

Dec. 31, 1935.

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2,025,978

ELECTRIC SWITCH

Filed Aug. 2, 1932

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Fig. 1.

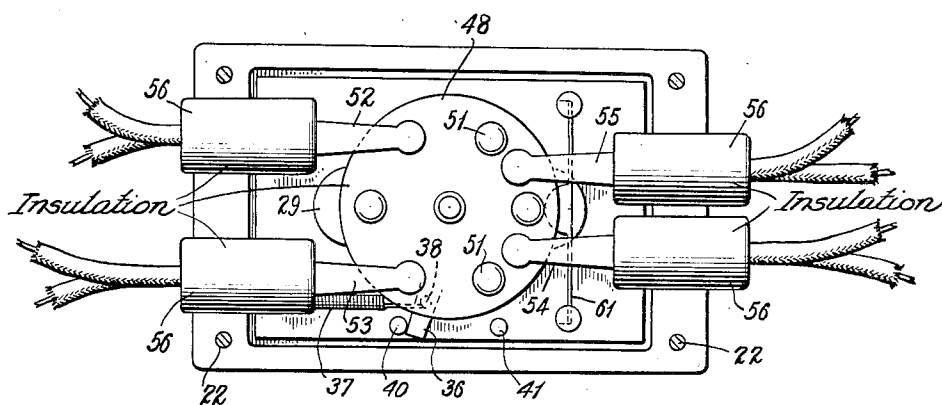
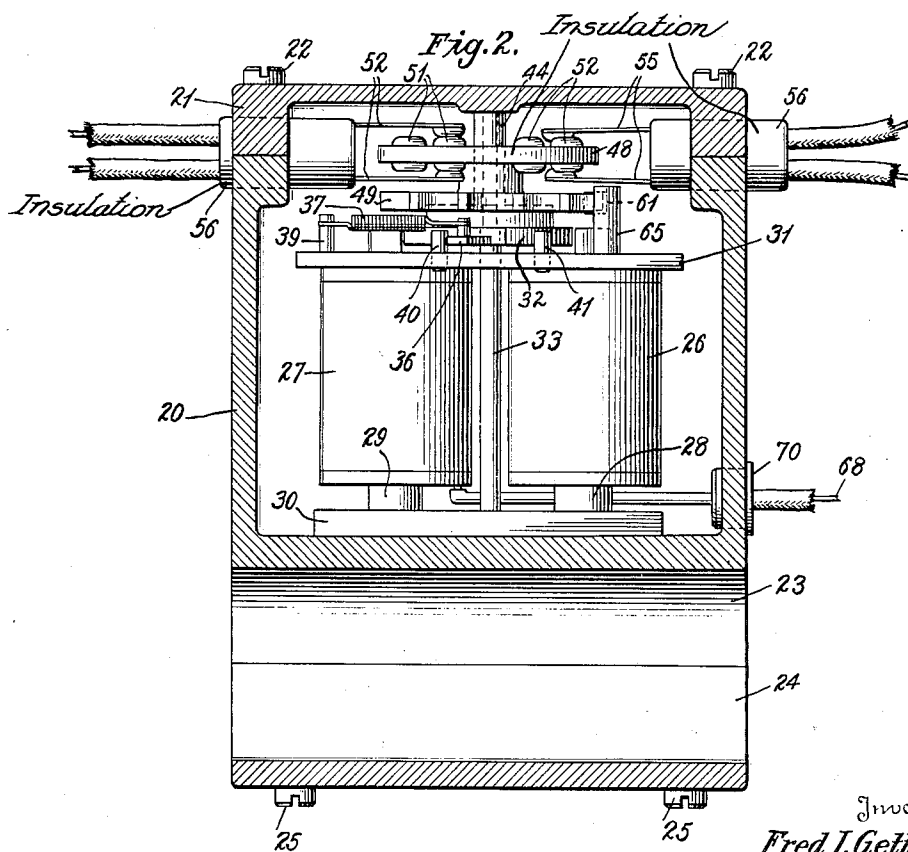


Fig. 2.



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Fig. 3.

