

March 18, 1924.

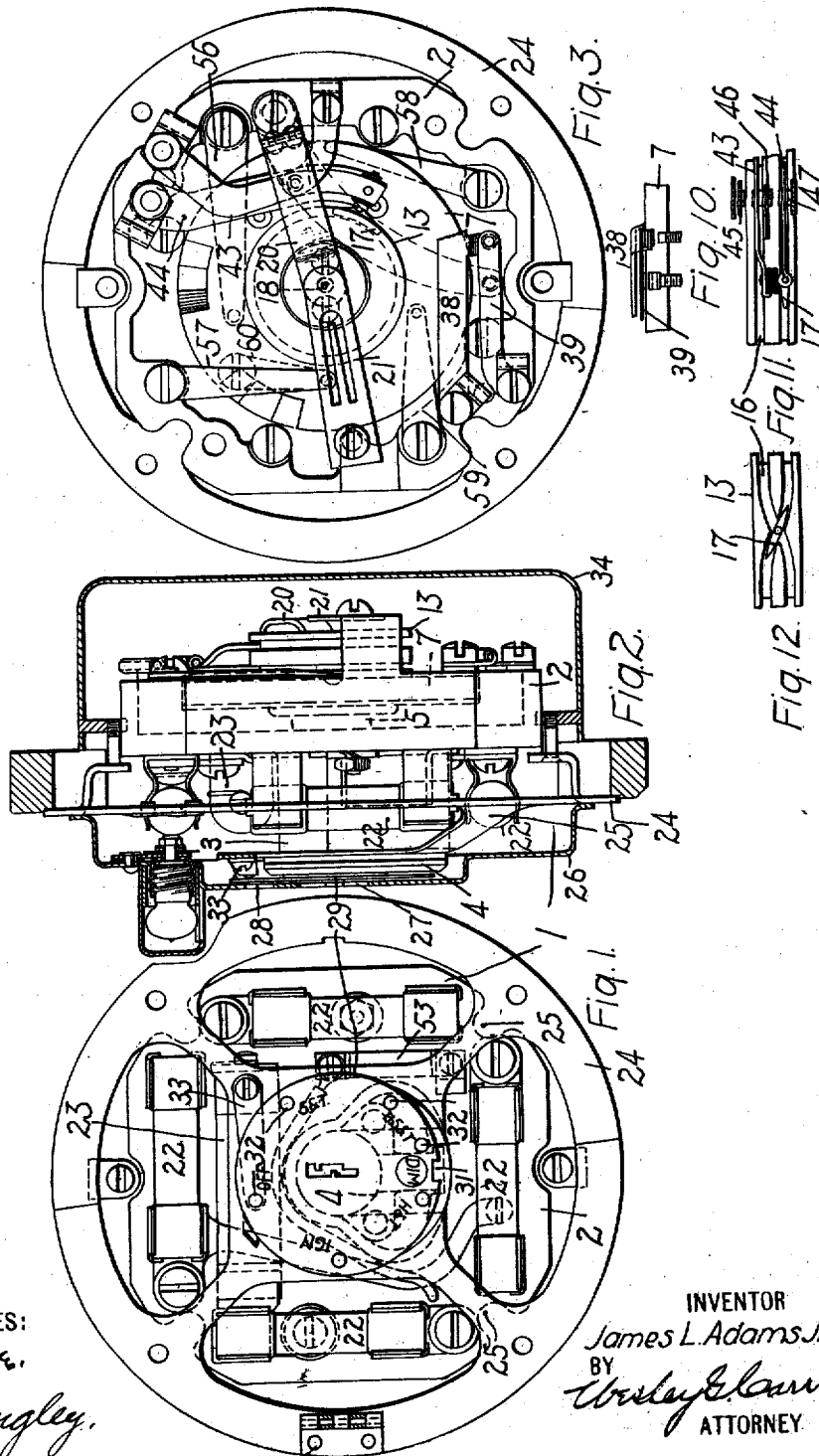
1,487,002

J. L. ADAMS, JR

AUTOMOBILE SWITCH

Filed Sept. 8, 1914

3 Sheets-Sheet 1



WITNESSES:
R. Ridge.
J. P. Langley.

