This invention relates to improvements in a liquid lifting device and refers more particularly to a receptacle to be placed on a portable vehicle with a connection to a vacuum source such as a manifold of an internal combustion engine, in order to lift liquids from reservoirs located below the level of the device. Considerable difficulty has been experienced by utility companies, such as the water, gas and electrical departments of municipalities in draining wells, sumps or reservoirs of water surrounding gauges or meters which are to be read or serviced. As a usual thing, a power or manually operated suction pump or bailing device is resorted to, making for delay and expense in labor costs.

One object of the present invention is to supply a simple device operated from the vacuum created in the inlet manifold of an internal combustion engine, functioning automatically through a vacuum receptacle to draw water into the receptacle and automatically dump the receptacle when full.

Another object of the invention is to eliminate the necessity of using a separate power or manually operated suction pump, as well as the necessity of tediously bailing by hand water from a below-ground reservoir or well.

In the accompanying drawing which forms part of the instant specification and is to be read in conjunction therewith and in which like reference numerals are used to indicate like parts in the various views;

Fig. 1 is a diagrammatic side elevational view of a portion of an automotive vehicle with a vacuum device positioned on the running board.

Fig. 2 is an enlarged sectional view of the float and vacuum relief valve assembly.

Fig. 3 is an enlarged sectional view of a portion of the vacuum receptacle with parts broken away.

Fig. 4 is a view taken along the line 4—4 of Fig. 2, looking in the direction of the arrows.

The art is replete with patents showing the use of a vacuum tank for transferring liquid from a reservoir positioned at the rear of an automotive vehicle to the engine under the hood and, in fact, this was the conventional method of feeding fuel to an internal combustion engine before the present fuel pump was developed. Typical of such patents are the patents to W. R. Hendricks, No. 1,751,772, dated July 16, 1929, and R. C. Huff, No. 1,399,964, dated December 13, 1921.

Likewise, it is recognized that the suction created in the inlet manifold of an internal combustion engine has been employed to create a vacuum upon an auxiliary tank or receptacle to pump or lift liquids as shown in the patent to H. J. Weiershauer, No. 1,383,861, dated October 18, 1921.

Applicant's device, however, is distinguishable from this art by the features of the float and vacuum relief valve assembly and the utilization of an air inlet standpipe which discharges air above the level of the liquid during the emptying operation, assuring rapid and complete exhaustion of the liquid from the vacuum receptacle. Referring to the drawing, a vacuum receptacle 1, consisting of a metal tank of any convenient shape, is positioned on the running board 2 of a vehicle 3. The vehicle is driven by an internal combustion engine, diagrammatically shown at 4, having an inlet manifold 5. On top of the receptacle is mounted a valve body 6 which has the form of a T-shaped connection, the lower leg 6a communicating with the vacuum receptacle 1; the upper leg 6b has an opening to the atmosphere; and the intermediate leg 6c is connected by means of a pipe 7 to the inlet manifold 5.

Details of the float and valve assembly are shown in Fig. 2. Around the lower leg 6a of the valve body is a flange 8 which, when seated on a compressible gasket 9 forms a pressure-tight fit between the vacuum receptacle and the lower leg 6a of the valve body. This portion of the valve body is threaded to receive a clamping ring 10 which draws the flange 8 tightly against the gasket 9. Within the valve body is positioned a guide member 11 which is centered at the top and bottom by perforated flanges 12 and 13 respectively. A perforated disk 14 is positioned at the upper extremity 6b of the valve body, serving as a seat for the valve 15 and acting as a closure for the opening in the disk 14 when vacuum is being imposed on the receptacle 1. The valve 15 is mounted on the upper extremity of the valve stem or rod 17, held centrally in the valve body by the guide 11. On the lower extremity of the rod 17 is a float 18 which rises and lowers with the rise and fall of liquid in the receptacle 1.

Also having communication with the top of the vacuum receptacle by means of a tapped boss 19 is an elbow 20 and flexible hose 21.

In the bottom of the receptacle is a liquid discharge opening 22 and an air vent opening 23, both of which are closed by means of a weighted flap valve 24, hinged at 26 to the bottom of the receptacle. The flap valve fits against a com-
pressible gasket 26, assuring a liquid-tight fit between the flap valve and the bottom of the vacuum receptacle. Attached to the flap valve is a rod 27 upon which is mounted an adjustable weight 28, the rod being positioned at a proper angle with the flap valve to hold it in a closed position as shown in full lines in Fig. 3. In the air vent opening 23 is a standpipe 29 which is sufficiently long to rise above the upper level of the liquid maintained in the vacuum receptacle by float 18.