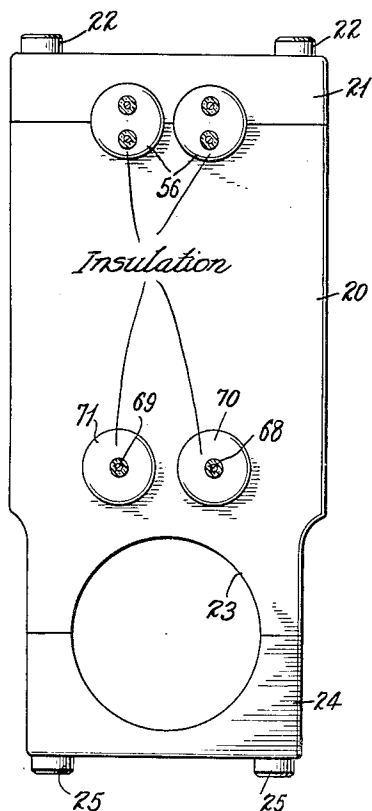


Fig. 4.

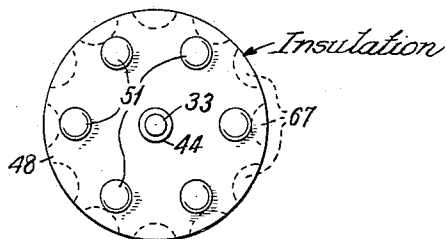


Fig. 5.

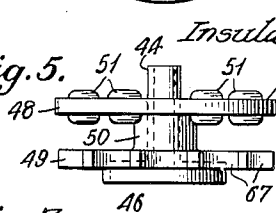


Fig. 6.

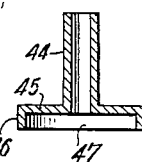


Fig. 7.

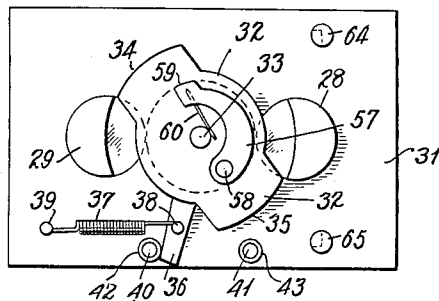
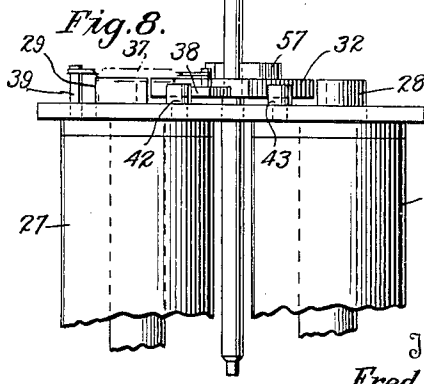
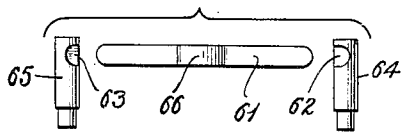


Fig. 9.



