

[54] **POWDER DISPENSER**[75] Inventor: **Robert J. Hart**, Tulsa, Okla.[73] Assignee: **Commercial Resins Company**, Tulsa, Okla.[22] Filed: **Jan. 2, 1974**[21] Appl. No.: **429,748**[52] U.S. Cl. **222/193**[51] Int. Cl. **B67d 5/54**

[58] Field of Search 222/193, 158; 117/100

[56] **References Cited****UNITED STATES PATENTS**

2,501,047	3/1950	Gustafsson et al.	222/193
3,568,215	6/1971	Roche	222/193

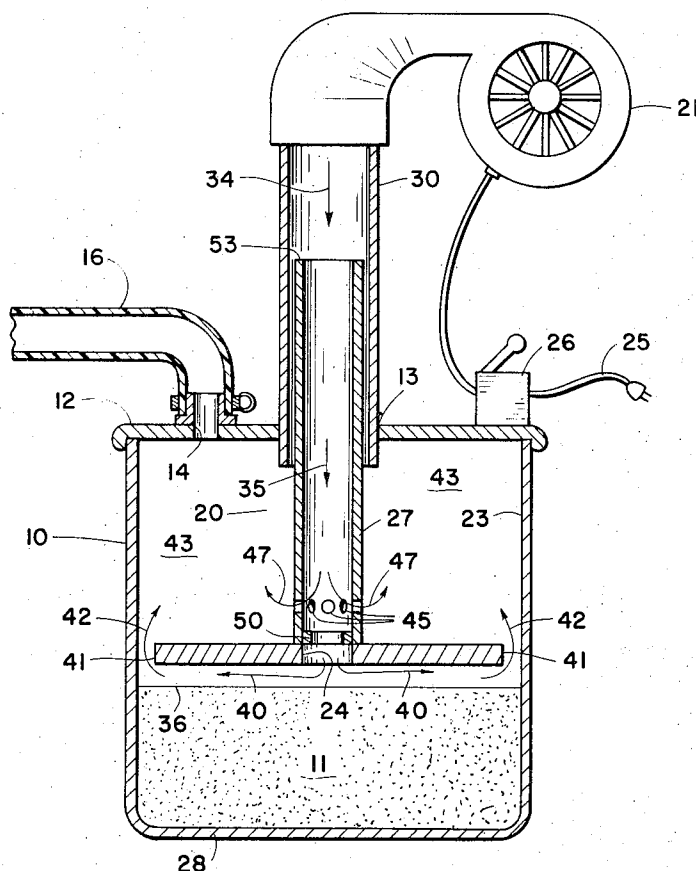
FOREIGN PATENTS OR APPLICATIONS

978,700	11/1950	France	222/193
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[57] **ABSTRACT**

A powder dispenser includes a powder container with a top having inlet and outlet holes. A plate of size slightly less than the inside of the container is movably disposed within the container above the contained powder. A tube connected to the plate in communication with a hole through it extends to outside the container through the inlet hole. A second tube is mounted to the top of the container in communication with the inlet hole and the first tube is longitudinally slideably located within the second tube. A blower is carried by the second tube to force air through the second and first tubes to between the plate and the powder. The air from the blower picks up the powder, moves it in the space between the edge of the plate and the container to above the plate, and dispels it through the outlet hole.

