Dec. 18, 1928. 1,695,939

R. K. WINNING

DASH SWITCH

Filed June 25, 1925

Fig. 1.

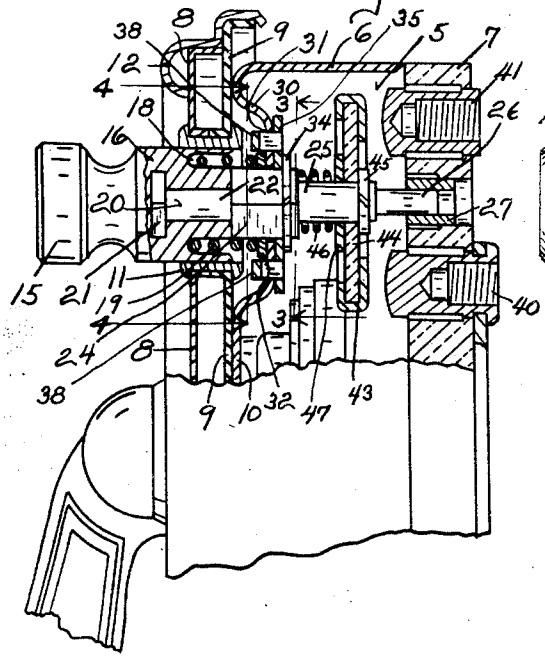


Fig. 2.

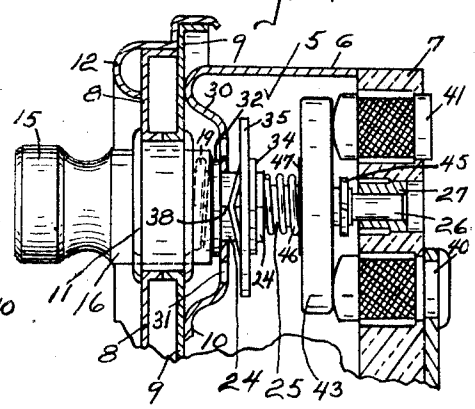


Fig. 3.

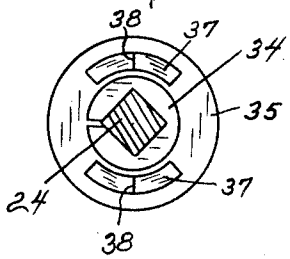
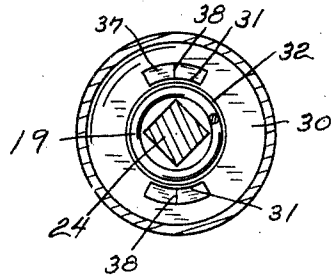


Fig. 4.



INVENTOR.

Robert K. Winning

BY

Erwin, Wheeler & Woolard

ATTORNEYS

Patented Dec. 18, 1928. 1,695,939

UNITED STATES PATENT OFFICE.

ROBERT K. WINNING, OF WAUWATOSA, WISCONSIN, ASSIGNOR TO CLUM MANUFACTURING COMPANY, OF MILWAUKEE, WISCONSIN.

DASH SWITCH.

Application filed June 25, 1925. Serial No. 39,470.

This invention relates to improvements in switches.

The switch herein disclosed is particularly adapted for service in the lighting circuits of motor vehicles and may conveniently be used to control the dash light circuit. It is one of the principal objects of the invention to provide a novel and improved type of switch mechanism so organized that the switch may be closed and retained in a closed position by one operation of the switch handle and by a different operation may be closed momentarily or for such a period as the operator continues to manipulate the switch handle. More particularly stated, it is my purpose to provide a switch so organized that a mere pressure at the end of the switch handle will close the switch for such a period as the pressure is maintained, whereas a rotation of the switch handle will result in depressing the handle and in maintaining it depressed after the operator has released the handle in its new position.

It is a further important object of the invention to provide switch mechanism adapted inexpensively to ensure a quick break in the circuit control by the switch and to accomplish this result through the use of mechanism adapted to maintain a yielding contact between the terminals of the switch.

Further objects of the invention are to provide a novel, improved and simplified switch adapted to be economically manufactured and easily assembled, and having few parts subject to wear; to provide a switch in which closure is effected by an axial movement of the switch handle and such axial movement may be brought about either directly by the pressure of the operator's hand or by the rotation of the handle to bring the cam surfaces into action to produce axial movement thereof; and to provide a novel form of cam for effecting axial movement of the shaft consequent upon its rotation.

