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[54] OIL REMOVING TOOL AND METHOD

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[51] **Int. Cl.** **F01m 11/04**

[58] **Field of Search** ..... 137/317, 320, 322, 323, 137/590; 184/1.5, 1 E; 141/98; 222/400.7, 464; 285/354, 343

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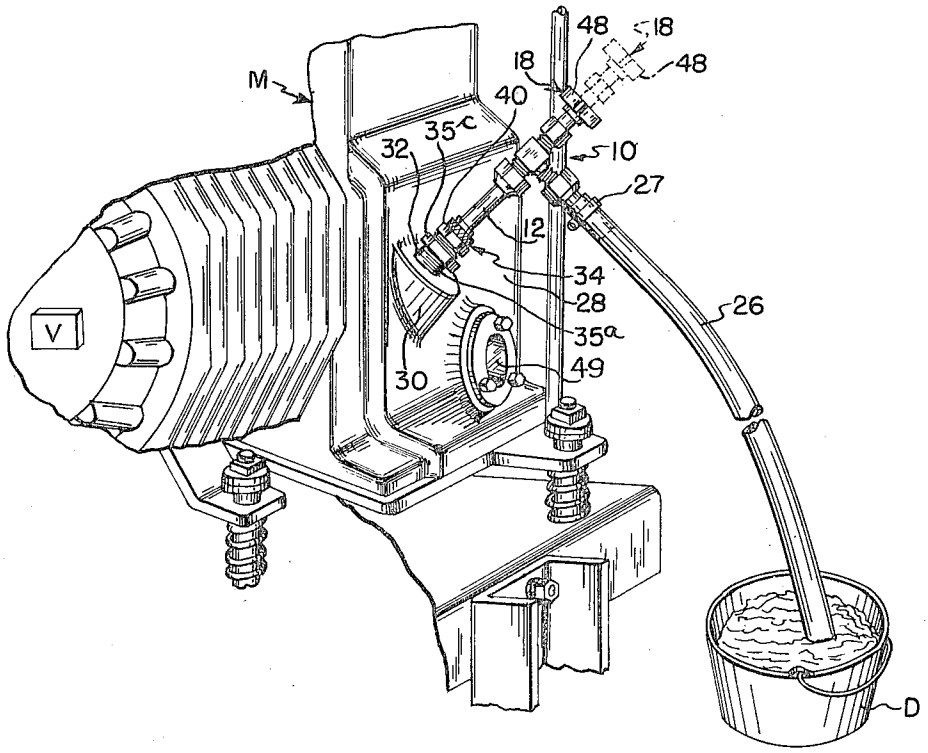
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[57] **ABSTRACT**

A simple, lightweight tool for enabling a serviceman to rapidly and conveniently remove oil from a crankcase of a compressor or the like, or remove enough oil to bring the oil level to the proper height as determined by the compressor manufacturer, comprising an elongated tube with a valve coacting with the tube for controlling the flow of oil or liquid therethrough, and having a coupling mounted on the tube and adapted for coupling with an access opening in the crankcase for mounting the tool on the crankcase. The coupling is movable lengthwise of the tube for providing for selectively adjusting the position of the ingress end of the tube with respect to the bottom of the crankcase. The coupling includes a sealing means for sealing the tube with respect to the access opening and said coupling after adjustment positioning of the tube, so that no oil leakage about the coupling occurs. The oil is forced from the crankcase through the tube by pressurizing the crankcase, and control of the oil is accomplished by actuation of the valve which in conjunction with an elongated discharge tubing coacting with the valve, can expeditiously convey the oil from the crankcase to a distant location from the compressor.