7 Claims, 2 Drawing Figures

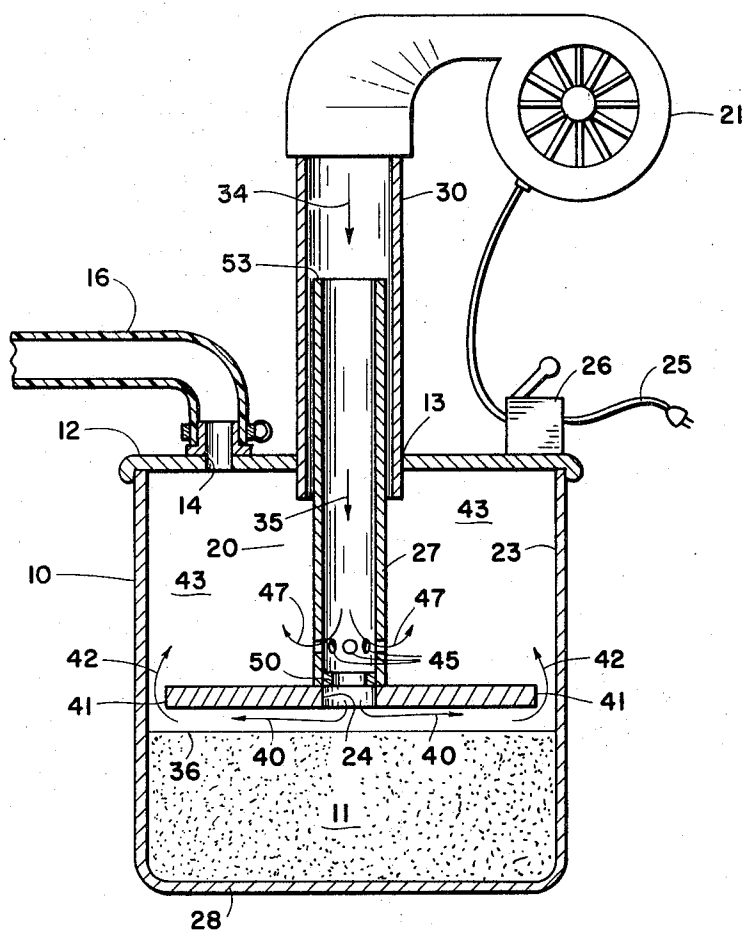


Fig. 1

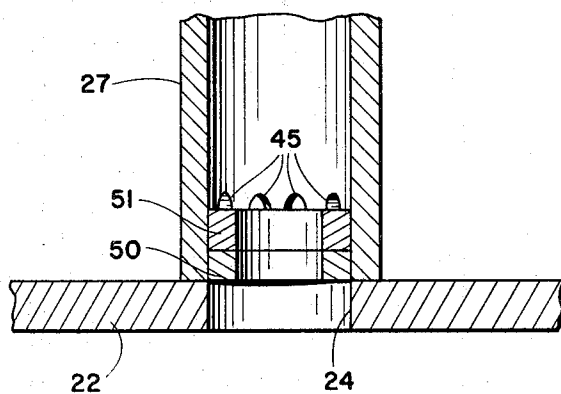


Fig. 2

POWDER DISPENSER

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to improvements in dispensers, and more particularly to improvements in dispensers for powder, particulate material, or the like.

2. Description of the Prior Art

In many instances, it is desirable to apply a uniform coat of a powder or like material to an object. For example, in the fabrication of pipelines, tanks, and so forth, a material resin, such as epoxy or the like, can be applied in a powder form to the pipeline, or the selected areas of the pipe, and subsequently cured to effect the desired coating thereon. Usually in such applications, the uniformity of the powder is of significant concern. Although many apparatus have been proposed for applying powder coatings, most apparatuses advanced heretofore have been directed toward dispensing powder for other purposes in which typically the uniformity of the powder is not of particular concern.

For example, Roche, U.S. Pat. No. 3,586,215, discloses an apparatus for dispensing dry powdered particulate material onto plantlife, and includes a receptacle for containing the powder material. An exhaust tube and one or more air supply tubes extend within the receptacle to near its bottom, and a pump applies suction to draw powder from the receptacle through the exhaust tube for dispensing it by asperating action, with the power supply tubes closed. Greater quantities can be controlled dispensed by varying the amount of the openings of the supply tubes.

