

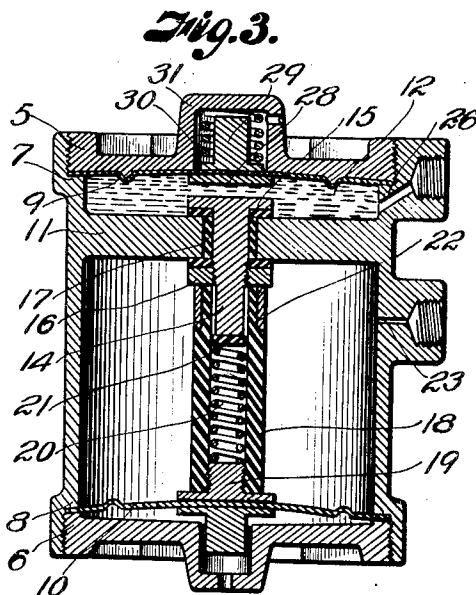
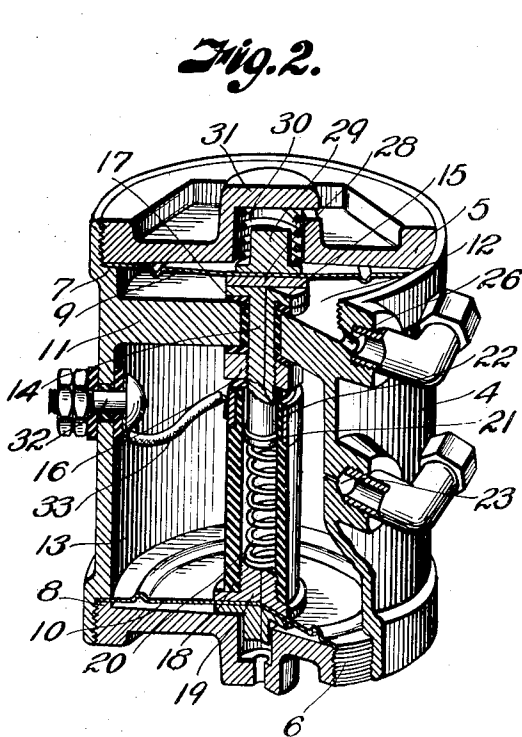
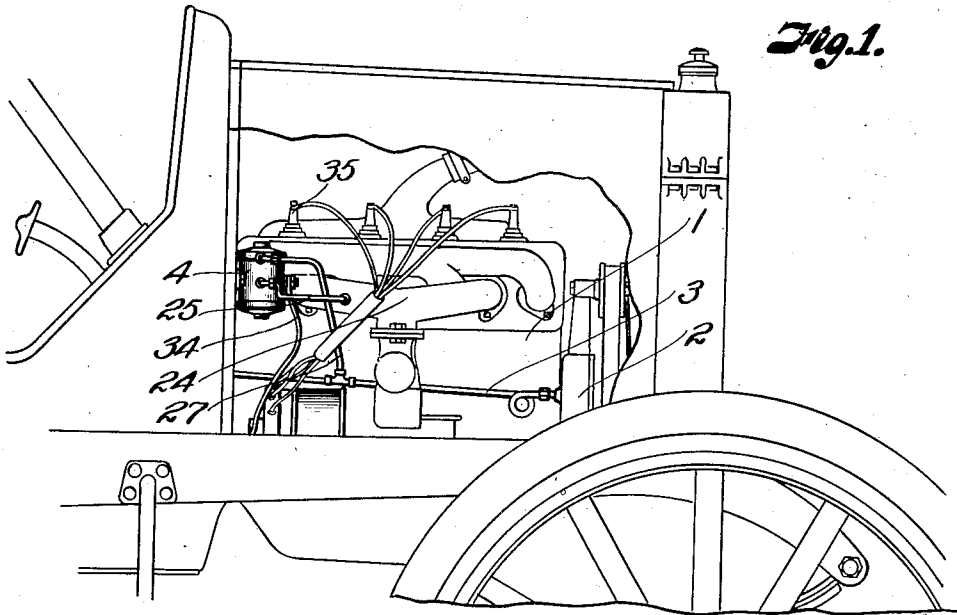
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G. C. WILLIS

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MOTOR PROTECTOR

Filed March 17, 1921



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UNITED STATES PATENT OFFICE.

