Aug. 23, 1932. H. E. NORVIEL ET AL 1,873,141

SWITCH

Filed Nov. 2, 1929

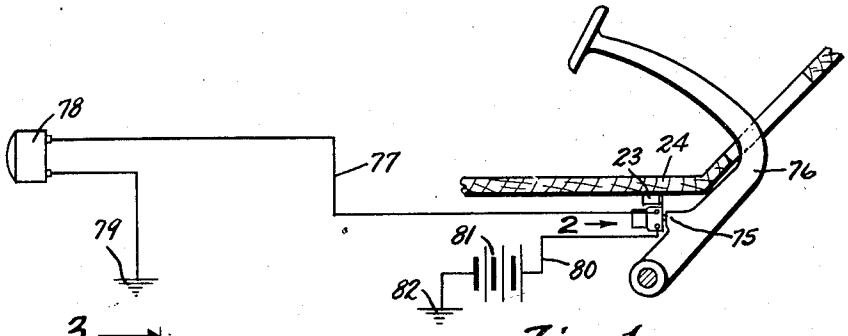


Fig. 1

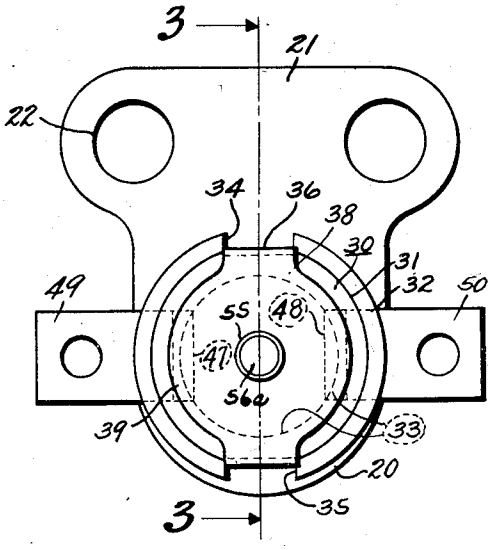


Fig. 2

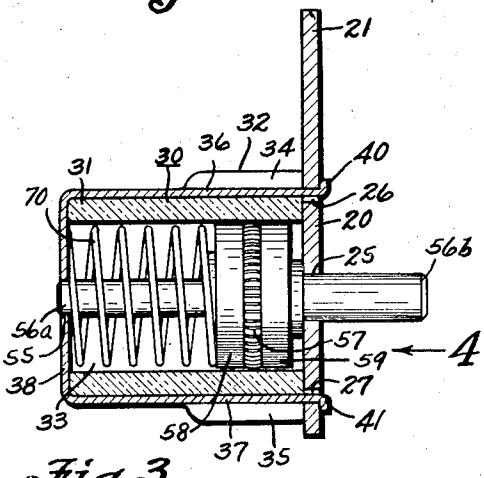


Fig. 3

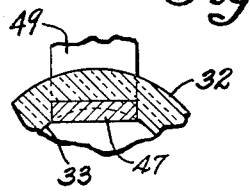


Fig. 6

Fig. 4

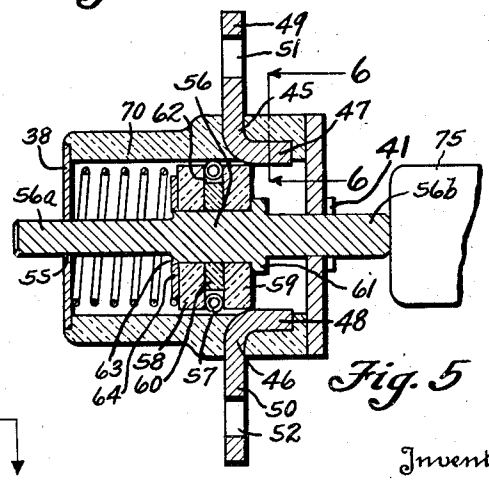


Fig. 5

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Patented Aug. 23, 1932 1,873,141

UNITED STATES PATENT OFFICE

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SWITCH

Application filed November 2, 1929. Serial No. 404,428.

This invention relates to electric switches of the class required for signal devices, as in automotive vehicles.

One of the objects of this invention is to provide a switch of the class described of simple design that will be efficient in its operation and that may be produced at a relative low cost.

Another object of the instant invention is to provide a switch of the class described that will be reasonably certain in its operation upon manipulation of a primary controller.

Another object of the invention is to provide a switch of the class described that is normally urged into circuit closed relation.

Another object of the invention is to provide a switch of the class described in which the movable contact element will present a cushioning effect, the better to insure circuit closing relation between the fixed contacts.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawing wherein a preferred embodiment of one form of the present invention is clearly shown.

