Jan. 22, 1935. G. A. GILLEN 1,989,052

MOTOR STARTING APPARATUS

Filed Nov. 3, 1932

Fig. 1.

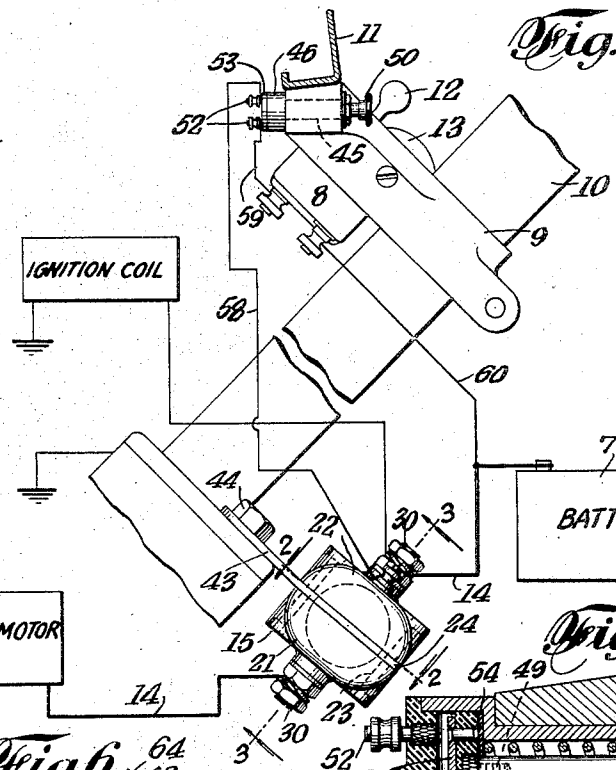


Fig. 4.

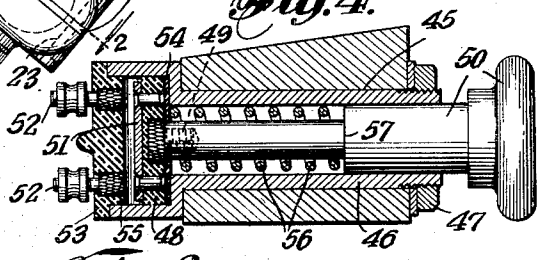


Fig. 6.



Fig. 2.

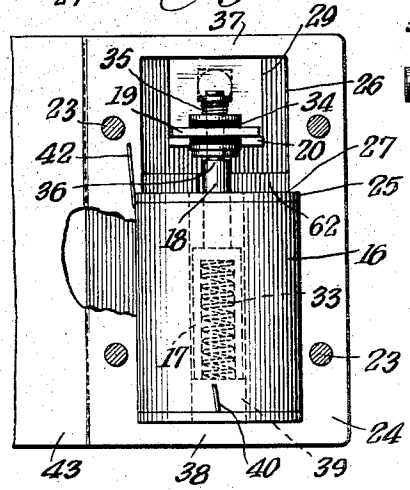


Fig. 3.

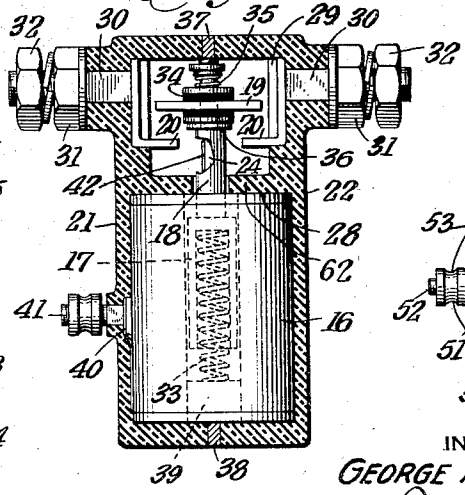
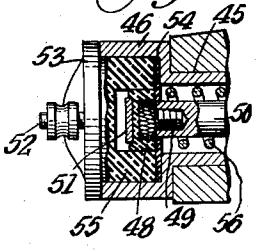


Fig. 5.



