PORTABLE ABRASIVE CONTAINER AND DISPENSER UNIT

Robert H. E. Schmidt and Robert E. Thompson, Houston, Tex., assigns to Bob Schmidt, Inc., a corporation of Texas

Filed Feb. 1, 1968, Ser. No. 702,423

Int. Cl. B65g 53/06

U.S. Cl. 302—53

8 Claims

ABSTRACT OF THE DISCLOSURE

A portable abrasive container and dispenser unit, wherein the unit is adapted to be filled with a large quantity of abrasive at the point of manufacture and/or bulk supply and then transported to the point of use for use as a pressurized dispenser, thereby eliminating the handling of bags of abrasive at any stage.

Background of the invention

The field of this invention is apparatus for transporting and dispensing sand or other abrasives for performing sand blasting operations or the like.

For many years, sand and other abrasives for sand blasting have been transported in sacks of paper or similar material to a point of use. There, the sacks have been stacked for storage until ready to use. In use, the sacks were emptied into the tank or pot of a dispenser, and usually, a tank or pot held one to ten sacks. These sacks were handled manually and weighed one hundred pounds or more, so that the lifting, splitting, and dumping were difficult.

Many of the problems involved in handling sacks or bags were eliminated by providing flexible pressurizable bags, as disclosed in United States Patent No. 3,182,425. However, when using such bags, additional handling and dispensing equipment was required at the point of use.

The present invention

With the present invention, relatively large quantities of abrasive can be transported and dispensed under pressure readily and without manual loading or unloading of abrasives in bags or other containers. The container and dispenser unit has a sand metering and dispensing valve wherein the pressurized air applied to the blast hose to begin the abrasive blasting operation.

Brief description of the drawings

FIG. 1 is an elevation of one form of the portable abrasive container and dispenser unit of this invention;
FIG. 2 is a vertical sectional view of the tank portion of the unit of FIG. 1;
FIG. 3 is a view, partly in section and partly in elevation, of a dispenser valve, two of which are illustrated at the lower portion of the unit in FIG. 2; and
FIG. 4 is a modified form of the unit illustrated in FIG. 1.

Description of the preferred embodiments

In the drawings, the letter A designates generally one form of the portable abrasive container and dispenser unit of this invention. As will be explained in detail, such unit is adapted to be filled, or partially filled, with sand or other abrasive at the point of manufacture and/or bulk supply and thereafter the unit is adapted to be transported to the point of use, at which point the unit is pressurized and serves as the dispenser for the abrasive, all of which is accomplished without requiring the handling of bags of abrasive at any stage.

Considering the invention more in detail, the portable abrasive container and dispenser unit A includes a tank 10 which is made of steel or other suitable rigid material which is capable of being pressurized. Normally, the tank 10 is a pressure vessel made in accordance with the American Society for Mechanical Engineers Code.

The tank or vessel 10 has an inlet opening 10a at its upper end which has a closure cap or cover 12 removably mounted therewith. Normally, such cover 12 is threaded into the closed position so that it tightly seals and retains relatively high pressures within the pressure vessel or tank 10. A handle 12a extends across and is preferably welded to the cover 12 for facilitating the threading and unthreading of such cover 12 as desired.

A discharge or outlet opening 10b is provided at the lower end or in the bottom of the pressure vessel or tank 10 for the discharge and metering of the sand or other abrasive from the tank 10 through a metering valve V. As can be seen in FIG. 2, it provides two of such outlet openings 10b, each of which has a valve V mounted therewith, as will be more fully explained in connection with the detailed structure of the valve V illustrated in FIG. 3.

A cleanout openings 10c with a cleanout removable door 14 is also provided at the lower end or bottom of the tank or container 10 to remove any undesired accumulation within the tank 10 if necessary. On the inside of the tank 10, a tapered or substantially conical discharge plate 15 is mounted. The upper annular edge 15a of such plate 15 is welded to the inside surface of the tank 10, and likewise the lower annular edge 15b is welded to the bottom 16b of the tank 10. Thus, a separate chamber 18c is formed below the plate 15 and above the bottom 18d. However, it will be appreciated that tank 10 may be formed with the plate 15 as the bottom portion of the tank 10 rather than being formed within the tank 10.