In the drawings:

Figure 1 is a view of a switch casing in side elevation, the casing being cut away to a vertical axial section to expose the switch mechanism embodying this invention.

Figure 2 is a view similar to Figure 1 showing the switch mechanism adjusted to a different position.

Figure 3 is a detail view taken on the section indicated at 3—3 in Figure 1.

Figure 4 is a detail view taken on the section indicated at 4—4 in Figure 1.

Like parts are identified by the same reference characters throughout the several views.

The switch casing 5 includes a stamped shell 6 to the rear of which a disk 7 of fiber or other insulating material is secured to comprise a terminal head. A two-part mounting plate 8 including plate members 8 and 9 is attached to the front wall 10 of casing shell 6. Plate members 8 and 9 are secured together by the eyelet 11 and by a bezel 12 in the manner more particularly described by me in a companion application.

The switch handle comprises a manually engageable knob portion 15 which preferably corresponds in diameter with plunger member 16. The plunger member is guided for axial movement in the eyelet 11, and annular channel 18 extending axially into the plunger 16 is adapted to receive a compression spring 19.

The handle comprising knob 15 and plunger 16 is preferably cast upon a switch shaft or stud which may be designated in its entirety by reference character 20 and which includes a polygonal head 21 embedded in the metal of the plunger portion 16 of the handle. Shank 22 extends through the channeled portion of the plunger 16 and is connected integrally with the square shaft section 24. From this square shaft section projects the round shaft section 25 of reduced diameter and beyond this is a further reduced round shaft section 26 guided in a metal bushing 27 pressed into place in the terminal head 7.

The casing shell 6 is provided at 30 with a cup shaped depression in its front wall 10. In the bottom of this depression are arcuate slots 31 concentric with the axis of shaft 20, the square portion 24 of which extends a concavely depressed portion 30 of the casing wall. A washer 32 seats against the depressed casing wall and serves as a seat for spring 19. An aperture in the casing wall through which shaft 20 passes is sufficiently large to permit of the free rotation of the square section 24 of the shaft.

Compression spring 19 tends to force outwardly shaft 20 and the handle cast thereon. Thus, if the handle is depressed in any manner and is subsequently released, spring 19

is adapted to restore it to its normal position. This position is defined by means of a split washer 34 applied in the usual manner to a groove in shaft section 24. This washer acts on the inner surface of the depressed casing wall 30 through an interposed cam member 35 which comprises a disk in which arcuately formed webs 37 are pressed upwardly to an apex at 38 as is best shown in Figures 2 and 3. The inclined portions of the webs 37 on either side of their respective apices 38 act as cam surfaces engaging the rear face of casing wall 30. The arcuate slots 31 in the depressed portion 30 of the casing wall are of such an extent that when the cam webs are properly aligned with these slots they are receivable therein as shown in Figure 1. Thereupon the cam disk 35 moves axially into contact with the rear face of wall portion 30 under the compression of spring 19 as exerted through the handle, shaft 20 and split washer 34. It will be obvious, however, that the cam webs may be moved rearwardly out of the slots 31 either by direct axial pressure on the knob 15 or by rotating the knob to cause the inclined surfaces of webs 37 to interact with the rear face of casing wall portion 30 at the margins of the slots in such wall portion. Figure 2 shows the parts of the switch rotated 90° from their respective positions in which they appear in Figure 1. The rotative movement of the handle has been transmitted to the cam disk 35 through the square shaft section 24 upon which the came disk is splined, being provided with a square hole to fit this shaft section. It will be clear from an inspection of Figure 2 that each of the cam webs 37 has left its slot 31 due to this rotation and the apex 38 of each cam web has been rotated into registry with an unslotted portion of the rear face of casing wall portion 30.

The terminals for wires comprising a circuit adapted to be closed by this switch are shown at 40 and 41 and comprise electrically conductive members embedded in the dielectric terminal head 7 of the switch casing. They will preferably be substantially equidistant from the sleeve 27 in which shaft section 26 of the switch is reciprocally guided. The circuit closer member comprises an electrically conductive, annularly channeled member 43 mounted on a dielectric disk 44 which is axially slidable on shaft section 25 and is normally pressed into contact with split washer 45 by means of a compression spring 46. The compression spring is confined between a shoulder at the end of shaft section 24 and a washer 47 in face abutment with the dielectric disk 44. This compression spring yieldably maintains the contacting closer or movable switch contact element 43 normally at its rearward limit of movement with respect to shaft 26, with respect to which the split washer 45 is made fast. If, however, the switch shaft 20 is axially adjusted rearwardly either by its mere manual depression or by its rotation and the consequent operation of the cam surfaces above described, the circuit closer will be carried rearwardly therewith and will contact with terminals 40 and 41 before the switch shaft or stud reaches its rearward limit of movement. During the continued rearward movement of the switch shaft or stud to its ultimate position, spring 46 is subjected to additional compression and split washer 45 moves away slightly from the rear face of the dielectric disk 44.