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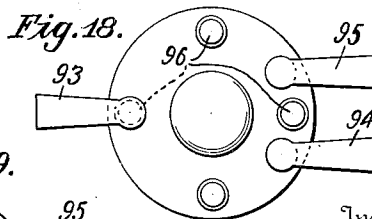
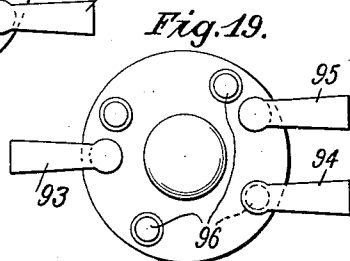
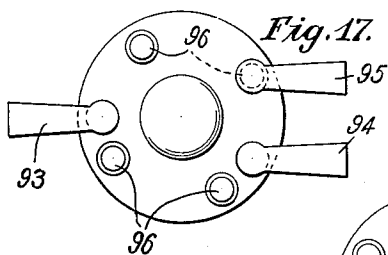
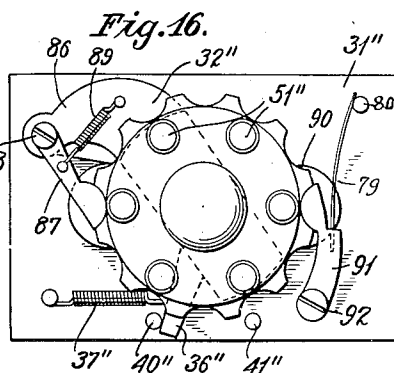
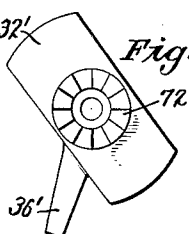
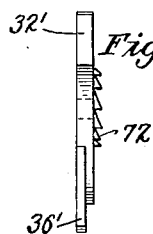
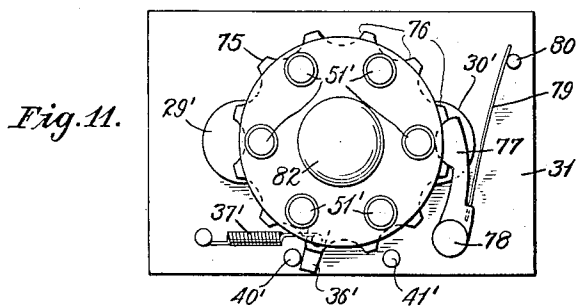
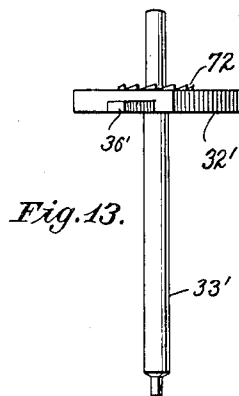
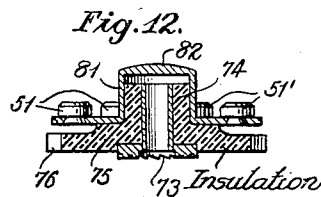
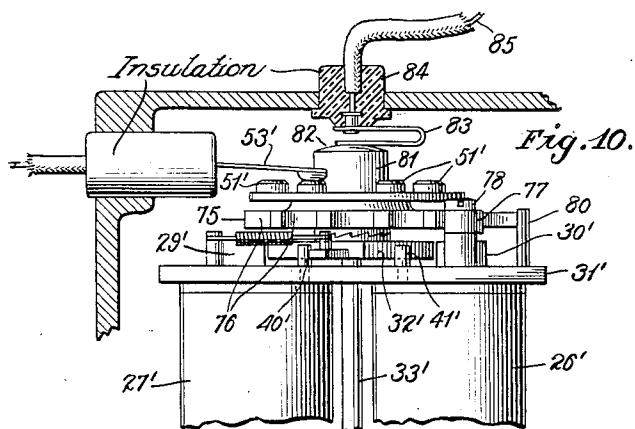
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UNITED STATES PATENT OFFICE

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ELECTRIC SWITCH

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Application August 2, 1932, Serial No. 627,288

6 Claims. (Cl. 200—105)

The invention relates to electric switches and has as an object the provision of an electromagnetic switch adapted for a step by step movement, each step shifting the circuit connections between conductors controlling circuits.

It is an object of the invention to provide a switch particularly adapted for use upon automotive vehicles to control the lighting and signaling system of the vehicle.

It is a further object of the invention to provide a switch for controlling the bright and dim headlights of the vehicle and arranged to change from bright to dim, or vice versa, at each actuation of the switch.

It is a further object of the invention to provide a switch having a rotatable contact element carrying equally spaced contact members and spring contacts extending into the path of revolution of said members and so spaced as to shift the circuits through said contact members at each step of revolution caused by an oscillating armature.

Further objects of the invention will appear from the following description when read in connection with the accompanying drawings showing illustrative embodiments of the invention, and wherein:

Fig. 1 is a plan view of the switch with the cover of the casing removed;

Fig. 2 is a side elevation of the switch with the casing in central vertical section;

Fig. 3 is an end elevation;

Fig. 4 is a plan view of the revoluble element;

Fig. 5 is a side view of the structure of Fig. 4;

Fig. 6 is a vertical section through the central member of the revoluble element;

Fig. 7 is a plan view of the mechanism of the switch with the revoluble member removed;

Fig. 8 is a detail elevation of the structure of Fig. 7.

