

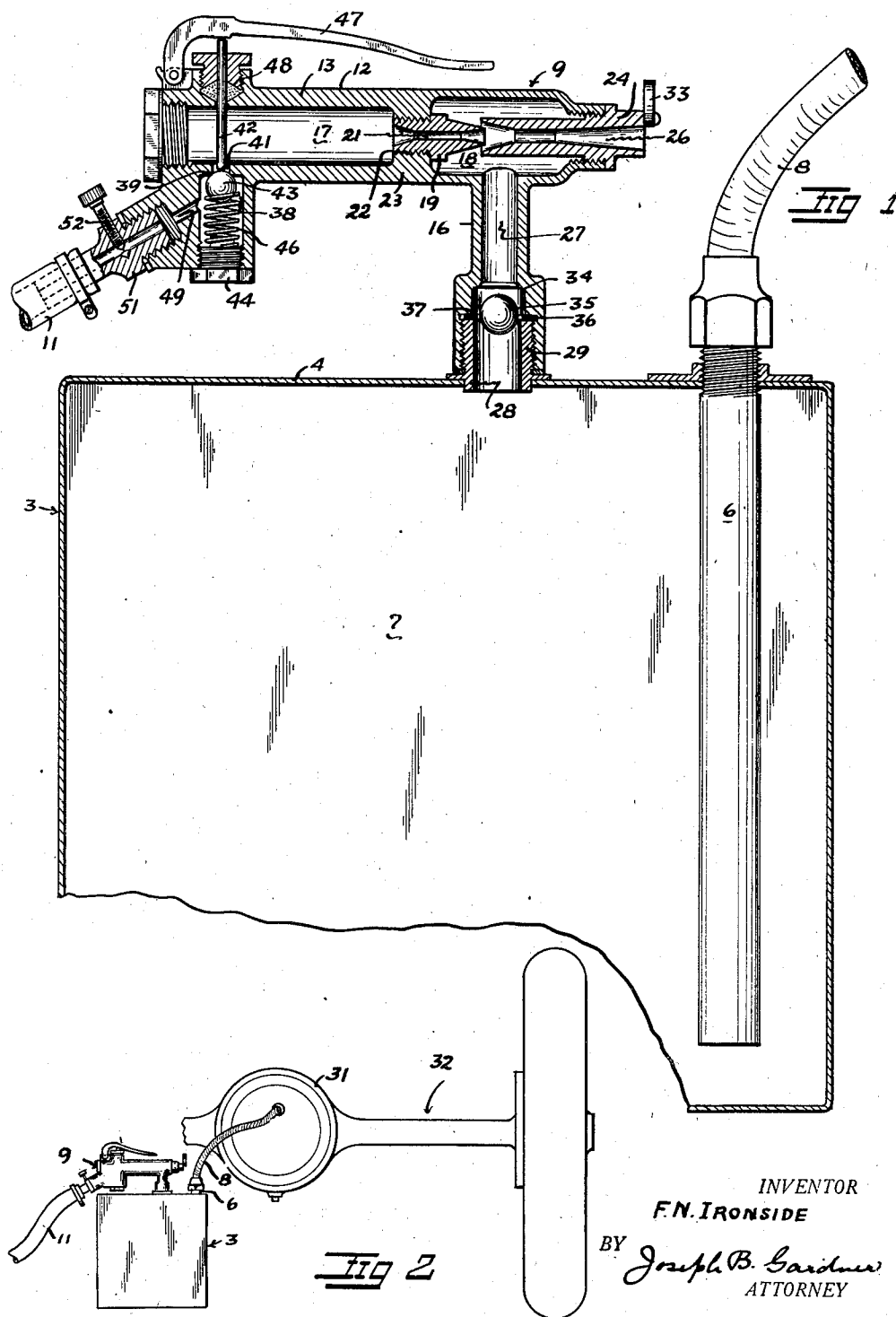
Jan. 1, 1935.

