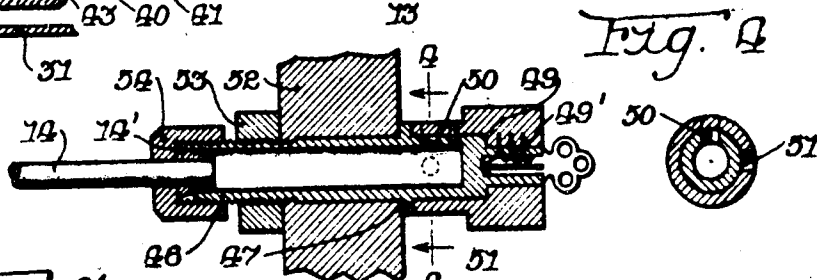
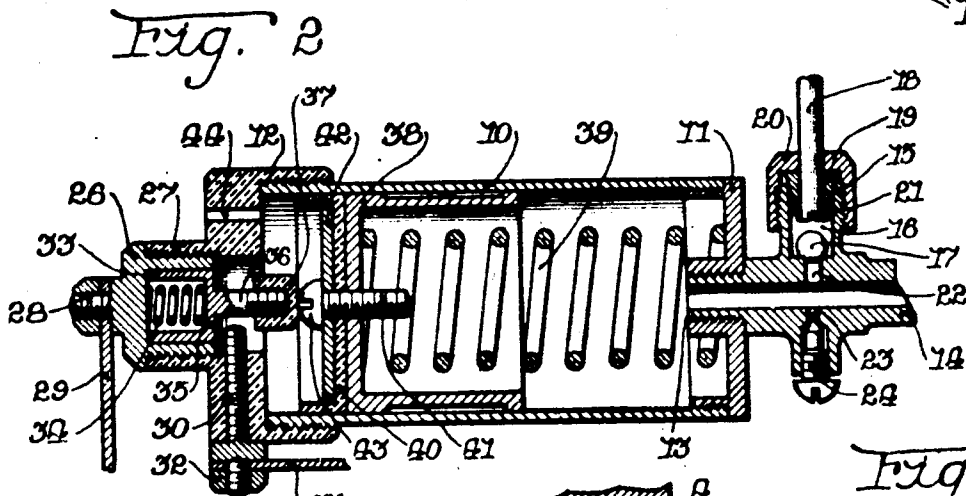
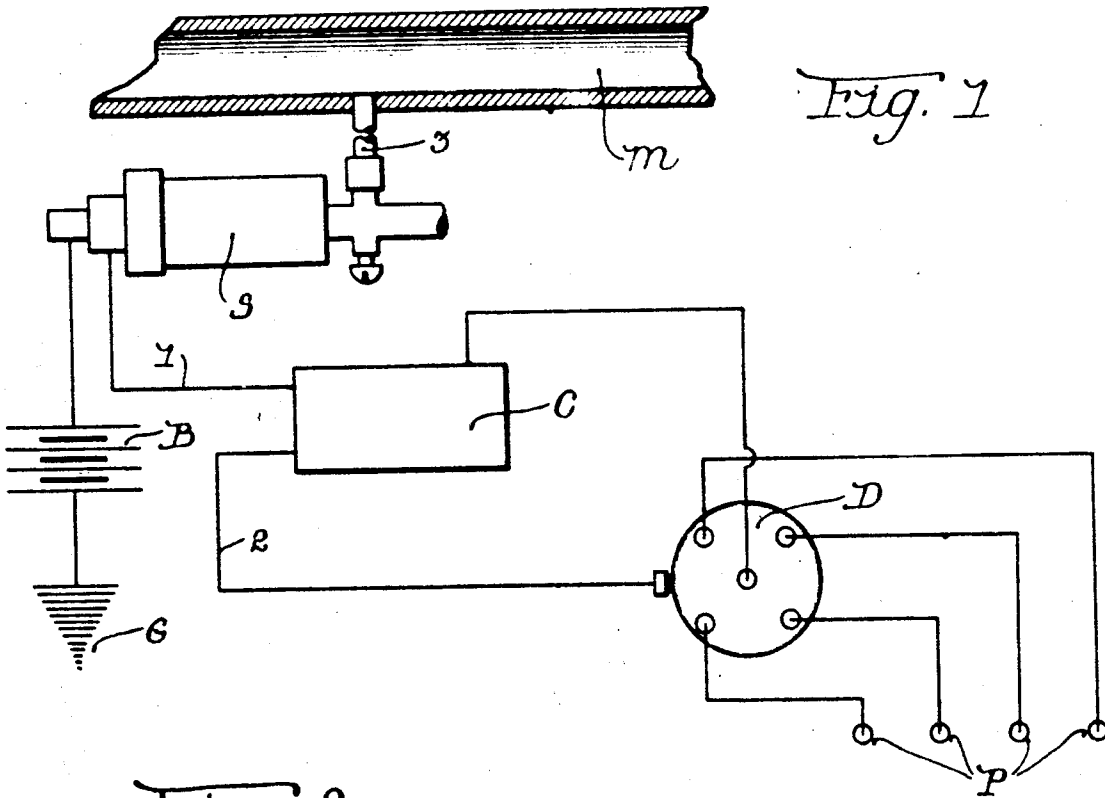


