Jan. 23, 1962 B. H. CLASON 3,018,457

CLOSED SYSTEM RESISTANCE UNITS

Filed June 22, 1959 2 Sheets-Sheet 1

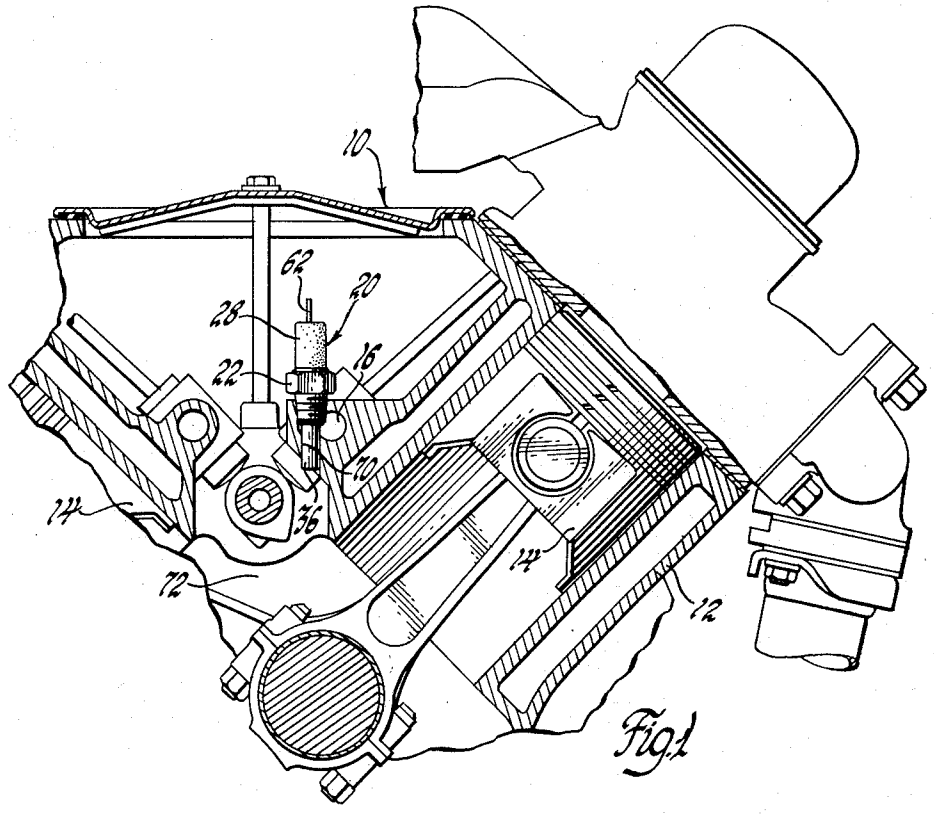


Fig. 1

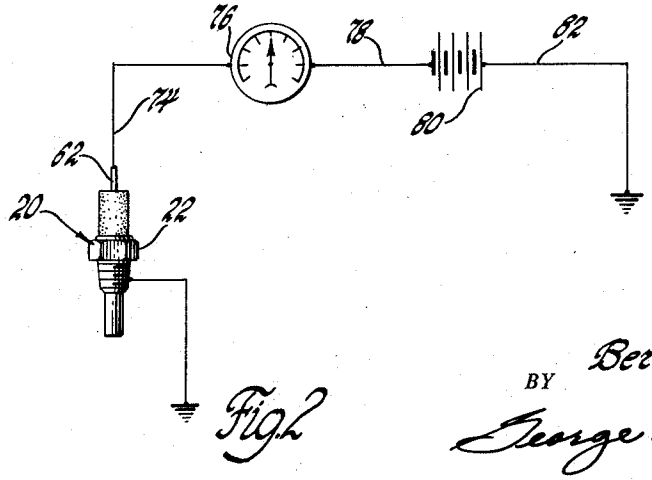


Fig. 2

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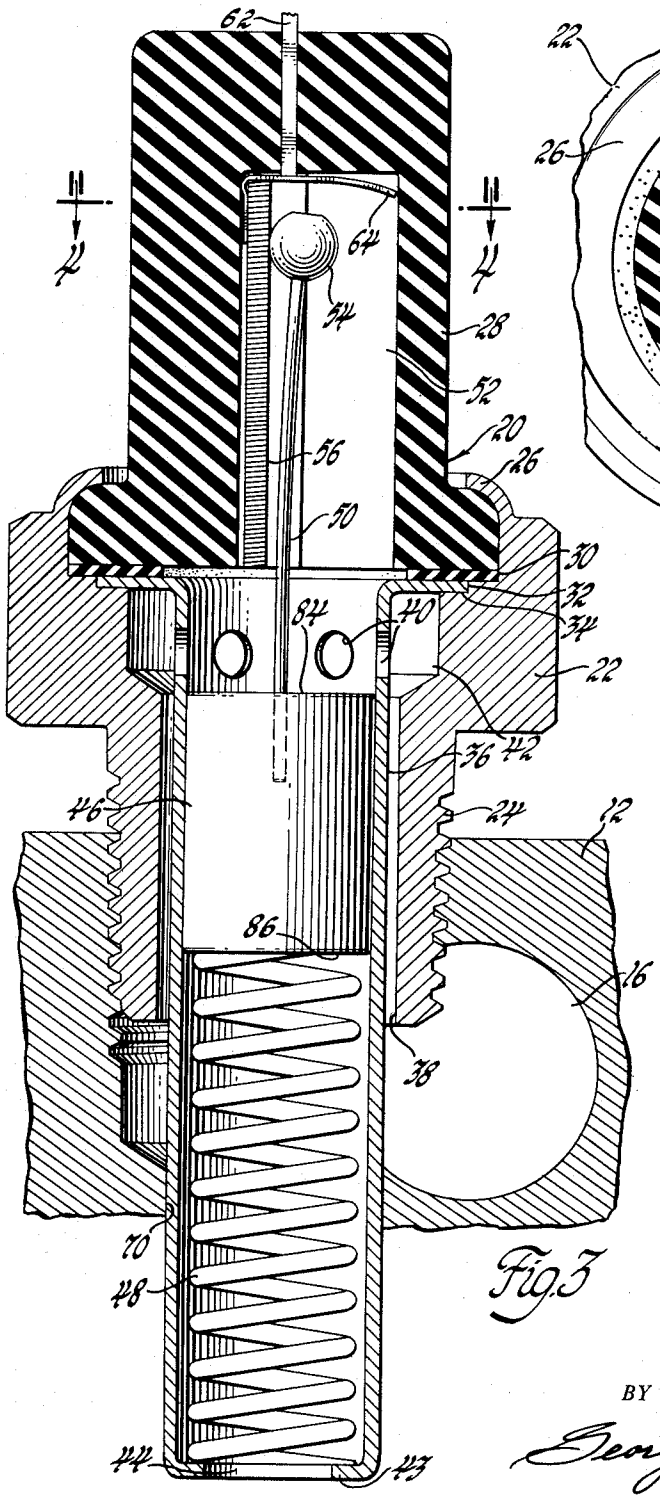


Fig. 3

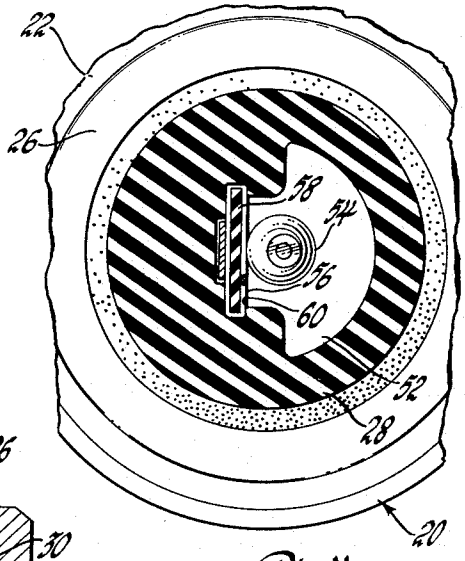


Fig. 4

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CLOSED SYSTEM RESISTANCE UNITS

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1 Claim. (Cl. 338—39)

This invention pertains to units which vary in electrical resistance dependent upon fluid pressures encountered and more particularly to units operable by pressures in closed fluid systems whereby current passing through the units is varied dependent upon those pressures to operate gages and the like.

An object of this invention is to provide an improved electrical resistance unit varying in resistance in accordance with fluid pressure in a closed system to which pressure the unit may be subjected and which unit will be simple in structure and reliable in operation.

A feature of the invention is a piston-operated electrical resistance unit in which the piston may be subjected to differential fluid pressures of two pressure zones in a closed fluid pressure system. Another feature is a resistance unit in which a piston is actuated by the differential pressures of two pressure zones in a closed fluid pressure system as supplemented by the potential force of spring means also acting upon the piston.

These and other important features of the invention will now be described in detail in the specification and then pointed out more particularly in the appended claims.

In the drawings:

FIGURE 1 is an end view of a portion of an automobile engine, much of that portion being in section better to illustrate one embodiment of the present invention.

FIGURE 2 is a diagrammatic representation of the electrical elements involved;

FIGURE 3 is an enlarged sectional view of a resistance unit as mounted on an engine as shown in FIGURE 1; and

FIGURE 4 is a sectional view looking in the direction of the arrows 4—4 in FIGURE 3.

In FIGURE 1, the engine generally indicated at **10** is of the conventional V-type with an engine block **12**, pistons **14** and a lubricating oil gallery **16** adapted to be supplied with oil under pressure.

