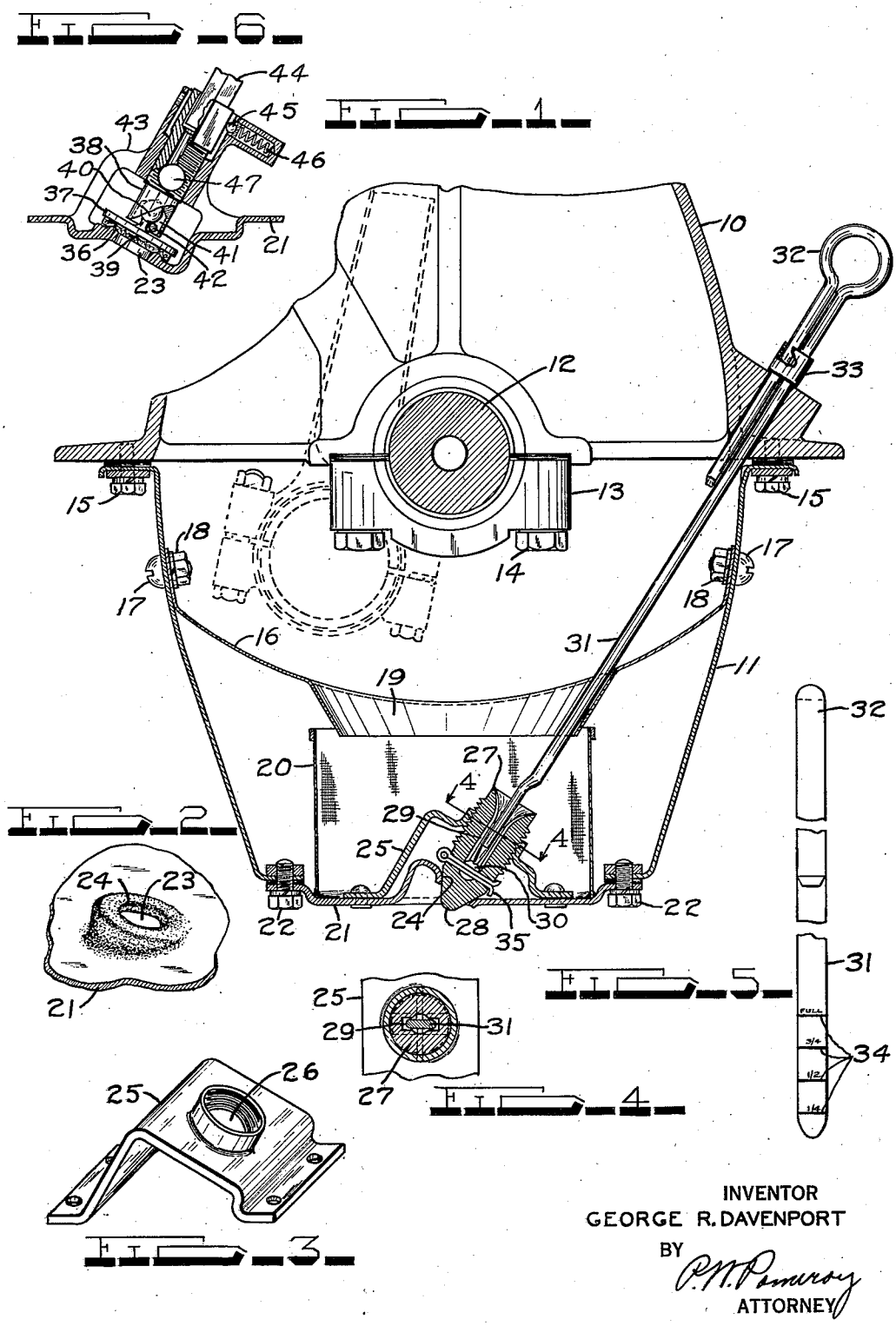
March 15, 1927. 1,621,155

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INTERNAL COMBUSTION ENGINE

Filed July 3. 1924



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Patented Mar. 15, 1927. 1,621,155

UNITED STATES PATENT OFFICE.

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INTERNAL-COMBUSTION ENGINE.

Application filed July 3, 1924. Serial No. 723,915.

This invention relates to internal combustion engines and has for its principal object the provision of means for readily and easily draining the lubricating oil from the crank case thereof.

Another object is to provide an oil drain valve for said engines that is operable without the necessity of reaching underneath the engine to operate it.

Another object is to provide a combination oil drain valve and oil level gauge.

Another object is to provide a combination oil drain valve and oil gauge in which the oil gauge necessarily forms a part of the oil drain valve, but as an oil gauge, functions entirely independent of the valve.

