to different contacting portions of the roller. Spring means are employed for maintaining the cooperating contacts in engageable relation. In the preferred embodiment of the invention the roller is journaled upon a resilient mounting and the contacts complemental to the roller are, themselves, preferably in the nature of leaf springs constrained to press upon the roller when it is in circuit closing position.

As I have practiced my invention, the roller has three spaced a part circular contacting portions distributed along its length. The contact or contacts with which the intermediate portion of the roller is engageable may be rigid and the other contacts are resilient and press upon the end contacting portions. The contacting part or parts that engage the mid-portion of the roller furnish a fulcrum for the roller permitting it to move in the plane of its axis, the roller thus functioning in conjunction with the leaf spring contacts in maintaining the end contacting portions of the roller in forming contacting relation. A leveling device is employed which is desirably mounted similarly to the contacting roller, and itself has no electrical function.

I will explain my invention more fully by referring to the accompanying drawing in which Fig. 1 is a sectional view of a switch which is particularly adapted for assembly with the steering gear housing upon a steering column of an automotive vehicle; Fig. 2 is a sectional view on line 2—2 of Fig. 1; Fig. 3 is a sectional view on line 3—3 of Fig. 1; Fig. 4 is a sectional view on line 4—4 of Fig. 3; Fig. 5 is a sectional view taken through the axis of the roller; Fig. 6 is a sectional view on line 6—6 of Fig. 1; and Fig. 7 is a perspective view illustrating the manner in which the roller is mounted.

The switch illustrated has a member which is inclusive of a horizontally disposed insulating plate 1, which is desirably rectilinearly movable, a roller mounting 2 which is preferably formed of strip spring metal bent into the form of a U and having its base portion assembled with the plate 1 by means of the rivets 3. A shaft 4 is passed through the sides of the U-shaped mounting 2 and is free to turn within holes that are formed in these mounting sides. Pins 5 are passed through the ends of the shaft 4 on the outer sides of the mounting 2 to prevent separation of the shaft from the mounting. A metallic roller 6 may be rigid with respect to or journaled upon said shaft. This roller is provided with annular contacting portions 7, 8 and 9 which may be integrally formed therewith, these contacting portions being spaced apart lengthwise of the roller. The roller is horizontal, being desirably parallel with the mounting plate 1. Another roller 10 is similarly mounted upon a U-shaped mounting 11 that is similar to the mounting 2 and which is anchored to the plate 1 by rivets. This second roller 10 is provided with an annular enlargement 13 at its midportion and in the same general plane with the annular contacting portions 8.

The other switch member is inclusive of another insulating plate 14 and metallic spring barrels 15 mounted upon and projecting upwardly from the plate 14 and metallic contacting bars 16 and 17 which are mechanically and electrically united with the two end spring barrels 15. These spring barrels constitute anchorages for the contacting bars, one end of each bar being anchored by such spring barrel and the other end of each bar being free to rise and fall. These bars 16 and 17 are of resilient metal and are flexed to press inwardly toward the plate 1 and away from the plate 14. The annular roller portions 8 and 13 ride over the inner ends of the spring barrels 15, these spring barrels being aligned in the direction of bodily movement of the mounting plate 1, as are also said roller portions. The axes of the two rollers are parallel and the two rollers are spaced sufficiently apart so that they cooperate to maintain the plate 1 level in all positions.

The switch shown is adapted for use in an automotive vehicle. Each of the spring bar-

rels 15 has an upwardly extending enlargement which is adapted to receive a contact plug 18. The various contacting plugs extend to different instrumentalities such as the tail lamp, head lamps, the dimming elements of the head lamps, the parking lamps and battery. Upwardly spring pressed metallic plunger contacts 19 are within the barrels 15 and enter the spaces that are entered by the plugs 18 to engage such plugs. When the mounting plate 1 is at either end of its travel the annular contacting portion 8 upon the roller 6 engages the contiguous inner end of the corresponding spring barrel, but does not then have direct engagement with the contacting bars 16 and 17. The spring mounting 2 exerts upwardly directed spring pressure upon the contacting roller 6 so that the annular contacting portion 8 has firm engagement with any of the spring barrels with which it is in register. The annular engaging portion 13 upon the roller 10 is similarly pressed into engagement with the spring barrels by the U-shaped mounting 11 which presses upwardly upon the roller 10. The upwardly pressing mountings 2 and 11 also engage the annular portions of the rollers with the plate 14 whose bottom surface is desirably flush with the inner ends of the barrel 15. When the contacting roller 6 is at any intermediate circuit making position it is in engagement with the angular branches of the contacting bars 16 and 17 that extend along the direction of movement of the plate 1, so that these angular branches of said bars press downwardly upon the end of the annular contacting portions 7 and 9 to cooperate with the mounting 2 to maintain the end portions of the roller 6 in good electrical contact with said contacting bars.

The switch illustrated may be provided with a casing 20 of which the insulating plate 14 constitutes a closure. This casing encloses the plate 1 and the parts assembled therewith. Mounting brackets 21 are secured to the casing and serve to mount the same upon the steering gear housing that is assembled with the steering column.

