

[54] **CRANKCASE DRAIN VALVE WITH ATTACHMENT FOR DISPOSABLE OIL BAGS**

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[22] Filed: **Mar. 20, 1974**

[21] Appl. No.: **453,106**

[52] U.S. Cl. **184/1.5, 141/313, 150/DIG. 1, 251/144**

[51] Int. Cl. **F16n 31/00**

[58] Field of Search **150/DIG. 1, .5; 141/114, 141/313, 315, 317; 184/1.5; 251/144, 339**

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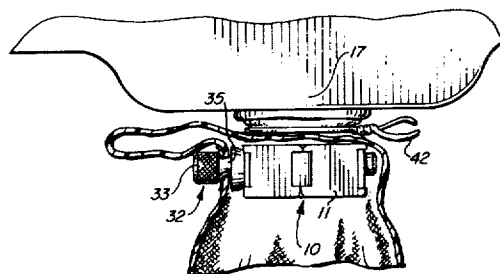
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[57] **ABSTRACT**

A crankcase drain valve adaptable for replacing the standard oil drain plug commonly used for draining used oil from the crankcases of most internal combustion engines comprising a threaded plug portion and an integral hexagon-shaped valve body portion having a drain hole extending axially through both portions. The drain valve is provided with a tapered bore extending laterally through the drain hole which is adapted to receive a tapered removable valve core. A retaining spring holds the core in place and prevents leakage of oil from the crankcase until a disposable oil bag is mounted on the drain valve to catch the used oil from the crankcase when the tapered valve core in the valve body is removed.