GROVER C. WILLIS, OF KANSAS CITY, MISSOURI, ASSIGNOR TO WILLIS-WARNER MANUFACTURING COMPANY, OF KANSAS CITY, MISSOURI, A PARTNERSHIP COMPOSED OF GROVER C. WILLIS AND JOSEPH O. WARNER.

MOTOR PROTECTOR.

Application filed March 17, 1921. Serial No. 453,043.

To all whom it may concern:

Be it known that I, GROVER C. WILLIS, a citizen of the United States, residing at Kansas City, in the county of Jackson and State of Missouri, have invented certain new and useful Improvements in Motor Protectors; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

This invention relates to an engine protector particularly applicable for use in connection with explosion motors.

The invention is primarily intended to be applied to an engine ignition system in such manner that the current for the ignition system will be short circuited when the lubricating system fails on account of insufficient oil, failure of the pump to operate or from any other cause.

One of the important features of my invention is the provision of an oil chamber and a vacuum chamber electrically connected together so that the ignition circuit can be short circuited through both chambers when the oil supply fails. The vacuum or suction chamber has co-operating contacts in it, which will be spaced apart when the engine is at rest, thereby breaking the connection for the "short" and thus enabling the engine to be started to turn it over a sufficient number of times to pump oil into the oil chamber to separate co-operating contacts therein, after which the suction in the suction chamber will be sufficient to cause the contacts in the suction chamber to move together, allowing the short circuit to be made through the medium of the contacts in the oil chamber when the oil supply fails.

In the drawings,

Fig. 1 is a side elevational view of an engine to which my invention is applied.

Fig. 2 is a sectional view through the circuit breaker casing and in short circuiting position, and

Fig. 3 is a cross sectional view through the short circuiting device out of circuit breaking position.

Referring now to the drawings by numerals of reference:

1 designates an engine, 2 an oil pump, 3 an oil pipe which may lead to an indicator on the dash board and back to the engine in the usual way, and 4 a cylindrical casing of a short circuiting device. The casing consists of a barrel having removable heads 5 and 6 which may be screwed into the ends of the barrel against the shoulders 7 and 8 respectively to hold the diaphragms 9 and 10 in place.

Between the diaphragms 9 and 10 is a lateral partition 11, dividing the barrel into an upper chamber 12 and a lower chamber 13. The partition 11 is provided with a central opening, through which projects a metal post 14, having a head 15 at one end and secured in place by a nut 16 at the other, the post being insulated from the partition 11 by an insulating sleeve 17, best seen in Figs. 2 and 3.

The lower end of the post extends a slight distance beyond the nut 16 and constitutes a guide for an insulating sleeve 18, preferably of rubber, which bears against the headed disk 19, fast to the diaphragm 10. There is a spring 20 within the insulating sleeve 18, one end of which bears against the end of an insulating disk 21 resting against the end of the post 14 and the other end of which bears against the disk 19 so that the diaphragm 10 is normally urged upon its seat or against the head 6 so that the metal contact ring 22, carried by the upper end of the sleeve 18, will normally be held out of contact with the nut 16.

The chamber 13 is provided with a restricted outlet orifice 23, which is connected to the intake manifold 24 of the engine 1 by a tubular connection 25. The chamber 12 is provided with an inlet orifice 26, connected to the oil pipe 3 by a pipe 27. The diaphragm 9 is provided with a contact 28 in line with the head 15 on the post 14 and said diaphragm also is provided with a guide lug 29, around which is coiled a spring 30, one end of which bears against the end of the recessed portion 31 on the head 5 and the other end of which bears against the diaphragm 9 so that the diaphragm will be normally urged against the head 15.

