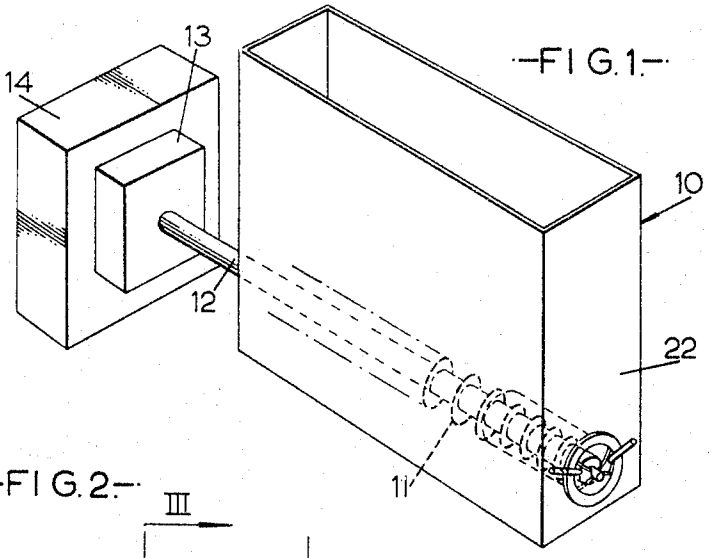
Dec. 10, 1968 E. E. CROSSLEY 3,415,424

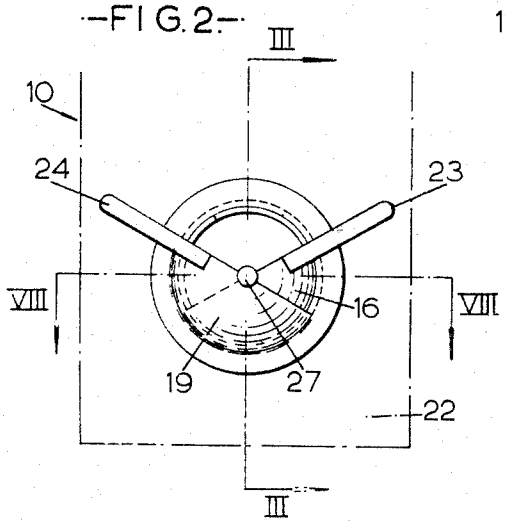
MEANS FOR DISPENSING PREDETERMINED QUANTITIES OF POWDERED OR GRANULATED MATERIALS

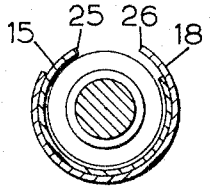
Filed Jan. 10, 1967 2 Sheets-Sheet 1

-FIG. 1-



-FIG. 2-





-FIG. 4-

-FIG. 3-

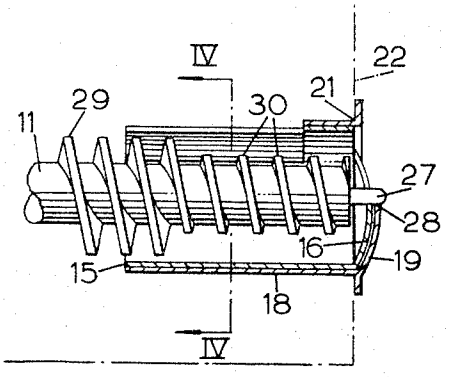


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FIG. 5.

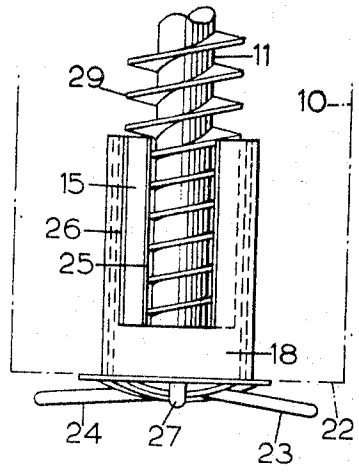
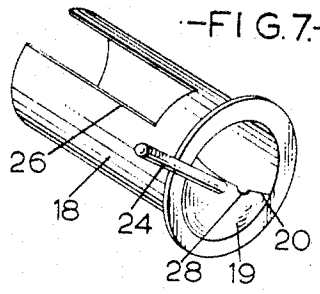


FIG. 7.



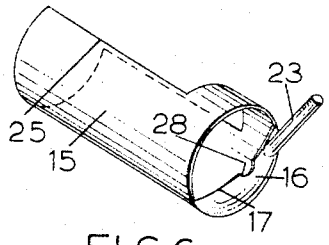
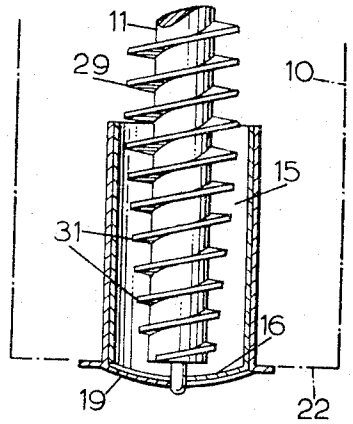


FIG. 6.