5 Claims, 10 Drawing Figures



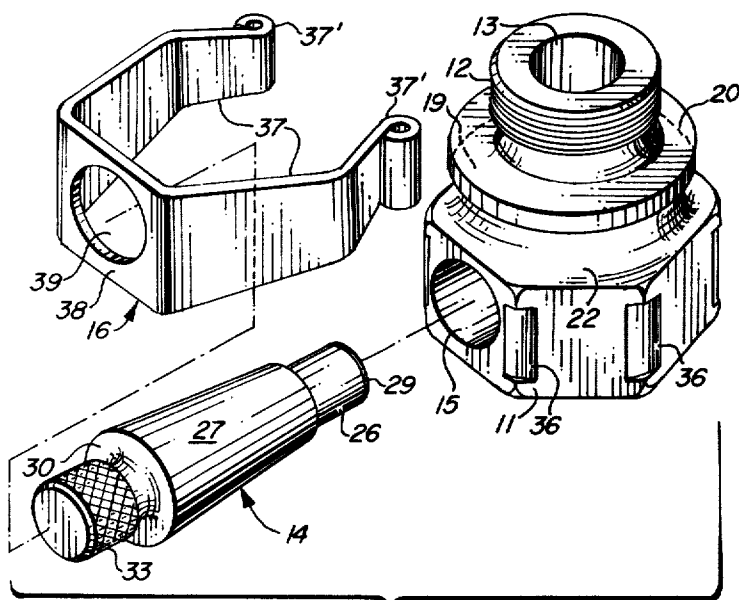


FIG. 1

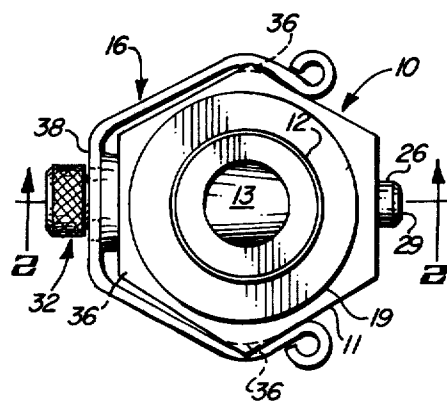


FIG. 3

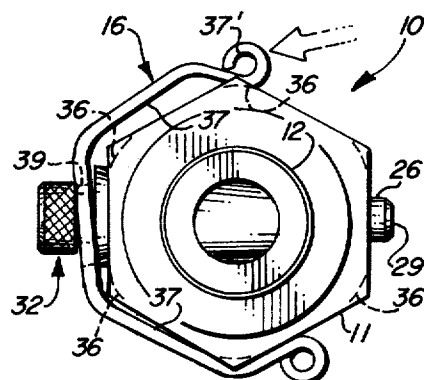


FIG. 4

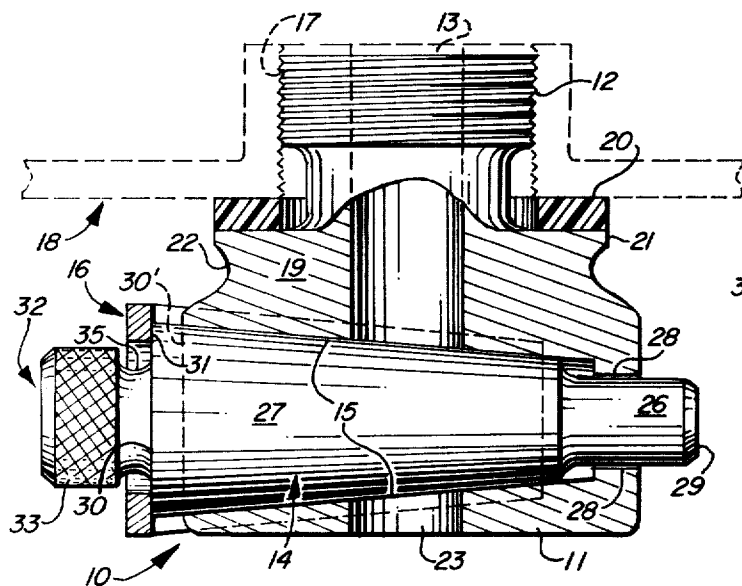


FIG. 2

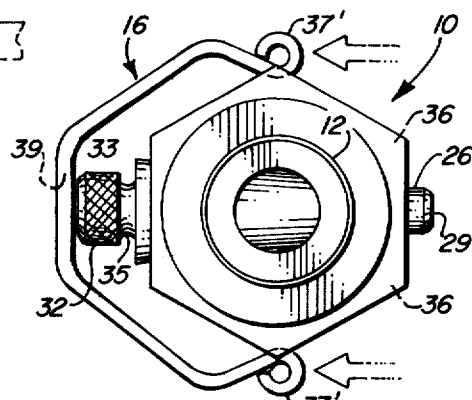


FIG. 5

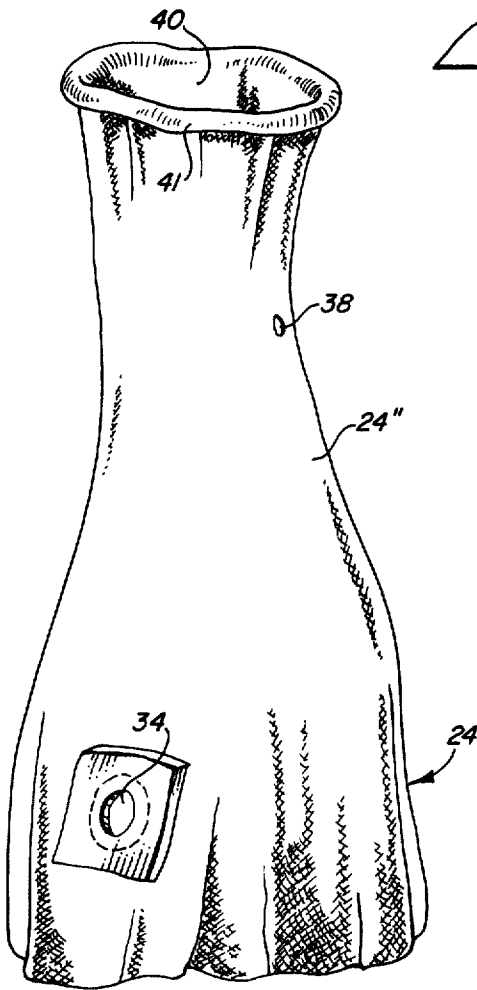


FIG. 6

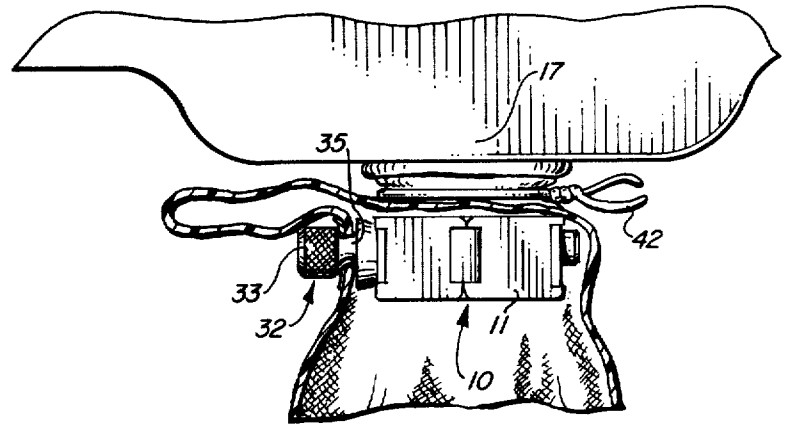


FIG. 7

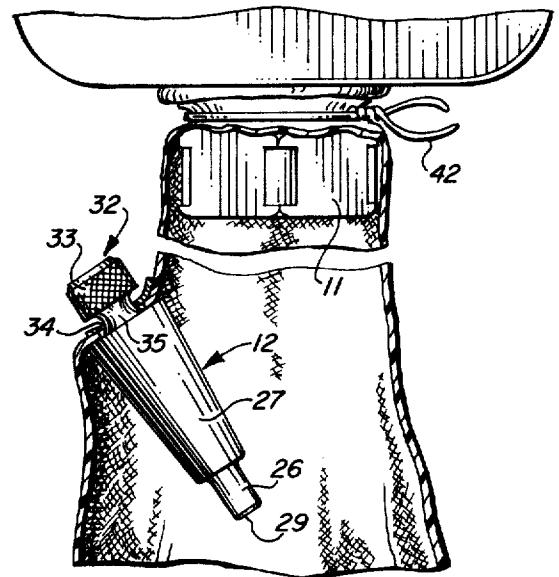


FIG. 8

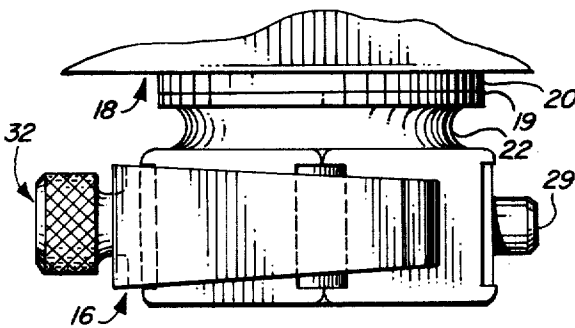


FIG. 10

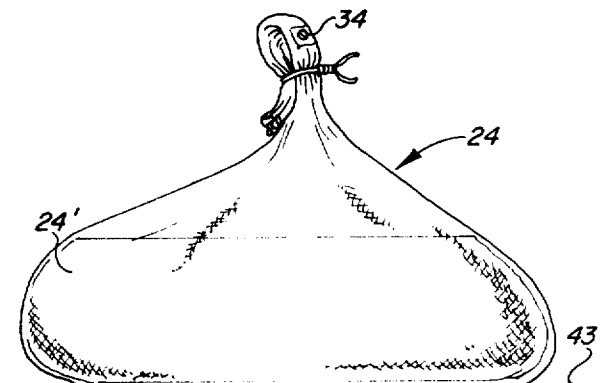


FIG. 9

CRANKCASE DRAIN VALVE WITH ATTACHMENT FOR DISPOSABLE OIL BAGS

BACKGROUND OF THE INVENTION

This invention relates to a crankcase drain valve for an internal combustion engine used for draining dirty contaminated oil from the crankcase into a disposable bag or container attachably mounted on the drain valve. The drain valve may be opened and closed and the oil filled bag removed from the same without contact with the draining oil and permitting the disposal of the oil in the sealed bag in an expedient manner.

DESCRIPTION OF THE PRIOR ART

Heretofore the crankcase or oil pan of most internal combustion engines has been provided with a drain plug comprising a male threaded plug portion having an integral head portion, the diameter of the head portion being larger than the plug portion and usually formed in a hexagon or square-shaped configuration. A suitable sealing washer was usually positioned in contact with the smooth, flat surface of the oil pan in leak-proof relationship with the drain plug. This drain plug was fitted into and removed with a suitable wrench or other type tool every time it was necessary to drain oil from the crankcase of the engine.

