

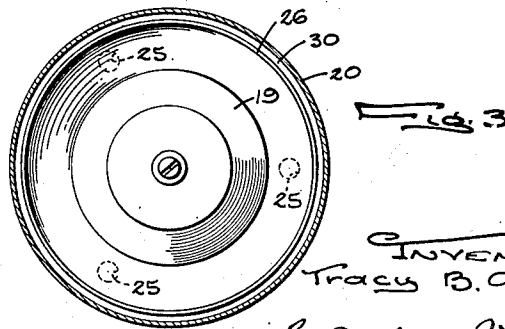
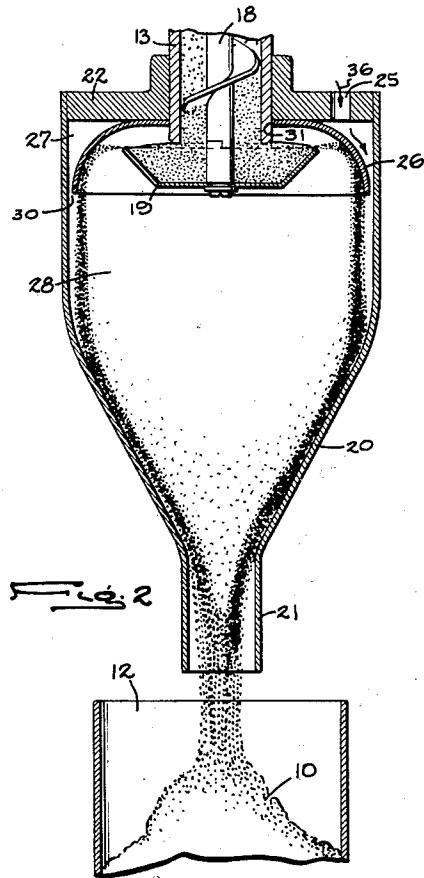
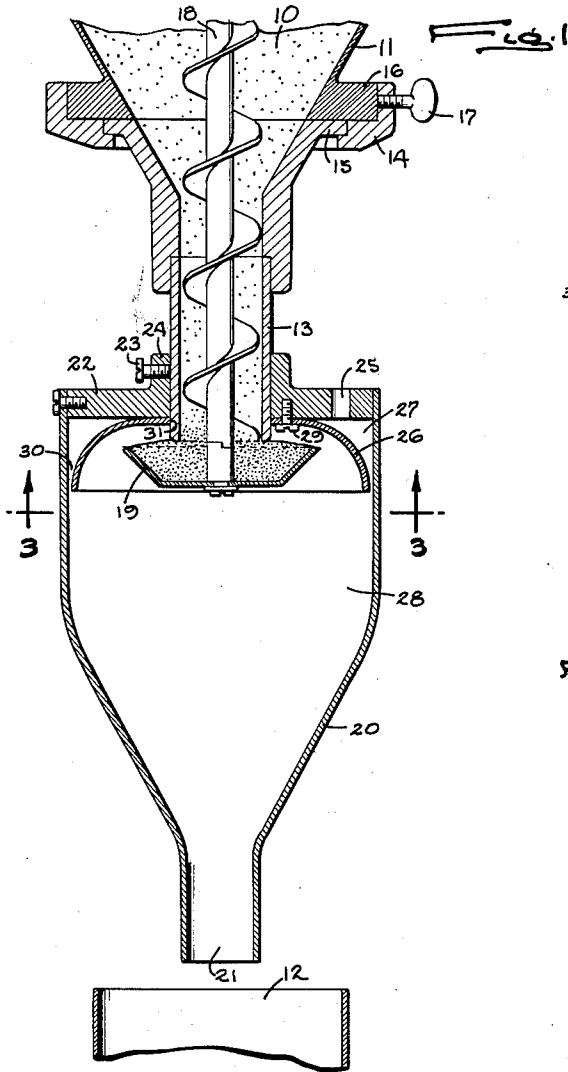
May 7, 1957

