

L. R. CALE

IGNITION SWITCH

2 Sheets-Sheet 1

The diagram shows a control circuit for a motor. At the bottom, a motor (21) is represented by a rectangle with a positive terminal (+) at the top and a negative terminal (-) at the bottom, which is grounded. A power source (20) is connected to the positive terminal of the motor. A switch (19) is connected between the power source and the motor. The switch is controlled by a relay (1) which has multiple contacts (22, 27, 31) and is connected to a control unit (57, 58, 59, 60). The control unit is connected to a power source (57) and a switch (58). The control unit also includes a component (60) and a switch (59). The relay (1) is connected to the power source (20) via a switch (19).

INVENTOR

Lambert R. Case
By *Martin J. Mauion*
ATTORNEY

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L. R. CALE

2,202,043

IGNITION SWITCH

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2 Sheets-Sheet 2

FIG 4

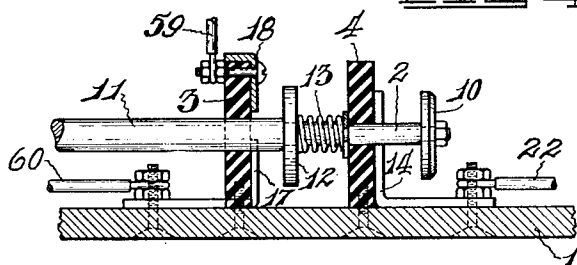


FIG 5

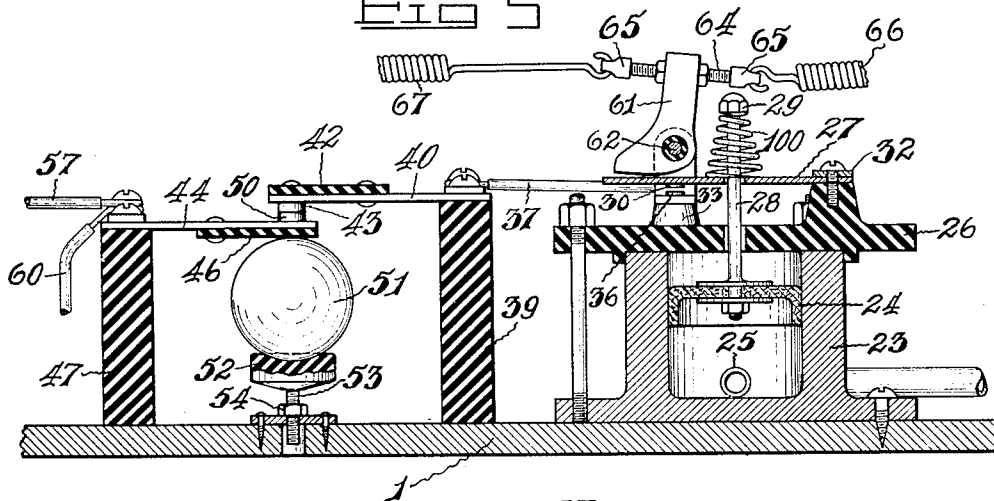
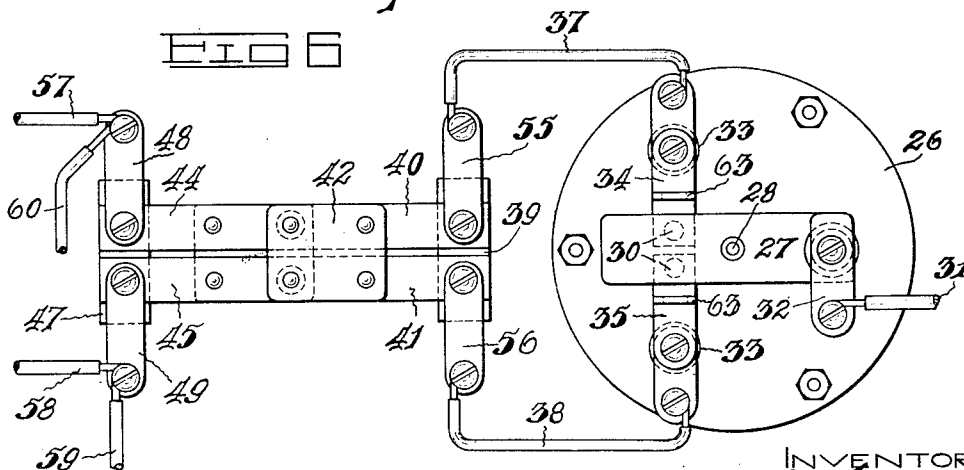


FIG 6



INVENTOR

Lambert R. Cale

BY *Martin J. Mauion*

ATTORNEY

UNITED STATES PATENT OFFICE

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IGNITION SWITCH

Lambert R. Cale, Bridgeport, Ohio, assignor of
one-half to George Bayder, Bridgeport, Ohio

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2 Claims. (Cl. 290—38)

This invention relates to internal combustion engines such as are used for powering automobiles and airplanes, and more specifically to automatic means for controlling the ignition and electrical circuits thereof.

