Oct. 13, 1942. A. A. BLUEMLE 2,298,781

SWITCH MECHANISM

Filed May 21, 1940

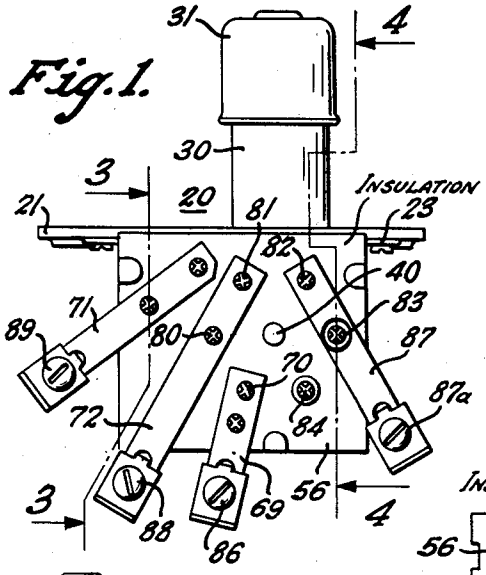


Fig. 1.

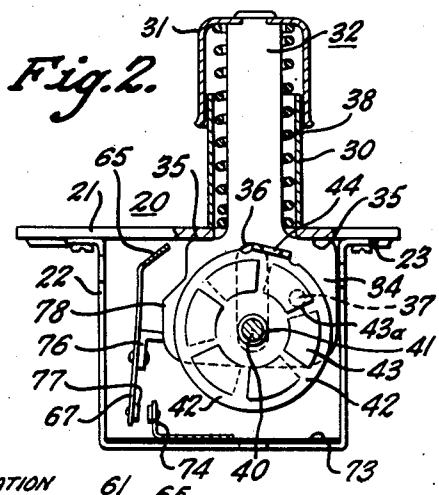


Fig. 2.

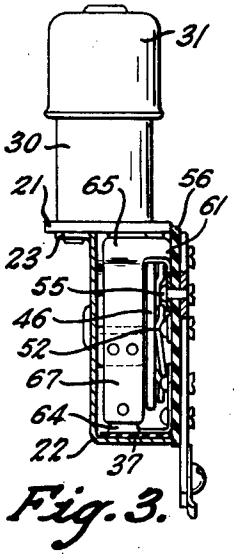


Fig. 3.

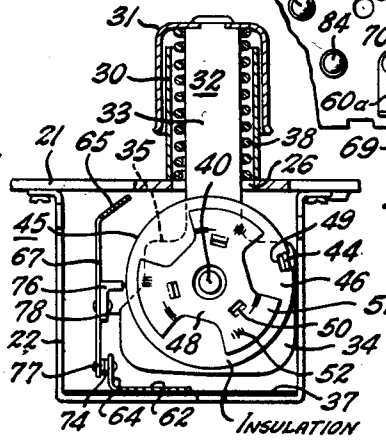


Fig. 5.

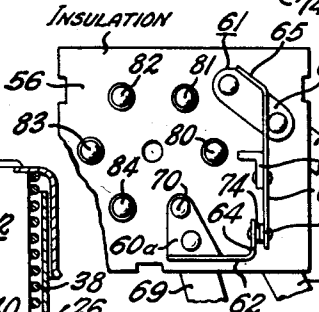


Fig. 6.

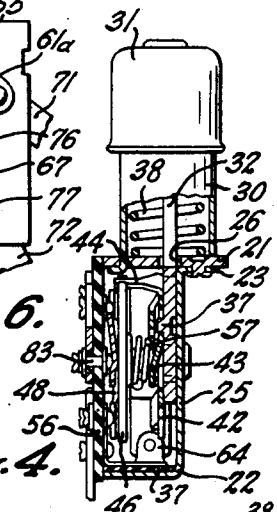


Fig. 4.

