

March 10, 1936.

L. O. PARKER

2,033,252

IGNITION STARTER CONTROL

Filed July 25, 1934

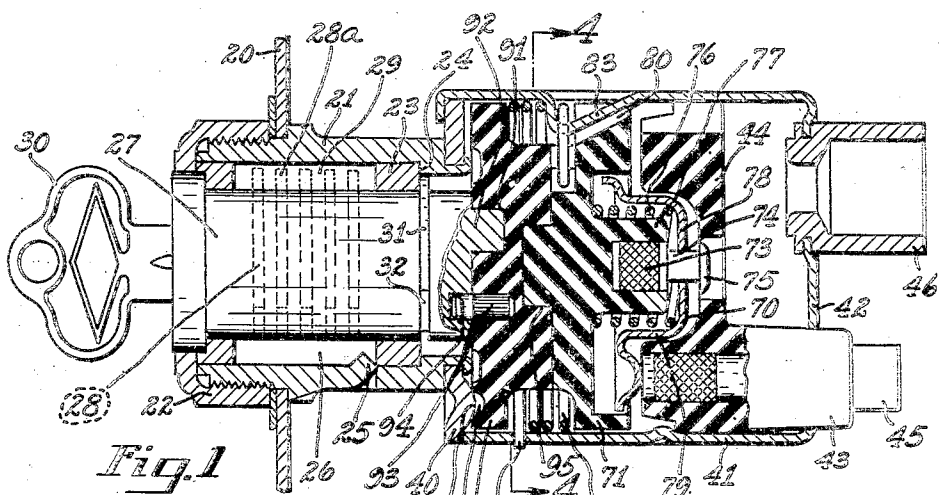


Fig. 1

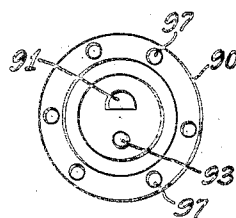


Fig. 2

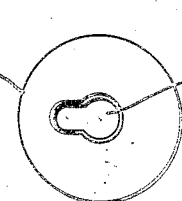


Fig. 3

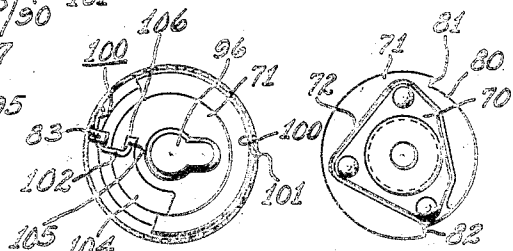


Fig. 4

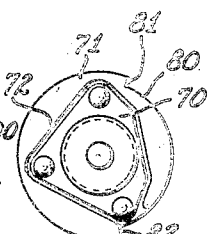
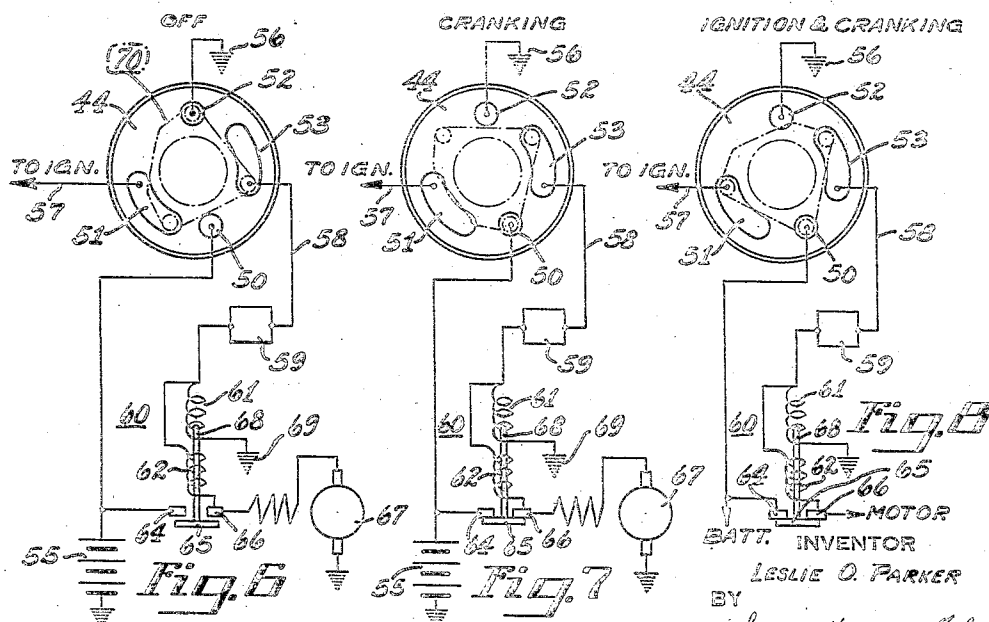


Fig. 5



IN FIGURES 6-7-8 THE SWITCH 59 IS CLOSED BY ENGINE THROTTLE ACTUATOR, OPENED BY ENGINE SUCTION.