This type of drain plug creates the following problems:

1. Draining oil from the crankcase of an internal combustion engine onto the ground or into a drain pan is messy and sometimes dangerous, especially if the oil is hot and contacts the hands, face or eyes of the serviceman.

2. The drain plug, if not carefully removed and reinserted in the oil pan of the engine by a competent mechanic, may have the threads on the plug or in the pan stripped, resulting in the necessity of replacing the damaged drain plug with a new one or repairing the damaged threads in the oil pan outlet at considerable waste of time and expense to again render it leakproof.

3. The drain plug may drop into the oil receptacle and oil may spill onto the surface of the floor over which it is being drained and then providing the necessity of transporting the used oil to a place of disposal or reclamation where this valuable product may be reprocessed and again used for many different purposes.

SUMMARY OF THE INVENTION

To eliminate the above disadvantages, an improved crankcase drain valve with disposable oil bag is provided.

It is, therefore, one object of this invention to provide an improved means for draining oil from the crankcase of an internal combustion engine into a disposable oil bag in a clean, expeditious manner without the necessity of removing the drain plug.

Another object of this invention is to provide an improved crankcase drain valve and disposable oil bag combination which may be effectively utilized by a novice for draining, containing, and disposing of the oil from the crankcase of an automobile with ease and safety.

Further objects and advantages of the invention will become apparent as the following description proceeds and the features of novelty which characterize this invention will be pointed out with particularity in the

claims annexed to and forming part of this specification.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an exploded perspective view showing the component parts of the crankcase drain valve in their unassembled relation.

FIG. 2 is a sectional view taken on line 2—2 of FIG. 3 showing the assembled drain valve installed in the threaded outlet opening of the oil pan or crankcase shown in dash lines as a part of an internal combustion engine with some parts shown in elevation for clarity.

FIG. 3 is a top plan view of the assembled drain valve illustrating one method of securing its removable valve core in sealed relationship in the valve body by means of a flat spring.

FIG. 4 is a top plan view of the drain valve similar to FIG. 3 illustrating the spring locking feature of the structure if the retaining spring is improperly moved away from the drain valve.

FIG. 5 is a top plan view of the drain valve similar to FIGS. 3 and 4 illustrating the proper procedure for removing the retaining spring from the drain valve.

FIG. 6 is a fragmentary perspective view of the upper neck portion of a drain bag utilized in association with the drain valve of this invention to drain the oil from the crankcase of an internal combustion engine and showing its rolled over access opening and small reinforced lower opening which is utilized to retain the removable core of the valve when the oil is being drained into the bag.

FIG. 7 is a fragmentary view partly in section and elevation showing the drain bag securely attached to and surrounding the drain valve with the removable valve core still in sealing relationship in the valve body in readiness for the oil draining operation.

FIG. 8 is a fragmentary view similar to FIG. 7 showing the drain bag still securely attached to and surrounding the drain valve but with the valve core removed from its sealing relationship in the valve body and retained securely in the small opening in the drain bag while the oil is being drained.

FIG. 9 is an elevational view of the oil filled drain bag in the position it would assume when resting on a flat surface and one method of closing and sealing the same with a twister wire.

FIG. 10 is an elevational view similar to FIG. 2 with the flat spring in place.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring more particularly to the drawings by characters of reference, FIGS. 1 and 2 illustrate the components of the crankcase drain valve 10 of this invention in their unassembled and assembled relationship to the oil drain pan of an internal combustion engine.

The components of the crankcase drain valve 10 comprise a hexagon-shaped lower body portion 11 and an integral threaded plug portion 12 having an axially positioned bore 13 extending therethrough. A tapered, removably mounted valve core 14 is provided for extending into a bore 15 arranged to extend into body portion 11 laterally of and through bore 13. A flat retaining spring 16 is adapted to retain valve core 14 in oil sealing relation in the body portion 11 of the valve when between draining periods and it is particularly designed to be easily installed or removed from associa-

tion with the removable valve core **14** and valve body **11** at any time after the valve body has been tightly screwed into the usual female threaded aperture **17** provided in the lower underside of the oil pan or crankcase **18** of an internal combustion engine.

