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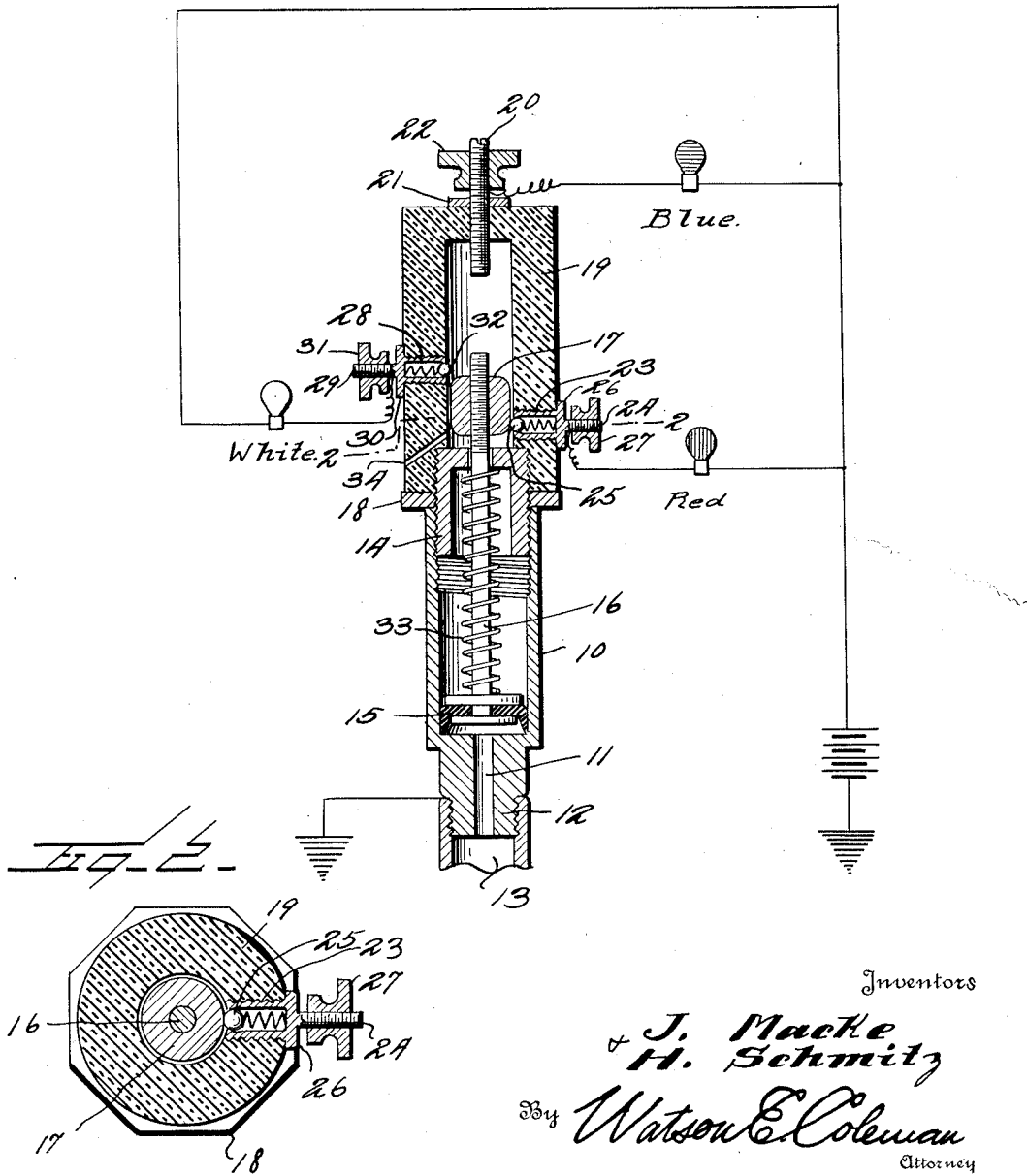
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PRESSURE OPERATED MULTIPLE CIRCUIT SWITCH

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Fig. 1



UNITED STATES PATENT OFFICE

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PRESSURE-OPERATED MULTIPLE-CIRCUIT SWITCH

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This invention relates to pressure gauges such as are designed to be used in connection with the lubricating systems of internal combustion engines for the purpose of determining the pressure in the system. The general object of the present invention is to provide a pressure gauge which will indicate by visual signals whether the pressure of the oil is too low, too high, or at the proper point.