INVENTOR
LESLIE O. PARKER
BY

Spencer, Hardman & Fisher
ATTORNEYS

UNITED STATES PATENT OFFICE

2,033,252

IGNITION STARTER CONTROL

Leslie O. Parker, Anderson, Ind., assignor to General Motors Corporation, Detroit, Mich., a corporation of Delaware

Application July 25, 1934, Serial No. 736,825

6 Claims. (Cl. 200—11)

This invention relates to switches for controlling the electrical circuits of an internal combustion engine, and more particularly to engine and cranking circuits.

It is one of the objects of the present invention to provide a switch of compact and durable construction by which the ignition circuits and engine starting circuits can be connected to current source such as the storage battery or by which the engine starting circuit only may be connected to the battery. The switch remains in the last-mentioned circuit-making position so long as the switch-actuating member is held in that position by the operator; but if released, the switch returns to "off" position automatically through the use of a spring.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawing wherein a preferred embodiment of the present invention is clearly shown.

In the drawing:

Fig. 1 is a longitudinal sectional view drawn on an enlarged scale of a switch embodying the present invention.

Figs. 2 and 3 are left-hand and right-hand side views respectively of a coupling member which connects the switch actuator with a contact carrier.

Figs. 4 and 5 are left-hand and right-hand side views of the contact carrier, Fig. 4 including a sectional view of the switch taken on the line 4—4 of Fig. 1, and Fig. 5 including removable switch contact.

Figs. 6, 7 and 8 are wiring diagrams showing respectively the off, cranking and ignition and cranking positions of the switch.

Referring to Fig. 1 numeral 20 designates a metal dash or instrument board of an automobile. The dash 20 is provided with an opening through which projects a tubular frame 21 co-operating with a nut 22 for clamping the frame to the dash. Frame 21 receives a tubular lock sleeve 23 retained against an internal shoulder 24 of the frame 21 by a lug 25 struck inwardly from the side wall of the frame 21 to enter a longitudinal slot 26 provided by the sleeve 23 in order to prevent the latter from turning or moving longitudinally. The sleeve 23 rotatably supports a key cylinder 27 carrying a plurality of plungers 28 which are received, as indicated by the dot-dash lines at 28a, by a longitudinal slot 29 provided by the sleeve 23. When a suitable key 30 is inserted in the cylinder 27 the plungers 28 will be withdrawn from the slot 29 so that cyl-

inder 27 may be turned. Cylinder 27 is retained within the sleeve 23 by a suitable retaining washer 31 which is received by a groove 32 provided by the cylinder 27.

The frame 21 is attached to a plate 40 which is attached to and provides a closure for the left-hand end of a cup-shaped switch case 41, the end wall 42 of which is apertured to receive one or more non-conducting bosses 43 integral with a stationary contact supporting block 44. As shown the boss 43 surrounds a metal insert 45 which provides a terminal at its right-hand end and a switch contact at its left-hand end. The end wall 42 is apertured to receive also a ferrule 46 to which may be attached a flexible metal conduit surrounding and protecting a wire for making connections between the switch and an ignition coil. As the conduit and wire form no part of present invention they are not shown except that the wire is shown in wiring diagrams of Figs. 6, 7 and 8.

The stationary contact supporting block 44 carries contacts 50, 51, 52 and 53. Contacts 50 and 52 which are circular are connected respectively with the storage battery 55 and with a ground 56, as shown in Fig. 6. Contacts 51 and 53, which are elongated, are connected respectively with a wire 57 leading to the ignition coil or circuit and with a wire 58 leading to a switch 59 which is connected with the magnet coils 61 and 62 of an electromagnetic switch 60. The switch 60 includes contacts 64 and 66 connected respectively with the storage battery 55 and a starting motor 67, and a movable switch contact 65 carried by the solenoid armature 68 of the switch. The coil 61 is grounded at 69 and coil 62 is connected with contact 66.