The hexagon-shaped body portion **11** of valve **10** and its threaded plug portion **12** is integrally connected by a circular flange portion **19** that is somewhat less in diameter than the diameter of the hexagon-shaped body portion **11**. Flange portion **19** is provided with a smoothly finished top surface which is adapted to contact and compress a suitable resilient washer **20** arranged between said surface and the flat, smooth undersurface of the crankcase **18**. Flange portion **19** is integrally connected to the top surface of the hexagon-shaped body portion **11** by a circular neck portion **21** having a convex outer circumferential shape forming a smooth-surfaced circular groove **22**.

The integrally threaded plug portion **12**, circular flange **19**, neck portion **21**, and the hexagon-shaped body portion **11** of the valve body **10** are all provided with the axially arranged bore **13** which extends through the entire valve body and communicates with the interior of oil pan **18**. An outlet opening **23** of the bore communicates with the interior of a plastic bag or container **24** shown in FIGS. 6, 7 and 8 which is preferably fabricated of a flexible material when the same is attached in oil sealed relationship to the circular groove **22** of drain valve **10**.

As shown in FIGS. 1 and 2 of the drawing, the tapered, removable valve core **14** is provided at its smallest end with a cylindrically shaped extension **26** which is integral with the tapered body portion **27** of the valve core. This extension is adapted to project through and out from an aperture **28** formed in one of the flat sides of the hexagon body portion **11** of valve body **10** in horizontal alignment with the centerline of the tapered bore **15** into which the tapered valve core **14** extends so as to present its flat, blunt end **29** outside the hexagon portion of the valve body. In this position it can be lightly tapped or pushed inwardly of the valve body to extricate the tapered valve core **14** from the tapered bore **15** if necessary and to assist in maintaining the horizontal alignment of the same in the tapered bore when inserted therein to assure total blockage of bore **13** in the valve body to prevent leakage of oil there-through.

It should be noted at this point in the description that the diameter of the tapered valve core **14** throughout its zone of intersection with bore **13** must be considerably larger than the diameter of said vertical bore in order to completely block and seal the same from the passage of oil therefrom when the valve core is inserted tightly in the tapered bore **15** and maintained therein by the flat retaining spring **16**.

The tapered body **27** of the valve core **14** is of sufficient length to allow its larger diameter end to extend a short distance beyond the face **30'** of the flat surface of the hexagon-shaped body portion **11** and the opening of the tapered bore **15** in which the valve core is inserted. This large diameter end is provided with a flat, smooth circular face **30** which is adapted to be contacted by the inner vertical face or surface **31** of the flat-sided retaining spring **16** (as shown in FIG. 2) to retain the tapered, removable valve core **14** in sealing relationship with the central vertical bore **13** in the valve body **10** when so desired.

The large diameter end of the tapered body **27** of the valve core is provided with a centrally located integral, cylindrically-shaped extension **32** having a knurled, finger-gripping circumferential surface **33** around its periphery. The diameter of extension **32** is somewhat larger than the diameter of a reinforced aperture **34** in the plastic bag or container **24**. The cylindrical extension **32** is also provided with a circular groove or relief portion **35** between the rear face of the knurled portion **33** and the flat, smooth circular face **30** of the tapered valve body **27**. The diameter of the circular groove **35** is also somewhat larger than that of the reinforced aperture **34** in the plastic bag **24** in which it is retained.

All six corners of the hexagon-shaped body portion **11** of the drain valve are turned or otherwise formed to provide a plurality of vertical, arcuate-surfaced notches or depressions **36**. These depressions are formed to retain legs **37** of retaining spring **16** and prevent them from sliding sideways on the valve body. These legs are formed integral with the flat vertical base or connecting portion **38** of retaining spring **16**, which portion is provided with a central aperture **39**, the diameter of which is slightly larger than the diameter of the outwardly projecting cylindrically extension **32** formed on the projecting end of the tapered valve body **27**. The size of aperture **39** allows retaining spring **16** to clear the cylindrical extension **32** when its inwardly biased pair of legs **37** are manually forced over the arcuate-shaped faces of the notches or depressions **36** in the corners of the hexagon-shaped body portion **11**. This type of fit causes the vertical face or surface **31** of the base portion **38** of the spring to contact the vertical circular face **30** at the large diameter end of the tapered body portion **27** of the valve core **14** to lock and hold the same in its inserted oil sealing relationship with the central vertical bore **13** of the valve body **10**.