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CIRCUIT BREAKER FOR IGNITION SYSTEMS.
APPLICATION FILED JUNE 18, 1917.

1,306,071.

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CIRCUIT-BREAKER FOR IGNITION SYSTEMS.

1,306,071.

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To all whom it may concern:

Be it known that I, GEORGE B. MAEGLY, a citizen of the United States, resident of Kansas City, county of Jackson, and State of Missouri, have invented a certain new and useful Improvement in Circuit-Breakers for Ignition Systems, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates broadly to internal combustion engines and more particularly to automatic controlling means for the ignition circuits thereof.

The manually controlled primary circuits of the ignition system now in general use is often left closed during a period of idleness of the engine which results in overheating of the primary winding of the induction coil used for producing the spark and consequent damage to the coil or complete destruction of the same, as well as a drain upon the battery and resultant deterioration of the same.

Various devices have been suggested for automatically breaking the ignition circuit when the engine is idle but the majority of these devices are complicated or delicate in construction, require careful adjustment and are not infallible.

The battery ignition systems now in general use are embraced in two types, generally known as the "open" and the "closed" circuit systems. The prevailing prior art devices for automatic making and breaking of the primary circuit are usually either of the "thermostatic cut-out" type and its variations or the "latch-release" type. The latter system is generally best adapted to open circuit work.

With the inherent defects of the prior art devices in mind I provide simple and inexpensive means for interposition in the primary circuit of either the "closed" or "open" systems to automatically open the primary circuits when the engine stops, so that if the driver inadvertently leaves the motor standing with the primary circuit switch in the closed position, no damage will result to the induction coil.

The device is applicable to any ignition system employing a battery as a source of energy, but of course, is not limited in its

use to battery ignition circuits. Nor is the device limited to use in connection with automobiles.

A further object of my invention is to provide a device capable of use in automatically opening or automatically closing the circuit.

Other objects and advantages not hereinbefore pointed out will appear from the following detailed description and the claims, taken with an inspection of the accompanying drawing, in which—

Figure 1 is a diagrammatic view of the circuit of an ignition system showing my improved switch associated therewith;

Fig. 2 is a longitudinal sectional view of the switch and actuating mechanism;

Fig. 3 is a fragmental detail section of means to control the switch manually from the dash; and

Fig. 4 is a transverse section taken on the line 4—4 of Fig. 3 looking in the direction of the arrows.

My invention contemplates the provision of an automatic switch pneumatically controlled from the intake manifold of an internal combustion engine whereby when the engine is idle and the air in the manifold is at atmospheric pressure or nearly so, the switch is opened disconnecting the primary of the ignition circuit. To this end I provide a pneumatically operated switch designated S in its entirety, said switch being interposed in the primary leads of the ignition circuit, said leads being designated 1 and 2 and the coil C. A battery is shown at B, one side of the battery being grounded at G. The manifold is designated M and is connected to the pneumatically controlled switch S by means of a conduit 3. The switch consists of two elements, namely, the circuit closing and opening structure and the pneumatically actuated element for controlling the circuit closing and opening member.