In the drawing:

Fig. 1 is a diagrammatic view of an improved switch as applied to the signal circuit of an automotive vehicle.

Fig. 2 is a rear elevational view of the switch substantially as illustrated by the arrow 2 of Fig. 1.

Fig. 3 is a vertical sectional view of the switch device substantially as indicated by the line and arrows 3—3 of Fig. 2, with parts thereof illustrated in their normal position of rest.

Fig. 4 is a front elevational view of the switch substantially as indicated by the arrow 4 in Fig. 3.

Fig. 5 is a horizontal sectional view of the switch device substantially as indicated by the line and arrows 5—5 of Fig. 4, with parts of the internal mechanism shown in circuit open position.

Fig. 6 is a sectional view as indicated by line and arrows 6—6 of Fig. 5.

In the drawing 20 indicates a base plate for the switch having an attaching bracket 21 providing apertured ears 22, by which the switch structure may be attached to a block or rail 23 upon the floor boards 24 of a vehicle. Aside from the apertures 22 just described the base 20 is further apertured at 25, 26 and 27 for a purpose which will presently appear.

A switch housing 30 is provided, which is substantially cylindrical in formation, in the present instance providing the portions 31 and 32 of different diameters or substantially stepped in exterior form, and longitudinally bored at 33 to provide a switch case of substantially shell like cylindrical form. The larger portion 32 of the housing is fluted or grooved at 34 and 35 to provide reception for legs 36 and 37, of a U-shaped clamping member 38 which aids in securing the housing 30 to the base 20. The bridge of the U-shaped member 38 is somewhat enlarged at 39, to provide a disc portion of substantial dimension to close off the end of the chamber 33, so that when the parts are assembled as shown in Fig. 3, the U-shaped member 38 will form a closure for the rear end of the chamber 33 with the legs 36 and 37 lying within the flutes 34 and 35 and extending through the apertures 26 and 27 of the base 20, where they are clinched against the outer face of the base at 40 and 41 respectively to secure the parts in assembled relation.

In addition to the above appointments the casing 30, has moldably secured within the enlarged portion 32, at points substantially equally circumferentially spaced between the flutes 34 and 35, inserts 45 and 46 which have angular extensions 47 and 48 the edges of which are substantially flush with the internal surface or bore 33 of the casing, while the extensions cut across the bore as cords forming flat walls at those points. These extensions 47 and 48 provide fixed switch contacts protruding into the chamber 33, as will be seen on reference to Fig. 6, and they have laterally extending portions 49 and 50 without the body of the shell, apertured at 51 and 52 to provide circuit terminals adapted to be connected into a signal circuit as illustrated in Fig. 1.

The bridge portion 39 of the attaching

bracket 38 is apertured at 55 in alignment with the chamber 33, and the aperture 25 of the base 20, so as to act as a guide for a contact actuator assembly shaft 56, as illustrated in Figs. 3 and 5. The contact actuator assembly is best illustrated in Figs. 3 and 5 and comprises the shaft 56 just referred to, that supports a contact carrier having a movable contact or conducting element 57 adapted for engagement and disengagement with the switch contacts 47 and 48.

In the illustrated embodiment the contact carrier comprises a pair of nonconducting discs or washers 58 and 59 having an interposed spacer 60 that when mounted upon the shaft 56 against a collar of flange 61, provide a spool like member having an annular groove 62 within which is disposed a conducting element 57. It is obvious that instead of constructing the contact carrier as illustrated, that it may be formed of a molded member of insulating material in which the elements 58, 59 and 60 would be of integral formation, and would still provide the annular groove 62 within which to seat the conductor 57. At all events whether the contact carrier is of integral formation or compiled as illustrated in Fig. 5, it is secured upon a shaft 56 against the collar 61 by staking a portion of the shaft 56 as at 63 against a clamping washer 64.

The conductor element 57 is of novel formation in that it is composed of a small helix of wire that is wrapped about the spacer 60, or disposed in the groove 62, with the ends thereof hooked together so that the helical ring is slightly under tension sufficient to retain it within the annular groove 62, and yet of sufficient magnitude of expansion, as necessitates slight lateral compression in order to pass the same within the bore 33 of the case 30. This insures positive electrical contact between the members 47 and 48 when the conducting element 57 is disposed therebetween. It also eliminates the necessity for close machining of parts in order to make work satisfactorily, since movement of the actuator assembly along the bore 33 will carry with it the conductor element 57. Due to its resilience and yielding properties, it will give way to obstructions and pass over the same, or allow continued movement of the assembly after meeting the same. Also this form of conductor element will yield sufficiently that a wiping engagement is obtained between the elements 47, 48 and 57.

