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FILLING SPOUT

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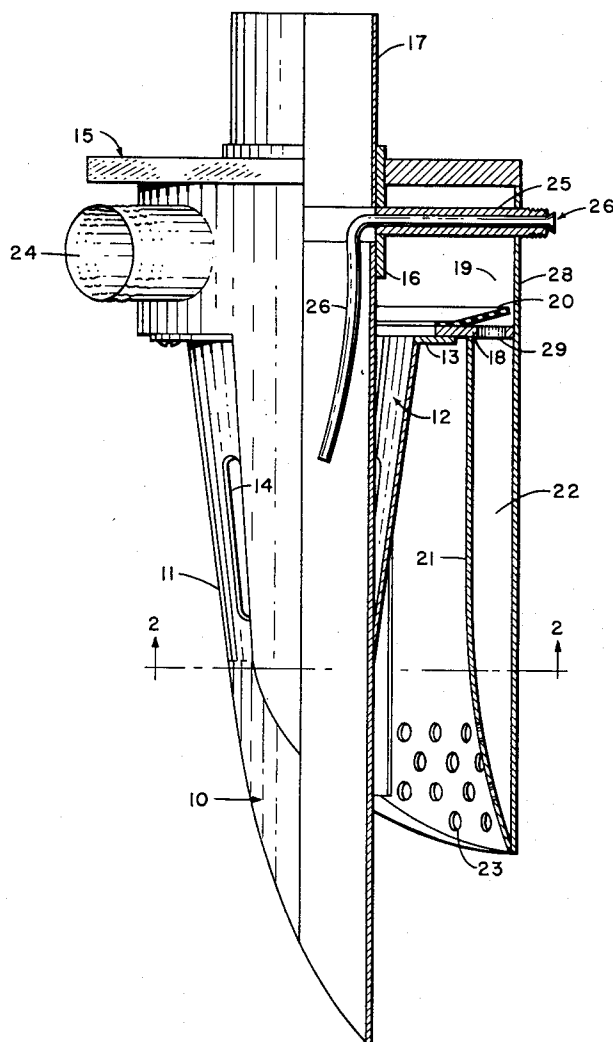


FIG. 1

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FILLING SPOUT

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This invention relates generally to the art of dispensing finely divided substances into bags. More particularly, the invention relates to a dispenser for filling valve bags with fluidized particulate substances in an improved manner whereby fast filling rates are achieved while experiencing negligible loss to the atmosphere of the substance being dispensed. Still more specifically, the present invention concerns an improved dispensing unit particularly adapted for use in combination with an air-flow packer, which unit comprises a novel spout assembly adapted to discharge the fluidized solids into a valve bag while simultaneously providing direct communication between the interior of the bag being filled and a remote suction source so as to facilitate escape of displaced and entrained air during the entire filling cycle. The invention additionally relates to the spout assembly as aforementioned having auxiliary means within the vicinity of the spout assembly for collecting any dust or fines which may have escaped from the valve of the bag either during or subsequent to the filling operation and also ancillary means for obviating spillage from the spout upon removal of the bag from said assembly.

Over the years a variety of different methods and apparatuses have been developed for filling valve type bags. Presently, there are apparatuses in use which merely require the operator to place the bag in a proper receiving position and initiate the filling, whereupon the rest of the filling cycle is accomplished automatically. The automatic portion of the cycle includes such sequential steps as: locking of the bag in position, feeding of a predetermined amount of material into the bag, cessation of the flow of material upon attaining said predetermined deposition, clearing the filling spout of any substance retained therein, releasing of the bag, tucking in of the valve portion of the bag and ejection of the bag onto a conveyor. In spite of the advanced state of development of this segment of the art, there nevertheless are certain operational features that desirably could be improved and additionally there is a definite need for improving the production rates of these expensive automatic machines.

Accordingly, the present invention provides for the overcoming of certain difficulties observed in the use of automatic packers, particularly the air-flow type, and furthermore permits a more efficient utilization of these machines. As indicated above, the gist of this invention concerns an improved dispensing unit for use in combination with the aforesaid packers and additionally appertains to a method of dispensing particulate substances from such packers in an improved manner.

In an effort to facilitate a more complete understanding of the precise nature of this invention, a brief discussion of various advantages residing in the practice thereof will be given preliminary to a detailed discussion of the method and apparatus involved therein.

The type of packers contemplated for use in the practice of this invention are employed for filling a variety of finely divided substances. As examples of typical materials that can be packaged by such means there are: hydrated lime, talc, silica flour, titanium dioxide, cement, refractory mixes, fertilizers, carbon black, resinous molding powders and the like. From the above enumeration it can be readily appreciated that it is very desirable, particularly from the standpoint of health considerations,

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that the filling operation be a clean one, that is, that there is substantially no escape to the atmosphere of the material being filled and also that there is no spillage from the spout after the filling operation. As will be seen hereinbelow, our invention provides beneficial results in these regards.