Fig. 9 is a detail side elevation upon an enlarged scale of the retaining means to hold the revoluble element in location at each step and to prevent retrograde movement of the revoluble element;

Fig. 10 is a detail side elevation showing a portion of the casing in section of a modified form;

Fig. 11 is a plan view of the switch mechanism of Fig. 10 with the spring contacts omitted;

Fig. 12 is a detail central vertical section of the revoluble element of Fig. 10;

Fig. 13 is a side elevation of the armature and spindle of Fig. 10;

Fig. 14 is an edge view and Fig. 15 is a plan view of the armature of Fig. 10;

Fig. 16 is a plan view corresponding to Fig. 11 of a still further modification; and

Figs. 17, 18, and 19 are plan views of the revoluble elements and spring contacts showing the revoluble element for a modified circuit arrangement at successive steps of revolution.

As shown in Figs. 1 to 9 inclusive the device comprises a casing 20 having a removable cover 21 retained by means of cap screws 22. The lower portion of the casing is provided with one-half of a bearing surface 23 for application of the switch to the steering column of an automobile, the remaining half of the bearing surface being carried by a removable member 24 which may be secured to the casing 20 by means of the cap screws 25. As indicated the device is preferably attached to the vehicle by clamping the same to the lower end of the steering column although it may be otherwise mounted upon the vehicle.

To cause operation of the switch there are shown a pair of electromagnet spools 26, 27 having cores 28, 29, the lower ends of the cores being mounted in a member 30 of magnetic material and the upper ends thereof being connected by means of a plate 31 of non-magnetic material as brass.

An oscillatable armature 32 is shown mounted upon a spindle 33 having bearings in the plates 30, 31, the ends 34, 35 of the armature being formed upon arcs of a circle and the ends of the cores 28, 29 being cut away to form arcuate recesses into which the ends of the armature 31 are attracted when the armature is energized.

To hold the armature in the normal position shown in Fig. 7 a projection 36 therefrom has attached thereto a spring 37 anchored to the projection at 38 and to a pin 39 secured upon the plate 31. Stop pins 40, 41 are shown rising from the plate 31 to limit the movement of oscillation of the armature, the pins being desirably provided with rubber sleeves 42, 43 to make the operation of the device noiseless.

Revolubly carried by the spindle 33 is a member comprising a sleeve 44 carrying at one end a disc 45 having an annular rim 46 to provide a recess 47 for a purpose to be described. Fixedly carried by the sleeve 44 are discs 48, and 49 connected by a hub 50, the disc 48 being formed of insulating material and desirably the disc 49 and hub 50 being also formed of a like material as, for instance, bakelite.

Mounted and equi-distantly spaced upon the disc 48 are shown contact buttons 51 shown in Fig. 4, as six in number, the buttons passing through the disc and presenting raised portions

upon each surface thereof. To coact with the buttons 51 there are shown pairs of contact springs 52, 53, 54, 55, each spring being connected to a separate wire passing through bushings 56 of the casing. The circuit closed through contacts 52, 53 may, for instance, lead to each of the headlights of the vehicle to cause operation of the bright lights and the wires connected to contacts 54, and 55 may lead to the corresponding dim lights of the vehicle.

It will be seen that in the position of the disc 48 shown in Fig. 1, a button is in bridging relation to each of the springs 52, 53 and therefore the bright lights of the vehicle will be displayed. One step of the disc 48 will cause the buttons to move out from between the springs 52, 53 and will cause a button to move between each of the springs 54, 55 whereby to extinguish the bright lights and to illuminate the dim lights of the vehicle. To cause step by step revolution of the disc 48 the armature 32 is provided with a pawl and ratchet device. In the form of Fig. 7 the pawl is in the form of a member 57 pivoted upon the armature at 58 and having its end 59 bearing against the interior surface 47 of the annular edge 46 of the revoluble member. The depending edge 46 as clearly shown in Fig. 2, encloses the member 57 extending to a plane closely adjacent the plane of the armature 32.