The dielectric disk 44 is not tightly fitted to shaft section 25 upon which it is slidably mounted and its looseness of fit ensures that it may adjust itself under the compression of spring 46 to contact firmly with terminals 40 and 41 even though the contact surfaces of such terminals may not be in a common plane normally to the axis of the switch shaft or stud.

It will be obvious that the spring 19 is primarily called upon to restore handle 15 to its original position when the switch is open. It will furthermore be obvious, however, that the added compression to which spring 46 is subjected during the ultimate closing movement of the contact member 43 will also be available to overcome the initial inertia of the switch handle and stud shaft as the handle, stud and shaft start to move outwardly toward the open switch position. It will furthermore be obvious that the unit consisting of the dielectric disk 44 and the annular channeled circuit closer 43 will not initially partake of the opening movement of the switch handle and stud shaft. The arrangement is such that the switch handle and stud shaft will initially start to move outwardly and after the parts have acquired momentum during the outward movement, the split washer 45 will strike the rear face of the switch closing unit and will thereby sharply break the contact theretofore established between terminals 40 and 41. This ensures the quick break of the circuit without the tendency to arc which might otherwise be experienced.

From the foregoing it will be seen that the switch herein disclosed is so organized that it may be closed either by direct pressure of the operator's hand or by rotation of the handle which, through the action of the cam webs 37, results in an axial movement of the switch closer 43. In the former case the contact will be broken automatically by the above described action of compression springs 19 and 46 as soon as the pressure of the operator's handle knob 15 is released. In the latter case the cam noses or apices 38 will be engaged behind the rear surfaces of casing portion 30 and being so engaged

will retain the switch closing member 43 in contact with terminals 40 and 41 until the knob 15 is again rotated in either direction to bring the cam webs 37 into registry with slots 31 and thereby to permit a retractive movement of the operating parts of the switch.

It will be obvious furthermore that the mechanism employed to ensure a positive contact of the circuit closing member with terminals 40 and 41 is also organized to provide for a positive quick acting disengagement of the circuit closer 43 from these terminals, this being done by allowing the switch handle and associated parts to acquire momentum in their retractive movement before the circuit closing member 43 is acted upon to withdraw it from the terminals.

While I do not desire to limit my invention to the specific construction herein disclosed, nevertheless I prefer this construction as it has many advantages due to its simplicity and the comparatively small number of parts involved. From the manufacturing standpoint it is very economical due to the fact that practically all of the parts may be machine made by stamping and die casting operations and the parts are so designed as to facilitate assembly.

The arcuately curved cam webs 37 are stamped from disk 35 by an operation which preferably severs them from the disk at their side margins while leaving them integrally connected with the disk at their ends. The cam device operates very effectively and, needless to say, is far less expensive than a cast fitting of similar conformation.

I claim:

1. As a new article of manufacture, a cam member comprising a plate having an integral strip severed therefrom along its sides and connected thereto at its ends, an intermediate portion of said strip being pressed out of the plane of laterally adjacent portions of said plate.

2. As a new article of manufacture, a cam member comprising a plate having an integral strip severed therefrom along its sides and connected thereto at its ends, an intermediate portion of said strip being pressed out of the plane of laterally adjacent portions of said plate, and said strip being arcuately curved.

3. In a device of the character described, the combination with a switch casing provided with an aperture and arcuate slots substantially concentric with said aperture, of a shaft extending through said aperture, a contact closer on said shaft and a disk connected with said shaft and provided with arcuate axially extending cam strips adapted to interact with said slots, said strips being receivable into said slots when in registry therewith and being adapted to advance said shaft axially in moving out of registry with said slots.

4. In a device of the character described, the combination with an axially movable handle shaft and a circuit closer mounted thereon, of a casing provided with an aperture receiving said shaft and having arcuate slots concentric with said aperture, a plate mounted on said shaft and provided integrally with axially extending strips severed at their side margins from said plate and connected at their ends therewith, intermediate portions of said strips being pressed into axially extending apices positioned to be received into said slots when in registry therewith.