As indicated, it is substantially impossible to obviate completely the loss to the atmosphere of dust and fines when using the prior art filling machines to fill valve type bags. Our invention, in one aspect, overcomes this deficiency of the prior devices by providing improved means for collecting any such dust and fines that might escape during the filling operation.

Most of the present day air-flow packers depend upon the porosity of the walls of the bag in order to allow the escape of the displaced and comparatively large quantities of entrained air introduced into the bag during the filling cycle. Consequently, as the material is deposited into the bag there is a comparative rapid diminution of area through which air can effectively escape. In the practice of our invention, however, novel means are provided for permitting rapid escape of a sizable portion of entrained or displaced air through the dispenser unit, such escape route being out of contact with the flow of material being dispensed therethrough. Thus faster filling of porous bags is realized in the practice of our invention. A further attribute of the instant invention is that nonporous bags can be used such as, for example, polyethylene bags.

Oftentimes in packaging practices it is desirable to regulate the amount of fines or sub-specification particle sized material that might exist in the bulk of material being filled. Typical applications wherein this desideratum is experienced is in the filling of valve bags with carbon black pellets, molding compositions and the like. As will be seen an important feature of our invention pertains to the effective removal of such undesirable fines during the filling operation.

Another objective of the present invention is to provide a dispensing unit which can be readily adapted for the use of bags having varying valve sizes.

Other objects, features and advantages of the present invention will be apparent to those skilled in the art from a consideration of a detailed description set forth hereinbelow. Such description given in connection with the accompanying drawings forming a part of this application is presented merely as illustrative of the preferred embodiments of the invention. It is of course to be understood that the method of our invention may be practiced using a variety of different structures other than those specifically illustrated in the accompanying drawings.

In the drawings:

FIG. 1 is a side-elevational view, partly in section, of a dispenser assembly incorporating the features of the present invention;

FIG. 2 is a sectional view taken on line 2-2 of FIG. 1; and

FIG. 3 depicts a modification of a filling spout and a related part for use in a dispenser assembly unit as generally shown in FIG. 1.

As mentioned, the structures, arrangements and combinations of this invention are contemplated as being advantageously used with otherwise conventional apparatuses for filling bags. Suitable conventional bag filling apparatuses include the gravity type, screw type, air-flow type, etc. An improved version of the last-mentioned type of apparatus is shown in the A. R. A. Swenson copending patent application Serial No. 683,127 filed September 10, 1957, now Patent No. 3,083,780. Additional reference is made to A. R. A. Swenson patent application Serial No. 822,049 filed June 22, 1959, now U.S. Patent

No. 3,075,595, which discloses and claims an exceptionally beneficial weighing device for use with an air-flow packer such as disclosed in the former application. Briefly stated, the use of the aforesaid packer and weighing device permits the introduction of fluidized material into the bag once the operator positions the bag in a filling position. Upon deposit of a predetermined amount of the material into the bag, the scale assembly will cause interruption of the flow of material and ejection of the bag. It is specifically pointed out that the above-mentioned packer and scale device form no part of this invention but merely are mentioned by way of illustrating suitable devices for using the dispensing unit constituting the novel subject matter of the instant invention.

Referring to the accompanying drawings and particularly FIGS. 1 and 2 thereof, the apparatus of our invention comprises a filling spout 10 for conveying the material to be dispensed into a valve bag. The filling spout can be any elongated hollow member but preferably is of tubular design as shown. Encompassing a substantial portion of the filling spout beginning at a point removed from the discharge outlet thereof is an adapter or flared extension 11 said flared extension being disposed about the filling spout 10 in such a manner so as to create an interstice between the inner surface of said adapter and the outer surface of the portion of the filling spout enclosed thereby. This interstice or void space is shown at 12 on the drawings. The preferred design for the flared extension is a form of a frustum having a major diameter somewhat greater than the inside diameter of the valve of the particular bag used and having a minor diameter capable of providing a slip-fit accommodation for the filling spout. In view of the likelihood of using bags having different valve diameters the interchangeable use of frustums having varying angular design is contemplated. The adapter is removably attached to the unit by means of flange 13. The site of said attachment can be better pointed out hereinbelow.

