R. VARLEY.

CIRCUIT CONTROLLER FOR EXPLOSIVE ENGINES.

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1,344,464. **Patented June 22, 1920.**

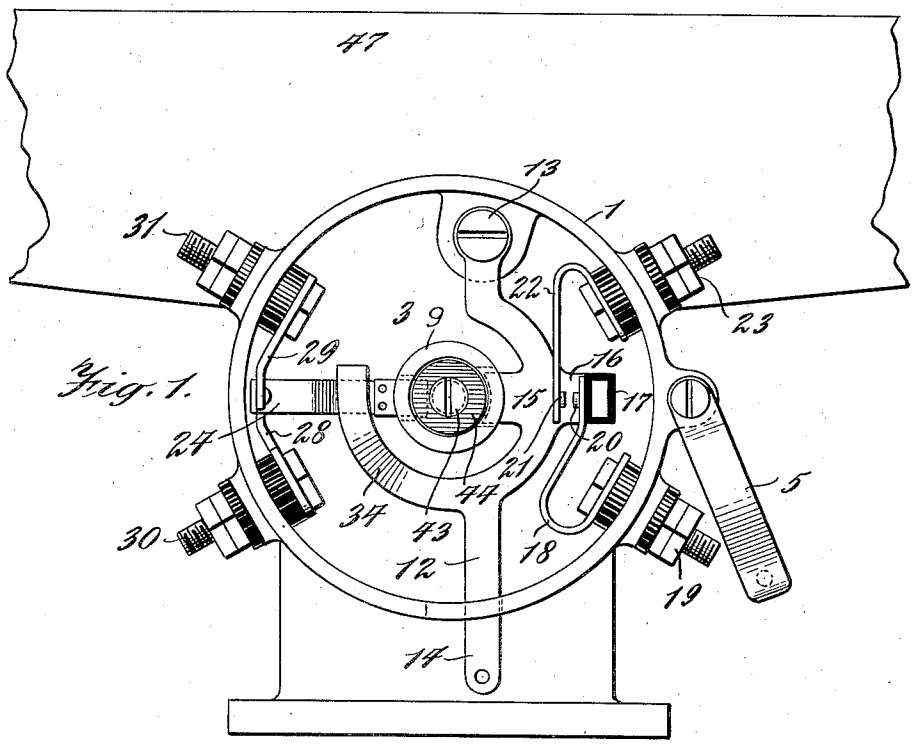


Fig. 1.

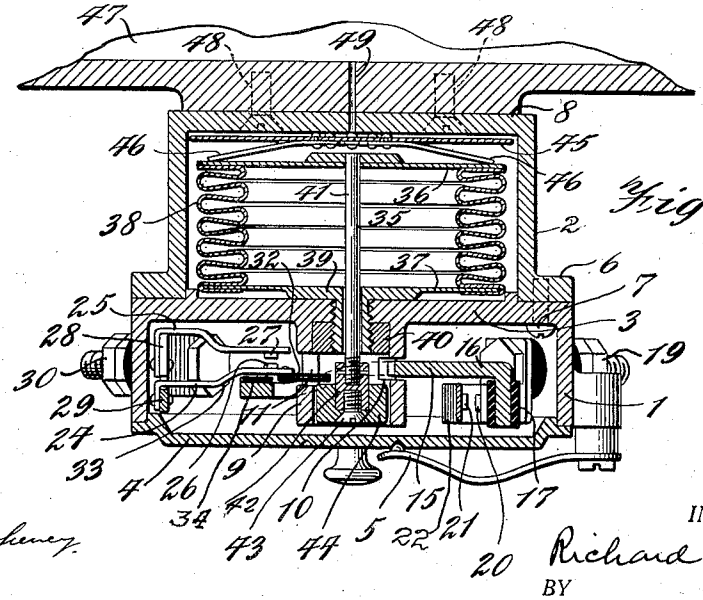


Fig. 2.

WITNESS:

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CIRCUIT-CONTROLLER FOR EXPLOSIVE-ENGINES.