A further object is to provide an oil pressure gauge having a cylinder, a piston therein and a stem, the cylinder being grounded and the stem operating in conjunction with three or more electrical contacts arranged at different heights so that when the piston is in its lower-most position it will engage with one of the contacts, thus energizing a light. When the pressure rises to normal, it will break its electrical engagement with the first-named contact and engage a second contact, thus indicating that the pressure is normal, and when the pressure is above normal, the piston will rise sufficiently high so as to engage with a third contact and close the circuit through a light or other signal indicating this abnormal pressure.

Other objects will appear in the course of the following description.

Our invention is illustrated in the accompanying drawings, wherein:

Figure 1 is a vertical sectional view of our improved pressure gauge.

Figure 2 is a transverse section on the line 2-2 of Figure 1.

Referring to the drawings, 10 designates a metallic cylinder having a bore 11 in the head 12 at the lower end of the cylinder, and being connected by a pipe 13 to an oil pump or other force feed mechanism of this character. The upper end of this cylinder is internally screw-threaded and adjustable in the upper end of the cylinder is an exteriorly screw-threaded cap 14 which is preferably hollow. Disposed within the cylinder is a spring pressed piston 15 having any usual or

suitable packing and having a stem 16 which extends out through the cap and is screw-threaded for engagement by an adjustable contact 17. This contact member 17 is metallic and is adjustable up and down upon the rod 16 and is relatively long for a purpose which will be later explained. The cap 14 is held in its adjusted position within the cylinder 10 by the set or jam nut 18.

Having screw-threaded engagement with the cap 14 is a fibre cap 19 which may be made of any suitable insulating material and within which the upper end of the piston rod 16 and the contact 17 operates. Extending through the top of this cap is a screw-threaded pin 20 constituting a contact and formed with a nick at its upper end whereby a screw driver may be applied thereto to adjust it. This pin is provided with the locking nut or jam nut 21 and with the binding nut 22 so as to permit the pin to be connected to a conductor. Extending through the side wall of the fibre cap 19 adjacent its lower end is the metallic bushing 23 interiorly screw-threaded for engagement by a pin 24, this pin bearing against a rotative ball or equivalent member 25. The pin 24 is locked in adjusted position by means of the lock nut 26 and carries a binding nut 27 whereby the pin may be connected in an electrical circuit.

Disposed approximately midway between the contact pin 24 and the contact pin 20 is another metallic bushing 28 interiorly screw-threaded for the contact pin 29 which carries the lock nut 30 and the binding nut 31.

It will be seen that the upper contact pin 20 may be adjusted up or down and that the contact member 17 upon the piston rod may also be adjusted. This contact member 17 is relatively long in order to provide for contact with the ball 32 on the contact pin 29 through a relatively long period. At the same time this contact 17 is of such length that when it is in contact with the ball 25 or contact member at the lower end of the

fibre cap it will not be in contact with the ball 32 and that when it moves upward it will break contact with the ball 32 just before it makes contact with the pin 20. A spring 33 surrounds the stem 16 and bears at one end against the cap 14 and at the other end against the piston 15 so as to urge the piston downward.

