V. G. APPLE.

SWITCH.

APPLICATION FILED OCT. 26, 1914.

1,155,121.

Patented Sept. 28, 1915.

2 SHEETS—SHEET 1.

Fig. 1.

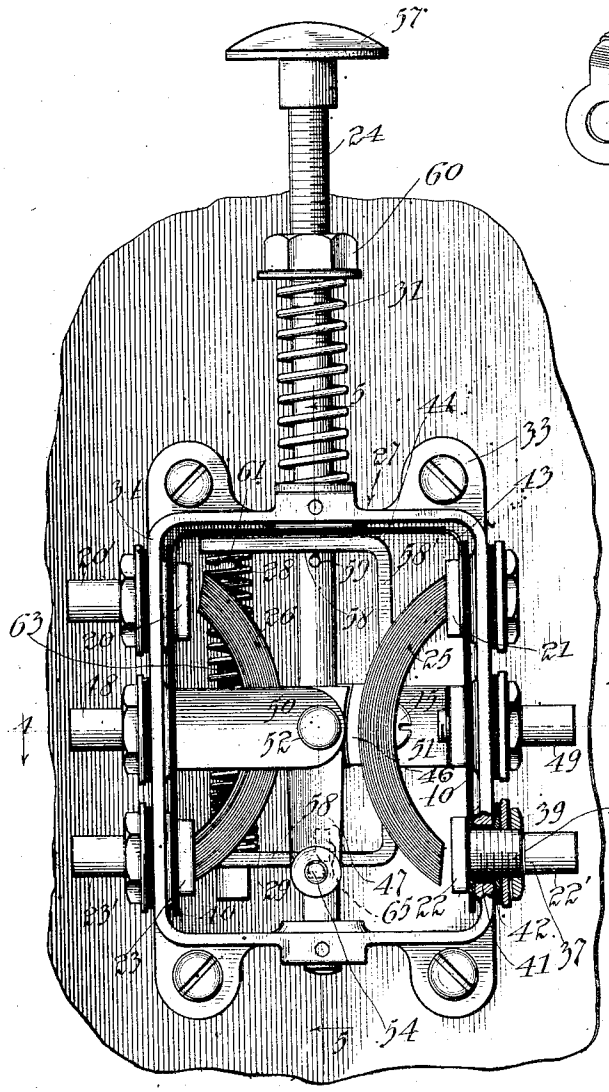


Fig. 3.

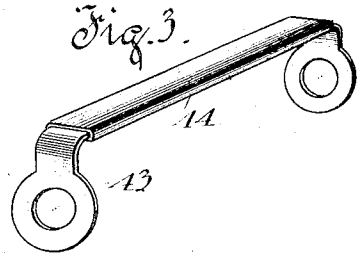
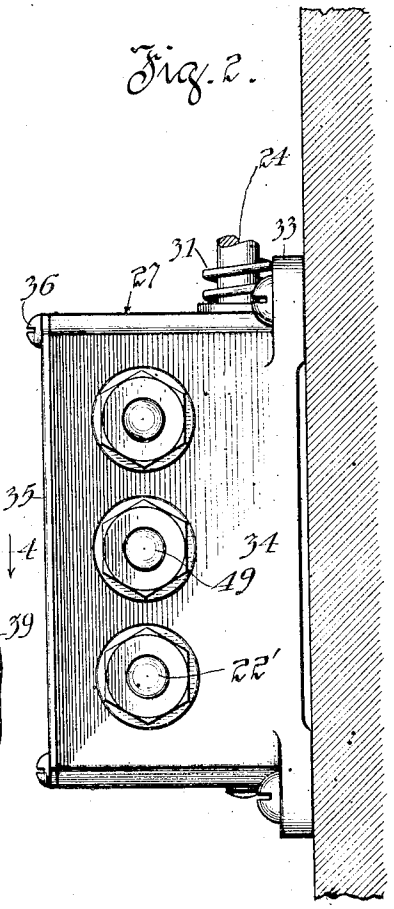


Fig. 2.



Witnesses

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2 SHEETS—SHEET 2.

