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2,903,091

AUTOMATIC OIL RESERVOIR

Filed Dec. 30, 1955

2 Sheets-Sheet 1

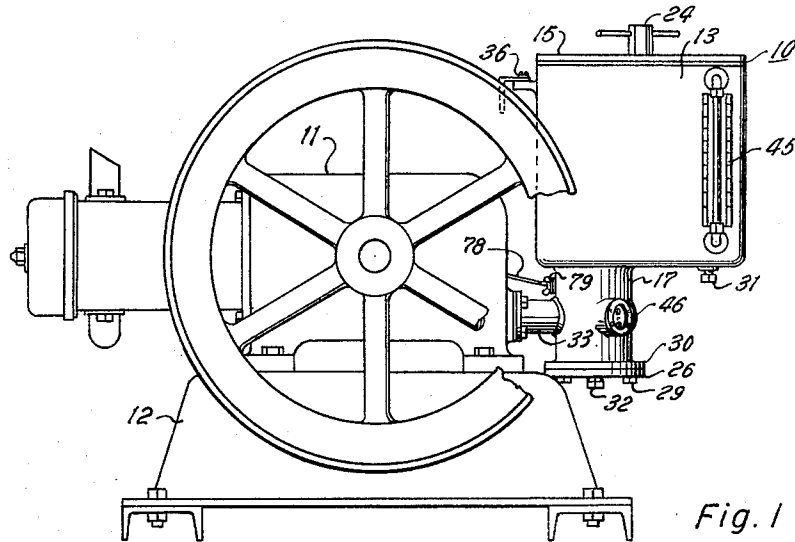


Fig. 1

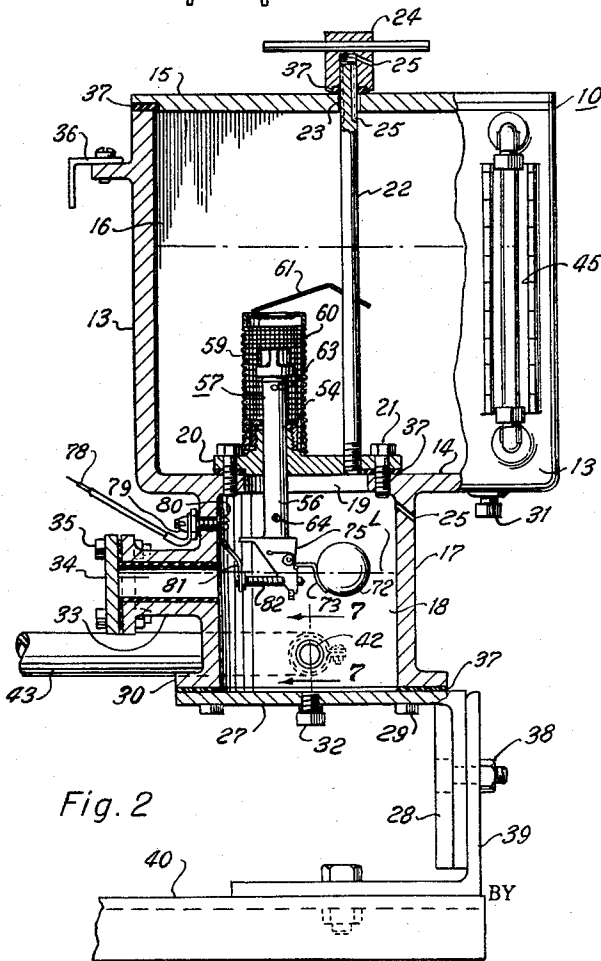


Fig. 2

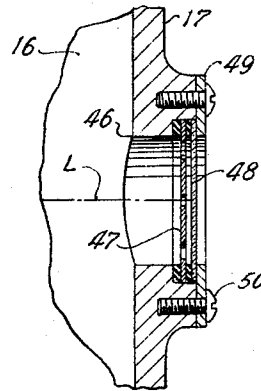


Fig. 3

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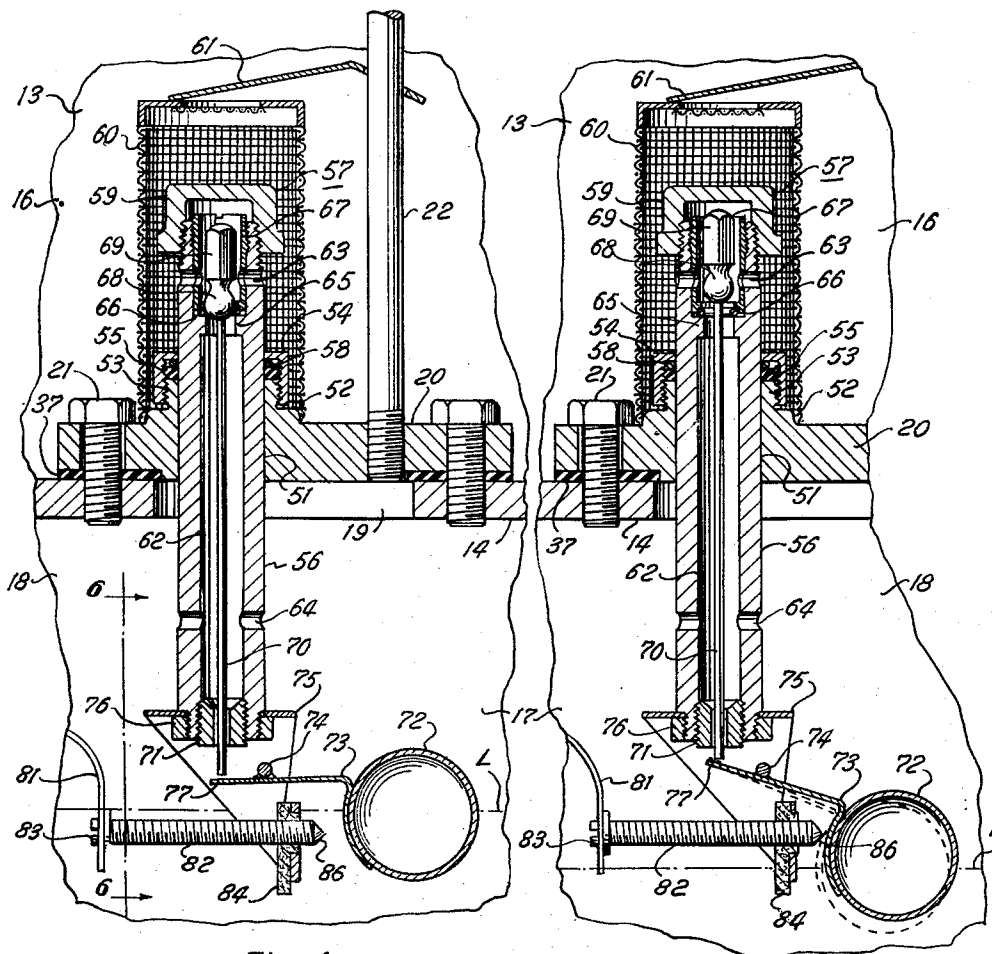


Fig. 4

Fig. 5

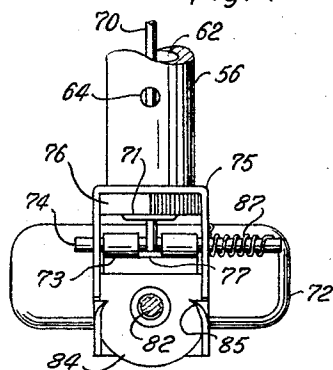


Fig. 6

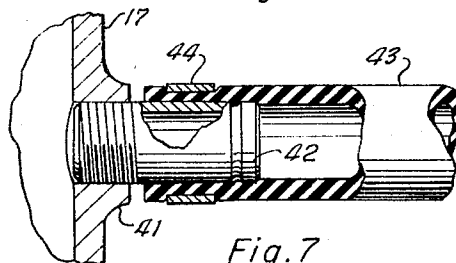


Fig. 7

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1

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AUTOMATIC OIL RESERVOIR

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2 Claims. (Cl. 184—103)

This invention relates to new and useful improvements in automatic oil reservoirs.

One object of the invention is to provide an improved automatic oil reservoir for maintaining a constant oil level in the crankcases of internal combustion engines and compressors as well as in lubricator cases and bearing housings.

Another object of the invention is to provide an improved automatic oil reservoir having a pair of communicating chambers and valve means actuated by the liquid level in one of the chambers for controlling communication therebetween, together with means responsive to said liquid level for controlling the operation of the engine upon which the reservoir is mounted.