Apertures 14 are provided in the flared extension 11, and as shown in the drawing preferably comprise a plurality (usually four) of longitudinally disposed slots. In availing of the particular slotted arrangement shown, the slots are to extend to near the smaller end of the flared extension so as to provide unobstructed communication between the interior of the bag placed over the filling spout-adapter combination and the interstice 12. Further, in beneficially utilizing the slot arrangement shown, it is desirable to terminate the ends of the slots farthest removed from the smaller end of the flared extension at a point slightly removed inwardly from where the exterior extremity of the valve normally contacts said flared extension. The reasons for the disclosed preferred slot arrangement can be better set forth in a discussion of the operation of the dispensing unit. However, it is to be mentioned here there are various ways of effecting communication between the interior of a bag and said interstice. Any such variations as may be readily devised by one skilled in the art are contemplated as being within the scope and spirit of this invention.

In FIG. 1 mounting block 15 is fixedly provided with a sleeve extension 16 near the center thereof to receive the filling spout 10 as a slip-fit. Tube 17 is similarly secured into the mounting block 15 by means of sleeve extension 16. Said tube 17 being adapted for receiving material from the hopper or similar supply reservoir of the packer.

Rigidly attached to mounting block 15 is the hood assembly 28. The initial portion of the hood assembly attached to said mounting block provides an essentially unobstructed cylindrical chamber 19 save for the tubes 10 and 17 disposed therein. Said chamber 19 has a diameter generously larger than that of either filling spout 10 or tube 17 and also significantly larger than the major diameter of the flared extension.

A front mounting plate 18 of diameter corresponding

to the inside diameter of the initial portion of the hood assembly is rigidly secured, such as by welding, to said assembly at a position sufficiently forward of the mounting block 15 so as to form the above described chamber. Said mounting plate 18 is provided with a circular aperture having a diameter approximately the same as that of the larger diameter of the flared extension 11. Means are disposed about the perimeter of mounting plate aperture so that the flange 13 of the flared extension can be readily attached thereto.

The top portion of the hood assembly extends forward towards the outlet section of the spout tube with the foremost edge thereof terminating at a point removed from the tip of the spout outlet. The portion of the hood assembly extending forward of the front mounting plate 18 is cutaway at the bottom so as to allow the valve of the bag to be sealingly positioned on the flared extension. As is to be noted, said extension of the hood assembly provides a canopy about the flared extension and a part of the filling spout immediately projecting forwardly therefrom.

A curved divider plate 21 extends from the forward face of the front mounting plate to the extended portion or leading edge of the hood assembly 28 providing between these elements a void space 22.

The front mounting plate 18 is provided with a plurality of apertures 29 contiguous to the upper extremity thereof. Desirably, the upper quadrant or so of front mounting plate 18 is aligned with apertures 29 in the manner indicated.

A preferred structural modification of the present invention utilizes a pipe 25 affixed to the top part of the hood assembly 28 and to sleeve extension 16 through the chamber 19 in a manner so as to effect communication with the interior of the cylindrical spacing provided by the sleeve extension 16. Said pipe 25 is preferably rigidly secured to each of said members such as by welding. A small diameter tube 26 is sealingly inserted through pipe 25 and positioned to extend within the filling spout tube 10 somewhat forwardly of the position of the front mounting plate 18. The end of the tube residing in the filling spout tube is preferably directed slightly downwardly and toward the discharge opening. The portion of tube 26 exteriorly protruding from pipe 25 is flanged in order to accommodate an air line connector.

FIG. 3 illustrates another version of a flared extension-filling tube combination which can be conveniently and quickly inserted in the dispensing unit as described above. The principal difference between this combination and that shown in FIG. 1 resides in the fitting utilized in connecting the filling tube to the dispensing unit. Specifically, in the embodiment depicted in FIG. 3 the rearward extremity of the filling spout is provided with the annular recess channel 27 which will permit said spout to be slip-fitted about the sleeve extension 16. It can be readily noted that in employing a filling spout of the type shown in FIG. 3, one can use an adapter (frustum type) whose minor diameter slightly exceeds the diameter of the filling spout thereby providing communication between the interior of the bag and the interstice 12 at this region. In using such a modification it is possible to dispense entirely with the longitudinal slots 14 shown in both FIGS. 1 and 3, or small apertures can be provided in lieu of the long slots shown in said figures.

Having described in detail the structural features of the instant invention as shown in the embodiments depicted in the drawings, a description will now be presented which illustrates the use of the dispensing unit of our invention with an air-flow packer.

With a vacuum source (not shown) operating and communicating with the chamber 19 by means of the connector 24, a partial vacuum is created in a bag whose valve portion is positioned about the adapted 11. This partial vacuum will tend to seal the valve of the bag to the adapter. Accordingly, the valve will be effectively

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sealed throughout the entire filling operation. However, if it is desired to obtain a more positive sealing action, conventional sealers may be provided about the adapter. There are a number of suitable sealing means for this purpose; nevertheless, it bears pointing out that in using the present invention such positive acting seals are not necessary if a vacuum force such as described is used to effect sealing.