FIGS. 2 and 3 of the drawings show the flat retaining spring **16** in its relative relationship with the hexagon body portion **11** and the tapered removable valve core **14** of the drain valve when retaining the same in its closed oil sealing position in the valve body. FIGS. 4 and 5 illustrate the one and only successful method which must be used to remove the spring from over the cylindrical extension **32** of the tapered valve core **14** and from its holding contact with the flat surfaces of the hexagon body portion **11** when removing the same for draining the oil from the oil pan or crankcase **18**. This simple procedure can only be accomplished by applying equal finger pressure simultaneously and in the same direction to the rolled ends **37'** of the pair of inwardly biased legs or extensions **37** of the spring as indicated by the pair of arrows in FIGS. 5. If such equal simultaneous pressure is not applied as described, the resulting effect would be to cause a binding of the edge of aperture **39** in the base connecting portion **38** of spring **16** in the circular groove **35** of the extension **32** of the valve core as indicated by the single arrow and arrangement of the spring in FIG. 4, thus preventing easy removal of spring **16** as described above.

After spring **16** has been carefully removed and laid aside from its valve core retaining position shown in FIGS. 2 and 3, the crankcase drain valve **10** of this invention is made ready for draining oil from the crankcase of the internal combustion engine as follows:

The flexible drain bag **24**, preferably fabricated of a plastic material such as vinyl and formed to provide a large capacity body portion **24'** and a comparatively

small diameter, long neck portion 24'' with the reinforced but stretchable aperture 34 therebetween, is rolled outwardly from the neck opening 40 toward the body portion 24' or formed with a top rolled edge 41 as shown in FIG. 6 of the drawings. This prevents the bag from slipping past the twist wire in groove 22 when containing the weight of the oil.

The long neck portion 24'' of the empty drain bag 24 is stretched and pushed up over the assembled crankcase drain valve 10 minus the valve core retaining spring 16 until its rolled top edge 41 and its outlet opening 40 completely surrounds the circular flange 19 of the valve body 10 and its circular groove 22 as well as the projecting extensions 26 and 32 of the still inserted tapered valve core 14. Alignment of the reinforced aperture 34 and the projecting end 32 of the valve core 14 must be done before twist wire 42 is applied. The empty drain bag is then lifted upwardly until the reinforced hole or aperture 34 in its side is brought into alignment with the knurled head or extension 32 of the tapered valve core 14 over which it is stretched and forced until it settles in the circular groove or relief portion of the same, as shown in FIG. 7 of the drawing. At this time a twist wire 42 is tightly secured around the upper end of the bag's neck portion 24'', thus drawing the same into contact with the circular groove 22 in the valve body in leakproof relationship therewith in order to hold the bag in place.

After the above described functions have been accomplished the knurled head portion 33 of the extension 32 of the valve core 14 is gripped in the fingers and pulled out of the tapered bore 15 of the valve body. That portion of the bag in which it is still retained by means of the small aperture 34 in the bag is allowed to drop down to assume substantially the position illustrated in FIG. 8. The oil now flows from the opening in crankcase 18 through the open bore 13 of the valve body into the lower confines of the bag which stretches the same and causes it to assume substantially the shape of a long-necked cylindrical bottle or vase. The bag gradually expands as it hangs from the drain valve or rests on a supporting surface or ground 43.

When the oil from the crankcase has been completely drained into the plastic bag 24, the tapered removable valve core 14, which is still retained in aperture 34 in the bag, may again be gripped in the fingers by the knurled head portion 33 of the extension 32 of the tapered valve core 14 and lifted up by stretching that portion of the bag in which it is retained and then re-inserted in the tapered bore 15 of the valve body to again block and seal bore 13 from further passage of oil therethrough.

