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COMBINED STARTING AND IGNITION SWITCHING DEVICE AND CIRCUITS THEREFOR.

APPLICATION FILED JULY 21, 1914.

1,226,971. Patented May 22, 1917.

FIG. 1

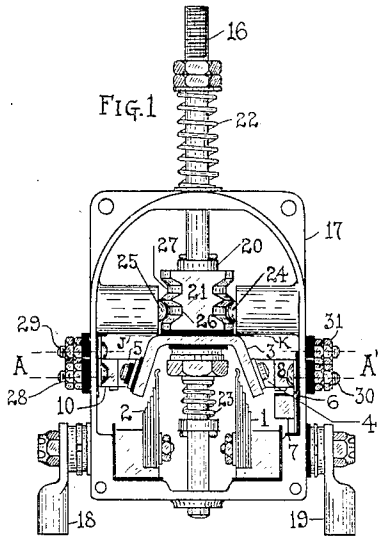


FIG. 2

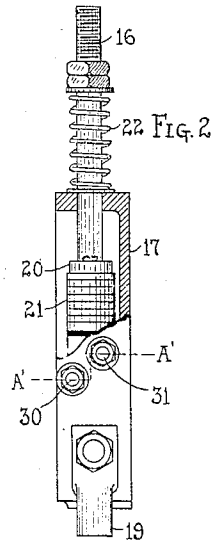


FIG. 3.

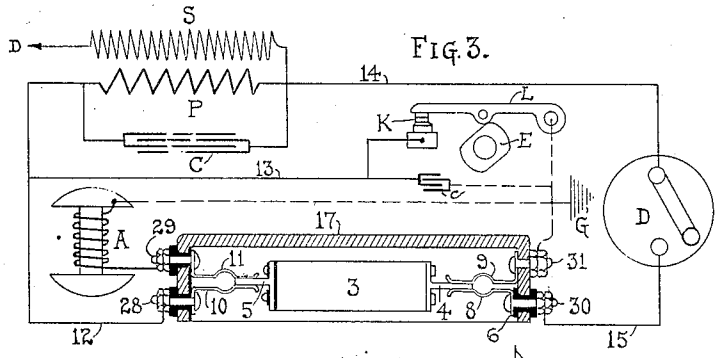
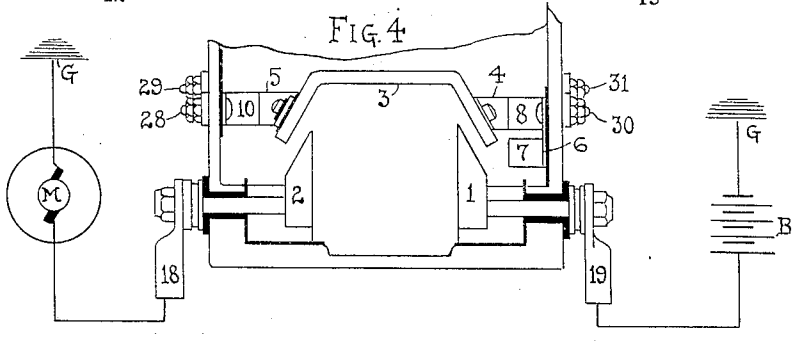


FIG. 4



WITNESSES:

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COMBINED STARTING AND IGNITION SWITCHING DEVICE AND CIRCUITS THEREFOR.

1,226,971. Specification of Letters Patent. Patented May 22, 1917.

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To all whom it may concern:

Be it known that I, WILLIAM J. HART, a citizen of the United States, resident of Mount Vernon, county of Westchester, State of New York, have invented certain new and useful Improvements in a Combined Starting and Ignition Switching Device and Circuits Therefor, of which the following is a specification, giving a full and clear description, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates particularly to apparatus used in starting and operating an internal combustion engine, such as used on automobiles and other moving vehicles. In certain systems now in use on moving vehicles, it is customary to start the engine using battery for a source of ignition current, and as soon as the engine is started, to throw over on to magneto. It sometimes happens that a driver will in stopping the vehicle he is driving, throw his ignition switch over on to "battery" instead of to the "off" position, and in a number of other ways, leave the switch on battery, in which case either the batteries are run down or the ignition coil is burned out, or both things may occur. It also happens that after a driver starts his engine he forgets to switch over to "magneto" and runs for a long time on battery. If he is using dry cells, in the ignition circuits, this runs them down and he soon finds himself without any ignition battery for starting.

To overcome all of these difficulties, I have combined the control of the ignition circuits with the starting switch which is now commonly used for operating and starting the motor, which cranks the engine. By my invention, it is impossible to leave the battery on the ignition circuits or to run on the battery after the engine has been started.

My invention is more particularly described in the attached drawings and specification, in which Figure 1 is a view of one form of starting switch with the cover removed and showing the various circuit contacts in their normal position.

Fig. 2 is a side elevation of Fig. 1 with one section of the switch box broken away to expose the switch plunger.

Fig. 3 shows a simplified wiring diagram of the ignition circuits in connection with the starting switch, a portion of which is shown as a section on line J K of Fig. 1 and the side walls on sections AA′ through which the ignition circuit terminals project.