The contact ring 22 is electrically connected to a binding post 32, through the medium of the conductor 33 within the chamber 13. The binding post is connected

to the source of electric supply, such as a magneto or battery through the medium of the short circuiting conductor 34. The barrel 4 is grounded with the engine so that a circuit can be made through it to short circuit the spark plugs 35.

Assuming all of the parts to be assembled and the engine turned over, the pump 2 will be effective to force oil through the pipe 3 in the usual manner. In doing this, part of the oil will be forced through the pipe 27 to fill up the chamber 12, forcing the contact plate 28 away from the head 15 of the post 14. The orifice 26 is slightly larger than the orifice 23; therefore, the oil will be admitted to the chamber 12 to break contact between 28 and 15 before the suction in the intake manifold 24 is sufficient to create a vacuum in chamber 13.

When the initial separating movement between 15 and 28 takes place, the diaphragm 10 will be on its seat so that the ring 22 will be out of contact with the nut 16. After the chamber 12 has become filled with oil, the suction created in the intake manifold 24 through the pipe 25 will exhaust the air from the chamber 13, raising the diaphragm 10, as shown in Fig. 3, so that the ring 23 will be in contact with nut 16 and the engine will then operate in the usual way.

Suppose, however, that the oil supply becomes exhausted from any cause, for example, because there is not sufficient lubricating oil or because the pump becomes ineffective to maintain the circulation through pipe 3. Then the spring 30 will preponderate in pressure over the oil pressure in chamber 12, so that 28 and 15 will contact. Since the engine is still turning over and maintaining a partial vacuum in 13 to hold the diaphragm 10 up, as shown in Fig. 3, the contact ring 22 will be in contact with nut 16. Therefore, a complete circuit will be formed from the source of generation, such as a magneto or battery, through 34, binding post 32, conductor 33, ring 22, nut 16, post 14, head 15, contact 28, diaphragm 9, casing of barrel 4, engine to which it is grounded, and back to the source of generation. The short circuit thus formed will prevent current from being supplied to the spark plugs. Therefore the engine will die down on account of failure of ignition circuit. The engine cannot be caused to function then until the lubricating system has been replenished with sufficient oil to allow pressure to be built up in the chamber 12 to raise the diaphragm 9 from contact head 15.

It will be apparent from the foregoing that as soon as the lubricating oil system fails, the ignition system for the spark plugs will immediately fail on account of short circuiting and that the engine will be stopped before it can be turned over a suf-

ficient number of times to destroy itself or cause deterioration for want of lubrication.

It will be clear from the foregoing that when the engine is operating and the oil supply is adequate, the contacts in the oil chamber will be separated, the partial vacuum in the vacuum chamber at this time being sufficient to raise the diaphragm 10 and connect the ring conductor 22 to the nut 16 where it will remain during the entire operation of the engine so that the only break in the short circuit conductor will be at the spaces between the contacts in the oil chamber. Then if the oil supply fails and the contacts in the oil chamber come together, the circuit will be grounded and the spark plugs can receive no current. When the engine dies down or comes to a state of rest, the partial vacuum in the vacuum chamber 13 will be destroyed so the diaphragm 10 will drop and separate the contacts 22 and 16; therefore, the short circuit will be broken.

This is important because it enables the engine to be operated upon the introduction of the requisite amount of oil in the lubricating system by reason of the fact that when the engine is cranked, the current cannot bridge the gap between the ring 22 and the nut 16 and consequently, current will be supplied to the spark plugs and the engine can turn over a sufficient number of turns to pump oil into the oil chamber 12 of the device to separate the contacts therein and immediately thereafter, there will be a sufficient partial vacuum created in chamber 13 to bring the ring 22 into contact with 16 so that when the oil supply fails, the contacts in chamber 12 will come together and short the circuit.

Attention is also called to the fact that when the contacts in chamber 12 are together so that the ignition circuit is "shorted" and the engine comes to a state of rest on account of the failure of the ignition system to properly function and the partial vacuum in chamber 13 is destroyed so that the ring 22 drops away from 16, it is still possible to turn over the engine and start it up, even though the contacts in the oil chamber are together. The engine will continue to function, however, only long enough to create a partial vacuum in chamber 13, sufficient to actuate the diaphragm 10 and to bring members 22 and 16 together, when the ignition circuit will again be "shorted," causing the engine to fail to function before it has operated long enough to cause enough heat to be generated to affect it.

