

V. G. APPLE.
SWITCH.
APPLICATION FILED JUNE 8, 1914.

1,132,997.

Patented Mar. 23, 1915.

2 SHEETS—SHEET 1.

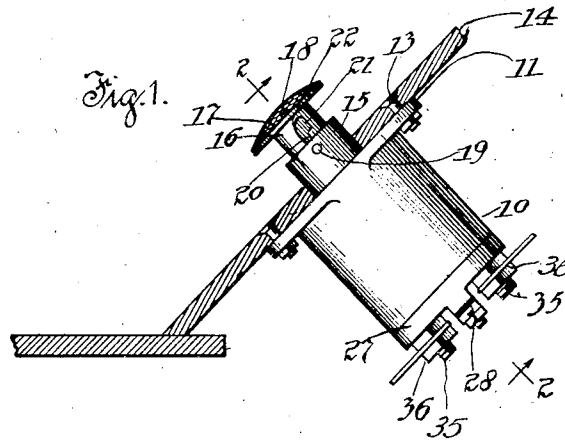


Fig. 2.

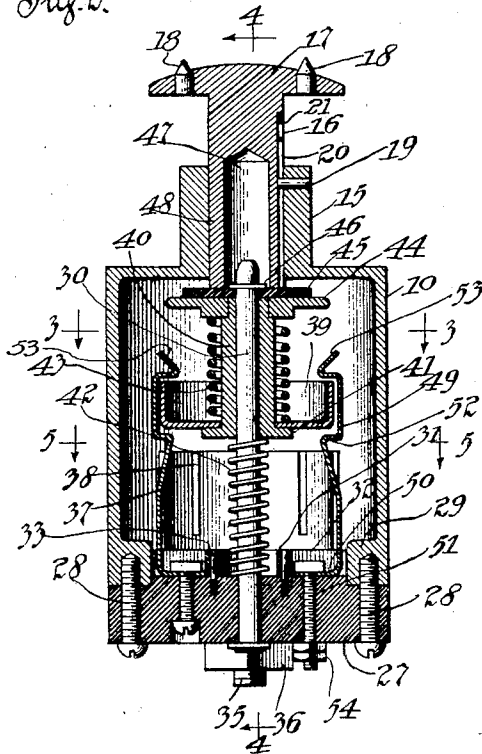
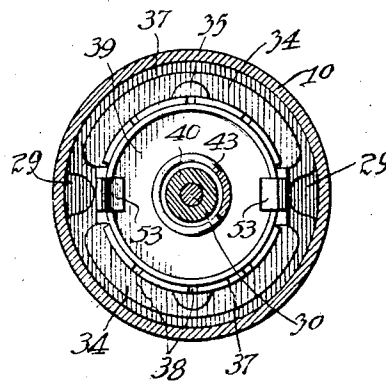


Fig. 3.