The mechanism for moving the movable switch member is claimed in my copending application Serial No. 414,489 filed December 16, 1929. Such mechanism is desirably inclusive of a rack 22 that is formed of a strip of metal which is sinuously curved to form the rack teeth. This rack is desirably carried by the plate 1. A pinion 23 is in mesh with the rack. The casing 20 also encloses said gear elements. A tubular hub 24, formed of resilient metal, is notched, as indicated at 25 to make it contractible. The switch operating shaft 26 is provided with a suitable operating means such as the knob 27 and is passed through an opening, which is formed in the casing 20 and into the hub. A clamping collar 28 embraces the hub and clamps it into engagement with the shaft to prevent inward movement of the shaft. This clamping collar is equipped with a suitable clamping screw 29. Outward movement of the shaft is prevented by the engagement of the hub enlargement 30 with the inner side of the casing 20. The pinion 23 is thus confined to a fixed plane of rotation. In order that the pinion may be readily assembled the combined axial length thereof together with its hub is less than the space between the side walls of the casing 20, so that said hub may be dropped into alignment with the opening in the casing that receives it, when the insulating plate 14 is not in position. The portions of the casing through which the hub 24 passes are laterally deflected and extended as illustrated in Fig. 6 to form a bearing for the hub.

The cavities in the bottom faces of the barrels 15 serve to hold the plate 1 and the parts thereon in position when the roller portions 7, 8, 9 and 13 are received in such cavities. Detents 31, which are desirably inwardly bulged portions of the casing 20, enter spaces between the rack teeth to hold the plate 1 in position when the switch is in circuit opening adjustment. These detents may also take part in holding the plate 1 in position when the switch is in circuit closing adjustment.

Changes may be made without departing from the invention.

Having thus described my invention, I claim:

1. A switch including two switch contact bearing members relatively movable to bring the contacts thereon into and out of engagement, one of said members carrying spring pressed rotatable annular portions contacting with the other member, three of said portions forming a triangle extending in the direction of movement of the members.

2. Switching mechanism embodying two members relatively movable rectilineally, one of said members being inclusive of a contacting roller having spaced apart annular contacting portions, the second member being simultaneously engageable by all of said annular contacting portions and having contact portions engageable by some of the annular contacting portions; and a spring mounting for the roller which presses the same into engagement with said second member, said mounting being between said members.

3. The structure of claim 2 wherein the spring mounting is of U form, the roller being carried in the sides of the mounting.

4. The structure of claim 2 wherein the contact portion engageable by one of the annular contacting portions is in the form of a resilient bar constrained to press upon this annular contacting portion.

5. A switch including one member that is inclusive of a contacting roller; and a sec-

ond member inclusive of a plurality of contacts, said roller having spaced apart annular contacting portions engageable with different contacts, one of the contacts engageable with one of said annular contacting portions being in the form of a resilient bar constrained to press upon this annular contacting portion.

6. The structure of claim 5 wherein the spring mounting is of U form, the roller being carried in the sides of the mounting.

7. A switch including one member that is inclusive of a contacting roller; and a second member inclusive of a plurality of contacts, said roller having spaced apart annular contacting portions engageable with different contacts, each contact that is engageable with an annular contacting portion being in the form of a resilient bar constrained to press upon the corresponding annular contact portion.

8. A switch including one member that is inclusive of a contacting roller having three spaced apart annular contacting portions; and a second member engageable by all of said annular contacting portions and having contacts engageable by the outer annular contacting portions and in the form of resilient bars constrained to press upon these annular contacting portions.

9. A switch including two switch contact bearing members relatively movable rectilineally to bring the contacts thereon into and out of engagement; and a leveling roller carried upon one of said members apart from the places of engagement of the contacts.

10. A switch including two switch contact bearing members relatively movable rectilineally to bring the contacts thereon into and out of engagement; a leveling roller carried upon one of said members apart from the places of engagement of the contacts; and a spring mounting for said roller and carried from one of said members and pressing this roller against the other member.

11. A switch including one member that is inclusive of a contacting roller; a second member inclusive of a plurality of contacts, said roller having spaced apart annular contacting portions engageable with different contacts; a spring mounting for the roller which presses the same in engagement with said contacts; and gearing for effecting rectilineal movement of one of the switch members.

12. A switch including one member that is inclusive of a contacting roller having three spaced apart annular contacting portions; a second member engageable by all of said annular contacting portions and contacts engageable by some of said annular contacting portions; a spring mounting for the roller which presses the same in engagement with said contacts; and gearing for effecting rectilineal movement of one of the switch members.

13. A switch including one member that is inclusive of a contacting roller; a second member inclusive of a plurality of contacts, said roller having spaced apart annular contacting portions engageable with different contacts, one of the contacts engageable with one of said annular contacting portions being in the form of a resilient bar constrained to press upon this annular contacting portion; and gearing for effecting rectilineal movement of one of the switch members.

14. A switch including one member that is inclusive of a contacting roller having three spaced apart annular contacting portions; a second member engageable by all of said annular contacting portions and having contacts engageable by the outer annular contacting portions and in the form of resilient bars constrained to press upon these annular contacting portions; and gearing for effecting rectilineal movement of one of the switch members.

In witness whereof, I hereunto subscribe my name.

HARRY A. DOUGLAS.