A leaf spring 60 is shown carried by the member 57 and having slight spring pressure upon the spindle 33 with the result that when the armature is attracted by the poles 28, 29, the member 57 will bite against the surface 47 to cause one step of the disc 48, and when the armature is returned by the spring 37 the member 57 will slip over the surface 47. To prevent retrograde movement of the disc 48 and to accurately locate the position of the disc at each step, the disc 49 is shown as formed with a scalloped edge having alternate scallops corresponding with the contact buttons 51.

A leaf spring 61 is shown supported at its ends in notches 62, 63 in posts 64, 65 carried by plate 31, the central portion of the spring 61 carrying a semi-circular button 66 yieldingly spring pressed into the scallops 67 of the disc 49.

Wires 68, 69 to energize the magnets 26, 27 are shown led in through the casing through bushings 70, 71 in the casing 20, the wires 68, 69 being desirably led to a circuit closer within the reach of the driver when the device is used upon an automotive vehicle.

In the form of the invention of Figs. 10 to 15 inclusive, the armature 32' is shown as carrying a series of radial ratchet teeth carried by a disc 72 centrally mounted upon the armature, which teeth coact with a like set of teeth 73 secured to a sleeve 74 in the revoluble member of the switch.

The armature in this form of the device is also provided with a return spring 37' and with stop pins 40', 41' as already explained.

The revoluble member of this form of the device is formed of a disc 75 of insulating material mounted upon sleeve 74 and provided with scallops 76 to coact with a locating member 77 pivoted at 78 on the plate 31' and spring pressed into engagement with the scallops by means of a leaf spring 79 bearing against a pin 80 mounted upon the plate 31'.

The disc 75 is shown as carrying a thimble 81 having a central closure 82 to contact with a spring contact member 83 carried by a button 84 and having circuit connections with a wire 85 which may lead, for instance, to battery. The

contact springs in this form of the device instead of being bridged by the buttons are arranged to each make contact by a single spring as 53', the circuit being through the wire 85, spring 83, thimble 81, one of the contact buttons 51', to a spring as 53', the arrangement of the springs being otherwise as that shown in Figs. 1 to 10 inclusive.

When the armature 32' is attracted the revoluble member will be given one step with yielding of the pawl 77 and when returned under influence of spring 37' the discs 72, 73 will cause the revoluble member to rise against the pressure of spring 83 and slippage of the ratchet teeth in said discs to allow the armature to return to normal without retrograde movement of the revoluble member, the circuits being correspondingly shifted.

In the form of Fig. 16 the armature 32'' is shown as having a projection 86 upon which is pivoted a pawl 87 at 88, which pawl is spring pressed by means of spring 89 into contact with the successive ratchet recesses 90 of the revoluble member, a dog 91 pivoted at 92 upon the plate 31'' being spring pressed into successive recesses 90 to prevent retrograde movement of the revoluble member.

The form of Fig. 16 also shows stop pins 40'', 41'' and a spring 37'' connected to a projection 36'' from the armature to return the armature to normal position.

In Figs. 17, 18, 19, there is shown an arrangement of contact buttons and springs for another form of circuit control. As there shown the contact springs 93, 94, and 95 are so placed about the revoluble member that they will successively contact with one of the contact buttons 96, in this instance being shown as 4 in number, equidistantly spaced upon the revoluble member so that one of the three circuits controlled by the contact springs is connected at each successive step of the revoluble member and one only is connected at a time.

The revoluble member illustrated in these figures may be controlled by any of the step by step mechanisms illustrated in the other figures.

The operation of the device will be clear from the above description. Minor changes may be made in the physical embodiments of the invention within the scope of the appended claims without departing from the spirit of the invention.

