May 21, 1968 O. G. HILLERNS 3,384,134

FILLING TUBE

Filed May 25, 1965 4 Sheets-Sheet 1

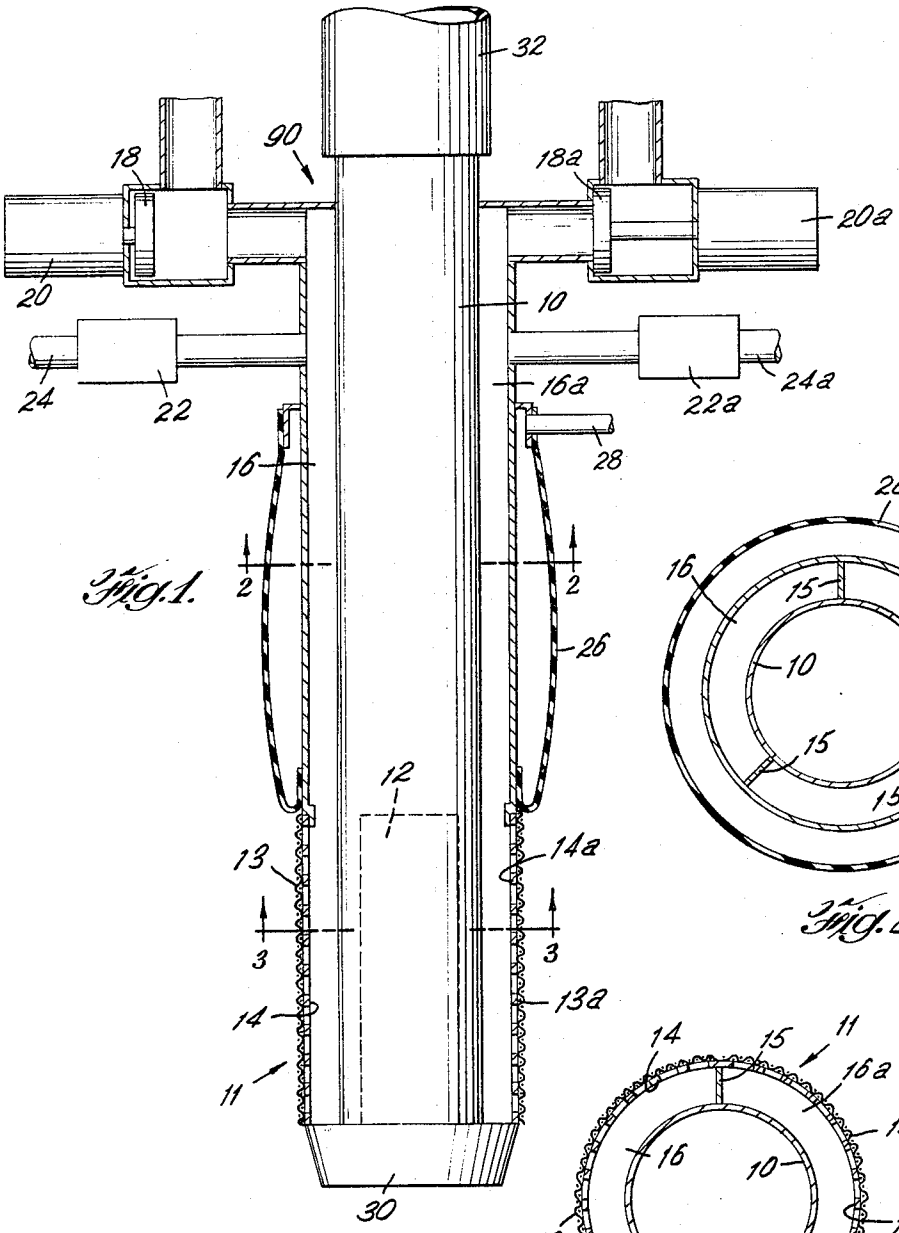


Fig. 1.

Fig. 2.

Fig. 3.

