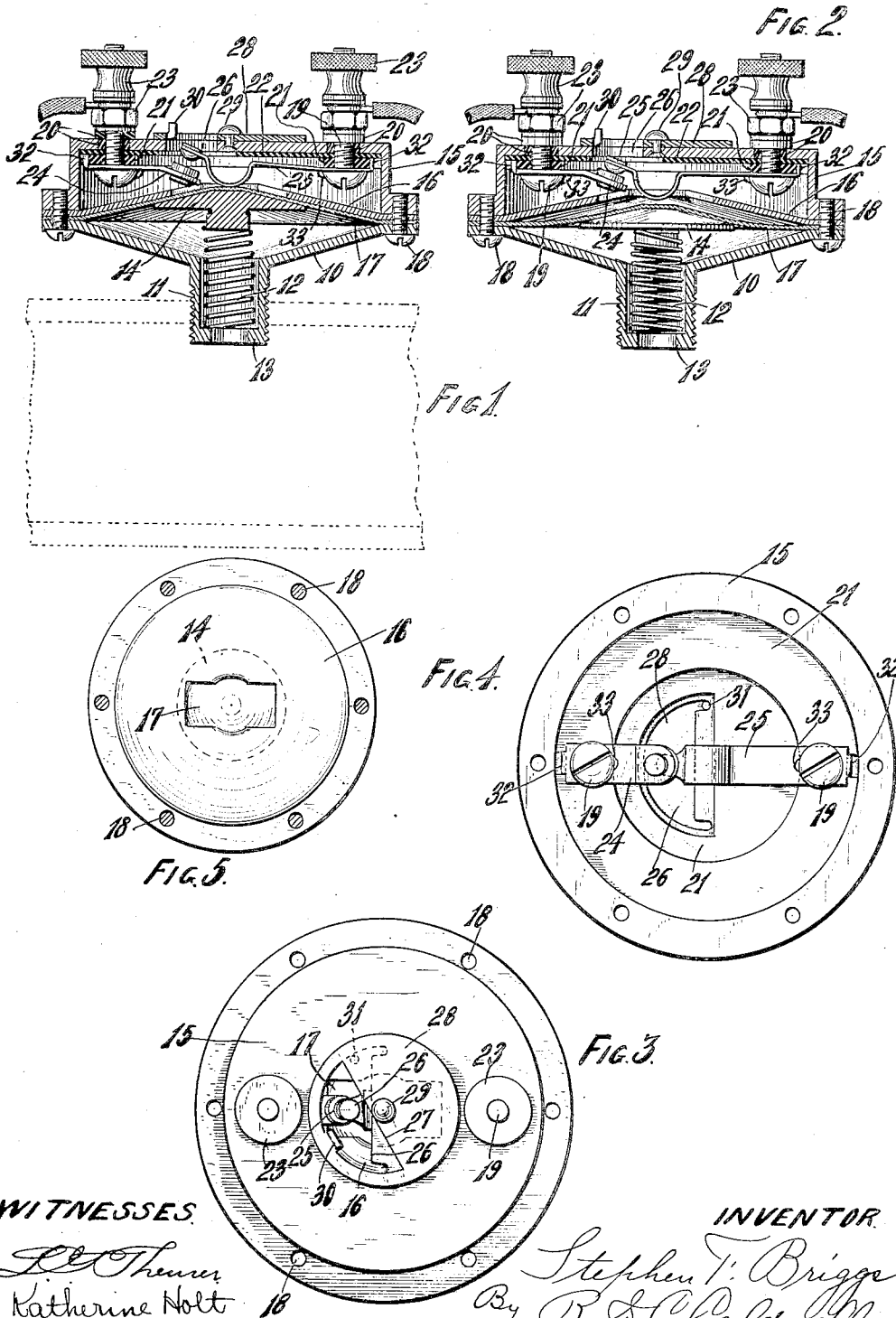


S. F. BRIGGS.
 SUCTION CONTROLLED SWITCH.
 APPLICATION FILED JUNE 28, 1915.

1,231,561.

Patented July 3, 1917.



WITNESSES

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SUCTION-CONTROLLED SWITCH.

1,231,561.

Specification of Letters Patent.

Patented July 3, 1917.

Application filed June 28, 1915. Serial No. 36,774.

To all whom it may concern:

Be it known that I, STEPHEN F. BRIGGS, a citizen of the United States, and resident of Milwaukee, in the county of Milwaukee, and State of Wisconsin, have invented new and useful Improvements in Suction-Controlled Switches, of which the following is a description, reference being had to the accompanying drawings, which are a part of this specification.