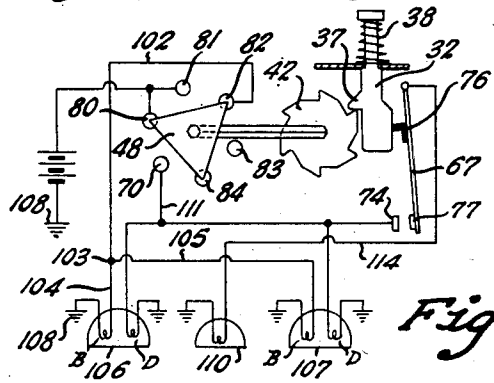


Fig. 7.

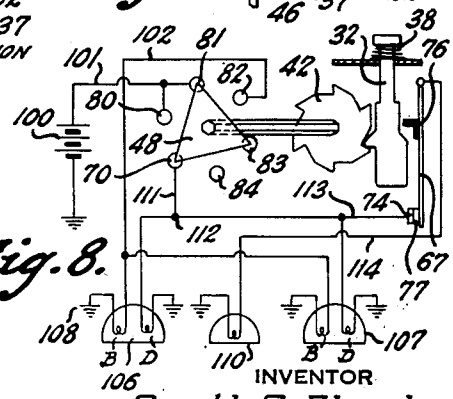


Fig. 8.

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Patented Oct. 13, 1942

2,298,781

UNITED STATES PATENT OFFICE

2,298,781

SWITCH MECHANISM

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Application May 21, 1940, Serial No. 336,421

7 Claims. (Cl. 171—97)

This invention relates generally to improvements in switch mechanisms and is directed more particularly to switch mechanisms of the plunger type for controlling the different light circuits of an automotive vehicle.

In operating an automotive vehicle at night the "bright" lights may be needed to illuminate country roadways a substantial distance ahead of the vehicle for safe driving but, it is often desirable to modify the light beams when passing an approaching vehicle. It is possible by means of known circuits to use a plunger switch which when in its normal position the "bright" lights will be connected in circuit and when the switch is actuated a full stroke and again returned to its normal position the "dim" lights will be connected in the circuit. Besides this plunger switch another manually operated switch mounted remote from the plunger is usually provided to connect a "passing" light in the circuit.

It is an object of the present invention to provide unitary mechanism for controlling the switching mechanism that controls a plurality of circuits including the "bright" and "dim" headlights and the "passing" light.

Another object of present invention is to provide a novel arrangement of the stationary contact terminals whereby the "passing" light circuit will be connected only when the "dim" light circuit is connected.

Another object of the invention is to provide a single operating means for a pair of switches of the above character, which will be cheap, compact, simple and rugged in construction which requires a minimum number of parts, and which can be manufactured at a relatively low cost.

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 the present invention is clearly shown.

In the drawing:

Fig. 1 is a rear plan view of the assembled switch embodying the present invention.

Fig. 2 is a plan view of the switch similar to Fig. 1 with the closure and movable contact assembly removed and parts in section.

Fig. 3 and Fig. 4 are sectional views taken substantially in lines 3—3 and 4—4 of Fig. 1.

Fig. 5 is a view similar to Fig. 2 showing the parts in operative relation when the plunger is depressed a full stroke.

Fig. 6 is a fragment of the switch closure showing the plan view of the inside face thereof.

Fig. 7 is a schematic view illustrating the parts and circuits of the automotive vehicles, the switch is shown in its normal position with the "bright" filaments connected in circuit.

Fig. 8 is a schematic view similar to Fig. 7 with the switch shown in its depressed position to connect the "dim" lights and the passing light in circuit.

Referring to the drawing, the switch 20 comprises a bracket or mounting plate 21 supporting a housing 22 in any suitable manner. In the present instance the housing is provided with integral ears 23 which are apertured to receive integral projections punched from the bracket. The projections are riveted over the ears 23 to attach the housing to the plate 21 as clearly shown in Figs. 2 and 4. The back wall 25 of the housing is preferably flat and has its inner surface in the same vertical plane as the rear wall of a rectangular opening 26 provided in the bracket 21.

The bracket 21 supports a sleeve 30 which has its upper end telescopically engaged by a cup-shaped button 31 to provide a cover for the sleeve. The button is attached to the upper end of a plunger 32, preferably flat. This plunger is stamped from sheet metal and is so formed to provide a reduced portion 33 and an enlarged portion 34 to provide shoulders 35. The enlarged portion 34 has an elongated slot 36 and an integral projection 37. A compression spring 38 about the reduced portion 33 and disposed between the bracket 21 and the button 31 is provided for urging the plunger 32 outwardly. The shoulders 35 of the plunger are finished to engage the bottom side of the bracket 21 to limit the outward movement of the plunger and hold the plunger in its normal position as shown in Fig. 2.

