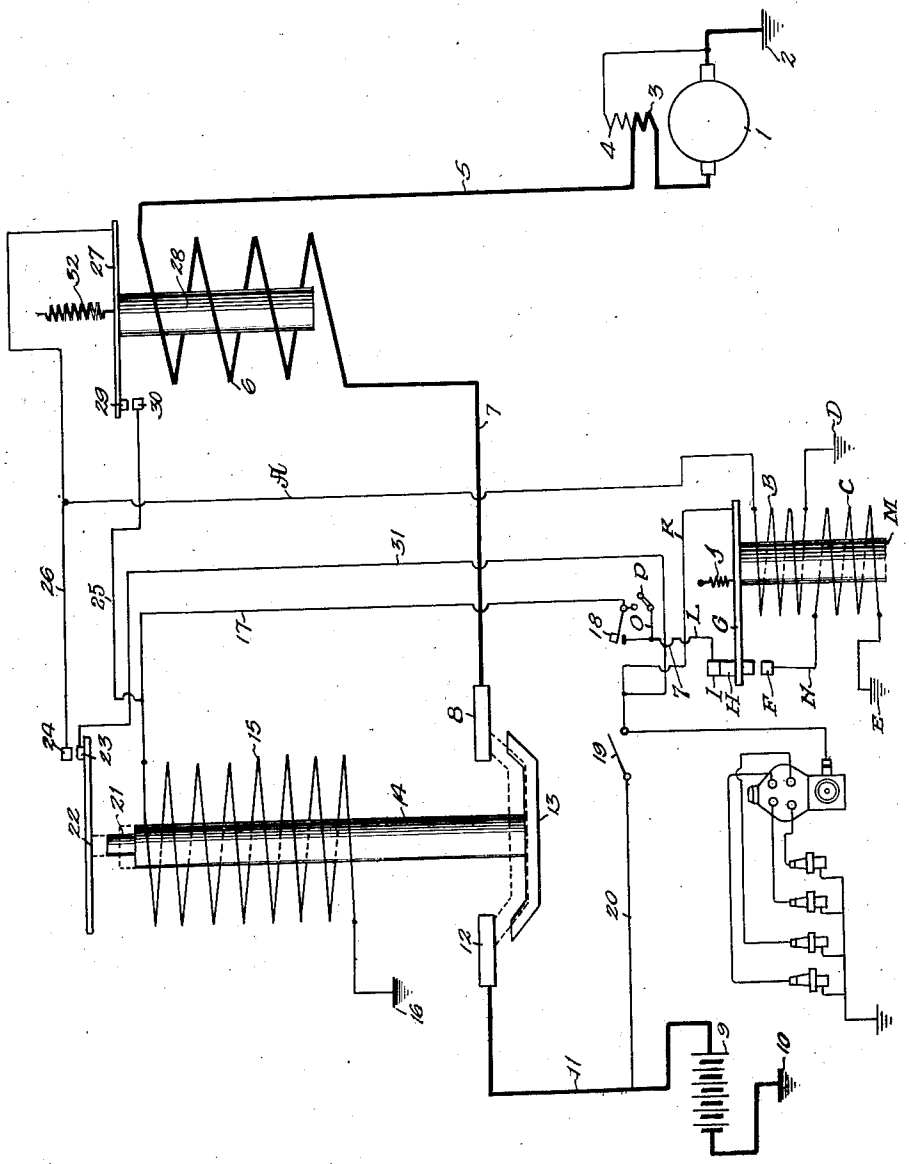
Nov. 16, 1926. 1,607,497

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AUTOMATIC STARTING DEVICE FOR AUTOMOBILES

Filed Jan. 23, 1924



WITNESSES

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Patented Nov. 16, 1926. 1,607,497

UNITED STATES PATENT OFFICE.

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AUTOMATIC STARTING DEVICE FOR AUTOMOBILES.

Application filed January 23, 1924. Serial No. 688,078.

This invention relates to improvements in automatic starting devices for automobiles, and is especially designed as an improvement upon the invention set forth in a patent, No. 1,484,539, issued to us, entitled "Automatic starting device for motors" and dated February 19, 1924.