Fig. 4.

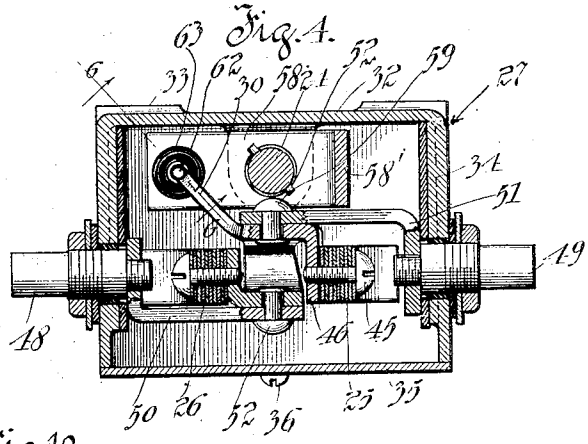
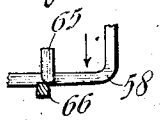


Fig. 9.



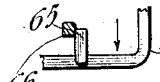


Fig. 10.

Fig. 11.

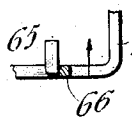


Fig. 12.

Fig. 5.

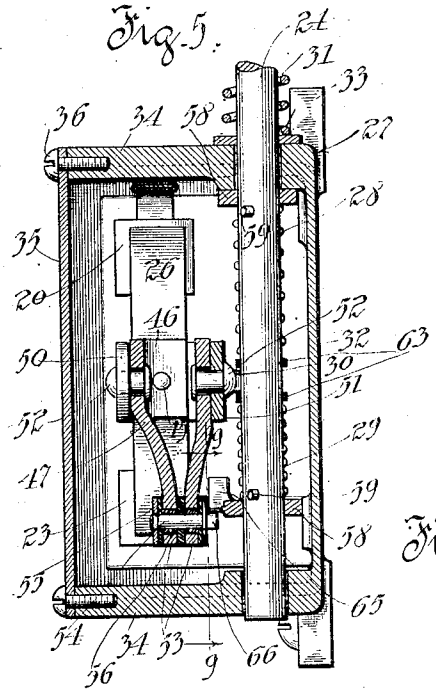


Fig. 6.

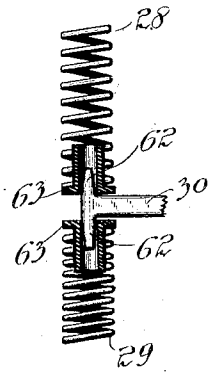


Fig. 7.

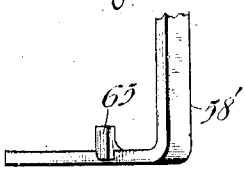


Fig. 8.

Witnesses

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UNITED STATES PATENT OFFICE.

VINCENT G. APPLE, OF DAYTON, OHIO.

SWITCH.

1,155,121. Specification of Letters Patent. Patented Sept. 28, 1915.

Application filed October 26, 1914. Serial No. 868,582.

To all whom it may concern:

Be it known that I, VINCENT G. APPLE, a citizen of the United States, residing at Dayton, in the county of Montgomery and State of Ohio, have invented certain new and useful Improvements in Switches, of which the following is a specification.

This invention relates to improvements in switches and more particularly to a pedal operating push switch that may be used in connection with gas engine electrical self starting apparatus.

One of the objects of my invention is to provide a weather proof, positive, efficient switch adapted to carry a comparatively heavy current in which the depression or release of a vertically sliding plunger causes a quick, snappy break of the connections previously made and almost simultaneously therewith the quick positive making of other connections.

Another object of my invention is to provide such a device in which the movable switch parts travel through a comparatively small distance although the operating plunger itself travels through a considerably greater range to cause the proper action of the switch.

Another object of my invention is to eliminate delicate and small parts, such as easily become deranged. Switches of this character are necessarily subjected to harsh and severe treatment and it is essential, therefore, that such a switch be simple, not likely to get out of order but if broken or deranged, easily repaired.