F. N. IRONSIDE

1,986,476

LIQUID HANDLING DEVICE

Filed March 24, 1928



INVENTOR
F. N. IRONSIDE
BY *Joseph B. Gardner*
ATTORNEY

UNITED STATES PATENT OFFICE

1,986,476

LIQUID HANDLING DEVICE

Frederick N. Ironside, Oakland, Calif., assignor of
one-half to Thomas M. Towne, Cleveland,
Ohio

Application March 24, 1928, Serial No. 264,551

5 Claims. (Cl. 184—1.5)

The invention relates to a device for transferring liquids between different containers therefor, and particularly to a device for transferring heavy oils and fluid greases.

5 An object of the invention is to provide a device of the character described whereby liquid may be supplied to or removed from a given container with equal facility.

10 Another object of the invention is to provide for the operation of the device by pneumatic means.

15 A further object of the invention is to provide in the device particularly simple and efficient means for adjustably controlling the operative pressures therein.

A still further object of the invention is to provide in the device means operative to prevent an over filling of a container forming a part of the structure.

20 The method of operating and of handling the liquid is the subject of a separate, co-pending application, Serial No. 353,010, filed by myself and Thomas M. Towne.

25 The invention possesses other objects and features of advantage, some of which, with the foregoing, will be set forth in the following description of the preferred form of the invention which is illustrated in the drawing accompanying and forming part of the specification. It is to be 30 understood, however, that variations in the showing made by the said drawing and description may be adopted within the scope of the invention as set forth in the claims.

Referring to said drawing,

35 Figure 1 is a vertical and generally sectional view of apparatus embodying the invention, a portion of a container of the apparatus being broken away.

40 Figure 2 is a reduced view showing the apparatus disposed for use in effecting a removal of the lubricant from a differential casing of a motor vehicle.

45 The present and preferred embodiment of the device of my invention comprises a relatively small and portable closed tank 3 having a top wall 4 through and from which a conduit 6 extends. The conduit end within the tank cavity 7 is disposed adjacent the bottom of said cavity, while a flexible hose 8 of required length is coupled to the outer conduit end by a suitable coupling.

50 It will now be noted that if a sub-atmospheric pressure be created in the tank cavity 7 while the free end of the hose 8 is immersed in a liquid, 55 such liquid will be drawn into the tank through

the hose as long as such sub-atmospheric pressure obtains in the tank. On the other hand, if the tank contains liquid above the bottom end of the conduit 6 and a pressure exceeding atmospheric be created in the tank, the liquid 5 will be forced from the tank through the conduit and hose as long as said conduit end is immersed therein and said pressure exceeds that of the atmosphere. These relations, it will be noted, form the basis of operation of the present 10 device, and means are accordingly provided for effecting the desired pressure conditions in the tank when and as required, such means essentially comprising an air compressor (not shown) and a control means 9 operatively connected between the tank 3 and a hose 11 from the compressor.

As herewith particularly disclosed, the control means 9 comprises a unitary structure having a body 12 which provides a mounting for the 20 various operative parts of the device. In the present embodiment, the body 12 comprises a generally cylindrical intermediate portion 13 and radial extensions 14 and 16. An air passage extends longitudinally through the body 25 portion 13, and said passage is divided to define portions 17 and 18 thereof by means of a nozzle 19 disposed therein. The nozzle 19, it will be noted, provides a bore 21 and extends somewhat into the passage portion 18 axially 30 thereof, it being noted that the diameter of the passage portion 18 is somewhat greater than that of the nozzle. As here shown, the nozzle 19 comprises a separate member threadedly engaged in an axial perforation 22 of a transverse partition 23 in the body passage, whereby the nozzle and partition cooperate to separate the passage portions 17 and 18, it being obvious, however, that the nozzle might be formed as an 40 integral part of the body.

Mounted in the passage portion 18 to extend axially therethrough and therefrom is a tubular member 24 having the bore 26 thereof aligned with the nozzle bore and preferably somewhat larger than the latter bore whereby air discharged from said nozzle will move freely into the bore 26. Preferably, and as show, the nozzle tip is disposed to extend slightly within the inner end of the bore 26, and such bore is slightly larger than said tip whereby an annular opening is defined between the nozzle tip and the 50 opposed portion of the member 24. For securing the member 24 in the position now described, the latter is here shown threadedly engaged in the outer end of the passage 18. 55

The body extension 16, it will now be noted, extends radially from the body portion 13 at the passage portion 18 therein and is provided with a passage 27 therethrough communicating with said passage portion and arranged for connection to the tank cavity 7. As herewith particularly shown, the top wall 4 of the tank is provided with a perforation 28 having a sleeve 29 mounted thereat, and the free end of the body extension 16 is threadedly engaged with said sleeve. In this manner, the tank is arranged to provide the mounting for the body 12 and the passage portion 18 is connected with the tank cavity by means of the passage 27. Preferably, and as shown, the control means is so disposed with respect to the tank as to provide a convenient handle therefor, the body portion 13 being disposed in parallel spaced relation from the top wall 4 of the tank.