1,344,464. Specification of Letters Patent. Patented June 22, 1920.

Application filed December 19, 1919. Serial No. 346,047.

To all whom it may concern:

Be it known that I, RICHARD VARLEY, a citizen of the United States, residing at Englewood, in the county of Bergen and State of New Jersey, have invented certain new and useful Improvements in Circuit-Controllers for Explosive-Engines, of which the following is a full, clear, and exact description.

This invention relates to internal combustion engines and has special reference to the ignition, starting and other electrical systems pertaining thereto. The object of the invention is to provide certain automatic protection devices for such systems, to accomplish which my invention consists in utilizing the vacuum produced in the intake manifold of the engine while running as a means to maintain certain circuits closed and to prevent others from being closed and, when the engine stops, to restore the circuits to a condition for manual control. Specifically, my invention consists of a casing in communication with the intake manifold of the engine and containing one or more electric switches or cut-outs subject to limited control by hand and by the vacuum in the intake manifold, the details of which will be described in connection with the accompanying drawing, in which—

Figure 1 is a front elevation of the mechanism comprising the invention, the cover plate being removed from the casing, and

Fig. 2 is a horizontal section thereof.

The casing of the device is made in two parts, indicated by 1 and 2 each of which is cylindrical or drum shaped and the part 2 being of somewhat less diameter than 1. The casing portion 1 is closed at the rear by an integral disk 3 and at the front by a removable cover 4 which is held in place by a spring clamp 5. The casing portion 2 is provided with a flange 6 through which screws 7 pass to secure it concentrically to the disk 3. The rear of the casing 2 is closed by an integral disk 8. From the disk 3 of the casing 1, a tubular column 9 projects forward axially and on its opposite sides about midway of its length, are two slots 10 and 11 respectively. 12 is a lever pivoted at 13 on the inside of the casing 1 near the side wall thereof. It extends across the diameter of the casing and passes out through a slot in the opposite side thereof for manipulation either directly or through a link, which may be attached at 14 to swing the lever in a plane at right angles to the axis of the casing. The lever is bent into an arcuate form at its middle portion, so as to pass around the column 9, this bent portion being provided with a lug 15 adapted to enter the slot 10 in the column 9. The lever also carries a lug 16 having a non-conducting block 17 attached to its extremity against the inner face of which rests the free end of a spring arm 18, whose opposite end is secured to a binding post 19 fixed in, and insulated from, the side wall of the casing 1. The free end of the arm 18 is provided with an electrical contact 20 which faces another contact 21 carried upon the free end of another spring arm 22, likewise attached to a binding post 23 carried by, and insulated from, the casing 1. The spring arm 18 normally exerts pressure against the block 17 sufficient to hold the lever 12 at its extreme right hand position with the contact 20 out of connection with the contact 21. 24 and 25 represent two contact springs arranged on the opposite side of the casing 1 from the springs 18 and 22 and respectively carrying contacts 26 and 27. These springs are supported respectively by arms 28 and 29 which in turn are secured to two binding posts 30 and 31, mounted in and insulated from casing 1. To the free end of the spring 24 is attached an insulating strip 32 which extends through the slot 11 in the column 9 and projects a short distance toward the axis of the column. This spring also has a bend 33, adjacent to which an extension or horn 34 attached to the lever 12, stands in such position that when the lever is moved to the left the extremity of the horn engages the bend 33 forcing the spring inward until the contacts 26 and 27 are brought into connection. The under side of the horn 34 is provided with insulation as shown in Fig. 2, to prevent escape of current from the spring to the horn.