One of the objects of the invention is to provide an automatic ignition cut-out whereby the entire ignition circuit of an internal combustion engine, as well as any other electrical circuit or circuits associated therewith, are broken as soon as the engine stops so that there can be no drainage by the lights, radio, heater and ignition from the battery when the engine is not operating.

Another object of the invention is to provide a device of the character referred to which is readily and conveniently applicable for operation with conventional starters and ignition systems of present internal combustion engines of automobiles and airplanes.

Another object is to provide a device designed to function as aforesaid and designed to operate by vacuum release from the intake manifold of the engine, mechanical apparatus being included in the invention which will permit the device to operate satisfactorily when the vacuum is low, for instance, when operating under full throttle.

Another object is to provide such a device whereby the entire electrical circuit is broken while an automobile is parked and unattended, thus reducing the hazard of fire.

Another object of the invention is to provide means for automatically and instantly breaking the entire electrical circuit when the vehicle equipped with the invention is subjected to an abnormally severe shock, as when the vehicle collides with another object, thus to eliminate the danger of fire and consequent injury and damage thereby.

Other objects and advantages not hereinbefore pointed out will appear from the following detailed description and the accompanying drawings, in which—

Figure 1 is a top plan view of the invention, the cover of the case in which the invention is housed being removed;

Figure 2 is a side elevational view of the invention, one of the sides of the case in which the invention is housed being removed;

Figure 3 is a diagrammatic view of the wiring of the invention;

Figure 4 is an enlarged detail view in vertical section of the switch elements which are manually actuated to close the electrical circuit when the engine is to be operated;

Figure 5 is an enlarged detail view in vertical

section of the vacuum operated cylinder and associated mechanism, and

Figure 6 is a top plan view of the cylinder and a portion of the associated mechanism.

Referring to said drawings, the reference numeral 1 designates a covered rectangular casing in which the invention is housed. A manually reciprocable rod 2 is journaled in spaced and aligned bearings 3 and 4 of insulating material, and the rod 2 is manually actuated by an attached flexible wire 5 housed in a flexible sheath 6. The wire 5 extends to and through an aperture in the instrument panel 7 of the vehicle, and its free end protruding from the instrument panel is provided with a knob 8 which may be grasped by the operator. A block or section of insulating material 9 is interposed between the attached ends of the rod 2 and the wire 5.

The inner end of the rod 2 carries a fixed metal disc 10, and a sleeve 11 is freely slidable on the rod 2 adjacent its inner end, said sleeve being provided with an integral disc 12, which latter is located intermediate the bearings 3 and 4. A spiral compression spring 13 encircles the rod 2 and is interposed between the bearing 4 and disc 12. As shown in Fig. 4 of the drawings, the sleeve 11 is received and supported by the bearing 3.

Fixed to the base of the casing 1 are two spaced, L-shaped, metal terminals 14 and 15, the vertical leg of each of said terminals abutting the face of the bearing 4 between said bearing and the disc 10. Also fixed to the base of the casing 1 are two spaced, L-shaped, metal terminals 16 and 17, the horizontal legs of the terminals being disposed through the bearing 3 and the vertical legs being disposed in abutting relation to the face of the bearing toward the disc 12. A third metal terminal 18 is provided on and fixed to the same face of the bearing 3. A connecting bar 19 connects the terminal 15 and the terminal 16. A conductor wire 20 connects the usual grounded storage battery 21 to the connector 19, while a conductor wire 22 leads from the terminal 14 to the starting motor (not shown) for the engine.

Fixed to the base of the casing is a cylinder 23 whose piston 24 is drawn into the cylinder bore by suction force exerted through a tube 25 leading from the engine intake manifold (not shown) to a port provided in the cylinder wall adjacent the bottom of the cylinder.