10 Claims, 4 Drawing Figures



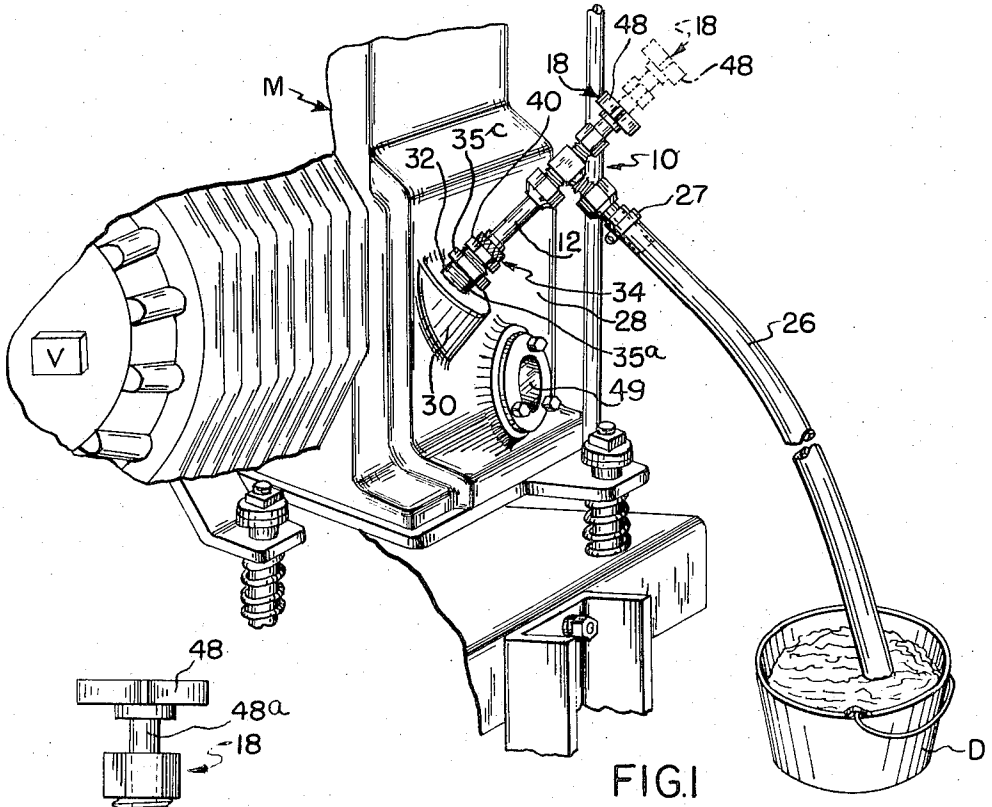


FIG.1

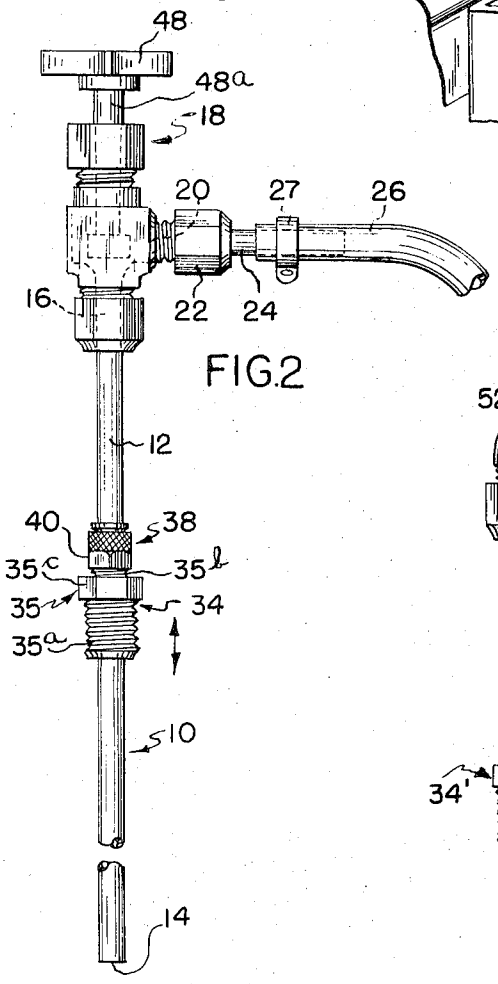


FIG.2

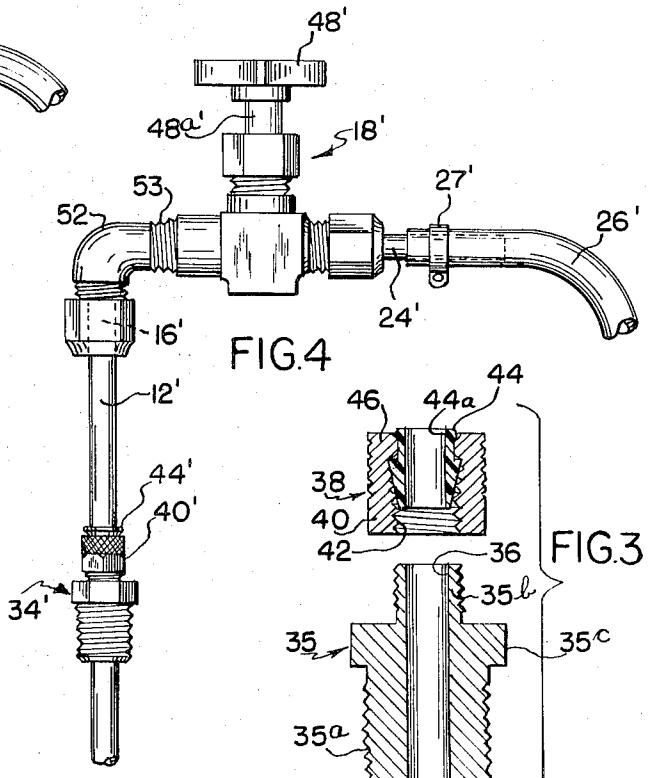


FIG.4

FIG.3

OIL REMOVING TOOL AND METHOD

This invention relates in general to a lightweight, portable tool for effecting expeditious and rapid removal of oil from the crankcase of a compressor, such as for instance a refrigeration compressor, or the like, and more particularly to an oil removing tool that can be rapidly adjusted for use with various makes or designs of crankcases, and especially various makes of refrigeration compressor crankcases.

BACKGROUND OF THE INVENTION

The removal of oil from the crankcases of compressors used in refrigeration and the like many times is a rather difficult and time consuming job. Sometimes such compressors are stacked or placed in close proximity to one another and/or in small area locations, which severely restricts a workman from obtaining convenient access to the usual drain plugs in the compressor crankcase, and materially inhibits the ability of a workman to catch the oil as it gushes from the drain plug. Accordingly, many times a workman who desires to change the oil, will merely open the drain plug and let the waste oil drain onto the floor, thereby creating unsanitary and messy conditions which have to be subsequently cleaned up.

SUMMARY OF THE INVENTION

The present invention provides a novel lightweight, portable tool which can be used to rapidly discharge oil from the crankcase of a compressor or the like, such as for instance the compressor of a refrigeration unit, and in a manner whereby the oil flow can be conveniently controlled, for direction to a spaced or distant receiving receptacle, and wherein the tool is readily adjustable for use with different makes of compressors, so that the tool can be utilized for draining oil from different makes and designs of compressors.

Accordingly, an object of the invention is to provide a novel portable tool for conveniently removing oil from the crankcase of a compressor or the like, such as for instance the compressor of a commercial refrigeration unit.

Another object of the invention is to provide a tool of the above type wherein the oil is forced by pressurization of the crankcase chamber, through the tool, and where means is provided for controlling the oil flow and directing it to a convenient discharge receptacle, or to some point distal from the crankcase mechanism.

Another object of the invention is to provide a lightweight, portable tool which can be conveniently carried by a workman, which can be utilized with many different makes or types of compressors, for conveniently and rapidly removing oil from the crankcase thereof, and in a manner whereby the removed oil can be disposed of without contaminating the area about the compressor.

Another object of the invention is to provide a novel method for removing oil from the crankcase of a refrigeration compressor, or the like.