The casing member 2 contains a bellows 35, comprising a rear head 36, a front head 37 and extension sides 38. To the center of the front head is fixed a threaded nipple 39 having an axial passage, the nipple being screwed into a threaded opening at the center of the disk 3 of the casing portion 1 and entering the bottom of the column 9, the nipple being firmly held by a lock nut 40. Attached to the center of the rear head 36

of the bellows is a rod 41 extending axially of the bellows through the passage in the nipple 39 and into the column 9, where it is fitted with a head 42 having a threaded passage adapted to receive a screw 43 which secures in place a larger head 44 having a diameter substantially fitting the bore of the column 9. The rod 41 passes freely through the passage in the nipple 39 so as to admit atmospheric pressure to the interior of the bellows. Within and against the rear wall of the casing part 2, is a disk 45 having attached to its central portion a number of radial spring fingers 46 which bear against the rear head 36 of the bellows, tending to compress the latter under normal conditions sufficiently to hold the head 44 flush with the outer end of the column 9.

The casing 1—2 is placed in communication with the intake manifold or pipe of an internal combustion engine in any convenient way. Such a manifold is indicated by 47 and I prefer to attach the casing to the wall of the manifold at the junction between the manifold and the pipe leading thereto from the carbureter. The attachment is made by means of screws 48 indicated in dotted lines in Fig. 2 and communication between the manifold and the casing is established by means of a passage 49 of small bore leading through the wall of the manifold and the rear wall of the casing part 2. In this way the chamber within the casing part 2 is subjected to the same fluid pressure as exists at any given time within the manifold.

To the binding posts 19 and 23 may be attached the terminals of an electric circuit which may be the circuit of a starting motor for the engine and for the purpose of this description will be understood as such. The binding posts 30 and 31 may carry the terminals of a circuit which controls the ignition of the engine. Both of these circuits are normally open at the contacts 20—21 and 26—27 respectively and under the same condition the plunger head 44 is at its extreme outer position, its rear face being forward of the two slots 10 and 11, it being held in this position by the contraction of the bellows due to the pressure of the spring fingers 46 against its rear wall. The normal condition here referred to is that when the engine is not running and atmospheric pressure exists throughout the chambers of the casings 1 and 2 and the manifold. In using this device to start the engine, the lever 12 is pulled to the left, whereupon both pairs of contacts 20—21 and 26—27 are closed by the two spring arms 18 and 24 yielding to the pressure of the lever. The starting motor is thereby energized and the ignition circuit is closed. As soon as the engine starts lever 12 is released and returns to its former position under the action of spring 18, or of some other spring properly applied for that purpose. The starting of the engine is accompanied by a reduction of fluid pressure in the manifold 47, due to the suction of the engine pistons. This reduction of pressure, or vacuum, is immediately communicated to the chamber in the casing 2 whereupon the atmospheric pressure in the bellows extends the latter, compressing the spring fingers 46 and pulling the plunger head 44 inward against the projecting end of the spring 24 to hold the contacts 26 and 27 closed, the plunger head at the same time covering the slot 10 in the column and locking the lever 12 in its right hand position to hold the contacts 20—21 open. The ignition circuit is therefore maintained closed to insure the running of the engine, while the starting circuit is locked in open condition and cannot, by accident or design, become closed while the engine is running, an incident which if it should occur might entail disastrous results. When the engine stops, atmospheric pressure throughout the mechanism is restored, the plunger moves outward, opens the ignition circuit and releases lever 12, thus restoring the mechanism to normal condition ready to again start the engine.

It will be understood that the device may operate upon electrical circuits used for any purpose whatever in connection with the engine, its function being merely to control the actuation of the contacts, and to protect the apparatus where protection is required.

I claim:

1. The combination of a gas engine having an intake pipe, an electric switch, manually controlled means and means responsive to the vacuum in the intake pipe, one of said means being operative to initially close the switch and the other to maintain it closed.

2. In an internal combustion engine, the combination of a switch controlling a "starter" circuit, a switch controlling an ignition circuit, means for manually closing said switches and means whereby a vacuum created by the operation of the engine will hold one of said switches open and the other closed.

3. In an internal combustion engine, the combination of the intake manifold, a casing in communication therewith, two switches in said casing controlling respectively two engine control circuits, a manually operated controlling device operative to close both of said switches and means responsive to the pressure in the intake manifold for holding one switch closed and the other open.

In witness whereof I hereunto subscribe my signature.

RICHARD VARLEY.