As shown in the diagrammatic view in Fig. 1, the usual distributor D is employed connected to the spark plugs P. Fig. 1 merely shows one application of the switch, the structure of the latter being best shown in Fig. 2.

The switch structure and associated mechanism, as shown in Fig. 2, embodies preferably a cylinder 10 having one end closed by

a threaded plug 11 and the other end by a threaded cap 12 of insulating material. The plug 11 threads into the open end of the cylinder and is provided with a threaded axial opening 13 to receive the threaded reduced extremity of one end of a conduit 14. An externally threaded boss 15 is formed on the conduit 14 and is provided with a valve chamber 16 adapted to receive a ball check valve 17. A tubing 18 projects into the valve chamber 16 and is surrounded with a conical packing 19, a cap 20 serving to connect said tubing to the boss and prevent the escape of air at the joint. The inner end of the tube 18 is notched as at 21 so that the ball 17 will not close the end of the tubing when removed from its seat. The valve chamber 16 communicates with the bore of the conduit 14 as indicated at 22. The free end of the tubing 18 is connected to the intake manifold S hereinbefore referred to. An outlet port 23 is provided in the conduit 14, said port being controlled by a needle valve 24, which is adjustable.

At the opposite end of the cylinder to that at which the conduit 14 is connected is mounted the circuit breaking device. The circuit closer preferably consists of a barrel 26, said barrel being externally threaded for engagement with an internally threaded boss 27 formed integrally with the insulating cap 12. The outer end of the barrel 26 is closed and is provided with a threaded projection 28 to which is connected one terminal 29 of the primary ignition circuit.

The other terminal of the primary circuit is connected to a threaded binding post 30 which extends laterally through the head of the cap 12 to a point in spaced relation with the barrel 26, the terminal being designated 31 and being secured to the free end of the binding post by a nut 32. The circuit closing element proper embodies a hollow thimble 33 receivable within the barrel 26, a coil spring 34 being contained within the thimble and the end of the barrel in order to normally tend to maintain the thimble in the outer (dotted) position. A vent 35 is provided in the thimble to allow of free movement of the thimble. A threaded extension 36 is formed on the thimble and extends axially therefrom, said extension having an insulating cap 37 on the free end thereof, for a purpose which will hereinafter appear.

The position of the circuit closing element is controlled by a piston 38 movable in the cylinder 10, said piston being normally maintained in the position shown in Fig. 2 by means of a relatively strong coiled spring 39, the latter being interposed between the transverse wall of the piston and the plug 11. The transverse wall or head of the piston carries a packing gland 40 of any suitable material, retained in place by means of a machine screw 41 and a washer 42. The head 43

of the machine screw is adapted to contact with the insulating cap on the end of the extension carried by the thimble, as shown in Fig. 2, to normally maintain the thimble in the position shown in full line in Fig. 2. A vent 44 is provided in the insulating cap 12.

Manual control of the operation of the piston is afforded by means of a valve located on the dash or at any other point distant to the engine. This valve comprises a tubular portion 46 provided with an annular flange 47 adjacent one end thereof, said end being closed and provided with a hollow extension 48 receiving a lock referred to later. The extension is provided with a bearing portion to receive a cap 49, the cap embracing the free end of the tubular portion 46 and abutting the flange 47. An opening 50 is provided in the tubular portion 46 under the cap and an opening 51 is provided in the cap adapted to be brought into registration with the opening 50 to destroy the vacuum produced in the conduit 14 when it is desired to render inoperative the piston. The tubular member 46 extends through the dash and is threaded to receive the retaining nut 53. Continuation of the conduit 14 to the valve 46 is arranged and the free end of the conduit 14 is provided with a packing gland 14', a retaining cap 54 having threaded engagement with the tubular body 46 serving to securely connect the conduit to said tubular body. The valve cap 49 is restrained against movement when open by means of a lock 49' involving the Yale or any other well known structure. The lock is adapted to receive a key retained by the owner of the car thereby preventing unauthorized persons from closing the ignition circuit.