A pivot stud or post 40 is secured at one end to the flat wall 25. The stud 40 has a collar 41 located adjacent the flat wall 25 and has a sliding fit with the side walls of the elongated slot 36. The function of the collar is to guide the plunger 32, together with the opening 26 in the plate 21, in a straight line movement. The free end of the stud extends through and beyond the elongated slot 36 to form a pivot for an apertured drive disc or plate 42. This drive disc 42 is provided with a plurality of cam portions 43 they are equally spaced apart in a circular row. The cams 43 are integral with the disc 42 but are punched out of the plane of the disc so that a portion of the cams are severed from the plate to provide straight edges 43a which are adapted to receive the projection 37 progressively. The

projection 37 normally rests against one or the other of the straight edges 43a so that when the plunger 32 is actuated downwardly the disc 42 will be rotated step-by-step on the stud 40 in one direction only. The periphery of the disc 42 is provided with an angular ear 44 which is adapted to drive a contact assembly 45.

The contact assembly 45 is rotatably supported on the stud 40. This assembly comprises a disc 46 of insulating material and a contact wheel 48. The contact assembly is given a step-by-step rotary motion in a clockwise direction as viewed in Fig. 5, by the drive disc 42 through the ear 44. The ear 44 fits into a notch 49 provided on the periphery of the disc 46. The disc 46 is also provided with notches suitably spaced about the axis of the disc 46 to receive prongs 50 formed integral with the plate 48, see Fig. 4 so that the plate will move with the disc 46. The movable contact 48 is placed upon the disc 46 on the side opposite to that which faces the drive disc 42. The contact plate has three radially disposed arms 51 which are deformed to provide a groove 52 in each arm to engage heads of contact terminal rivets 55 suitably supported and insulated from each other on a closure 56.

The housing 22 is closed by the closure 56 which carries the conducting terminal rivets 55, having rounded heads which fit into the deformations or grooves 52. The heads of the terminal rivets cooperate with the grooves 52 to restrain backward movement of the contact assembly 45, or in other words restrain the whole assembly from moving in a counterclockwise direction as viewed in Fig. 5.

A compression spring 57, interposed between the drive plate 42 and the driven disc 46, operates in two directions. The spring 57 operates to urge in one direction the various elements associated with the contact assembly 45 toward the closure 56 and the spring also operates in the other direction to urge the plate 42 against the face of the plunger 32 and the plunger portion 34 against the wall 25 of the housing 22. Thus, the plunger will have a sliding engagement with the back wall 25 of the casing. The spring 57 also furnishes the necessary pressure to effect a good contact engagement with terminals and yet yieldingly permits the contact wheel 48 and the disc 46 to move axially upon the stud to allow the contact wheel 48 to leave the terminals 55 upon each operation of the switch in the clockwise direction, as viewed in Fig. 5. The pressure exerted by the spring is sufficient to hold the contact grooves 52 against the head of the rivets 55 and prevent backward movement of the assembly, due to the fact that three of the rounded heads of the rivets 55 are located within the grooves 52 at the same time.

The closure 56 also supports a pair of angular conducting brackets 60 and 61. The bracket 60 includes arms 60a, 62 and 64 while bracket 61 includes arms 61a, 65 and 67. The bracket 60 is attached to the closure 56 by rivets 70 passing through apertures provided by the arm 60a, closure 56 and a conducting plate 69. The rivets in this instance are clinched over the plate 69. One of the rivets 70 is so positioned that its rounded head is in the path of the arms 52 of the contact wheel 48 as will be obvious from the arrangement shown in Fig. 6. The arm 61a of the bracket 61 is secured in a similar manner but the rivets are clinched over a conducting plate 71 and the rounded heads are located out of the path of the arms 52 see Fig. 6.