In the embodiment illustrated in FIGS. 1 and 2, the tank or vessel 10 is provided with supporting brackets 20, each of which is welded or otherwise secured to the external surface of the tank 10, and each of which is adapted to be mounted on and connected to upstanding support plates 25 which are welded or otherwise secured to a trailer frame or support 26. The trailer frame 26 may be formed of steel channel members or any other suitable structural steel and preferably is formed with a pair of axles for mounting four wheels 27 as indicated in FIG. 1. A hitch 28 is preferably provided at the forward end of the frame 26 for connection to a tractor, truck, or other vehicle for transporting the unit A from the point of filling same to the point of use, and for the return as desired.

When the tank 10 has been filled with sand or other abrasive and the cover 12 has been threaded to its closed position, the tank 10 may then be pressurized with air or gas under pressure. To accomplish such pressurizing, a gas pressure inlet pipe 30 extends through the wall of the tank 10 and is welded thereto so that no air pressure escapes around such pipe 30. The inner end 30a of the pipe 30 is disposed near the upper end of the tank 10 so that pressure is developed above the sand or other abrasive in the tank 10. The lower end 30b of the pipe 30 may be at any suitable position, but as illustrated, it is intermediate the upper and lower ends of tank 10 and such end 30b is connected through a valve 34 (FIG. 1). The line 32 joins with the discharge line 33 from a water separation tank 35. The tank 35 has an inlet or coupling 35a which is connected to any suitable source of gas or air under pressure (not shown). Thus, gas or air under pressure is introduced into the separation tank 35 and passes through the line 33 to the
3,476,440

3

line 32 and then continues on also through the line 37 to the valve V as will be explained. Actually, there are two valves V in the preferred form of the invention, and therefore, there are two lines 32, one to each of the valves V, whereas within the tank 70 can be seen in FIG. 1. Each valve V has a discharge tube or hose and coupling 40 for connection to a sand blast hose of conventional construction (not shown).

An air bleed of pipe 50 with a bleed off valve 51 is preferably provided at the upper end of the tank 10 and 30 to bleed air if the air pressure within the tank 70 may be opened and the pressure dissipated before refilling. Also, it is to be noted that handling eyes or lugs 52 are provided at the upper end of the tank 10 for engagement by hooks on a crane or similar lifting equipment in the event it is desired to move the tank 10 or from or through the framework 26.

Within the tank 10, a baffle plate 53 is disposed adjacent the outlet end 30a of the air pressure pipe 30 to avoid sand entering pipe 30 when tank 70 is being filled. An equalization pipe 55 is also disposed within the tank 10 so as to establish communication between the area above the abrasive within the tank 10 and the space 10e above the plate 55, which equalization prevents any undue pressure on the plate 55, which might otherwise occur if an excessively high pressure were provided above the plate 55, particularly when it is supporting a large amount of the abrasive during the discharge through the valves V.

One of the valves V is illustrated in detail in FIG. 3, and certain other features thereof are visible in FIGS. 1 and 2. The valve V includes a valve body 60 which has a substantially vertical discharge tube 61 connected therewith or forming a part thereof, such tube 61 communicating with the outlet opening 10d thereof above within the tank 10. The discharge tube 61 extends downward and becomes part of the vertical tubular portion 61a within the body 60, and it communicates with a horizontal air flow tube 63 also formed as a part of the body 60 in the preferred form of the invention. The air flow tube 63 is disposed substantially perpendicular to the vertical discharge tube and communicates therewith, except for the intervening valve element 65, which is of special construction as will be explained. The valve element 65 is disposed at an angle or is inclined with respect to the discharge tube 61a, and it is adapted to close such tube 61a to completely seal off and prevent any of the abrasive or air pressure within the tank 10 from passing through the air flow tube 63.