In the Roche patent the exhaust and supply tubes are mounted at a fixed point in the receptacle with respect to the contained powder. This fixed attitude easily can result in variation in the output of the powder quantity dispensed, and although not of particular concern in applications such as applying insecticides or foliage dusting material, it is of importance in uses wherein a uniform suspension is required regardless of the quantity of undistributed powder within the receptacle. Also, because the pump is located with its vanes in the exhaust line, the powder material can come in contact with them, which is undesirable in many uses.

Barclay U.S. Pat. No. 2,696,933, on the other hand, discloses an apparatus for dispensing uniform quantities of powder for particular use in application of salts of L-glutamic acid to fowls to enhance their natural flavors. To dispense the powder, a receptacle is provided having a tube with holes along its length located at the bottom of the receptacle, for aerating the powder. The aerated powder, by virtue of the gas continually supplied to the tube, becomes entrained in the upwardly moving stream of gas. A nozzle is provided near the top of the receptacle to propel an auxiliary gaseous stream transversely to the direction of the gas entraining stream and toward an outlet opening for application to the fowl.

Other dust or powder handling apparatus have been used, such as the apparatus of Colbert, U.S. Pat. No. 2,093,998, in his method for making granuals to be embedded in cementitious surfaces.

SUMMARY OF THE INVENTION

In light of the above, it is an object of the invention to present a powder dispenser.

It is another object of the invention to present a powder dispenser for uniformly distributing powder, regardless of the quantity remaining in the powder supply.

It is still another object of the invention to present a powder dispenser including an automatic indicator of the remaining undispensed powder.

It is still another object of the invention to present an apparatus for dispensing powder which is portable and can be easily moved from place to place.

It is yet another object of the invention to provide a powder dispenser in which the rate at which the powder dispensed can be controlled.

These and other objects, features, and advantages, will become apparent to those skilled in the art from the following detailed description, when read in conjunction with the accompanying drawings and appended claims.

The invention, in its broad aspect, presents a powder dispenser which includes a cylindrical container of first diameter. The container is open at its top for receiving the powder, and a top having inlet and outlet holes is provided for enclosing the container. An air inlet plenum is attached to the top communicating with the inlet hole, and an air blower is carried by the air inlet plenum to blow air thereinto. A discoidal plate is locatable within the container above the powder, and is of second diameter slightly less than that of the first diameter of the container. A second air inlet plenum is longitudinally slideably located partially within the first air inlet plenum, and is attached to the plate in communication with the hole through it. When air is forced from the blower into the first air plenum, it is conducted by the first and second air plenums to between the plate and the powder to maintain an air space therebetween and to entrain a constant portion of the powder in the air space. The entrained powder is then expelled between the plate and the container through the outlet hole.

BRIEF DESCRIPTION OF THE DRAWING

The invention is illustrated in the accompanying drawing wherein FIG. 1 is a side elevational view, in cross-section, of the air dispenser, in accordance with the principles of the invention.

And FIG. 2 is a side elevation in cross-section of the air expelling and powder rate controlling holes of the apparatus of FIG. 1, showing a hole covering ring located within the air inlet tube.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

In accordance with the preferred embodiments of the invention, as shown in FIG. 1 of the accompanying drawing, a powder receiving container 10, of cylindrical configuration is employed. The powder 11 can be placed within the container 10, as shown, in any desired quantity. A top 12 encloses the container, and is in sealing engagement therewith to provide a generally airtight interior.

The container 10 and top 12 can conveniently be of metal or other material, and, in the actual fabrication of the device, can easily be merely a can of any widely commercially available type, of any convenient capacity, for example, 5 gallons.

An inlet hole 13 and outlet hole 14 are provided in the top 12, the inlet hole 13 being approximately cen-

trally located through the top 12, and the outlet hole 14 being laterally displaced therefrom. Conveniently, an outlet hose 16 is connected to the top 12, to conduct the output from the dispenser, for distribution, as will be described below.