It will now be clear that the passage portion 18 constitutes a chamber having three openings—namely, the nozzle bore 21, the bore 26 of the member 24, and the passage 27. If, now, an air stream under pressure be introduced through the nozzle 19, its flow through the bore 26 of the member 24 will draw air with it from the chamber 18 and so tend to create a vacuum in said chamber, with the result that the continued removal of air will draw air from the tank cavity. In this manner, if the free end of the hose 8 is immersed in a liquid, as in the grease of the differential housing 31 of the motor vehicle 32 illustrated in Figure 2, the latter will be drawn into the tank cavity in a well understood manner. If, on the other hand, the bore 26 of the member 24 be closed, the air discharged from the nozzle 19 will flow into the tank cavity and so create a pressure therein for emptying said cavity of any liquid down to the level of the intake of the conduit 6. In this manner, the introduction of air into the chamber 18 through the nozzle 19 may be utilized either to draw a liquid into the tank 3 or to force a liquid from the tank to a desired point of delivery.

Any suitable means may be utilized for closing the bore 26 of the member 24 when liquid is to be delivered from the tank in the manner described. As here shown, a disc-shaped member 33 is pivoted at one edge thereof to the free end of the member 24 whereby it may be swung across the mouth of the bore 26 when the bore is to be closed. As shown, the member 33 is disposed out of the way, when a suction is to be created in the tank. It will be obvious that other closure means for the bore 26 might be provided—in fact, it has been found satisfactory to close the bore opening simply by the application of a finger thereto.

Means are preferably provided for preventing an over-filling of the tank with liquid while the suction of the device is operative thereagainst, and as shown, such means comprises the provision of a valve arranged to be operated by the liquid in the tank. As herewith particularly disclosed, the passage 27 of the body portion 16 is formed to provide a downwardly directed seat 34 against which a valve plug 35 is arranged to engage. Preferably, and as shown, the seat 34 is annular and the plug 35 is in the form of a ball of somewhat smaller diameter than the bore of the passage 27 below the seat 34. Support of the ball from below is arranged to be effected by means of a perforated member 36 mounted at and against the upper end of the tank sleeve

29. In the present embodiment, the member 36 is in the form of a flat annulus having inwardly extending projections 37 cooperative to engage and support the ball just below its mid-section. In this manner, a maximum surface of the ball is exposed to liquid moving upwardly thereagainst through the sleeve 29 whereby the impact of such liquid against the ball is arranged to displace the ball toward the seat 34 where it will be held by the suction. The ball is of course heavy enough to resist displacement from its normal position on the member 36 by reason of the suction alone and its volume and weight relations are preferably such that it will float in the liquid. In this manner, if the before mentioned impact of the liquid is not sufficient to effect a seating of the ball, the latter is arranged to be floated to its seat, and the sealing of the passage 27 is assured. It will now be obvious that a particularly simple valve means is provided for preventing any liquid from reaching the chamber 18 of the control device.

Means are preferably provided as part of the control device for regulating the flow of air from the compressor hose 11 and through the nozzle 19. Accordingly, and as shown, the body extension 14 is provided with a longitudinal passage 38 extending therethrough into the body passage portion 17, said passage being reduced at its inner end to provide a seat 39 and a port 41 between the seat and body passage 17. Extending transversely through the body 12 and axially through the port 31 is a valve stem 42 operatively related to a valve plug 43 disposed in the passage 38 and arranged for engagement with the seat 39—as shown the plug 43 comprises a ball. The free end of the passage 38 is here shown closed by means of a screw plug 44, and a compression spring 46 is operatively engaged between said plug and the valve plug 43 whereby the latter will be constantly urged to maintain a seated position. Manual actuation of the valve stem 42 is arranged to be effected by means of a lever 47 pivoted to the body at the opposite side thereof from the body extension 14, said lever being normally disposed substantially parallel to the intermediate body portion 13 whereby the fingers of an operator's hand are arranged to simultaneously enclose said lever and body portion. The stem 42 freely engages in the port 41 and is preferably passed through a stuffing box 48 at its point of emergence from the body portion 13. In this manner, the operator is permitted to control the operation of the device directly thereat and in a convenient manner.

