Oct. 29, 1968 C. E. RENNER 3,407,430

VACUUM CLEANER CONSTRUCTION FOR USE INSIDE TANKS

Filed April 20, 1967

Fig. 1

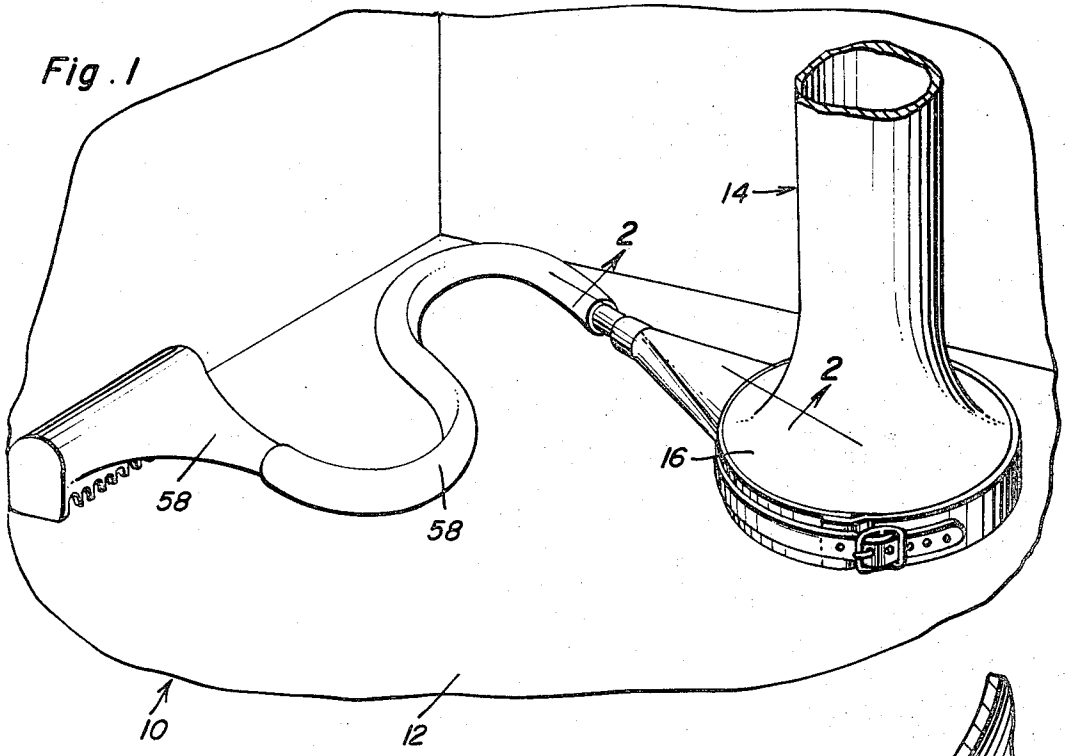


Fig. 2

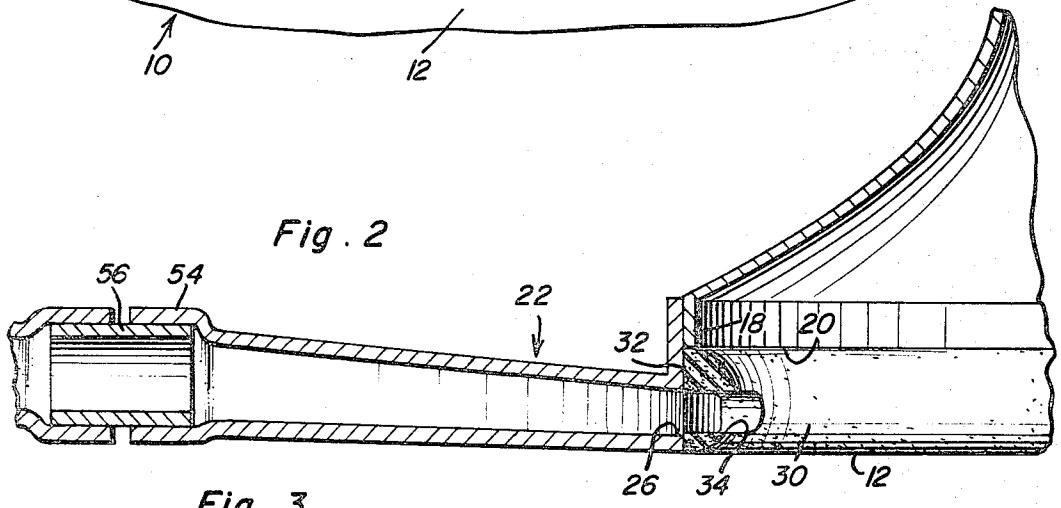
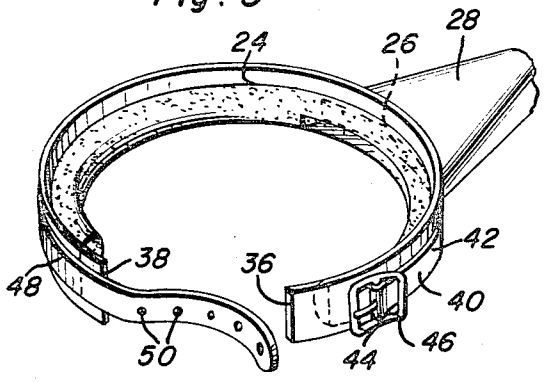


Fig. 3



Carl E. Renner

INVENTOR.

BY Clarence A. O'Brien and Harvey B. Jacobson

Attorneys

United States Patent Office 3,407,430
Patented Oct. 29, 1968

3,407,430

VACUUM CLEANER CONSTRUCTION FOR USE INSIDE TANKS

Carl E. Renner, 3824 Rachel Ave.,
Port Arthur, Tex. 77640

Filed Apr. 20, 1967, Ser. No. 632,252
9 Claims. (Cl. 15—314)

ABSTRACT OF THE DISCLOSURE

An annular adapter which may be secured to the lower end portion of a fill and discharge pipe projecting downwardly into a fluid tank and terminating at its lower end a slight distance above the bottom of the tank, the annular adapter being operable to form a fluid-tight seal between the lower end of the pipe and the bottom of the tank and including an outwardly projecting hollow neck portion communicated with the interior of the annular adapter at its inner end and including an outer end portion adapted to have the outlet end of a vacuum conduit secured thereto, whereby a suitable source of vacuum may be operatively connected to the fill and discharge pipe exteriorly of the associated tank and a vacuum hose may be connected to the neck of the adapter for vacuuming the interior of the tank.

The vacuum cleaner attachment of the instant invention is adapted to be utilized in transforming the fill and discharge pipe of a large tank into a portion of a vacuum conduit whereby the interior of the tank may be readily vacuumed by a workman disposed therein when a suitable source of vacuum is operatively communicated with the fill and discharge pipe exteriorly of the tank.

Large tanks such as that utilized on oil tankers and the like include large diameter fill and discharge pipes which project downwardly into the tanks and terminate downwardly a spaced distance above the bottom of the tank. In this manner, these pipes may have oil or any suitable fluid which is to be carried in the tanks pumped therethrough to fill the tank. In addition, the same pipes may be utilized to drain substantially all of the oil from within the tanks. Inasmuch as the lower ends of these fill and discharge pipes terminate downwardly only slightly above the bottoms of the associated tanks, it would be practically impossible to apply a closing cap to the lower end of one of these fill and discharge pipes since there is insufficient clearance between the lower ends of these pipes and the bottom of the associated tank to apply such a cap.

However, a split annular member may be opened to be slipped around the pipe and then slid downwardly to the lower end thereof in contact with the bottom of the pipe and then tightened about the pipe so as to provide a closure for the end of the pipe. If such an annular member is provided with a neck portion whose inner end is in registry with the volume of the tank immediately below the lower end of the pipe, then a suitable vacuum conduit may be connected to the neck and the pipe may be connected to a suitable source of vacuum exteriorly of the tank so as to transform the pipe into a portion of the vacuum conduit by which workmen within the tank may vacuum the same.