Other and further objects will become apparent from the following description when taken in combination with the drawings, wherein:

Figure 1 is a front elevation of my improved switch with the cover plate removed. Fig. 2 is a side elevation of the same. Fig. 3 is a perspective view of a connecting strip. Fig. 4 is a transverse sectional view on the line 4—4 of Fig. 1. Fig. 5 is a vertical sectional view on the line 5—5 of Fig. 1. Fig. 6 is an enlarged detail of the springs for actuating the movable switch parts. Fig. 7 is an enlarged perspective detail of the plunger operated latch. Fig. 8 is an enlarged detail view of the pin carried by the movable switch member for coöperation with the latch shown in Fig. 7. Figs. 9 to 12 inclusive are diagrammatic views of the latch parts in various positions.

In all of the views the same reference characters are used to designate similar parts.

The device is of a type which may be characterized as a four contact plunger operated switch. The four contacts 20, 21, 22 and 23 are positioned at the corners of a rectangular box like casing 27 and normally when the plunger 24 is spring held in its uppermost position, two contacts 21, 23 diagonally opposite each other, are engaged by the blades or brushes 25, 26, these two contacts being broken and the other two 20, 22, completed when the plunger is depressed.

Two alining and opposing coil springs 28 and 29 are positioned in the casing, their outer ends being carried by a part secured to the plunger and their adjacent ends connected with a lever 30 carried by the moving part of the switch. When the plunger is depressed, the upper spring 28 is compressed and therefore tends to swing the lever 30 into its lower position causing the brushes to engage contacts 20, 22. When the pedal is released it moves upwardly under the influence of its heavy coil spring 31 and the lower spring 29 of the pair of opposed springs compressed throws the end of the lever upwardly carrying the operating part of the switch into the position illustrated in Fig. 1, and holding the brushes 25 and 26 tightly against the contacts 21, 23.

Obviously in a switch of this character it is essential that the contacts be made and broken with a quick, decisive movement of the switch parts so as to prevent arcing and burning away of the contact surfaces. To insure this I have provided in my switch a latch device, carried by the operating plunger which holds the switch parts in the last assumed position until the plunger has neared the end of its throw, in whichever direction it may be moving, when the latch releases and permits whichever one of the springs, 28 or 29 is compressed to throw the switch to the desired position.

Having outlined the principal parts and general functions of my improved switch, I will now describe more in detail its structural features.

The entire mechanism is contained within a rectangular casing 27, having a base portion 32, carrying lugs 33 by means of which the casing can be securely mounted on a part of the frame or foot board of a motor car. The side walls 34 of the casing extend out-

wardly from the base 32 forming an inclosed box like structure over the open face of which is secured a cover plate 35 by means of the screws 36.

The four contact points 20, 21, 22 and 23 are positioned in opposite side walls of the casing in pairs at diagonally opposite ends. A portion of the lower right hand corner of the casing, in Fig. 1, is shown broken away for the purpose of illustrating the terminal structure. It will be noted that the contact head 22 is carried at the inner end of a rod 37, the outer end 22′ of the rod being cylindrical to serve as a binding post and the inner portion threaded at 38 for coöperation with a clamping nut 39. An insulating strip 40 is placed against the inner face of each of the side walls and protects the heads or contacts 20, 21, 22 and 23 from the metal of the casing. A bushing 41 surrounds the rod 37 where it passes through the opening in the casing and a fiber washer 42 is placed between the outer wall of the casing and the nut 39. I have indicated the binding posts for the contacts 20, 22 and 23 by the same numerals with the exponent prime mark (′) (20′, 22′, 23′). Contact 21 is not provided with a binding post but is electrically connected with contact 20 by means of the metallic strip 43 positioned within the casing and covered with insulating material 44.

The movable part of the switch comprises the two arcuate brushes 25, 26 with their ends positioned to make connection with the contacts 20, 21, 22, and 23. These brushes are mounted at their centers by means of screws 45—45, upon the inwardly extending legs 46—46 of the arms 47—47. Binding posts 48 and 49 positioned in the opposite side walls of the casing midway between the contacts 20—23 and 21—22 carry at their inner ends, instead of contact heads, a pair of brackets 50—51 in which are secured pins 52—52 upon which are pivoted the arms 47—47 at the center of the casing. From the above it will be obvious that the brushes 25, 26 are pivotally mounted within a frame so as to swing as a unit about the axially alining pins 52—52 as an axis.

