

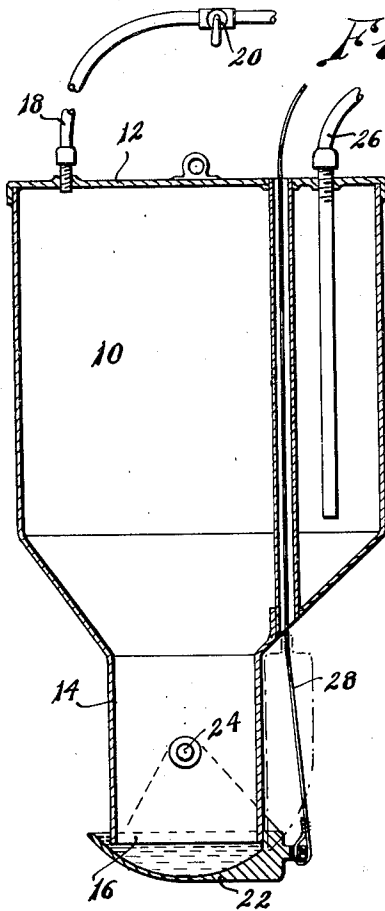
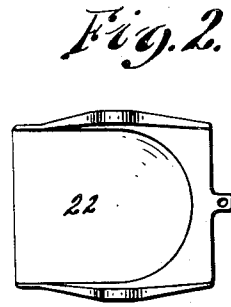
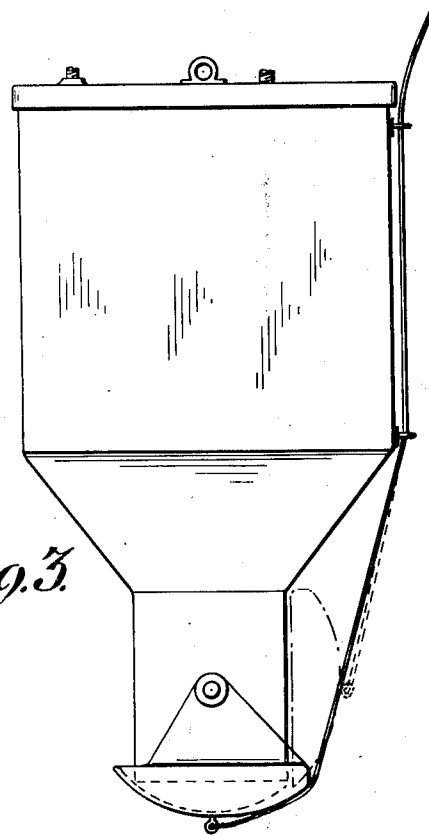
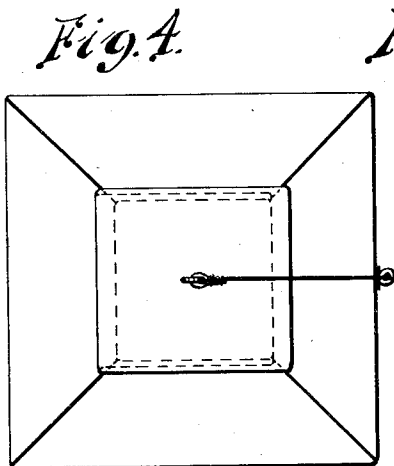
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1,973,560

APPARATUS FOR SEMIFLUID AND FLUID EVACUATION

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APPARATUS FOR SEMIFLUID AND FLUID
EVACUATION

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5 Claims. (Cl. 214—1)

This invention relates to improvements in apparatus for semi-fluid and fluid evacuation. More especially it relates to apparatus adapted for evacuating any fluid or semi-fluid substance from a container or excavation but particularly well suited for handling the heavier class of semi-fluid substances, such as heavy sludge, coarse sand and gravel associated with water, and a large variety of other materials which are fragmentary or comminuted solids associated with a liquid. Or solid materials, such as those mentioned, having little or no liquid associated with them may be made semi-fluid by injection of a fluid thereinto thereby to prepare them for evacuation by the device herein described.

