ABSTRACT OF THE DISCLOSURE

An oil pan drain assembly including an inverted up-right headed tubular drain plug screwed into the bottom wall of an oil pan. The tubular plug wall contains a slotted portion in an area immediately above the oil pan bottom wall thereby allowing drainage through the tubular plug. An integrally molded slidable valve is disposed within the tubular plug and is normally positioned over the interior aperture of the slotted portion, for occluding drainage from the oil pan. At such time when draining of the pan is desired, a tubular tool is screwed into the tubular plug which engages the cylindrical valve and slides the valve from the slotted portion of the tubular drain plug thereby exposing the slot opening to the oil contained in the pan. As a result, the oil exits from the pan and passes through the tubular drain plug and tubular tool to a collecting receptacle below. Removal of the tool returns the valve to its initially closed position to prevent further drainage.

This invention relates to a novel and useful oil pan drain plug assembly and more specifically to an apparatus which is adapted to be secured in the oil drain outlet opening in an oil pan and to provide a suitable closure member for the drain opening. The drain plug assembly includes an inverted upright headed tubular drain plug member which may be removably secured in a drain opening of an oil pan with the head of the drain plug member abutted against the outer surfaces of the oil pan disposed about the drain opening. The head of the drain plug member is short in axial length as are the heads of conventional solid drain plugs and the upper end of the tubular drain plug member adapted to be disposed within the associated oil pan is provided with axially movable valve means to close the tubular drain plug member immediately above that portion of the drain plug member passing through the oil pan. The valve member is yieldingly urged toward a closed position adjacent the head of the tubular member and may be pushed upwardly to an open position by an implement inserted in the lower end of the inverted tubular drain plug member and to a level spaced slightly above the drain seat.

The tubular drain plug member includes radial oil drain openings disposed immediately above the seat for the valve member and these drain openings are therefore ineffective to drain oil from the associated oil pan when the valve member is in its lowermost closed position in seated engagement with the seat provided therefor. The valve member is not provided to establish a reliable closure for the tubular drain plug member but only as a temporary closure therefor, a removable closure member similar to a conventional drain plug being provided for threaded engagement with the lower end of the tubular drain plug member to establish a closure member for the drain plug assembly during operation of the associated engine on which the oil pan is mounted.

In order to drain oil from the associated oil pan, the small drain plug is removed from the lower end of the tubular drain plug member and an externally threaded tubular member including oil outlet openings in its upper end and a projection on its upper end adapted to be engaged with the valve member of the drain plug assembly is threadedly engaged in the lower end of the tubular member. After being thread upwardly into the tubular drain plug member, the projection on the upper end of the externally threaded tubular member will engage the valve member and axially upwardly displace the latter and in order to open the tubular drain plug member thereby allowing oil within the oil pan to pass through the drain openings formed in the tubular drain plug member and the outlet openings in the upper end of the externally threaded tubular member to thereafter flow outwardly from the lower end of the externally threaded tubular member.

Although drain plug assemblies including valve members resiliently urged into seating engagement with valve seats facing inwardly of a drain plug assembly have heretofore been provided, these previous drain plug assemblies have not been readily adaptable and specifically designed for use on automotive oil pans since the manner in which they are to be operatively associated with the oil container from which oil is to be drained requires them to project considerably below the associated oil container.

It is accordingly a main object of this invention to provide an oil pan drain plug assembly of the above aforementioned improved type which includes structural features enabling it to be removable secured within an oil drain opening in the bottom of an oil pan with but a slight projection of the drain plug assembly being disposed below the adjacent bottom surfaces of the associated oil pan.

Another object of this invention is to provide an oil pan drain plug assembly that will greatly facilitate the draining of oil from an associated oil pan.

Still another object of this invention is to provide an oil pan drain plug assembly in accordance with the preceding objects that may be readily constructed so as to be adaptable for use in connection with substantially all automotive oil pans.