Fig. 4 shows a simplified wiring diagram of the starting motor circuit and the contacts used in the starting switch for the ignition circuits.

In the various figures of the drawing like numbers are used for the corresponding parts. Referring particularly to the details, 17 is a starting switch box. 16 is a plunger which carries a contact arm 3. When the plunger 16 is depressed the contact arm 3 is brought into contact relation with the brushes 1 and 2, which are connected respectively to terminals 19 and 18. Terminal 19 is connected to battery B, which has its opposite terminal grounded. Terminal 18 is connected to the starting motor M, the other terminal of which is grounded. It is thus seen that the motor circuit is completed and the motor will begin to operate and continue to operate as long as the plunger 16 is held in a depressed position. Mounted on the side of the box 17, are suitable spring members 6, 9, 10 and 11. The member 6 has two forks, 7 and 8. Looking at Fig. 4, the spring member 9 is below the fork 8, there being no spring member below the fork 7. The spring member 6 is connected by terminal 30 and wire 15 to a contact switch D. Spring member 9 is connected by means of terminal 31 to the frame of the box 17 which is grounded. The member 3 of the starting switch has mounted thereon two contact blades 4 and 5. 4 is not insulated therefrom, while 5 is insulated therefrom by suitable bushings. The contact blade 10 is connected by a terminal 28 and wire 12 to the primary P of the induction coil. The switch blade 11 is connected by terminal 29 to a winding A of the magneto armature, the other end of said winding being connected to the frame of the magneto which is grounded. The blades 6,

10 and 11, with their respective terminals are insulated from the box 17 as will be seen in Fig. 3. Connected to wire 12 is wire 13, which runs to a contact screw K and the condenser C. L is a breaker box lever usually mounted on the magneto and operated by the cam E. Connected across primary P is a condenser C. Leading from the induction coil is a wire 14 running to the lever of the switch D, which may be mounted in any convenient place to suit the driver of the vehicle. The secondary S of the induction coil is connected to one end of the primary P and condenser C and wire 14. The other end D runs to the distributer of the magneto. This distributer is not shown, as it is a well known piece of apparatus and forms no part of the present invention.

In the operation of the starting switch, by pushing plunger 16 downward the member 21, which is carried on the auxiliary member 20 of the plunger and having two grooves 26 and 27, is caused to pass suddenly the plungers 24 and 25, in going from one position to the other, and by means of the springs 22 and 23 a quick action is obtained so that there is no arc at brushes 1 and 2, and no time is lost in switching from battery to magneto. The starting switch is made automatic by means of the springs 22 and 23, so that as soon as the pressure is removed from the plunger 16, immediately the engine starts on its own power, the switch blade 3 is carried back to its normal position, which position is the operating position of the magneto and the "off" position for the starting motor and battery ignition.

The ignition circuits so far as the starting switch is concerned can be traced as follows: Assuming that the plunger 16 is pushed down, so that the plungers 24 and 25 rest in a groove 27 of member 21, then as previously described, the starting motor circuit will be closed and battery will be taken from the switch member 3 to contact blade 4, fork 7 of switch blade 6, terminal 30 to switch D, the same being now closed, wire 14, primary P of induction coil, wire 13, contact K, lever L to ground, which is also the opposite side of battery B. As the engine is cranked, contact K is opened and closed by the cam E acting on the lever L, and a spark is produced by the secondary S of the induction coil through the distributer and spark plugs of the engine in the ordinary manner. When the engine begins to fire, the pressure is removed from the plunger 16, and it is returned to its normal position as shown in Fig. 1. It is now seen that a circuit is completed from the magneto armature A through contact 29, switch blade 11, contact blade 5, switch blade 10, contact 28 to the primary P of induction coil, wire 14, switch D, wire 15, contact 30, switch blade 6, and its fork 8, switch blade 4 and contact blade 9, terminal 31 to ground, to which the other end of the armature winding is connected. A second circuit is obtained for the armature current from the wire 12 through wire 13, contact K, lever L to ground, and thus it will be seen that this second circuit is in multiple with the primary of the induction coil and condenser C, and that the armature is short circuited through the contact K. When the cam E breaks the contact K, the current generated in the armature A is discharged through the winding P of induction coil in the ordinary manner for circuits of this nature.

It is thus seen that by my arrangement of switch parts and wiring I am enabled to combine the ignition controlling apparatus with the starting switch, thereby doing away with a special switch, which is ordinarily used with ignition circuits. While I have shown a so-called low tension ignition system, my invention is broad enough to include all systems in which battery is used in the ignition circuits during the starting period. The form of starting switch shown is no part of my invention as my improvements may be applied to any of the numerous starting switches now in use. I have also shown the same battery for operating both the starting motor and ignition apparatus, but this is not necessary, and it will be seen that numerous and extensive changes and alterations may be made in various details, without departing from the spirit of my invention and the scope of the appended claims.