Other objects and advantages of the invention will be apparent from the following description taken in conjunction with the accompanying drawings wherein:

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a fragmentary, generally diagrammatic, perspective, illustration of the tool of the invention inserted into a threaded access opening in a refrigeration compressor crankcase, for removing the lubricating oil therefrom;

FIG. 2 is a fragmentary, broken, elevational view of the tool illustrated in FIG. 1;

FIG. 3 is an enlarged, sectional view of the coupling means for coupling the tool of the invention in the threaded opening in the compressor crankcase, and illustrating the associated deformable collar for sealing the tube of the tool to prevent leakage of oil thereabout, during removal of oil from the crankcase; and

FIG. 4 is a fragmentary, enlarged elevational view of a modified form of the tool of FIG. 2.

DESCRIPTION OF PREFERRED EMBODIMENTS

The tool 10 (FIG. 1) comprises a tube 12 which in the embodiment illustrated is of generally linear extension. Tube 12 may be formed of any suitable material such as for instance copper, and has an ingress end 14 and an egress end 16. A valve member 18 coacts with the tube, for controlling the flow of oil from the ingress end 14 of the tube through the tube, and with the valve including a discharge port 20 which coacts in liquid-tight relation via threaded coupling 22, with stub tubing 24 disposed generally perpendicular to the tubing section 12. Tubing section 24 may be likewise formed of any suitable material, such as for instance copper. It will be seen that oil flowing into ingress end 14 of tube 12, flows through the tube 12, through the valve 18 and out the discharge port 20.

A preferably flexible tubing or hose section 26 is coupled in sealed relationship as by means of fastener clamp 27 to the stub tube 24, for directing the oil or other liquid removed by the tool, to a discharge receptacle D, which may be disposed a considerable distance from the location of the compressor mechanism M, which in the embodiment illustrated represents a commercial refrigeration compressor. The crankcase 28 of the compressor may include a conventional embossment 30 which defines a threaded opening 32 therethrough, which communicates with the interior of the compressor, and which is normally closed by means of a threaded plug (not shown).

Mounted on tube section 12 is a coupler means 34 adapted for mounting the tool in access opening 32. Coupler means 34 comprises a ferrule 35 including an externally threaded base section 35*a* and an externally threaded head section 35*b*, separated by an integral nut section 35*c*. Longitudinal passageway 36 through the ferrule member is adapted to receive the tube 12 therein in readily slidable relation.

Coupling means 34 includes sealing means 38 for sealing the tube 12 against oil leakage at the coupling means. Sealing means 38 includes internally threaded sleeve 40, with the threads 42 thereof being adapted for threaded coaction with threaded head 35*b* on the ferrule. Sealing means 38 also includes a deformable collar 44 mounted in sleeve 40 and having a passageway 44*a* therethrough receiving therethrough the tubing section 12. Collar 44 which may be formed of plastic, such as for instance nylon, is movably retained by enlargement 46 in sleeve 40 and is adapted to be deformed by threaded head section 35*b* of the ferrule, upon tightening of the metal sleeve 40 onto the head section, and into sealing, gripping relationship with the tubing section 12, to thus seal the tubing section 12 with respect to the coupling 34 and prevent leakage of

oil about the tube 12 during removal of the oil from the crankcase of the refrigeration compressor mechanism M.

Prior to tightening the sleeve member 40 onto the threaded head 35*b* of the ferrule, the tool including the tube 12 is adjusted by moving it lengthwise with respect to the coupling 34, to position the lower end of the tubing section 12 closely adjacent the bottom wall of the crankcase, thus, ensuring that all of the oil in the crankcase chamber will be exhausted or removed therefrom, and permitting ready use of the tool with different makes of compressors which may have different depths of crankcase chambers in relation to the threaded access opening 32 thereinto. It will be understood that the base 35*a* of the ferrule 35 is first threaded into the threaded opening 32 in the crankcase to mount the tool in the access opening of the crankcase, and as shown in FIG. 1. Movement of the ingress end of the tool into engagement with the bottom of the crankcase tells the serviceman by feel that the end of tube 12 is adjacent the bottom of the crankcase.

