

Nov. 14, 1933.

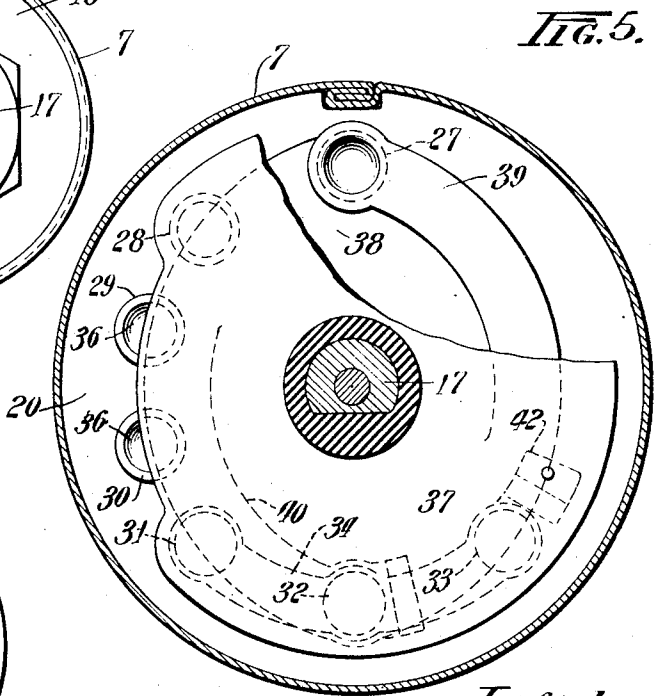
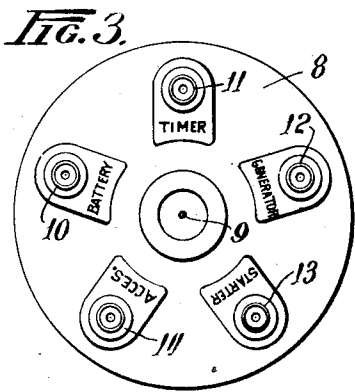
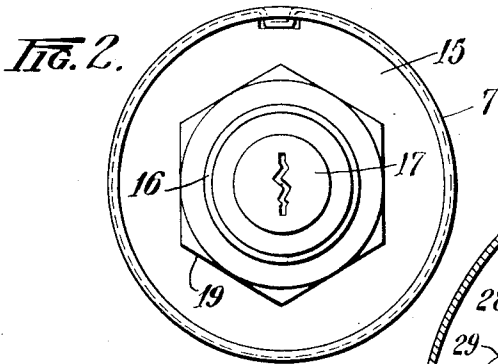
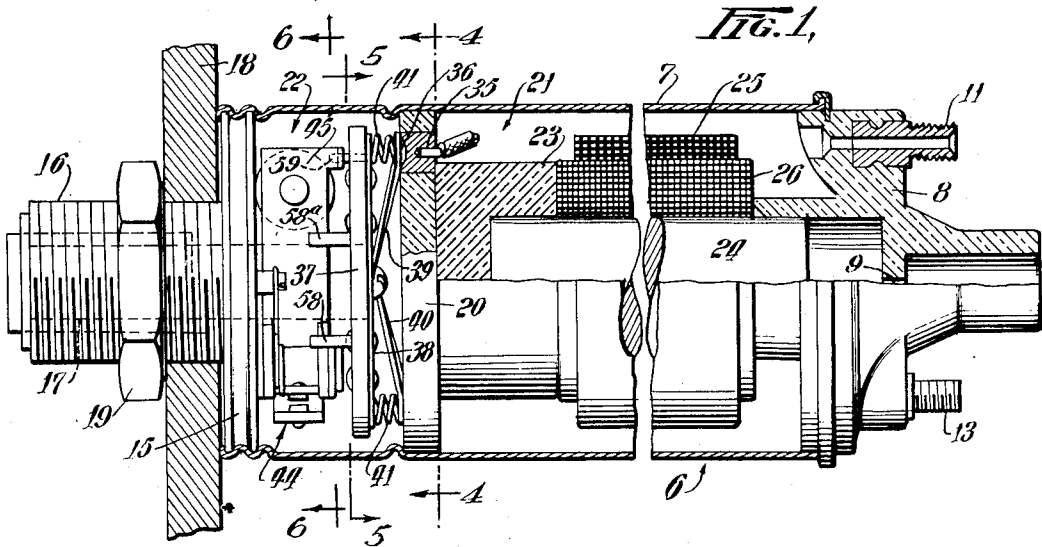
W. J. WILLIAMS