INVENTOR
James L. Adams, Jr.
BY *Wesley E. Law*
ATTORNEY

March 18, 1924.

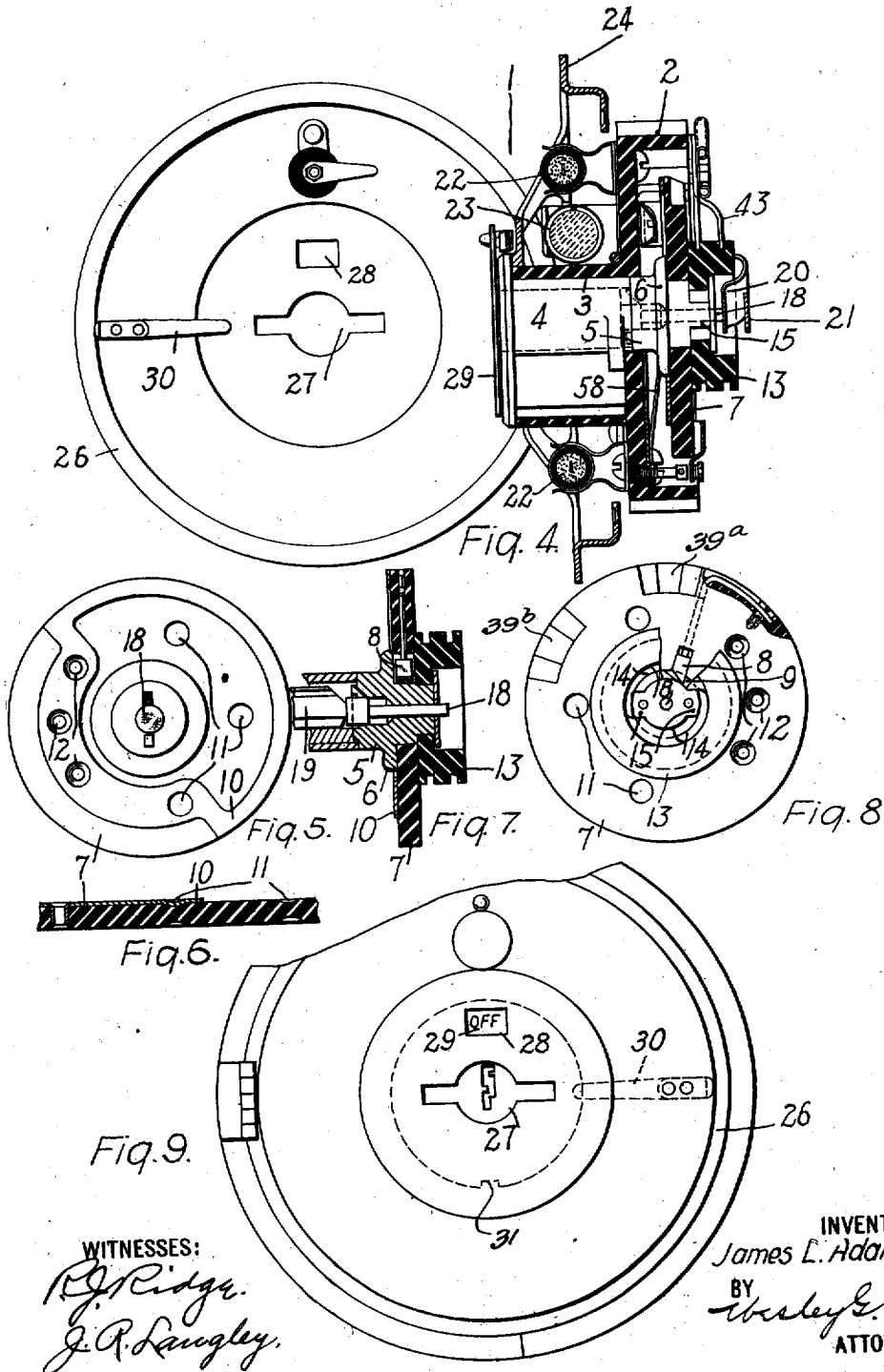
1,487,002

J. L. ADAMS, JR

AUTOMOBILE SWITCH

Filed Sept. 8, 1914

3 Sheets-Sheet 2



WITNESSES:

R. J. Ridge.
J. R. Langley.

INVENTOR

James L. Adams, Jr.

BY

Wesley E. Carr
ATTORNEY

March 18, 1924.

1,487,002

J. L. ADAMS, JR

AUTOMOBILE SWITCH

Filed Sept. 8, 1914

3 Sheets-Sheet 3

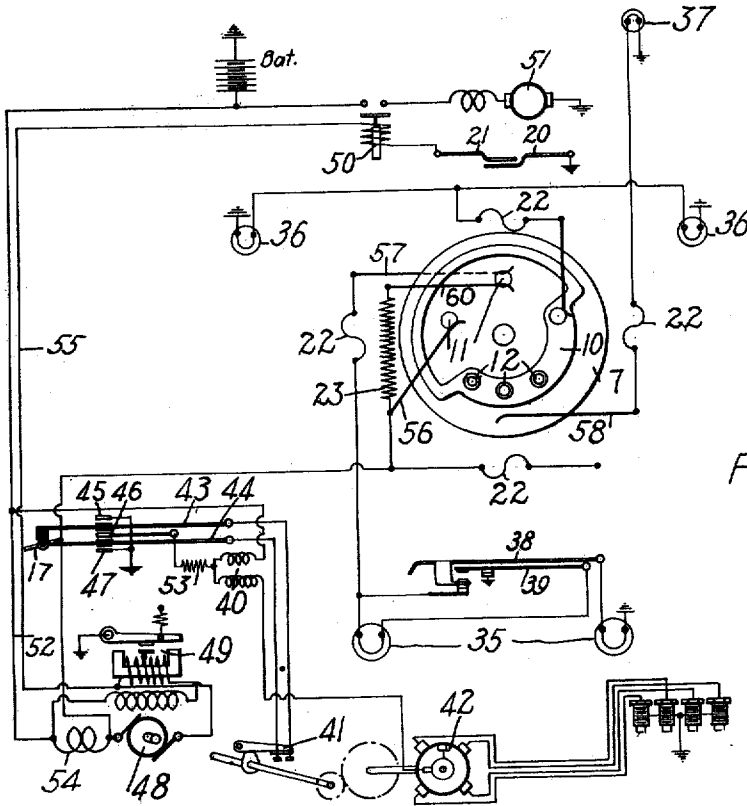


Fig. 13.

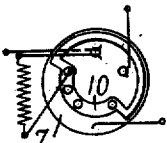


Fig. 14.

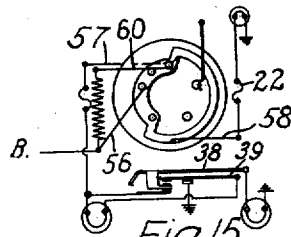


Fig. 15.

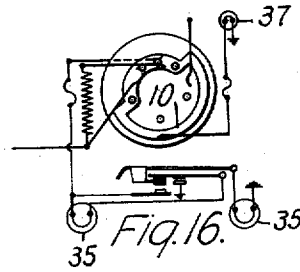


Fig. 16.

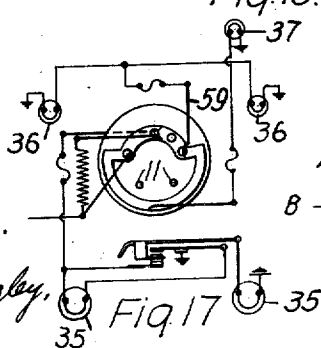


Fig. 17.