FIG. 8.



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MEANS FOR DISPENSING PREDETERMINED QUANTITIES OF POWDERED OR GRANULATED MATERIALS

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9 Claims. (Cl. 222—311)

ABSTRACT OF THE DISCLOSURE

Dispensing means for granulated or powdered material, for example for dispensing dry ingredients such as coffee, tea and sugar in a beverage vending machine, comprising a tube having an open end into which a feed screw extends for feeding the material to a delivery opening in an end wall at the other end of the tube, shutter means being provided by varying the effective size of the delivery opening, and a by-pass opening being disposed in the side wall of the tube, for diverting material from the inner side of the delivery opening, means being provided for varying the effective size of the by-pass opening, the latter means and the shutter being interconnected so that when one opening is enlarged the other opening will be reduced, and vice versa. The said tube may be disposed within an outer tube which also has an outlet opening in its end wall and a by-pass opening in its side wall, the two tubes being rotatable relatively to one another to bring the two outlet openings and the two by-pass openings into and out of register with one another respectively.

In beverage vending machines, dry ingredients such as coffee, tea and sugar are contained in cannisters and predetermined quantities of these ingredients are dispensed as required for mixing with liquid, e.g. water and/or milk. The usual means for this purpose comprises a feed screw in the bottom of the cannister, adapted to force material through a delivery opening, driving means for the feed screw being adapted to rotate the feed screw through a predetermined number of revolutions. The quantity of material dispensed by such apparatus can be varied either by varying the number of revolutions of the feed screw on each dispensing operation, or by changing the feed screw for one of larger size or of different pitch. In any of these methods, a mechanical change is required, e.g. a change in the driving mechanism or substitution of a different feed screw.

The present invention is designed to provide a dispensing mechanism, for powdered or granulated material, which is capable of being readily adjusted to vary the quantity of material dispensed on each dispensing operation. Whilst the invention is primarily designed for use in beverage vending machines, it can equally well be adapted for dispensing pre-determined quantities of powdered or granulated materials for other purposes.

According to the invention, a feed screw is adapted to feed powdered or granulated material to a delivery opening, means, such as a shutter, being provided for varying the effective size of the delivery opening, and a bypass opening also having means for varying its effective size is adapted to divert material from the inner side of the delivery opening, the means for varying the effective size of the said two openings being coupled whereby when one opening is enlarged the other opening will be reduced and vice versa.

One particular arrangement of a feed screw in a dry ingredients cannister, according to the invention, together with a modification, will now be described by way of example only with reference to the accompanying drawings, in which:

FIGURE 1 is a perspective view of a dry ingredients cannister, incorporating the dispensing means,

FIGURE 2 is a front view of the lower portion of the cannister illustrating the variable delivery opening,

FIGURE 3 is a section on the line III—III of FIGURE 2,

FIGURE 4 is a section on the line IV—IV of FIGURE 3,

FIGURE 5 is a plan view of the dispensing means and illustrates a variable bypass opening,

FIGURE 6 is a perspective view of an inner sleeve for the delivery screw,

FIGURE 7 is a view similar to FIGURE 6 but showing an outer sleeve, and

FIGURE 8 is a section on the line VIII—VIII of FIGURE 2 but illustrating a modified form of delivery screw.

Referring to the drawings, the particular arrangement illustrated is intended for the dispensing of powdered or granulated ingredients in a beverage vending machine. In this example, the powdered or granulated material is contained in a cannister **10** and a feed screw **11** is disposed in the bottom of the cannister, a drive shaft **12** projecting from the rear end of the feed screw through an opening in the rear wall of the cannister **10**, the shaft **12** being connected through reduction gearing **13** to an electric motor **14** for driving the feed screw **11**. The forward end portion of the feed screw **11** is enclosed in a tube **15** the front end of which has an end wall **16** with a delivery opening **17** therein. This tube, which will be called the inner tube **15**, is fitted within an outer tube **18** and is rotatable about the common axis of the two tubes relatively to the outer tube **18** which latter also has a front end wall **19** with a delivery opening **20**. The outer tube **18** is rotatable about its axis in an opening **21** in the front wall **22** of the cannister **10**, the front end wall **19** of the outer tube **18** being aligned with or projecting slightly in front of the front wall **22** of the cannister, and the front end wall **16** of the inner tube **15** bearing against the inner surface of the front end wall **19** of the outer tube **18**.