1,935,169

CIRCUIT CONTROL DEVICE FOR AUTOMOBILES

Filed Sept. 2, 1930

2 Sheets-Sheet 1



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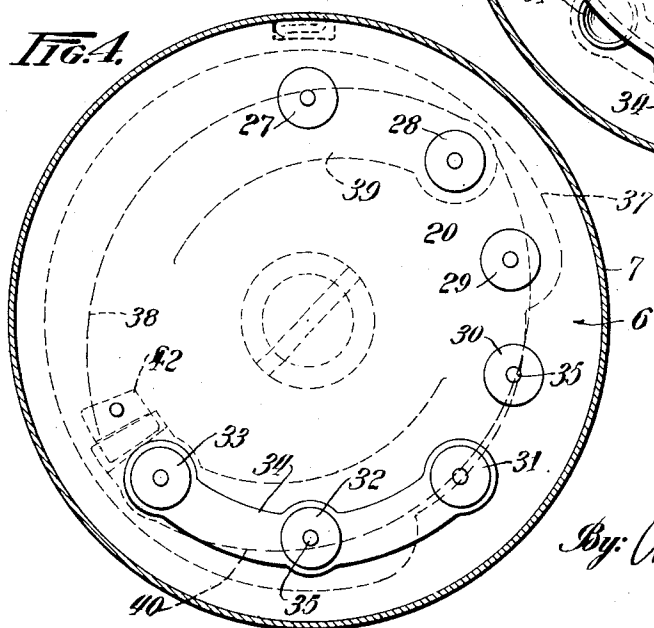
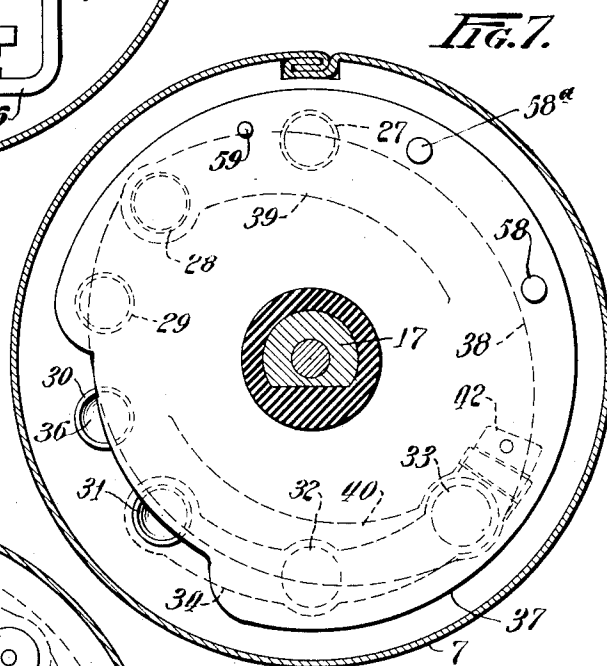
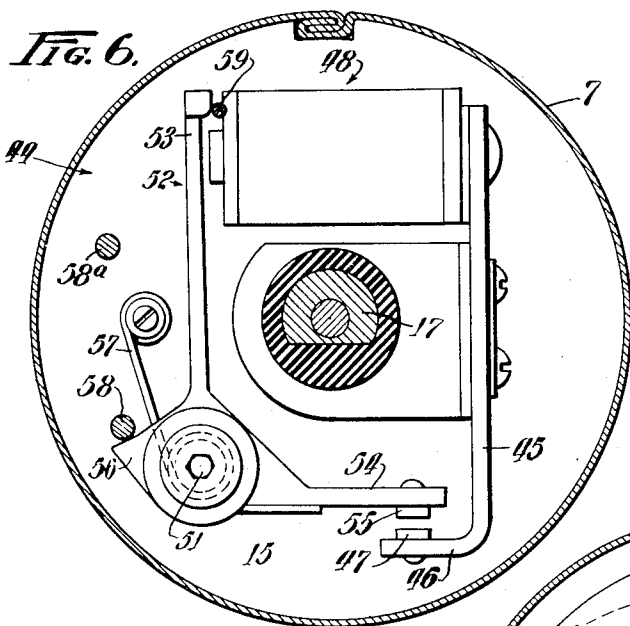
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1,935,169