Having thus described my invention, what I claim is:

1. In a device of the character described, the combination of a battery, a starting motor, a switch for connecting said battery to said motor, a magneto having a circuit breaker and circuits therefor, said magneto operating said circuit breaker in one of said circuits when said switch connects battery to the starting motor and operating said circuit breaker in another circuit when said switch is in its normal position.

2. In combination, a starter circuit, a battery circuit and a magneto circuit, a switch member manually movable in one direction to close the starter circuit and automatically movable in the opposite direction to break such circuit, other switch members manually movable to break the magneto circuit and close the battery circuit and automatically operable to break the battery circuit and to close the magneto circuit, the battery circuit closing movements of said other members being dependent on starter circuit closing movements of said first switch member.

3. In a device of the character described, the combination of a battery, a starting motor, a switching mechanism connecting said

battery to said motor and a housing for said mechanism, a magneto, an induction coil, circuits for both magneto and induction coil, said circuits being controlled within said housing by said motor switching mechanism, substantially as and for the purpose described.

4. In a device of the character described, the combination of a battery, a starting motor, a switch for closing the circuit of the battery to said motor, a magneto, an induction coil, said switch also closing the circuit of battery to the induction coil, at the same time that it closes the starting motor circuit, said switch also at this time opening the magneto circuit, means for returning the switch to its normal position, thereby opening the battery circuit to the motor and induction coil and closing the magneto circuit, substantially as and for the purpose described.

5. In a device of the character described, the combination of a battery, a starting motor, means for closing the circuit of the battery to said motor, ignition apparatus and circuits therefor. means carried by said first means for controlling the said ignition circuits, whereby an operative ignition circuit is closed, when said first mentioned means is in its normal position, substantially as and for the purpose described.

6. In a device of the character described, the combination of a battery, a starting motor, and means for closing the circuit of the battery to said motor, said means having a normal and an abnormal position, a magneto, an induction coil in co-relation, and circuits therefor, said means also carrying means for closing the battery circuit to said ignition coil and opening the magneto circuits when the said means are in the abnormal position, and opening the battery circuit to the ignition coil and closing the magneto circuits when said means are in their normal position, substantially as and for the purpose described.

7. In a device of the character described, the combination of a battery, a starting motor, a switch, a magneto, an induction coil, a circuit breaker and circuits adapted to work in conjunction therewith, said magneto being removed from said circuits when said switch is in its abnormal position, substantially as and for the purpose described.

8. In a device of the character described, the combination of a battery, a starting motor, a switch therefor, said switch having two terminals, said battery being connected to one terminal and said motor to the other terminal, a plunger carrying a contact member adapted to bridge the two terminals, whereby battery is connected to the starting motor, said bridge member carrying switch contacts controlling ignition circuits, including a magneto and an induction coil, substantially as and for the purpose described.

9. In a device of the character described, the combination of a battery, a starting motor, switching mechanisms to connect said battery to said motor, a box for containing said switching mechanism, a magneto, an induction coil, a circuit breaker, and circuits therefor, contacts mounted in the side of said box, said contacts being in said magneto, and induction coil circuits, the said switching mechanism also serving to open and close the said contacts to said magneto, and said induction coil, substantially as and for the purpose described.

10. In a device of the character described, the combination of a battery, a starting motor, a switch member for closing the circuit of the battery to said motor, a magneto, an induction coil, and a circuit breaker in co-relation therewith, circuits for said magneto, a circuit for said induction coil, the said circuits including the circuit breaker, means operated by said switch member for opening the circuit of the magneto, and for closing the circuit of the battery to the induction coil and said breaker, at the same time that the battery circuit is closed to the starting motor, substantially as and for the purpose described.

11. In a device of the character described, the combination of a battery, a starting motor, a switch member for closing the circuit of the battery to said motor, a magneto, an induction coil, and a circuit breaker in co-relation therewith, circuits for said magneto, a circuit for said induction coil, said circuits including the circuit breaker, means operated by said switch member for closing the circuit of the magneto to the said circuit breaker, and opening the circuit of said battery to said induction coil and circuit breaker, when said switch member is in its normal position, substantially as and for the purpose described.

12. In a device of the character described, the combination of a battery, an induction coil, a magneto, a circuit breaker arranged in circuits common to both coil and magneto, a switch adapted to open one of the common portions of said circuits, a starting motor and source of power therefor, means for closing the circuit between said source of power and said motor, said means controlling switching means, whereby the magneto is removed from the ignition circuits, and a source of power is connected to the induction coil at one position of the switching means, and whereby the magneto is connected into the ignition circuits and the source of power is removed therefrom when the switching means is in another position, substantially as and for the purpose described.

13. In a device of the character described,

the combination of a battery, a starting motor, and a switch therefor, said switch having two terminals, said battery being connected to one terminal and said motor to the other terminal, a plunger carrying a contact member adapted to bridge the said terminal whereby battery is connected to the starting motor, said bridge member operating switch contacts controlling ignition cuits, substantially as described.

In testimony whereof I affix my signature in the presence of two witnesses.

WILLIAM J. HART.

Witnesses:

M. W. BARTLETT,

C. W. CURTISS.