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D. R. DE TAR

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ELECTRIC SWITCH MECHANISM

Original Filed Nov. 19, 1932

Fig. 1.

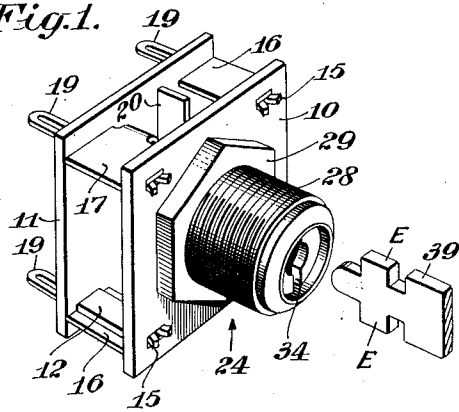


Fig. 2.

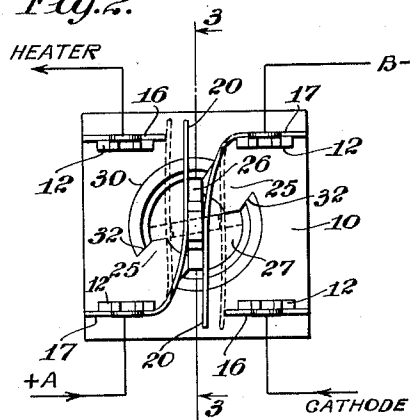


Fig. 3.

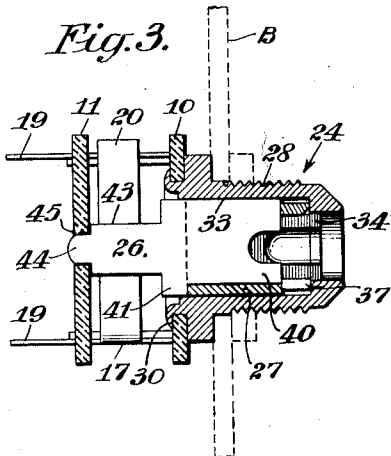


Fig. 4.

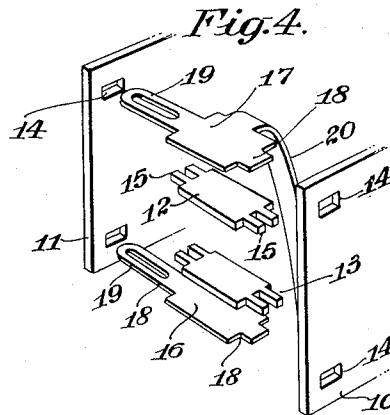


Fig. 5.

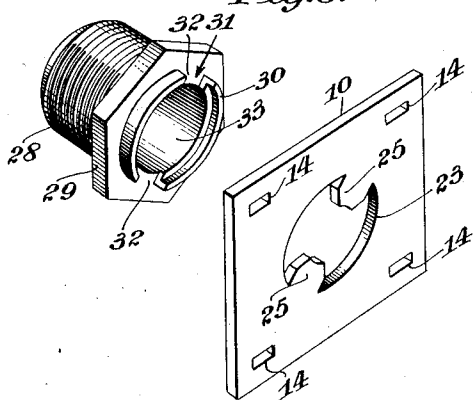
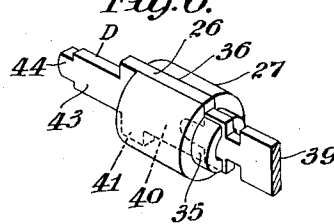


Fig. 6.



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UNITED STATES PATENT OFFICE

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ELECTRIC SWITCH MECHANISM

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13 Claims. (Cl. 200—42)

The present invention relates to electric switch mechanisms whereby two or more circuits may be opened or closed simultaneously and, more particularly, to an improved key-actuated switch mechanism which may be advantageously employed, for example, in connection with radio apparatus designed primarily for vehicle installations.

It is a primary object of the invention to provide an improved power supply switch for radio apparatus and the like, for example, which protects such apparatus against unauthorized use.

Another object of the invention is to provide an improved power supply switch which requires a special key for properly actuating the same.

A further object of the invention is to provide a key-controlled power supply switch, from which the key cannot be withdrawn until the switch is placed in "off" position.

Another object of the invention is to provide a key-actuated power supply switch whereby two or more circuits may be controlled simultaneously.

A further object of the invention is to provide a power supply switch as specified, which will maintain a plurality of circuits either in "off" or "on" condition, regardless of shock or vibration.

Another object of my invention is to provide a power supply switch as specified which is so constructed that its terminal connections are unobstructed and conveniently accessible.

A further object of my invention is to provide a power supply switch as specified, wherein the terminal connections are integral with the contact and contacting elements of the switch.