A further object of the invention is to provide an improved automatic oil reservoir having a lower compartment communicating with the crankcase of an internal combustion engine and an upper compartment for supplying oil to the lower compartment and a float-actuated valve for controlling communication between the compartments arranged to be opened by the float when the oil in said lower compartment falls below a predetermined level and exposed to the oil in the upper chamber so as to be self-closing.

An important object of the invention is to provide an improved automatic oil reservoir, of the character described, wherein the valve is mounted in the upper chamber and has means for engagement with the float in the lower chamber whereby said valve is not subjected to any pressure within said lower chamber and may be readily removed for cleaning.

A particular object of the invention is to provide an improved automatic oil reservoir, of the character described, wherein the valve has an elongated housing depending from the upper chamber into the lower chamber with means at its lower end for pivotally supporting the float which includes an arm for engagement with the stem of a valve element mounted in and seated at the upper portion of the housing whereby there is no direct connection between said float and valve element.

An object of the invention is to provide an improved automatic oil reservoir, of the character described, having means associated with the float and connected with the ignition circuit of the engine for grounding the circuit and killing said engine when the oil falls below a predetermined level.

A construction designed to carry out the invention will be hereinafter described, together with other features of the invention.

The invention will be more readily understood from a reading of the following specification and by reference to the accompanying drawings, wherein an example of the invention is shown, and wherein:

Fig. 1 is a side elevational view of an automatic reservoir constructed in accordance with the invention mounted on an engine,

Fig. 2 is a transverse, vertical, sectional view of the reservoir mounted in a different manner,

2

Fig. 3 is an enlarged, sectional view of the sight gauge for the lower chamber of the reservoir,

Fig. 4 is an enlarged, fragmentary sectional view showing the mounting of the valve and float,

Fig. 5 is a view, similar to Fig. 4, showing the float lowered for opening the valve,

Fig. 6 is a transverse, vertical view, taken on the line 6—6 of Fig. 4, and

Fig. 7 is a transverse, vertical, sectional view, taken on the line 7—7 of Fig. 2.

In the drawings, the numeral 10 designates the substantially rectangular body or housing of an automatic oil reservoir embodying the principles of the invention and mounted on the crankcase 11 of an internal combustion engine 12. The housing 10 includes upright side walls 13, a horizontal bottom wall 14 and a flat cover or lid 15 which coact to provide an upper compartment or chamber 16 (Fig. 2). A reduced, cylindrical housing portion or casing 17 depends from the bottom wall 14 to provide a lower compartment or chamber 18 communicating with the upper chamber 16 through a circular opening 19 in said bottom wall. The opening 19 is closed by an overlying, circular plate 20 which is fastened to the bottom wall by suitable screws 21. An elongated stud or rod 22 is screw-threaded in the plate 20 and projects upwardly through the chamber 16 and an opening 23 in the lid 15 for receiving a suitable nut 24 to confine said lid in engagement with the upper margins of the side walls 13. As shown by the numeral 25 in Fig. 2, suitable vents are formed in the casing 17, the stud 22 and its nut 24.

The lower end of the chamber 18 may be closed by a suitable cap or blank flange 26 as shown in Fig. 1 or by the flange 27 of an angular supporting bracket 28 as shown in Fig. 2. In either event, bolts 29 are provided for securing the bottom closures to the radial flange 30 at the lower end of the casing 17. Conventional drain plugs 31 and 32 are mounted in the bottom wall 14 and the bottom closures or flanges 26 and 27. A reduced, flanged collar 33 projects radially from the casing 17 for connection with the engine crankcase 11 as shown in Fig. 1 or for receiving a cap or blank flange 34 and suitable bolts and nuts 35 as shown in Fig. 2, whereby the reservoir may be supported by a direct connection with said crankcase or by the bracket 28. If desired, one of the side walls 13 may be provided with a mounting flange and bracket 36. It is noted that suitable gaskets or other packing 37 is provided for the lid 15, plate 20, nut 24, flange 30 and cap 34 to prevent leakage. When the bracket 28 is used to support the reservoir, it is adjustably connected by bolts and nuts 38 to a bracket 39 which is bolted to the frame 40 of the engine.