This invention has for its object to provide a switch for electrical circuits to be controlled by suction, as an ignition or lighting switch for automobiles and the like controlled by a state of partial vacuum occurring in the intake manifold or other part of the gas engine when the crank shaft of the engine is in motion.

An object of the invention is to automatically open an electrical circuit when the engine stops, and thus avoid a waste of electrical energy, as by a closed battery ignition circuit when the engine is not in operation, or by the burning of headlights when the automobile is standing.

Another object of this invention is to provide such a suction controlled switch with a diaphragm sensitive to the suction to oppose a spring pressed member which tends to hold the spring actuated switch contacts apart, which diaphragm under the influence of the suction is capable of overcoming the spring pressed member to permit the switch contacts to become engaged.

Another object of the invention is to provide such a switch with a convex shield for limiting the movement of the diaphragm, with an opening through which one of the switch contacts may be engaged, said spring pressed member being shaped to fit the curvature of the shield and to cover said opening in the shield whereby the diaphragm is protected from strain in the event of an abnormal pressure in the part with which it is connected as upon the occurrence of an explosion in the intake manifold, or what is known as backfiring of the engine.

Another object of the invention is to locate the switch mechanism outside of the suction chamber where it may be readily accessible for inspection and cleaning.

Another object of the invention is to perfect details of construction of switch mechanism of this character.

With the above and other objects in view the invention consists in the suction controlled switch as herein claimed and all equivalents.

Referring to the accompanying drawings, in which like characters of reference indicate the same parts in the different views,

Figure 1 is a central sectional view of a suction controlled switch constructed in accordance with this invention, the switch members being in their open position;

Fig. 2 is a similar view thereof with the switch members in their closed position;

Fig. 3 is a top view thereof;

Fig. 4 is a bottom view with the casing removed from the base; and,

Fig. 5 is a plan view of the concave plate showing by dotted lines the relative position of the spring pressed convex member.

In these drawings 10 indicates a funnel-shaped casing base with a central projecting threaded nipple portion 11 adapted to be screwed into an intake manifold of a gas engine or other fluid conducting part where a state of partial vacuum is created by the movements of the engine shaft, the same being represented in dotted lines in Fig. 1. Contained within this connecting neck portion of the base is a light coil spring 12 bearing against an internal flange 13 at the end thereof and supporting a mushroom-shaped member 14 by coiling around the stem thereof and fitting within a groove of the stem. An inverted cup-shaped casing member 15 is fitted on the base 10 with a concave plate 16 therebetween, and a diaphragm 17 of leather or other suitable material stretched across the chamber formed between the diverging surfaces of the plate 16 and the base 10, and the parts are firmly secured together by a number of screws 18 passing through their edges and threading into the flange of the casing 15. The rounded or conical shape of the member 14 corresponds with the shape of the under surface of the plate 16, against which it is opposed by the action of the spring 12, and an oblong opening in the center of the plate 16 is of smaller size than the said member 14 so that when the diaphragm is not subjected to suction it is held between the edges of said opening and the edges of the member 14 entirely around the opening. This affords protection to the diaphragm in the event of backfiring or other cause for

creating pressure within the diaphragm chamber, as such pressure is then held by the member 14 without stretching the diaphragm by forcing it through the opening.

5 The casing 15 at diametrically opposite points has screws 19 passed therethrough with their threaded ends outwardly, and these screws are insulated from the casing by bushings and washers 20 of insulating
10 material surrounding them and by passing through an insulating ring 21 and an insulating disk 22, both of which are approximately of the same diameter as the interior of the casing. Nuts and washers 23 are
15 mounted on the threaded ends of the screws 19 to form binding posts.

A stationary spring contact arm 24 is mounted on one of the screws 19 within the casing and a movable spring contact arm 25
20 is mounted on the other, and the latter, though reaching toward the arm 24 to contact therewith, is bent downwardly to project into the opening in the center of plate 16 so as to be engaged by the diaphragm covered spring pressed member 14 and held out
25 of contact with arm 24 as long as the member 14 is in its uppermost position, which will be until the diaphragm is subjected to suction. The spring action of contact arm
30 25 is thus overcome by the action of spring 12 except when the spring 12 is compressed by the influence of the suction on the diaphragm. The movable contact arm 25 has its rounded bent portion approximately in
35 the center of the casing so as to be engaged by the highest point of the rounded head of member 14, or rather by the diaphragm at this point, so that the contact ends of the arms 24 and 25, which are provided with
40 contact points, are located at one side of the axis of the casing just beneath a semi-circular opening 26 into which the end of contact arm 22 may project if necessary. This semi-circular opening 26 may have a similarly
45 shaped opening 27 in a disk shaped cover plate 28 register therewith to permit of the contact points being examined and cleaned, or it may be closed by said cover plate by turning the latter on its central pivotal connection 29 by which it is secured to the casing 15. An upturned lug 30 on the cover
50 plate 28 forms a convenient means by which it may be turned, and a downwardly extending stop pin 31 by engaging the ends of opening 26 limits the movements thereof. The spring contact arms 24 and 25 are held
55 fixed in their proper positions by having lugs 32 bent upwardly from their outer ends and fitting into notches formed in the edge of insulating ring 21. Each of the screws 19 may be kept from turning by a touch of
60 solder 33 connecting the edge of the screw head with the contact arm.