A plunger assembly 20 is provided within the container 10. The plunger assembly 20 includes a discoidal plate 22, which is of diameter or dimensions slightly less than that of the interior wall 23 of the container 10. A hole 24 is formed through a center portion of the plate 22, at a location approximately corresponding to the hole 13 in the top 12. Outstandingly connected to the plate 22 is a tube or plenum 27. The tube 27 is of length sufficient to extend to the outside of the container 10 through the inlet hole 13 of the top 12, when the plate 22 is located adjacent the bottom 28 of the container 10, as below described. An additional or second plenum or tube 30 is connected to the top 12, adjacent the inlet hole 13, coaxially aligned with the first tube 27. The second tube 30, therefore, longitudinally slideably receives the first tube 27, to enable the first tube 27 to be moved upwardly and downwardly therein.

A blower 21 powered from a convenient power source (not shown) via electric cord 25 and on switch 26, is attached to the upper or first tube 30, by bolts, screws, or the like (not shown) in air receiving relationship, whereby air from the blower 21 is injected, as shown by the arrow 34 into the outside tube 30, then, into the inside tube 27, as shown by the arrow 35, through the hole 24 in the plate 22, to between the plate 22 and the top 36 of the powder within the container. The air thus injected, provides an air cushion between the top 36 of the powder 11 and the bottom of the plate 22, thereby defining an air space between the powder and plate which remains relatively constant, independent of the quantity of powder contained within the container 10.

The air thus injected, will pick up a portion of the powder 11 and suspend it within the air space between the powder surface 36 and plate 22. Because the plate 22 is of dimensions slightly smaller than the interior or inside of the container 10, the air and powder will flow as shown by the arrows 40 outwardly from the hole 24, and around the end 41 of the plate 22, as shown by the arrows 42. The suspended powder is then located within the area 43 above the plate 22, and is carried by the air pressure out the outlet hole 14 and conducting pipe 16, to be dispensed.

To further assist and control the removal of the suspended powder from the area 43, a plurality of holes 45 are provided through the inside tube 27, at a location near the top of the plate 22. A portion of the air from the blower 21 is diverted into the area 43 above the plate 22 through the holes 45, as shown by the arrows 47. Thus, the quantity of air which is expelled through the hole 24 in the plate 22 can be controlled by the sizes of the holes 45. It can be seen that depending upon the ratio of the air expelled through the bottom hole 24 to the air expelled through the side holes 45, the plate can be made to ride at any desired location above the surface 36 of the powder 11. Consequently, the relative sizes of the holes 24 and 45 can be chosen to effect the desired overpressure in the area beneath the plate 22 to control the height at which it is located in operation over the powder 11. Furthermore, because the height controls the velocity of the air expelled from

the hole 22, it also will affect the quantity of powder picked up to be dispensed.

The amount of air expelled from the holes 45 can be controlled in various ways. For example, the holes themselves may be fabricated of a predetermined size or diameter, depending upon the rate of flow desired. Additionally, if a temporary different rate is desired, as shown in FIG. 2, a first washer or ring 50 can be located within the inside tube 27 at a location below the holes 45. Thereafter, a plug or washer 51 can be located within the tube 27 prior to the dispensing activities, such as by merely dropping the plug down from the top 53 of the inside tube 27. As shown in FIG. 2, the plug 51 will extend over a portion of the holes 45, the extent of its obstruction thereof being determined by the width of the plug 51. Thus, by choosing the width of the plug or washer 51 to effect a desired closure or obstruction of the holes 45, the rate of powder dispensed can be controlled.