After the tubing section 12 is properly positioned with respect to the bottom wall of the crankcase chamber, the sealing sleeve 40 is threaded tightly onto the head section 35*b* of the coupling means, which causes the sealing collar 44 to be urged into gripping, sealing relationship with respect to the tubing section 12, thus sealing the tubing against escape of oil about coupling 34.

Thereafter, the crankcase may be pressurized for instance by use of a valve V (FIG. 1) conventionally found on one end of the compressor mechanism, and to a pressure of approximately 10 to 15 psig, so that the oil in the compressor chamber, which is adapted to be exhausted, is under predetermined pressure, thereafter valve V can be returned to "off" condition.

Prior to pressurization of the compressor crankcase chamber, the handle 48 and associated stem 48*a* of the valve 18 is rotated so as to close the valve 18, so that the oil can not be forced out of the tool past the valve while pressurization of the crankcase chamber is occurring. The end of the disposal conduit 26 can be placed in a suitable discharge container D, which may be disposed close to the compressor, or if conditions prohibit such, can be disposed a considerable distance away from the compressor; or the container D can be disposed at a higher level than the level of the crankcase of the compressor. The valve 18 is then opened so as to permit the pressure in the crankcase chamber to force the oil therein through the ingress end 14 of tube 12, up through the tube through the valve 18, out the stub tube 24, and then out the distal end of the tubing 26 to the container D, thus conveniently and rapidly removing all of the oil from the crankcase of the compressor, and enabling the oil to be removed without contamination of the area around the compressor. Moreover, it will be seen that if the oil level in the crankcase happens to be too high, the tool can be used to remove only a portion of the oil, to lower the level of the oil to the proper height as determined by the compressor manufacturer. Sight glass 49 can be monitored by the serviceman to insure the proper level of oil in the compressor illustrated. Tubing 26 is preferably translucent or transparent so that the flow of oil therethrough can be visually observed.

After all the oil is removed from the crankcase of the compressor and the pressure within the latter has fallen to zero psig, the sealing sleeve 40 can be loosened, and the ferrule 35 can be rotated so as to remove the ferrule from access opening 32 in the crankcase wall whereupon the tool may be removed from opening 32. Thereafter, fresh oil can be placed into the compressor crankcase and the conventional plug can be rethreaded into opening 32 to seal the latter. The oil removed from the compressor crankcase can then be properly disposed of.

Referring to FIG. 4, there is shown another embodiment of the tool. Like parts have been referred to with like reference numbers, except that the suffix prime (') has been added thereto. The tool 10' of this embodiment includes a gooseneck section 52 coupled to the egress end 16' of the tube section 12', and then the gooseneck section 52 is coupled as by means of a threaded connection 53 to the valve 18'. In other respects, tool 10' may be generally similar to that of tool 10 of the first described embodiment.

The gooseneck section of the tool provides utility to the tool when for instance compressors are closely stacked together and not sufficient space is provided between the compressors without interference between parts of the compressors or some other part of the refrigeration mechanism. By rotating the tool about the lengthwise axis of tube section 12' the valve portion 18' can be positioned so as to provide for accessibility in controlling the operation of the handle 48' thereof. With such an arrangement it will be seen that the stem 48*a*' of the operating handle portion 48' is not coaxial with the lengthwise axis of the tube section 12' as is the stem 48*a* of the first described embodiment.

While the tube sections 12 and 12' were described as being made of, for instance copper tubing, it will be understood that such tubing sections can be formed of plastic material such as for instance a flexible plastic material, to enable some flexibility in the tube section 12 or 12' to more readily permit its passage by obstructions that might be found in a crankcase chamber of a compressor. However, a more or less rigid, generally linearly extending tubing section 12 or 12' is preferred for the tool, although a flexible tubing section is useful in conjunction with very close working conditions wherein space for insertion of the tool into the access opening is at a premium.

