May 16, 1933. J. M. KELLY 1,909,107

SWITCH

Filed Nov. 2, 1929

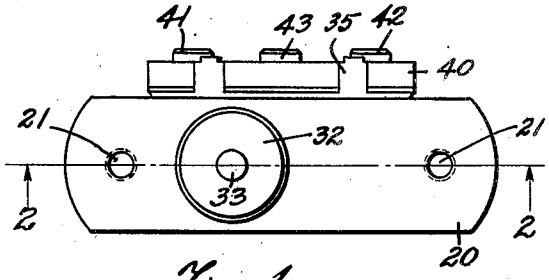


Fig. 1

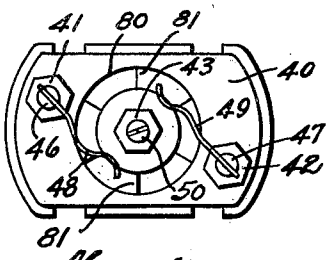


Fig. 4

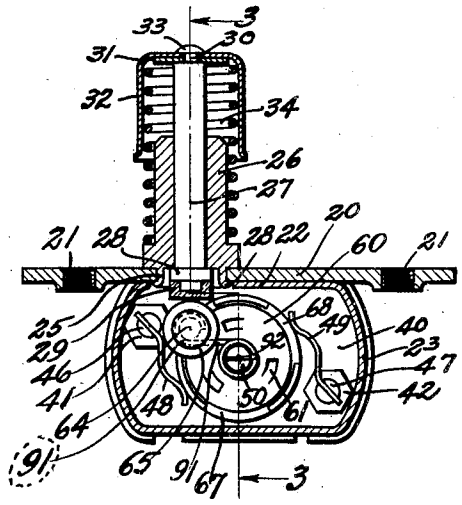


Fig. 2

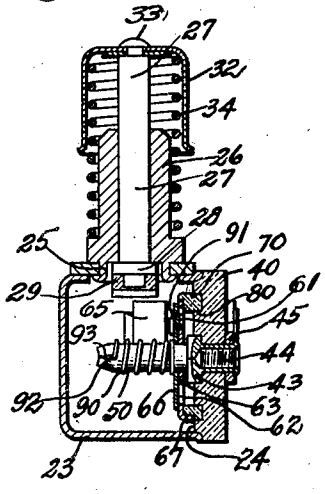


Fig. 3

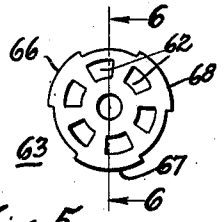


Fig. 5

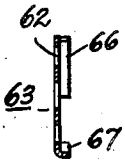


Fig. 6

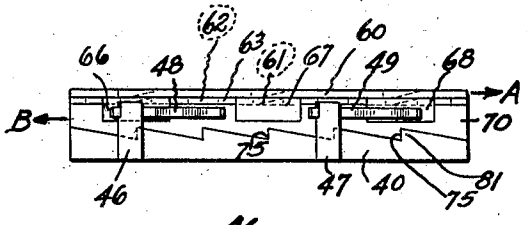


Fig. 10

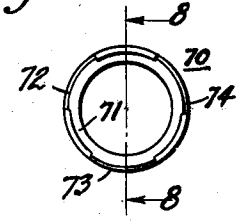


Fig. 7

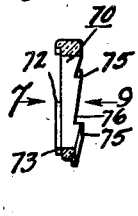


Fig. 8

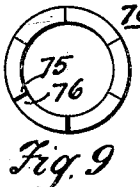


Fig. 9

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UNITED STATES PATENT OFFICE

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SWITCH

Application filed November 2, 1929. Serial No. 404,306.

This invention relates to electrical switches particularly of the plunger type by which one to and fro motion of the plunger causes the switch to be closed in one circuit, and a subsequent motion of the plunger causes the switch to be closed in a second circuit.

It is an object of the invention to provide a switch which is simple in construction and that may be made at a relatively low cost.

It is a further object of the invention to provide a ratchet type switch which is compact in construction, and to provide for operating such a switch by successive manual movements.

A further object of the invention is to improve switches in general.

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 plan view of my improved foot dimmer switch.