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FILLING TUBE

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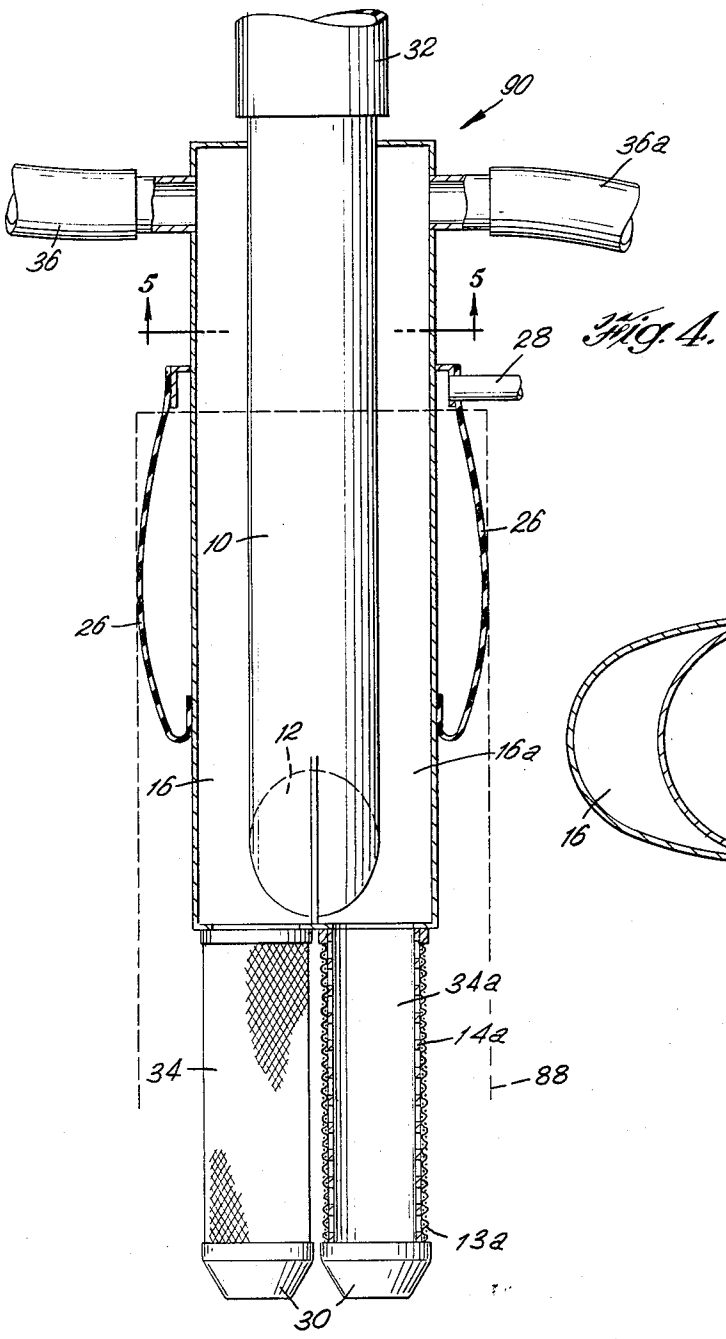


Fig. 4.

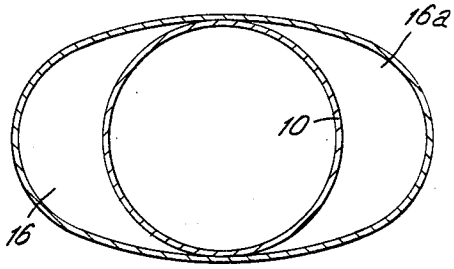


Fig. 5.

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FILLING TUBE

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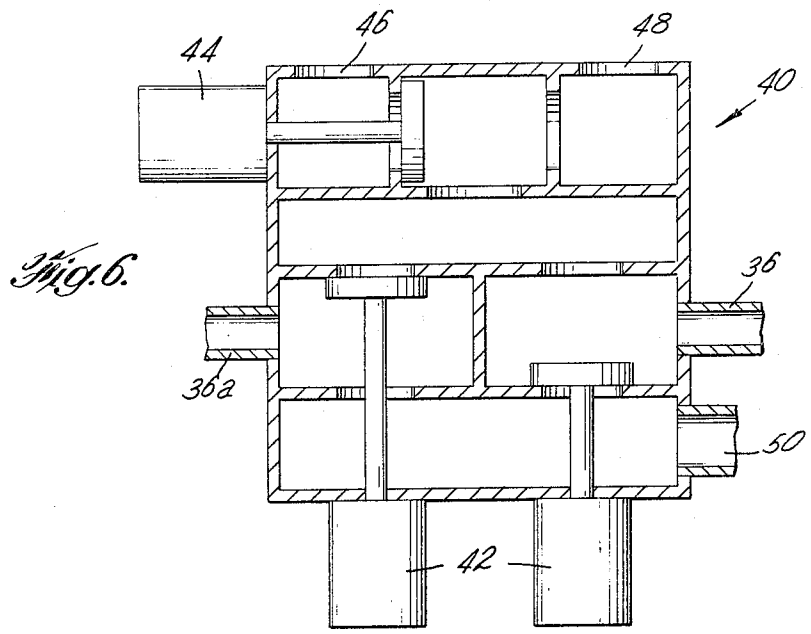


Fig. 6.

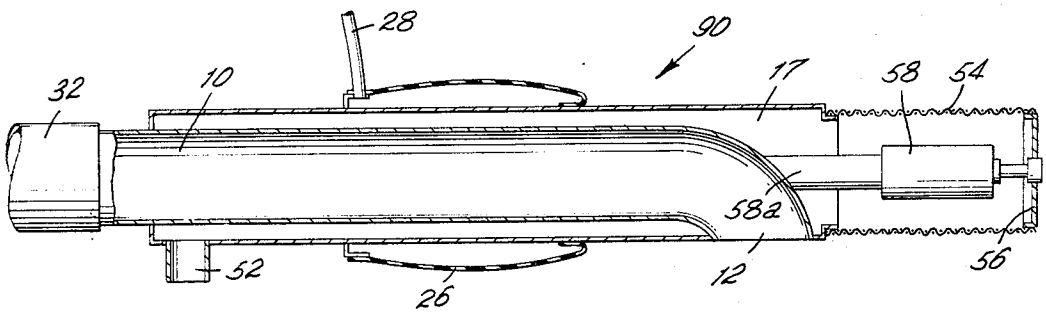


Fig. 7.