A further object is to provide an oil drain valve for engines of motor vehicles in which the means for operating the valve is readily accessible after raising the hood over the engine.

A still further object is to provide a valve in the bottom of the crank case of an internal combustion engine for draining the lubricating oil therefrom, the valve being threadably received in a support and being movable towards and away from its seat by rotary movement of the same, rotary movement being imparted thereto by means of a rod which also functions as an oil level gauge.

The above being among the objects of the present invention, the same consists of certain features of construction and combination of parts to be hereinafter described with reference to the accompanying drawing, and then claimed, having the above and other objects in view.

In the accompanying drawing which illustrates a suitable embodiment of the present invention, and in which like numerals refer to like parts throughout the several views:

Figure 1 is a fragmentary sectional view of an internal combustion engine taken perpendicularly to the longitudinal axis of the same showing an embodiment of the present invention incorporated therein.

Figure 2 is a fragmentary perspective view of the cap which closes the opening in the bottom of the oil pan of the engine illustrated in Figure 1, showing the seat for the oil drain valve formed therein.

Figure 3 is a perspective view of the member that threadably receives and supports the oil drain valve.

Figure 4 is a sectional view taken on the line 4—4 of Figure 1.

Figure 5 is a fragmentary view of the oil level gauge member taken perpendicular to its length and from a point ninety degrees around from the view of the same in Figure 1.

Figure 6 is a partially broken view of a modification of the oil drain valve shown in Figure 1.

The internal combustion engine, a fragment of which is shown in Figure 1, is provided with a crank case 10 and an oil pan 11. A crank shaft 12 is journaled in the crank case 10 and is held in place by the cap 13 secured to the crank case 10 by the bolts 14. The upper flanged edge of the oil pan 11 is secured to the lower flanged edge of the crank case 10 by the screws 15. Positioned approximately midway between the top and bottom of the oil pan 11 is a tray 16 secured tightly to the sides thereof by the screws 17 and nuts 18, the purpose of which is to carry the oil thrown from the crank shaft and other bearings to the opening 19 through which it drains into the screen strainer tube 20 and from there into the crank case 10 to again be passed by the pump to the various bearings.

The screen strainer tube 20 seats in a depression formed in the cap 21 which closes the opening in the bottom of the oil pan 11, the cap 21 being secured in place by the screws 22 and the tube 20 being soldered thereto around its lower edge. The central portion of the cap 21 is provided with an opening 23 and the metal thereabout is formed to provide a valve seat 24, the plane of which is angularly disposed to the plane of the cap 21 for reasons which will be apparent later. Secured to the upper face of the cap 21 is a valve support member 25 which is open on the sides to allow oil to flow from the oil pan 11 therethrough to the opening 23. The upper portion of the support is formed to provide a threaded opening 26, the axis of which is coincident with the axis of the valve seat 24. Threadably received in the opening 26 is the valve 27 which is provided with a conical end 28 adapted to engage the valve seat 24 and

thereby close the opening 23. It is apparent that rotation of the valve 27 will cause it to approach or to recede from the valve seat 24 dependent upon which direction it is turned.

The valve 27 is provided with a rectangularly sectioned axial opening 29 which extends from its upper face down to a cross passage 30 disposed just above the conical end 28. A member 31 which serves as an oil gage and also means for turning the valve 27 projects through the side of the crank case 10 and extends down through the opening 19 and into the opening 29 in the valve 27, the end which engages the opening 29 being flattened as shown in section in Figure 4 so that when these parts are in engagement one is non-rotatable in respect to the other. The upper end of the member 31 is slidably received in the crank case 10 and the end thereof is formed into a loop 32 to serve as a handle. A collar 33 welded or otherwise secured to the gage member 31 is adapted to abut against the crank case 10 and limit the amount the gage member 31 projects therethrough. The lower end of the gage member 31 is provided with marks 34 for indicating the height of the oil in the oil pan 11. The method pursued in using the member 31 as an oil gage is to remove it and wipe it off, replace it, and again remove it and the height of the oil in the oil pan 11 will be clearly shown on the lower end thereof. The cross opening 30 is provided in the valve 27 in order that no oil will be trapped in the axial opening 29 and thus induce a false reading of the gage 31 when the oil level is below its upper surface. In order that the valve 27 may not be inadvertently unscrewed completely out of the support 25, a cotter pin 35 is inserted through the valve 27 below the threaded opening 26 of the support 25 and projects out far enough therefrom to prevent the valve from passing through the opening 26.