Therefore, it will be clear that an engine protector is provided which will adequately safe-guard the engine against being operated deliberately or accidentally while there is not sufficient lubricating oil to supply the

necessary lubricant to the parts requiring lubrication.

What I claim and desire to secure by Letters-Patent is:

5 1. In a device of the class described, a closed casing having a vacuum chamber and an oil chamber, a contact-carrying diaphragm in the oil chamber, a contact post having one end in the oil chamber and the
10 other in the vacuum chamber, a contact-carrying diaphragm in the vacuum chamber to be moved into functional position to contact its contact with the post when a vacuum is created in the vacuum chamber,
15 a binding post in the wall of the casing, and a connection between the contact in the vacuum chamber and the post.

2. A device of the class described comprising a casing divided into an oil chamber and a vacuum chamber, a diaphragm having an electrical contact in the oil chamber, a conductor extending through the oil chamber and into the vacuum chamber, the diaphragm normally being separated from
25 the conductor by oil pressure, a diaphragm in the vacuum chamber having a contact to move against the conductor when a vacuum is created in the vacuum chamber, a binding post in the casing, and an electric
30 connection in the vacuum chamber between the binding post and the contact therein.

3. A device of the class described comprising a casing divided into a vacuum chamber and an oil chamber, an electric
35 conductor electrically connecting the two chambers, a pressure responsive electric contact in the oil chamber, a vacuum responsive contact in the vacuum chamber, and an electric connection between the last
40 named contact and the casing.

4. A device of the class described comprising a casing divided into an oil chamber and a vacuum chamber, an electric conductor electrically connecting the two chambers, a yielding contact having an inherent
45 tendency to move into contact with the conductor but normally held away therefrom by oil pressure in the oil chamber, an electric contact normally urged away from the
50 conductor but movable into engagement therewith in response to suction within the vacuum chamber, and means for electrically connecting the casing and the contact in the vacuum chamber.

55 5. A device of the class described comprising a casing consisting of a barrel hav-

ing an intermediate partition dividing the barrel into an oil chamber and a vacuum chamber, a diaphragm in the oil chamber, a contact carried thereby, an electric conductor connecting the oil chamber with the vacuum chamber, a spring normally urging the diaphragm toward the conductor, said diaphragm being normally held away therefrom by oil pressure supplied through an inlet port in the oil chamber, a diaphragm in the vacuum chamber, a contact carried thereby adapted to contact with the conductor, a spring normally urging the last named diaphragm away from the conductor to separate the contact therefrom, said contact in the vacuum chamber being movable into engagement with the conductor in response to suction in the vacuum chamber through an outlet port therein, and an electric connection between the barrel and the contact in the vacuum chamber.

6. A device of the class described comprising a casing divided into a vacuum chamber and a pressure chamber, a conductor electrically connecting the two chambers, a pressure responsive, electric contact in the pressure chamber normally out of contact with the conductor when a given pressure is in the pressure chamber, and a vacuum responsive contact in the vacuum chamber movable into contact with the electric conductor under influence of a partial vacuum in the vacuum chamber and normally urged against contacting position when the partial vacuum in the vacuum chamber depreciates to a determined degree whereby the passage of current through the conductor from one chamber to the other will be obstructed until the contact in the vacuum chamber is moved into contact with the conductor under the influence of the partial vacuum in the vacuum chamber.

7. In combination with an oil pressure system, an ignition, short-circuiting device comprising a casing having an oil pressure chamber and a vacuum chamber, an ignition short-circuiting means in the pressure chamber, circuit breaking means in the vacuum chamber, means operable by a vacuum for closing the circuit breaking means, and means operable by the oil pressure for opening the short-circuiting means.

In testimony whereof I affix my signature.

GROVER C. WILLIS.