In operation, the top 12 is removed from the container 10, and the desired quantity of powder 11 is placed therein. The discoidal plate 22 is then located on top of the powder 11, and the top 12 replaced upon the container 10 such that the tube 27 connected to the plate 22 is longitudinally emplaced within the tube 30. The blower 21 is connected to a source of electrical power by the plug and cord 25, and the switch 26 is activated, to turn the blower 21 on. The air blown by the blower 21 is directed through the tubes 27 and 30, to beneath the plate 22, above the powder 11. The air intermediate the plate and powder picks up a certain portion of the powder, carries it around the ends 41 of the plate 22, and expels it through the outlet 14. The expulsion of the powder is aided by air diverted through the holes 45 in the bottom tube 27. By varying the quantity of the air flowing through the holes 45, such as by inserting plugs of various width, as above described, the expulsion rate of the powder is controlled.

As the powder 11 is expelled from within the container 10, and its level drops, the plate 22 and bottom tube 27 will drop a corresponding amount, since the distance between the plate 22 and the top 36 of the powder 11 remains essentially constant, the air pressure from the blower 21 also remaining essentially constant. Thus, the location of the lower tube 27, seen above the top 12 of the container is an indicator of the level of the powder within the container 10. To enable the lower tube 27 to be observed, the top or outside tube 30 can be made of a transparent material, such as plastic, or the like, so that the level of the tube can be readily determined. Additionally, if desired, gradations (not shown) can be inscribed upon the upper tube 30, for more precise measurement of the quantity of the powder remaining in the container 10.

Although the invention has been described and illustrated with a certain degree of particularity, it is understood that the present disclosure has been made only by way of example, and that numerous changes in the details of construction and the combination and arrangement of parts may be resorted to without departing from the spirit and scope of the invention as hereinafter claimed.

What is claimed is:

1. A powder dispenser, comprising, an enclosable powder receiving receptacle having input and output holes,

movable plate means locatable within said receptacle,
 a first tube attached adjacent a hole through said plate means and extending through the input hole to outside said container to define an airflow path therebetween,
 a second tube disposed about said first tube, extending outwardly from said container from said input hole,
 blower means for ejecting a gas into said second tube to be conducted by said first tube through the hole in said plate means to pick up the powder and expel it through the exhaust hole, and for maintaining the position of said plate means above the powder to form a gas flow path of constant dimensions above said powder to provide uniform powder pick up independent of the quantity of contained powder.
 2. The powder dispenser of claim 1 further comprising a ring locatable in said first tube, and wherein said first tube has a plurality of holes formed therethrough above said plate means within said container whereby a portion of the air from said blower means is diverted therethrough,
 said ring being of thickness sufficient to obstruct at least a portion of said holes, to control the ratio of the air flowing through said holes to the air flowing through said hole in said plate means.
 3. The powder dispenser of claim 1 wherein said second tube is made of transparent material whereby said first tube can be observed to indicate the height of the plate means within said container to indicate the quantity of contained powder.
 4. A powder dispenser, comprising,
 a cylindrical container of first diameter, said container being open at its top for receiving the powder,

der,
 a top for enclosing said container having inlet and outlet holes,
 an air inlet plenum attached to said top and communicating with said inlet hole,
 an air blower carried by said air inlet plenum to blow air thereinto,
 a discoidal plate locatable within said container above the powder of second diameter slightly less than said first diameter,
 and a second air inlet plenum longitudinally slidably located partially within said first air inlet plenum, attached to said plate in communication with the hole therethrough,
 whereby air from said blower is injected through said first and second plenums to between said plate and the powder to maintain an airspace therebetween and to entrain a constant portion of the powder in the airspace to be expelled between the plate and container and through the outlet hole.
 5. The dispenser of claim 4 wherein said second air plenum further has formed a plurality of holes therethrough at a location adjacent its connection with said plate, whereby air within said second air plenum is additionally expelled through said holes to control the rate of distribution of the powder.
 6. The dispenser of claim 5 further comprising means for partially blocking the holes in said second air plenum above the plate to control the amount of powder flow exhausted through said outlet hole.
 7. The apparatus of claim 4 wherein said first air plenum is of transparent material whereby the longitudinal position of the second air plenum can be observed to indicate the powder level within the container.

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