However, the valve element 65 may be moved or withdrawn by an actuating device determined by the setting of the end of a threaded shaft 80, as will be explained, so as to meter predetermined amounts of the abrasive from the tank 10 into the flow tube 63.

The valve element 65 has an O-ring or O-ring which seals with a guide portion 60a of the body 60 so as to prevent the escape of air pressure around the valve element 65. A piston 70 is connected to, or is formed integrally with, the valve element 65, and it too has an O-ring or suitable packing 70a therewith which is in sealing engagement with the inside surface of a cylinder or chamber 71 which is either integral with or connected to the body 60. The lower surface 70b of the piston 70 is in communication with air pressure supplied from the air pressure source through the air flow tube 63 by means of a connecting pressure tube 75 so that air pressure supplied to the unit A for pressurizing the tank 10 also applies pressure to open the valve element 65.

As the valve element 65 is moved to the open position, it is resisted by the spring 66, which thus provides means to return the valve element 65 to the closed position when the air pressure on the piston 70 is reduced or eliminated. The shaft 80 is in threaded engagement with suitable thread receiving cover 81a connected and formed integrally with the chamber 71. Thus, by a rotation of the wheel or handle 82, the threaded shaft 80 is rotated to move its end 80a upwardly or downwardly; this adjusts the stop provided by such end 80a for contact by the upper end of the piston 70 to thereby adjust the extent of movement of the piston 70 and consequently the extent of the valve element 65.

In the closed position, the inclined face 65a of the valve element 65 engages an inclined valve seat 60b or preferably a rubber valve seat element 85 disposed on such seat 60b.

In the use or operation of the form of the invention illustrated in FIGS. 1–3, the unit A is filled, or partially filled, with abrasives by opening the cover 12 and then introducing the abrasive into the tank 10 at a point of manufacture of the abrasive or at a bulk supply depot or at any other suitable source of supply. In any event, the filling is accomplished with bulk equipment and without the need for the handling of bags or any manual filling operations. After the abrasive is within the unit A, it is pulled or is otherwise moved to the location for sand blasting operations. When the apparatus A reaches the point of use, it is connected to a suitable source of compressed air or other gas which is connected at 35a. The compressed air or gas pressurizes the tank 10 and also supplies the air pressure to the air flow tube 63 of each of the valves V, or one valve V if only one such valve is utilized. Thus, the tank is pressurized and the valve or valves V are automatically opened substantially simultaneously. This results in a pressurized flow of the abrasive downwardly through the vertical discharge tube 61a and through the open or partially open valve element 65 into the flow tube 63. The pressure within the flow tube 63 acts to force the abrasive outwardly to the discharge connection or connections 40 where one or more abrasive blasting hoses with suitable nozzles are connected, as will be well understood. The air pressure in the air flow tube 63 thus has a pressure effect and it also has an aspirator effect in addition to the pressurized feeding of the abrasive from the tank 10.

After all the abrasive has been discharged, the air pressure is cut off or disconnected from the unit A, and it is returned to the bulk supply for refilling same. The operation may be repeated as desired, and it will be understood that this invention thus provides both the transportation and dispensing equipment within the single unit A. Therefore, additional expensive equipment at the point of use becomes unnecessary.

A modified form of the invention is illustrated at A–1 in FIG. 4, which is a duplicate of that illustrated in FIGS. 1–3, except that the unit A–1 does not have wheels, but instead is adapted to rest on the ground or foundation. Thus, the support members 25 of FIGS. 1–3 are replaced by support members 125 which form legs which may rest upon the ground or floor. The unit A–1 is moved by positioning same on the bed of a truck, train, or other equipment for transportation. The air separation unit 35 likewise is modified as indicated at 135 to provide legs 135a which rest upon the ground or other support as illustrated. For the handling of the unit A–1, the lugs 52 may be engaged by suitable lifting hooks or other equipment, as will be well understood.

The foregoing disclosure and description of the invention are illustrative and explanatory thereof, and various changes in the size, shape, and materials as well as in the details of the illustrated construction may be made within the scope of the appended claims without departing from the spirit of the invention.