The contact pin 24 at the lower end of the fibre cap is connected in circuit with a source of current and with a red light. The contact pin 29 is connected in circuit with a source of current and with a white light and the pin 20 is connected in circuit with a source of current and with a blue light. This circuit includes the grounded cylinder 10. Thus it will be seen that when the pressure in the oil line is low the contact 17 will engage with the ball 25 and the red light will be energized, thus indicating that the oil pressure is below normal. If or when the pressure rises, the contact 17 will engage the ball 32 and the white light will be energized. If the pressure rises to an abnormal extent, the pin 16 will engage the contact pin 20 and the blue light will be energized. Thus, an indication will be given to the driver as to whether the pressure in his oil line is too low or too high or normal. Preferably, the contact 17 will have such a length that it will contact with the ball 32 through quite a range of pressures. Thus, for instance, the contact 17 will stay in electrical engagement with the contact 32 under pressure of from five lbs. to thirty lbs., that is, while the pressure is rising from five lbs. to thirty lbs., or the gauge may be so constructed that the contact 17 will energize the white light from five lbs. to sixty lbs. By adjusting the contact 17, any desired range can be secured. It is to be noted that the cap 14 constitutes a pressure regulating device. By turning this cap inward, the pressure on the spring 33 is increased. By turning it away from the head 12, the pressure is decreased. Thus, as the pressure is increased, greater resistance is offered to the inward movement of the piston and greater pressure of oil is required in order to shift the piston inward from its initial position. The contact pin 20 is also adjustable in or out so as to secure the proper instant of contact between the extremities of the piston rod 16 and this pin.

The operation of this device when a driver gets into a machine is as follows: The first thing he does is to turn the ignition key to start the engine. At this time, of course, the pressure of oil is very slight if any and, therefore, the contact 17 is in engagement with the contact ball 23 and as soon as the ignition circuit is opened the red light will be displayed. The motor is then started and as soon as a slight pressure is reached as for instance, five lbs. of pressure, the red light will be de-energized and the contact 17 will reach the white light contact 32 and the white light will be ener-

gized. This white light will burn when the engine is running normally, but if the weather is cold or if the engine is cold and must not be raced, the oil will cause high pressure, higher than normal and the piston will leave the white light contact and engage the contact pin 20, thus energizing the blue light and notifying the driver of danger from high pressure and that he is not to race the motor.

Another advantage of this invention is as follows: The oil pit or chamber is ordinarily rearward of the motor and the oil pump is located in this pit. If now the machine goes down a long incline or hill, the oil will run to the front of the motor or the oil chamber and leave the oil pump so that no oil will go through the feed pipe, which may cause the bearings to burn. Under these circumstances, the red lamp will be energized, thus notifying the driver of the danger. The same thing is true if the motor springs an oil leak or the oil gets low.

It will be noted that there is no gauge to read and that visual or other obvious signals are used to indicate dangerous or safety conditions in the oil line. This is very advantageous for if the car is traveling in traffic where the driver must have his eyes always on the road, these three or more light signals will be so evident that the driver cannot help but see them and thus the necessity of closely watching the pressure gauge is done away with. These lights are preferably installed on an instrument board but obviously they may be installed in any position where they will be obvious. With this construction, the motor does not stop or become stalled when the oil pressure drops below a certain point. Our device simply warns the driver so that he can run slow until he can get help and service. These devices can be installed at any place about the engine if connected on the pressure feed line so as to receive the full pressure of the oil on the piston 17. Inasmuch as there may be a small leakage of oil past the piston we preferably provide the fibre cap 19 with a drainage opening 34. Of course, we do not wish to be limited to the exact construction illustrated, nor to the precise arrangement of parts as these may be varied in many ways without departing from the spirit of the invention as defined in the appended claims.

We claim:—

1. A pressure indicator including a cylinder having an inlet at one end and adapted to be connected to a source of pressure, an adjustable cap formed at the opposite end of the cylinder, a piston rod passing through said cap, a spring bearing at one end against the cap and at the other end against the piston, a cap of insulating material operatively secured to the cylinder, a plurality of contact members mounted in said cap at spaced distances, one of said contact members extend-

ing through the end of the cap, the last named contact member being longitudinally adjustable, means on the contact members whereby each may be electrically connected in circuit with a signal lamp and a source of energy, and a contact member mounted upon the piston rod for longitudinal adjustment and elongated in the direction of the rod, and having a length only slightly less than the distance between any two of the first-named contact members.