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FILLING TUBE

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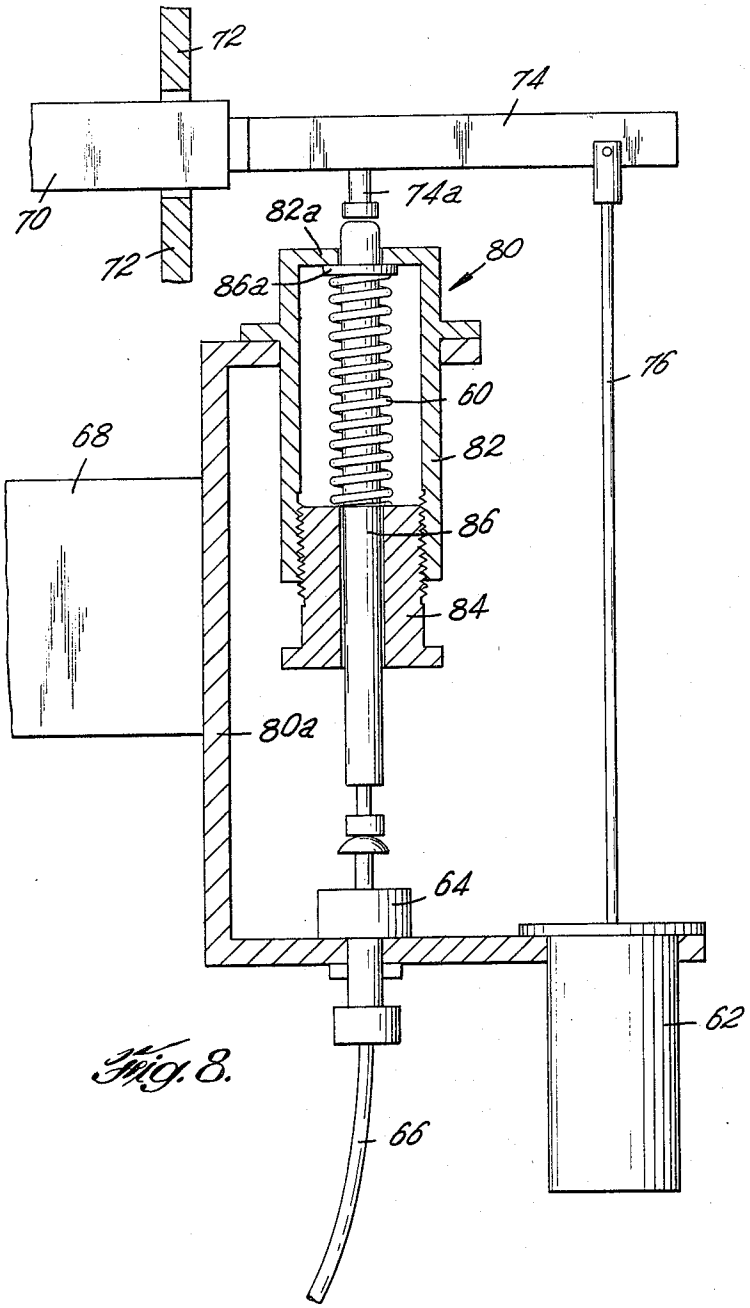


Fig. 8.

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United States Patent Office 3,384,134 Patented May 21, 1968

3,384,134

FILLING TUBE

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Filed May 25, 1965, Ser. No. 458,577
14 Claims. (Cl. 141—10)

ABSTRACT OF THE DISCLOSURE

A filling tube for delivering fluidized particulate material into air-impervious industrial bags is provided. The tube has filtered vents for removing fluidizing air from the entering material. The filters are cleaned intermittently while venting of the fluidizing air takes places continuously.

This invention relates to a filling tube apparatus. More particularly, this invention relates to an apparatus for filling industrial shipping bags with fluidized product particles. Even more particularly, this invention relates to an apparatus for separating fluidizing air from fluidized product particles as the particles are packed into industrial shipping bags and a method therefor.

The apparatus of the present invention is designed primarily for use in conjunction with industrial shipping bags which are equipped with a filling means, such as a filling valve. Many of these industrial shipping bags are constructed from air-impervious materials such as thermoplastic film, metal foils, paper laminated with thermoplastic films and the like as well as various combinations thereof. Due to the air-impervious nature of these types of industrial shipping bags, a great deal of difficulty has been encountered when attempting to pack finely divided products therein.

Generally, commercial bag packing apparatus is employed for packing granular and/or powdery products in industrial shipping bags wherein finely divided products are first fluidized and then conveyed in their fluidized state by air under pressure to an industrial shipping bag for packaging.

One of the major problems encountered in these packaging operations has been the effective separation of the fluidized particles from the fluidizing air as the particles are packed in air-impervious industrial shipping bags in order to prevent the entrained air from becoming entrapped in the industrial shipping bag together with the product being packed therein. When air entrapment does occur, industrial shipping bags are obtained which are filled to less than capacity with actual product, have poor stackability, are difficult to handle, have an unsightly appearance, and can be readily ruptured when being filled by the air pressure created by the entrapped air.

It is an object of this invention, therefore, to provide an apparatus for filling air-impervious industrial shipping bags with fluidized product particles which apparatus is capable of separating the fluidizing air from the product being packed.

This and further objects of the present invention will become more clear from the ensuing discussion.