We claim:

1. A portable container and dispenser unit for bulk handling of abrasives, comprising:
   (a) a rigid portable tank having an inlet opening for filling same with abrasive and an outlet opening for discharging abrasive therefrom;
   (b) closure means for closing said inlet opening after said tank has abrasive therein for transportation from a bulk supply to a point of use;
(c) a metering valve connected to said outlet opening for sealing the tank when closed and for metering the abrasive when open; and
(d) an air flow discharge line connected below said metering valve through which air flows for carrying abrasive from said tank to a remote point for sand blasting;
(e) an air supply line for supplying air to said tank and to said air flow line;
(f) means directing air pressure in said air flow line to said metering valve to open same automatically; and
(g) means acting on said metering valve in opposition to said air pressure to automatically close said valve upon a predetermined reduction in air pressure in said air flow line to thereby prevent an inadvertent discharge of abrasives from said tank.

2. The unit set forth in claim 1, wherein said metering valve includes:
(a) a valve body having a substantially vertical discharge tube, a valve seat in said tube, and an opening in one wall of said body;
(b) an air flow tube below said discharge tube disposed substantially perpendicular thereto and communicating therewith;
(c) an inclined valve element adapted to move through said opening and having a lower end adapted to engage said valve seat for closing the communication between said discharge tube and said air flow tube; and
(d) said valve body having a body portion disposed at an acute angle with respect to the axis of said substantially vertical discharge tube and in which said valve element moves at such an acute angle.

3. The unit set forth in claim 1, wherein said metering valve includes:
(a) a valve body having a substantially vertical discharge tube;
(b) an air flow tube below said discharge tube disposed substantially perpendicular thereto and communicating therewith;
(c) an inclined valve element for closing and opening the communication between said discharge tube and said air flow tube;
(d) air pressure actuated means on said valve element for controlling the opening of said valve element in accordance with the air pressure acting thereon; and
(e) said means acting on said metering valve in opposition to said air pressure being a spring means which acts on said valve element in opposition to the air pressure in said flow discharge line for closing said valve automatically when the air pressure in said flow line is reduced a predetermined amount.

5. A metering valve, comprising:
(a) a valve body having a substantially vertical discharge tube, a valve seat in said tube, and an opening in one wall of said body;
(b) an air flow tube below said discharge tube disposed substantially perpendicular thereto and communicating therewith;
(c) an inclined valve element adapted to move through said opening and having a lower end adapted to engage said valve seat for closing the communication between said discharge tube and said air flow tube; and
(d) said valve body having a body portion disposed at an acute angle with respect to the axis of said substantially vertical discharge tube and in which said valve element moves at such an acute angle.

6. The structure set forth in claim 5, including:
(a) air pressure actuated means on said valve element for controlling the extent of opening of said valve element in accordance with the air pressure acting thereon.

7. The structure set forth in claim 5, including:
(a) air pressure actuated means on said valve element for controlling the opening of said valve element in accordance with the air pressure acting thereon; and
(b) adjustable means for limiting the amount of opening obtained when said valve element is moved to the open position by air pressure.

8. The structure set forth in claim 5, including:
(a) air pressure actuated means on said valve element for controlling the opening of said valve element in accordance with the air pressure acting thereon; and
(b) spring means acting on said valve element in opposition to said air pressure for moving said valve element to a closed position in engagement with said valve seat.

References Cited

UNITED STATES PATENTS

<table>
<thead>
<tr>
<th>Patent Number</th>
<th>Date</th>
<th>Inventor</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>671,303</td>
<td>4/1901</td>
<td>Warren</td>
<td>302—53</td>
</tr>
<tr>
<td>1,898,354</td>
<td>2/1933</td>
<td>Fickey</td>
<td>302—53</td>
</tr>
<tr>
<td>2,032,367</td>
<td>3/1936</td>
<td>Kennedy</td>
<td>302—53</td>
</tr>
</tbody>
</table>

ANDRES H. NIELSEN, Primary Examiner