The circuits illustrated in Fig. 6 are controlled by a movable switch contact 70 of triangular formation illustrated in dot-dash lines in Fig. 6 and in full lines in Fig. 5. The contact 70 is supported by the rotatable contact carrier 71 provided with a triangular recess 72 so shaped as to permit the triangular contact 70 to fit somewhat loosely therein. The carrier 71 which is made of molded insulated material carries a metal insert 73 having a shank of reduced diameter 74 which extends through a central hole in the contact 70. The right-hand end of the shank 74 is riveted over at 75 so as to provide a shoulder which limits separation of the contact 70 from the carrier 71. A coil spring 76 which surrounds a circular boss 77 carrying the insert 73, presses its left-hand end against the carrier 71 and its right-hand end against the end wall

78 of the cup-shaped central portion 79 of the contact 70. Thus the contact 70 is yieldingly pressed against the stationary contact block 44. The carrier 71 is provided with an arcuate notch 80 the ends of which are defined by shoulders 81 and 82. The notch 80 receives a lug 83 struck inwardly from the cylindrical side wall of the switch case 41. The lug 83 cooperates with shoulders 81 and 82 to limit the rotative movement of the carrier 71.

The carrier 71 is operatively connected with the key cylinder or switch-actuating member 27 by a coupling member 90 also made of molded insulating material and so shaped as to provide a recess 91 for receiving a projection 92 integral with the key cylinder 27, and provided with an insert 93 which provides a pin extending into a hole 94 provided by the key cylinder. Thus the coupler 90 is connected with the key cylinder 27. Coupler 90 is also provided with a recess 95 which is somewhat like a keyhole in shape and receives a corresponding boss 96 extending from the adjacent face of the carrier 71. Thus the carrier 71 and coupling 90 are operatively connected. The coupler 90 is provided with an arcuate row of depressions 97 cooperating with suitably spaced detents provided by the plate 40, one of the detents being shown at 98. Due to the spring 76 which urges the contact 70 toward the stationary contact block 44 and the contact carrier 71 and the coupler 90 toward the switch cover plate 40, there is yielding cooperation between the detent bosses 98 and the edges of the material of the carrier 90 surrounding the recesses 97. Thus the switch may be yieldingly retained in certain of its operating positions.

In order to start the engine it is necessary to connect the battery with the ignition circuit and the control circuit. This is accomplished by the key 30 which moves the contact 70 from the position shown in Fig. 6 to that shown in Fig. 8. In this position it is clear that the battery will be connected with the ignition contact 51 and with the engine starter contact 53. Switch 59 is one which is closed by the engine throttle actuator or accelerator pedal. When switch 59 is closed current will flow from the battery through the magnet windings 61 and 62 to effect the armature 63 and the closing of the switch 64, 65 and 66 about when this occurs current will flow directly through the battery to the starting motor and the coil 62 will be short circuited. Coils 61 and 62 are so designed that the energization is required to attract the armature 63 into its switch-closing position. The coil 61 alone is sufficient to maintain the armature 63 in switch closing position. Consequently during the engine starting operation very little current is diverted from the motor 67, coil 61 being a high-resistance winding. When the engine starts, when being cranked by the motor 67, engine suction will effect the opening of the switch 59. As switch 59 does not per se constitute a part of the present invention it is shown only diagrammatically.

To stop the engine the operator turns the contact 70 back to the position shown in Fig. 6. It will be noted in this position wire 57 is connected to ground 56. If the wire 57 is encased in a suitable armor or metal conduit it is apparent that the grounding of the wire 57 will make it more difficult to establish a connection between the battery and the ignition circuit without the use of the switch.

The switch has still another position shown

diagrammatically in Fig. 7. In this position contact 70, the battery contact 50 is connected only with the starter contact 53 so that the engine may be cranked with the ignition turned off whenever it is desired to break the engine loose from congealed oil when preparing to start in cold weather. The switch 70 must be held in this position by the operator because as soon as the operator releases the key 30, a coil spring 100 will restore the contact carrier 71 to the "off" position. The spring 100 is confined within an annular recess provided between the carrier 71 and the coupler 90. One end 101 of the spring 100 is received by a suitable hole in the side wall of the case 41 as shown in Figs. 1 and 4. The other end 102 of the spring 100 is shaped like a hook and extends through an eye provided by the lug 83 and into another arcuate recess 104 provided by the carrier 71; the extreme end portion 105 of the spring 100 is received by a recess 106 extending from the recess 104. It will be noted that the turning of the contact 70 in a counterclockwise direction from the off position shown in Fig. 6 to that shown Fig. 7 will cause the spring hook 102 to be moved counterclockwise around the axis of rotation of the carrier 71. Thereby causing the spring to be stressed beyond its initial state of stress, thereby requiring the operator to retain his grip on the key 30 in order to maintain the switch in the position shown in Fig. 7. When the operator releases the key 30 the spring hook will return to its normal position against the lug 83 and will carry with it the contact carrier 71. Any tendency of the carrier 71 to over travel in a clockwise direction on being returned to off position by the spring 100 is resisted by the cooperation of certain detent bosses 98 with certain detent recesses 97 of the coupler 90.