Now it has been found that the objects of the present invention can be accomplished, in general, by providing a filling tube apparatus which has means for conveying fluidized particles from the fluidizing chamber of a commercially available bag packing apparatus to the filling tube apparatus, means in the filling tube apparatus for discharging the fluidized particles into the interior of an air-impervious industrial shipping bag; means for separating fluidizing air from the fluidized particles as said particles are packed in an industrial shipping bag, means for removing the fluidizing air from and cleaning the separating means, and means for securing the filling tube apparatus in the filling means of an industrial shipping bag.

The products with which the filling tube apparatus of the present invention can be employed are those which have a particle size of between 350 mesh to 40 mesh, preferably 200 mesh to 60 mesh, such as wheat, flour, cornstarch, trisodium phosphate, gypsum, silica flour, kaolin clay, pulverized coal, synthetic organic polymer resins and the like. Additionally, these products can also be mixed with coarser product particles, such as granules and pellets, which have particle sizes up to about ¼" diameter.

The shape of the product particles which can be packed with the filling tube apparatus of the present invention is not critical. For example, particles which are irregular spheroids or which exhibit a lamellar or plate-like appearance can be readily packed with the filling tube apparatus of the present invention.

Additionally, the mass densities of the products which can be packed are also not critical and can range from between about 40 to 400 pounds per cubic foot. In similar fashion, the bulk densities of these products can range from between about 15 to 150 pounds per cubic foot. As is well known to those skilled in the art, the term "mass density" refers to the weight of a solid cubic foot of product mass while the term "bulk density" pertains to the weight of the mass of a product in particle form occupying one cubic foot of space and includes air.

The filling tube apparatus of the present invention can be generally constructed from a material which is a rigid, self-supporting, light weight tube and which is resistant to the corrosive properties and abrasive effects of the product particles being conveyed therethrough. One end of the product tube is connected to a conduit through which fluidized particles under air pressure are fed into the filling tube. The other end of the filling tube is equipped with an opening through which the fluidized particles are discharged into an air-impervious industrial shipping bag. Adjacent to the discharge opening is a filter means which acts as the means by which the fluidizing air is separated from the fluidized particles. The filter means is connected, by suitable conduits, to vent and backflush means which act through connecting conduits to remove the separated, fluidizing air from the area surrounding the filter means and also acts to clean the filter means by forcing therethrough a stream of air under pressure.

Surrounding the body of the filling tube apparatus is a means by which the filling tube can be securely sealed in the filling means of an industrial shipping bag after being positioned therein.

The securing means can be provided, for example, by constructing the periphery of the filling tube apparatus so that it increases in diameter and can be thusly forced into the filling means, or by any other means well within the knowledge of those skilled in the art.

The securing means of the present invention is preferably formed from a flexible material which is capable of being inflated and deflated, such as a rubber sleeve. With such means, the filling tube can be readily inserted, when deflated, into the filling means of an industrial shipping bag, such as into a filling valve. Once positioned, the securing means, or inflatable sleeve, can be inflated to provide an air-tight seal between its walls and the walls defining the filling means of the industrial shipping bag. After the bag has been filled, the securing means is deflated and the bag removed from the filling tube.

Since most commercially available bag packing equipment are pneumatically operated, the filling tube apparatus of the present invention can be readily adapted to function in conjunction with the system employed. How-

ever, it should be understood that the filling tube apparatus of the present invention can be adapted to operate, with equal efficiency, in systems which utilize mechanical or electrical means in addition to pneumatic means. Similarly, a system which utilizes a combination of electrical, mechanical and pneumatic means can also be employed.

The present invention will become more clear when considered together with the accompanying drawings wherein:

FIGURE 1 is a top plan view illustrating one embodiment of the present invention;

FIGURE 2 is a sectional view thereof taken through line 2—2 of FIGURE 1;

FIGURE 3 is a further sectional view thereof taken through line 3—3 of FIGURE 1;

FIGURE 4 is a top plan view partly in section of another embodiment of the present invention;

FIGURE 5 is a sectional view thereof taken through line 5—5 of FIGURE 4;

FIGURE 6 is a sectional view of one embodiment of a vent housing which can be employed in the present invention;

FIGURE 7 is a schematic side elevational view of still another embodiment of the apparatus of the present invention; and,

FIGURE 8 is an end elevational view, partly in section, of one embodiment of a scale beam spring booster which can be employed in the present invention.

Turning now to the drawings wherein like reference numerals denote like parts, reference numeral **10** of FIGURE 1 designates a product feed tube in a filtered filling tube apparatus, generally designated as **90**, through which fluidized product particles are conveyed.

The materials which can be employed to fabricate the product feed tube **10** are not critical. Suitable among the materials which can be used to provide a rigid, self-supporting, non-abrasive and chemically inert product feed tube are aluminum, stainless steel, brass, nickel or chromium plated steel, sintered glass, high molecular weight polymeric materials, such as polystyrene, and the like.

The product feed tube should be between about 12 inches to 18 inches in length, preferably 14 inches to 16 inches long, and have an inside diameter of between about 1 inch to 3 inches, preferably 1½ inches to 2¼ inches, although the dimensions of the product feed tube **10** are also not critical. However, the product feed tube should not be so large as to be unwieldy or not be capable of cooperating with the filling means of an industrial shipping bag, or have an inside diameter so small as to interfere with or obstruct the passage of fluidized products therethrough.

