

Oct. 21, 1958

C. H. SNYDER

2,857,202

DISPENSERS FOR SOLIDS AND LIQUIDS

Filed Jan. 7, 1954

2 Sheets-Sheet 1

FIG. 2

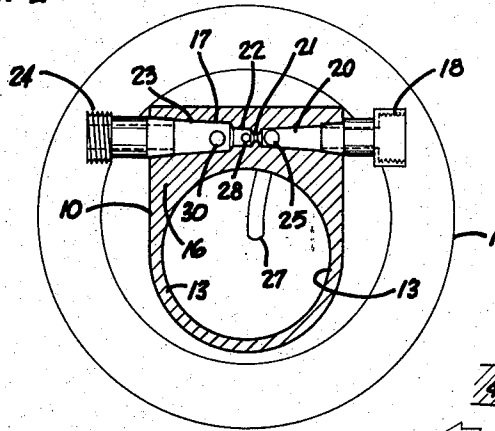


FIG. 3

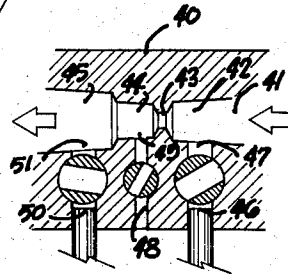
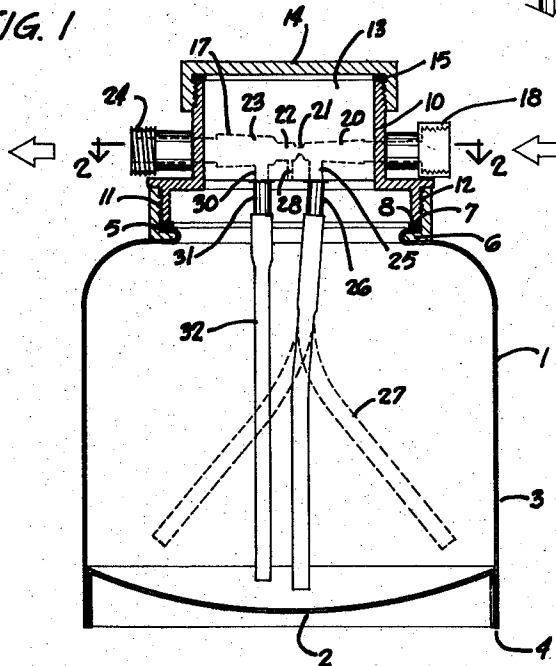


FIG. 1



INVENTOR.