Fig. 2 is a longitudinal section through Fig. 1 substantially as illustrated by the line and arrows 2—2.

Fig. 3 is a vertical sectional view through Fig. 2 substantially as indicated by the line and arrows 3—3.

Fig. 4 is an inside view of the closure member or switch back, the contact actuator assembly having been removed therefrom.

Fig. 5 is a plan view of a ratchet plate used in this improved switch.

Fig. 6 is a sectional view through the ratchet plate substantially as illustrated by the line and arrows 6—6 of Fig. 5.

Fig. 7 is an elevational view of one face of the contact carrier ring substantially as indicated by the arrow 7 of Fig. 8.

Fig. 8 is a sectional view through the same substantially as illustrated by the line and arrows 8—8 of Fig. 7.

Fig. 9 is a rear elevation of the contact carrying ring substantially as indicated by the arrow 9 of Fig. 8.

Fig. 10 is a diagrammatic view of the switch, the elements being projected upon a single plane to illustrate the relation of the cooperating parts.

With particular reference to the drawing, 20 indicates a mounting plate provided with the apertured squirts 21 which operate to secure the switch assembly upon any convenient support, which may be the floor boards of the vehicle cab. The mounting plate 20 or bracket, as it may be called, is secured to one of the walls 22 of a substantially rectangular sheet metal casing 23 so as to provide an open wall portion 24 in a plane at substantially right angles to the plane of the mounting plate 20. At a convenient point, both the plate 20 and the side wall 22 of this assembly are apertured to receive the reduced extension 25 of a sleeve 26 which operates to guide a plunger 27 therethrough, the reduction 25 being peened against the plate 20 at 28 making the juncture thereof secure. The plunger 27 conforms to a headed member having the abutment 28 carrying a nonconducting cap 29 disposed within the switch case, and terminating beyond the sleeve 26 in a shank 30 on which is disposed the reenforcing washer 31 and a cap 32, and secured thereon by riveting the shank 30 against the cap 32 as at 33. Disposed about the sleeve 26 and confined within the cap 32 there is a spring 34 which normally urges the plunger 27 in an upward or extended position substantially as indicated in Figs. 2 and 3.

The housing 23, while it has been stated as rectangular need not be of that form, but in fact may be cylindrical or other desired formation. However, it is desired that one open side thereof be associated relative to the mounting plate as has been described, and that the side walls or periphery thereof may terminate in the tangs 35 which make provision for securing a closure member 40 in cooperative relation with the switch case.

In the form illustrated the closure member 40, or switch back as it may be termed, is formed of nonconducting moldable com-

pound and fashioned to secure in the body thereof a plurality of terminal posts 41, 42 and 43.

It is preferred that the inserts terminate in tubular portions 44 so as to provide threaded engagement with screws which will cooperate in securing leads thereto. The extending portions without the member 40 may then be expanded against washers or shims 45 to provide more rigid construction as may be seen by reference to Fig. 3. The inserts 41 and 42 terminate in short bifurcated studs 46 and 47 which are adapted to support spring contact fingers 48 and 49, and are so positioned relative to the insert 43 and to each other that the contact members 48 and 49 will extend in substantial parallelism and in the general direction of the insert 43, that is preferably positioned intermediate and concentric to the inserts 41 and 42.

The insert 43 terminates in a pivot post 50 within the switch housing and pivotally supports a contact actuator assembly for cooperation with the spring contact elements 48 and 49. This contact actuator assembly comprises a driving disc 60, provided with spring like ratchet teeth 61, which cooperate with the radially spaced apertures 62 of the ratchet plate 63, both of which are journalled upon the said shaft 50. At one point on the peripheral portion of the disc 60 there is provided a post 64 which retains a cam roller 65, that is normally engageable with the nonconducting cap 29 of the plunger 27 when the assembly is in position within the housing.