At one end of the product feed tube **10**, there is provided a discharge mouth **12** shown in phantom by the dotted lines in FIGURES 1 and 4.

A cap **30** is placed over this end of the product feed tube **10** to facilitate insertion of the product feed tube **10** into the filling valve of an industrial shipping bag, while, at the same time, acts to protect the filling valve of the shipping bag from undue wear and tear.

The other end of the product feed tube **10** is connected to a flexible conduit **32**, such as a rubber hose, which conveys fluidized material to the product feed tube **10** from the fluidizing chamber of a commercial bag packer. This conduit **32** is usually part of the bag packing apparatus.

A filter means, generally designated as **11**, comprising two support members **14** and **14***a* and cooperating filter screen members **13** and **13***a* is mounted adjacent the discharge mouth **12**. The filter support members **14** and **14***a* are formed so that they adapt to the circumference of the product feed tube **10**, as shown in greater detail in FIGURE 3. They are preferably fabricated of thin-gauge metal having a plurality of perforations therein or of coarse-mesh wire screen and act to support the filter screen members **13** and **13***a*. While metal is a preferred material for use in forming the filter support members, other materials, such as those mentioned in discussing the construction of the product feed tube above, can also be employed, as will be apparent to those skilled in the art.

The materials employed to fabricate the filter screen members **13** and **13***a*, which are wrapped over the filter support members **14** and **14***a* respectively, are also not critical provided the materials selected are sufficiently porous to admit the free passage of air therethrough and yet are capable of preventing the fluidized particles from passing therethrough. They should also preferably be resistant to the corrosive properties and abrasive effects of the product particles with which they come into contact. Suitable for this purpose are such materials as stainless steel wirecloth, canvas, paper conventionally manufactured and synthetically produced or naturally occurring textile materials, and the like.

It should be understood that, in lieu of employing filter support members **14** and **14***a* and filter screen members **13** and **13***a*, a single filter means which is rigid and self-supporting, such as sintered metals, can be similarly employed to obtain the same results.

At one end, the filter support members **14** and **14***a* are covered by the cap **30** while the other ends are interconnected to and communicate with vent ducts **16** and **16***a*. These vent ducts **16** and **16***a* are fabricated so that they at least partially surround the product feed tube **10** in much the same manner as do the filter support members **14** and **14***a*. As shown in FIGURE 2, channels A and B are defined in the vent ducts **16** and **16***a* by means of metal plates **15**. The metal plates **15** are vertically disposed between the walls defining the product feed tube **10** and the walls of the vent ducts **16** and **16***a* and extend therebetween from the vicinity of the discharge mouth **12** to the inlet end of the product feed tube **10**. The vent ducts can be readily constructed from thin-gauge but rigid, self-supporting material.

The vent ducts **16** and **16***a* are equipped with vent valves **18** and **18***a* located near the inlet end of the product feed tube **10** and mounted directly upon the filling tube **90**. The vent valves operate alternately and their function is to exhaust the filtered fluidizing air to a suitable dust collector such as, for example, a dust collector intake cowl which is usually part of commercially available bag packing equipment and is generally provided with a suction means. Hence, filtered air is alternately removed from the area surrounding the discharge mouth **12** and the filter means **11** through the vent ducts **16** and **16***a* by means of the vent valves **18** and **18***a*.

A pair of air cylinders **20** and **20***a* actuate the vent valves **18** and **18***a*. These air cylinders are timed so that one vent valve is closed during the backflushing or cleaning of one portion of the filter means while the other vent valve is opened during venting or exhausting of filtered fluidizing air from the other portion of the filter means.

Operating in conjunction with the air cylinders **20** and **20***a* are a pair of backflush valves **22** and **22***a* which are activated to alternately backflush and thereby clean the filter screen members and are also directly mounted to the filling tube **90**. For example, when air cylinder **20** opens vent valve **18**, backflush valve **22** is simultaneously closed to vent filter screen member **13** through vent duct **16**. At the same time, air cylinder **20***a* holds vent valve **18***a* closed while backflush valve **22***a* is opened to backflush filter screen member **13***a* through vent duct **16***a*.

Air under pressure can be supplied to backflush valves **22** and **22***a* by means of flexible connecting lines **24** and **24***a* which convey air under pressure from a source of non-lubricated air.

It should be understood that the venting and backflushing of the filter screen members is an alternating process; that is, the two filter screen members are alternately vented and backflushed in identical cycles. However, the cycles are set out of phase so that one filter screen is backflushed while the other is vented. Generally, the backflush

portion of each cycle is of shorter duration than the venting portion. Hence, while both filter screen members can be vented at the same time, they are not backflushed at the same time. If both filter screen members were backflushed at the same time, additional air under pressure would be forced into the industrial shipping bag without providing any means to exhaust this additional air until the next portion of the venting cycle. There would also be created a pulsating effect in the industrial shipping bag as this additional air is introduced therein. These are not desirable operating conditions since there would result a reduction in the amount of product which can be packed, bag weights would be adversely affected, and the shipping bags be subject to possible rupture during filling.

The frequency with which the filter means can be vented and backflushed during a bag-filling cycle can be varied as desired. However, it has been found that good results are obtained when the filter means is backflushed at a frequency of between about 40–50 pulsations per minute, the backflush portion of each pulsation having a duration of between about ⅓ to ½ second. When the filter means comprises two separate members, each filter member can be backflushed at a frequency of between about 20–25 pulsations per minute.