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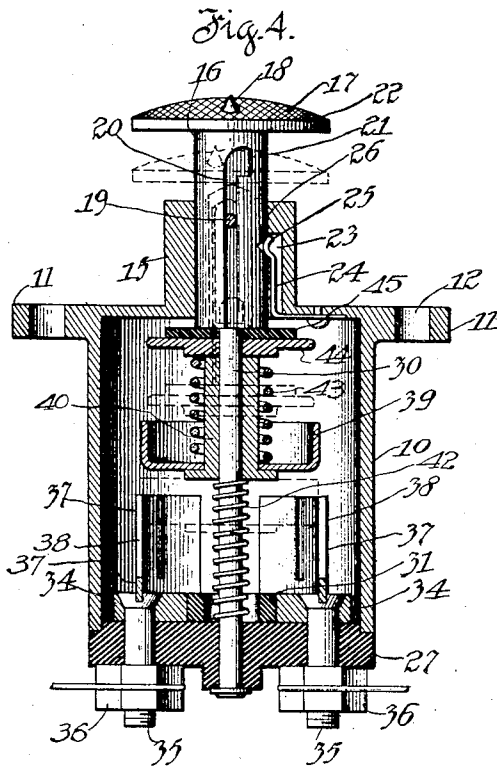
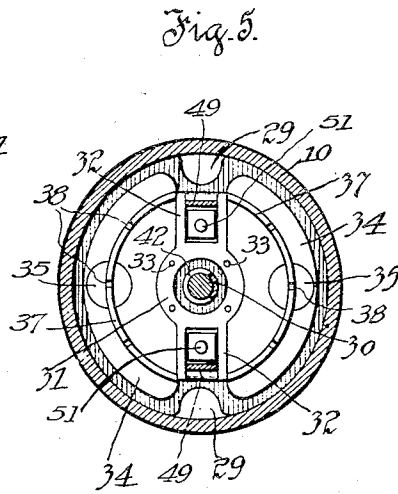
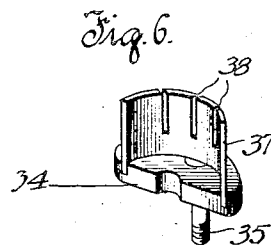
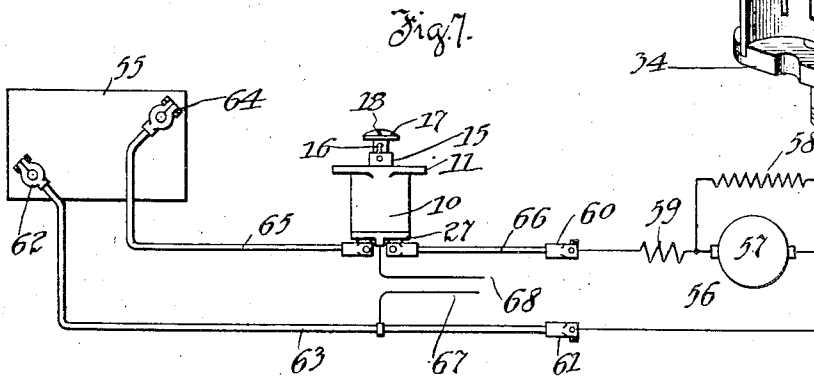
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2 SHEETS-SHEET 2.



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UNITED STATES PATENT OFFICE.

VINCENT G. APPLE, OF DAYTON, OHIO, ASSIGNOR TO THE APPLE ELECTRIC COMPANY,
OF DAYTON, OHIO, A CORPORATION OF OHIO.

SWITCH.

1,132,997.

Specification of Letters Patent.

Patented Mar. 23, 1915.

Application filed June 8, 1914. Serial No. 843,758.

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 compact, weatherproof switch adapted for use in connection with an electrical apparatus for starting gas engines.

One of the objects of my invention is to provide a simple, compact switch inclosed in a weatherproof casing, adapted to carry a heavy current and having a quick snappy make and break action.

Another object of my invention is to provide such a switch adapted for connection in an electric starting system for gas engines wherein the storage battery is connected directly across the dynamo terminals, the switch being of the double contact single pole type and connected directly in one of the main feed wires.

Another object of my invention is to provide such a switch for directly connecting the storage battery to the dynamo and simultaneously connecting the ignition circuit to condition the same for operation of the gas engine.

Still another object is to provide such a switch for operation by a foot pedal which on being pressed inwardly for closure of the contacts automatically locks itself and is releasable only on a partial rotation of the pedal member.

Other and further objects will become apparent to those skilled in the art from a consideration of the following description and drawings, wherein:

Figure 1 is a side elevation of my improved switch showing it mounted upon the foot board or instrument board of an automobile. Fig. 2 is a longitudinal sectional view on the line 2—2 of Fig. 1. Fig. 3 is a transverse sectional view on the line 3—3 of Fig. 2. Fig. 4 is a longitudinal sectional view on the line 4—4 of Fig. 2. Fig. 5 is a transverse sectional view on the line 5—5 of Fig. 2. Fig. 6 is a perspective view of one of the switch blades, and Fig. 7 is a diagrammatic representation of my dynamo, battery

and ignition circuit with the switch connected in one of the main feed wires.

Referring to the drawings the numeral 10 indicates a cylindrical shell or casing provided at its upper end with diagonally opposite lugs 11 flush with the upper end of the cylinder and having apertures 12 to receive the bolts 13, by means of which the switch is secured to a support such as the instrument board 14. A tubular head 15 extends a short distance from the upper end of the cylinder 10 and is bored out to receive a removable plunger 16 by means of which the switch is operated.

