Aug. 18, 1959 W. E. EGERER 2,900,470

CARBURETOR STARTER SWITCH

Filed Nov. 4, 1957

FIG. 1.

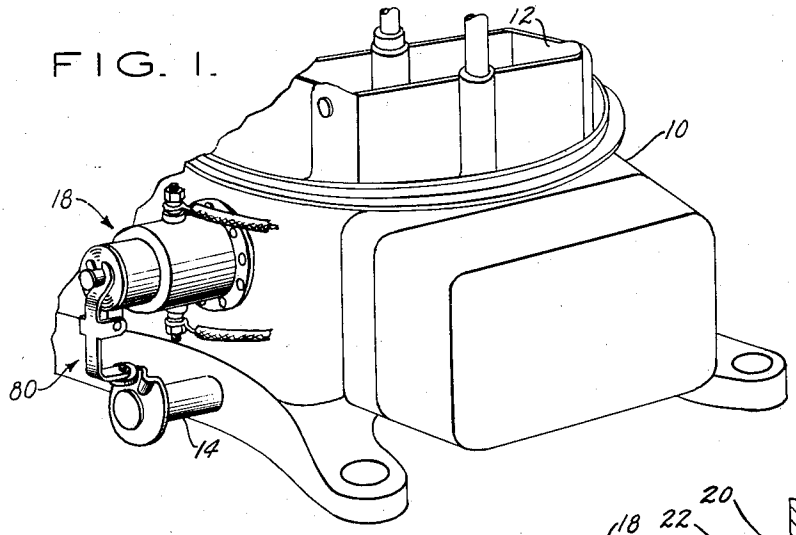


FIG. 3.

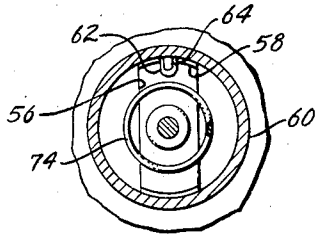


FIG. 2.

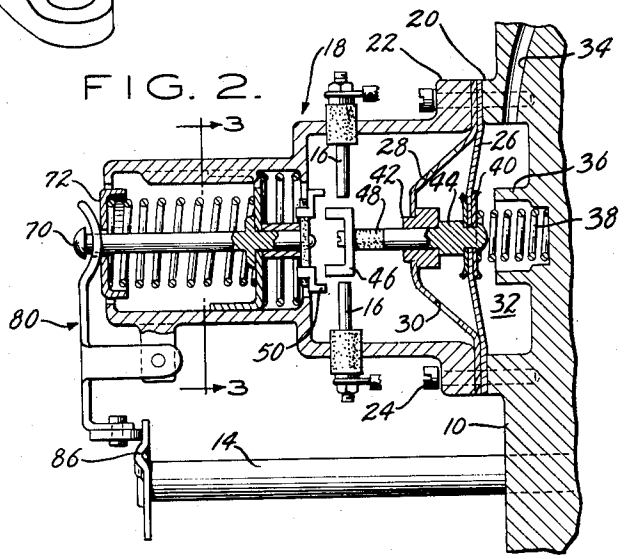
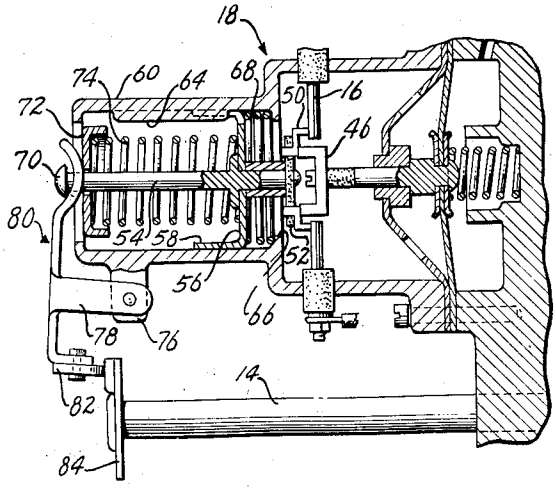


FIG. 4.