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MOTOR STARTING APPARATUS

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Application November 3, 1932, Serial No. 640,943

7 Claims. (Cl. 200—87)

This invention relates to motor starting systems.

The objects of the invention are to provide simple, inexpensive, easily installed, rugged, practical and efficient means for enabling starting of an automotive engine by a push button or the like, located at the dash or other convenient position on the vehicle and to furnish such apparatus in a form readily applicable to existing starting motor systems and without complicated wiring or the extension of long, heavy current carrying leads.

The foregoing and other desirable objects are attained by the novel features of construction, combinations and relations of parts hereinafter described, illustrated and broadly claimed.

The drawing accompanying and forming part of the specification illustrates one of the practical commercial embodiments of the invention, but it is to be understood that the structure may be varied as regards this disclosure, all within the true intent and broad coverage of the claims.

Fig. 1 is a broken part sectional and part diagrammatical representation of the invention as in use on a starting system of more or less standard construction.

Figs. 2 and 3 are broken enlarged and partly sectional views of the electromagnetic circuit closer as on substantially the planes of lines 2—2 and 3—3 of Fig. 1.

Fig. 4 is an enlarged longitudinal sectional view of the push button control switch for the circuit closer.

Fig. 5 is a fragmentary sectional detail of the latter on a plane at right angles to Fig. 4. Fig. 6 is a fragmentary detail, illustrating certain modifications.

In Fig. 1, details of the starting system of an automobile of well-known make are indicated as follows:

The starting motor at 6, storage battery 7, ignition switch at 8 on the dash, or more properly speaking, the bracket 9, of steering column 10, which is attached to the dash 11. This ignition switch is controlled by a finger lever 12, which can be operated when the lock indicated generally at 13 has been released by a proper key.

The present invention is used with these parts as follows:

In place of the floor switch which is usually located in the line 14 leading from the battery to the starting motor, there is interposed an electromagnetic switch indicated generally at 15 in Fig. 1 and consisting in detail as shown in Figs. 2 and 3 of a solenoid coil 16, operating a core 17, connected with a stem 18, carrying a contact 19, for bridging the contacts 20, which are connected in the starting motor circuit. This whole mechanism is enclosed in an insulated casing shown as made up of the two half shells 21, 22, secured together by through bolts 23, over an intermediate supporting and grounding plate 24, which, as appears in Fig. 2, is cut out at 25 to closely receive the solenoid coil and has a smaller connecting cut-out portion 26 to freely receive the switch parts. The shoulder 27 between these two communicating open portions of the plate serves to definitely position the end of the coil thus providing a mechanical reinforcement to the casing sections, which themselves, as shown at 28 in Fig. 3, have half round cavities shaped to fit and hold the coil.

The stationary contacts 20 of the starter switch are shown in Fig. 3 as of generally L-shaped form with the bases of the L's located closely adjacent the end of the coil and the backs of the L's as seated in correspondingly shaped cavities 29, in the opposite section of the casing. To further hold these contacts against turning they are shown as having squared studs 30, projecting from the backs thereof, through correspondingly shaped openings in the casing sections and they are held in this non-turning relation by nuts 31, engaged on the outer screw threaded ends of the studs, additional nuts 32 serving for securing the ends of the heavy leads from the battery and to the starting motor.

The magnetic core of the solenoid is shown as of hollow form and thus adapted to receive the circuit breaking spring 33, which located within the length of the coil is a feature in keeping the unit small and compact.