From the foregoing description and accompanying drawings it will be seen that the invention provides a novel lightweight, portable tool which enables a serviceman to rapidly and expeditiously remove oil from a crankcase of a compressor or the like, and wherein the tool includes an elongated tube having coupling means movable lengthwise of the tube for mounting the tool in an access opening of the crankcase disposed above the bottom wall of the crankcase, and with the coupling means including means for sealing the coupling means with respect to the tube to prevent leakage of oil at the coupling means, and wherein the tube is movable lengthwise with respect to the coupling means prior to actuation of the sealing means, to position the ingress end of the tube closely adjacent to the bottom of the crankcase, for ensuring removal of all of the oil from the crankcase. The invention also provides a novel method for removing oil from the crankcase of a compressor or the like.

The terms and expressions which have been used are used as terms of description and not of limitation and there is no intention in the use of such terms and ex-

pressions of excluding any equivalents of any of the features shown or described, or portions thereof, and it is recognized that various modifications are possible within the scope of the invention claimed.

What is claimed is:

1. In a portable tool for removing oil from a crankcase of a compressor, comprising, an elongated tube having an ingress end and an egress end, coupling means movable lengthwise of the tube adapted for mounting said tool in a threaded axis opening in the crankcase disposed above the bottom wall of the crankcase, said coupling means including means for sealing the coupling means with respect to the tube, the latter extending completely through said coupling means, said sealing means including a sealing collar disposed in an externally accessible sleeve, said collar being adapted to be compressed into gripping, sealed coaction with said tube upon predetermined tightening actuation of said sleeve onto said coupling means to prevent leakage of oil between said tube and said coupling means, said tube being selectively movable generally lengthwise and with respect to said coupling means prior to sealing actuation of said sealing means, to position the ingress end of said tube close to the bottom of the crankcase when said tool is mounted on the crankcase, for insuring the removal of substantially all of the oil from the crankcase, valve means coacting with said tube in mounted relation thereon for controlling the flow of liquid through said tube and said valve means downstream from said ingress end of said tube for conveying oil from the crankcase through said valve means to a distal location with respect to said tube, said coupling means comprising a ferrule member having an externally threaded base section adapted to be received in threaded coaction in the threaded access opening in the crankcase, an intermediate exteriorly accessible ferrule actuation section providing for selective rotation of said ferrule member, and an externally threaded head section coaxially disposed with respect to said base section and said intermediate section, said sleeve being internally threaded and disposable in threaded coaction with said threaded head section, the latter coacting with said collar for causing squeezing of the collar into sealing relationship with respect to the tube and with respect to said head section upon predetermined threading of said sleeve onto said head section, said threaded base section, said intermediate ferrule actuation section and said sealing means providing rapidly actuatable means for mounting the tool on the crankcase and whereby said tube can be rapidly adjusted lengthwise thereof to locate said ingress end adjacent the bottom of the crankcase and said tube can be placed in sealed relation with respect to said ferrule member, and also providing for rapid removal of the tool including said coupling means from mounted relation on the crankcase, upon completion of the oil removing operation and without total disassembly of said coupling means.

2. In combination, a portable tool for removing oil from a crankcase of a compressor for a refrigeration unit, and the crankcase, said crankcase having a threaded access opening disposed above the bottom wall of said crankcase, said tool comprising an elongated tube having an ingress end and an egress end, coupling means movable lengthwise of said tube mounting said tool in said threaded access opening in said crankcase, said coupling means including means for sealing the coupling means with respect to the tube, said sealing means including a sealing collar disposed in an externally accessible sleeve, said collar being adapted to be compressed into gripping sealed coaction with said tube upon predetermined tightening actuation of said sleeve onto said coupling means to prevent leakage of oil between said tube and said coupling means, said tube being movable generally lengthwise with respect to said coupling means prior to sealing actuation of said sealing means to position the ingress end of said tube close to the bottom of the crankcase when the tool is mounted on the crankcase for insuring the removal of substantially all of the oil from the crankcase, valve means coacting with said tube in mounted relation thereon for controlling the flow of liquid through said tube and said valve means, flexible conduit means coacting with said valve means downstream from said ingress end of said tube for conveying oil from the crankcase through said valve means to a distal location with respect to said tube, said coupling means comprising a ferrule member having an externally threaded base section received in threaded coaction in said threaded access opening in the crankcase, and an externally threaded head section coaxially disposed with respect to said base section, said sleeve being internally threaded and disposable in threaded coaction with said threaded head section, the latter coacting with said collar for causing squeezing of the collar into sealing relationship with respect to the tube and with respect to said head section upon predetermined threading of said sleeve onto said head section, said threaded base section and said sealing means providing rapidly actuatable means for mounting the tool on the crankcase whereby said tube can be rapidly adjusted lengthwise thereof to locate said ingress end adjacent the bottom of the crankcase and said tube can be placed in sealed relation with respect to said ferrule member, and also providing for rapid removal of the tool from mounted relation on the crankcase, and with said tube extending completely through said ferrule member, said collar and said sleeve into the interior of said crankcase and being maintained in predetermined gripped position by the coaction between said collar and said tube and between said collar and said sleeve.