Accordingly, it is the main object of this invention to provide such an adapter for use inside a large tank and therefore enable the fill and discharge pipe of the tank to be converted into a portion of a vacuum conduit for vacuuming the interior of the tank clean.

Another object of this invention, in accordance with the immediately preceding object, is to provide an adapter which will be adjustable in size so as to be adapted to be utilized in conjunction with fill and discharge pipes of various diameters.

A still further object of this invention is to provide an annular adapter in accordance with the preceding objects and constructed in a manner whereby the split portion thereof may have its end edge portion disposed in overlapped engagement with each other and yet still be operable to form a relatively good air-tight seal between the lower end of the associated fill and discharge pipe and the bottom of the associated tank.

A final object of this invention to be specifically enumerated herein is to provide a vacuum cleaner attachment in accordance with the preceding objects and 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 reside 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 refere to like parts throughout, and in which:

FIGURE 1 is a fragmentary perspective view of the interior of a tank downwardly into which a fill and discharge pipe having a flared lower end spaced slightly above the bottom of the tank projects, the vacuum cleaner attachment of the instant invention being operatively associated with the flared lower end portion of the fill and discharge pipe as well as the bottom of the tank;

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

FIGURE 3 is a fragmentary perspective view of the attachment of the instant invention.

Referring now more specifically to the drawings the numeral **10** generally designates a large tank in which fluid is adapted to be received and including a bottom wall **12**. The tank **10** includes a fill and discharge pipe generally referred to by the reference numeral **14** and which projects downwardly through an opening in the upper portion of the tank **10** and includes a flared lower end portion **16** spaced slightly above the bottom wall **12** of the tank **10**. The flared lower end portion **16** of the pipe **14** includes a cylindrical terminal end portion **18** whose lower annular edge **20** is spaced only slightly above the bottom wall **12**, the latter being spaced approximately two inches below the annular edge **20**.

The attachment of the instant invention is generally referred to by the reference numeral **22** and includes a split generally cylindrical ring member **24** constructed of any suitable stiff but flexible and somewhat resilient material. The ring member **24** includes a circumferentially extending slot **26** formed in and extending along a lower portion of the ring member **24** and the latter includes a funnel-type neck **28** projecting generally radially outwardly of the ring member, formed integrally therewith and opening into the interior of the ring member **24** through the opening **26**.

The bottom two-thirds of the ring member **24** has a seal member **30** secured to its inner surface portions in fluid-tight sealed engagement therewith and the seal member **30** is generally semicylindrical in cross-sectional shape with its convex surfaces opening inwardly of the ring member **24** and its cylindrical surface portion **32** abutted against and secured to the inner surfaces of the ring member **24**. The seal member **30** has a circumferentially extending slot **34** formed therein in registry with the slot **26** and the seal member **30** extends circumferentially about the ring member **24** from a point spaced slightly from one end edge **36** of the ring member to a point

spaced slightly from the other end edge 38 of the ring member 24.

A section 40 of flexible strap has one end 42 thereof secured to the ring member 24 while the other free end 44 thereof has a buckle 46 secured thereto. In addition, a second strap section 48 has one end secured to the end of the ring member 24 remote from the end thereof to which the strap section 42 is secured and the other end of the second strap section 48 is suitably apertured at points spaced longitudinally therealong whereby the free end of the section 48 may be secured to the free end of the section 40 in adjusted overlapped engagement therewith so as to vary the effective circumference of the ring member 24 and thus adapt the latter for clamping engagement with pipes such as pipe 14 but including flared lower end portions of different diameters.

The opposite ends of the seal member 30 are spaced from the end edges 36 and 38 of the ring member 24 in order that the opposite ends of the ring member 24 may be readily secured together in adjusted overlapped relation.