Mounted on a boss provided on the upper surface of the cylinder head 26 is one end of a resilient metal arm 27, said arm having an aperture through which the piston rod 28 protrudes. A

compression spring 100 encircles the piston rod and is interposed between the arm 27 and a nut 29 which is threaded on the end of the piston rod. Two spaced metal contact points 30 are provided on the under face of the free end of the resilient arm 27.

A conductor wire 31 leads from the connector 19 to a metal plate 32 fastened to the boss of the cylinder head 26, the plate 32 and arm 27 permanently contacting each other.

Fastened to lugs 33 carried by the cylinder head 26 are oppositely disposed and separated plates 34 and 35, each of which is provided on its upper face adjacent its inner end with a contact point 36, the points 36 being vertically aligned with the points 30 of the arm 27 but out of contact therewith.

A conductor wire 37 leads from the plate 34 to a metal plate 55 while a conductor wire 38 leads from the plate 35 to a metal plate 56, the plates 55 and 56 being fixed to a post 39 of insulating material.

Also attached to the post 39 are the ends of two flexible metal strips 40 and 41, the two strips being spaced apart and having their opposite ends joined together by a section of insulating material 42. A metal contact point 43 is fixed to the under surface of each strip at its free end.

The free ends of the two strips 40 and 41 overlie the free ends of similar metal strips 44 and 45, and the free ends of the strips 44 and 45 are joined together by a section of insulating material 46, while the opposite ends are attached to a post 47 of insulating material. A metal plate 48 is attached to the strip 44 and the post 47, while a metal plate 49 is attached to the strip 45 and the post 47. A metal contact point 50 is fixed to the upper surface of each of the strips 44 and 45 at its free end and the contact points 50 and 43 are in aligned relation.

The said points 43 and 50 are normally maintained in abutting relation by a sphere 51 interposed between the spring strips and a sphere supporting platform 52. Said platform is vertically adjustable by the provision of a threaded stem 53 and a complemental nut 54, adjustment being provided to afford means for increasing or decreasing the force exerted on the spring strips by the sphere.

A conductor wire 57 leads from the plate 48 to the electrical circuit supplying current to the lights, horn, radio, heater, and similar accessories, while a wire 58 leads from the plate 49 to the coil of the ignition system for the engine. A conductor wire 59 leads from the terminal 16 to the plate 49 and a conductor wire 60 leads from the terminal 17 to the plate 48.

When it is desired to start the engine, the knob 8 is grasped and the wire 5 pulled outwardly of the instrument panel 7. Such action initially moves the disc 12 into contact with the terminals 16, 17 and 18. Electrical current is thereby furnished to the engine ignition from the battery 21 through wire 20, connecting bar 19, terminal 16, disc 12, terminal 18, and conductor wires 59 and 58, while electrical current is furnished to the lights, horn, etc., from the battery through wire 20, connecting bar 19, terminal 16, disc 12, terminal 17, and conductor wires 60 and 57.

Continued pulling of the knob 8 and wire 5 (during which the spring 13 compresses) moves the disc 10 into contact with the terminals 14 and 15, thus to supply electrical energy from the battery to the starting motor through the wire 20, terminal 15, disc 10, terminal 14 and wire 22. Upon

the closing of the electrical circuit to the starting motor, the latter is actuated and commences operation of the engine, electrical current being supplied to the ignition system as aforesaid.

Simultaneously with the commencement of the operation of the engine, suction force is applied to the cylinder 23 through the intake manifold tube 25. This pulls the piston 24 and its rod 28 downwardly, thereby compressing the spring 100 and depressing the resilient arm 27 so that the contacts 30 and 36 are brought together. Thus, so long as the engine is operating, electrical current will be furnished to the engine ignition through wires 20 and 31, arm 27, points 30 and 36, plate 35, wire 38, plate 56, spring strips 41 and 45, plate 49 and wire 58. Likewise, so long as the engine is operating, electrical current will be furnished to the lights, horn, etc., from the arm 27 and points 30 and 36 through plate 34, wire 37, plate 55, spring strips 40 and 44, plate 20 48 and wire 57.

When the engine commences to operate, the knob 8 and wire 5 are pressed inwardly, disconnecting the discs 10 and 12, thereby to break the electrical circuits controlled by said elements since said circuits are then not required.

Should the engine cease operation, the cylinder 23 will return to atmospheric pressure and the tension of the spring 100 on arm 27 will be released so that said arm will spring upwardly separating contact points 30 and 36 and breaking all electrical circuits. Operation of the engine can then only be restored by actuation of the knob 8, wire 5, and discs 10 and 12, as hereinbefore described.