2. A pressure indicator comprising a cylinder having an inlet at one end adapted to be connected to a pressure line, a piston operating within the cylinder and having a metallic piston rod adapted to be at all times connected to a source of energy, a spring urging the piston toward the inlet opening, means for adjusting the tension of said spring, a plurality of contacts arranged in longitudinal series on but insulated from the cylinder, each contact being adapted to be connected in a circuit with the source of energy and a signal, an elongated, longitudinally adjustable metallic contact member carried upon the piston and adapted to successively engage said first named contacts to energize the signal and having a length nearly equal to but slightly less than the distance between said first-named contacts, and a contact member passing through the end of the cylinder and adjustable therethrough and adapted to be operatively connected in a circuit with the source of energy and a signal and to be electrically engaged by the piston, said contact member acting as an adjustable stop against which the piston strikes when it is fully forced inward.

3. A pressure indicator including a non-conductive cylinder section closed at one end and internally screw-threaded at the opposite end, a hollow metallic cap externally screw-threaded and engaging the cylinder section, a metallic cylinder constituting a continuation of the nonconductive cylinder and having screw-threaded engagement with the cap whereby the cap may be adjusted into or out of the metallic cylinder, and having an inlet opening at its end remote from the cap, means for locking the cap in its adjusted position in the metallic cylinder, a metallic piston rod passing through said cap, a piston disposed within the last named cylinder section, a spring bearing at one end against the cap and at the other end against the piston, a plurality of contact members mounted in said nonconductive cylinder section and spaced from each other a distance slightly greater than the length of the piston distances, one of said contact members extending through the end of the nonconductive cylinder section and being longitudinally adjustable therein and adapted to be engaged by the piston rod when the piston rod has been forced fully inward, the metallic cylinder

section and the several contacts on the non-conductive cylinder section being adapted to be each connected in circuit to the source of energy and the signal.

4. A pressure indicator including a cylinder, a piston operating therein, the cylinder having an inlet opening, a spring urging the piston toward the inlet opening, an electrical contact carried by the piston and moving therewith, the contact being elongated in the direction of the length of the piston and being rounded at its ends, and a contact disposed in the path of movement of the piston carried contact and adapted to be engaged thereby as the piston moves to a predetermined position and comprising a socket extending through the wall of the cylinder and having a binding screw exterior to the wall, a metallic spring disposed within the socket, and a metallic ball disposed within the socket and urged by the spring outward into the path of movement of the piston carried contact.

5. A pressure indicator of the character described including a non-conductive cylinder section closed at one end and internally screw-threaded at the opposite end, a hollow metallic cap externally screw-threaded for engagement with the cylinder section, a metallic cylinder constituting a continuation of the non-conductive cylinder and having screw-threaded engagement with the cap to permit the cap to be longitudinally adjusted within the metallic cylinder, a lock nut engaging the cap and holding it in its adjusted position, the metallic cylinder having an inlet opening remote from the cap, a metallic piston rod passing through the cap, a piston disposed within the last named cylinder section, a spring bearing at one end against the cap and at its other end against the piston, the cap being counter-bored to receive the adjacent end of the spring, a longitudinally elongated contact member disposed within the non-conductive cylinder and mounted on the piston rod for longitudinal adjustment thereon, and a plurality of contact members extending through the walls of said non-conductive cylinder section and spaced from each other a distance nearly that of the contact member carried upon the piston rod, the metallic cylinder section and the several contacts on the non-conductive cylinder section being adapted to be each connected in circuit to the source of energy and a signal.

6. A pressure indicator including a cylinder having an inlet at one end adapted to be connected to a pressure line, a piston operating within the cylinder and having a piston rod, means urging the piston toward the inlet opening, an insulating member mounted upon the cylinder and into which the piston rod passes, the insulating member having a drainage opening, a plurality of con-

tacts arranged in series on the insulating member and each adapted to be connected to a source of energy and a signal, and a contact member carried upon the piston rod and adapted to successively engage said first-named contacts and energize the signal, the contact member being elongated.

In testimony whereof we hereunto affix our signatures.

JACOB MACKE.
HARRY SCHMITZ.

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