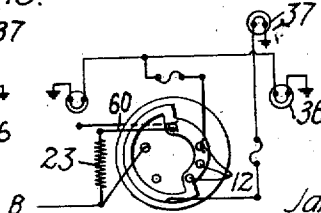


Fig. 18.

WITNESSES:
J. P. Langley
J. P. Langley

INVENTOR
James L. Adams, Jr.
BY
Wiley E. Carr
ATTORNEY

UNITED STATES PATENT OFFICE.

JAMES L. ADAMS, JR., OF WILKINSBURG, PENNSYLVANIA, ASSIGNOR TO WESTINGHOUSE ELECTRIC AND MANUFACTURING COMPANY, A CORPORATION OF PENNSYLVANIA.

AUTOMOBILE SWITCH.

Application filed September 8, 1914. Serial No. 860,614.

To all whom it may concern:

Be it known that I, JAMES L. ADAMS, JR., a citizen of the United States, and a resident of Wilkesburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Automobile Switches, of which the following is a specification.

My invention relates to automobile switches and particularly to such switches as control the starting, lighting and ignition systems of automobiles.

My invention has, for one of its objects, to provide a unitary mechanism for controlling the starting, lighting and ignition systems of automobiles.

A second object of my invention is to provide a switch, of the character indicated above, in which all of the operations of the systems controlled by it may be controlled by a single key.

A further object of my invention is to provide a switch which is so constructed that it cannot be tampered with by unauthorized persons.

In the installation of the various electrical systems of automobiles, it is desirable that the wiring layouts be as simple as possible to the end that the time and materials required by the manufacturer to equip the assembled automobile may be materially reduced. It is desirable, also, in the interest of economy of space and of convenience in operation, to combine the functions of the various independent switches in a unitary mechanism that may be controlled by a single lever or key. An important factor in connection with such devices is the means for preventing unauthorized persons from removing the cover plate of the switch to insert "jumpers" or to short circuit certain portions of the switch in order to render it operative without the use of the usual key.

I provide a combined switch and fuse block which obviates the necessity for connecting wires between them. A single key operates, when adjusted, to various positions, to produce any desired combination of effects upon the several electrical systems controlled by it. Since no assembling screws are accessible from the exterior of the mechanism, unauthorized persons cannot open the switch except by destroying some of its parts.

In the accompanying drawings, Fig. 1 is a front end view, in elevation, of the switch mechanism with the cover removed. Fig. 2 is a side view, partially in elevation and partially in section, of the switch, the casing and cover being shown. Fig. 3 is a rear view, in elevation, of the switch, the casing being removed. Fig. 4 is a view, in longitudinal section, of the switch with the cover in open position and the casing removed. Fig. 5 is an end view of a rotatable disk carrying contact elements. Fig. 6 is a sectional view of a portion of the disk shown in Fig. 5. Fig. 7 is a sectional view of a portion of the operating mechanism. Fig. 8 is an end view, partially in elevation and partially in section, of the mechanism illustrated in Fig. 7, parts being broken away. Fig. 9 is a front end view of the switch, the cover being in closed position. Figs. 10, 11 and 12 are views of details of the controlling mechanism for the ignition system. Fig. 13 is a diagrammatic view of circuits and apparatus employed in connection with my invention. Figs. 14, 15, 16, 17 and 18 are diagrammatic views showing the circuits controlled by the rotatable member of the switch as it is adjusted to various positions.

Referring particularly to Figs. 1, 2, 3 and 4, the switch 1 comprises a hollow cylindrical base member 2 of insulating material having a reduced portion 3 in which is mounted a lock 4 of any desired type as, for example, a Yale lock. A stationary portion of the lock 4 is secured to the member 2, while the rotatable portion of the lock is connected to a short shaft 5 that is provided with a flange portion 6.