The plunger 16 is provided at its outer end with a head 17 having spiked inserts 18 in order that the operator's shoe may positively engage with the head and rotate the same for unlocking the switch. The locking mechanism comprises a pin 19 extending through the tubular head 15 into the opening within which the plunger 16 reciprocates and engaging a longitudinal slot 20 in the wall of the plunger 16, the outer end of the slot 20 having an offset recess 21 provided at its outer end with a curved or cam shaped end wall 22. As the plunger 16 is forced into the head 15, the pin 19 being in engagement with the slot 20 it is apparent that when the end of the slot reaches the pin the latter will engage with the cam shaped wall 22 and cause the partial rotation of the plunger 16 throwing the offset recess of the slot 21 around the pin. When the operator removes his foot from the pedal, the plunger is pressed outwardly by the action of a spring and the shoulder provided by the offset recess 21, engages with the pin 19 and locks the plunger in position. To unlock the plunger and permit the action of the spring to push it outwardly a partial rotation is necessary in order to carry the offset recess of the slot 21 out of engagement with the pin and to move the slot 20 into alignment therewith.

A part of the inner wall of the head 15 is cut away at 23 to receive the leaf spring 24, the free end of which is hooked at 25, to engage a notch 26 cut in the plunger 16 at a point where it registers with the spring when the plunger is in its outer position and the switch contacts separated. This is to prevent the plunger 16 from accidental re-

moval from the head 15 by vibration. If the operator wishes to lock the switch in its "off" position, the plunger may be pulled out of the head 15 by applying sufficient pressure to slip the spring head 25 out of the notch 26.

A disk like head or base 27 of insulating material closes the inner open end of the cylinder 10 and is secured thereto by the two screws 28 which take into tapped openings in the lugs 29 carried at the inner wall of the cylindrical shell 10. The switch proper, together with its operating mechanism, is carried entirely upon the insulating head 27 so that when the screws 28 are removed, the entire switch with its various assembled parts may be removed intact from the cylindrical shell 10 for inspection or repair.

A post 30 is secured at its lower end in a central opening in the insulating head 27 and extends axially upward into the shell 10 to a point where the head 15 joins the shell. An annular ring 31 of insulating material is positioned upon the inner face of the head 27, spaced slightly away from the post 30, and is provided with diametrically oppositely extending slotted wings 32. This ring, together with its wings in the present instance, is made in a removable piece secured to the head 27 by the pins 33, though it is obvious that the same may be made integral with the head if so desired. A pair of metallic sectors 34 are positioned upon the inner face of the insulating head 27 at each side of the dividing line formed by the slotted wings 32 by means of the bolts 35 secured at their heads to the sectors. These bolts 35 extend outwardly through the insulating head 27 and carry the nuts 36 providing terminal contacts for the switch. Upwardly extending arcuate plates or blades 37 slotted as at 38 to provide flexibility are secured at their lower ends in arcuate slots in the sectors 34 and provide the two opposite contacts or poles for the switch. A metallic cup shaped switch member 39 is slidable on the post 30 and when forced downward, in a manner to be described, makes a tight fit within the arcuate blades 37 closing the switch.

A thimble 40, slidable upon the post 30, is flanged outwardly at its lower end 41, providing an abutment for the cup-shaped switch member 39 which is slidably movable on the body part of the thimble. An open spring 42 surrounds the post 30 and is positioned between the lower face of the flange 41 of the thimble and the inner face of the insulating head 27. This yieldingly holds the thimble in its uppermost position carrying with it the cup shaped switch member 39. A second open spring 43 considerably stiffer than the spring 42 surrounds the thimble 40 abutting at its lower end against the cup shaped switch member 39 and at its

upper end against a metallic disk 44 secured upon the upper end of the thimble. An insulating washer 45 is positioned over the disk 44 and a locking ring or key 46 engaging the upper end of the post 30 locks the above described parts from slipping up over the end of the post.

The plunger 16 is centrally bored as at 47 to receive the upwardly extending end of the post 30 and the tubular inner end 48 of the bored out plunger engages the upper surface of the insulating washer 45 thus permitting inward movement of the plunger 16 to be transmitted to the switch member. Obviously an inward pressure upon the plunger 16 forces downward the cup shaped switch member 39 into engagement with its opposite switch members 37, closing the circuit.

