Oct. 28, 1952 C. A. MATIRKO 2,615,693

APPARATUS FOR FEEDING GROUND MATERIALS

Filed April 15, 1947

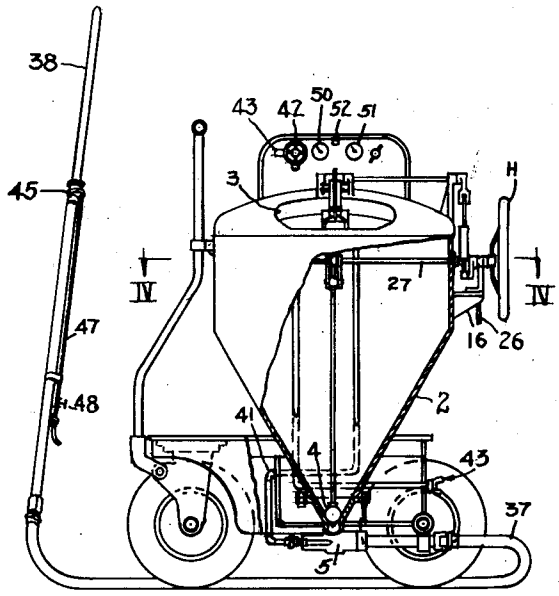


Fig. 1

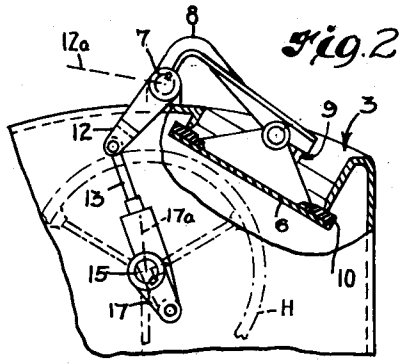
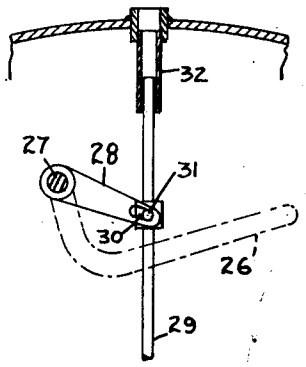


Fig. 2



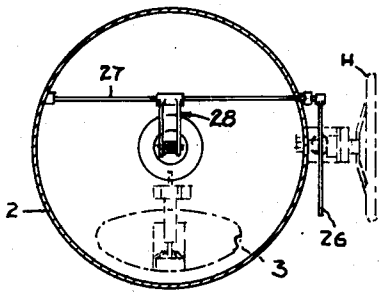


Fig. 4

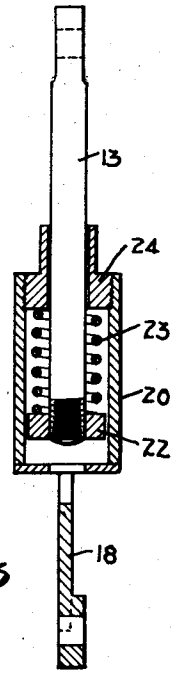


Fig. 3

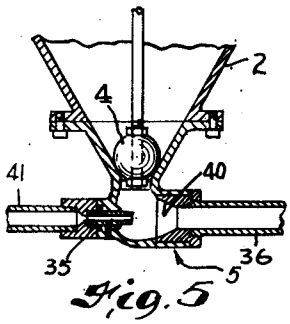


Fig. 5

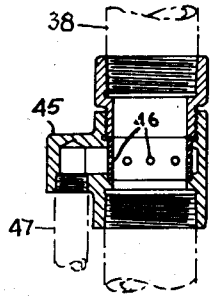


Fig. 6.

INVENTOR.
CHESTER A. MATIRKO
BY
Oberlin & Limbach
ATTORNEYS.