In order to connect the two brushes mechanically and make them operate simultaneously I have extended the arms 47—47 downwardly and adjacent to one another at their lower ends 53—53 and connected them by means of a pin 54, electrically insulating them by means of fiber washers 55 and fiber bushings 56. Oscillation of the brushes about the pivot 52 causes movement of the pin 54 through a slight arc about 52 as a center.

The operating plunger 24 passes vertically through openings in the upper and lower walls of the casing and carries at its upper end a foot button 57. The plunger 24 pierces the parallel legs 58 of a wide U-shaped bracket 58′ positioned within the casing and is secured thereto by means of the pins 59—59 which extend through the rod at the inner sides of each of the legs. A heavy coil spring 31 bearing at its lower end against the upper wall of the casing and at its upper end against the nut 60, screw threaded on the plunger 24, normally holds the same in its uppermost position, insuring a positive return to normal position when pressure on the button 57 is released.

The free end of the legs 58—58 of the U-shaped bracket carry inwardly extending lugs 61—61 fitting within the outer ends of the previously described springs 28 and 29. The lever 30 extends from one of the two arms 47—47 and at its outer end is provided with oppositely extending prongs 62—62 fitting within the fiber thimbles 63—63 which in turn engage the inner ends respectively, of the oppositely positioned coil springs 28 and 29.

From so much of the apparatus as has already been described it will be evident that when the plunger 24 is depressed carrying with it the U shaped bracket 58′ the upper spring 28, of the pair of opposed coil springs, will be compressed throwing downwardly the lever 30 and consequently swinging the brushes 25, 26 about their pivot pins 52—52 into such position as will cause their diagonally opposite ends to engage with contacts 20 and 22. Releasing the plunger 24 permits the spring 31 to raise the same, compressing the spring 29 and bringing the outer end of the lever upwardly, oscillating the brushes 25, 26 about their pivots into the position shown in Fig. 1, with their diagonally opposite ends in engagement with contacts 21, 23. In each instance, however, were no other apparatus provided, the movement would be comparatively slow and the snappy, quick, making and breaking of the circuit, so desirable in apparatus of this kind, would not be present. To overcome this slow, sluggish action I have provided a latching device for holding the switch post in its previously assumed position until one or the other of springs 28—29 have been compressed to a considerable extent. The latch comprises a rectangular shaped lug 65 carried by the lower of the two arms 58 of the U-shaped bracket 58′. This lug is adapted to engage with a projecting portion 66 of the pin 54 carried at the lower end of the two arms 47—47.

The operation of the latching device is best understood by reference to the diagrammatic views numbered 9 to 12 inclusive. In Fig. 9 the latch parts are shown in normal position, the plunger being at the upper end of its stroke. As the lug 65 is moved downwardly by the plunger the upper coil spring 28 is depressed and its action therefore tends to throw the pin 66 to the right. Movement

of the pin 66 to the right is prevented by engagement with the lug 65 and the energy of the spring 28 is therefore stored until the upper end of the lug 65 has passed beneath the pin 66 when it is permitted to fly across the path of the lug just after passing the point indicated in Fig. 10. The upper spring 28 being under pressure the switch blades will be held in engagement with contacts 20—22. As pressure upon the foot button 57 is released, the U 58 will move upwardly under the influence of heavy spring 31 carrying with it the latch 65. On the upward movement of the U shaped bracket 58 the lower spring 29 will be compressed, and its pressure will be exerted in an endeavor to press the pin 66 to the left of the position shown in Fig. 12. Such movement is resisted by its engagement with the upwardly moving latch 65 until it reaches a point near the end of its stroke just after passing the position indicated in Fig. 12. The pin 66 is then permitted to fly past the end of latch 65 under the influence of the stored energy of spring 29 breaking circuit between brushes 25—26 and contacts 20—22 and causing the brushes to engage contacts 21—23.