In order that the making and breaking action of the switch may be positive, snappy and quick in its action, eliminating sparking and burning of the contact surfaces such as would result from a slow make and break, I have provided two upwardly extending leaf springs 49 bent over at their inner ends 50 to lie within the slotted wings 32. The bolts 51 take through openings in the inner ends 50 of the leaf springs and openings in the insulating head 27, securing the leaf springs 49 in proper position. The upper ends of the springs 49 are provided with shoulders 52 positioned somewhat above the upper end of the switch members 37 and extending inwardly sufficiently far to engage with the cup-shaped switch member 39 normally locking the same up away from the blades 37. The extreme upper ends of the leaf springs 49 are turned outwardly, as at 53, so that when the annular disk 44 is forced inwardly upon the post 30, by the plunger 16, it will engage with the outwardly turned ends 53 of the leaf springs forcing them apart and permitting the cup shaped switch member 39 to pass beyond the shoulders 52 and engage with its opposite switch members 37.

The operation of the device is as follows. Normally the spring 42 presses the cup shaped switch member 39 upwardly upon the post 30 above the leaf spring shoulders 52 and out of contact with its opposite switch members 37. As the plunger 16 is pressed inwardly by the operator's foot the metal disk 44 is pressed downward compressing the spring 43. Obviously the pressure upon the cup shaped switch member 39 forces it against the shoulders 52 of the leaf springs 49 which however hold the switch member from downward movement of the post 30 until the disk 44 contacts with the outwardly turned ends 53 of the leaf springs spreading them apart and permitting the compressed spring 43 to force downward the cup shaped switch member 39 with a rapid,

snappy action into contact with the opposite switch members 37. Obviously the spring 43 is compressed a considerable degree before the leaf springs are separated and the closure of the switch contacts is therefore very rapid and burning and sparking is prevented. Inward movement of the plunger 16 causes the engagement of the pin 19 with the cam shaped end wall of the slot 22, partially rotating the plunger until it engages with the offset recess 21 of the slot, and when the operator's foot is removed from the pedal, the pedal is thereby locked in position with the switch in engagement. When the operator wishes to open the switch, the plunger 16 is partially rotated until the pin 19 is in alignment with the slot 20 and the spring 43 no longer being held in compression permits the spring 42 to act upon the inner end of the thimble 41 which carries the cup shaped switch member 39. The first action of the spring in forcing upwardly against the cup shaped switch member 39 is to press the same into engagement with the under sloping surfaces of the shoulders 52 of the leaf springs 49. These resist for a time the action of the spring 42 until it overpowers the leaf springs, forcing them outward and permitting the accumulated force of the spring 42 to suddenly shoot the thimble 40 upward upon the post 30 quickly separating the cup shaped switch member 39 from its coacting switch members 37. The result is a quick, snappy break, eliminating sparking and burning of the contacts. Whereas the switch is primarily designed as a double contact single pole switch for connecting and disconnecting a circuit including a battery and dynamo I have also provided the outer end of one of the bolts 51, which secure the leaf springs upon the insulating head 27, with nuts 54 to which one side of the ignition circuit may be connected.

The circuit diagrammed in Fig. 7 comprises a storage battery 55 and a dynamo 56 having an armature 57, shunt field 58, series field 59, and terminals 60 and 61. The terminal 62 of the storage battery is connected directly by the main conductor 63 to the terminal 61 of the dynamo and the other terminal 64 of the storage battery is connected by the wire 65 to one side of the switch, the other side of the switch is connected through the wire 66 to the terminal 60 of the dynamo. I have not deemed it necessary to show in detail the ignition circuit but have shown only two of the wires extending thereto and numbered 67 and 68. One of the wires of the ignition circuit 67 is connected directly to the feed wire 63 and the other wire 68 is connected to the terminal 54 of the switch. Closure of the switch thus directly connects the battery 55 across the terminal of the dynamo 56 and at the same time connects

the wires 67 and 68 of the ignition circuit across the terminals of the battery.