The electrical resistance unit of the present invention is generally depicted at **20**. This unit comprises a main body **22** in the form of a hexagonal member and a threaded neck portion **24** whereby the unit may be attached to the engine block **12**. A portion **26** of the main body **22** is peened over to retain a dielectric or plastic housing **28**, a washer **30** and a flange **32** tightly in position to form a unitary assembly. The flange **32** is held in an annular recess **34** formed within the body **22** and it is an integral part of a sleeve **36** which extends through the threaded neck portion **24**. The latter is bored as at **38** to present an annular clearance around the shell **36**. The washer **30** is interposed between the insulator housing **28** and the flange **32** and the material of this washer is resilient whereby the parts may be held permanently and tightly together.

The sleeve **36** has an annular series of perforations **40** near the flange **32** and these perforations communicate with a recess **42** formed within the body **22**. At the other end of the sleeve **36**, the latter is turned inwardly to form an annular shoulder **43** which defines a port **44**. A piston **46** is slidably mounted within the sleeve **36** and a spring **48** is mounted between the shoulder **43** and the piston to act on the latter. A resilient conducting rod **50** extends from one end of the piston

46 to which it is affixed and into a chamber **52** formed in the housing **28**. This rod bears a metal contact ball **54** which is mounted in resilient engagement with at least one loop of a resistance coil **56** positioned within the chamber **52**. The coil **56** is wound about a flat insulator strip **58** and is held within a pocket **60** formed as an extension of the chamber **52** as best seen in FIGURE 4.

An electrical terminal **62** extends through the end wall of housing **28** and as the latter is of dielectric material, it is convenient to mold the terminal **62** in place in the housing when the housing per se is manufactured. The coil **56** is firmly held within the housing against endwise displacement by soldering or welding the same to a spring member **64** which in turn is pressed into position and into resilient contact with one end of the terminal **62**. The sides of the chamber **52** will grip the spring member **64** and prevent displacement of the latter.

It will be noted that the engine block **12** is bored to form a passage **70** to accommodate the sleeve **36**. It will be understood that the sleeve should tightly fit within the passage **70** preventing any undue communication between the oil gallery **16** and the interior space **72** of the crankcase.

It will be understood that the engine block **12** constitutes an electrical ground as shown in FIGURE 2 and that the terminal **62** is connected by means of a line **74** to a gage **76**, the latter being conventional in being responsive to fluctuations in current. The gage **76** is also connected by a line **78** to a battery **80** and the battery in turn is grounded by a line **82**.

In operation of the device, and assuming that the engine **10** is operating, it will be appreciated that the engine gallery **16** constitutes a zone of relatively high fluid pressure and this fluid pressure of the oil will be exerted by way of the annular clearance space **38**, the recess **42** and the ports **40** against one end **84** of the piston **46**. The other end **86** of the piston will be acted upon by the spring **48** and also by the atmospheric pressure of the crankcase as exerted through the port **44**. As a consequence, the piston **46** will compress the spring **48** dependent upon the amount of oil pressure in the gallery **16** and the gage will register the pressure of the oil in the gallery by virtue of its pointer position. This is because the contact **54** will slide along the coil **56** to a position corresponding with the oil pressure in the gallery **16** and the resistance will accordingly be varied as the pressure varies. Oil leaking by the piston **46** will flow back into the engine crankcase by way of the port **44**. The current will pass from the battery **80**, through the gage **76** and the terminal **62** and then by way of a portion of the coil **56** as determined by the oil pressure and then by way of the contact **54**, the arm or rod **50** and the piston **46** to the sleeve **36** and the engine block **12**. The electrical resistance will increase as the pressure differential increases and the gage will be calibrated accordingly.

Ordinarily it would be considered that a diaphragm could be used in place of the piston **46** but such is not the case. It would interfere with proper and sensitive actuation of the contact **54** necessary to secure accuracy for the gage **76**. Loose free sliding of the piston **46** is accompanied by leakage around the latter but the system, being closed, permits return of the leaking oil to the crankcase without loss and free and reliable movement is definitely accorded the piston.

I claim:

A closed system resistance unit in combination with a support, the latter being adapted to serve as a ground and having two enclosed pressure zones, said unit including a body with threaded neck portion detachably secured to said support, a resistance coil located within

said unit and insulated from said support, a terminal connected to one end portion of said coil, a piston slidable in said unit in a given path, a contact carried by one end of said piston and resiliently engaging said coil, spring means acting in said path against the other end of said piston, said unit further including a sleeve fixed within said body and slidably retaining the said piston and enclosing said spring means, said sleeve having perforations near one end, a passage in said threaded neck portion connecting one of said pressure zones by said perforations to said one end of said piston, a port at the other end of said sleeve connecting the other of said pressure zones to the said other end of said piston, and the arrangement being such that differential pressures

in said pressure zones acting against said piston may move the latter in said path and said contact along said coil to vary resistance to a current passing through said unit by way of said terminal, coil, piston and threaded neck.

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