For establishing communication between the engine crankcase 11 and the chamber 18 when the collar 33 is closed by the cap 34, a screw-threaded boss 41 is formed in the casing 17 for receiving a nipple 42 which has a suitable conductor or hose 43 connected thereto by a clamp 44 (Fig. 7). A suitable liquid level sight gauge 45 is mounted on one of the side walls 13, while the casing 17 has a circular sight opening 46. As shown most clearly in Fig. 3, the opening 46 has an apertured plate 47 and sight glass 48 mounted therein and confined against displacement by the usual retaining ring 49 and screws 50. As shown by the broken line L, the reservoir is mounted so that the medial portion of the sight opening 46 is aligned with or coincides with the desired oil level of the engine crankcase 11. It is pointed out that the reservoir may be mounted in the same manner on or in association with compressor crankcases, lubricator cases and bearing housings.

The upper chamber 16 is adapted to contain a reserve

supply of oil or other lubricant for supplying the same to the lower chamber 18 which communicates with the crankcase through the collar 33 or the hose 43. Communication between the chambers is established by an opening 51 in the plate 20 and is surrounded by an annular, upstanding boss 52 having a reduced, screw-threaded collar or nipple 53 extending upwardly therefrom (Figs. 4 and 5). An annular clamp nut or gland 54 is screw-threaded on the nipple 53 for confining a sealing ring 55 in frictional engagement with the elongated, cylindrical body or housing 56 of a valve 57. In order to provide a metal-to-metal contact between the valve body 56 and the plate 20, a ring 58 of copper or other conductive metal may be confined in engagement with said valve body between the nuts 54 and sealing ring 55. Due to the frictional engagement of the sealing ring 55, the valve body is suspended within the opening 51 and depends through the opening 19 of the bottom wall 14 into the chamber 18. The upper end of the valve body projects above the nipple 53 into the chamber 16 and has a cap nut 59 screw-threaded thereupon. A cylindrical screen or strainer 60 is confined in engagement with the boss 52, by a spring clip 61 slidably mounted upon the stud 22, so as to surround the upper end of the valve 57 in concentric, spaced relationship.

The valve body 56 is tubular and has an axial, co-extensive bore 62 and radial ports 63 and 64 in its upper and lower end portions communicating with the chambers 16 and 18, respectively. An annular valve seat or shoulder 65 is formed in the upper portion of the bore 62 below the ports 63 for supporting and confining an elastic valve seat 66, which may be in the form of an O-ring, in coaction with a complementary retaining member 67 screw-threaded in said bore (Figs. 4 and 5). The elastic seat 66 is adapted to be engaged by a ball or substantially globular or spheroidal valve element 68 which has a polygonal head 69 extending upwardly therefrom for close fit within the bore of the retaining member 67. An elongated, cylindrical rod or stem 70 depends through the bore 62 from the valve element 68 and has its lower end projecting axially from the lower end of said bore. For guiding the valve stem 70, a suitable bushing 71 is screw-threaded in the lower end of the bore and coacts with the polygonal head 69. It is noted that the valve element controls communication between the chambers 16 and 18 and is held in engagement with the seat 66 by its weight and the weight of the oil in said chamber 16 as shown in Fig. 4. When the valve element is raised from its seat as shown in Fig. 5, the oil within the chamber 16 may flow through the ports 63, bore 62 and ports 64 into the chamber 18.

For lifting the valve element 68 out of engagement with its seat and permitting the flow of oil from the upper chamber to the lower chamber, a hollow float 72 is disposed within the lower chamber. The float 72 is secured to an angular arm or lever 73 pivotally mounted upon a horizontally-extending pivot pin 74. An angular or substantially U-shaped bracket 75 is suspended from the lower end of the valve body 56 for supporting the pivot pin 74 and may be secured to said body by an annular nut 76. As shown by the numeral 77, the arm 73 has its free end extending beyond the pivot pin 74 so as to underlie the valve stem 70 in closely spaced relationship (Fig. 4). Due to this arrangement, the arm engages the valve stem to lift the valve element out of its engagement with its seat upon lowering of the oil level L as shown in Fig. 5, whereby oil is permitted to flow from the chamber 16 to the chamber 18 until the float 72 rises sufficiently to permit reseating of said valve element. In this manner, the desired oil level is maintained in the chamber 18 as well as in the crankcase 11.