T. B. MORGAN, JR  
DISPENSING MECHANISM

2,791,355

Filed Jan. 24, 1955

2 Sheets-Sheet 1



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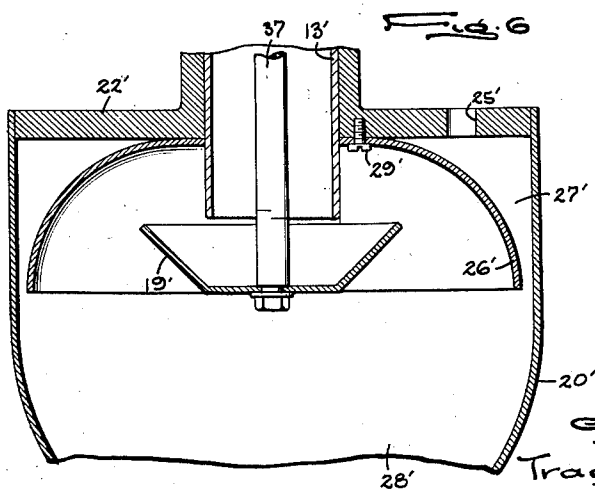
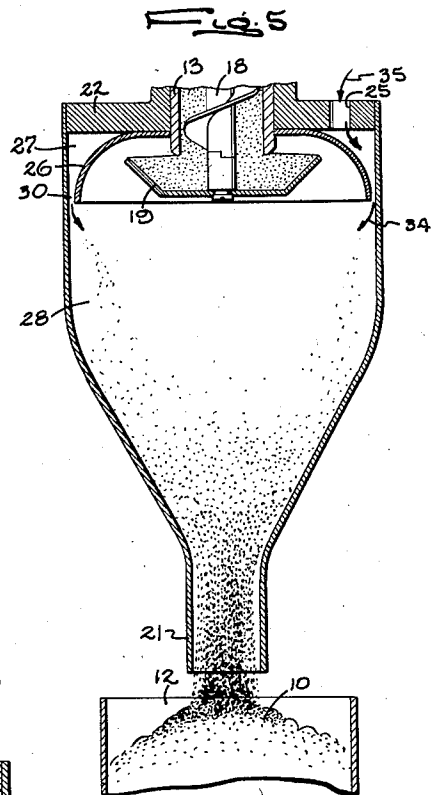
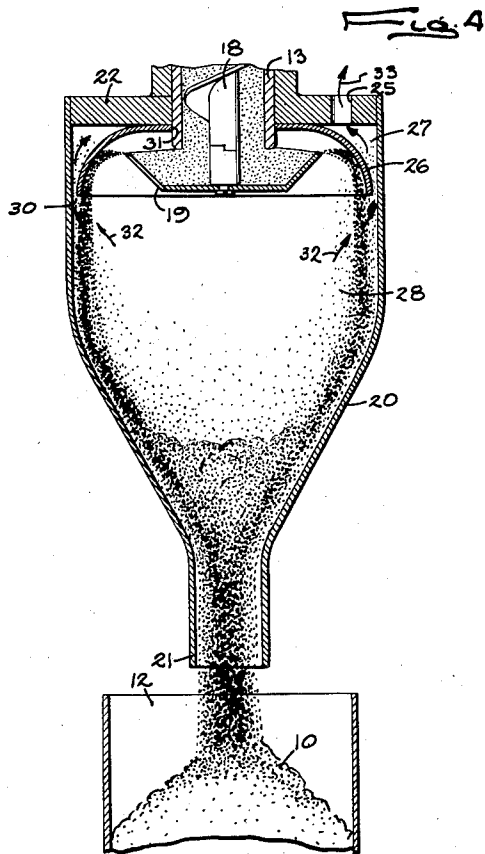
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2,791,355