The other arm 62 of the bracket 60 is located adjacent the bottom wall of the housing and suitably insulated therefrom by a strip 73 of insulating material. The free end of the arm 62 is bent at an angle as at 64 and supports a relative stationary contact 74. The arm 67 of the bracket 61 is provided with a resilient extending portion which carries an L-shaped rubbing block 76 and a contact 77 which is adapted to engage the stationary contact 74. The contacts 74, 77 are normally separated from each other, due to the fact that one arm of the rubbing block 76 engages a cam portion 78 formed on the marginal edge of the enlarged portion 34 of the plunger 32 as clearly shown in Fig. 2.

Certain of the rounded heads of the rivets are utilized as stationary terminal contacts, namely 70, 80, 81, 82 while the heads 83 and 84 are dummies. The said mentioned heads are arranged in a circular row. The terminal contact 70 is connected with the plate 69 outside the cover which carries a suitable screw terminal 86 to which a conductor wire, not shown, leading to the "dim" filaments of the head lamps is attached. The terminal contacts 80 and 81 are electrically connected through the plate 72, which carries a terminal screw 88 to which a conductor wire, not shown, leads to a source of electrical energy, such as a storage battery. The terminal contact 82 is connected through plate 87, terminal screw 87a, and a conductor wire, not shown, with the "bright" filaments of the head lamps. The dummy rivet head 83 is insulated from the plate 87. The bracket 61 is connected to the plate 71 outside the closure 56. The plate 71 is provided with a terminal screw 89 to which a conductor wire not shown, leading to a current consuming device, such as a "passing" lamp or a "fog" lamp is attached.

The switch embodying the present invention is adapted to control a plurality of circuits. In the present instance the switch is shown for use to control the "bright," "dim," and "passing" lighting circuits of an automotive vehicle. Referring to Fig. 7 the switch is shown in its normal position with the "bright" filaments of the headlamps 106 and 107 connected in the circuit. In this position, the bridging member or contact wheel 48 will have its arms 51 engaging several terminal contacts, namely the battery terminal 80, the bright filament terminal 82 and dummy terminal 84. When in this position current will flow from one side of the battery 100, through lead 101 to terminal 80, contact 48, terminal 82, lead 102, to a point 103 whence the circuit is divided, a portion passing through lead 104 and a portion through lead 105 to bright filaments "B" of lamps 106 and 107 respectively back to battery through ground connections 108. It will be observed that the contacts 74 and 77 are separated thus no current will pass through the filament of the "passing" light 110.

When the switch is actuated from the position shown in Fig. 2 to the position shown in Fig. 5 the plunger 32 through projection 37 acting upon one of the straight edges 43a will rotate the drive wheel 42 substantially 60° in a clockwise direction around the post 40. As the drive wheel 42 is turning the contact assembly 45 will be driven simultaneously by the ear 44. When the plunger has moved its full stroke the contact assembly 45 will be advanced to a new position corresponding to that shown in Fig. 8. It will be noted that in this position the rubbing block 76 will be free of the cam 78 allowing the resilient

arm 67, due to its own resiliency, to move the contact 77 into engagement with the stationary contact 74 to complete a circuit through the filament of the "passing" light 110 and also through the dim filaments "D" of the lamps 106 and 107. When the plunger is actuated a full stroke to the position shown in Fig. 8 the battery terminal 81, dummy contact 83 and terminal contact 70 will be bridged by the movable contact 48 causing current to flow as follows: from battery 100, lead 101, terminal 81 terminal 70, lead 111, to point 112 whence the current will be divided in three portions, one portion flowing through the "dim" filament of lamp 106, another through dim filament of lamp 107 and a third portion through lead 113, contacts 74, 77, arm 67 lead 114, through filament of lamp 110 and back to the battery through ground connections of the respective lamps. These circuits will be maintained so long as the plunger is held in its full downward stroke. When the pressure is released upon the plunger, the spring 38 will return the plunger to its normal position thus causing the cam 78 to engage the rubbing block 76 urging the arm 67 outwardly to separate the contact 77 from contact 74 to open the circuit to the passing light filament.