I claim:

1. An electric switch comprising, in combination: an electromagnet; a spindle mounted adjacent said magnet; an armature mounted on said spindle to be oscillated by attraction of said magnet; spring means to return said armature to normal position; a disc revolubly mounted on said spindle; pawl and ratchet means between said armature and disc to move said disc one step with each oscillation of said armature; equidistantly spaced contact buttons carried by said disc; a plurality of spring contacts respectively connected in a plurality of circuits and projecting into the path of movement of said buttons; said springs so located as to close at least one circuit through a button at each position of said disc and to shift the circuit connection at each step of the disc.

2. An electric switch comprising, in combination: a pair of electromagnet coils having cores; a spindle pivoted between and parallel with said cores; an armature mounted on said spindle for oscillation under influence of said mag-

net; stop means to limit said motion of oscillation; yieldable spring means to hold the armature normally at a limit of movement with the armature spaced from the cores; a revoluble member mounted on said spindle; pawl and ratchet means for causing step by step revolution of said member by oscillations of said armature; equidistantly spaced contact buttons carried by said member; and a plurality of contact springs extending into the path of movement of said buttons; said spring contacts so arranged that at least one thereof shall be in contact with one of said buttons with others thereof out of contact at each step location of said member whereby to successively shift circuits through said springs and buttons at each step movement of said member.

3. An electric switch comprising, in combination: a pair of electromagnet coils having cores presenting exposed ends; a spindle mounted between said coils parallel with said cores; the said ends of said cores partially cut away to provide recesses having arcuate walls concentric with said spindles; an armature oscillatably mounted on said spindles, the ends of said armature formed upon arcs to swing into said recesses; stop means to limit said motion of oscillation; yieldable spring means to hold the armature normally at a limit of movement with the armature spaced from the cores; a revoluble member mounted on said spindle; pawl and ratchet means for causing step by step revolution of said member by oscillations of said armature; equidistantly spaced contact buttons carried by said member; and a plurality of contact springs extending into the path of movement of said buttons; said spring contacts so arranged that at least one thereof shall be in contact with one of said buttons with others thereof out of contact at each step location of said member whereby to successively shift circuits through said springs and buttons at each step movement of said member.

4. An electric switch comprising, in combination: a pair of electromagnet coils having cores; a spindle mounted between said coils and parallel with said cores; an armature mounted on said spindle for oscillation under influence of said cores; an element of a pawl and ratchet device carried by said armature; a sleeve and disc revolubly mounted on said spindle, the disc bearing the remaining element of said device; a

hub and disc carried thereby mounted on said sleeve for rotation therewith; a step locating device coacting with notches in the edge of said disc; a second disc mounted on said sleeve for rotation therewith; spaced contact buttons carried by the last named disc; a plurality of contact springs projecting into the path of movement of said buttons; said springs arranged to bring at least one thereof into contact with one of said buttons and others thereof out of contact at each step location of said revoluble parts.

5. An electric switch comprising, in combination: a casing having a removable cover, said casing and cover formed with opposite pairs of registering recesses; lead-in-wire and contact-spring-supporting bushings seated in said recesses; a pair of spaced contact springs carried by each of said bushings; a disc mounted in the casing to revolve in a plane parallel with the plane of said springs; electro-magnetically actuated means in the casing for causing step by step rotation of said disc; equidistantly spaced contact buttons carried by said disc and projecting from each surface thereof; said contact springs standing on opposite sides of said disc to be bridged by said buttons; said springs so spaced that the springs carried by one pair of bushings are bridged and those carried by the remaining pair are out of contact at each step of rotation of the disc and the circuit connections are changed at alternate steps.

6. An electric switch comprising, in combination: a casing having a removable cover; said casing and cover formed with a plurality of registering recesses; lead-in-wire and contact-spring-supporting bushings seated in said recesses; contact springs carried by said bushings; a recess centrally located in said cover; a lead-in wire and a contact-spring-supporting bushing in said recess; a contact spring carried by said bushing; a disc revolubly mounted in said casing; electro magnetically actuated means in the casing for causing step by step rotation of said disc; equidistantly spaced contact buttons carried by the perimeter of said disc; a contact button centrally located upon said disc in constant engagement with said spring contact carried by said centrally located bushing in said cover; and means to maintain constant electrical connection between said centrally located and said equidistantly spaced buttons.

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