Filed Jan. 24, 1955

2 Sheets-Sheet 2



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2,791,355

**DISPENSING MECHANISM**

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Application January 24, 1955, Serial No. 483,499

4 Claims. (Cl. 222-411)

This invention relates to a filling machine in which material, such as powder, is dispensed from a supply hopper by means of an auger and deposited in a suitable container. More particularly, the invention has reference to a filler in which the column of powder in the hopper is supported by a disk disposed beneath the auger. The disk is secured to the auger to turn with the latter and, when turned, the disk throws the powder laterally as it is discharged from the hopper by the auger. In order to guide the powder from the disk to the container, the disk is enclosed within a hollow collector which is formed with a spout disposed above the container.

In some instances, the spout must be comparatively small due to the size of the bag and, as a result, the powder is delivered to the collector by the auger at a rate faster than the powder can flow through the spout. Under these conditions, the powder piles up within the collector until the auger stops, the powder thereafter continuing to flow out through the spout. Near its top, the collector may be formed with holes to let air escape and prevent a build-up of pressure within the collector. With prior constructions of this type, however, dust also escaped through these holes creating undesirable conditions around the filling machine.

The general object of the invention is to provide a new and improved filling machine of the above character which eliminates or materially reduces the dust escaping from the collector.

A more detailed object is to achieve the foregoing by dividing the interior of the collector into upper and lower chambers and by disposing the disk in the lower chamber so that the dust initially forms in the lower chamber and rises into the upper chamber while dust-free air leaves the collector through the holes therein.

The invention also resides in the novel construction of the member separating the upper and lower chambers.

Other objects and advantages of the invention will become apparent from the following detailed description taken in connection with the accompanying drawings, in which

Figure 1 is a fragmentary vertical sectional of a filling machine embodying the novel features of the present invention.

Fig. 2 is a view similar to Fig. 1 and shows one stage in the operation of the filling machine.

Fig. 3 is a sectional view taken along the line 3-3 in Fig. 1.

Fig. 4 is a view similar to Fig. 2 but shows a subsequent stage in the operation.

Fig. 5 also is a view similar to Fig. 2 and illustrates a third stage.

Fig. 6 is a fragmentary vertical sectional view of a modified form.

For purposes of illustration, the invention is shown in the drawings as embodied in a filling machine in which a material 10 to be dispensed, such as powder, is discharged from a supply hopper 11 and deposited in a container 12, in this instance a flexible walled bag. The hopper is in the form of a hollow inverted cone terminating at its lower end in an opening which communicates with a vertical outlet tube 13. The latter is clamped to the lower end of the hopper by a ring 14 projecting in under a flange 15 on the tube and secured to a collar 16 on the exterior

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of the hopper by means of thumb screws 17. Disposed within the tube and extending up into the hopper along the axis thereof is an auger 18 of the type conventionally used in filling machines of this type. The auger is turned successively by a suitable power actuator (not shown) through predetermined angles and thus feeds measured charges of powder out of the hopper through the tube 13.

Supporting the powder 10 within the tube 13 is a dish-shaped disk 19 secured to the lower end of the auger 18 to turn with the latter. When the auger is not turning, the column of powder within the tube rests on the disk which thus prevents the powder from falling. When the auger turns, however, the disk also turns and the powder is thrown laterally from the disk by centrifugal force thus dispensing the powder. The powder as it is thrown from the disk is guided into the bag 12 by a hollow collector 20 enclosing the disk and formed with an outlet spout 21. The powder drops from the collector through the spout and into the bag.

In some instances, as when the filling machine is used in conjunction with an automatic packaging machine, it is necessary to discharge the powder 10 from the hopper 11 at a predetermined rate. When the mouth of the bag 12 is small, this rate may be greater than the rate at which the material can be introduced into the bag. In other words, the size of the bag mouth limits the size of the tube or spout which guides the material into the bag. To compensate for this, the spout 21 of the collector 20 is correlated in size with the size of the bag mouth. Hence, the spout is smaller than the tube 13 and, as a result, the material drops by gravity from the collector to the bag at a slower rate than that at which it is delivered to the collector by the auger 18.