5. In a device of the character described, the combination with an axially movable handle shaft and a circuit closer mounted thereon, of a casing provided with an aperture receiving said shaft and having arcuate slots concentric with said aperture, a plate mounted on said shaft and provided integrally with axially extending strips severed at their side margins from said plate and connected at their ends therewith, intermediate portions of said strips being pressed into axially extending apices positioned to be received into said slots when in registry therewith, and a spring pressing said shaft in a direction tending to maintain said apices within said slots.

6. A switch device providing a bearing, a handle guided for reciprocation and rotation in said bearing, a shaft extending from said handle, an apertured casing wall receiving said shaft, a spring confined between said casing wall and said handle, a cam carried by said shaft within said casing wall and adapted to interact therewith upon rotation of said handle and in a direction to advance said shaft axially to compress said spring, and a circuit closer carried by said shaft and adapted to be adjusted to operative position upon the axial movement of said shaft, said cam comprising a disk connected with said shaft for rotation therewith and to transmit axial movement in one direction thereof, and cam strips expressed integrally from said disk to provide axially projecting apices adapted to interact with said wall, said wall providing complementary surfaces.

7. A switch device providing a bearing, a handle guided for reciprocation and rotation in said bearing, a shaft extending from said handle, an apertured casing wall receiving said shaft, a spring confined between said casing wall and said handle, a cam carried by said shaft within said casing wall and adapted to interact therewith in a direction to advance said shaft axially to compress said spring, and a circuit closer carried by said shaft and adapted to be adjusted to operative position upon the axial movement

of said shaft, said cam comprising a disk connected with said shaft for rotation therewith and to transmit axial movement in one direction thereof, and cam strips expressed integrally from said disk to provide axially projecting apices adapted to interact with said wall, said wall being provided with arcuate slots adapted normally to receive said apices when said shaft is in a rotative position such that said apices are in registry therewith.

8. The combination with an apertured switch casing and a bearing mounted externally thereof and aligned with the aperture therein, of a handle reciprocably and rotatably mounted in said bearing and provided in its inner end with an annular channel, a shaft projecting from said handle through the aperture of said casing, a spring wound about said shaft and confined between the extremity of said channel and the outer face of said casing, a limiting member on said shaft within said casing, and a cam disk splined to said shaft between said limiting member and the apertured wall of said casing, said cam disk being provided with an axially projecting cam and said casing being provided with a complementary surface adapted to interact with said cam.

9. The combination with an apertured switch casing and a bearing mounted externally thereof and aligned with the aperture therein, of a handle reciprocably and rotatably mounted in said bearing and provided in its inner end with an annular channel, a shaft projecting from said handle through the aperture of said casing, a spring wound about said shaft and confined between the extremity of said channel and the outer face of said casing, a limiting member on said shaft within said casing, and a cam disk splined to said shaft between said limiting member and the apertured wall of said casing, said cam disk being provided with arcuate axially expressed strips connected with said disk at their ends and axially bowed intermediate their ends, and said casing being provided with slots adapted, upon the rotation of said disk, to register with said strips and to receive the axially bowed portions thereof.

10. In a device of the character described, the combination with a handle, of a shaft having a head cast in said handle, a squared section immediately adjacent said handle, and a cylindrical section projecting beyond said squared section.

11. In a device of the character described, the combination with a handle, of a shaft having a head cast in said handle, a squared section immediately adjacent said handle and a cylindrical section projecting beyond said squared section, and retaining collars on said shaft encircling said squared section and said cylindrical section.

12. In a device of the character described, the combination with a handle and a shaft projecting therefrom and including a squared section and a cylindrical section, of a cam member splined to said squared section, a collar on said squared section remote from said handle, a circuit closer rotatably and axially movable on the cylindrical section of said shaft, a collar on said cylindrical section remote from said handle, and a spring acting axially of said shaft upon said circuit closer to press said circuit closer toward said last mentioned collar.

13. In a device of the character described, the combination with a handle and a shaft projecting therefrom and including a squared section and a cylindrical section, of a cam member splined to said squared section, a collar on said squared section remote from said handle, a circuit closer rotatably and axially movable on the cylindrical section of said shaft, a collar on said cylindrical section remote from said handle, a spring acting axially on said shaft upon said circuit closer to press said circuit closer toward said last mentioned collar, and a second spring acting on said shaft in a direction opposite to the direction of action of the first mentioned spring.