Patented Oct. 28, 1952 2,615,693

UNITED STATES PATENT OFFICE

2,615,693

APPARATUS FOR FEEDING GROUND MATERIALS

Chester A. Matirko, Tiffin, Ohio, assignor to Basic Refractories, Inc., Cleveland, Ohio, a corporation of Ohio

Application April 15, 1947, Serial No. 741,670

9 Claims. (Cl. 259—151)

1

This invention relates to apparatus for projecting ground materials by fluid pressure, as in an ejector stream; and it is among the objects of the invention to provide a simple and reliable construction capable of handling a wide variety of pulverulent or grandular materials, and with such pressure as desired. Other objects and advantages will appear from the following description.

To the accomplishment of the foregoing and related ends, the invention, then, comprises the features hereinafter fully described and particularly pointed out in the claims, the following description and the annexed drawing setting forth in detail certain illustrative embodiments of the invention, these being indicative, however, of but a few of the various ways in which the principle of the invention may be employed.

In said annexed drawing:

Fig. 1 is a side elevational view, partly in section, showing an embodiment of the invention;

Fig. 2 is an enlarged scale elevational detail of the closure operating mechanism, the closure being shown in section;

Fig. 3 is a further enlarged detail sectional view of a portion of said operating mechanism;

Fig. 4 is a transverse sectional view taken on a plane substantially indicated by line IV—IV, Fig. 1;

Fig. 5 is an enlarged scale sectional detail of the outlet and its valve control; and

Fig. 6 is an enlarged scale fragmentary sectional view of the liquid inlet on the nozzle conduit.

The construction includes in general a container 2 with feed-inlet 3 at the upper portion, and an outlet below controlled by a valve 4 which leads to an ejector chamber 5. The inlet is controlled by a closure 6 which is opened inwardly, and to a position entirely out of the path of material being charged in through the opening 3. Pivoted at 7 in a convenient location near the inlet opening 3 is an arm 8 which carries the closure 6, being loosely pivoted thereto so as to allow some freedom of independent swinging movement on the part of the closure element and thereby assure accurate seating against the opening when the closure is swung into place. The amount of independent swinging motion by the closure 6 with respect to the arm 8 is limited by a stop 9 and by a double tapered drilling in the hub of closure 6. A packing gasket 10, which may be secured to the closure 6, provides air-tight sealing when the closure is in place. Also in relation to the pivot mounting 7 and to the

2

arm 8 is an extension 12 which, being rigid with the arm 8, is connected by a link 13 to a toggle operating means embodying a hand wheel H and stub shaft 15 mounted in a suitable bracket 16 on the container 2. To the stub shaft 15 there is secured an arm 17 to which is pivotally connected the member 18 of the link system 13. The member 18 may have a cylindrical end portion 20, within which the end of the member 13 may be guided, and a nut 22 on the end thereof may confine a compression spring 23 which thrusts also against the cap 24 which is screw-threadedly attached to the cylindrical member 20. Thereby, the link system including elements 13 and 18 may permit sufficient elongation and shortening to throw through dead center, in a toggling arrangement involving the arm 17 and the link system 13, and locking is thus effected in a particularly secure manner. As indicated in Fig. 2, the arms 8, 12 and 17 are in the positions shown by solid lines when the closure is in its normal position, but when opened, the lever arm 12 is swung up to the dot-dash line 12*a*, and the lever 17 is swung up to the dot line 17*a*, the closure being turned back into a position approximately vertical beyond the line of the opening. Thus, material poured into the container does not strike or abrade the closure element.

For control of the valve 4, a hand-operating lever 26 is arranged adjacent the hand wheel H, the lever 26 being sufficiently bent to curve under the bracket 16 and be easily accessible, and being secured to a rocker shaft 27 which is mounted in the container, and which has a lever arm 28 to raise and lower the valve rod 29. Suitable lost motion means may be interposed, such as slots 30 in the bifurcated end of the arm cooperating with opposite pins 31 on the valve rod 29. The valve rod may be guided above in a long bushing 32 carried by the top of the container. Desirably, the container has a conical bottom which converges to its outlet, and the ball valve 4 seats therein. The valve is preferably of slightly resilient material, as rubber, synthetic or natural, and desirably loaded with fine metallic or mineral filler, such as to afford considerable firmness, along with the resiliency favoring accurate setting.