The front end wall of each tube comprises substantially a semicircle, so that by rotating one tube relatively to the other tube, the effective delivery opening can be varied between half the area of the front end wall and a fully closed position, that is, from a position in which the semi-circular end walls **16** and **19** are in register with one another to a position where they are fully out of register so that the end wall of each tube obscures the opening in the end wall of the other tube. However, it is not desired that the opening should ever be fully closed, and that being so, a radially disposed lever **23** projects from the front end of the inner tube **15** through the opening **20** in the front end wall **19** of the outer tube **18**, to serve for manually rotating the inner tube **15**, and this lever **23** will prevent the delivery opening being fully closed. A similar radial lever **24** projects from the front end of the outer tube **18**, for manually rotating the outer tube.

The tube **15** has an axially disposed slot **25** and the tube **18** has a similar slot **26**, the two slots being arranged so that they can be brought into and out of register with one another by rotating one tube relatively to the other tube. In this way, the effective size of the opening provided by the two slots **25** and **26** can be varied, this opening being the by-pass opening. The slots **25** and **26** are so disposed around the two tubes with relation to the positions of the openings **17** and **20** in the end walls of the tubes, that as the delivery opening formed by the openings **17** and **20** is being reduced, the by-pass opening provided by the slots **25** and **26** will be enlarged, and vice versa. As the manipulating levers **23** and **24** are disposed at the front ends of the tubes, and project at the front of the

cannister **10**, adjustment of the openings can be effected readily, and the need for mechanical adjustments or substitution of parts is avoided. The by-pass opening of the slots **25** and **26** may be arranged to close fully when the delivery opening **17**, **20** is at its maximum size.

In operation, material will be fed through the delivery opening, the rate of delivery depending on the effective size of the delivery opening, and when the delivery opening is partly closed, the by-pass opening will be opened to a corresponding degree to permit excess material to flow therethrough and back into the cannister.

The feed screw **11** extends from the rear wall of the cannister **10** and through the inner tube **15**, and has a pin **27** projecting from its forward end into engagement with notches **28** in the end walls **16** and **19** of the tubes **15** and **18**. The thread **29** of the screw **11** serves to feed material from the cannister into the inner tube **15** and extends into the rear end portion of the inner tube. The thread at the forward end of the screw **11** has its outside diameter reduced as shown at **30** in FIGURE 3, thus leaving a clearance between the forward thread portion **30** and the inner tube. An alternative arrangement for the feed screw **11** is shown in FIGURE 8, the thread **29** extending into the rear end portion of the inner tube **15** as in the arrangement shown in FIGURE 3, but instead of reducing the forward thread portion stepwise, the outside diameter of the forward portion of the thread is reduced progressively so as to be substantially conical as indicated at **31**.

I claim:

1. Means for dispensing granulated, powdered or other particulate material comprising a tube having an open end and having an opposite end provided with an opening for delivery of material, adjustable shutter means for varying the effective size of said delivery opening, means providing a by-pass opening in the side of said tube, adjustable means for varying the effective size of said side wall by-pass opening, a feed screw extending into said open end of the tube for feeding material toward said openings, said by-pass opening being adapted to divert material from the tube at the inner side of said delivery opening, and means for operatively coupling and associating said adjustable means whereby when one of said openings is enlarged the other is reduced, and vice versa.

2. Dispensing means according to claim **1**, in which the feed screw is disposed substantially horizontally in the bottom of a container for the material to be dispensed,

and a drive shaft projects from the rear end of the feed screw through the rear wall of the container and is operatively connected to a driving motor, and the delivery opening is disposed in the front wall of the said container.

3. Dispensing means according to claim **2**, wherein the forward end of said feed screw extends relatively rotatably into engagement with a recess in the end of said tube at said delivery opening.

4. Dispensing means according to claim **1**, wherein said tube is disposed with an outer tube having a delivery opening in an end wall adjacent the delivery opening in the inner tube, and said tubes are relatively rotatable about a common axis to vary the registry of their delivery and by-pass openings.

5. Dispensing means according to claim **4**, in which each delivery opening comprises approximately one half of the end wall of the corresponding tube and each by-pass opening comprises an axially disposed slot in the corresponding tube.

6. Dispensing means according to claim **5**, in which the forward end portion of the feed screw within the inner tube is of reduced diameter to leave clearance between it and the said tube.

7. Dispensing means according to claim **5**, in which the forward end portion of the feed screw within the inner tube is progressively reduced in diameter so as to be substantially conical.

8. Dispensing means according to claim **4**, in which a lever on the inner tube extends through the delivery opening of the outer tube for rotating the inner tube relatively to the outer tube.

9. Dispensing means according to claim **4**, wherein the delivery opening end of said outer tube is rotatably mounted in the front wall of said container.

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U.S. Cl. X.R.

222—318, 412; 103—41