INVENTOR.
WILLIAM E. EGERER
BY Whittemore, Hulbert & Belknap
Attorneys

United States Patent Office 2,900,470 Patented Aug. 18, 1959

2,900,470

CARBURETOR STARTER SWITCH

William E. Egerer, Detroit, Mich., assignor to Holley Carburetor Company, Van Dyke, Mich., a corporation of Michigan

Application November 4, 1957, Serial No. 694,151

10 Claims. (Cl. 200—83)

The present invention relates to a carburetor starter switch.

It is an object of the present invention to provide in combination with a carburetor for an internal combustion engine, a starter switch adapted to be closed by movement of the carburetor throttle shaft into predetermined position when the engine is stopped and to be opened as an incident to starting of the engine.

More specifically, it is an object of the present invention to provide a starter switch in combination with a carburetor including a pair of fixed contacts, a pair of movable contacts engageable with the fixed contacts upon predetermined rotation of the throttle shaft, and a bridging contact in position to engage said movable contacts when the engine is idle and movable as an incident to starting the engine out of contact with the movable contacts.

More specifically, it is a feature of the present invention to provide on the exterior wall of a carburetor a boss adapted to receive a switch housing and to have clamped therebetween a flexible diaphragm and a rod guide, means for connecting the interior of the chamber formed between the diaphragm and the tool of the carburetor engine manifold vacuum, a bridging contact connecting to said rod, resilient means urging said resilient contact forwardly to bridging or operative position, a pair of fixed contacts in said housing, a pair of movable contacts in said housing movable into and out of an operative position in which they are in engagement with said fixed contacts and with said bridging contact, and means responsive to throttle opening to move said movable contacts into operative position.

It is a further feature of the present invention to provide apparatus as described in the preceding paragraph in which said movable contacts are mounted on a second rod having a spring seat intermediate its ends and located in a guide chamber, spring means interposed between one end of the guide chamber and said spring seat and operative to move said movable contacts out of operative position, a second spring in said guide chamber engageable with the opposite side of said spring seat, lever means engageable with the opposite end of said second spring, and cam means actuated by rotation of said throttle shaft for moving said lever means in a direction to compress said second spring to urge said second rod in a direction to move said movable contacts into operative position.

Other objects and features of the invention will become apparent as the description proceeds, especially when taken in conjunction with the accompanying drawing, illustrating a preferred embodiment of the invention, wherein:

Figure 1 is a fragmentary perspective view of the carburetor with the starter switch assembled therein.

Figure 2 is an enlarged transverse section through the starter switch.

Figure 3 is a section on the line 3—3, Figure 2.

Figure 4 is a view similar to Figure 3 showing the starter switch in closed position.

In accordance with the present invention a starter switch is provided which is responsive to conditions dependent on operation of the carburetor and located on an exterior wall of the carburetor for most efficient response to the carburetor conditions. In general terms the carburetor conditions employed in control of the starter switch are engine manifold vacuum and the position of the throttle plate in the air induction passage of the carburetor leading to the engine intake or induction manifold.

Referring now to the figures, there is indicated at **10** a portion of a carburetor which may be considered as of conventional design including an air induction passage **12** through which air is drawn to the interior of the carburetor for mixing with fuel and for passage therethrough into the engine intake manifold. As is well understood, flow of air through the carburetor is controlled by a throttle plate which is rotatable therein and which is connected to a throttle shaft **14**.

