

Sept. 30, 1924.

1,509,939

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MEANS FOR CONTROLLING FLUIDS UNDER PRESSURE

Filed Sept. 24, 1921

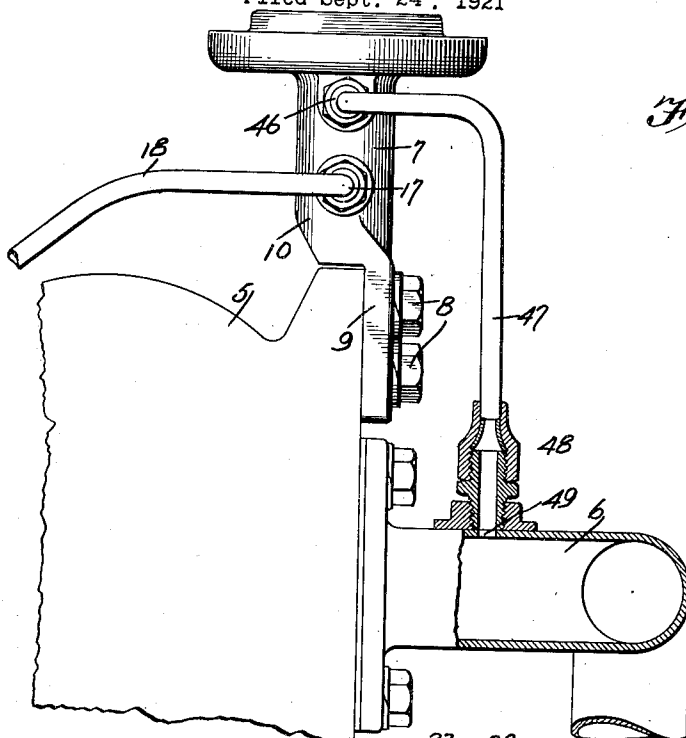


Fig. 1.

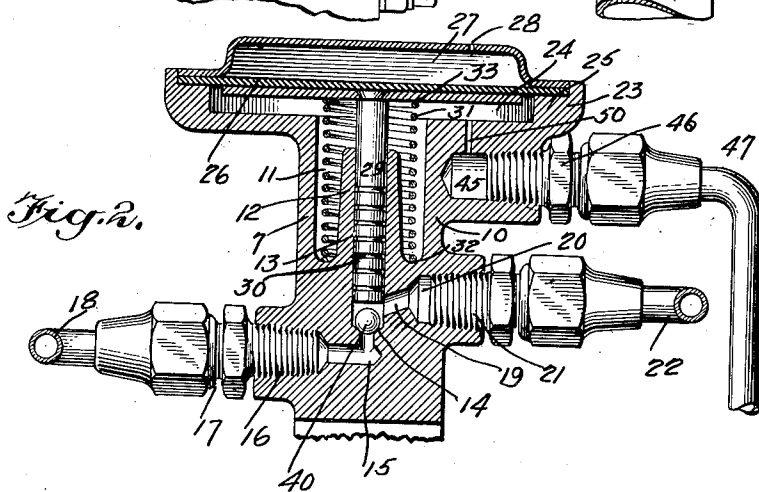


Fig. 2.

WITNESSES

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MEANS FOR CONTROLLING FLUIDS UNDER PRESSURE.

Application filed September 24, 1921. Serial No. 503,075.

To all whom it may concern:

Be it known that I, JACOB G. ELKIN, a citizen of the United States, and a resident of the city of New York, borough of Manhattan, in the county and State of New York, have invented a new and Improved Means for Controlling Fluids Under Pressure, of which the following is a full, clear, and exact description.

The present invention relates to new and useful improvements in devices for controlling fluids under pressure and while the device is capable of use in various connections, in the present illustration it is shown as adapted to a force feed lubricating system for internal combustion motors.

It is one of the primary objects of the invention to provide a means by which the flow of lubricant to the various parts to be lubricated may be automatically controlled in such a manner that the supply of lubricant will be commensurate with the speed of operation of the motor throughout the speed range of said motor.