Should a vehicle equipped with the invention become involved in an abnormal collision with another object, the shock of the collision will jar the sphere 51 from its position intermediate its platform 52 and the spring strips 40, 41, 44 and 45. Removal of the sphere from its normal position will permit separation of the strips 40 and 41 from contacting relation with the strips 44 and 45 and all electrical circuits will be broken, thus eliminating the hazard of a fire or an uncontrolled runaway vehicle. Resumption of engine operation may be secured either by replacing the disengaged sphere and starting the engine as hereinbefore described, or the knob 8 and attached wire 5 may be pulled outwardly to move the discs 12 and 10 into circuit closing position for starting the engine, after which the wire 5 is pushed inwardly a sufficient distance to disengage the disc 10 from contact with the terminals 14 and 15, but maintaining (because of the presence of the compressed spring 13) the disc 12 in contact with the terminals 16, 17 and 18. Thus, electrical energy will continue to be furnished to the ignition system and to the lights, horn, etc. through wires 59—58 and 60—57, respectively.

There may be instances, especially when the engine is under full throttle, when the suction through the tube 15 will be inadequate to maintain the piston 24 and its associated arm 27 depressed. To overcome this contingency, a cam shoe 61 is pivotally mounted on a pin 62 supported by bearing brackets 63. A threaded pin 64 extends through the upper end of the cam shoe 61 and has eyes 65 threadedly received on its opposite ends. A retractile coil spring 66 has one of its ends connected to one of the eyes 65 and has its opposite end anchored on the casing wall. Another retractile coil spring 67 has one of its ends connected to the other of 75

the eyes 65 and has its opposite end connected to the foot throttle (not shown). Obviously, when the foot throttle is depressed for supplying fuel to the engine, the spring 67 is pulled forwardly, thereby pivotally moving the cam shoe 61 so that its toe engages and depresses the free end of the arm 27 so that the metal contact points 30 and 36 contact each other. The spring 66 returns the cam shoe 61 out of arm-depressing position when pressure on the foot throttle is released. Suction through the tube 25 will maintain the electrical circuits closed while the engine is operating at idling speed.

What is claimed is:

1. In apparatus of the character described, the combination of a vehicle powered with an internal combustion engine having an ignition system, a normally open electrical circuit from a source of electrical energy to a starting motor for said engine, a manually operable switch for controlling the circuit to the starting motor, a normally open electrical circuit to the electrical system of the vehicle, a manually operable switch for controlling the circuit to said electrical system and adapted to be actuated for closing said circuit simultaneously with the actuation of the switch in the starting motor circuit, a second circuit to the electrical system of the vehicle open when the engine is not operating, said circuit including a resilient conducting element maintaining the circuit open when the engine is inoperative, a piston in a cylinder operable by suction in the intake manifold of the engine whose piston rod is connected to the resilient conducting element, said conducting element being moved to circuit closing position by said piston and its rod upon and during operation of the engine to maintain said circuit closed, the circuit to the starting motor and the first mentioned circuit to the electrical system of the vehicle being designed to be opened by actuation of their manual switches upon closing of the circuit controlled by the resilient conducting ele-

ment, and a cam associated with and designed to act upon said resilient conducting element and connected to and operable by the throttle of said engine for affording additional means for moving and maintaining said element in circuit closing position when said engine is being operated from the throttle.

2. In apparatus of the character described, the combination of a vehicle powered with an internal combustion engine having an ignition system, a normally open electrical circuit from a source of electrical energy to a starting motor for said engine, a manually operable switch for controlling the circuit to the starting motor, a normally open electrical circuit to the electrical system of the vehicle, a manually operable switch for controlling the circuit to said electrical system and adapted to be actuated for closing said circuit simultaneously with the actuation of the switch in the starting motor circuit, a second circuit to the electrical system of the vehicle open when the engine is not operating, said circuit including a resilient conducting element maintaining the circuit open when the engine is inoperative, a piston in a cylinder operable by suction in the intake manifold of the engine whose piston rod is connected to the resilient conducting element, said conducting element being moved to circuit closing position by said piston and its rod upon and during operation of the engine to maintain said circuit closed, a break in the said second circuit consisting of separated overlapping conductor elements maintained in contacting relation for maintaining said circuit normally closed by a wedge interposed between said overlapping conductor elements and an immovable portion of said apparatus, said wedge being adapted to be jolted from wedging position when the vehicle is abnormally jarred to permit separation of the overlapping conductor elements and opening of the circuit.

LAMBERT R. CALE.