The usual engine starter circuit leading to the electric motor for starting the engine is provided with a pair of fixed contacts **16** which are spaced apart in a housing member **18** clamped to an exterior wall of the carburetor **10**. More specifically, the exterior wall of the carburetor is provided with an annular boss **20** and the housing **18** is provided with a flange **22** adapted to be clamped to the boss **20** by assembly screws **24**. Intermediate the flange **22** and the boss **20** are clamped a flexible diaphragm **26** and a rigid rod guide member **28** which may be of generally conical shape and have vent openings **30**, or which if preferred may be in the form of a strap bent to the configuration illustrated in Figure 2. The exterior wall of the carburetor, its boss **20** and the flexible diaphragm **26** provide for an enclosed pressure chamber **32** which communicates with the engine manifold through a passage indicated at **34**. It will be appreciated that when the engine of which the carburetor is a component is not running, pressure within the manifold is atmospheric. Located within the chamber **32** is a smaller boss **36** forming a cup which receives a compression spring **38** urging the diaphragm **26** to the left as seen in Figure 2. When the engine is running manifold vacuum effective through the passage **34** reduces pressure within the chamber **32** and moves the flexible diaphragm **26** to the right to a position in which the inner washer **40** engages the edge of the boss **36**.

The rod guide **28** has a guide bushing **42** therein through which is longitudinally slidable a rod **44** having a bridging contact **46** carried at its outer end and insulated therefrom by insulating material indicated at **48**.

Associated with the fixed contacts **16** and the bridging contact **46** are a pair of movable contacts **50** mounted on an insulating support **52** carried by a second rod **54** which intermediate its ends has a guide member and spring seat **56** fixed thereto. The member **56** includes guide flanges **58** which are slidable on the interior surface of a guide chamber portion **60** of the housing **18**. As best seen in Figure 3, one of the guide flanges **58** is recessed as indicated at **62** for the reception of a guide rib **64** provided at the interior surface of the guide chamber portion **60**.

The housing **18** is provided at the inner end of the guide chamber portion **60** with a radially inwardly extending seat **66**. A compression spring **68** is engaged by the spring seat **66** and the member **56**.

At its outer end the second rod **54** is headed as indicated at **70** and carries a washer or spring seat **72**. Intermediate the washer or spring seat **72** and the member **56** there is provided a second spring **74**.

The housing **18** is provided with a depending lug **76**

to which an arm 78 of a lever 80 is pivoted. The lever 80 at one end is provided with a roller 82 which is engageable with a cam disc 84 secured to the throttle shaft 14 of the carburetor. The cam disc 84 is provided with an outwardly extending camming portion 86 engageable with the roller to rock the lever clockwise about its pivot support from the position shown in Figure 2 to the operative position shown in Figure 4. The upper end of the lever 80 is bifurcated and embraces the end of the second rod 54 inwardly of its head 70. When the lever 80 is rocked clockwise to the position shown in Figure 4, the spring 74 is compressed, thus applying a yielding force tending to move the rod 54 in a direction which will cause the movable contacts 50 to engage the stationary contacts 16.

From the foregoing it will be observed that when the usual key controlled ignition switch is closed, a circuit may be completed to the starter motor of the engine except for the gap between fixed contacts 16, which are connected in series in the circuit. At this time of course the engine will not be running and accordingly atmospheric presure will prevail within pressure chamber 32 which in conjunction with the spring 38 will hold the bridging contact 46 to the operative position illustrated in Figure 2. At this time the operator will depress the accelerator pedal rotating the throttle shaft 14 to a position representing a throttle opening, best suited to starting of the engine. At this time the cam 86 will rock the lever 80 to the position shown in Figure 4, thus urging the movable contacts 50 into simultaneous engagement with the stationary contacts 16 and the bridging contact 46. A circuit is thus completed to the starter motor which will turn the engine over. The slow rotation of the engine resulting from operation of the starter motor will not induce a sufficient manifold vacuum to retract the bridging contact 46. However, as soon as the engine fires and its speed of rotation is increased over that resulting from operation of the starter motor, the manifold vacuum is quickly effective to reduce pressure within the chamber 32 to a point sufficient to permit atmospheric pressure to overcome spring 38 and to move the diaphragm to the right, thus withdrawing bridging contact 46 from engagement with the movable contacts 50.