In operation, a vacuum is created in the receptacle 1 by suction through the pipe 7 from the inlet manifold 5. The vacuum receptacle being empty, the float is in a lowered position, lowering valve 15 to a seated position on the disk 14, as shown in full lines in Fig. 2, thereby sealing the receptacle from communication to the atmosphere at the top. The hinged flap valve 24 is likewise seated as shown in full lines in Fig. 3, due to the effect of the weight 28. The flexible tubing or hose 21 is then immersed in the liquid to be raised or drawn from the reservoir. Vacuum is imposed upon the receptacle driving the liquid into the receptacle as long as the lower end of the tube 21 is immersed. When the liquid has risen to a height in the vacuum receptacle that it lifts the float 18, valve 15 will be raised from its seat and the vacuum seal broken in the receptacle, thus permitting the weight of a column of fluid to break the seal of the weighted flap or dump valve 24, discharging the water through the outlet 22 onto the surface of the ground. As the liquid is discharged from the vacuum receptacle, air is admitted through the tube 23 and standpipe 29 to the receptacle to displace the water discharged therefrom.

The height that liquid can be raised by this device depends upon the viscosity of the liquid and the value in inches of mercury of the vacuum created in the receptacle by suction of the intake manifold. The economy of the device and its efficiency in operation lends itself readily to removal of water from wells, sumps and reservoirs of small capacity.

The device is adaptable as well to use as a ballasting apparatus for power boats driven by internal combustion engines. The vacuum line to the receptacle would be connected to the engine, the liquid suction pipe immersed in the bilge and the discharge valve located above the level of the water body in which the boat is floating.

It will be understood that certain features and subcombinations are of utility and may be employed without reference to other features and sub-combinations. This is contemplated by and is within the scope of my claims. It is further obvious that various changes may be made in details within the scope of my claims without departing from the spirit of my invention. It is, therefore, to be understood that my invention is not to be limited to the specific details shown and described.

Having thus described my invention, I claim:

1. A vacuum device for lifting liquid from a reservoir below the level of the device adapted to be used with a vacuum source such as the intake manifold of an internal combustion engine, including in combination a liquid receptacle, a connection near its top communicating with a vacuum source, a liquid supply line connected near the top of the receptacle, a discharge valve in the bottom of the receptacle, an air inlet standpipe mounted in the discharge opening, a float in the receptacle and a vacuum relief valve allowing to the atmosphere the connection to the vacuum source and open the discharge valve and air inlet standpipe.

2. A vacuum device for lifting liquid from a reservoir below the level of the device adapted to be used with a vacuum source such as the intake manifold of an internal combustion engine, including in combination a liquid receptacle, a liquid supply line connected near the top of the receptacle, a discharge valve in the bottom of the receptacle, an air inlet standpipe mounted in the discharge opening, a valve body having communication to the vacuum source, the atmosphere and the receptacle, a float in the receptacle, a vacuum relief valve serving as a closure to the atmospheric communication to the valve body, said vacuum relief valve mounted upon a rod slideable in the valve body, said float and vacuum relief valve coacting with the liquid level in the receptacle to open the elevated discharge valve and air inlet standpipe.

3. A vacuum device for lifting liquid from a reservoir below the level of the device adapted to be used with a vacuum source such as the intake manifold of an internal combustion engine, including in combination a liquid receptacle having a discharge opening in its bottom, a standpipe having an air passage opening through the bottom of the receptacle, a valve plate to close the discharge from the receptacle and to permit atmospheric air to enter the air passage of the standpipe.

4. A vacuum device for lifting liquid from a reservoir below the level of the device adapted to be used with a vacuum source such as the intake manifold of an internal combustion engine, including in combination a liquid receptacle having a discharge opening in its bottom, a standpipe having an air passage opening through the bottom of the receptacle, a valve plate to close the discharge opening and the air inlet of the standpipe and adjustable weight means to normally hold the valve plate in a closed position, a liquid supply line connected near the top of the receptacle, a valve body having communication with a vacuum source, the atmosphere, and the receptacle, and a vacuum relief valve serving as a closure to the communication to the atmosphere, said vacuum relief valve mounted upon a rod slideable in the valve body, said float and vacuum relief valve coacting with the rise in liquid level in the receptacle to open the valve when to permit the liquid to discharge from the receptacle and to permit atmospheric air to enter the air passage of the standpipe.

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