Referring now to Figs. 5, 6, 7 and 8, a disk 7 of insulating material, which is loosely mounted upon the shaft 5 adjacent to the flange 6, is provided with a spring-pressed pawl 8 which coacts with a shoulder portion 9 on the shaft 5 to form a ratchet mechanism. The disk 7 is rotated by the shaft 5 when the latter is rotated in one direction but it remains stationary under other conditions. The disk 7 and a contact segment 10, which is mounted upon the disk, are provided with a number of depressions 11 that are engaged by coacting contact fingers to accentuate the position of the disk as it rotates. The contact segment 10 is provided, also, with contact pieces 12 extending

through the disk 7 to connect a coacting pair of contact fingers 57 and 60 which engage the contact pieces simultaneously on opposite sides of the disk.

5 A disk 13, of insulating material, which is loosely mounted on the end portion of the shaft 5, is provided with a pair of oppositely disposed slots 14 to coact with corresponding lugs 15 on the shaft to provide a
10 lost-motion connection between these members. The disk 13 is provided with a continuous peripheral groove 16 which coacts with a slider 17 (Figs. 11 and 12) for a purpose to be later described.

15 The short shaft 5 is provided with a central longitudinal bore to be occupied by a slidable pin 18 that is engaged by the end of the key 19 when it is inserted in the lock 4 and which operates, upon an additional forward movement of the key beyond its normal operating position, to effect the engagement of spring contact members 20 and 21 to control the starting circuit. Such additional movement is permitted by the laterally movable tumblers of the switch in the same manner as they permit the insertion of the key.

The front face of the base member 2 serves as a fuse block, and four fuses 22, which protect the lamps of the vehicle, are symmetrically arranged about the reduced portion 3. A resistor 23, which is employed in connection with the lighting system, is also mounted on the base member 2. An annular member 24, which is connected to the stationary portion of the lock 4 by radial arms 25, and that is provided with suitable openings for bolts or screws, affords a convenient means for attaching the switch to the dashboard of the vehicle. A cover 26, which is
40 hinged to the member 24, is provided with a slot 27 for the insertion of the key and a slot 28 for inspection of a dial 29 that is carried by the rotatable portion of the lock 4. The cover 26 is also provided, upon its inner
45 surface, with a finger 30 which coacts with the dial 29 to prevent the opening of the cover 26 except when a notch 31 in the dial 29 registers with the finger 30. The dial 29 is provided, also, with holes 32 near its
50 periphery which coact with a spring 33 to accentuate the position of the dial. A suitable casing member 34, which encloses the switch mechanism, is fastened to the annular member 24 in such a manner that it may be
55 removed only when the front cover is open.

The circuits and apparatus employed in connection with my invention are illustrated diagrammatically in Fig. 13. It will be noted that the head lights 35, side lights 36
60 and tail light 37 of the vehicle are arranged in separate circuits so that any desired combination of lights may be obtained by properly setting the switch. A pair of contact fingers 38 and 39, which are controlled by
65 coacting cam surfaces 39a and 39b on the

disk 7, operate to connect the head lights 35 in series or in parallel relation, according as the finger 38 is in its upper or lower position.

The ignition system shown in Fig. 13 comprises an induction coil 40, an interrupter 41
70 and a distributor 42. The direction of the current traversing the interrupter is controlled by a reversing switch comprising a pair of spring arms 43 and 44 which are actuated by the slider 17 in the groove 16 to
75 engage contact members 45 and 46, respectively, when they are in their upper positions and to engage contact members 46 and 47, respectively, when in their lower positions. A ballast resistor 53, which is in-
80 cluded in the ignition circuit, is mounted on the base member 2. The ignition mechanism is actuated by the shaft of a dynamoelectric machine 48, the battery-charging circuit of which is controlled by a cut-out
85 49. The contact fingers 20 and 21 control the circuit of the coil of an electro-magnetic switch 50 which, in turn, controls the connection of a starting motor 51 to a storage
90 battery.

