

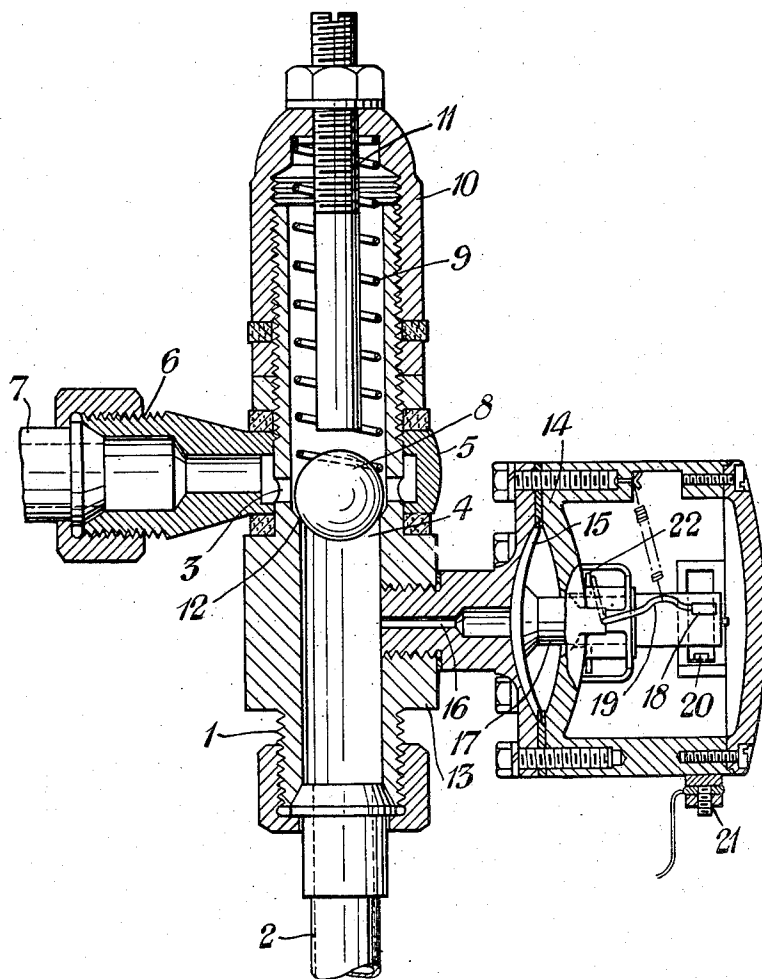
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OIL PRESSURE OPERATED ELECTRIC SWITCH

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OIL PRESSURE OPERATED ELECTRIC SWITCH

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3 Claims. (Cl. 200—53)

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The present invention relates to a switching device for use in connection with internal combustion engines especially upon vehicles and arranged to be operated by a supply of lubricating oil to the internal combustion engine.

Switches of the type referred to have already been proposed but suffer from serious objections in that they depend for operation upon the oil pressure obtaining in the lubricating system of the internal combustion engine. It is thus necessary to arrange that the switch shall not be operated until a certain minimum pressure is developed in the lubricating system and this minimum pressure is invariably such that it cannot easily be developed when starting the engine by hand and results in a considerable drain on the battery when the engine is started by means of a starter motor. With such devices it is therefore the practice to provide a control whereby the device can be rendered inoperative when starting the engine.

Furthermore, since such devices break the electric circuit controlled by the switch which of course includes the ignition circuit when the pressure in the lubricating system falls below the predetermined minimum in the event of a bearing failing with consequent fall in the oil pressure to zero the engine stops and can only be driven by operating the control referred to above or by otherwise rendering the switching device inoperative. This is of course liable to be very inconvenient since it is obviously necessary when a bearing fails to continue driving until a garage is reached where the necessary repairs can be effected.

In my prior British Patent No. 515,461 there is described a device which avoids the defects of the known devices described above and comprises a device embodying an electrical switch intended to be inserted within the ignition circuit of an internal combustion engine, said device comprising a chamber adapted to be connected to said pump or conduit, extending therefrom and having an outlet for completing the oil circulating system, a member normally closing said outlet and displaceable to open the same by oil pressure within the chamber, said electrical switch being controlled by said member and arranged to be closed just before said outlet is opened.

I have now improved upon this construction of switch and according to the present invention there is provided a device embodying an electrical switch and intended to be inserted within the ignition circuit of an internal combustion engine and controlled by the pump supplying lubricating

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oil thereto, said device comprising a chamber adapted to be connected with said pump, and having an outlet for completing the oil circulating system, a member normally closing said outlet and displaceable to open the same by oil pressure within the chamber, and means responsive to the pressure of the oil within said chamber for closing said electrical switch, said means being responsive at a pressure less than that required to operate the member closing said outlet.

This result accrues from the fact that in order to close the switch it is only necessary to build up within the chamber referred to sufficient pressure to cause movement of the pressure responsive means operating the switch. Thus it is unnecessary to build up a working pressure in the whole lubricating system of the engine to close the switch as is the case in the devices previously proposed. Furthermore, it will be apparent that should the pressure on the engine side of the device fail, for example, by reason of a damaged bearing the switch is not opened since the pressure responsive means which operates the switch will always be in the switch closing position so long as the pump operates and there is a supply of oil to the pump. On the other hand should the oil supply fail by reason of a broken pump or pipe leading from the pump to the device or by reason of lack of oil, the switch is opened immediately and the engine cannot be restarted until a sufficient supply of lubricant is ensured.