The seal member 30 is operable to form a relatively fluid tight seal between the annular end edge 20 and the bottom wall 12 so as to thereby close the lower end of the pipe 14 except for the neck 28 which tapers outwardly into a generally cylindrical fitting portion 54 in which an adapter sleeve 56 has one end telescoped so as to operably connect the discharge end of a flexible conduit section 58 to the neck 28, the other end of the connecting sleeve 56 being telescoped into the discharge end of the flexible conduit 58.

The end of the flexible conduit 58 remote from the neck 28 has a vacuum nozzle 58 operatively connected thereto and accordingly, when the end portion of the pipe 14 disposed exteriorly of the tank 10 is operatively connected to a suitable source of vacuum, the nozzle 58 may be utilized to vacuum clean the interior surfaces of the tank 12.

The seal member 30 may project slightly below the lower surface portions of the ring member 24 and may be of a vertical height so as to be slightly vertically compressed upon the ring member 24 being clamped about the flared lower end 16 of the pipe 14. However, the seal member 30 should not project below the lower surface of the ring member 24 when the latter is clamped about the flared lower end portion 16 of the pipe 14 in order that the free end portions of the ring member 24 not having the seal member 30 secured thereto may be in relatively good surface-to-surface and thus reasonably fluid-tight engagement with the bottom wall 12 of the tank 10.

The foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to 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 as new is as follows:

1. In combination with a large volume liquid tank including a bottom wall and a filling and discharge pipe projecting downwardly into said tank and including an open lower end spaced slightly above and opening outwardly toward said bottom wall, a vacuum attachment comprising a sleeve member removably secured about the lower end portion of said pipe and projecting therebelow, said sleeve member being in at least reasonably good fluid tight sealed engagement with said bottom wall and the lower end of said pipe, said sleeve member including passage means extending through at least one wall portion thereof below said lower end and adapted to have the discharge end of a flexible vacuum conduit operatively communicated therewith, whereby a suitable source of vacuum may be communicated with the end of said pipe disposed exteriorly of said tank and said vacuum conduit may then be used to vacuum clean the interior of said tank.

2. The combination of claim 1 wherein said sleeve member comprises a split band including opposite end portions removably secured together.

3. The combination of claim 2 wherein the opposite end portions of said band include means operable to secure said portions together in adjusted end overlapped relation.

4. The combination of claim 1 wherein said sleeve member includes an outwardly projecting hollow neck opening inwardly through said sleeve member and comprising said passage means.

5. For use in combination with a large volume liquid tank including a bottom wall and a filling and discharge pipe projecting downwardly into said tank and including an open lower end spaced slightly above and opening outwardly toward said bottom wall, and a vacuum attachment comprising a split sleeve member including opposite end portions provided with means for removably securing said end portions together and therefore adapted to clamp said sleeve member about the lower end of said pipe with said sleeve member projecting below said lower end portion and in contact with said bottom wall with said sleeve member in reasonably good fluid tight sealed engagement with said pipe and bottom wall, said sleeve member including passage means extending through at least one wall portion thereof and adapted to be disposed below said lower end and to have the discharge end of a flexible vacuum conduit operatively communicated therewith, whereby a suitable source of vacuum may be communicated with the end of said pipe disposed exteriorly of said tank and said vacuum conduit may then be used to vacuum clean the interior of said tank.

6. The combination of claim 5 wherein the opposite end portions of said band include means operable to secure said portions together in adjusted end overlapped relation

7. The combination of claim 5 wherein said sleeve member includes an outwardly projecting hollow neck opening inwardly through said sleeve member and comprising said passage means.

8. The combination of claim 1 wherein said sleeve member includes resilient seal means secured to and extending about at least a major portion of the inner surface of said sleeve member and forming a good fluid tight seal with the opposing portions of the lower end edge of said pipe and said bottom wall.

9. The combination of claim 5 wherein said sleeve member includes an outwardly projecting hollow neck opening inwardly through said sleeve member and comprising said passage means, said hollow neck being formed as an integral portion of said sleeve member.

References Cited

UNITED STATES PATENTS

1,184,201	5/1916	Niemeyer	15—338
2,871,504	2/1959	Gall et al.	15—338

EDWARD L. ROBERTS, *Primary Examiner.*