It may be assumed that the vehicle to which the switch may be attached is stationary and that the switch mechanism is in the "off" position, as indicated in Figs. 1 and 13, in which no current is supplied to the circuits controlled by it. When it is desired to operate the vehicle, the key 19 is inserted in the lock 4 and turned in a clockwise direction, as viewed in Fig. 1, until the legend
95 IGN on the dial 29 registers with the slot 28. The disk 7 and contact segment 10 then occupy the positions, relatively to the several coacting contact fingers, as illustrated in Fig. 14. The slider 17, which, in the "off" position, occupies a position midway between the ends of its path of movement, as shown in Figs. 12 and 13, is actuated either
100 upwardly or downwardly, as the case may be, to connect the interrupter 41 in circuit with the battery. Assuming that the slider 17 has been actuated upwardly, current flows through a circuit extending from the battery, through a conductor 52, primary winding of the induction coil 40, resistor 53, contact members 46 and 44, interrupter 41, contact members 43 and 45 to ground and thence
105 to the grounded terminal of the battery.

The key 19 is then pressed forwardly to actuate the pin 18 to effect engagement of the contact members 20 and 21. A circuit is
110 then completed which extends from the battery through conductor 52, series field winding 54, armature winding of the generator 48, conductor 55, coil of switch 50 and contact members 21 and 20 to ground. The
115 switch 50 then closes to complete the circuit of the starting motor 51, which may be operatively connected to the engine (not shown) in any suitable manner.

When the engine starts under its own 120

power, the operator releases the key and the contact members 20 and 21 separate to de-energize the coil of the switch 50 and thereby open the motor circuit. The switch 50 may also open when the generator voltage opposes that of the battery. When the engine reaches a predetermined speed, at which the voltage of the generator 48 has reached a predetermined value, the cut-out 49 operates to close the charging circuit of the generator.

When it is desired to operate the vehicle lamps, the key 19 is rotated in a clockwise direction to connect the desired lamps in circuit. In the position designated by H & T on the dial 29, the circuits are arranged to connect the head lights and tail light in circuit, as illustrated in Fig. 15. The battery and the generator 48 are connected to the contact segment 10 through contact fingers 56 and 60. The head lights 35, which are connected in parallel relation, are connected to the contact segment 10 by means of contact finger 57, fuse 22, and contact fingers 38 and 39. The tail light 37 is also connected to the contact segment 10 through a contact finger 58 and a fuse 22.

In the next position of the switch, which is designated by DIM, the circuits are arranged as illustrated in Fig. 16, with the head lights 35 in series. The head lights are thus dimmed because of the increased resistance of the circuit. The tail light remains in circuit and is not dimmed.

The arrangement of the circuits, when the switch is in the position designated by H, S & T, is illustrated in Fig. 17. The head lights 35 are again arranged in parallel relation for full illumination. The side lights 36, which are connected in parallel relation, are connected to the contact segment 10, through a contact finger 59 and a fuse 22. The tail light 37 is also connected in circuit.

The last operative position of the switch is illustrated in Fig. 18, in which the side lights and tail light only are connected in circuit. The battery is connected to the contact segment 10 through the resistor 23 and a contact finger 60, and the lights are accordingly protected from excessive current because the resistor 23 compensates for the voltage drop caused by the head lights when they are in circuit.

When it is desired to stop the engine and turn off all lamps of the vehicle, the switch is actuated in a clockwise direction to the "off" position. The slider 17 is then at the point of intersection of the branches of the groove 16, in which position the ignition circuit is broken by the contact members 43 and 44. When it is desired to withdraw the key and leave the switch locked in any desired position, the key is rotated in a clockwise direction to obtain the desired grouping of the lamps. The key is then turned

in a counter-clockwise direction until the dial registers the "off" position. The key may then be withdrawn and the switch is locked, with the desired lamps burning and the ignition circuit operative. The position of the disk 7 is not affected by the reverse movement of the key, because of the disk's pawl and ratchet connection to the lock. The disk 13, however, has a lost motion connection with the shaft 5 and will not be returned to the "off" position of the slider 17 which controls the ignition system.