On the return movement of the plunger 32 by the spring 38 the driving wheel 42 and the contact assembly 45 will remain stationary maintaining the "dim" filaments of lamps 106 and 107 in the circuit. The pressure exerted by the spring 57 is sufficient to hold the contact grooves 52 against the rounded heads of the terminal and prevent counterclockwise movement of the contact assembly.

While the 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 in combination with a control circuit including a current source for a plurality of current consuming devices; switching means for controlling the connection of the source to all of the devices comprising spaced stationary terminals including a common terminal and a plurality of distributing terminals and a movable contact, said movable contact being so constructed to connect the common terminal with either of the distributing terminals; switching means for connecting another current translating device with the source comprising a movable contact and a relative stationary contact one of which is connected to one of the distributing terminals and the other with the translating device; and a common means for actuating both switching means simultaneously when said actuating means is moved in one direction.

2. An electric switch unit comprising a housing having a back wall; a terminal block for closing the housing and provided with terminal contacts including a power terminal and distributing terminals; a transverse shaft between the back wall and the block; switching means including a rotary contact movable in one direction only between the wall and the block mounted upon the shaft for connecting the power terminal alternately with the distributing terminals; switching means including a stationary contact and a biased oscillatable contact carried by the block, one of which is connected to one of the distributing terminals; a pawl-and-ratchet mechanism for actuating the rotary contact; cam means for normally holding the oscillatable contact separated from its stationary contact; and common means for moving the pawl and the cam in a direction whereby the pawl rotates the rotary contact and the cam permits the oscillatable contact to engage its contact.

3. An electric switch unit comprising a housing having a back wall; a shaft fixed to the wall; an insulating block supported by the housing opposite the back wall; a plurality of terminal contacts fixed to the block and arranged in a circular row about the shaft; a rotary contact between the wall and the block to engage the contacts in step-by-step relation mounted on the shaft; a pawl-and-ratchet mechanism for actuating the rotary contact; switching means including a relative stationary contact and a biased movable contact carried by the closure one of which is electrically connected with one of the terminal contacts; a cam for controlling the movement of the biased contact; and common means for moving the pawl and the cam in a direction to rotate the rotary contact and permit the biased contact to engage the stationary contact.

4. An electric switch unit comprising a common terminal; a plurality of distributing terminals; a rotary contact for bridging the common terminal alternately with the distributing terminals; manually operable means for actuating the rotary contact; auxiliary switching means comprising a biased movable contact and a relatively stationary contact one of which is connected to one of the distributing terminals; and means carried by the manually operated means for normally holding the biased contact out of engagement with its stationary contact but permitting said biased contact to engage successively its stationary contact under the influence of its bias when the manually operated means is actuated in a direction to rotate the first mentioned contact in steps to engage alternately the stationary terminals.

5. An electric switch unit comprising, a power terminal and a plurality of distributing terminals; a rotary bridging member movable in one direction only for alternately connecting the distributing terminals with the power terminal; a switch comprising a biased contact and one of the distributing terminals; means for normally holding the biased contact out of engagement with its distributing terminal; a pawl-and-ratchet mechanism for actuating the rotary bridging member; and common means for moving respectively the pawl and the holding means in a direction to rotate the bridging member to engage alternately the terminals and permit the biased contact to engage successively its distributing terminal under the influence of its bias.

6. An electric switch unit comprising; a power terminal and a plurality of distributing terminals; a rotary contact member for alternately connecting the distributing terminals with the power terminal; a switch including one of said distributing terminals and a biased contact to successively engage same; means for normally holding the biased contact from said one distributing terminal; and common means for permitting movement of both movable contacts simultaneously when said means is moved in one direction from its normal position.

7. An electric switch including in combination, a casing; a switch back closing one side thereof; a plurality of stationary contacts arranged in an arcuate path and a biased movable contact adapted for successive engagement with one of

the stationary contacts carried by the switch back; a carrier supporting bridge means rotatably mounted within the casing, said bridge means adapted to engage alternately certain of the stationary contacts; an actuator carried by said casing and projecting through same for reciprocable movement; and provisions provided by the actuator cooperating with the carrier and the biased movable contact whereby the bridging means is rotated step-by-step and the biased contact engages its associated stationary contact successively when the actuator is moved a predetermined distance in one direction from its normal position.

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