CIRCUIT CONTROL DEVICE FOR AUTOMOBILES

Filed Sept. 2, 1930

2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

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CIRCUIT CONTROL DEVICE FOR
AUTOMOBILESWilliam J. Williams, Chicago, Ill., assignor to
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tion of Illinois

Application September 2, 1930. Serial No. 479,412

8 Claims. (Cl. 175—357)

This invention relates to improvements in circuit control devices for automobiles and it consists of the matters hereinafter described and more particularly pointed out in the appended claims.

The primary object of the invention is to provide a simple and efficient device for automotive vehicles for controlling the "on" and "off" conditions of the circuits for the ignition system and the starting motor and correlated devices of the vehicle of which the device forms a part.

A further object of the invention is to provide a device of this kind in the nature of an ignition coil in which is embodied an associated circuit breaker of peculiar construction.

These objects of the invention as well as others together with the many advantages thereof, will more fully appear as I proceed with my specification.

In the drawings:—

Fig. 1 is a view partly in longitudinal section and partly in side elevation, of an ignition coil and contained switch and circuit breaker embodying my invention.

Fig. 2 is a view in elevation of the key end of the coil of Fig. 2.

Fig. 3 is a view in elevation of the terminal end of said coil.

Figs. 4, 5 and 6 are transverse vertical sectional views through the coil as taken on the lines 4—4, 5—5, and 6—6 respectively of Fig. 1.

Fig. 7 is a view of the switch similar to that shown in Fig. 5 with the parts in a changed relation.

Referring now in detail to that embodiment of the invention illustrated in the accompanying drawings and especially to Fig. 1 thereof, 6 indicates as a whole the improved circuit control device in the nature of a high tension ignition coil.

Said coil as is best shown in Fig. 1 includes a tubular metal casing 7 which is closed at one end by a head 8 of insulation having a center terminal 9 and arcuately spaced terminals 10, 11, 12, 13 and 14 adapted for association with the battery, timer, generator, starting motor and accessories respectively of the automobile in which the device is embodied. The other end of said casing is closed by a head 15 including a tubular extension 16 in which is disposed a key actuated lock cylinder 17. The extension is screw threaded and is adapted to project through a suitable support 18 such as the instrument board of the automobile and may be secured thereto by a nut 19 travelling on said extension.

Spaced a suitable distance inwardly from the head 15 of the coil is a transverse wall 20 of insulation that divides the casing into a coil chamber 21 and a switch and circuit breaker chamber 22. Associated with the wall 20 is a boss 23 disposed in the coil chamber and supported in said boss and the terminal head 8 respectively, axially of the casing is the core 24 for the coil as a whole. In the chamber 21 between the boss 23 and head 8 and surrounding the major portion of the core are the primary and secondary windings 25 and 26 respectively of said coil. One end of the primary winding is connected to the terminal 11 and the corresponding end of the secondary winding 26 is connected to the center terminal 9.