The ratchet plate 63 is provided with a plurality of circumferentially spaced contact segments 66, 67 and 68 which are bent into conformity with the periphery of said plate and extend in the same axial direction therefrom. A contact carrying ring 70 of nonconducting material is provided with a facial depression 71 for the reception of the major portion of the ratchet plate 63, and with circumferentially spaced recesses 72, 73 and 74 for the reception of the contact segments 66, 67 and 68 respectively. In the formation of this contact supporting ring it may be molded into an independently separable piece as illustrated in Figs. 7, 8 and 9, or it may be moldably secured about the segments 66, 67 and 68 which will function as inserts therein. At all events whether the contact supporting ring 70 be fashioned to fixedly support the ratchet plate or not, the reverse side thereof from the surface depression 71, is fashioned to provide a succession of ratchet teeth 75 separated by the recesses 76 as illustrated in Figs. 8 and 9. For cooperation of these provisions the switch back or closure member 40 is provided with an annular groove or recess 80, concentric with the pivot post 50, the bottom being provided with a series of ratchet teeth 81 forming one way ratchet engagement with the similarly fashioned teeth 75 of the contact supporting ring 70.

This contact actuated assembly is mounted upon the pivot post 50 (so as to be in engagement with the switch back 40, whereupon a spring 90 is passed over the pivot post with one end 91 wrapped about the post 64, and stretched about the post 50, the other end 92 of the spring being seated in a kurf 93 at the end of the pivot post 50. In so assemblying the spring 90 with respect to the elements just described, it is placed under both an angular and an axial stress so that the contact actuator assembly is urged in firm engagement with the switch back 40, whereby the ratchet provisions between the ring 70 and the base 40, and the ratchet provisions between the disc 60 and plate 63 will both be urged into mating relation, and so that the contact assembly will be urged in one direction of rotation relative to the pivot post 50.

When the closure member 40 with all of its apertinent structure is assembled in relation to the housing 23, the cam roller 65 will then be disposed directly beneath the cap 29 of the plunger 27, with the spring 90 urging the roller 65 against the cap 29. At each successive movement of the plunger the driving disc 60 will be caused to rotate about the pivot post 50 which, due to the two pair of ratchet provisions, will cause the contacts to move in one direction only with respect to said pivot post. As the assembly moves about the post 50 the contact segments 66, 67 and 68 are successively brought into engagement with one or the other of the contact springs 48 and 49, whereby an electrical circuit is completed between the terminal member 43 and one or the other of the terminal members 41 and 42. It will be observed by reference to the drawing, particularly Fig. 2, that the contact elements 48 and 49 are so positioned upon the back 40 relative to the post 50, and consequently the contact segments that electrical connection is never made directly between the contacts 48 and 49, but is always made between the pivot post 50 and one or the other of the contact elements 48 or 49. This provides a novel means for alternately switching from one to the other of two desired circuits. It is particularly adaptable to those instances in which a light circuit is desired to be closed through circuits providing different intensities of illumination.

The impact is illustrated by Fig. 10, where the arrow A represents the movement of the driving disc 60 relative to the ratchet plate 63 and ring 70, while the arrow B represents the movement of ring 70 relative to the back 40. It is obvious that manipulation of the plunger 27 will result in the

shifting movement of the members 63 and 70 toward the left of Fig. 10, and between the disc 60 and switch back 40, a distance equal to the space between two adjacent ones of the ratchet teeth 75. This movement will operate to bring one or the other of the contact segments 66, 67 or 68, into engagement with one or the other of the conductors 48 or 49, at each successive depression of the controller 27.

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. In an electrical switch, the combination of a contact actuator assembly comprising, a pivot post, a driving disc carried upon said post, spring means secured to said post and driving disc tending to urge the latter in both axial and angular movement with respect to said post, a ratchet plate fixed for rotation about said post and driven by said driving disc, said ratchet plate providing contact segments about the periphery thereof, a contact supporting ring of nonconducting material secured to said ratchet plate, and providing recesses for the reception of said segments whereby said ring may be driven by said ratchet plate.

2. In a switch of the class described, the combination comprising, a nonconducting contact supporting ring and having peripheral recesses, and a driving contact supporting plate, said plate providing axial extensions comprising contact segments circumferentially disposed relative thereto for mating engagement with recesses of said contact ring whereby said ring may be rotated by said plate; and oscillating means for imparting step-by-step rotary movement to said plate in one direction only.

