Oct. 18, 1932. F. J. ROUTLEDGE 1,882,948

STARTER CONTROL FOR GAS ENGINES

Filed June 4, 1931

Fig. 1.

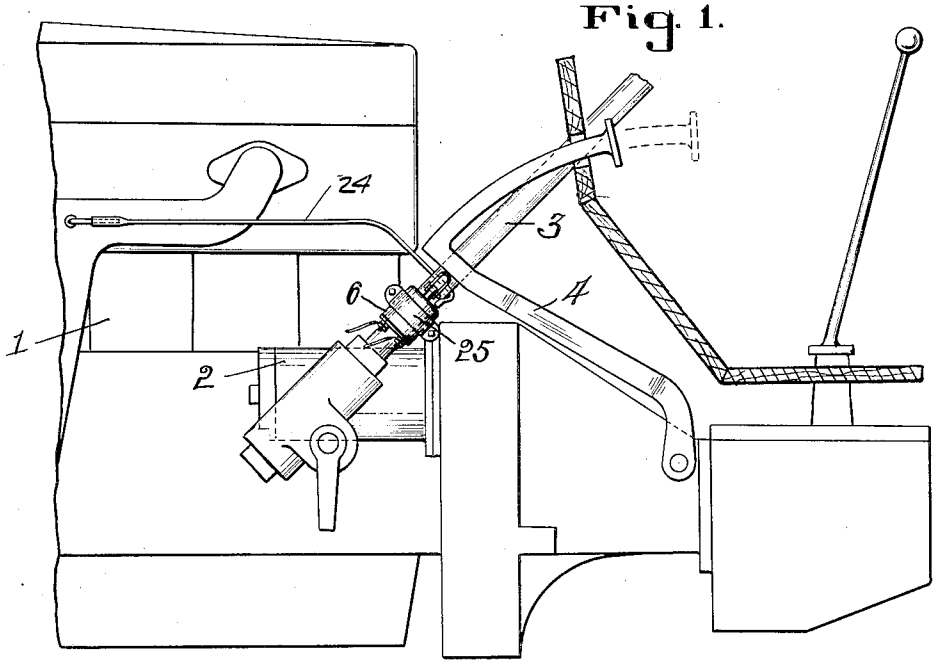


Fig. 2.

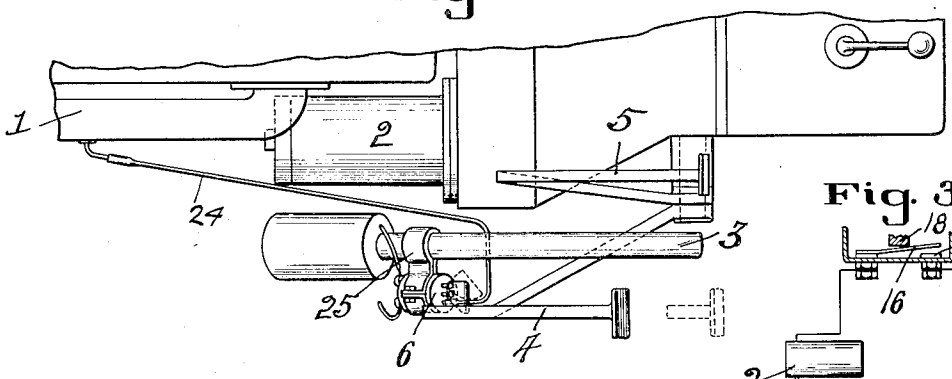


Fig. 3.

Fig. 4

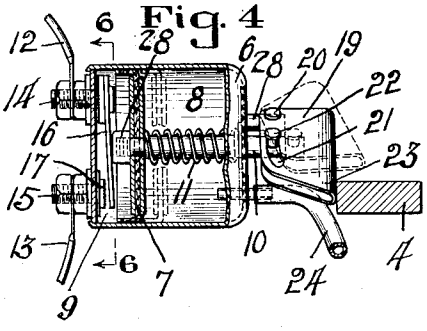


Fig. 5.