While the embodiment of the present invention as herein disclosed, constitutes a preferred form, it is to be understood that other forms might be adopted, all coming within the scope of the claims which follow.

What is claimed is as follows:

1. In an electrical system for an automotive vehicle in which circuit provisions are made for engine running ignition, engine starting ignition, and engine cranking without engine ignition, a circuit controller for selectively perfecting the several circuits, said controller comprising in combination; a casing having an inwardly extending lug; a contact carrier rotatably supported within the housing and having a peripheral notch to provide a pair of stops, on the carrier, and said stops adapted to engage the lug to limit the rotary movement of the carrier over the terminal support; a bridging member provided by the carrier and movable into engagement with fixed contacts; means for actuating the carrier; and a coiled spring having one end anchored in a hole provided by the casing and the other end hooked over the lug, said hooked end adapted to extend into a recess provided by the carrier for effecting movement of the carrier throughout a portion only of the entire range of movement.

2. A circuit controller comprising in combination; a casing having an inwardly extending lug; a terminal support with fixed contacts carried by the casing; a contact carrier having a circular notch to receive the lug and limit rotary movement of the contact carrier over the terminal carrier, said carrier being provided on one side with a boss having a notch and a cavity on its periphery and provided with a projection extend-

ing from its face; a plate having a boss provided with a recess on its face, said recess adapted to receive the projection of the carrier to provide a driving connection between the carrier and plate and said plate and carrier when in a driving relation the bosses of the plate and carrier provide an annular groove between same; means for actuating the plate, a bridging member supported by the carrier and movable into engagement with the fixed contact; a spring for urging the bridging member toward the terminal support and for maintaining the driving relation between the carrier and plate and the driving relation between the actuator and the plate; and a second spring located within the annular groove and anchored relative to the casing so that one end of the second mentioned spring is capable of extending into the cavity of the carrier for effecting movement of the plate throughout a portion only of its entire range of movement.

3. A circuit controller comprising in combination; a casing; a terminal support with fixed contacts carried by the casing; a plurality of rotatable members of insulating material formed with bosses and provided with provisions on the faces thereof to form a driving relation between same, and said members when in the driving relation the bosses of the rotatable members provide an annular groove; means for actuating one of the rotatable members; a bridging contact plate carried by the other rotatable member and movable into engagement with the fixed contacts; a spring interposed between the contact plate and the second mentioned rotatable member for urging the contact plate against the terminal support and for maintaining the driving relation of the rotatable members, but permitting axial movement of the members relative to each other; means formed on the casing cooperating with one of the rotatable members to limit the rotary movement of the members within the casing; and a second spring located within the groove formed by the bosses of the rotatable members and anchored relative to the casing so that one end of the spring will engage one of the rotatable members for effecting movement of the rotatable members after the members have been moved a certain distance of their entire range of movement.

4. In an electrical system for an automotive vehicle in which circuit provisions are made for

engine running ignition, engine starting ignition, and engine cranking without engine ignition, a circuit controller for selectively perfecting the several circuits, said controller comprising in combination; a casing having an inwardly extending lug; a terminal support with fixed contacts carried by the casing, a contact carrier having a circular notch to provide a pair of shoulders and a recess located intermediate the shoulders, said shoulders adapted to engage the lug to limit the movement of the contact carrier over the terminal support; a bridging member provided by the carrier and movable into engagement with the fixed contacts; means for actuating the carrier; and a coiled spring having one end anchored to the case and the other end hooked about the lug and extending into the recess for effecting movement of the carrier throughout a portion only of its entire range of movement.

5. An electric switch comprising in combination, a housing having an inwardly extending projection, a fixed contact support carried by the housing, a movable contact member, a rotatable member for driving the movable contact member, means for imparting partial rotations in opposite directions to the rotatable member, and a spring located within the housing and having one end anchored to the housing and the other end hooked over the projection, said hooked end adapted to extend into a recess provided by the rotatable member when same is moved in one direction only, whereby the spring will resist movement of the rotatable member from a normal position to an operative position.

6. An electric switch, comprising in combination, a casing having an inwardly extending lug, said casing insulatively supporting a plurality of fixed contacts, a movable contact member, a rotatable member for actuating the movable contact member and having a peripheral notch to provide a pair of stops cooperating with the lug to limit the movement of the rotatable member in either direction, means for imparting rotations in opposite directions to the rotatable member, and a spring having one end anchored to the casing and the other end hooked over the lug, said hooked end adapted to extend into a recess provided by the rotatable member when moved in one direction and tending to resist movement of the rotatable member in that direction only.

LESLIE O. PARKER.