Herein, the collector 20 is a hollow casing whose side wall converges downwardly and terminates in the tubular outlet spout 21. The latter is sized to cause the powder falling through it to enter the bag 12. At its upper end, the collector is closed by a cover plate 22 which encircles the lower end of the tube 13 and is secured to the latter by a set screw 23 threaded through a boss 24 on the cover and abutting against the tube. Since the auger 18 delivers the powdered material to the collector at a faster rate than the material leaves the collector through the spout 21, the material piles up in the collector which the auger is turning and continues to fall out through the spout after the auger is stopped. One or more holes 25 may be provided in the cover 22 to permit the air within the collector 20 to escape as the material piles up.

In dispensing powdered material, the air within the collector 20 becomes laden with dust. With prior arrangements of this type, the dust is forced out of the collector through the holes 25 creating undesirable conditions around the filling machine. To reduce or eliminate the expulsion of dust, the present invention contemplates the provision of novel means for maintaining the air in the upper portion of the collector dust-free so that this air is forced out while the dusty air remains in the collector. This means comprises a member 26 extending across the inside of the collector to divide the latter into upper and lower communicating chambers 27 and 28. The auger 18 introduces the material into the collector below the member 26 so that, initially, the dust created by the falling powder forms only in the lower chamber. As the material begins to pile up in the bottom of the collector, the dust-laden air in the lower chamber is forced up into the upper chamber pushing the dust-free air in the latter chamber ahead of it and out through the holes 25. The upper chamber is sized so that, before it is filled completely with dust, the auger has been stopped, the air in the upper chamber then being drawn down into the lower chamber as the latter empties.

In the present instance, the member 26 is a rounded

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dome secured to the under or inner side of the cover 22 by screws 29. The dome 26 is somewhat smaller than the internal diameter of the collector 20 to form a narrow ring-like passage 30 connecting the upper and lower chambers 27 and 28. As illustrated in the drawings, the upper chamber is substantially smaller than the lower chamber and is annular in shape. At its center, the dome 26 is formed with a hole 31 through which the tube 13 projects.

Preferably, the dome shape of the member 26 is utilized to turn the powder 10 through a right angle as the latter is thrown laterally by the disk 19 so that the powder is directed downwardly without substantial loss of speed. For this purpose, the disk is disposed within the dome whereby the disk throws the powder against the downwardly curved interior of the dome which deflects the powder down as shown in Fig. 2. Because of the curvature of the dome, the direction of the powder is changed without a substantial reduction in speed.

In operation, the parts initially are in the position shown in Fig. 1 with the collector 20 empty, the powder in the tube 13 supported on the disk 19, and an empty bag 12 beneath the spout 21. When the auger 18 begins to turn, the powder is thrown laterally from the disk 19, is turned downwardly by the dome 26 and flows down along the wall of the collector. At first, all of the powder thrown by the disk falls out through the spout 21 and into the bag 12. Since the auger 18 delivers the powder to the collector faster than it can flow through the spout, however, the powder begins to pile up in the bottom of the collector as illustrated in Fig. 4.

Throwing the powder from the disk 19 creates dust within the collector 20 below the dome 26, that is, in the lower chamber 28. As the powder piles up in the collector, the dust is forced up through the passage 30 and into the upper chamber 27 as indicated by the arrows 32 in Fig. 4 while the dust-free air originally in the upper chamber is forced out through the holes 25 (arrows 33). Before the dust in the upper chamber also begins to flow out through these holes, the auger 18 stops and the powder piled up in the collector continues to flow out through the spout 21. This draws the dust in the upper chamber back down into the lower chamber as illustrated by the arrows 34 in Fig. 5. This also draws dust-free air back into the upper chamber through the holes 25 (the arrows 35 in Fig. 5). On the next cycle, the flow of powder creates a pumping action which draws more air from outside in through the holes 25 (see arrows 36 in Fig. 2) and thus insures complete scavenging of all dust in the upper chamber 27.