In operation, the pistons of an internal combustion motor upon their idle stroke create a vacuum within the cylinder, and under ordinary operating conditions this vacuum is satisfied by an intaking of the combustible charge. The speed of motors of this type is generally determined by the volume of fuel fed to the cylinders and when the volume of fuel is reduced the speed of the motor decreases, an increase in speed being obtained by an increase of volume fuel supply.

When, however, the volume of fuel supply is reduced, the pull of the piston is not wholly satisfied by the reduced volume of fuel, and this action produces a partial vacuum in the intake manifold of the motor.

It is a further object of the invention to utilize this partial vacuum present in the intake manifold when the motor is operating at reduced speeds, to operate means for controlling the supply of lubricant to the various parts to be lubricated in such a manner that as the speed of the motor is reduced, the vacuum present in the intake manifold operates means for proportionately reducing the flow of lubricant through the lubricating system.

It is a still further object of the invention to provide a mechanism as above described

which is entirely automatic in its operation.

Referring to the drawings,

Figure 1 is a fragmentary view of an internal combustion motor, the manifold and a portion of the device of the present invention being shown in section.

Figure 2 is a vertical sectional view of an automatic controlling element constructed in accordance with the present invention.

Referring more particularly to the drawings, the reference character 5 designates an internal combustion motor, and 6 designates the intake manifold thereof, which parts are conventionally shown for the sake of illustration.

The automatic controlling device is designated by the reference character 7 and the same is supported upon the internal combustion motor 5 by means of cap screws, bolts or the like 8, the body of the automatic controlling element having an arm through which the fastening means 8 passes.

This automatic controlling element is shown in detail in Figure 2 and the same comprises a body portion 10 having a centrally disposed chamber 11. Arranged centrally of the chamber 11 is an upstanding flange or nipple 12, and said upstanding flange or nipple 12 is provided with a passageway 13 extending downwardly into the body portion 10. This passageway 13 is formed on its lower end with a seat 14, and leading from said seat 14 is a right angular passage 15. Screwing into the body portion 10 as at 16 is a suitable connection 17, and leading into said connection 17 is the supply line 18 of a suitable lubricating system, preferably of the force feed type.

Leading from the passageway 13 at a point slightly above its seat 14 is a passage 19, and said passage 19 extends into an enlarged chamber 20. Projecting into the chamber 20 is a nipple 21, and said nipple 21 forms the connecting means of the lubricant discharge pipe 22 of the lubricating system.

The body portion 10 of the automatic controlling device is formed with an upper enlarged portion 23, and said upper enlarged portion 23 is formed with a chamber 24. The reference character 25 designates a shoulder defining the edge of the chamber 24, and mounted upon said shoulder 25 is a diaphragm 26. This diaphragm 26 is en-

closed by means of a cover or the like 27, and said cover 27 is provided with an air vent 28.

Secured to the diaphragm 26 and depending from the under face thereof is a stem 29, and said stem 29 projects downwardly of the passage 13 to a point where its lower end will coincide with the upper portion of the passage 19 heretofore mentioned. This stem 29 is provided with a series of lubricating grooves 30, by means of which a lubrication of the stem 29 in the passage 13 is had.

Surrounding the flange or nipple 12 is a coil spring 31, the lower end of which engages the base of the flange or nipple 12, as at 32, the upper end of said spring engaging the under surface of the diaphragm, as indicated by the reference character 33. By this means the diaphragm is maintained in normal position when the motor is not in operation.

The reference character 40 designates a ball valve, and said ball valve is adapted to rest upon the seat 14 at the lower end of the passage 13. The diameter of the ball valve 40 is less than the distance between the seat and the lower end of the stem 29, which construction permits of a vertical movement of the ball valve 40 to open and close the right angular passage 15 heretofore mentioned.

The reference character 45 designates a chamber formed in the body 10 of the automatic controlling device 7, and leading into said chamber is a nipple 46. Connected to the nipple 46 is a pipe 47, and, as more clearly shown in Figure 1, this pipe 47 is connected as at 48 to the intake manifold 6 of the motor, and at the point of connection of the pipe 47 with the intake manifold 6 the intake manifold is provided with a port or opening 49. Leading from the chamber 45 to the chamber 24 below the diaphragm 26 is a passage or vent 50.