In the chamber 5 below the valve 4, a fluid jet nozzle 35 is arranged opposite the outlet opening 36 which may connect by a suitable hose 37 or the like to a discharge nozzle 38. The chamber 5 provides clearance around the nozzle 35 through the entire 360°, and by a suitable tapered and

removable steel throat **40** leading to the outlet **36**, an even and unimpeded outflow is attained. The nozzle **35** may be fed by any desired fluid, but usually, air is employed, and the feed pipe **41** may be conveniently arranged along the outside of the container and have a control valve **42** above. The point of attachment of an air supply hose for example leading thereto may be at any desired location, above or below, being illustrated by the connection **43**.

In instances where it is desired to introduce a liquid into the stream of pulverulent material, the liquid inlet **45** on the nozzle **38** may be brought into use. This is in the form of a series of radial inlets **46** to the nozzle lumen, as supplied from the surrounding collar member **45**, and which is fed in turn by a small conduit **47** leading from a suitable hose connection to the source of liquid supply. With a control valve **48** in a convenient location, the supply of liquid can be controlled when and as desired.

Conveniently located pressure gauges **50**, **51** may be arranged to show the feed pressure on the nozzle jet **35**, and the pressure within the container respectively, and a conveniently located valve **52** may release the pressure from the container when the closure is to be unseated.

With the construction as thus set out, granular or pulverulent materials can be jetted, such that for instance with furnace lining refractory material, repairs or replacement of full linings may be conveniently accomplished; and similarly, cementitious material such as Portland cement mixtures with aggregate, etc., can be placed. Water or solutions or other liquids can be added at the nozzle as may be desired.

Other modes of applying the principle of the invention may be employed, change being made as regards the detail described, provided the features stated in any of the following claims, or the equivalent of such, be employed.

I therefore particularly point out and distinctly claim as my invention:

1. In apparatus of the character described, means for pressure-projecting granular material, comprising a portable wheel-supported conical bottom container with upper inlet and bottom outlet, means for maintaining a pressure-differential between the inside and outside of the container, including a closure for the inlet movable inwardly, a closure for said outlet including a resilient ball operating into a tapered seat, an axially movable rod carrying said ball, a tubular guide for said rod dependent from the top of the container, a hand-operated rock shaft with arm and lost-motion connection to said rod, a nozzle chamber adjacent and under said ball, a fluid jet nozzle projecting in said chamber, a discharge opening opposite said nozzle, a discharge conduit including a hose section leading from said opening, and a valve-controlled liquid inlet on said conduit including a small chamber surrounding the conduit for liquid supplied thereto, and means including openings from said chamber into the conduit.

2. In apparatus of the character described, means for pressure-projecting granular material, comprising a portable wheel-supported conical bottom container with upper inlet and bottom outlet, means for maintaining a pressure-differential between the inside and outside of the container, including a closure for the inlet movable inwardly, a closure for said outlet including a resilient ball operating into a tapered seat, an axially movable rod carrying said ball, a guide for said rod in the upper part of the container, a hand-operated rock shaft with arm and lost-motion connection to said rod, a nozzle chamber adjacent said ball, a fluid jet nozzle projecting in said chamber, a discharge opening opposite said nozzle, a discharge conduit including a flexible section leading from said opening, and a liquid inlet on said conduit including a small chamber surrounding the conduit for liquid supplied thereto, and means including openings from said chamber into the conduit.