In my co-pending application Serial No. 471,853, there is disclosed in detail a method and apparatus for evacuating semi-fluid and fluid substances, said apparatus including a portable bucket which is fluid-tight except for an inlet and discharge opening in its bottom. The bucket has an interior seal for the said opening, and suitable control means for opening and closing the interior of the bucket to atmosphere. In use the bucket is lowered into the container or excavation wherein is the material to be evacuated, the bucket meanwhile being maintained closed to atmosphere. When the bucket is lowered sufficiently, with resultant compression of air therein, opening of its interior to atmosphere causes outrush of air and inrush of liquid or semi-liquid. And the force and effect of the inrushing liquid carries substantial amounts of fragmentary or comminuted solid matter, which may be associated with the liquid, into the bucket. Then, according to the invention of the said copending application, the bucket is closed to atmosphere while being raised, and atmospheric pressure at said bottom opening, alone or in combination with an interior valve or seal, maintains the contents against discharge until such time as the bucket again is opened to atmosphere.

Whereas the bucket of my said copending application discloses an internal valve or seal which is entirely satisfactory for handling all fluid substances, and all strictly semi-fluid substances, the heavier sludges, coarse sand and other materials which, even though immersed in liquid, are likely to pack and be difficult to move, may cause trouble in discharging them from a bucket embodying the internal types of valve or seal.

My present invention relates to a bucket similar to that briefly described in the foregoing, but embodying improvements whereby it can handle efficiently the heavier fragmentary or comminuted

solid matters associated with, or which may be brought into association with a fluid vehicle.

It is an object of the invention to provide an evacuating bucket having no internal obstruction in the path of material entering in or discharging from the bucket.

Another object is to provide means exteriorly of the bucket for closing its bottom inlet and discharge opening against entrance of air into the interior. A feature of this latter is the attaining of a liquid seal for said opening.

Still another object is to provide so that said closing means may be out of the way of inrushing material when the bucket is being charged, and, when released, moves, by gravity, to its operative position as the loaded bucket is raised.

These objects and results may be attained with a container or bucket which is fluid-tight except for an opening in a bottom region for in-flow and outflow of material. No obstruction interiorly of the bucket retards or prevents free movement of materials in and out, but exteriorly I provide means which is permitted to move across said opening when the bucket is loaded and is being raised. Preferably this means is in the form of a scoop, mounted for arcuate movement between an idle position, where it is uninterfering with charging of the bucket, and an operative position where it underlies the said inlet and discharge opening. An important feature, however, is the attaining automatically of a liquid seal for said opening when the scoop closure moves to operable position. Assuming, of course, that liquid or semi-liquid surrounds the lower portion of the bucket when and after being loaded, the said scoop-closure is permitted to move to its operative position as soon as the bucket is started upward with its load. The interior now will be closed to atmosphere, and contents will not discharge so long as this condition exists. The initial upward travel of the bucket maintains the opening under water or other liquid or semi-liquid substance. And the dish-like closure moves across said opening while it is so immersed. This arcuate movement of the scoop causes it to pick up liquid or semi-liquid in quantity to provide a liquid seal for said opening, which seal persists after the bucket is completely elevated. Thus the contents are held in the container against discharge until transported to a proper location when, by opening the interior to atmosphere discharge will automatically occur by gravity outflow. Or, if the solid matter therein has become too solidly packed for automatic discharge, a slight

agitation thereof within the bucket will set it in discharging motion.

It is intended that the patent shall cover, by suitable expression in the appended claims, whatever features of patentable novelty exist in the invention disclosed.

In the accompanying drawing:

Figure 1 is an elevation, in medial vertical section, of a device embodying the invention;

Figure 2 is a plan of the scoop closure per se;

Figure 3 is a modification with the control means for the scoop exteriorly of the bucket; and

Figure 4 is a bottom plan of Figure 3.

Referring to the drawing, the bucket 10 may be of any suitable material, preferably metal, and may be of any desired shape. As illustrated it has a cylindrical main body portion whose upper end is closed as at 12, and has a neck 14 at its lower portion, with opening 16 for inflow to and outflow from the bucket.

The bucket is constructed fluid-tight except for the bottom opening 16, but has a conduit 18, leading out from an upper location, with means, such as valve 20, for opening and closing the interior of the bucket to atmosphere at will. Ordinarily the bucket will be of size requiring a hoist or the like for handling it but, of course, a suitable size might be lowered and elevated by hand or by other devices.

The invention relates more particularly to an improved closure and seal for the opening 16. For these purposes I employ a closure 22 exteriorly of the bucket. This preferably is in the form of a scoop, and may be mounted to swing about an axis, such as at 24, between an operative position shown in full lines in Figure 1 and an out-of-the-way position indicated by dot and dash lines in the same figure.