The primary object of this improvement is to provide means whereby the starter motor cannot be energized while the engine is running, especially the type of starter that engages teeth on the fly wheel, with which if the starter motor is energized while the engine is running is apt to cause serious damage to the starter motor and the gear teeth.

A further object is to provide an entirely automatic starting system by which, when the ignition switch is turned on, the starting apparatus will be set in operation, start the engine, and cut off the starter without any further attention from the operator.

A further object is to provide convenient means for starting the engine in case of a stall, especially in heavy traffic where time is limited.

With these and other objects in view, the invention consists in certain novel features of construction and combinations of parts as will be more fully hereinafter described and pointed out in the claims.

The accompanying drawing is a diagrammatic view illustrating one embodiment of our invention.

1 represents a starting motor, grounded at 2 and provided with series windings 3, and a shunt winding 4, connected by a wire 5 to a magnet winding 6, which, in turn, is connected by a wire 7 to a stationary contact 8.

A battery 9, grounded at 10, is connected by a wire 11 to another stationary contact 12 operatively associated in relation to the stationary contact 8. A switch member or arm 13, normally spaced from the contacts 8 and 12, is carried by a movable magnet core 14. This core is energized by a winding 15 grounded at 16 and connected by a wire 17 to a push button switch 18. This push button switch is in series with an ignition switch 19, and this in turn is connected by a wire 20 to the battery 9. Whenever the winding 15 is energized, the core 14 is pulled up so that the switch member 13 bridges the contacts 8 and 12. This bridging causes the circuit to be established from the battery through said contact, the winding 6 and the starting motor.

The upper end of the core 14 is provided with a projecting portion 21, or striker head, adapted when moved upward to contact with a movable bar 22, one end of which is provided with a contact 23 to make a circuit through a contact 24 disposed adjacent thereto. The contact 24 is connected by a wire 26 to one end of a bar 27 carried by the core 28 of the magnet winding 6. The other end of the bar 27 carries a contact 29 movable with the bar 27 but adapted when moved in a given direction to engage a contact 30.

The contact 23 is connected by a wire 31 to a point between the push button 18 and the ignition switch 19. When a definite current is established in the winding 6 of the magnet, the core 28 will be pulled down to close the circuit through the contacts 29 and 30. The characteristics of the magnet winding 6 and the core 28 are so calculated that it requires a definite amount of current to move the core down, preferably that amount of current drawn by the motor 1 when turning over the engine to start the same.

This winding is also so calculated that after the engine is started the reduction of current drawn by the motor is such as to be insufficient to hold the core 28 down, whereby any suitable means, such as a spring 32, pulls the core 28 up to break the contacts 29 and 30. On the other hand, when current is flowing through the winding 15, the core 14 is held up to bridge the contacts 8 and 12, and when said winding 15 is deenergized, the core drops, breaking the contacts 23 and 24. The winding 15 is connected by a wire 25 to contact 30 to form a holding circuit for the winding. M represents an iron core, wound with two windings B and C, respectively, which are suitable to withstand line voltage and have an extremely low current consumption.

Adjacent the core M is an armature G, provided with a double contact H which normally rests against the contact I, due to the action of a spring J. Another contact F is provided directly opposite the contact H and is normally out of engagement with the contact H.

One end of winding B is connected by a wire A to wire 26 and the other end of said winding is grounded at D.

One end of winding C is connected by a

wire N with contact F, and the other end of said winding is grounded at E.

A wire K connects armature G with the wire 31 between push button 18 and ignition switch 19, and a wire L connects contact I directly with the contact button of switch 18.

A wire O connects wire L with wire 17 to cut out the push button 18, and a manually operated switch P is provided in this wire O so that when this switch P is closed the operation will be entirely automatic when the ignition switch 19 is closed.