Another object of the invention is to provide a key-actuated power supply switch which is compact and simple in construction, comprises a minimum number of parts, is relatively cheap to manufacture, is neat in appearance, occupies a minimum amount of space, and which is highly efficient for the purposes for which it is designed.

With these and other objects in view, the invention resides in the novel construction, combination, and arrangement of parts, the novel features of which are set forth with particularity in the appended claims, the invention itself, however, both as to its organization and its method of operation, together with additional objects and advantages thereof, being best understood from the following description of a specific embodiment, when taken in connection with the accompanying drawing in which

Fig. 1 is a perspective view of my improved switch mechanism,

Fig. 2 is a plan view of the improved switch mechanism with the rear frame member removed, showing a plurality of circuit connections,

Fig. 3 is a vertical sectional view taken on the line corresponding to the line 3—3 in Fig. 2,

Fig. 4 is a fragmentary exploded perspective view illustrating certain structural features of the invention,

Fig. 5 is an exploded perspective view illustrating another structural feature of the invention, and

Fig. 6 is a perspective view illustrating the cooperative relationship between a portion of the switch mechanism and an actuating member therefor.

Referring more particularly to the drawing, wherein similar reference characters indicate corresponding parts throughout, my improved power supply switch comprises a pair of rectangular frame members 10 and 11 of suitable insulating material, which are secured together in spaced parallel relation by means of a plurality of tie bars 12 having shouldered end portions 13 that are adapted to be inserted in and passed through suitable openings 14 formed in each of the frame members 10 and 11 preferably adjacent each corner thereof.

In order that the tie bars 12 may be secured to the frame members 10 and 11 by means of the openings 14 therein, the reduced free end portions 13 of the tie bars 12 are slotted inwardly from their free ends to provide tines or prongs 15 which are adapted to be spread apart after the tie bars 12 have been properly located between the frame members 10 and 11 to clinch the prongs 15 firmly in the aforesaid openings 14. However, before the prongs 15 are spread apart, similar elements comprising two contact members 16 and two resilient contacting members 17 having similarly shouldered end portions 18, are assembled with the tie bars 12, with their reduced end portions 18 also disposed in the frame openings 14, as clearly shown in Fig. 4.

In this connection, it is to be noted that one shouldered end portion of each of the two contact members 16 and one shouldered end portion of each of the two resilient contacting members 17 is somewhat longer than the opposite reduced end portion thereof. These end portions, in the assembled switch, are adapted to project beyond the outer side of the rear frame member 11 to provide terminals 19 whereby wire connections may be conveniently made with the switch.

As clearly shown in Fig. 2, each resilient contacting member 17 is further provided with a flexible contacting arm or blade 20 which is bent substantially at right angles to the secured end portion by means of which the said members 17 are secured between the frame members 10 and 11. The flexible contacting arms 20 extend in opposite directions between the frame members 10 and 11 so that they may be moved, by means hereinafter described, into contacting relation with the contact members 16.

The frame member 10 is further provided with a central opening 23 whereby a lock assembly, generally indicated at 24, is suitably secured to the frame member 10. The peripheral edge which defines the opening 23 is interrupted by diametrically opposed, inwardly extending projections 25 which are adapted to serve as stop elements for limiting rotary movement of a switch actuating member 26 which forms a part of the lock assembly 24, for preventing rotary movement of the lock assembly 24 relative to the frame member 10 and for retaining a cylinder 27 within the lock assembly against endwise movement.

The lock assembly 24 comprises an outwardly threaded barrel member 28 having a flange 29 of hexagonal configuration formed on one end thereof whereby a switch mechanism of the character described may be mounted on a panel B, or the like, as shown in Fig. 3. The outer face of the hexagonal flange 29 is provided with a shoulder portion defining a collar 30 which is mutilated or divided by means of a slot 31 formed diametrically across the collar 30 to the full depth thereof to provide two diametrically opposite recesses 32 which are adapted to receive the projections 25 formed with the frame member 10, when the collar 30 is, in the assembly of the improved switch, inserted in the frame opening 23 and the divided portions of the collar 30 peened over to rivet the barrel member 28 fast to the frame member 10. The barrel member 28 is further provided with a bore 33 which terminates, adjacent its free end, in a restricted opening defined by a key slot 34, as clearly shown in Fig. 1.

The cylindrical member 27 is provided with a reduced end portion 35 and a longitudinal slot 36 which extends inwardly through its axial center to a point short of the total diameter thereof, the cylinder 27 being rotatably disposed in the bore 33 of the barrel member 28. However, before the member 27 is inserted in the bore 33 with its reduced end portion 36 foremost, a loose fitting split collar 37 is first positioned on the end portion 35 whereby the collar 37 is adapted to cooperate with the key slot 34 and the slot 36 to yieldably retain a key 39 which is adapted to be inserted in said key slot 34 to actuate the member 27 by means of the slot 36 therein.