When this function has been accomplished, the oil filled bag now resting on the floor or ground surface 43 may be entirely removed from its attachment with the again assembled drain valve by stretching aperture 34 in the bag over the knurled head of the extension 32 of the inserted valve core 14 to remove that portion of the bag from the same and then by holding the neck portion 24'' of the bag in one hand and untwisting the wire 42 from its described position of retention as shown in FIGS. 7 and 8, causing the neck portion of the bag to be pulled down and out of contact with any part of the drain valve. The long neck portion 24'' of the bag is turned over or doubled back on itself and again tightly secured by wire 42 at a point in the neck which is directly below the aperture 34 as shown in FIG. 9 of the

drawing, ready for clean, neat and efficient disposal of the bag and the spent oil contained therein at any convenient place of disposal.

After the oil filled bag 24 is made ready for disposal as described above, the previously removed flat retaining spring 16 may be easily replaced in its valve core retaining position by applying pressure against the circular face 30 at the large diameter end of the tapered body portion 27 of the same over the projecting extension 32 and with its pair of inwardly biased legs or extensions 37 secured from moving sideways in the notches or depressions 36 formed in the corners of the lower hexagon-shaped body portion 11.

It should be noted and understood that should the tapered body portion 27 of the valve core 14 under pressure from the retaining spring 16 be insufficient to completely block and prevent the escape of some oil from the vertical central bore 13 in the valve body around the contacting surfaces of the tapered bore 15 and the mating valve core body 27, properly sized O-rings may be secured in circular grooves (not shown) on each side of the tapered body portion 27 which is intersected by the vertical center bore 13 of the valve body so as to contact the tapered bore 15 in positive oil sealing relationship with the tapered body portion 27 of the valve core 14.

Further, to aid in more rapid draining the crankcase of the automobile a vent hole 38 may be placed in the drain bag to vent to atmosphere any pressure build-up in the bag.

Although but one embodiment of the invention has been shown and described, it will be apparent to those skilled in the art that various changes and modifications may be made therein without departing from the spirit of the invention or from the scope of the appended claims.

What is claimed is:

1. A drain plug assembly for use on an automotive crankcase comprising in combination:

a plug threadedly receivable in a threaded opening in the bottom of a crankcase and provided with a drain bore extending axially therethrough,

said plug being provided with a polygonal shaped outer surface along a first part of its length for engagement by a tool for threading it into the threaded opening of the crankcase and a cylindrically shaped portion along a second part of its length,

said first part of said plug being provided with a valve bore extending laterally through said drain plug and intersecting said drain bore,

a valve core for removably positioning longitudinally thereof into said valve bore with an interference fit to seal said drain bore,

spring means for detachably clamping around at least a part of the outer periphery of said first part of said plug for holding said valve core in said valve bore,

a groove formed in the outer surface of said second part of said plug for receiving the neck of a drain bag therein,

the large diameter end of said valve core being provided with a necked-down portion,

said spring means comprising a flat, resilient spring bent into a polygonal shape conforming to the polygonal shape of said first part of said plug for interference fit therewith,

said spring being provided with an aperture of a size large enough to fit over the necked-down end of said valve core but smaller than the large diameter end of said valve core, whereby when the aperture of said spring receives the necked-down end of said valve core and said spring is clamped around said polygonal surface of said plug, said valve core is firmly held in place in said valve bore, and

an oil impervious, resilient bag having a neck portion for fitting within said groove for attachment thereto upon removal of said spring from around said plug,

said bag being provided with an aperture in its neck portion for fitting over the necked-down portion of said valve core in an interference fit,

said valve core being suspended by said bag within its interior when said valve core is removed from said valve bore for draining oil from the crankcase.

2. The drain plug assembly set forth in claim 1

wherein:

said bag is provided with a vent hole in its neck portion.

3. The drain plug assembly set forth in claim 1 wherein:

said bag is formed of a plastic material.

4. The drain plug assembly set forth in claim 1 in further combination with:

a twist wire for twisting around the neck of said bag within said groove for firmly attaching said bag to said plug.

5. The drain plug assembly set forth in claim 4 wherein:

the open end of said neck portion of said bag is provided with an edge rolled over on itself to keep from being pulled from under said twist wire when said twist wire is twisted around the neck of said bag within said groove.

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