This system and switch is designed primarily for the purpose of eliminating all unnecessary parts in order to provide an inexpensive and simple equipment for self starters for automobiles of the cheaper variety in which an expensive and complicated system cannot be installed, because of the initial low cost of the car. I have succeeded in this system in eliminating everything but a plain dynamo motor with series and shunt fields and single armature windings, to operate at low voltage, a double contact single pole starting switch and a two terminal storage battery. It has been actually demonstrated that a system of this nature will satisfactorily operate in connection with low powered automobiles, without the necessity of complicated and intricate controlling and regulating mechanism. Even at low car speed, as for example eight to ten miles an hour the loss from the battery is practically nothing for the reason that the bucking series windings tend to build up the dynamo field in the right direction even at low speed.

My copending application entitled Automobile self starting systems, Serial No. 843,758, filed June 8th, 1914, relates more particularly to this system and illustrates and describes the same in detail.

It is obvious that various changes may be made in the apparatus and system without departing from the spirit and scope of my invention.

Having described my invention, what I claim is:—

1. In a switch the combination of a base part; a post, secured therein; switch blades, carried by said base; a switch member, slidable upon the post and adapted to engage with said switch blades; means, normally tending to move said switch member into engagement with said blades; means, normally holding said switch member from engagement with the blades and means carried by said post for releasing said holding means.

2. In a switch the combination of a base; a post, carried thereby; switch blades, carried by the insulating base; a switch member, slidable on the post and adapted to engage with said blades; a disk, slidable upon said post above the switch member, a spring interposed between the disk and switch member; means, for normally holding said switch member out of engagement with the switch blades; and a longitudinally movable plunger, for potentiating said spring and subsequently releasing said holding means.

3. In a switch the combination of a base; a post, carried thereby; a switch blade, carried by the base; a switch member, slidable on said post; means, normally holding the

switch member out of engagement with the switch blade; a spring, adapted to move said switch member into engagement with the switch blade; and longitudinally movable means, for potentiating said spring and subsequently releasing said holding means.

4. In a switch the combination of a base; a post, carried thereby; a switch blade, carried by the base; a switch member, slidable upon said post; a disk, carried by said post above the switch member; a spring, interposed between the two; means, normally holding said switch member out of engagement with the switch blade; a casing, for said switch member; a plunger, slidable therein and adapted to engage said disk; and means, operable by said disk for releasing said holding means.

5. In a switch the combination of a casing; a base, therein; a post, carried by said base; switch blades, carried by said base; a switch member, slidable upon said post; a switch operating plunger, slidable within the casing; a disk, carried by the outer end of said post; a spring, interposed between said disk and switch member; normally operating means, for holding said switch member out of engagement with the switch blades; and means, operated by the inward movement of said plunger for potentiating said spring and subsequently releasing said holding means.

6. In a switch the combination of a casing; a plunger, slidable therein; a base, closing one end of the casing; a post, secured therein; switch blades, mounted upon the base; a switch member, slidable upon said post and adapted to engage said blades; a spring, interposed between said base and switch member normally holding the same out of engagement with the blades; a disk, slidable upon said post above the switch member; a spring, interposed between said disk and switch member; and leaf springs, carried by the base, and provided with shoulders adapted to engage with said switch member and normally hold the same out of engagement with the switch blades,

the outer ends of said leaf springs being cam shaped for engagement with the said disk, substantially as and for the purpose set forth.

7. In a switch the combination of a base part; a post, secured therein; switch blades carried by said base; a switch member slidable upon the post and adapted to engage the said switch blade; means, adapted to engage with said switch member and move the same into engagement with the switch blade; means, comprising a cam shaped leaf spring insulated from the switch blades, normally holding said switch member from engagement with the blades, said leaf spring adapted to be engaged by the switch member when the same engages the switch blade; means, carried by post for releasing the holding means; and a binding post connected with said leaf spring.

8. In a switch the combination of a casing; a plunger, slidable therein; a base, closing one end of the casing; a post, secured therein; switch blades, mounted upon the base; a switch member slidable upon said post and adapted to engage said blade; a spring, interposed between said base and switch member normally holding the same out of engagement with the blade; a disk, slidable upon said post above the switch member; a spring interposed between said disk and switch member; leaf springs, carried by the base and insulated from the switch blade; said springs being provided with shoulders adapted to engage with said switch member and normally hold the same out of engagement with the switch blade, the outer ends of said leaf spring being cam shaped for engagement with the said disk; and a binding post connected with one of said leaf springs.

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

VINCENT G. APPLE.

In the presence of—

N. E. SNYDER,

E. M. EARNHART.