CLIFFORD H. SNYDER

BY *William D. Carothers*
HIS ATTORNEY

Oct. 21, 1958

C. H. SNYDER

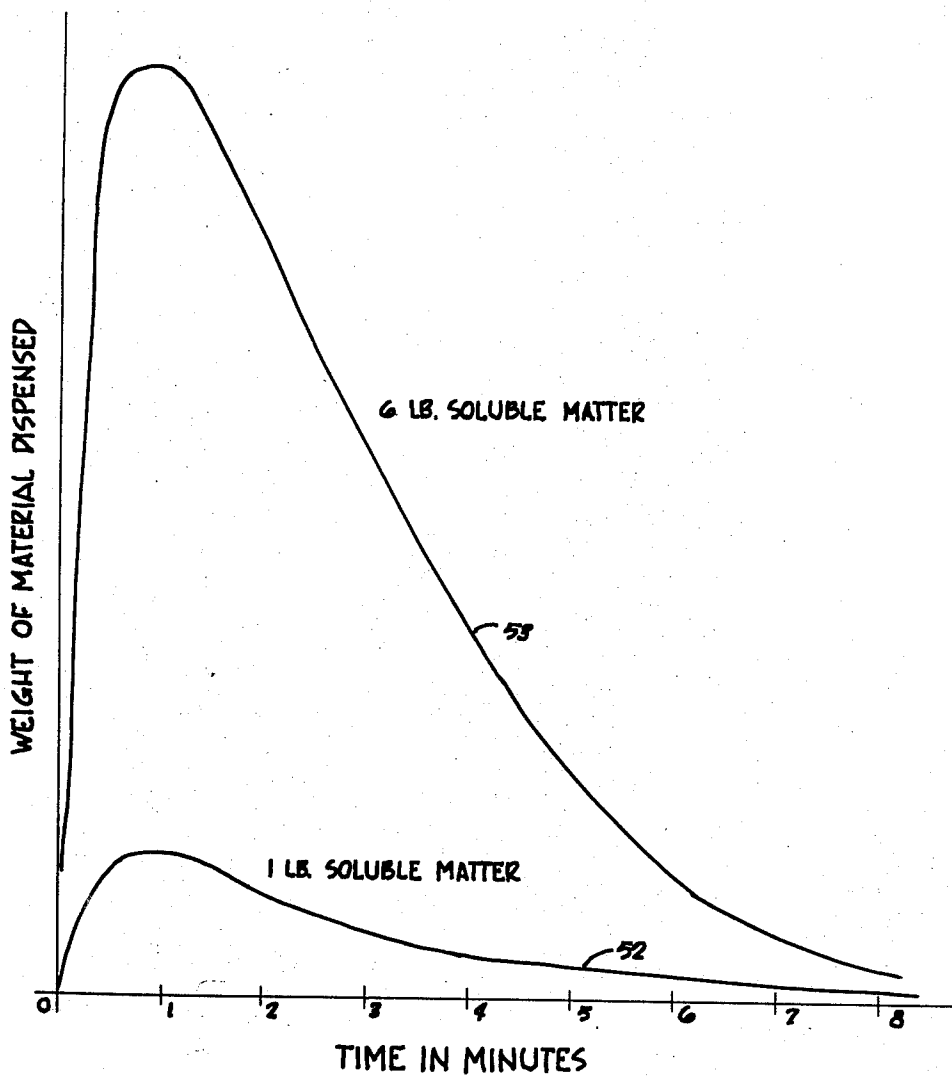
2,857,202

DISPENSERS FOR SOLIDS AND LIQUIDS

Filed Jan. 7, 1954

2 Sheets-Sheet 2

FIG. 4



INVENTOR.
CLIFFORD H. SNYDER
BY
William D. Barothe
HIS ATTORNEY

1

2,857,202

DISPENSERS FOR SOLIDS AND LIQUIDS

Clifford H. Snyder, Dormont, Pa., assignor, by mesne assignments, to Clifford H. Snyder, Imperial, Pa.

Application January 7, 1954, Serial No. 402,774

7 Claims. (Cl. 299—84)

This invention relates generally to a method and apparatus for dispensing materials in solid or liquid form by use of a liquid conveyor stream operating under pressure and more particularly to a liquid conveyor stream for proportioning the distribution of solid or liquid materials.

Distribution systems of this character have been employed in the nature of a chamber intermediate the ends of the length of hose in which is deposited a cake or other form of the material to be distributed and when the hose is connected with a suitable liquid outlet such as a water faucet, a fine stream penetrates the cake and erodes it carrying the material to the roses or other flowers or garden as the case may be, depending upon the use of the material being distributed. However, such an application produces an uncontrolled discharge percentage of the material. Sometimes the cake will disintegrate much faster than others and a greater proportion of the material than is necessary is distributed in this manner. The cake lasts only for a short period of time and is completely disintegrated and conveyed by the liquid stream.

The present invention employs a container in which liquids and solids may be distributed. The solids may be inserted in dry powdered form for distribution. When the container is filled with water and connected intermediate the sections of the length of hose the liquid or solids are picked up and carried away by the stream in predetermined proportions depending upon the preadjustment of the orifices in carrying a part of the liquid conveyor into and out of the dispensing chamber and thus displacing a proportioned amount of material to be dispensed within the conveyor stream and through the hose to discharge. By means of this method one can accurately control the amount of solids or liquids to be dispensed over a particular area through sprinkling and one may control the weight of which the same is sprinkled by controlling the water by-passed through the container holding the material to be dispensed. Obviously a soluble or a nonsoluble material as well as a liquid may be dispensed in this manner.

Another important object of this invention is the provision of an agitator which is in the form of a flexible hose that supplies the water to the container. When the container is filled with liquid and material to be dispensed, the flexible hose creates a suspension of the solids within the liquid in the container. A second flexible hose, which aids in removing the liquid from the container, is likewise movable and thus withdraws the solids forced into suspension from different parts of the container.