The movable bridging contact 19 is shown as carried by an insulating bushing 34, slidably pressed by spring 35, against shoulder 36 on the stem, which construction enables the solenoid core to have a slight further movement after the contacts are engaged, as indicated in Fig. 2, permitting the movable contact 19 a certain self-adjusting or seating movement on the contacts 20 and, in the circuit opening action, enabling the core to start its movement under the impulse of spring 33 and to snap the movable contact off the fixed contacts 20. By this construction, a full firm closing of the circuit is assured and when the coil is de-energized, the movable contact is snapped off its seat to quickly interrupt the starting motor circuit. The upper bar 37 of the skeletonized mounting plate stands over the upper or outer end of the solenoid stem 18 and hence, as indicated in Fig. 3, may be utilized as a solid

abutment, limiting the outstroke of the movable core. Similarly, at the bottom or opposite end, the cross bar 38 of the skeletonized plate is in line with spring 33 and may support the spring abutment plug 39, in the lower end of the coil, thus taking the thrust off the spring and saving the hollow sections of the insulating casing from carrying this load.

One end of the solenoid coil designated 40, is shown as brought to an insulated terminal 41 on one section of the casing and the other end of the coil, as shown at 42, in Fig. 2, is simply bared and brought out over the face of the mounting plate 24, at one side of the opening therethrough, in position to be clamped firmly against said plate when the casing sections are tightened thereover. As this mounting plate is connected with a part of the main structure of the vehicle, a grounded return for the coil is thus provided.

In Fig. 1, the mounting plate is shown as having a slightly angled extension portion 43, caught beneath the bolts 44 on the steering arm gear case at the foot of the steering column. This particular location brings the magnetic switch practically in a direct line between the battery and starting motor, where the heavy current connections are shortest.

The control switch for closing circuit through the solenoid coil is shown as mounted at the dash, on the steering bracket 9, by being seated in a bore 45, which is usually provided in such brackets.

In detail, the switch is shown as consisting of a sleeve 46, fitting in the bore 45 and held at the back by an enlargement 46, engaging the back of the bracket and at the front by a nut 47, screwed on the outer end of the sleeve and bearing against the front of the bracket. The enlargement 46 constitutes a housing for a movable switch member consisting of insulating bar 48, fixed on screw 49, engaged in the end of plunger 50, said bar carrying a contact 51, to bridge contacts 52, carried by insulating cap 53, closing the outer end of said housing.

A plate 54, Fig. 5, held to the inner end of the housing by extension lugs 55 of the cover, bridging the switch bar 48, serves as an abutment for spring 56, acting against the shoulder 57, to thrust the push button plunger outwardly to the open circuit position indicated in Figs. 1 and 4.

The push button dash switch is shown as connected to control the solenoid coil by a lead 58 from the insulated terminal 41 of the coil and by a short connection 59 to one of the terminals of ignition switch 8, which latter has a connection with the battery at 60.

When the lock 13 is released by a proper key and handle 12 can be turned to close circuit through switch 8, as must be done for starting a car, the control switch will then be cut in circuit, so that operation of the push button will close a circuit through the solenoid coil. The latter will immediately close circuit through the starting motor. Hence, after the main switch is unlocked, the dash switch becomes effective to control the starting of the motor, but is ineffective and inoperative so long as the main switch is locked.

The invention, as to added parts, consists of simply the two units, the solenoid switch and the dash switch and these are quickly and easily mounted and connected by simple short wiring. The heavy current wiring extends only from the battery to the starting motor and only low current leads are carried to the dash.

The magnet coil is fully protected electrically and mechanically by the composite casing of insulating sections and intermediate frame plate. The insulating sections serve as insulating mounts for the insulated coil terminal and for the combined terminals and switch contacts of the starting motor. The frame portion of the plate serves as a reinforcement for the insulating sections and extending completely about the casing, as it does, it acts as a guard to take accidental blows, such as might come from a hammer or wrench used in the vicinity of the switch.