A final object of this invention is to specifically enumerate herein is to provide an oil pan drain plug assembly in accordance with the preceding objects which will conform to conventional forms of manufacture, be of simple construction and easy to use so as to provide a device that will be economically feasible, long lasting and relatively trouble-free in operation.

These together with other objects and advantages which will become subsequently apparent resides in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part hereof, wherein like numerals refer to like parts throughout and in which:

FIGURE 1 is a fragmentary bottom plan view of an oil pan shown with the oil pan drain plug assembly of the instant invention operatively associated therewith;

FIGURE 2 is an enlarged fragmentary vertical sectional view taken substantially upon the plane indicated by the section line 2—2 of FIGURE 1;

FIGURE 3 is an exploded perspective view of the oil pan drain plug assembly and illustrating the manner in which the small drain plug element of the assembly may be removed and replaced by the tubular oil draining conduit member of the drain plug assembly; and

FIGURE 4 is a fragmentary vertical sectional view similar to that of FIGURE 2 but illustrating the manner in which the tubular oil drain conduit member may be utilized to unseat the valve member of the drain plug assembly and duct the oil being drained from the oil pan to the inlet end of an oil refuse hose.

Referring now more specifically to the drawings the numeral 10 generally designates an oil pan including a bottom wall 12 having a depressed portion 14 with a threaded outlet opening 16 therein,
The oil pan 10 is conventional in design and of the type usually having a headed bolt-type drain plug similar to, but larger than the drain plug element generally referred to by the reference numeral 18 in FIGURE 3 of the drawings, but is of the type usually having a headed bolt-type drain plug member generally referred to by the reference numeral 22. The drain plug member 22 includes an upright and externally threaded body portion 24 including a centrally apertured head portion 26 on its lower end. The head portion 26 is externally threaded as at 28 and includes an upwardly opening circumferential groove 30 in its upper surface 32 which extends about the base of the body portion 24. The groove 30 has an annular sealing ring 33 disposed therein which is adapted to sealingly engage a boss 34 formed on the bottom wall 12 about the outlet opening 16. The tubular drain plug member 22 is sealingly threaded in the outlet opening 16 and held in position relative to the bottom wall 12 by rotation of means by a pair of set screws 36 threadedly engaged in appropriate small diameter threaded bores 38 formed in the head portion 26. The upper ends of the set screws 36 are pointed as at 40 and frictionally engaged with the depressed portion 14 of the bottom wall 12.

The lower end of the body portion 24 includes generally radial oil outlet openings 42 and defines an annular upwardly facing valve seat 44 spaced immediately below a horizontal plane containing the oil outlet openings 42. A cup-shaped valve member 46 is slidable disposed in the body portion 24 and is yieldingly urged to a lowest position in fluid sealing engagement with the seat 44 by means of a compression spring 48 whose lower end is seated within the cup-shaped valve member 46 and whose upper end bears against an abutment washer 50. The upper end of the body portion 24 is provided with an inwardly opening circumferential groove 52 in which a ring lock 54 is seated, the ring lock 54 serving to limit upward sliding movement of the abutment washer 50 in the body portion 24.

The aforementioned drain plug element 18 is removable secured within the threaded bore 28 formed in the head portion 26 and a sealing washer 56 is disposed between the upper surface of the head 58 of the drain plug element 18 and the confronting surfaces of the head portion 26.

A tubular and externally threaded drain conduit member 60 is provided and includes a conical upper end portion 62 apertured as at 64. The tubular drain conduit member 60 is threadedly engageable in the threaded bore 28 in lieu of the drain plug element 18 after the latter has been removed and the conical upper end portion or extension of the drain conduit member 60 is engageable with the cup-shaped valve member 46 to urge the latter upwardly to a position disposed above the outlet openings 42, see FIGURE 4. A suitable oil refuse hose or conduit 66 may have its inlet end telescoped over the lower end of the drain conduit member 60 and in this manner, the oil 68 within the oil pan 10 may be drained from the latter.