Air is arranged to be introduced to the passage 38 through a passage 49 provided in the body portion 14, the latter passage being here shown provided in the wall defining the passage 38. Connection of the hose 11 with the passage 49 is provided by means of a connecting member 51 threadedly engaged with the body portion 14 at the inlet end of the passage 49 and having a reduced portion for insertion in the hose whereby the latter may be clamped about it.

Since available pressures may vary and will usually be greater than those required for a most satisfactory operation of the device now described, a throttle means is preferably provided for adjustably controlling the pressure of the air delivered at the nozzle 19. As here shown, such means is provided in the hose connecting member 51 and comprises a needle valve 52 threadedly engaged therein and arranged to have

the inner end thereof adjustably interposed in and across the passage of said member.

It will now be noted that the device is particularly intended for use in transferring liquids between various containers therefor. Thus, if the device is to be used for changing the lubricant in the differential housing 31, the tank 3 might first be charged with a flushing liquid from a container thereof and such liquid then discharged in the differential housing cavity. The mixed lubricant and flushing fluid would then be drawn into the tank from the differential housing, whence it would be discharged into a waste container. The tank would then be charged with fresh lubricant, and the discharge of such lubricant into the differential housing would complete the change. It will thus be clear that all of the essential operations in changing the lubricant are arranged to be effected by use of one device, the cavity of the tank essentially constituting a transfer chamber in the process.

In using the device for introducing a flushing liquid into a housing for a differential or other mechanism, it will be noted that after the level of liquid in the tank falls below the intake of the conduit 6, the air will be emitted from the conduit under pressure. The air thus emitted from the hose would be used to create turbulence in the flushing liquid and any liquid or grease to be removed, and so insure a distribution of the flushing liquid to all parts of the mechanism in the housing and a thorough mixing thereof with the matter to be removed. This feature respecting the use of the device is particularly valuable and constitutes an important element of the present invention.

I claim:

1. In a device for flushing a receptacle and withdrawing liquid therefrom, comprising a closed tank, a conduit arranged to form the means of communication between said tank and receptacle, and manually controlled means including an aspirator associated with the tank for forcing liquid and air separately from the tank to the receptacle and liquid from the receptacle to the tank exclusively by way of said conduit.

2. A flushing apparatus comprising a portable container, a single working pipe only extending from said container and open thereto near the bottom of the same, an air-operated aspirator adapted for operation from a compressed air line connected to the upper part of the container for exhausting the same and creating a suction in said pipe, said aspirator formed and arranged to permit manual diverting of the compressed air into the container for forcing the contents thereof out through said pipe.

3. A flushing apparatus comprising a portable container, a single working pipe only extending from said container and open thereto near the bottom of the same, an air-operated aspirator adapted for operation from a compressed air line connected to the upper part of the container for exhausting the same and creating a suction in said pipe, and a manually operated valve on said aspirator for interrupting the aspirator action and diverting the compressed air into the container for creating a pressure therein and forcing the contents of the container out through said pipe.

4. In a flushing apparatus, means for creating alternate pressure and suction comprising an air-operated aspirator taking the form of a hollow T so as to form a carrying handle, and a manually operable compressed-air admitting valve on the cross run of the T, the other end of the cross run being open for the exhaust and adapted for manual closing by the carrying hand of an operator to divert the compressed air down the leg of the T.

5. An apparatus for flushing a receptacle and withdrawing the contents therefrom, comprising a container, means to establish a passage for fluid between said container and receptacle, and an air-operated aspirator communicating with said container and adapted for operation from a compressed air-line, said aspirator formed and arranged to permit manual diverting of compressed air into said container and for forcing same through said first means to said receptacle.

FREDERICK N. IRONSIDE.