By means of this arrangement, the engine may be left running, although the key has been removed. In order to stop the engine when the key is rotated counter-clockwise, the key is rotated beyond the "off" position to the next position, which is that designated by S & T. The disk 13 is then in the "off" position and the ignition circuit is broken. The key may then be rotated clockwise to the proper position for withdrawal, without affecting the position of either of the disks 7 and 13.

When the key is again inserted and rotated in the clockwise direction, the pawl and ratchet mechanism insures that the dial 29 and disk 7 will again assume their normal relative positions. It will be readily understood that further rotation of the disk 13 will cause the slider to move in the direction opposite to that described above in connection with the operation of the switch and thus effect the engagement of contact members 43 and 44 with contact members 46 and 47, respectively, to reverse the connections of the interrupter 41.

By omitting the spring contact members 20 and 21, the switch may be employed without further change for the control of lighting and ignition circuits only. Also, if the disk 13, slider 17 and contact members 43, 44, 45, 46 and 47 are omitted, the switch may be used for starting and lighting control only.

It will be noted that I provide a simple and efficient means for controlling the starting, lighting and ignition systems of a motor vehicle by means of a single actuating element. By combining a number of independent controlling devices in a single unitary mechanism, I have avoided the use of a large number of conductors that are ordinarily necessary to connect the several electrical systems with the controlling mechanism.

The switch operates automatically to reverse the direction of current through the interrupter of the ignition system and thus prolong the life of the interrupter contact members by preventing the excessive transfer of metal from one of the contact members to the other which results when the current always flows in the same direction. It is possible, by means of the mechanism above

described, to produce any desired combination or arrangement of the various electrical systems controlled by the switch. When the key is withdrawn from the switch, the mechanism is locked in the position in which it is left until the key is again inserted. Since the switch is inaccessible both from the front and the rear, it cannot be tampered with during the absence of the owner. These and many other advantages will be apparent to those skilled in the art to which my invention appertains.

I claim as my invention:

1. In an electrical system, the combination with a lighting circuit and an ignition circuit and circuit-controlling devices therefor, each comprising relatively movable contact members, one of said devices having a plurality of operative positions in which corresponding combinations of contact members are in engagement, of means for locking said circuit-controlling devices, and a single member for effecting the actuation of said devices and the locking of said devices in their respective adjusted positions when said one device is in any of its several operative positions.

2. In an electrical system, the combination with a lighting system and an ignition system and circuit-controlling devices therefor, each comprising relatively movable contact members, one of said devices having a plurality of operative positions in which corresponding combinations of contact members are in engagement, of locking means for said circuit-controlling devices and a single key for effecting the actuation of said devices to their respective operative and inoperative positions and for locking them in any of such positions.

3. The combination with a plurality of electrical circuits and circuit-controlling devices therefor comprising relatively movable contact members having a plurality of operative positions in which corresponding combinations of contact members are in engagement to vary conditions in said circuits, of a removable key that is rotatable to actuate one of said devices to its respective operative positions and is longitudinally movable to actuate another of said devices to an operative position, certain of said devices being locked in their respective operative positions to maintain the corresponding conditions in the circuits controlled thereby upon the withdrawal of said key.

4. The combination with the ignition and lighting systems of an automobile, of means for controlling said systems, said means comprising an oscillatable member for reversing the direction of the current traversing said ignition system and a rotatable member for effecting the oscillation of said oscillatable member and for determining the condition of said lighting system.

5. The combination with the lighting, ignition and starting circuits of a motor vehicle, of a revoluble member for controlling said lighting and ignition circuits, locking means for said revoluble member, and a member slidable relatively to said revoluble member for controlling said starting circuit and for locking said revoluble member in a plurality of positions.

6. The combination with a plurality of electrical circuits which comprise an electric starting motor and ignition mechanism for an internal combustion engine and electric vehicle lamps, of a unitary lock and switch mechanism for controlling said circuits to produce a plurality of arrangements of said circuits, said mechanism comprising an actuating member having a longitudinal movement for controlling one of said circuits and a rotative movement for controlling the other circuits, said member being operable to lock said mechanism in a plurality of positions.