Another object of this invention is the provision of a vent at the top of the container which prevents the same from accumulating a pressure and permits the gas to escape therefrom until the container is filled by liquid and after which the liquid with the material therein is dispensed therethrough. The liquid is dispensed through the upper outlet as well as through the lower flexible outlet that extends to the bottom of the container. This

2

dual discharge provides a more uniform discharge of the material at any one instant, than if the material were withdrawn at one place only. In this manner the ultimate discharge proportions the liquid and the solids in suspension in the liquid discharged at the nozzle, which proportions remain substantially constant relative to the amount of the materials found in the container at the same instant. After a mixture period the amount of material is reduced proportionately over a period of time until all of the solids or other materials are dispensed from the container, at which time only water will remain. If the container is made of glass, this can be observed.

Uniform distribution at any one instant is based on two principal factors. First the materials are withdrawn simultaneously at top and bottom of the container and secondly the whipping and stirring action within the container maintains the solids and soluble material well mixed in the water at all times. Thus a full portion of materials may be accurately distributed over a given area of ground in a known period of time. In fertilizing, this conserves the fertilizer and properly feeds the soil.

In order to aid in maintaining this mixture uniform throughout the container, at any one time a flexible hose is placed on the inlet to the container. The water discharging from this hose rapidly flips it back and forth and around in circles not repeating a definite pattern, thus maintaining an active and continuous movement of the liquid keeping it well uniformly mixed.

This stirring action combined with the dual discharge and the selection of the tandem orifices creating the discharge provides a definite pattern of emptying the container of materials that is substantially repeated regardless of the weight of materials loaded into the container leaving room for some liquid.

By this means materials may be accurately dispensed over a predetermined period of time. To vary the dispensing pattern the device may be regulated by valves thus controlling the inlet and the dual outlets.

Other objects and advantages appear hereinafter in the following description and claims.

Accompanying drawing shows for the purpose of exemplification without limiting the invention or claims thereto certain practical embodiments of the invention wherein:

Fig. 1 is a view in vertical section showing the container and the hose connections therefor.

Fig. 2 is a view in horizontal section taken along the lines 2—2 of Fig. 1.

Fig. 3 is a view showing the vertical section of a dispenser wherein the openings into the container are of different proportions than that shown in Figs. 1 and 2, and wherein valve members are employed to control said orifices.

Fig. 4 is a graph showing a discharge pattern in emptying the same container with varied amounts of material to be dispensed therein and under equal pressure and orifice conditions.

Referring to Figs. 1 and 2 of the drawings, 1 represents a pressure vessel having an inverted head 2, the peripheral edges of which are welded or otherwise secured to the edges of the cylindrical portion 3 as indicated at 4. The inner bottom surface of the pressure vessel is preferably concave as shown. The top or mouth of the pressure vessel 1 is provided with an outwardly extending flange 5 secured over the inturned flange 6 of the ring member 7. The gasket 8 is secured over the inturned flange 5 of the pressure vessel and is engaged by the lower end of the body member 10. The bore of the sleeve 7 is threaded as indicated at 11 to match with the thread 12 on the lower end of the body member 10. This structure can be made integral.

3

The upper portion of the body member has an off center bore as indicated at 13 and which is enclosed by the threaded cap member 14 sealed with the rubber washer 15. The off center solid portion 16 of the body member 10 is provided with a horizontal passage as indicated at 17 which has several different sizes of bores. As shown at the extreme right of both figures of the drawings, the passage 17 is connected to the hose coupling 18 which is internally threaded to receive the end of a hose that is connected to an ordinary tap. This coupling in turn is connected to the passage 17. The first bore in the passage 17 is the bore 20 that is preferably tapered and approaches a smaller diameter bore 21. At the other end of the bore 21 the passage 17 increases in diameter as indicated by the bore 22 which is preferably smaller in diameter than the bore 20. A fourth bore 23 is the next section of the passage 17 and it is larger than the bore 22. The bore 23 may be larger in diameter or may be the same size as the bore 20, and it extends to the outlet hose connection 24. The bore 23 preferably expands in diameter as it approaches the hose connection 24. These bore sections are made to taper because they are more easily formed with the taper than without.

The bore section 20 has a downwardly extending passage 25 which terminates in the hollow stem 26 having slid thereover the flexible tubing 27 which extends toward the bottom of the container but stops short thereof.