Having described my invention, what I claim is:—

1. A switch comprising an actuating member, a movable switch blade, a lug projecting therefrom, contacts for said blade, a resilient connection between the actuating member and blade and a latch carried by the actuating member and on its movement in one direction engaging one side of said lug to lock the switch blade from movement until the said member nears the end of its stroke, and on the movement of the said member in the opposite direction engaging the opposite side of said lug to prevent movement of the blade until the member nears the end of its stroke in the return direction.

2. A switch comprising an axially movable plunger, a pivotally mounted switch blade, an insulating lug projecting therefrom, contacts adapted to be engaged by the switch blade, a pair of alining coil springs secured at their outer ends to said plunger, a lever extending from said switch blade to one side of the axis thereof and in engagement with the adjacent ends of said springs, and a latch carried by the plunger for engagement with said lug to lock the blade from movement until the plunger nears the end of its stroke.

3. A switch comprising a casing, an axially movable plunger extending into said casing, a switch blade pivotally mounted within the casing, contacts supported in the walls of the casing and adapted to be engaged by the switch blade, binding posts for said contacts extending outside of the walls of the casing, a pair of alining coil springs positioned within the casing and secured at their outer ends to a portion of said plunger, a lever extending from the switch blade to one side of its axis and in engagement with the adjacent ends of said spring, and a latch carried by the plunger for engagement with a portion of said switch blade to lock the blade from movement until the plunger nears the end of its stroke.

4. A switch comprising an axially movable plunger, a pivotally mounted switch blade, contacts adapted to be engaged by the switch blade, parallel arms extending from said plunger, a pair of alining coil springs secured at their ends to said arm, a lever extending from said switch blade to one side of its axis and positioned between the adjacent ends of said spring, substantially as and for the purpose set forth.

5. A switch comprising a U-shaped switch actuating member, a pair of alining coil springs within the open end of the U-shaped member and secured at their outer ends to the said member, a pivotally mounted switch blade, contacts adapted to be engaged by the switch blade, a lever extending from said switch blade to one side of its axis and positioned between the adjacent ends of said springs, and a latch carried by the U-shaped member for engagement with a portion of the switch blade to lock the same from movement until the U-shaped member nears the end of its stroke.

6. A switch comprising an actuating member, a rectangular inclosing casing, four contacts positioned in opposite side walls of the casing, a switch blade adapted to make contact with either one or the other of one pair of contacts, a second switch blade adapted to make contact with either one or the other of the second pair of contacts, said blades being pivotally mounted upon the same axis, a resilient connection between the said blade and the actuating member, and a latch mechanism for locking said blades from movement until the actuating member nears the end of its stroke.

7. A switch comprising an actuating member, a switch blade structure including oppositely positioned arcuate blades mechanically pivoted upon a single axis, but electrically insulated one from the other, contacts for the opposite end of the switch blade, a resilient connection between the blade structure and the actuating member and a latch mechanism for locking said blade from movement until the actuating member nears the end of its stroke.

8. A switch comprising an actuating member, a switch blade structure including oppositely positioned arcuate blades, pivotally mounted upon a common axis, a pair of axially alining coil springs secured at their outer ends to said actuating member,

an insulated lever extending from the switch blade structure between the inner ends of the said coil springs, an insulated lug projecting from the switch blade structure, and a latch carried by the actuating member for engagement with said lug to lock the blade structure from movement until the actuating member nears the end of its stroke.

9. A switch comprising an inclosing casing, contacts on opposite side walls thereof, a blade structure comprising a pair of blades adapted to engage said contacts, brackets projecting inwardly from said opposite side walls, a blade carrying arm pivoted to each bracket on a common axis, electrically insulated means mechanically connecting said arms and means for actuating said blade structure.

In testimony whereof I hereunto set my hand in the presence of two subscribing witnesses.

VINCENT G. APPLE.

In the presence of—
FORÉE BAIN,
MARY F. ALLEN.