When the reservoir 10 is mounted on or in association with the crankcase of an internal combustion engine 12 as shown in Figs. 1 and 2, it is desirable to provide means

for stopping the operation of the engine when the oil falls below a predetermined level. An electrical lead 78 has connection with the ignition system or magneto (not shown) of the engine and is connected by a wing nut 79 to an insulated screw 80 extending through the wall of the casing 17. The screw 80 is fully insulated from the casing and has one end of a spring contact 81 engaged with its head for connection with a screw-threaded stud 82. As shown most clearly in Figs. 4 and 5, the other end of the spring contact 81 is engaged over the head 83 of the stud 82 and a nut 84 of suitable insulating material is mounted on the lower portion of the bracket 75 for adjustably supporting said stud in close proximity to the float 72. Although the nut 84 may be mounted in any suitable manner, it is preferably confined by prongs 85 bent into overlying relationship (Fig. 6). The stud has a tapered or pointed end 86 projecting through the nut in close proximity to the float for engagement by the depending portion of the arm 73 when the oil level L falls below a predetermined point.

Since the float and its arm are connected to the valve body 56 through the pivot pin 74 and bracket 75 and since said valve body has a metal-to-metal contact with the housing 10 by means of the plate 20 and the contact ring 58, the ignition circuit of the engine is grounded and stops operation of said engine when said arm contacts the pointed end 86 of the stud 82, as shown in broken lines in Fig. 5. A coil of wire 87 is wound around the pivot pin and has its end secured to said pin and to the bracket to insure a metal-to-metal contact between the float arm and the valve body. Of course, the stud is adjusted so that it will not be engaged by the float lever until the oil in the chamber 18 falls below a predetermined level. So long as there is oil within the chamber 16, the oil level within the chamber 18 will not fall sufficiently to ground the ignition circuit and stop operation of the engine, because the valve element 68 is unseated for supplying oil to the chamber 18 upon the slightest lowering of the float and clockwise pivoting of its lever.

It is noted that the stud 82 is readily adjustable in accordance with the desired oil level and that said level is determined by the projection of the valve body into the lower chamber 18. Since the stud 82 is detachably connected to the spring contact 81, the entire valve and its float may be withdrawn through the opening 19 upon removal of the plate 20; however, this should not be necessary since the valve may be thoroughly cleaned by removing the cap 59 and withdrawing the valve element 68. Due to the screen or strainer 60, the valve should not become clogged during normal operation. Usually the valve becomes clogged only when the screen is removed during draining of the upper chamber 16. It is noted that the cap 59 protects the valve element and prevents displacement thereof in the event the reservoir is inverted during shipment or installation. Although the valve seat 66 is preferred, it is noted that the valve element could seat against the shoulder 65. Since the retaining member 67 is readily removable, the valve seat may be replaced whenever desired. The supply oil in the upper chamber 16 may be replenished without interrupting the operation of the reservoir or its engine by removing the lid 15 upon loosening of the nut 24. Attention is directed to the fact that the valve element is self-seating and that the float 72 and its arm 73 are provided for unseating said valve element by engagement with its stem 70. Therefore, the weight of the valve element and the oil in the chamber 16 is utilized to seat the valve element. Only a slight movement of the float is required to unseat the valve element due to the close spacing between the lower end of the valve stem and the free end 77 of the float arm.

The foregoing description of the invention is explanatory thereof and various changes in the size, shape and materials, as well as in the details of the illustrated construction may be made, within the scope of the appended

5

claims, without departing from the spirit of the invention.

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

1. An automatic oil reservoir for maintaining a constant oil level in a crankcase including a housing having upper and lower chambers, the lower chamber communicating with the crankcase and having a common oil level, the upper chamber containing oil and communicating with the lower chamber for supplying oil thereto through an opening therebetween, a valve for controlling the flow of oil from the upper chamber to the lower chamber and including a body complementary to and depending through the opening from said upper chamber into said lower chamber, an arm pivotally mounted on the valve body within said lower chamber, a float carried by the arm, a self-seating valve element in said valve body and having a depending valve stem extending through said body for engagement by the arm to unseat the valve element only when the oil in the crankcase and lower chamber falls below a predetermined level, said valve body being slidable in said opening to vary the elevation of the float, and clamp means for securing said

6

body in adjusted positions relative to said opening.

2. An automatic oil reservoir as set forth in claim 1 wherein the valve body is tubular and has a coextensive bore communicating with the upper and lower chambers, a valve seat in the upper portion of the bore for downward engagement by the valve element, guide means in the lower portion of said bore for the valve stem, and a head on the upper end of said valve element and adjacent the upper end of said body to facilitate withdrawal of said element and cleaning of said bore.

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