The third bore 22 is provided with a small downwardly open passage 28. The larger or fourth bore 23 is provided with the passage 30 that terminates in the hollow stem 31 that may also be provided with a flexible hose such as the member 32. When the lid 14 is removed and a goodly quantity of solid material that is to be distributed over the lawn or other vegetation is deposited in the container 1, this charge may substantially fill the container 1 or at least up to the shoulder formed at the upper part of the container. The lid is then replaced and secured tightly and a hose is connected with the hose connection 18 and the water is turned on with a discharge hose section with a sprinkler or nozzle connected to the outlet 24. When the water is turned on it travels in through the passage 17 and a goodly supply is directed downwardly through the flexible tube 27. Since there is no water in the container at all, the container begins to fill. As the container is filling the air trapped in the container is forced out through the passage 28 and is discharged through the discharge hose connected to the threaded portion 24. When the whole of the container is filled with liquid, the material therein becomes more buoyant and begins to lift from the bottom of the container and as it does this the flexible hose 27 is forced and permitted to flap back and forth and the material together with the liquid is mixed and discharged through the tube 32. Thus the tube 32 and the passage 28 simultaneously discharge liquid and owing to their proportionate sizes, discharge proportionate amounts of fluid in a given unit of time. Likewise the proportion of a restricted orifice 21 and the size of the passage 25 determine the amount of liquid that is permitted to pass straight through the passage 17 and that amount that is supplied to the container. The fact that the liquid is restricted by the orifice 21 and then discharged into a larger passage 22 and again into the larger passage 23 creates a suction on the passages 28 and 32 thus aiding to withdraw a solution therefrom as well as being forced out by the liquid passing downwardly through the passage 25 and the flexible hose 27 into the container which is filled. The proportionate sizes of these passages and the mixing action of the hose 27 aid in supplying a predetermined amount of liquid or solid material that is being dispensed with the liquid or water conveyor over a predetermined period of time.

Referring now to Fig. 3 the lid member 40 of the receptacle is provided with the horizontal passage 41 which is likewise made in three sections of different diameter bores as illustrated at 42, 43, 44 and 45. The sec-

4

tion 42 is provided with downwardly open passage 46 controlled by the valve member 47, and the downwardly extending intermediate passage 48 is controlled by the valve member 49 whereas the downwardly extending passage 50 is controlled by the valve member 51. Thus each of the passages 46, 48 and 50, although they may be substantially equal in size, are controlled by the respective valve members 47, 49 and 51. Regulating these controls to provide a different proportionate size of the passages connecting the conveyor stream with the interior of the dispensing chamber 1 permits one quickly to adjust the distribution of the material within the chamber 1 or to retain or extend the period of time depending upon the setting of the valve members. A structure of this character may be provided in places where employing commercial gardeners who are skilled in mixing and distributing the material more readily than that of the domestic type as illustrated in Fig. 1 wherein the orifices are set to provide the proportionate amounts for that ordinarily employed for use around the house and on the lawn and garden surrounding the home.

As the materials in the container 1 become suspended by the liquid the hose 27 is free to whip and maintains the solid materials in suspension even though they are considerably heavier than water. By reason of this whipping action of the hose 27, it forces the water in many directions against the bottom and sides of the container. This action in itself creates a suspension that is not otherwise obtainable and also provides for a more uniform distribution of the solid within the conveyor liquid. If the solids are very fine there is no difficulty in maintaining them in suspension even though they are actually metals. The larger the solid particle the more difficult it is to maintain in suspension. Thus a more violent stream is required in the flexible hose 27. This may be obtained by higher water pressure or greater volume flow through the tube 27. The sizes of the solid particles are of course limited by the size of the orifices.

By reason of the fact that two outlets 28 and 30 are employed no pressure can be developed in the container other than that created by the flow which of course is immediately effective on the discharge. The combined effect of the variable bores creating suction and the flow of liquid into the container in proportion to the pressure developed in the small bore 21 accounts for the safety in operation of this device in preventing pressure accumulation.

The proportionate pressures by ejection and injection together with the constant stirring action and dual discharge adjacent the top and bottom of the container simultaneously provides a uniform distribution of the materials. As shown in Fig. 4 the curve 52 shows the dispensing of one pound whereas the curve 53 shows the dispensing of six pounds of the same material. The orifices and bores were not changed and the pressure was the same in both cases. These curves illustrate a similarity in pattern which is unexpected. It takes practically the same period of time to empty different quantities from the container using the same relative sizes of orifices and pressures. To empty the container sooner one has to change the proportions of the passages 25, 28 and 30 but upon changing these passages as by the valves 47, 49 and 51 the same pattern will be produced with different amounts of material as illustrated in Fig. 4. The flexibility of the hose 27 and the volume of the container will effect the discharge but each hose and each container provide comparable emptying patterns as shown in Fig. 4.