A modified form of the valve construction is shown in Figure 6 in which the valve seat is not of the metal-to-metal type illustrated in Figure 1 but is of the type in which the valve is provided with a deformable facing. In Figure 6 the cap 21 is provided with an opening 23 as in the construction shown in the other figures, but the valve seat 36 is not of the conical type as in the other figures, being of the type provided with a raised bead about the valve opening 23. The valve in this construction is formed in two parts, the valve proper 37 and the stem 38. The valve proper is of the disc type provided with a deformable facing 39 and is provided with a ball projection 40 which is held in the recess 41 of the stem member 38 by the pin 42, allowing a limited universal movement of the valve proper 37 in respect to the stem 38. The stem 38 is threadably received in the suport 43 formed with or secured to the cap 21 but in this case its upper end is formed hexagonal in shape and is provided with an axial hexagonal opening which is adapted to receive the hexagonal end of the oil gage member 44. In this construction a ball 45 pressed against the upper hexagonal end of the stem 38 by a spring 46 is provided for preventing inadvertent turning of the stem 38. A cross opening 47 is provided in the stem 38 for the same purpose as the cross opening 30 in the valve 27 in the construction shown in Figure 1 previously described.

It will be evident that the construction shown has several novel features, among which are the combining of the oil drain valve and the oil level gage, and the bringing of the means for operating the oil drain valve up to a position readily accessible without getting underneath the engine.

Another valuable feature in the construction shown is the placing of the oil drain valve within the screen strainer tube 20. The result of this construction is that what sediment has collected within the tube 20 will be washed from the walls thereof and from the bottom through the opening 23 by reason of the fact that all the oil in the oil pan 11 will have to run through the tube 20 in a reverse direction to the normal direction of flow when the drain valve is opened to drain the oil from the oil pan.

Although I have shown but two modifications of the present invention, it is apparent that it is capable of a large number of modifications and variations without departing from the spirit and substance of the broad invention, the scope of which is commensurate with the appended claims.

What I claim is:—

1. In a liquid receptacle, a drain valve and a depth gauge therefor, said depth gauge being insertable in said receptacle to operate said valve and withdrawable therefrom to determine the depth of liquid in said receptacle.

2. In combination with an internal combustion engine, an oil drain valve therefor, and an oil gauge member adapted to extend into said engine to operate said valve to move the same toward and from its seat, said gauge member being withdrawable from said engine to determine the depth of oil therein.

3. In an internal combustion engine, a valve for draining the oil pan thereof, a gauge insertable in said oil pan, and connecting means within said oil pan between said gauge and valve whereby rotation of said gauge will operate said valve, said gauge being withdrawable from said engine for determining the depth of oil in said oil pan.

4. In an internal combustion engine, an

oil pan having an opening in the bottom thereof; a cap closing said opening an opening in said cap; a valve for closing the last mentioned opening a gauge member for determining the depth of oil in said oil pan; and means whereby said gauge member may be operated to operate said valve.

5. In an internal combustion engine, an oil pan; an oil strainer in said oil pan; a drain valve positioned within said oil strainer for draining the oil from said oil pan; a gauge for determining the depth of oil in said oil pan; and means whereby said depth gauge may be operated to cause operation of said valve.

6. In an internal combustion engine having a crank case and an oil pan provided with an opening therein, an oil drain valve having its outer end seated in said opening, and a gauge member extending through said crank case into said oil pan and connecting with the inner end of said valve whereby rotation of said gauge member will rotate said valve to move the same toward and from its seat.

7. In an internal combustion engine having a crank case and an oil pan provided with an opening in the bottom wall thereof, a support in said oil pan having an opening in axial alignment with said opening in oil pan, a valve rotatably mounted in said opening in said support and adapted to close said opening in said oil pan, and means exterior of said crank case and oil pan for operating said valve.

8. In an internal combustion engine having a crank case and an oil pan provided with an opening in the bottom wall thereof, a support in said oil pan having an opening in axial alignment with said opening in oil pan, a valve having a conical outer end rotatably mounted in said opening in said support, said conical end being adapted to seat in said opening in said oil pan, and a gauge extending into said oil pan for determining the depth of oil therein, said gage being engageable with said valve to rotate the same toward and from its seat.

9. In an internal combustion engine, an oil pan having an opening in the bottom thereof, a cap closing said opening, an opening in said cap, a support secured to said cap having an opening therein in axial alignment with the opening in said cap, a valve mounted in said opening in said support and adapted to close said opening in said cap, and a gauge member for determining the depth of oil in said oil pan, said gauge being engageable with said valve to move the same toward and from said opening in said cap.

Signed by me at Detroit, Michigan, U. S. A., this 28th day of June, 1924.

GEORGE R. DAVENPORT.