The wall 20 and its boss 23 is made of a moulded insulation and in said wall near its periphery, are embedded a plurality of arcuately spaced fixed plugs 27, 28, 29, 30, 31, 32 and 33 respectively, the three later ones being connected together by a buss 34 as best shown in Fig. 4. The plugs 27—28 and 32—33 constitute fixed contacts while the plugs 29—30 and 31 constitute terminals for the convenient attachment of current conductors thereto. Each plug is in the form of a metallic body formed at one end with a central recess 35 whereby an associated conductor may be connected thereto and formed at its other end with a concaved recess 36 for engagement by an associated movable contact as will later appear.

The lock cylinder 17 extends into the chamber 22 where it has secured thereto a disc of insulation 37 forming the movable base of a switch within said chamber 22. When the lock cylinder is turned in one direction or the other by means of the proper key (not shown) inserted from the outer end thereof, it is apparent that the switch base will turn therewith. On that face of the base, adjacent the wall 20 is fixed a metallic plate 38 formed to provide a pair of oppositely disposed, helical, spring contact fingers 39 and 40 respectively, each formed to engage certain associated contacts 27—28 and 32—33 respectively. Each finger is formed with a convex end to engage in the concaved recess of its associated contact before mentioned and to further insure proper contact engagement, each finger is backed up by a spring 41. On one side of the wall 20 in the circular path of the contacts before mentioned and beyond the contact 33 is provided another fixed contact 42 adapted in the movement of the switch to be engaged by the extremity of the finger 40 when its convex end is engaged in the re-

cess 36 of the contact 33. This contact 42 is electrically connected to the terminal 30.

In the chamber 22 of the casing between the end wall 15 and switch base 37 is located a circuit breaker indicated as a whole as at 44. It comprises a bracket 45 fixed to said wall 15 and having a bent end 46 on which is mounted a contact 47. On the other end of said bracket is mounted an electro-magnet 48 the winding of which is connected by a suitable conductor with the terminal 29, the bracket itself being connected by a suitable conductor with the terminal 30. Associated with said bracket and pivoted on the wall 15 as at 51 is a bell crank shaped contact lever 52 having one arm 53 disposed to be attracted by the magnet 48 and a second arm 54 carrying a contact 55 to coact with the bracket contact 47. On the hub of said lever is a projection 56 and a spring 57 secured at one end to the wall 15 and bearing at its other end upon the arm 54 normally acts to hold the contacts 47—55 spaced apart. On the switch base 37 and facing toward the circuit breaker as a whole are studs or pins 58—58^a and 59 respectively, arranged to so engage the arm 53 and extension 56 of said lever as to make and break engagement between the contact 47—55. The lever 52 is connected by a suitable conductor with the terminal 31.

The contact 27 is connected to the terminal 10 by a suitable conductor, disposed within the chamber 21 of the casing so as to be enclosed thereby.

When the switch in the chamber 22 of the coil casing is in its "off" position, the contact finger 39 is engaged with the contact 28 and the contact finger 40 is engaged with the contact 33 (which in turn is connected to the terminal 31 and contact 32 through the buss 34) and the extreme end of said finger 40 is engaged with the contact 42. When the contact fingers are in the position described, they are thus releasably held because of the concave-convexed formation of the said fingers and contacts as before described and the pin 58 will have so engaged the extension 56 of the circuit breaker lever 52 as to hold the contacts 47—55 spaced apart and open.

When the key of the switch has been inserted into the cylinder 17 and a turn (of about 45°) has been imparted thereto in one direction, this will move the contact fingers 39 and 40 into engagement with the contacts 27 and 32. When the device is embodied in an automotive vehicle, the contact 27 is connected to the associated battery by a suitable conductor not shown.