I claim:

1. A dispenser for distributing solid material in granular form which comprises a container for receiving the material, an ejector having a liquid conveyor inlet and outlet, a restricted passage between said inlet and outlet, a second passage from the inlet to the container, a third passage from the container to said outlet, and means at

5

the end of the second passage to induce constant movement of the granular material in the container and maintain the granular material in suspension, and a fourth and more restrictive independent passage from said container to said outlet, said outlet increasing in cross section between the points of entry from the fourth passage to the third passage and the first passage being substantially the same cross section as the fourth passage to induce partial suction in the third and fourth passages.

2. An ejector comprising a main passage to direct the flow of fluid therethrough having a series of four bores, a first passage leading off the first bore to conduct fluid from the main passage, the second bore being the smallest of said bores, a second passage leading off the third bore to conduct fluid to said main passage, and a third passage leading off the fourth bore to conduct fluid to said main passage, said third bore being smaller than said fourth bore.

3. The structure of claim 2 which also includes valve means for said first, second and third passages.

4. A dispenser for distributing material which comprises a container having a lid to close the same, an ejector having a main passage of four consecutive bores connected between an inlet and an outlet, a first passage connecting the first bore with said container adjacent the bottom thereof, a second and smallest bore in said main passage separating said inlet and outlet, a second passage connecting the third bore on the outlet side of said second small bore with said container at the top thereof, and a third passage connecting said fourth bore with said container at the bottom thereof.

5. The structure of claim 4 characterized in that the third bore of the main passage on the outlet side of said second and smallest bore is smaller than said fourth bore and has the second passage connected thereto.

6. A mixing and dispensing apparatus including a closed liquid mixing chamber through which a circulating liquid is passed for mixing therewith materials of higher specific gravity than that of the circulating liquid for uniformly distributing these materials comprising an inlet and an outlet for said chamber, a normally straight section of flexible hose attached to said inlet and depending downwardly into the chamber toward the center but short of the bottom of said chamber, a second normally straight section of flexible hose attached to said outlet

6

of said chamber and extending into the same and short of the bottom of said chamber, said flexible inlet hose being free and uninhibited and of such length that it will simultaneously mechanically whip the circulating liquid and the materials to agitate the same and also to haphazardly direct the forceful liquid stream to all points over the bottom and lower portion of said chamber, said flexible outlet hose being mechanically whipped by the action of the flexible inlet hose and by the forceful action of the liquid stream discharged from the flexible inlet hose so as to remove the materials with the circulating liquid.

7. An agitator for uniformly mixing solids in a liquid in a dispensing container having a closed chamber with an inlet for admitting liquid under pressure, characterized in that said liquid inlet is at the top of the container, comprising a normally straight flexible rubber hose section attached to said inlet near the top of said container and depending downwardly short of the bottom of said container to direct the liquid stream under pressure toward the bottom of said chamber to mechanically whip the contents in the chamber and also to direct the force of the stream haphazardly over the whole of the bottom of the chamber to violently agitate and mix the solids for discharge with the liquid, an outlet for discharging the liquid and mixed solids from the lower portion of said container, and a flexible tube attached to said outlet and reaching short of the bottom of the chamber to be flexed about by the mechanical whipping of the inlet hose and also by liquid discharge action of the inlet liquid stream so that the solution and mixed materials enter the discharge flexible tube at varying points near the bottom of the chamber to provide a uniform mixture for discharge.

References Cited in the file of this patent

UNITED STATES PATENTS

1,452,966	Field	Apr. 24, 1922
1,488,125	Kline	Mar. 25, 1924
1,920,721	Tirrell	Aug. 1, 1933
2,058,901	McPherson	Oct. 27, 1936
2,107,340	Pedrick	Feb. 8, 1938
2,501,047	Gustafsson et al.	Mar. 21, 1950
2,562,415	Chase	July 31, 1951
2,683,622	Dragon	July 13, 1954