7. The combination with a plurality of electrical circuits comprising an electric motor, ignition mechanism and electric lamps, of a unitary switch mechanism for controlling said circuits comprising common means for actuating said switch mechanism and for locking said switch mechanism in a plurality of operative positions.

8. The combination with a plurality of electrical circuits of a motor vehicle, of a unitary switch mechanism for controlling said circuits, said mechanism having a plurality of operative positions and comprising locking mechanism and a single key member for effecting the actuation of said switch mechanism and the locking of said switch mechanism in said positions.

9. The combination with a plurality of electrical circuits, a dial having characters for indicating certain of said circuits and a rotatable member for controlling the circuits indicated on said dial, of locking means for said rotatable member and a slidable key associated with said rotatable member for controlling another of said circuits, for actuating said rotatable member, and for locking said rotatable member in desired positions.

10. The combination with a plurality of electrical circuits, a dial having characters for indicating certain of said circuits and a rotatable member for controlling the circuits indicated on said dial, of locking means for said rotatable member and a slidable key mounted in the axis of said rotatable member for controlling another of said circuits, for actuating said rotatable member, and for locking said rotatable member in predetermined positions.

11. The combination with a lighting system comprising the head, side and tail lights of a motor vehicle and a resistor, of a uni-

tary mechanism comprising an actuating member which operates, according to its position, to effect the connection of the head lights and tail light in circuit with the head lights in parallel relation, the connection of the head lights in series relation and maintain the tail light connections, the connection of all of said lights in circuit and the connection of the side and tail lights in circuit with said resistor.

12. The combination with a plurality of electrical circuits comprising the starting and ignition mechanisms for an internal combustion engine and the lamps of a motor vehicle, of means for controlling said circuits comprising a single actuating member which operates, according to its angular and longitudinal positions, to render the ignition mechanism operative, to effect the simultaneous operation of the starting and ignition mechanisms, to effect the connection of the lamps in circuit in a plurality of combinations, with the ignition and starting mechanism either operative or inoperative, as desired, and to render all of said circuits ineffective.

13. The combination with the lighting, ignition and starting circuits of a motor vehicle, of a lock having a rotatable member for controlling said lighting and ignition circuits and having a longitudinally movable member for controlling said starting circuit.

14. The combination with the lighting, ignition and starting circuits of a motor vehicle, of a lock having a rotatable member for controlling said lighting and ignition circuits and a longitudinally movable key for controlling said starting circuit and for actuating said rotatable member.

15. The combination with the starting, lighting and ignition circuits of a motor vehicle, of switches for controlling said circuits, a main operating device for controlling the lighting and ignition switches, a second operating device movable relatively

to said main device for controlling the starting switch, and common means for actuating said device and for locking said main operating device in certain of its positions.

16. The combination with the starting, lighting and ignition circuits of a motor vehicle and switches for controlling said circuits, of a main operating device for controlling the lighting and ignition switches, a second operating device comprising a rod slidable relatively to said main device for controlling the starting switch, and common means for actuating said second device and for locking said main operating device.

17. The combination with the starting, lighting and ignition circuits of a motor vehicle and switches for controlling said circuits, of a dial plate, a main operating device associated with said dial plate and controlling the lighting and ignition switches, said main operating device having a hub provided with a passage, a second operating device comprising a rod slidable in the passage in said hub, and common means for actuating said slidable rod and for locking said main operating device in certain of its positions.

18. In a system, the combination with two electrical circuits and switches therefor, of a removable handle for one and a lock for the other whereby the conditions in the corresponding circuits may not be changed in the absence of said removable handle, and means actuated by the attachment of said removable handle for disabling said lock to permit the operation of the corresponding switch to control its associated circuit.

In testimony whereof, I have hereunto subscribed my name this 25th day of Aug., 1914.

JAMES L. ADAMS, JR.

Witnesses:

T. N. RALSTON,
B. B. HINES.