In operation, the normal position of the piston, when the engine is at rest, is that shown in Fig. 2. In other words, the head 43 of the screw 41 is in intimate contact with the insulated cap 37 carried by the extension formed on the thimble 33 thus maintaining the latter, against the tension of the spring 34, in the position shown in full line in Fig. 2. The spring 39 serves to maintain the piston in the position shown, said spring, of course, being of greater strength than the spring 34. To start the engine to which my switch is applied the usual steps are taken, such as either cranking the engine or imparting rotary movement thereto from the self starter. As soon as the engine turns over one or two times, sufficient vacuum or subnormal air pressure is created in the intake manifold M which is imparted to the cylinder 10 and causes the piston 38 to be withdrawn from the position shown, against the tension of the spring 39 toward the opposite end of the cylinder, releasing the circuit closing thimble 33 and permitting one end of the same to come into contact with the binding post 30 as shown in dotted line

in Fig. 2. This will close the primary ignition circuit and maintain it closed as long as the engine is running.

The cylinder 38 will maintain this position with some slight variations as long as the engine is rotating, or as long as there is a subnormal air pressure in the intake manifold. The speed of action of the piston to break the circuit is controlled by manually adjusting the needle valve 24. At the moment the engine ceases to rotate and the vacuum dies in the intake manifold, the piston, under the action of the spring 39, will be returned to the position shown in Fig. 2, the screw will engage the circuit breaking element and the latter will be moved to open the primary circuit. The device has been shown as occupying a horizontal position but by changing the check valve arrangement in a small degree, the cylinder may be placed in any convenient position, either under the hood or under the cowl. The device is applicable to any internal combustion engine employing the battery ignition system, this being practically the only system of ignition in which such a device is of especial utility. It will be apparent that the valve 46 may be utilized to render the device inoperative in so far as starting the engine is concerned. Thus by leaving the valve 46 locked open the vacuum in the intake manifold has no effect on the piston thus preventing closing of the automatic switch and thereby keeping unauthorized persons from starting the car, owing to inability to close the ignition circuit.

The structure which I have disclosed is merely one preferred adaptation of the broad principle of my invention and I do not limit myself to the details of structure shown. I direct particular attention to the broad idea of controlling the ignition circuit from or by means of the subnormal air pressure created in any engine intake manifold. The device need not, in use, be limited to internal combustion engines, but possesses a scope of wide utility.

As an equivalent of the piston, a flexible diaphragm may be employed and many different modifications may be had for use as switch or circuit breaking devices actuatable by a piston or a diaphragm.

I reserve the right to make changes in the detailed structure and in the various applications of the invention such as do not depart from the spirit and scope of the invention as claimed.

I claim:

1. In combination, an internal combustion engine having an intake manifold, a battery ignition system for the engine and a coil having primary and secondary windings, a circuit breaker interposed in the primary circuit comprising a spring-actuated circuit closing member, a cylinder, a piston in said

cylinder, means on the piston to engage said circuit closer, spring means to normally maintain the piston against the circuit closer to maintain the latter in the open position and means connecting said cylinder to the intake manifold, whereby when the engine is running the subnormal air pressure in the manifold will act upon said piston to release the circuit closer and permit the same to move to closed position.

2. In combination, an internal combustion engine having an intake manifold and a battery ignition system for the engine, a circuit breaker interposed in the primary circuit of said ignition system comprising a cylinder connected to the manifold, a piston in said cylinder, a switch at one end of said cylinder, means to force the piston into engagement with said switch to maintain the latter in open position when the engine is at rest, and means to close the switch when released.

3. In combination, an internal combustion engine having an intake manifold, a cylinder in communication with the manifold, a piston in said cylinder, means to maintain the piston at one end of the cylinder, a switch held open by said piston when in normal position, and means to adjust the action of said piston.