Fig. 6 illustrates a modified construction in which the parts corresponding to those in the preferred embodiment are indicated by the same but primed reference characters. In this case, the auger is omitted and the powder falls by gravity from the hopper through the tube 13'. When the disk 19' is turned by the shaft 37, it throws the powder laterally just as in the case of the disk 19. A construction such as this may be used where the powder has free flowing characteristics and does not require the assistance of an auger to flow down through the tube 13'. In other respects, this construction is the same as that shown in Figs. 1 through 5.

It will be seen that an arrangement constructed as described above prevents the air about the filling machine from becoming dusty. This is achieved through the action of the dome 26 which serves the additional function of deflecting the powder downwardly without slowing the flow of powder and thereby maintaining the speed of the filling operation.

I claim as my invention:

1. Dispensing mechanism comprising a hollow casing having a discharge outlet adjacent the lower end thereof, a tube projecting down into said casing centrally thereof and through the upper end of the casing, means for supplying powdered material to said tube, an annular mem-

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ber encircling the lower end portion of said tube within said casing and extending horizontally across the casing to divide the interior of the same into upper and lower chambers, a generally horizontal disk disposed beneath said tube to support the column of material in the tube, mechanism for turning said disk about a generally vertical axis to throw the material laterally of the disk into said lower chamber, the edge portions of said member being curved downwardly around said disk to deflect the material toward said outlet and the margin of the disk being spaced from the wall of said casing to form a passage connecting said chambers, and means defining an opening into said upper chamber to permit air therein to escape while dust in the lower chamber enters the upper chamber through said passage.

2. Dispensing mechanism comprising a hollow casing having a discharge opening adjacent the lower end thereof, a tube projecting down through the upper end of said casing and into the interior thereof, means for supplying powdered material to said tube, an annular member encircling the lower end portion of said tube and extending across said casing on the inside thereof to divide the interior of the casing into upper and lower chambers, said member terminating short of the wall of said casing to define a narrow annular passage connecting said chambers, a horizontally disposed disk located beneath said tube to support the column of material therein, and mechanism for turning said disk about a generally vertical axis to throw the material laterally into said lower chamber, said casing having an opening adjacent the upper end thereof to permit air in said upper chamber to escape and dust in the lower chamber to enter the upper chamber through said passage.

3. Dispensing mechanism comprising a hollow casing having a discharge outlet adjacent the lower end thereof and an opening adjacent the upper end, a generally horizontal member disposed within said casing and extending across the same to divide the interior of the casing into upper and lower chambers communicating with each other, a conduit extending through said opening and into said lower chamber, and means for intermittently introducing charges of powdered material through said conduit into said lower chamber at a rate faster than the free flow of material permitted by said outlet whereby the air and dust carried therewith are forced from the lower chamber into said upper chamber and the dust-free air in the upper chamber is forced out through said opening until the delivery of said charge of material is completed, the size of said upper chamber being correlated with the delivery of material to hold the dust and prevent the dust from escaping through said opening before the delivery of said charge is completed.

4. Dispensing mechanism comprising a hollow casing having an outlet portion at the lower end thereof, a member disposed within said casing and extending across the same to divide the interior of the casing into upper and lower chambers communicating with each other, a supply tube projecting down into said casing and terminating in said lower chamber, means for delivering powdered material to said tube, a horizontal disk disposed beneath said tube to support the column of material therein, and mechanism for turning said disk about a generally vertical axis to throw the material laterally of the disk and into said lower chamber, said casing having an opening in the upper end portion thereof to permit air in said upper chamber to escape and dust in the lower chamber to rise into the upper chamber.

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