The device operates in the following manner:

With the motor at rest, the several parts assume the position in which they are shown in Figure 2. Assuming, now, that the motor is started, the oil pump (not shown) would set up a forced circulation of a lubricant through the pipe 18, passage 15 by the ball valve 40, passage 19 to the distributing pipe 22.

When the speed of the motor has been reduced, it is obvious that the volume of oil supplied to the motor under normal working conditions would be excessive for the motor at low speed, and upon reduction of the speed of the motor (which is caused by a reduction in the amount of fuel supplied), a partial vacuum is produced in the intake manifold 6. Due to the action between the intake manifold 6 and the chamber 24 through the medium of the pipe 47, this vacuum acts to depress the diaphragm 26. As this diaphragm 26 is depressed, the stem

29 is depressed, and upon a downward movement of said stem 29 the movement of the ball valve 40 under the influence of the pressure of the lubricant travelling therethrough is restricted and, consequently, a reduction of lubricant passing through the passages 15 and 19 is had.

When, however, the motor is speeded up and more lubricant is required, due to the fact that a greater volume of fuel is present in the intake manifold, the partial vacuum created therein is reduced and the diaphragm is permitted to move in the opposite direction under the influence of the spring 31. This action elevates the lower end of the stem 39 and permits of a greater movement of the ball valve 40, thus permitting a greater volume of lubricant to flow through the passages 15 and 19, which condition is necessary when operating at high speeds.

From the foregoing it is apparent that the present invention provides a new and improved mechanism for automatically controlling the flow of lubricant in a pressure lubricating system, and that such automatic control is capable of supplying lubricant to the several working parts of an internal combustion motor in proper quantities at various speeds throughout the speed range of said motor, and that the automatic operation of the device is primarily dependent upon existing circumstances in the intake manifold of the motor to which it is attached.

Having thus described the invention, what is claimed is:

1. A control valve for lubricating systems comprising a body portion provided with a longitudinally extending passageway, a transverse passageway intersecting said longitudinal passageway, a ball loosely mounted in the longitudinal passageway and adapted to close the transverse passageway, a stem slidably mounted in the longitudinal passageway and adapted to limit the movement of said ball in said longitudinal passageway, a diaphragm connected to said stem and adapted to depress the latter upon creation of vacuum on one side of said diaphragm, means for creating a vacuum to cause a movement of the diaphragm, and a spring surrounding said stem and exerting pressure upon the diaphragm to move the same in a direction opposite to the direction in which the diaphragm is moved by the creation of a vacuum, as and for the purpose set forth.

2. A control valve for lubricating systems comprising a body portion having a longitudinally extending passage terminating at its lower end in a valve seat, a chamber formed around said passage in the valve body, said chamber being so formed as to provide a projecting nipple, a rigid stem slidably mounted in said nipple and movable longitudinally of the longitudinal passage of the valve body, a ball freely mounted in the longi-

itudinal passage of the valve body and adapted to be engaged by said stem, and means for causing said stem to engage said ball, said means comprising a diaphragm connected to the stem and operated in one direction by the creation of a vacuum on one side thereof, means for creating a vacuum to operate the diaphragm, and a coil spring mounted in said chamber and engaging said diaphragm and operating to move the same in a direction opposite to the direction in which it is moved by the creation of the vacuum heretofore mentioned.

3. A control valve for lubricating systems comprising a hollow integral member having passageways formed therein, a valve in one of said passageways, a diaphragm mounted internally of the hollow integral member and dividing the same into a vacuum chamber and a chamber open to the atmosphere, the vacuum chamber being on the same side of the diaphragm as the valve, means for seating said valve upon the creation of a

vacuum in the vacuum chamber, and means for unseating the valve upon the breaking of the vacuum in the vacuum chamber.

4. A control valve for lubricating systems comprising a hollow integral member having passageways formed therein, a valve in one of said passageways, a diaphragm mounted internally of the hollow integral member and dividing the same into a vacuum chamber and a chamber open to the atmosphere, the vacuum chamber being on the same side of the diaphragm as the valve, means for seating said valve upon the creation of a vacuum in the vacuum chamber, and means for unseating the valve upon the breaking of the vacuum in the vacuum chamber, said first-mentioned means comprising a stem connected to the diaphragm and engaging said valve and the second-mentioned means comprising a coil spring engaging the diaphragm on the side adjacent the vacuum chamber.

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