4. A controller for ignition systems, comprising a cylinder adapted for communication with the intake manifold of an internal combustion engine, a spring retarded piston in said cylinder, manual means to control the responsiveness of said piston to various subnormal pressures in the intake manifold, a circuit breaker carried by the cylinder interposed in the primary circuit of the ignition system, and adapted for actuation by said piston, whereby when the engine is started and a subnormal air pressure is created in the intake manifold, said piston is moved to permit said circuit breaker to close the primary circuit.

5. In combination, a cylinder having a piston movable therein, said piston having spring means tending to move the same outwardly, an intake pipe for an internal combustion engine connected to said cylinder, a primary circuit breaker having a relatively movable and a relatively stationary member, spring means of less strength than the spring means of the piston tending to close the circuit breaker, said piston having means for engaging the movable member of the circuit breaker.

6. In combination with the intake pipe of an internal combustion engine, a cylinder having a piston, a spring for the piston, a circuit breaker for the ignition circuit of the engine mounted on the cylinder and normally held open by the spring for the piston, spring means tending to close the circuit breaker independently of the piston and

a pipe connecting the cylinder and the intake pipe.

7. In combination with the intake pipe of an internal combustion engine, a cylinder having a piston, a spring for the piston, a circuit breaker for the ignition circuit of the engine mounted on the cylinder and normally held open by the spring for the piston, spring means tending to close the circuit breaker independently of the piston, a pipe connecting the cylinder and the intake pipe and a check valve in said pipe between the intake pipe and the cylinder.

8. In combination with the intake pipe of an internal combustion engine, a cylinder having a piston, a spring for the piston, a circuit breaker for the ignition circuit of the engine mounted on the cylinder and normally held open by the spring for the piston, spring means tending to close the circuit breaker independently of the piston, a pipe connecting the cylinder and the intake pipe, a check valve in said pipe between the intake pipe and the cylinder, and an adjustable bleeder port for bleeding the suction in the cylinder.

9. In combination with the intake pipe of an internal combustion engine, a cylinder having a piston, a spring for the piston, a circuit breaker for the ignition circuit of the engine mounted on the cylinder and normally held open by the spring for the piston, spring means tending to close the circuit breaker independently of the piston and a pipe connecting the cylinder and the intake pipe, a pipe communicating with the cylinder and a key controlled valve for said last mentioned pipe, said valve being adapted to be mounted on the dashboard of a vehicle for controlling the operation of said piston.

10. In combination, an internal combustion engine having an intake manifold, a battery ignition circuit having a primary and a secondary, means controlled from the intake manifold to automatically open and close the primary circuit when the engine is at rest and running respectively and lock controlled means comprising a valve for manually disabling said primary circuit controlling means.

11. In combination, a cylinder, a piston slidable in the cylinder, a head for one end of the cylinder, said head bearing an insulated contact forming part of a circuit breaker, a movable contact slidable in said head forming the cooperating part of a circuit breaker, spring means mounted on the head for moving said movable contact into engagement with said first named contact, said movable contact having means adapted to be engaged by the piston and a spring for the piston, said spring being mounted in the cylinder and being adapted to force the movable contact away from the other contact, said cylinder being adapted to be connected to the intake pipe of an internal combustion engine, and said contacts being adapted to be connected in the ignition circuit of the engine.

12. In combination, a cylinder, a head of insulation for the cylinder, a stationary contact mounted in said head, a movable contact guided in said head, said movable contact having a guiding portion and having a spring for forcing the movable contact into engagement with the stationary contact, a piston in the cylinder, and a spring for the piston, said piston being adapted to engage the movable contact and hold it out of engagement with the stationary contact, said cylinder being adapted to be connected to the intake pipe of an internal combustion engine.

13. In combination, a cylinder, a piston fitting in the cylinder, a spring in the cylinder engaging the piston and tending to force the same outwardly, a circuit breaker mounted on one end of the cylinder, said circuit breaker comprising a stationary contact and a movable contact, spring means tending to close the circuit breaker, said spring means being normally overcome by the spring for the piston, a pipe communicating with the interior of the cylinder, said pipe being adapted to be connected to a source of suction and a check valve controlling the connection between the source of suction and the cylinder.

In witness whereof, I hereunto subscribe my name this 15th day of June A. D., 1917.
GEORGE B. MAEGLY.