The air-flow packer forces the material through tubes 17 and 10 into the bag. In so far as there is a considerable amount of entrained air forced into the bag along with the material it is obviously very desirable to permit the escape of this air in a rapid fashion. In the practice of the instant invention, rapid exhaustion of air is, in the main, accomplished by permitting the displaced and entrained air to exit through the apertures associated with the adapter 11. With specific reference to FIG. 1, communication between the interstice 12 and the interior of the bag is provided by the forward extremity of slots 14. The constant withdrawal of air through interstice 12 and thence through chamber 19 is greatly aided by the suction force acting upon chamber 19 through fitting 24. The reason why our mode of exhausting entrained air is especially effective resides in the fact that the materials deposited in the bag, regardless of particle size, are nevertheless heavier than air and consequently by sheer momentum are deposited at the bottom of the bag furthest from the apertures 14 thus causing a natural accumulation of the air in the latter region.

For the same reason as advanced directly above, the larger particle size materials have a tendency to settle into the bag bottom quickly whereas an appreciable portion of the fines content will remain suspended in the gas or air accumulating at the top of the bag. Thus, by the application of sufficient suction force so as to effect quick exhaustion of air one can additionally withdraw a substantial percentage of the fines associated with the deposited material.

It is contemplated that in the practice of this invention the above described suction force must continually communicate with the interior of the bag throughout the complete filling cycle.

At the end of each filling cycle a temporary blast of air is blown through tube 26 in order to expel the material left in the filling tube 10 into the bag. Thus by maintaining a lower air pressure in the bag during the filling cycle, as is accomplished by application of a continuous suction, more effective expelling of the material from the filling spout is realized. In the operation of expelling retained material from the filling spout following the filling cycle, a comparatively high volume of air is momentarily discharged through tube 26. During this brief phase of the operation, the pressure condition existing in chamber 19 and interstice 12 is reversed from one of partial vacuum to one of pressure relative to the ambient atmospheric pressure. Consequently at this instance, due to the reversal of air-flow between chamber 19 and void space 22, flapper valve 20 is forced against the apertures 29 in front of the mounting plate 18 thereby effectively sealing the void 22 from chamber 19 and consequently preventing the discharge of contaminated air from chamber 19 through void 22 and apertures 23.

In a typical filling operation, dust and fines in the material being packaged is intermixed with the air in the filling spout and the void left in the top of the bag at the end of the filling cycle. In all of the prior art

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practices that we are aware of, this contaminated air escapes into the surrounding atmosphere when the bag is removed from the spout because the air within the spout and within said void invariably exists at a higher temperature than that of ambient temperature and tends to rise and thus disperse rapidly. This very objectionable loss to the atmosphere of dust is substantially completely obviated in the present invention by means of the hood assembly 28 or rather the extension thereof forming a canopy about the filling spout. Thus, the forward extension of the hood assembly serves to confine the contaminated air within the vicinity of apertures 14 and 23. With vacuum applied to the fitting 24, an air-flow is created through apertures 14 and 23, interstice 12 and void space 22, and thence through chamber 19. In this manner the contaminated air inevitably present in the vicinity of the forward extension of hood assembly 28 upon removal of the bag, is withdrawn into the dispensing unit. The hood assembly functions in substantially the manner as described above to collect any blowby that might occur between the adapter and the valve of the bag during a filling operation.

What is claimed is:

1. An improved material dispenser for a valve bag packer which comprises: a hollow frustum having a forwardly positioned smaller end and a rearwardly positioned larger end and having slots longitudinally disposed between said ends and extending to near the smaller end of the frustum, said frustum having an outside diameter equal to the inside diameter of the valve of the valve bag at a point intermediate between its rearward end and the corresponding ends of said slots; a tubular filling spout having an outside diameter essentially corresponding to the inside diameter of the smaller end of said frustum axially disposed therein for at least about the length of the frustum and projecting forwardly therefrom; a hook extension encompassing said frustum and a portion of the filling spout projecting forwardly therefrom, a longitudinally extending divider plate disposed to provide a void space between it and the inner surface of said hood extension, said divider plate being apertured near the extremity thereof joining the leading edge of said hood extension; a void chamber commonly adjacent to and solely communicating with said confined hood void spacing and the annulus formed by said frustum and that portion of the filling spout disposed therein; and means for applying suction force to said void chamber.

2. A dispenser in accordance with claim 1 having means for introducing a stream of gas under pressure into said filling spout in the direction of the discharge outlet thereof and means for substantially sealing off the communication between said chamber and said confined hood void spacing when the pressure within said chamber exceeds the ambient atmospheric pressure.

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