The drawing and the foregoing specification constitute a description of the improved carburetor starter switch in such full, clear, concise and exact terms as to enable any person skilled in the art to practice the invention, the scope of which is indicated by the appended claims.

What I claim as my invention is:

1. A carburetor controlled engine starter switch for use with a carburetor having a rotatable throttle shaft, comprising a support, a pair of spaced apart fixed contacts adapted to be connected in series with the starter circuit, a pair of contact members movable into and out of engagement with said spaced contacts, means responsive to rotation of said throttle shaft for controlling the position of said pair of movable contacts, a bridging contact movable into and out of engagement with said pair of movable contacts, and means operable in response to starting of the engine for moving said bridging contact out of engagement with said pair of movable contacts.

2. A carburetor controlled engine starter switch for use with a carburetor having a rotatable throttle shaft, comprising a support, a pair of spaced apart fixed contacts adapted to be connected in series with the starter circuit, a pair of contact members movable into and out of engagement with said spaced contacts, means responsive to rotation of said throttle shaft for controlling the position of said pair of movable contacts, said last named means comprising yieldable transmission means, a bridging contact movable into and out of engagement with said pair of movable contacts, and means operable in response to starting of the engine for moving said bridging contact out of engagement with said pair of movable contacts.

3. A starter switch for use with an internal combustion engine having an intake manifold and a carburetor having a throttle shaft, comprising a support on said carburetor, a pair of spaced apart fixed contacts on said support adapted to be connected in the engine starter circuit, a pair of spaced contacts movable into and out of engagement with said fixed contacts, spring means normally holding said movable contacts out of engagement with said fixed contacts, means operable upon rotation of said throttle shaft for moving said movable contacts into engagement with said fixed contacts, a bridging contact, means normally urging said bridging contact into a position in which it engages said movable contacts when they are in the position in which they engage said fixed contacts, and means operated by starting of the engine to move said bridging contact out of engagement with said movable contacts.

4. A starter switch for use with an internal combustion engine having an intake manifold and a carburetor having a throttle shaft, comprising a support on said carburetor, a pair of spaced apart fixed contacts on said support adapted to be connected in the engine starter circuit, a pair of spaced contacts movable into and out of engagement with said fixed contacts, spring means normally holding said movable contacts out of engagement with said fixed contacts, means operable upon rotation of said throttle shaft for moving said movable contacts into engagement with said fixed contacts, a bridging contact, means normally urging said bridging contact into a position in which it engages said movable contacts when they are in the position in which they engage said fixed contacts, and means responsive to engine manifold vacuum to move said bridging contact out of engagement with said movable contacts.

5. A starter switch for use with an internal combustion engine having an intake manifold and a carburetor having a throttle shaft, comprising a support on said carburetor, a pair of spaced apart fixed contacts on said support adapted to be connected in the engine starter circuit, a pair of spaced contacts movable into and out of engagement with said fixed contacts, spring means normally holding said movable contacts out of engagement with said fixed contacts, yieldable means operable upon rotation of said throttle shaft for moving said movable contacts into engagement with said fixed contacts, a bridging contact, means normally urging said bridging contact into a position in which it engages said movable contacts when they are in the position in which they engage said fixed contacts, and means responsive to engine manifold vacuum to move said bridging contact out of engagement with said movable contacts.

6. A switch comprising a base having an annular boss thereon, means to create a vacuum associated with said base, a switch housing having a flange secured to said boss, a rotatable shaft protruding through said base and extending alongside of the switch housing, a flexible diaphragm and a rod guide clamped between said flange and boss, said diaphragm forming a closed chamber with said boss and the included portion of the base, a passage connecting said chamber to the vacuum creating means, a rod fixed to said diaphragm and slidable in said guide, a bridge contact on said rod, a pair of spaced apart fixed contacts in said housing adapted to be connected in an electrical circuit, and a pair of contacts movable into and out of an operative position in which they engage both said fixed contacts and said bridging contact, and means operated by rotation of said rotatable shaft to a predetermined position to move said movable contacts into operating position.