As contact 32 is connected to contact 33 through the buss 34, current could pass into the primary and secondary windings 25 and 26 of the coil 6. A slight further turn of the key in the same direction but not so far as to cause the contact fingers to leave their respective contacts, will cause the pin 58^a on the switch base 37 to engage the lever arm 53 of the circuit breaker and move it toward the electro-magnet 48 and at the same time cause the contacts 47—55 to engage against the action of the spring 57.

Current would then pass through the fingers 39^a and 40, through a suitable conductor not shown, to contacts 55—47, lever 53 conductor 50 to contact 30.

In this last mentioned movement of the switch, current could also pass through the bracket 45 of the circuit breaker 44 and energize the winding of the electro-magnet 48, and this will cause the same to hold the arm 53 of the circuit breaker against the action of the spring 57. So soon as

turning pressure on the actuating key is released the pin 58 backs away from the lever arm 53 and the contact fingers slip back into full center engagement with the contacts 27 and 32; this being due to the concavo-convexed formation of said fingers and contacts as well as the natural spring action in said fingers. Thus the magnet 48 maintains engagement between the contacts 47—55 to hold closed an associated circuit such as the starting motor circuit of the vehicle.

So soon as the engine runs under its own power it drives the usual generator and produces a current supply which passes to contact 29 and conductor 49, to the winding of the electro-magnet 48 which acts to deenergize the same. When thus deenergized, said magnet loses its attractive effort or power on the arm 53 so that the spring 57 immediately acts to open or separate the contacts 47—55.

Assume that after the engine has been started, the before mentioned generator fails in its function of current generation. Under such a condition the circuit breaker would also fail to break the starting motor circuit. Thus a condition would arise wherein the engine is running and the starting motor is still operating, and such a condition is one to be avoided, because of the damage which naturally occurs. To circumvent such a condition, the key operated switch in the coil casing is turned but a slight distance in the other direction (but not so far as to cause the fingers 39 and 40 to leave the contacts 27—32) and this will cause the pin 59 to engage and pass the end of the lever arm 53 of the circuit breaker and thus swing said lever against the attraction of the magnet 48 and produce a separation between the contacts 47—55.

Upon turning said switch in the direction to "off" position, the pin 58 engages the projection 56 of the circuit breaker lever 52 so that said circuit breaker is effectively held against tampering by unauthorized persons.

While in describing the invention, I have referred in detail to the form, arrangement and construction of the various parts as well as a specific wiring lay-out, the same is to be considered merely as illustrative so that I do not wish to be limited thereto except as may be specifically set forth in the appended claims.

I claim as my invention:—

1. A circuit control device for automobiles comprising a casing, a partition dividing the same into a coil chamber and a switch chamber, a coil in said coil chamber, contacts fixed in said partition and certain ones of which are operatively connected to said coil, a switch member in the switch chamber and movable from an "off" to an "on" position and vice versa and carrying contact fingers for engagement with the fixed contacts in said partition, and a circuit breaker in one of said chambers and including a fixed contact and a movable contact which are held in a spaced apart relation by the switch member when in its "off" position and which last mentioned contacts automatically engage when said switch moves towards its "on" position.

2. A circuit control device for automobiles comprising a casing, a partition dividing the same into a coil chamber and a switch chamber, a coil in said coil chamber, contacts fixed in said partition, and certain ones of which are operatively connected to said coil, a switch member in the switch chamber and movable from an "off" to an "on" position and vice versa and carrying

contact fingers for engagement with the fixed contacts in said partition, and a circuit breaker in the switch chamber including a fixed contact and a movable contact which are held in spaced apart relation by the switch member when in its "off" position.

3. A circuit control device for automobiles comprising a casing, a partition dividing the same into a coil chamber and a switch chamber, a coil in said coil chamber, contacts fixed in said partition and certain ones of which are operatively connected to the coil, a switch member in the switch chamber and movable from an "off" to an "on" position and vice versa and carrying contact fingers for engagement with the fixed contacts in said partition, and a circuit breaker in one of said chambers including a spring pressed arm and an electro-magnet each including cooperating contacts normally disposed in spaced relation, said arm being engaged by a part of the switch in its movement toward "on" position and so moved thereby as to engage the contacts of said arm and magnet and to also engage said arm with the core of said electro-magnet.