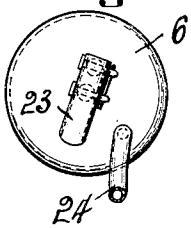
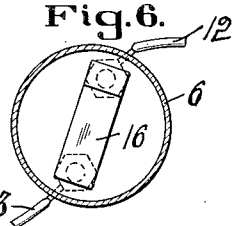


Fig. 6.



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UNITED STATES PATENT OFFICE

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STARTER CONTROL FOR GAS ENGINES

Application filed June 4, 1931. Serial No. 542,003.

This invention relates to control means for the circuits of electric starters for the gas engines of automobiles, and has for its object the provision of simple, efficient and novel means for eliminating the use of the customary starter button and utilizing one of the operating levers of the automobile, such for instance as the clutch pedal lever, to effect a closing of the starter switch and also to provide means which is automatically operable by the engine when running, to render and maintain the starter circuit inoperative, so long as the engine continues to run, and render such circuit again operative for starting purposes when the engine is at rest.

The invention is fully described in the following specification, and while in its broader aspect it is capable of embodiment in different forms, one embodiment thereof is illustrated in the accompanying drawing, in which—

Figure 1 is a fragmentary view of an automobile, with the mechanism embodying the invention associated therewith, and with the operating pedal for the starter switch in starting position. Fig. 2 is a plan view of a portion of the parts shown in Fig. 1. Fig. 3 is a diagram of the electric starter circuit. Fig. 4 is an enlarged fragmentary view of the control embodying the invention, with the starter switch open and showing the operating pedal in starter-operating position. Fig. 5 is a plan view of the starter switch control, and Fig. 6 is a cross-section on the line 6—6 in Fig. 4.

Referring to the drawing, 1 designates an internal combustion engine of an automobile, 2 the customary electric starter therefor of any suitable type, 3 the steering post column, and 4 and 5 the associated clutch and brake pedals, respectively, common to automobiles.

The starter control embodying the invention includes a cylinder 6, which is closed at both ends and has a piston 7 operating therein and dividing the cylinder into a suction chamber 8 and a switch chamber 9, the latter being disposed in what may be termed the lower end portion of the cylinder. A stem 10 projects centrally from the piston 7 through the chamber 8 and upper end of the cylinder and is encircled within said chamber by a coiled expansion spring 11, which acts against the piston to retain it in the normal lowered position shown in Fig. 4.

The starter circuit has the two leads 12 and 13 connected, respectively, to terminal posts 14 and 15, attached in spaced relation to the lower end of the cylinder 6, one having a spring switch arm 16 projecting from its inner end within the cylinder chamber 9 and having its free end normally standing in spaced or open circuit relation to the stationary switch contact member 17 forming the inner end of the other post.

The piston stem 10 at the lower side of the piston 7 is provided with a stud 18 adapted to have contact with the spring switch arm 16, so that when the piston and post are lowered from the normal position shown in Fig. 4, the switch arm will be moved to close the starter circuit. The tension of the switch arm 16 is greater than the tension of the spring 11, so that the latter does not exert sufficient pressure on the stem 10 to overcome the tension of the spring arm and close the circuit.

A stud 28 projects stationarily from the upper end of the cylinder 6, at one side of the stem 10, and has a lever 19 pivoted thereto at 20. This lever extends across the outer end portion of the stem 10 and has pin and slot connection therewith, so that a depression of the free end portion of the lever causes a lowering of the stem 10 and piston 7 from normal position and effects a closing of the starter switch circuit.