7. A switch comprising a base having an annular boss thereon, means to create a vacuum associated with said base, a switch housing having a flange secured to said

boss, a rotatable shaft protruding through said base and extending alongside of the switch housing, a flexible diaphragm and a rod guide clamped between said flange and boss, said diaphragm forming a closed chamber with said boss and the included portion of the base, a passage connecting said chamber to the vacuum creating means, a rod fixed to said diaphragm and slidable in said guide, a bridge contact on said rod, a pair of spaced apart fixed contacts in said housing adapted to be connected in an electrical circuit, and a pair of contacts movable into and out of an operative position in which they engage both said fixed contacts and said bridging contact, spring means opposing motion of said movable contacts into operating position, and means operated by rotation of said rotatable shaft to a predetermined position to move said movable contacts into operating position.

8. A switch comprising a base having an annular boss thereon, means to create a vacuum associated with said base, a switch housing having a flange secured to said boss, a rotatable shaft protruding through said base and extending alongside of the switch housing, a flexible diaphragm and a rod guide clamped between said flange and boss, said diaphragm forming a closed chamber with said boss and the included portion of the base, a passage connecting said chamber to the vacuum creating means, a rod fixed to said diaphragm and slidable in said guide, a bridge contact on said rod, a pair of spaced apart fixed contacts in said housing adapted to be connected in an electrical circuit, and a pair of contacts movable into and out of an operative position in which they engage both said fixed contacts and said bridging contact, spring means opposing motion of said movable contacts into operating position, and cam means operated by rotation of said rotatable shaft to a predetermined position to move said movable contacts into operating position.

9. A switch comprising a base having an annular boss thereon, means to create a vacuum associated with said base, a switch housing having flange secured to said boss, a rotatable shaft protruding through said base and extending alongside of the switch housing, a flexible diaphragm and a rod guide clamped between said flange and boss, said diaphragm forming a closed chamber with said boss and the included portion of the base, a passage connecting said chamber to the vacuum creating means, a rod fixed to said diaphragm and slidable in said guide, a bridge contact on said rod, a pair of spaced apart fixed contacts in said housing adapted to be connected in an electrical circuit, and a pair of contacts movable into and out of an operative position in which they engage both said fixed contacts and said bridging contact, spring means opposing motion of said movable contacts into operating position, and means operated by rotation of said rotatable shaft to a predetermined position including yieldable means operable to overcome said spring means to move said movable contacts into operating position.

10. A switch comprising a base having an annular boss thereon, means to create a vacuum associated with said base, a switch housing having a flange secured to said boss, a rotatable shaft protruding through said base and extending alongside of the switch housing, a flexible diaphragm and a rod guide clamped between said flange and boss, said diaphragm forming a closed chamber with said boss and the included portion of the base, a passage connecting said chamber to the vacuum creating means, a rod fixed to said diaphragm and slidable in said guide, a bridge contact on said rod, a pair of spaced apart fixed contacts in said housing adapted to be connected in an electrical circuit, and a pair of contacts movable into and out of an operative position in which they engage both said fixed contacts and said bridging contact, a second rod connected to said movable contacts, a spring seat fixed to said second rod intermediate its ends, a guide chamber in which said second rod is movable, a spring interposed between one end of said guide chamber and one side of said seat to urge said second rod in a direction to move said movable contacts away from operative position, a second spring in said guide chamber having one end seated at the other side of said seat, a lever pivoted to said housing having a portion engaging the other end of said second spring, and cam means connected to said rotatable shaft operable to compress said spring to move said second rod in a direction to move said movable contacts into operative position.

References Cited in the file of this patent

UNITED STATES PATENTS

2,225,943	Schweiss	Dec. 14, 1940
2,289,463	Schlosser	July 14, 1942
2,748,760	Stoltman	June 5, 1956
2,816,189	Clason	Dec. 10, 1957