3. In a switch of the class described, the combination comprising a nonconducting contact supporting ring having peripheral recesses, and a driving contact supporting plate, said plate providing axial extensions comprising contact segments circumferentially disposed relative thereto for mating engagement with recesses of said contact ring whereby said ring may be rotated by said plate, said contact segments being flush with the periphery of said contact ring and oscillating means for imparting rotary movement to said plate in one direction only.

4. In an electrical switch the combination comprising, a closure member of nonconducting material, a plurality of terminal studs moldably secured within said closure, one of said terminal studs providing a pivot post within the switch enclosure and supporting a contact actuator assembly, others of said studs providing yieldable contact members engageable with said actuator assembly, and an annular recess in said closure member concentric with said pivot post and providing a series of ratchet teeth cooperable with said actuator assembly.

5. The combination set forth in claim 4 in which, said actuator assembly comprises, a nonconducting contact supporting ring having ratchet teeth cooperable with the teeth of said closure member, a ratchet plate bridging the open area of said ring and providing axial extensions circumferentially spaced and embedded in said contact carrying ring.

6. The combination set forth in claim 4 in which, the actuator assembly comprises, a contact supporting ring, a ratchet plate driving the same and providing contact segments engageable with recesses in said ring, and a driving disc in cooperative relation with said ratchet plate, and ratchet provisions between said ratchet plate and driving plate on the one hand, and said contact supporting ring and closure member on the other hand, whereby said contact supporting ring may be driven in one direction only upon actuation of said driving plate.

7. An electric switch comprising in combination a mounting plate, a housing secured to said plate, a non-conducting terminal support and a non-conducting contact carrier having cooperating ratchet provisions to permit movement of the carrier in one direction only, means for imparting step by step, motion to the carrier, terminals carried by the terminal support, one of them pivotally supporting the contact carrier, stationary switch contacts carried by the other terminals and a movable contact carried by said carrier and cooperating with the stationary contacts.

8. An electric switch comprising in combination a housing, a non-conducting terminal block closing the housing, and a nonconducting contact carrier, said terminal block and contact carrier having molded ratchet provisions cooperating to permit movement of the carrier in one direction only, means carried by the casing for actuating said contact carrier, stationary contacts, supported by the terminal block, and a movable contact mounted on the contact carrier.

9. An electric switch comprising in combination a mounting plate, a housing secured to said plate, a non-conducting terminal block closing the housing and carrying a plurality of terminal posts, stationary contacts carried by said posts, a non-conducting contact carrier within the housing, a contact member secured thereon for engagement with the stationary contacts, said terminal block and contact carrier having cooperating molded ratchet provisions per-

mitting but one direction of rotation, and means for actuating the contact carrier.

10. An electric switch comprising in combination; a housing; a non-conducting terminal block closing said housing, said block carrying a plurality of terminal posts and having fixed ratchet provisions; stationary contacts carried by said posts; a movable member having ratchet provisions cooperating with said fixed ratchet provisions located within said housing; a contact member secured on said movable member for engagement with the stationary contacts; and means for imparting to said movable member a step-by-step rotary motion in the same direction only.

11. An electric switch comprising in combination; a housing; a non-conducting terminal block closing said housing, said block carrying a plurality of terminal posts and having fixed ratchet provisions; stationary contacts carried by said posts; a movable member having ratchet provisions cooperating with said fixed ratchet provisions located within said housing; a contact plate secured on said movable member for engagement with the stationary contacts; an oscillatable driving disc, said disc and plate having ratchet provisions operable to rotate said movable member in one direction only; and manual operating means for rotating said disc in one direction to turn the movable member.

12. An electric switch comprising in combination; a housing, a non-conducting terminal block closing said housing, said block carrying a terminal post extending through the block and into the housing, said block having a circular row of detents concentric with said post; stationary contacts attached to the block; a movable member rotatably supported by said post and having teeth cooperating with the detents of said block; a contact plate secured on said movable member for engagement with the stationary contacts; an oscillatable driving disc, said disc and plate having ratchet provisions operable to rotate said movable member in one direction only, means for rotating said disc in one direction to turn said movable member; and a common spring for turning the driving disc in the opposite direction and for urging the two ratchet devices toward each other.

In testimony whereof I hereto affix my signature.

JOHN MARTIN KELLY.