The contact actuator assembly thus described is ready to be connected with the casing described above, and it has been found advisable in assembling, to pass the clamping member 38 over the outer end of the case 30 with the legs 36 and 37 disposed in their respective flutes 34 and 35, and then placed within the chamber 33 against the closure 39 an actuating or return spring 70. Against the spring 70 the contact actuator assembly herein described is placed, so that the end 56*a* of the shaft passes through the spring 70 and the aperture 55 of the disc 39. This will position the contact carrier with the conducting element 57 within the chamber 33 of the case, whereupon the base member 20 may be placed over the members thus assembled so that the aperture 25 is received by the shaft extension 56*b*, and so that the apertures 26 and 27 are threaded with the legs 36 and 37 of the clamp 38. This automatically positions the parts in correct relation with one another, whereupon the said legs 36 and 37 may be clinched against the plate 20 as at 40 and 41. The spring 70 of course is placed under slight compression directly the base 20 is forced into mating engagement with the legs 36 and 37 and the end of the case 30, and will thus function to force the contact carrier against the base 20 for its normal position, as illustrated in Figs. 3 and 5 or so that the conducting element 57 is normally in engagement with the switch terminals 47 and 48, and so that the shaft end 56*b* will normally protrude beyond the base 20.

The switch is then adapted for mounting upon the vehicle floor boards or other parts as illustrated in Fig. 1, or in any convenient form so that the projecting portion 56*b* of the shaft will be in the path of movement of a boss 75, or other part, of one of the desired control levers, as a brake pedal 76, forming part of the usual equipment of a vehicle. One of the terminals as 49 may be connected by lead 77 with a signal lamp 78, that may be grounded at 79, and the other terminal as 50 may be connected by lead 80 with a battery 81 that is also grounded as at 82, thus completing the electrical circuit.

Under normal conditions, that is, when the control 76 is in a passive state, the embossment 75 will engage the protruding end 56*b* of the shaft and move the shaft 56 through the guide apertures 25 and 55 to a circuit open position as illustrated in Fig. 5. Under these conditions there will be no warning signal given out by the lamp 78. Directly upon movement of the control 76 the switch shaft 56 is allowed to move against the base 20, by reason of the spring 70 pressing it thereagainst, and under these conditions the circuit will be closed between the switch terminals 47 and 48, whereby the signal circuit is completed through the battery and the lamp 78 with their associated connections to given the desired warnings. It is obvious of course that this switch is so mounted upon the vehicle as to present the shaft extension 56*b* in the path of movement of the desired control lever, so that when the lever is released that it will engage the shaft end at the extreme of its return movement to move the conducting element 57 out of engagement with the contacts 47 and 48. A slight move-

ment of the lever 75 then, will condition the switch to close the circuit therethrough and any amount of further movement of the control lever has no effect upon the switch. Thereby the need for adjustment of connections between the lever and switch is eliminated, and the warning signal is always manifest at the first part of the movement of the lever 76.

While the form of embodiment of the present invention as herein disclosed, constitutes a preferred form, it is to be understood that other forms might be adopted, all coming within the scope of the claims which follow.

What is claimed is as follows:

1. An electric switch comprising, an integrally formed nonconducting terminal support and switch case, a supporting bracket therefor, and a clamping member securing said switch case to said bracket, said member and bracket each forming a closure for one end of said case.

2. An electric switch comprising in combination, a switch case of nonconducting material moldably securing a pair of terminal members, a supporting bracket and a clamping member securing said case to the bracket and closing each end of the case, and contact completing means within the case operable to open and close circuits through said terminal members.

3. An electric switch comprising in combination, a cylindrical switch casing of nonconducting material insulatingly supporting a pair of switch terminals and terminal brackets, a bracket for supporting said casing and closing one end thereof, a clamping member for closing the other end of said casing and for securing said casing to said bracket, both of said members closing the casing being apertured in axial alignment with said casing, and contact closing means within said casing guided by said apertures for controlling circuits through said switch terminals.

4. An electric switch comprising in combination, a casing of nonconducting material insulatingly supporting a pair of switch terminals, a base closing one end of the casing and providing a bracket for supporting the switch structure, means clamping the housing to the base and closing the other end of said casing, means within the housing guided by axial openings in the base and clamping means for optionally controlling circuits through said switch terminals, said controlling means being normally urged toward terminal engaging position.