According to the invention the scoop 22 is gravity acting, i. e. it moves by gravity to operative position whenever released, if its arcuate path of travel is unobstructed. It is a feature also that a considerable amount of the weight of the scoop is concentrated at its rear or lagging portion, whereby the forward position is urged tight against the rim of opening 16 when the scoop is in operative position.

Of itself the scoop-closure 22 would be of no avail for preserving the fluid-tight character of the bucket after the latter had been elevated into atmosphere. But, by the invention, the mechanical closing accomplishes a simultaneous liquid sealing of the opening 16. The scoop in its closing movement picks up liquid or semi-liquid which ordinarily will be present in quantity around the lower portion of the bucket; and this picked up liquid is retained in the scoop in quantity sufficient to provide an effective seal for opening 16. Consequently, with conduit 18 closed, and opening 16 liquid sealed, the bucket may be elevated and transported as desired without loss of any contents. And discharge of the contents may be accomplished by the mere opening of the bucket interior to atmosphere through conduit 18, when the contents ordinarily will flow out by gravity.

In this connection it should be mentioned that the scoop-closure 22 is not required to bear any of the weight of contents of the bucket, and, consequently, the closure is easily movable to open the discharge passage. Vacuum in the bucket tends to hold contents in, and the closure 22 serves merely as a container of the water, or other liquid, which constitutes the seal for preserving the vacuum in the bucket. But immediately upon

breaking the seal, by drawing away of closure 22 contents are permitted to discharge; and, by opening valve 20, the discharge, by gravity outflow, ordinarily will be rapid and complete.

Under certain conditions, however, as when solid material becomes fairly solidly packed in the bucket, it may be necessary to agitate it a little to start outflow. To this end a conduit 26 with stiff portion leading well down into the bucket may lead from any suitable source of compressed air, for injecting an agitating charge into the packed material when necessary.

In Figure 1 the scoop 22 is controlled by a cable 28 or the like which extends up through the bucket to a suitable control point. Figure 3 shows a similar means of control wholly exterior to the bucket. Both provide for pulling and holding the scoop in its out-of-the-way position while the bucket is descending, and during its loading, the mere release of the cable permitting the automatic gravity swing of the scoop to closing and liquid-sealing position when the loaded bucket starts its upward journey.

I claim as my invention:

1. In apparatus for evacuating fluid and semi-fluid material, a fluid-tight receptacle having an inlet and discharge opening, means for opening the interior of the receptacle to atmosphere, and a closure exteriorly of the container movable between a position where it completely clears said opening and a position where it stands across said opening, said closure being adapted to hold a body of liquid in liquid-sealing relation to said opening.

2. In apparatus for evacuating fluid and semi-fluid material, a fluid-tight receptacle having means for opening its interior to atmosphere, and having a neck portion at a lower location, with mouth for entrance to and discharge from the receptacle; a closure for said mouth, movable out of the path of material entering in and discharging out of the container, said closure having walls adapted to surround said mouth and being capable of holding a body of liquid in liquid-sealing relation to said mouth; and means for controlling the movements of said closure.

3. In apparatus for evacuating fluid and semi-fluid material, a fluid-tight receptacle having means for opening its interior to atmosphere, and having a bottom opening for inflow and outflow; a scoop closure pivotally mounted exteriorly of the receptacle and movable to a position underlying said opening and to another position where it completely clears said mouth and means for controlling the closure.

4. In apparatus for evacuating fluid and semi-fluid material, a fluid-tight receptacle having means for opening its interior to atmosphere, and having a bottom opening for inflow and outflow; and a container for liquid mounted exteriorly on the receptacle and adapted to stand with the rim of said opening immersed in and the opening sealed by the liquid in the container; said container moving by gravity to the said sealing position; and means for moving it to inoperative position to clear the path for discharge from the receptacle.

5. In apparatus for evacuating fluid and semi-fluid material, comprising a submersible fluid-tight receptacle having a bottom opening for entrance and discharge and means for opening the interior of the receptacle to atmosphere, a closure for said bottom opening mounted exteriorly of the receptacle and movable across said

bottom opening; and means for moving said closure to an open position; the said closure being adapted, in its closing movement, to pick up a body of liquid and to thereby liquid-seal said opening, to maintain the receptacle fluid-tight when elevated; and the said maintained fluid-

tightness resulting in the closure being free from the weight of contents of the receptacle, whereby the closure is movable with ease away from said opening to break the seal for gravity discharge.

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