3. The combination in accordance with claim 2 wherein said tube is flexible.

4. The combination in accordance with claim 2 wherein said tube is substantially linear and said valve means is mounted on one end of said tube, said valve means including an actuating stem portion disposed substantially coaxial with said tube.

5. The combination in accordance with claim 2 wherein said tube has a gooseneck portion at one end with said valve means being downstream of said gooseneck portion in a direction toward the distal end of the latter.

6. The combination in accordance with claim 2 wherein said valve means includes a manually operable handle portion comprising a stem disposed in alignment with the lengthwise axis of said tube, said valve means also including a discharge port the axis of which is disposed generally perpendicular to the lengthwise axis of said tube.

7. The combination in accordance with claim 2 wherein said sealing collar is formed of plastic material, such as for instance nylon.

8. In the method of removing oil from a crankcase of a compressor of a refrigeration unit through a threaded access opening therein disposed above the bottom wall of the crankcase, comprising, providing a portable tool which includes an elongated tube having an ingress end and an egress end, a valve means on the tube for controlling the flow of liquid through the tube, and a coupler mounted on the tube and movable lengthwise thereof, said coupler including actuatable means for selectively sealing the coupler with respect to the tube and means for threadedly mounting the coupler and tube in said opening comprising, inserting the ingress end of the tube into said opening and threading the coupler into the access opening in the crankcase to movably mount said tube of the tool in the access opening, moving the tube generally lengthwise with respect to and through the coupler so as to position the ingress end of the tube closely adjacent the bottom of the crankcase, actuating the sealing means to hold and seal the selectively positioned tube with respect to the coupler for preventing escape of oil thereabout, closing the valve means and pressurizing the crankcase so that the oil in the crankcase of the compressor is urged outwardly of the tube toward said valve means by the pressure in said crankcase, opening the valve means to permit the flow of oil from the crankcase through the tube and the valve means, and utilizing a flexible conduit means coacting in communicating relation with the valve means to convey the oil passing from the crankcase through said valve means to a location distant from the crankcase, and then depressurizing the crankcase, deactuating the sealing means so as to release the hold of the latter on said tube, unthreading the coupler from the access opening in the crankcase, and removing the tool including the tube and coupler from the access opening.

9. A method in accordance with claim 8 wherein said actuation of the sealing means includes the step of threading a rotatable sleeve of the coupler onto a threaded head portion of the coupler to deform a collar disposed in the sleeve into gripping sealed coaction with the tube for holding and sealing the tube with respect to the coupler, after the tube has been positioned with respect to the bottom of the crankcase.

10. A method in accordance with claim 8 wherein the tool includes a gooseneck portion with the valve means disposed downstream of the gooseneck portion, and swinging the gooseneck portion with respect to the lengthwise axis of the tube, so as to provide clearance to adjust the valve means with respect to adjacent obstructions prior to actuation of the sealing means into holding and sealing relationship with the tube, thus permitting control of the valve means for egress of oil from the crankcase and without interference from adjacent obstructions.

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