3. In apparatus of the character described, means for pressure-projecting granular material, comprising a portable wheel-supported conical bottom container with upper inlet and bottom outlet, means for maintaining a pressure-differential between the inside and outside of the container, including a closure for the inlet, a closure for said outlet including a resilient ball operating into a tapered seat, an axially movable rod carrying said ball, a hand-operated rock shaft with arm and lost-motion connection to said rod, a nozzle chamber adjacent said ball, a fluid jet nozzle projecting in said chamber, a discharge opening opposite said nozzle, a discharge conduit leading from said opening including a flexible section, and a liquid inlet on said conduit including a small chamber surrounding the conduit for liquid supplied thereto, and means including openings from said chamber into the conduit.

4. In apparatus of the character described, a portable wheel-supported conical bottom container with upper inlet and bottom outlet, means for maintaining a pressure-differential between the inside and outside of the container, including a closure for the inlet, a closure for said outlet of the container including a ball operating into a tapered seat, means for seating and unseating said ball, a nozzle chamber adjacent said ball, a fluid-jet nozzle projecting in said chamber, a discharge opening opposite said nozzle, and means including conduit leading from said opening and including a flexible section.

5. In apparatus of the character described, a portable wheel-supported conical bottom container with upper inlet and bottom outlet, means for maintaining a pressure-differential between the inside and outside of the container, including a closure for the inlet, a closure for said outlet of the container including a ball operating into a tapered seat, means for moving said ball, a nozzle chamber adjacent said ball, a fluid-jet nozzle projecting in said chamber, a discharge opening opposite said nozzle, means including conduit leading from said opening, and a liquid inlet on said conduit.

6. In apparatus of the character described, a container with upper inlet and bottom outlet, means for maintaining a pressure-differential between the inside and outside of the container, including a closure for the inlet, a closure for the outlet including a ball operating into a tapered seat, an axially movable rod carrying said ball, a hand-operated rock shaft with arm and lost-motion connection to said rod, a nozzle chamber adjacent said ball, a fluid-jet nozzle projecting in said chamber, means including discharge opening opposite said nozzle, a conduit leading from said opening, and a liquid inlet on said conduit including a small chamber surrounding the conduit for a liquid supply thereto, and means including openings from said chamber into the conduit.

7. In apparatus of the character described, a container with upper inlet and bottom outlet, means for maintaining a pressure-differential

between the inside and outside of the container, including a closure for the inlet, and a closure for the outlet of the container including a resilient ball operating into a tapered seat, means for moving said ball to and from such seat, a nozzle chamber adjacent said ball, a fluid jet nozzle projecting in said chamber, means including discharge opening opposite said nozzle, and a conduit leading from said opening.

8. In apparatus of the character described, a container with upper inlet and bottom outlet, means for maintaining a pressure-differential between the inside and outside of the container, including a closure for the inlet, a closure for the outlet of the container including a valve, a discharge chamber adjacent said valve, a fluid-jet nozzle projecting in said chamber, means including discharge opening opposite said nozzle, a conduit leading from said opening, and a liquid-inlet on said conduit.

9. In apparatus of the character described, a container with upper inlet and bottom outlet, means for maintaining a pressure-differential between the inside and outside of the container, including a closure for the inlet, and a closure

for the outlet including a slightly resilient ball operating into a tapered seat, an axially movable rod carrying said ball, and a hand-operated rock shaft with arm and pin and slot connection to said shaft, a nozzle chamber adjacent said ball, a fluid jet nozzle projecting in said chamber, and means including discharge opening opposite said nozzle.

CHESTER A. MATIRKO.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,370,593	Kling	May 8, 1921
1,478,865	Weber	Dec. 25, 1923
1,663,206	McRae	Mar. 20, 1928
1,902,456	Matthews	Mar. 21, 1933
1,953,091	Westberg et al.	Apr. 3, 1934
2,240,205	Call	Apr. 29, 1941
2,355,475	Skaller	Aug. 8, 1944
2,534,270	Kemper	Dec. 19, 1950