While the backflush and venting means; that is the vent ducts **16** and **16***a*, the vent valves **18** and **18***a*, the air cylinders **20** and **20***a*, and the backflush valves **22** and **22***a*, have been described and are illustrated in FIGURE 1, as being integrally mounted directly to and upon the filling tube **90**, it should be understood that these means can also be separately housed as is described in greater detail hereinbelow.

Intermediate the length of the product feed tube **10** there is mounted a securing means comprising a bag seal sleeve **26** which is annularly disposed about and connected to the outer surface of the vent ducts **16** and **16***a* so that it can be readily inflated and deflated. The bag seal sleeve **26** can be inflated when air under low pressure is supplied thereto by means of, for example, a flexible connecting line **28**. The flexible connecting line **28** can be conveniently equipped with a control valve (not shown) so that the flow of air into and out of the bag seal sleeve **26** can be readily regulated. The bag seal sleeve **26** is deflated when the filling tube **90** is inserted into the filling valve of an industrial shipping bag. Once the filling tube **90** is in place, air is admitted into the bag seal sleeve **26** through the flexible connecting line **28** until an air tight seal is obtained between the walls of the filling valve and the walls of the bag seal sleeve **26**. When the bag seal sleeve **26** has been thusly inflated, it is disposed about the vent ducts **16** and **16***a* and the product feed tube **10** as is illustrated in FIGURE 2.

It should be understood that when the filling tube of the present invention is inserted into the filling valve of an industrial shipping bag, it is inserted far enough into the filling valve so that the fluidized product particles flow freely through the discharge means and into the body of the shipping bag.

In FIGURE 4, there is illustrated another embodiment of the filling tube apparatus **90** of the present invention which is shown positioned in an industrial shipping bag **88**. In this embodiment, the filter means comprises two separate filter cylinders **34** and **34***a* each being covered at one end with its own cap **30**. Each filter cylinder can be constructed in the same manner as described for the filter support members **14** and **14***a* shown in FIGURE 1 and each can be similarly provided with its own filter screen members **13** and **13***a*. In like fashion, the filter cylinders can also be fabricated from rigid, self-supporting sintered metals, as described hereinabove. The other ends of the filter cylinders **34** and **34***a* are attached to the forward end of the main body of the filling tube **90** so that they are each interconnected to and communicate with the vent ducts **16** and **16***a*. In this embodiment, a filter means is provided which has a large surface area and which can be conveniently replaced with new units.

As can be seen in FIGURE 5, the vent ducts **16** and **16***a* in this embodiment are elliptical in cross-section. In many instances, this overall shape is helpful, particularly where the filling valve of an industrial shipping bag has the same or similar shape.

Flexible connections **36** and **36***a* (FIGURE 4) provide the conduit means by which the filter cylinders **34** and **34***a* can be vented and backflushed through vent ducts **16** and **16***a* when the vent and backflush means are contained in a separate housing.

In FIGURE 6, there is illustrated a separate housing for vent and backflush means generally designated by reference numeral **40**. Reference numeral **42** designates pneumatically operated vent and backflush valves while reference numeral **44** denotes a pneumatically operated vent valve switch. A vent to the atmosphere is provided at **46** and a suction vent to a suitable dust collector is indicated at **48**. Air under low pressure of between about 4–10 p.s.i.g. is supplied to the housing through inlet **50**. The vent and backflush means in the separate housing operate in the same manner as do the vent and backflush means mounted directly to the filling tube **90** as described in greater detail hereinabove.

A still further embodiment of the filling tube apparatus of the present invention is illustrated in FIGURE 7. In this embodiment, the filter means **54** comprises a flexible filter screen in the form of a sleeve. The same or similar materials can be employed to fabricate the filter sleeve **54** as are used for the filter screen members **13** and **13***a* as described in greater detail hereinabove. One end of the filter sleeve **54** is connected to and communicates with a vent duct **17** while the other end is secured to a plate **56**. The plate **56** is in turn connected to a pneumatically operated piston cylinder **58** which is supported forward of the discharge mouth **12** and mounted to the product feed tube **10** by support means **58***a*. An outlet **52** is provided in the vent duct **17** to exhaust vented air from the filter element **54** to atmosphere or to a dust collecting system.

In operation, the filter sleeve **54** is inserted into the bag to be packed and is alternately relaxed and stretched taut by means of impulses transmitted thereto from the pneumatically activated piston cylinder **58** cooperating with plate **56** so that the filter sleeve **54** is subjected to pulsations. In this manner, the filter sleeve **54** is shaken and kept clean of fluidized product which tends to clog it while simultaneously providing the means by which the fluidizing air is separated from the product being packed.