4. A circuit control device for automobiles comprising a casing, a partition dividing the same into a coil chamber and a switch chamber, a coil in said coil chamber, contacts fixed in said partition and certain ones of which are connected to said coil, a switch member in the switch chamber and movable from an "off" to an "on" position and vice versa and carrying contact fingers for engagement with the fixed contacts in said partition, and a circuit breaker in one of said chambers including a spring pressed arm and an electro-magnet each including cooperating contacts normally disposed in spaced relation, said arm being engaged by a part of the switch in its movement toward "on" position and so moved thereby as to engage the contact of said arm and magnet and to also engage said arm with the core of said electro-magnet, said switch when moved to its "off" position so engaging said arm as to move it against the attraction of said core and to then hold it in a position spacing its contact from that one associated with the electro-magnet.

5. A circuit control device for automobiles comprising a casing, a partition dividing the same into a coil chamber and a switch chamber, a coil in said coil chamber, contacts fixed in said partition and certain ones of which are connected to said coil, a switch member in said switch chamber and movable from an "off" to an "on" position and vice versa and carrying contact fingers on one side thereof for engagement with said fixed contacts, a circuit breaker also disposed in the switch chamber and including a fixed contact and a movable contact and means on the other side of said switch member adapted when said switch member is in an "off" position, for engagement with a part of said circuit breaker to hold the contacts of said circuit breaker in spaced relation.

6. A circuit control device for automobiles

comprising a casing, a partition dividing the same into a coil chamber, a coil in said chamber, a switch member in said switch chamber and movable from an "off" to an "on" position and vice versa and carrying contact fingers on one side thereof for engagement with said fixed contacts, a circuit breaker in said switch chamber and comprising a spring pressed arm and an electro-magnet each including cooperating contacts disposed in spaced relation and means on the other side of said switch member adapted when said switch member is in the "off" position for engagement with a part of said arm to hold the contacts of said circuit breaker in spaced relation.

7. A circuit control device for automobiles comprising a casing, a partition dividing the same into a coil chamber and a switch chamber at the respective ends of the casing, an ignition coil in the coil chamber, contacts fixed in said partition and some of which are connected to said coil, a switch member in the switch chamber, a lock barrel turnably mounted in that end of the casing associated with the switch chamber and operatively supporting the switch member whereby it may be turned from an "off" to an "on" position and vice versa, contact fingers carried by one side of the switch member for engagement with said fixed contacts in the partition, a circuit breaker in said switch chamber and mounted on the associated end of the casing and including an arm and an electro-magnet between which said barrel extends, said arm and magnet including cooperating contacts and means on the other side of said switch which when said switch is in an "off" position so engages said arm as to hold the contact thereof spaced from the associated one on the electro-magnet.

8. In a circuit control device of the kind described, a casing having an end wall and a partition dividing the casing into a coil chamber and a switch chamber, an ignition coil in said coil chamber, contacts in said partition and some of which are connected to said coil, a lock barrel extending through in said end wall into said switch chamber, a switch member in the switch chamber turnable with said barrel and including contacts for engagement with contacts in said partition, an electro-magnet, a support therefor fixed to said end wall and including a fixed contact, a spring pressed L-shaped arm also pivoted on said end wall of the casing and having a part carrying a contact for cooperation with the contact on the magnet support and having another part for cooperation with the core of said magnet, and means carried by the switch member and operating when the same is in "off" position to engage a part of said L-shaped arm so as to hold said contacts in spaced relation, said means operating when said switch is turned to an "on" position to engage that part of said arm cooperating with the magnet core for moving said arm part into engagement with said core.

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