Assuming that the switch P is open, the operation is as follows:

When the ignition switch 19 is closed a circuit is established as follows: ground 10, battery 9, wire 20, switch 19, wire K, armature G, contacts H and I, wire L to the contact button of switch 18. When the switch 18 is closed this circuit is further developed as follows: wire 17, winding 15, ground 16. The consequent energization of winding 15 causes the core 14 to be raised, closing the following circuit: ground 10, battery 9, wire 11, contact 12, arm 13, contact 8, wire 7, winding 6, wire 5 through the motor and its windings, thus causing the motor to start. The elevation of core 14 also raises lever 22, engaging contacts 23 and 24. The starting current of the motor so energizes winding 6 as to cause the depression of the core 28, and the closing of the contacts 29 and 30. When this happens the following circuit is developed: ground 16, winding 15, wire 25, contacts 29 and 30, armature 27, wire 26, contacts 23 and 24, wire 31, switch 19, wire 20, battery 9 and ground 10. This circuit is a holding circuit for the winding 15. At the same time the following circuit is developed: ground 10, battery 9, wire 20, switch 19, wire 31, contacts 23 and 24, wire 26, wire A, coil B, ground D. The energization of coil B depresses the core M and its armature G, breaking the contacts H and I and making the contacts H and F. Breaking the contacts H and I will open the circuit through the push button 18 so that after this circuit is broken the push button will remain inoperative as long as the ignition switch is closed. Making the contacts H and F will energize winding C as follows: ground E, winding C, wire N, contacts F and H, armature G, wire K, ignition switch 19, wire 20, battery 9 and ground 10.

As soon as the motor 1 starts, however, the current in the main circuit and consequently in winding 6 is reduced, and the spring 32 is strong enough, with this normal current flowing in winding 6, to raise the core 28, the armature 27 thus breaking contacts 29 and 30. This breaks the holding circuit for winding 15, which becomes de-energized, thus permitting core 14 to drop and break the main circuit across contacts 8 and 12. The dropping of the core 14 also causes arm or lever 22 to drop, breaking contacts 23 and 24 and thus opening the circuit through the winding B and de-energizing said winding. The contacts H and I, however, are still held open by the fact that the coil C is energized through contacts H and F from the ignition switch 19, and furthermore until the ignition switch is opened and closed again it will be impossible to operate the starting motor. However, as soon as the ignition switch is open the winding C becomes de-energized, permitting the armature G to move upward, breaking contacts H and F and making contacts H and I. Thereafter as soon as the switch 19 is again closed and the push button 18 operated the cycle of operations can be repeated.

In order to make the operation entirely automatic, all that is necessary is to omit the button 18, connecting wire L and wire 17 together. The starter can be push-button operated with the automatic lockout or strictly automatic by providing the switch P to short circuit the button 18. When the button is used to set the starting apparatus in action, the button becomes inoperative at once and remains so until the ignition switch is turned off, and turned on again.

We claim:—

1. An automatic starting device for automobile motors, which comprises a battery, a starting motor, a circuit breaker and a main line winding in series, an auxiliary circuit connected to said battery and including a push button and an ignition switch, a second winding adapted when energized to close the circuit breaker in the main line, said second winding being connected in circuit with the push button and adapted to be energized when the push button is closed, and means including a third winding energized by the closure of relays actuated by the main line winding and the second winding to open the push button circuit whereby subsequent depressions of the button will be ineffective to energize the second winding.

2. An automatic starting device for automobile motors, which comprises a battery, a starting motor, a circuit breaker and a main line winding in series, an auxiliary circuit connected to said battery and including a push button and an ignition switch, a second winding adapted when energized to close the circuit breaker in the main line, said second winding being connected in circuit with the push button and adapted to be energized when the push button is closed, means including a third winding energized by the closure of relays actuated by the main line winding and the second winding to open the push button circuit whereby subsequent depressions of the button will be ineffective to energize the second winding, and magnetic means energized by the opening of the push button circuit to hold it open.

3. An automatic starting device for motors, which comprises a main circuit including a battery, a circuit breaker, a main line winding and a motor; an auxiliary circuit including a push button and an ignition switch, a second winding adapted when energized to close the circuit breaker, said second winding being in circuit with the push button, a holding circuit for the second winding, a plurality of switches in said holding circuit, one of said switches adapted to be closed when the second winding is energized, another of said switches adapted to be closed when the main line winding is energized, the second of said last mentioned switches adapted to open when the automobile engine starts to run, whereby the holding circuit is opened at that time, a third winding energized by the closing of the main circuit, means actuated by the energization of said third winding to open the push button circuit, and a fourth winding adapted to be energized when said last mentioned means is actuated to hold said means in position to maintain the push button circuit open, whereby subsequent depressions of the push button will not affect the auxiliary circuit until the ignition switch has been opened, said last mentioned holding circuit being closed through the ignition switch.

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