14. In a device of the character described, the combination with a switch casing having apertured front and rear walls and a terminal mounted in its rear wall at one side of the aperture therein, of a handle axially adjustable through the apertures of said walls, a spring pressing said handle forwardly with respect to said casing, a stop on a rear portion of said handle, a contact member slidable on said handle to and from engagement with said stop, and a spring seated against a portion of said handle and urging said contact member in the direction of said stop, said handle being axially adjustable to compress initially said first mentioned spring and to compress said last mentioned spring after said member engages said terminal, together with cam means mounted in part on said shaft and in part on said casing and adapted to interact upon the rotation of said shaft to produce sustained axial movement of said shaft.

15. In a device of the character described, the combination with a switch casing having apertured front and rear walls and a terminal mounted in its rear wall at one side of the aperture therein, of a handle axially adjustable through the apertures of said walls, a spring pressing said handle forwardly with respect to said casing, a stop on a rear portion of said handle, a contact member slidable on said handle to and from engagement with said stop, and a spring seated against a portion of said handle and urging said contact member in the direction of said stop, said handle being axially adjustable

to compress initially said first mentioned spring and to compress said last mentioned spring after said member engages said terminal, together with cam means mounted in part on said shaft and in part on said casing and adapted to interact upon the rotation of said shaft to produce sustained axial movement of said shaft, said cam means comprising a slotted wall in said casing and a disk having axially offset portions receivable in the slot of said wall when aligned therewith and adapted to ride upon unslotted portions of said wall to maintain said member in contact with said terminal.

16. In a device of the character described, the combination with a switch casing providing a relatively stationary terminal, of a shaft normally freely adjustable axially in the direction of such terminal and provided with a stop in a portion adjacent thereto, a contact member slidable on said shaft to and from engagement with said stop and adapted during the axial adjustment of said shaft to contact said terminal and to be moved from said stop thereby, a spring urging said member in the direction of said stop, a second spring urging said shaft from said terminal, and complementary cam surfaces connected respectively with said casing and said shaft and adapted upon rotation of said shaft to adjust said shaft axially in opposition to said second spring.

17. In a device of the character described, the combination with a switch casing providing a relatively stationary terminal, of a shaft normally freely adjustable axially in the direction of such terminal and provided with a stop in a portion adjacent thereto, a contact member slidable on said shaft to and from engagement with said stop and adapted during the axial adjustment of said shaft to contact said terminal and to be moved from said stop thereby, a spring urging said member in the direction of said stop, a second spring urging said shaft from said terminal, and complementary cam surfaces connected respectively with said casing and said shaft and adapted upon rotation of said shaft to adjust said shaft axially in opposition to said second spring, said cam surfaces being adapted upon rotation to given position releasably to maintain said shaft in an advanced position of axial adjustment.

18. In a device of the character described, the combination with a switch casing providing a relatively stationary terminal, of a shaft normally freely adjustable axially in the direction of such terminal and provided with a stop in a portion adjacent thereto, a contact member slidable on said shaft to and from engagement with said stop and adapted during the axial adjustment of said shaft to contact said terminal and to be moved from said stop thereby, a spring urging said member in the direction of said stop, a second spring urging said shaft from said terminal, and complementary cam surfaces connected respectively with said casing and said shaft and adapted upon rotation of said shaft to adjust said shaft axially in opposition to said second spring, said cam surfaces comprising a casing wall having an arcuate slot and a cam disk having complementary strips axially pressed to apices and which are respectively receivable into said slots when in registry therewith and are adapted to ride on unslotted portions of said wall when not in registry with said slots.

19. In a device of the character described, the combination with a switch casing providing a relatively stationary terminal, of a shaft normally freely adjustable axially in the direction of such terminal and provided with a stop in a portion adjacent thereto, a contact member slidable on said shaft to and from engagement with said stop and adapted during the axial adjustment of said shaft to contact said terminal and to be moved from said stop thereby, a spring urging said member in the direction of said stop, a second spring urging said shaft from said terminal, and complementary cam surfaces connected respectively with said casing and said shaft and adapted upon rotation of said shaft to adjust said shaft axially in opposition to said second spring, said shaft being axially movable normally in each direction when in rotative positions in which said cam surfaces do not interact.

20. In a switch device, the combination with an apertured casing wall, of a bearing aligned with said aperture, a handle reciprocably and rotatably mounted in said bearing, a shaft secured to said handle and extending through said aperture and into the interior of said casing, a compression spring confined between said casing and handle, a cam comprising a portion carried by said casing and a portion carried by said shaft and arranged to move said shaft axially inwardly of said casing upon manual rotation thereof, contacts carried by said casing, and a circuit closer carried by said shaft and adapted to engage said contacts upon inward movement of said shaft.

ROBERT K. WINNING.