In operation, the tubular drain plug member 22 is secured in the oil outlet opening 16 in a conventional manner and is illustrated in FIGURE 2 of the drawings with the drain plug element 18 threadedly engaged in the threaded bore 28. In this manner, the oil outlet opening 16 is completely closed in order to prevent the oil 68 from passing outwardly therefrom.

When wishing to drain the oil 68 from the oil pan 10, the drain plug element 18 is unthreaded from the bore 28. The cup-shaped valve member will prevent the oil 68 from flowing downwardly through the threaded bore 28 when the drain plug element 18 is removed and enable a mechanic to threadedly engage the drain conduit member 60 in the threaded bore 68 without oil dripping on his hands. After the drain conduit member 60 has been positioned as illustrated in FIGURE 4 of the drawings, the oil 68 will pass through the radial openings or bores 64, the apertures 64, and then downwardly through the drain conduit member 60 and into the flexible pipe or hose 66.

After all of the oil 68 has been drained from the oil pan 10, the drain conduit member 60 may be removed and replaced by the drain plug element 18 in order to again fully close the lower end of the tubular drain pipe member 22.

From FIGURE 2 of the drawings it may be seen that the drain plug assembly 20 projects a slight distance below the portion of the bottom wall 12 of the oil pan 10 disposed about the outlet opening 16. Therefore, it may be seen that the oil drain plug assembly may be used as a replacement for conventional drain plugs without the drain plug assembly 20 projecting appreciably below the bottom wall 12. This advantage of the oil drain plug assembly 20 is made possible by the fact that the automatic valving action of the assembly 20 defined by the cup-shaped valve member is disposed inwardly of the outer end of the oil outlet opening 16.

The foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes may be made by those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described and accordingly all suitable modifications and equivalents may be resorted to, falling within the scope of the invention as claimed.

What is claimed is as new as is follows:

1. An oil pan drain plug assembly for use with an oil pan, said oil pan having a down wardly opening outlet formed therein, said drain plug assembly comprising an inverted upsetting and headed tubular drain plug housing of one piece construction and removable secured in said outlet, the oil pan confronting surface of the head of said plug housing including a circular recess therein, a sealing member disposed within said recess wherein the oil pan confronting portion of said sealing member remains exposed to abut the outer surface of said oil pan, a plurality of set-screws contained within said head and adapted to frictionally engage the outer surface of said oil pan to prevent rotational motion of said plug housing, a second circular recess formed within the downwardly facing surface of said head, said plug housing including means defining oil drain opening means formed therein including portions spaced above said head and adapted to respond to the thickness of the portions of said oil pan disposed above said outlet opening, said plug housing also including means defining an internal upwardly facing valve seat below the lowest portion of said oil drain opening means, a rigid cup-shaped cylindrical valve member having a planar bottom surface and reciprocatable in said plug housing and shiftable between an operative upper position disposed above said oil drain opening means and a lower operative position in seated engagement with said seat and closing the lower end of said plug housing below said oil drain opening means, a coil spring having one end seated in the valve member, means on the upper end of said plug housing engaging the other end of the spring for yieldingly urging said valve member toward said lower operative position, a tubular drain conduit member including one end portion removable and threadably insertable in the lower end of said plug housing, the lower end portion having a conical tip with oil drain inlet openings therein, said conical tip being flat at the upper end and in rotatable engagement with the planar bottom surface of said valve member to inwardly displace the latter by a selectable distance thereby opening the lower end of said plug housing upon threadedly engaging said conduit member upwardly into said plug housing to form a relatively tight fluid seal theretwixt when said conduit member is disposed in said plug housing, a second sealing member disposed within said aforementioned second cir-
circular recess formed within the downwardly facing surface of said head, and a blank drain plug element removably securable within the head of said plug housing in lieu of said conduit member for occluding said oil drain opening means, said plug element including a head, the upper surface of which engages said second sealing member and wherein the upper portion thereof is disposed within said second recess.

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