In the present embodiment of the invention, the lever 19 is of channel form in cross-section to adapt it to straddle both the stud 28 and stem 10, and the side walls of the portion of the lever, which straddles the stem 10, are provided with longitudinally extending transversely registering slots 21 receiving a cross-pin 22 carried by the stem 10. The free end portion of the lever 19 projects from the stem 10 at the opposite side thereof to the stud 28 and forms a nose 23, which, when the parts are in the normal position shown in Fig. 4, stands in the path of movement of the clutch pedal 4 and in position

to be engaged thereby when the clutch pedal is near the limit of its down stroke, so that a continuation of such stroke, after the pedal has engaged the lever, will impart a lowering movement to the stem 10 and close the starter circuit.

The upper end or suction chamber portion 8 of the cylinder 6 is connected by a tube 24 to the intake manifold of the associated engine, so that when the engine is running at a speed sufficient to create a suction in such manifold, such suction will be communicated to the chamber 8 and cause an upward movement of the piston 7 against the tension of the spring 11 to substantially the dotted line position shown in Fig. 4. The moving of the piston and its stem 10 to this position, causes the stem pin 22 to act against the lever 19 to move it to inoperative position with respect to the clutch pedal 4, as shown by dotted lines in Fig. 4. It is thus evident that when the engine is running the lever 19 is automatically moved to inoperative position, which throws its nose out of the path of movement of the pedal 4, so that the clutch pedal may have a complete stroke without closing the starter circuit. This is an important safety or protecting feature for the starter mechanism, as it prevents any possibility of the starter circuit being closed while the engine is running. The cylinder 6 is shown in the present case as being attached to the steering column 3 by a bracket 25.

It is apparent that in the use of my starter control, the starter circuit is normally open, both when the engine is at rest and when running. It is also apparent that when the engine is at rest, the control lever 19 of the starter mechanism stands in the path of movement of the clutch pedal 4, so that a complete stroke of such pedal will actuate the lever 19 to lower the stem 10 and effect a closing of the starter circuit, and that as soon as the clutch pedal has been released from engagement with the lever 19 and a sufficient suction generated in the chamber 8 by a running of the engine to retract the piston 7, the switch will be opened and maintained open so long as the engine runs.

I wish it understood that my invention is not limited to any specific construction, arrangement or form of the parts, as it is capable of numerous modifications and changes without departing from the spirit of the claims.

Having thus described my invention, what I claim as new and desire to secure by United States Letters Patent is:

1. In a device of the character described, the combination of a yieldably held normally open switch, a manually operable member, a reciprocable plunger, and means normally in operative position to transmit motion of the manually operable member to said plunger to cause the latter to close said switch, said plunger being operable under the influence of suction to move said means to a position where it is inoperable for transmitting motion of the manually operable member to said plunger.

2. In a device of the character described, the combination of a yieldably held normally open switch, a plunger movable to close the switch, means yieldably urging the plunger in a direction to close the switch but with insufficient force to close it, manually operable means to positively move the plunger to close the switch, and means operable by suction acting upon said plunger to render the manually operable means ineffective.

3. In a device of the character described, a switch, a cylinder, a member reciprocable in said cylinder to cause said switch to open or close, said member being movable away from the switch, after the latter opens, by suction created in the cylinder, a manually operable lever, and a second lever connected to said reciprocable member and operable by a predetermined movement of the first lever to move said reciprocable member to close the switch, said second lever being movable into inoperative relation with respect to the first lever by the suction induced movement of said reciprocable member.

4. In a device of the character described, a cylinder, a plunger operating in said cylinder and having a stem projecting therefrom, a normally open switch closed by a movement of said plunger in one direction, means normally maintaining the plunger in one position of its movement with said switch open, a lever connected to said stem and operable to move the stem and plunger to switch closing position, a second lever manually operable to move said first lever to switch closing position, said plunger being movable from normal position and away from the switch by suction created in the cylinder, and thereby moving said first lever out of engaging position with respect to said second lever.

In testimony whereof I have hereunto signed my name to this specification.

FREDERICK J. ROUTLEDGE.