The invention will now be described with reference to the accompanying drawing which shows an embodiment in cross section.

Referring to the drawing the device shown is adapted to be connected in the oil circulating system of an internal combustion engine for which purpose an inlet union 1 is suitably threaded for connection to the outlet of an oil pump or a conduit 2 extending from such outlet. The oil circulating system is completed through ports 3 in the wall of a cylindrical chamber 4 which may be formed integrally with the union 1. These ports communicate with a collar or housing 5 having an outlet union 6 adapted to have connected to it an oil circulating pipe 7. The flow of oil from the chamber 4 to the ports 3 is controlled by a ball 8 which is spring loaded by compression spring 9 housed in a cap 10. This cap also carries an adjustment spindle 11 which controls the amount of lift of the ball 8. When the engine is running the ball is lifted off its seating 12 at the end of the chamber 4 to allow oil to flow from the pump through the chamber

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4 and ports 3 to the pipe 7 leading to the oil circulating system of the motor.

Screwed into the wall 13 of the chamber 4 is a diaphragm switch 14 the diaphragm 15 of which is open to the chamber 4 through a small diameter conduit 16.

The diaphragm switch 14 is of known construction and comprises essentially a spring loaded plunger 17 bearing against the diaphragm 15 and operating with an electrical contact 18 mounted on a spring loaded bell crank lever 19. The bell crank lever bears against a member 22 mounted upon a plunger 17 so that on movement of the diaphragm 15 responsive to the pressure of the oil in the chamber 4 the contact 18 is moved downwardly to close with the stationary contact 20. When pressure is relieved on the diaphragm 15 the contacts are once again opened.

This type of switch is made to operate at very low pressures of one or two pounds per square inch and it is found that the pressure created in the chamber 4 merely by turning the engine of a motor car over by hand is sufficient immediately to close the contacts 18 and 20 which complete the ignition circuit. The ball 8 is made to lift off its seating and allow oil to pass at a pressure slightly in excess of that required to operate the switch 14. It will be apparent that with this arrangement it is not necessary to create a pressure throughout the oil circulating system of the engine in order to close the switch but merely to build up sufficient pressure within the chamber 4 to operate the switch. Since the pressure required is only one or two pounds per square inch this pressure is immediately created on turning the engine over at the normal rate for starting. The contacts 18 and 20 are connected with the ignition circuit of the engine. Normally the contact 18 is grounded and the contact 20 is connected to an outside terminal 21 which is connected on to the low tension side of the circuit.

Since, as is normal with most modern electrical ignition circuits of motor cars, the accessories such as the direction indicators, horn and windshield wipers are introduced into and controlled by the ignition circuit, failure of the oil supply automatically cuts these accessories out and thus prevents them being left on to exhaust the battery.

While the device is shown with the ball at the upper end of the chamber 4 it may, of course, be in the reverse position, and if desired the chamber 4 need not be a straight chamber but may be of angle section and the switch 14 mounted in a vertical position above it.

What I claim is:

1. A device adapted to be inserted within the electric circuit of an internal combustion engine and controlled by the pump supplying lubricating oil to said internal combustion engine, said device comprising: an oil pressure chamber having an inlet and an outlet, a valve normally closing said outlet and displaceable to open the same by oil pressure within the chamber, a normally open switch adapted to be interposed within said electrical circuit, and movable means independ-

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ant of said valve and joined to the interior of said chamber responsive to the pressure of the oil therein for closing said electrical switch, said means being responsive at a pressure less than that required to displace said valve.

2. A control device for the oil circulatory system of an internal combustion engine adapted to be inserted within the electrical circuit of said internal combustion engine and controlled by the pump supplying lubricating oil to said internal combustion engine comprising: an oil pressure chamber having a port adapted for connection with said circulatory system, a spring loaded ball valve normally closing said port, said valve being displaceable to provide fluid communication between said chamber and said port by oil pressure within said chamber, a switch housing, a flexible diaphragm peripherally joined to the interior of said housing, defining an operating chamber on one side thereof, a conduit connecting said chamber with said operating chamber, a normally open switch interposed within said housing upon the other side of said diaphragm, said diaphragm being responsive at a pressure lower than that required to displace said ball valve, and means connecting said diaphragm with said electrical switch to close said switch on response by said diaphragm to the oil pressure within said chamber, said electrical switch being opened automatically on release of pressure on the said diaphragm.

3. A control device for the oil circulating system of an internal combustion engine having an electrical circuit comprising: an oil pressure chamber having an outlet joined to said circulating system, a valve normally closing said outlet and displaceable to open the same by oil pressure within said pressure chamber, a switch housing joined to said chamber, a flexible diaphragm peripherally sealed within said housing defining an operating chamber and a switch containing chamber, a conduit inter-connecting the interior of said pressure chamber with said operating chamber, a normally open switch within said switch chamber, and adapted to be interposed within said electrical circuit, and movable spring loaded means interconnecting said diaphragm and said switch to close said switch on response by said diaphragm to the oil pressure within said chamber, said diaphragm being responsive at a pressure lower than that required to displace said valve.

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