Usually, conventional and commercially available bag packing apparatus is employed to pack industrial shipping bags with fluidized products. Generally, this bag packing equipment utilizes a scale to determine when a packed bag has reached capacity. The scale beam is positioned so that its movement activates a valve or switch which, in turn, causes the flow of product to be cut off. Normally, there is a short time interval between the time the scale beam moves or swings and the time the product flow ceases. Hence, the exact weight of a filled shipping bag is dependent, to a degree, upon the rate of product flow during this short time interval. Additionally, the rate of product flow is affected by the back pressure caused by air in the bag. Therefore, in order to obtain consistent bag weights, the back pressure in the bag at the time the flow of product is cut off should be the same for all bags during the packing operation. However, the pressure created by the backflushing operation when the filter means in the filling tube of the present invention are cleaned (FIGURES 1–5), produces fluctuations or pulsations of the back pressure in the bag. This, in turn, results in a slight fluctuation in the rate of product flow. When this fluctuation of product flow rate occurs during the swing of the scale beam, the amount of product continuing to be discharged into the shipping bag varies sub-

stantially from one filled shipping bag to another depending upon whether the flow of product is cut off at a high or low rate of product flow.

In order to overcome this deficiency and more narrowly control filled bag weights, it has been found that a spring-loaded scale beam booster apparatus can be provided which permits the filter backflush pulses to be momentarily interrupted during the swing of the scale beam.

In FIGURE 8 there is illustrated one embodiment of a scale beam spring booster which can be employed with the filling tube apparatus of the present invention. Reference numeral **68** designates the frame of a commercial bag packing machine and **70** denotes the tail of its scale beam equipped with conventional scale beam stops **72** positioned on opposite sides of the tail of the scale beam. An extension arm **74** is attached to the end of the scale beam **70** and has an adjustable stop **74***a* inserted intermediate its ends. A pivot link and arm assembly **76** is pivotably connected at one end to the end of the scale beam extension arm **74** and to a dashpot **62** at the other end. The dashpot **62** is a conventional device used to minimize scale beam oscillation. The booster spring apparatus, generally indicated as **80**, is mounted to and held in place by means of a frame **80***a* which also provides the means by which the spring booster apparatus is connected to the frame of the bag packer **68**.

The spring booster apparatus **80** comprises a compression coil spring **60** wound about a central plunger **86**. The apparatus is held in place by means of a housing **82** which is equipped with a threaded guide bushing **84** so that adjustments of the compression spring **60** can be readily made. The booster spring housing **82** is secured to the support frame **80***a* so that the scale beam **70**, dashpot **62** and spring booster apparatus **80** are made an integral part of the bag packer apparatus by being directly mounted to the frame of the bag packer **68**.

The upper end of the spring booster housing **82** is equipped with a flange **82***a* which cooperates with the flange **86***a* at the upper end of the plunger **86**. These flanges, **82***a* and **86***a*, coact to arrest the upward movement of the plunger **86**. The other end of plunger **86** is positioned to cooperate with a normally closed pneumatic bleed valve **64**. The bleed valve **64** is in turn connected by means of a flexible conduit **66** with the pneumatic circuit which controls the vent and backflush means and the fluidizing chamber of the bag packer.

During operation, the spring-loaded plunger **86** acts to assist in tipping the scale beam **70** by exerting an upward force on the adjustable stop **74***a* as the weight of the product being packed in an industrial shipping bag reaches the point where it alone would cause the scale beam **70** to tip. To accomplish this, the coil spring **60** is pre-set to be released so that it causes the scale beam **70** to swing or tip as the industrial shipping bag approaches its product weight capacity. For example, the coil spring **60** can be set to be released and tip the scale beam **70** when the industrial shipping bag being packed is capable of accepting only 5 pounds more of fluidized product. Stated another way, if the industrial shipping bag being packed has a product capacity of 50 pounds, the coil spring **60** can be adjusted to tip the scale beam **70** when the product weight in the industrial shipping bag reaches 45 pounds.

It should be understood, however, that the scale beam **70** will swing or tip only until the upward force exerted by plunger **86** on the adjustable stop **74***a* ceases. This occurs when flange **86***a* coacts with flange **82***a* and arrests the upward movements of the plunger **86**.

It should also be understood that the distance upward through which the plunger **86** travels is less than the total distance through which adjustable stop **74***a* travels as the scale beam **70** oscillates between stops **72**. Dashpot **62** assists in preventing excess oscillation of the scale beam **70**.

As the plunger **86** reaches the extremity of its upper movement, as determined by flanges **82***a* and **86***a*, the other end of the plunger **86** permits the normally closed pneumatic bleed valve **64** to become opened and transmit a signal to the pneumatic control circuit through flexible conduit **66**. Upon receipt of this signal, the pneumatic control circuit causes the back-flushing and venting operation to be interrupted and the remaining fluidized product required to fill the bag is permitted to flow into the bag until bag capacity has been reached. The scale beam **70** is then permitted to complete its upward swing causing the product flow to be cut off and permit any remaining entrapped air in the bag to escape. A brief backflushing pulse is also transmitted to clean the filter means of clogged product in preparation for the next bag-filling operation.

While interruption of the vent and backflushing process has been described as being actuated by means of a weight-anticipating device, it should be understood that other suitable but less efficient means such as time-delay valves can be similarly employed.

The spring booster apparatus of the present invention can also be equipped so that the pneumatic control circuit will cause the pressure in the fluidizing chamber of the bag packer to decrease near the end of the filling cycle thereby decreasing the rate at which the bag is filled and more closely control the consistency of bag weights.