The coil, as customary in such cases, may be wound on a suitable spool and this may be constructed as indicated in Fig. 6, with a protruding hollow guide 61 for the magnetic core, said guide seating in half round cavities 64, in the partition elements 62 of the casing sections, whereby the spool is definitely centered in the casing. In this view, there is also shown how the end of the coil, which is to be grounded, that is the end designated 42, may be secured by solder or the like, as indicated at 63, in a drilled opening through the outer bar of the frame plate. The frame plate extends far enough from the side of the casing to permit the same being bent at different angles to suit special locations.

What is claimed is:

1. A starting switch unit, comprising a skeletonized mounting plate having an opening therethrough, a switch casing consisting of cooperating insulating casing sections secured to opposite sides of the mounting plate over the opening therethrough, a magnet coil seated in said plate opening between the casing sections, armature and switch elements operating in said plate opening and switch contacts carried by the casing sections in position for engagement by said switch element and said skeletonized mounting plate projecting at one side from between said casing sections to afford a means for supporting a complete unit.

2. A starting switch unit, comprising a skeletonized mounting plate having an opening therethrough, a switch casing consisting of cooperating insulating casing sections secured to opposite sides of the mounting plate over the opening therethrough, a magnet coil seated in said plate opening between the casing sections, armature and switch elements operating in said plate opening, switch contacts carried by the casing sections in position for engagment by said switch element, said magnet coil having an insulated terminal on one of the casing sections and the opposite end of said coil having a bared terminal portion secured to the mounting plate, whereby the mounting plate is made the other terminal for the coil and said skeletonized mounting plate projecting at one side from between said casing sections to afford a means for supporting a complete unit.

3. A starting switch unit, comprising a skeletonized mounting plate having an opening therethrough, a switch casing consisting of cooperating insulating casing sections secured to opposite sides of the mounting plate over the opening therethrough, a magnet coil seated in said plate opening between the casing sections, armature and switch elements operating in said plate opening, switch contacts carried by the casing sections in position for engagement by said switch element, said magnet coil having one end of the same caught between one of the casing sections and the opposed face of the mounting plate and bolt means securing the casing sections together over the interposed portion of the skeletonized

mounting plate and said skeletonized mounting plate projecting at one side from between said casing sections to afford a means for supporting a complete unit.

4. A starting switch unit, comprising companion casing sections, a mounting plate held between said casing sections and having a cavity in line with the space between the casing sections, a solenoid coil held in the cavity of the mounting plate between said casing sections, a core actuated by said solenoid, a switch contact carried by said core and cooperating switch terminals carried by the casing sections in position to be bridged by the switch element carried by the core and said skeletonized mounting plate projecting at one side from between said casing sections to afford a means for supporting a complete unit.

5. A starting switch unit, comprising companion casing sections, a mounting plate held between said casing sections and having a cavity in line with the space between the casing sections, a solenoid coil held in the cavity of the mounting plate between said casing sections, a core actuated by said solenoid, a switch contact carried by said core, cooperating switch terminals carried by the casing sections in position to be bridged by the switch element carried by the core, a spring within the coil acting against the solenoid core, said spring and the opposite end of the core being in line with overstanding end portions of the mounting plate.

6. A starting switch unit, comprising an insulating casing, a solenoid coil within said casing, spaced switch contacts inside the casing adjacent one end of the coil, a core operating in the solenoid coil, a spring within the coil acting to thrust said core outwardly toward the spaced switch contacts, a bridging contact slidingly mounted on said core and movable thereon in a direction away from the spaced contacts and a spring on the core acting to force said sliding switch contact in a direction toward the spaced switch contacts.

7. A switch of the character disclosed, comprising a two part insulating casing, a metallic mounting plate interposed between the two parts of the insulating casing and having a mounting and grounding lug portion projecting therefrom, a magnet coil mounted in said casing and having one end of the same electrically connected with said interposed mounting and grounding plate, an insulated terminal for the other end of said coil mounted on one of the insulating casing parts and cooperating switch elements located in the insulating casing, one of them actuated by said magnet coil and another having a terminal on the insulating casing.

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