5. An electric switch comprising in combination, a housing of nonconducting material substantially cylindrical in formation, said housing having inserts in the wall thereof forming switch contacts within the housing and circuit terminals without, means supporting the housing and providing closures for each end of the cylindrical portion, a movable contact assembly within the housing carried by a shaft guided by openings in each of the closure members, and means urging the contact assembly into circuit completing position, and means permitting movement of said assembly into circuit open position.

6. An electric switch comprising in combination, a housing of nonconducting material substantially cylindrical in formation, said housing having inserts in the wall thereof forming switch contacts within the housing and circuit terminals without, means supporting the housing and providing closures for each end of the cylindrical portion, a movable contact assembly within the housing carried by a shaft guided by openings in each of the closure members, and means urging the contact assembly into circuit completing position, and means permitting movement of said assembly into circuit open position, said contact assembly comprising a shaft and a plurality of nonconducting washers supporting a resilient contact ring, for engagement with said switch contacts.

7. The combination set forth in claim 5 in which the contact assembly comprises a shaft mounted for lineal movement through the apertures of said closure members, a nonconducting contact carrier secured to the shaft, a helical ring of conducting material supported by said carrier in engageable relation with said switch terminals, and a spring disposed against one of the closure members and the contact carrier for urging the same into circuit closing relation with respect to said switch terminals.

8. An electric switch comprising in combination, a housing of nonconducting material substantially cylindrical in formation and provided with an enlarged bore therethrough, a sheet metal base plate forming an attaching bracket therefor, and closing one end of said bore, a U-shaped clamping member closing the other end of said bore and securing said housing to said base, both of said closure members providing apertures in axial alignment with said enlarged bore, and a contact actuator assembly within said housing guided for movement by said aligned apertures, said housing providing inserts, portions of which are exposed within the housing and operable as switch contacts normally engageable by a conductor element of said contact actuator.

9. An electric switch comprising in combination, a casing of nonconducting material substantially cylindrical in formation and providing a longitudinal bore therethrough, said casing being exteriorly fluted at substantially diametrically opposite points and moldably securing a pair of conducting inserts, said inserts being substantially diametrically opposite and disposed at points

intermediate said flutes, means closing each end of the bore of said casing, one of said closures comprising a U-shaped member, the legs of which are disposed in the said flutes and operate to secure the housing to the other of said closure, and a contact actuator within the casing normally completing circuit closed relation between said switch contacts.

10. An electrical switch comprising in combination, a housing providing a cylindrical shell, switch terminals secured in the walls of said housing, means closing each end of said housing, one of said closing means including a U-shaped clamp for securing the housing to the other of said closure members, and means within the housing for controlling circuits through said switch terminals.

11. An electric switch comprising, an integrally formed nonconducting terminal support and switch case, a supporting bracket therefor, and a clamping member securing said switch case to said bracket, said case comprising a substantially cylindrical shell closed at each end by said bracket and clamping member.

12. An electric switch comprising in combination, a housing of nonconducting material substantially cylindrical in formation, said housing having inserts in the wall thereof forming switch contacts within the housing and circuit terminals without, means supporting the housing and providing closures for each end of the cylindrical portion, a movable contact assembly within the housing carried by a shaft guided by openings in each of the closure members, and means urging the contact assembly into terminal engaging position yet permitting movement of said contact assembly into circuit open position.

13. An electric switch comprising in combination, a casing of nonconducting material substantially cylindrical in formation and providing a longitudinal bore therethrough, said casing being exteriorly fluted at substantially diametrically opposite points and moldably securing a pair of conducting inserts, said inserts being substantially diametrically opposite and having portions thereof flush with the surface of said bore, means closing each end of the bore of said casing, one of said means having parallel legs situated in said flutes to retain the housing in place, and a contact actuator providing a resilient conducting element normally completing circuit closed relation between said switch contacts.

14. A plunger operated switch comprising in combination, a cylindrical housing of dielectric material providing diametrically arranged exterior flutes, metallic head members closing each end of the housing, one of said head members providing integrally formed legs disposed in the flutes of said casing, said legs passing through apertures in the second head member where they are clinched over to hold the parts together, and a plunger within the housing carrying a movable contact normally urged toward one of the head members.

15. In a plunger operated switch, the combination comprising, a hollow cylindrical housing of dielectric material providing a pair of contact terminal inserts, said inserts providing exposed surfaces within the housing projecting above the internal surface thereof, a plunger and a contact carrier for movement within the housing, said carrier providing an annular groove on its periphery, and an expansible contact ring disposed in said groove normally expanding to the diameter of said bore, but yieldable to pass between the raised portions of said inserts, and means for moving the carrier.

In testimony whereof we hereto affix our signatures.

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VANCE ECOFF.