While the apparatus of the present invention has been described and illustrated with particularity and in some detail, it should be understood that it is susceptible of variations and modifications without departing from the scope and spirit of the invention. For example, the product feed tubes, discharge mouths, vent and backflush means, filter elements and so forth described and illustrated in one embodiment can be readily interchanged or combined with similar or dissimilar components disclosed and described in another embodiment. In similar fashion, while the control and circuitry means for the apparatus of the present invention has been referred to as being pneumatic, other circuitry and control means such as electrical, mechanical, hydraulic, and the like can also be employed in whole or in part or in various combinations thereof, as is well known to those skilled in the art.

What is claimed is:

1. A filling tube apparatus for filling air-impervious bags with fluidized product particles comprising:

(a) a product feed tube connecting with a supply source of fluidized product particles at one end and terminating in a discharge opening at the other end;

(b) at least one duct terminating in a filter means proximate the discharge end of said product feed tube;

(c) means connected with said duct for continuously venting said filter means and

(d) means connected with said duct for intermittently cleaning said filter means of filter particles during filling of said air-impervious bag.

2. The apparatus of claim **1** wherein said product feed tube has an inflatable sleeve annularly mounted thereabout to provide upon insertion of said product feed tube into said bag an air tight seal when said sleeve is inflated.

3. Apparatus of claim **1** wherein the filter means comprises a plurality of support members and a plurality of filter screen members wrapped about said support members, said filter screen members being capable of admitting air therethrough but which are impervious to the passage therethrough of the fluidized product particles being discharged.

4. Apparatus of claim **1** wherein each vent duct is fabricated of a rigid, self-supporting material annularly disposed about the outer surface of said product feed tube and mounted thereto.

5. Apparatus of claim **1** wherein the vent and backflush means comprises, in combination:

(a) a plurality of pneumatically actuated vent valves;

(b) air cylinders cooperating with said vent valves;

(c) a plurality of pneumatically actuated backflush valves;

(d) means for supplying air under pressure to said air cylinders and to said pneumatically actuated vent valves and backflush valves; and,

(e) means through which filtered fluidizing air is removed from said filter means and conveyed to a suitable receptacle.

6. Apparatus of claim **1** wherein the filter means is a fabricated filter sleeve positioned at the discharge end of the product feed tube such that its longitudinal axis is substantially parallel to the longitudinal axis of said product feed tube, one end of said filter sleeve being secured to and closed by a plate while the other end is interconnected to and communicates with said vent duct means, said filter sleeve being capable of being alternately stretched taut and relaxed by means of impulses transmitted thereto.

7. Apparatus of claim **6** wherein the impulses are transmitted to said filter sleeve by means of a cooperating air cylinder and piston positioned within said filter sleeve which is connected at one end to said plate and mounted at the other end to said product feed tube.

8. A filling-tube apparatus for filling air-impervious bags with fluidized product particles comprising:

(a) a product feed tube connecting with a supply source of fluidized product particles at one end and terminating in a discharge opening at the other end;

(b) a plurality of ducts terminating in filter means proximate the discharge end of said product feed tube;

(c) means connected with each duct for alternately venting and backflushing the associated filter means and

(d) means for controlling the venting-backflushing cycle of each duct and associated filter means so that venting occurs substantially continuously during filling of an air-impervious bag.

9. Apparatus of claim **8** wherein the filter means comtioned two, separate filter cylinders each of which is positioned at the discharge end of said product feed tube such that they are substantially parallel to each other and to the longitudinal axis of said product feed tube, one end of each of said filter cylinders being closed while the other end of each of said filter cylinders is interconnected to and communicates with said vent duct means.

10. Apparatus of claim **8** wherein the vent and backflush means are mounted directly to and are an integral part of said filling tube apparatus.

11. A method for packing air-impervious industrial shipping bags with fluidized product particles which comprises, in combination:

(a) supplying, under air pressure, a stream of fluidized produce particles to a filling tube, said filling tube being secured within the filling means of an air-impervious industrial shipping bag;

(b) continuously discharging said fluidized product particles from said filling tube into said industrial shipping bag;

(c) separating the fluidizing air from said fluidized product particles through the use of a filter means mounted adjacent to the discharge end of said filling tube;

(d) alternately venting and backflushing the filter means so that fluidizing air is removed therefrom and the filter means is cleansed of product particles; and

(e) controlling the venting and backflushing cycle of each filter means to effect continuous venting of said fluidizing air and facile flow of said product particles.

12. A method for packing air-impervious industrial shipping bags with fluidized product particles which comprises, in combination:

(a) supplying, under air pressure, a stream of fluidized product particles to a filling tube, said filling tube being secured within the walls defining a filling means in an air-impervious industrial shipping bag;

(b) continuously discharging said fluidized product particles from said filling tube into said industrial shipping bag;

(c) separating the fluidizing air from said fluidized product particles through the use of a filter means mounted at the discharge end of said filling tube;

(d) removing the separated, fluidizing air from said filter means; and

(e) preventing the filter means from becoming clogged with fluidized product particles by alternately and periodically stretching said filter means taut and then relaxing said filter means.

13. Method of claim **12** wherein the alternate relaxation and stretching taut of said filter means is accomplished by subjecting said filter means to periodic pneumatic impulses.

14. A method for packing air-impervious bags with fluidized product particles comprising:

(a) supplying a stream of fluidized product particles through a filling tube into an air-impervious bag;

(b) continuously removing the fluidizing air from said fluidized product particles through a filter means mounted adjacent to the discharge end of said filling tube while

(c) intermittently cleaning said filter means of product particles.

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