The switch actuating member 26 is adapted to transmit motion from the cylinder 27 to the flexible blades 20 and consists of a flat section of insulating material, such as bakelite, for example, which is adapted to have one of its end portions 40 inserted in the slot 36 to a longitudinal depth limited by a projection 41 which defines a shoulder on one edge of and intermediate the ends of the member 26. The width of the said end portion 40 is such that it corresponds with the depth of the slot 36, as will be clearly understood from an inspection of Fig. 6. The opposite end portion of the member 26 is defined by two reduced portions 43 and 44, the former being adapted to act as a cam between the arms or

blades 20, whereby the said blades are moved into contacting relation with the respective side edges of the contact members 16. The remaining reduced free end 44 is adapted to project into a small opening 45 formed centrally in the frame member 11, whereby the cam portion 43 of the member 26 is supported in axial alignment.

One example of utilizing the improved switch in connection with a plurality of electron tube circuits is shown in connection with Fig. 2, wherein one set of contacts 16 and 17 is connected between an "A" supply circuit and the heater element of an electron tube, while the remaining set of contacts 16 and 17 are connected in a "B" supply circuit, preferably in the negative return lead to the cathode as indicated by the leads shown attached to the said contacts.

In the operation of my improved switch mechanism, the key 39 is inserted in the key slot 34 with a thrust sufficient to cause the side edges E thereof to slightly expand the split collar 37 until the said edges are within the collar 37, whereby frictional contact is maintained between the key 39 and the inner periphery of the collar 37 to prevent the dislocation of the key, when in "off" position in the slot 34, by extraneous shocks, vibrations, or other forces.

When the key 39 has been inserted in the key slot 34, as above described, and it is desired to place the improved switch mechanism in "on" position, the key is turned clockwise. This action causes the cylinder 27 and the switch actuating member 26 to be rotated in response thereto until the key 39 has moved through an arc of 90° in which position the projection 41 on the member 26 has engaged one of the inwardly extended projections 25 on the frame member 10 to limit clockwise movement of the key-actuated parts. During this quarter turn movement of the key 39, cylinder 27 and the switch actuating member 26, the intermediate reduced portion 43 of the member 26 acts as a cam against each of the resilient arms or blades 20 whereby said blades 20 are moved into contacting relation with the contact members 16 or in the position indicated by the broken lines in Fig. 2. In the above described position, the resilient arms or blades 20 are maintained in contacting relation with the contact members 16 by the engagement of the surfaces of the resilient arms 20 with the edges D of the intermediate reduced portion 43 of the switch actuating member 26.

In the counter clockwise movement of the key 39 to "off" position, the cylinder 27 and the switch actuating member 26 are similarly limited in their return movement to normal position by the engagement of the projection 41 on member 26 with the other inwardly extended projections 25 formed with the frame member 10 whereby the slot 36 in the cylinder 27 is again restored into registering position with the key slot 34, whereupon the key 39 may subsequently be withdrawn or permitted to remain in key slot 34 at the option of the operator.

Although one specific embodiment of the invention is shown and described, it is to be expressly understood that many modifications thereof are possible. The invention, therefore, is not to be restricted except insofar as is necessitated by the prior art and by the spirit of the appended claims.

I claim as my invention:

1. A lock switch for simultaneously controlling a plurality of electrical circuits, said switch comprising a support, a plurality of make and break

elements mounted on said support, said elements acting to constantly assume circuit breaking relation, and key-controlled means comprising a cylinder having a slot therein passing through the axis thereof and a nonconductive coupling member in said slot cooperating with said support and said elements respectively for simultaneously bringing each of said elements into circuit-making relation.

2. A lock switch for simultaneously controlling a plurality of electrical circuits, said switch comprising a support, a plurality of make and break elements mounted on said support, said elements including resilient members acting to constantly assume a circuit breaking position, key-controlled means comprising a cylinder having a slot therein passing through the axis thereof associated with said support, and a coupling member of insulating material disposed in said slot and in co-operative relation with said resilient members for simultaneously moving each of said resilient members against the action thereof into circuit-making position in response to said key-controlled means.

3. A lock switch for simultaneously controlling a plurality of electrical circuits, said switch comprising a support, a plurality of make and break elements mounted on said support, said elements including resilient members acting to constantly assume a circuit breaking position, key-controlled means comprising a cylinder having a slot therein passing through the axis thereof associated with said support and a cam member of insulating material disposed in said slot with one end portion thereof extending between said elements and movable relative thereto for simultaneously moving each of said resilient elements against the action thereof into circuit breaking position, and means for limiting the movement of said key-controlled means.