In operation, the switch of this invention
65 may be included in a battery ignition circuit

or a headlight circuit or any other electrical circuit which it is desired to control by means of suction in the intake manifold or other conductor to which the device is connected, and as long as the engine is idle and the diaphragm is not subjected to suction
70 such circuit will remain open by the disconnection of the contacts 24 and 25, as shown in Fig. 1, but immediately upon the establishment of a partial vacuum in said conductor, as upon the cranking of the engine
75 for starting it in operation, the suction produced in the intake manifold or other conductor will cause the diaphragm to move the member 14 downwardly against the action of its spring 12 and thus permit the spring
80 action of contact arm 25 to move it into contact with arm 24, as shown in Fig. 2, to establish the circuit connection which will remain closed during the operation of the engine, but will open again when the engine
85 stops. This reopening of the contacts is of course due to the action of spring 12 in forcing the member 14 upwardly and overcoming the spring pressure of contact arm 25.

90 Upon the occurrence of an abnormal pressure in the conductor, as when the engine backfires, the diaphragm is protected from such pressure by the diaphragm fitting against the concave plate 16 and by the head
95 of member 14 fitting thereagainst around the edges of the opening in said plate. The diaphragm will therefore retain its proper shape and the switch will not be injured by the explosion.

100 The contact points may be readily inspected and cleaned when necessary through the opening in the casing by turning the cover plate 28 so that its opening registers therewith, but this cover plate is normally
105 left in a closed position to protect the switch from dirt.

While the switch has been described as in the position shown it is obvious that it may be placed in any position without affecting
110 its operation, and that upon the reversal of the position of the contacts and properly proportioning the strength of the opposing springs it may be made to open or close a circuit upon the occurrence of a predetermined pressure or suction. It is also obvious that by opposing one spring against
115 another, as described, the device may be made very sensitive and still positive in its operation.

120 What I claim as new and desire to secure by Letters Patent is:

1. A pressure operated switch, comprising a casing, a diaphragm contained therein and forming a pressure chamber on one side
125 thereof, a spring pressed convex member within the pressure chamber bearing against the diaphragm, a spring actuated switch contact engaged by the diaphragm and having its spring action opposed to the spring
130

action of the convex member, and a companion switch contact engaged and disengaged by the spring actuated switch contact.

2. A pressure operated switch, comprising a casing having a concave wall, a diaphragm within the casing to fit against the concave wall on one side and forming with the casing a pressure fluid chamber on the other side, a spring pressed convex member within the pressure fluid chamber and bearing against the diaphragm and adapted to fit within the concave wall with the diaphragm therebetween, there being an opening in the concave wall smaller than the convex member and opposite thereto, a spring actuated switch member engaged through said opening by the diaphragm covered convex member, and a companion switch member engaged and disengaged by the spring actuated switch member.

3. A pressure operated switch, comprising a cup-shaped casing, a concave plate and a funnel shaped base secured together at their edges with the concave plate between the casing and the base, a diaphragm with its edges held between the edges of the concave plate and the base, said base having a threaded tubular projection adapted for connection with a fluid pressure conductor,

a coil spring seated in the said tubular projection, a convex member mounted on the coil spring and bearing against the diaphragm and fitting within the concave plate with the diaphragm therebetween, there being an opening in the concave plate smaller than the convex member and opposite thereto, and a pair of insulated spring engaged switch contact members within the casing, one of which is adapted to be engaged by the diaphragm covered convex member through the opening in the concave plate.

4. A pressure operated switch, comprising a pressure fluid chamber having a concave wall with an opening therethrough, a diaphragm stretched across the cavity of the concave wall, a convex member bearing against the diaphragm opposite the opening in the concave wall and larger than said opening and switch contacts engaged and disengaged by the movements of the convex member.

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

STEPHEN F. BRIGGS.

Witnesses:

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