4. In a device of the character described, a plurality of inter-related circuit controlling elements, a cylinder having a slot therein passing through the axis thereof and a non-conductive cam member disposed in said slot including a key for actuating said cylinder cooperatively associated with said elements, and annular spring means associated with said cylinder whereby said key is yieldably retained in said cylinder when in neutral position.

5. In combination, a switch comprising contact members and resilient contacting members adapted to control a plurality of circuits simultaneously, key actuated lock means including a cylinder having a slot therein passing through the axis thereof and a non-conductive cam member disposed in said slot associated with said switch for controlling said resilient contacting members, said cam member being co-axial with said cylinder and extending between said resilient contacting members whereby said contacting members may be flexed into contacting engagement with said contact members upon operation of said lock.

6. In combination, a switch comprising a pair of frame members, a plurality of cooperatively related contact and contacting members positioned between said frame members, spacing means connecting said frame members in spaced parallel relation, a lock including a key actuated cylinder having a slot therein passing through the axis thereof and a non-conductive cam member disposed in said slot secured to one of said frame members, said cam member being co-axial

with said cylinder and extending between said contacting members whereby said members are moved into engagement with said contact members in response to movement of said cylinder, and means for limiting the movement of said cam member.

7. In combination, a switch comprising a pair of frame members, a plurality of cooperatively related contact and contacting members positioned between said frame members, spacing means connecting said frame members in spaced parallel relation, a cylinder lock including a cylinder having a slot therein passing through the axis thereof, a non-conductive cam member disposed in said slot and a detachable key therefor secured to one of said frame members, said cam member being co-axial with said cylinder and extending between said contacting members for moving said contacting members into engagement with said contact members in response to rotation of said key, and means carried by one of said frame members for limiting rotation of said cam member.

8. A lock switch for simultaneously controlling a plurality of electrical circuits, said switch comprising a pair of spaced parallel supports, a key-actuated lock carried by and extending through one of said supports centrally thereof, and a plurality of make and break elements positioned between said supports, said elements including two substantially parallel resilient arms acting to constantly assume a circuit breaking position, said lock comprising a cylinder having a slot therein passing through the axis thereof and a non-conductive cam member disposed in said slot and extending between said arms whereby each of said arms may be moved against the action thereof into circuit making position when said lock is actuated, and yieldable means associated with said cylinder whereby a key for said lock is yieldably retained in said slot when in neutral position.

9. A lock switch for simultaneously controlling a plurality of electrical circuits, said switch comprising a pair of supports inter-connected in spaced parallel relation, a pair of contact elements and a pair of resilient contacting elements positioned between said supports, said resilient elements acting to constantly assume a non-contacting position with respect to said contact elements, a key-actuated lock carried by and extending through one of said supports centrally thereof, a rotatable cylinder in said lock having a slot therein passing through the axis thereof, and a cam member of insulating material disposed in said slot with its inner free end portion extending between said resilient elements whereby said resilient elements may be moved against the action thereof into engagement with said contact elements when said lock is actuated, said contact elements and said resilient contacting elements each having one of their ends extended through one of said supports to provide a plurality of terminal connection members.

10. In a lock switch for controlling a plurality of electrical circuits, a barrel member provided with means defining an end opening having such contour as to permit the insertion therein of a key having a pre-determined shape, means providing a circumferential channel in the interior of said barrel member, a spring disposed in said channel and adapted to resiliently hold a key in place subsequent to insertion thereof

through the end opening and a plurality of circuit terminals arranged to be controlled by said key.

11. In a lock switch for controlling a plurality of electrical circuits, a barrel member provided with means defining an end opening having such contour as to permit the insertion therein of a key having a predetermined shape, means providing a circumferential channel in the interior of said barrel member, a spring disposed in said channel and adapted to resiliently hold a key in place subsequent to the insertion thereof through said end opening, and switch controlling means within said barrel member arranged to be actuated by said key.

12. A lock switch for controlling a plurality of electrical circuits comprising a plurality of switch elements and a barrel member, said member being provided internally with an annular shoulder, means within said barrel member spaced from said shoulder whereby to provide

an annular channel, a key adapted to be received within said barrel member to control said switch elements, and spring means disposed in said channel and adapted to contact with and resiliently hold said key in place subsequent to insertion thereof in said barrel member.

13. In a lock switch for controlling a plurality of electrical circuits, a barrel member, means disposed within said barrel member adapted to control said switch, means associated with said barrel member defining an end opening having such contour as to permit the insertion therein of a key having a predetermined shape whereby said first named means may be actuated to control said switch, means providing a circumferential channel in the interior of said barrel member, and a spring disposed in said channel adapted to yieldably retain said key in place subsequent to the insertion thereof through said end opening.

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