

Oct. 11, 1960

O. R. TITCHENAL

2,955,796

VALVE BAG FILLING MACHINES

Filed May 18, 1955

3 Sheets-Sheet 1

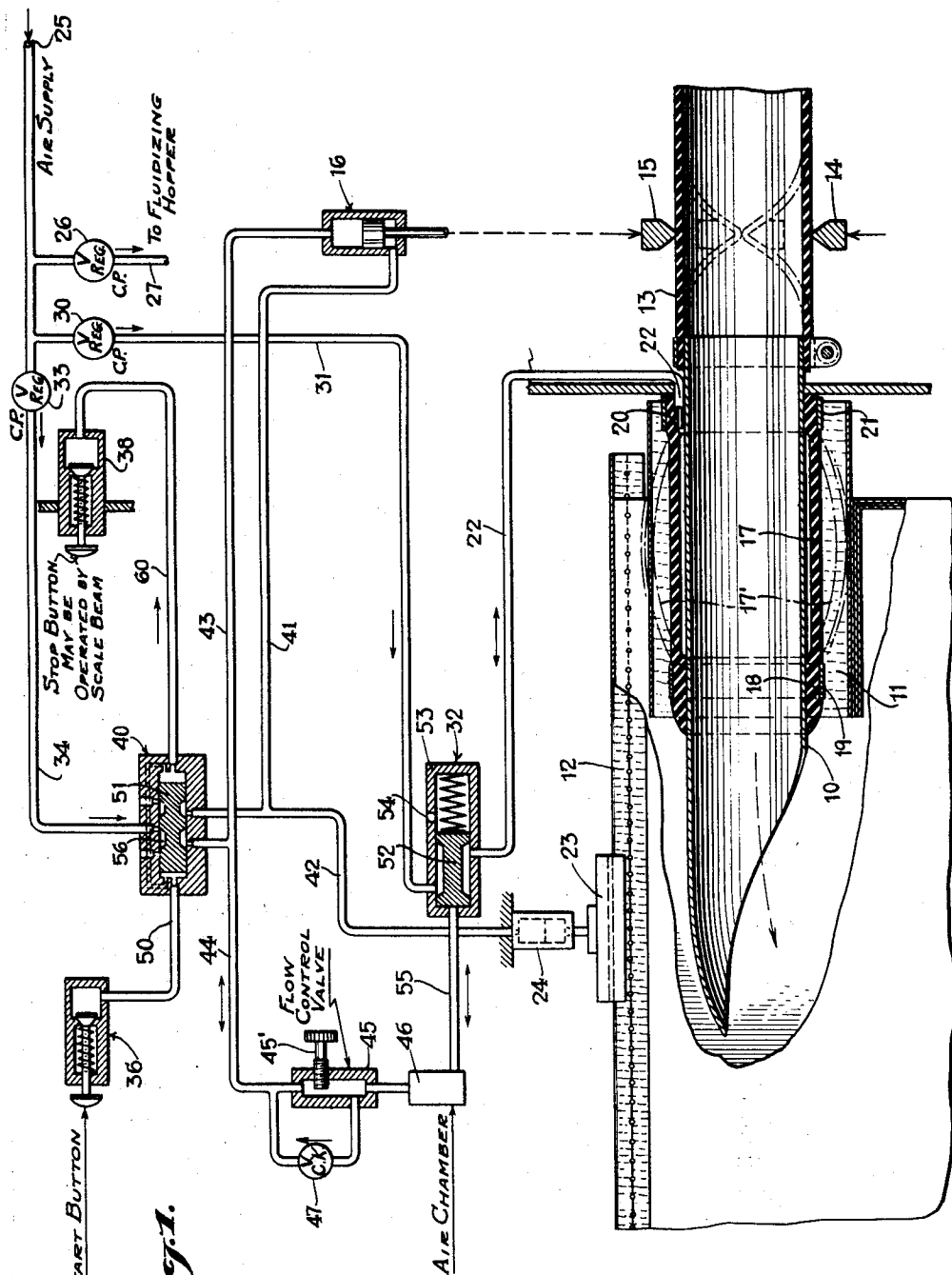


Fig. 1.

INVENTOR.

OLIVER R. TITCHENAL.

BY

Ward, Keal, Haselton, Ormel & McElhannon
ATTORNEYS.

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O. R. TITCHENAL

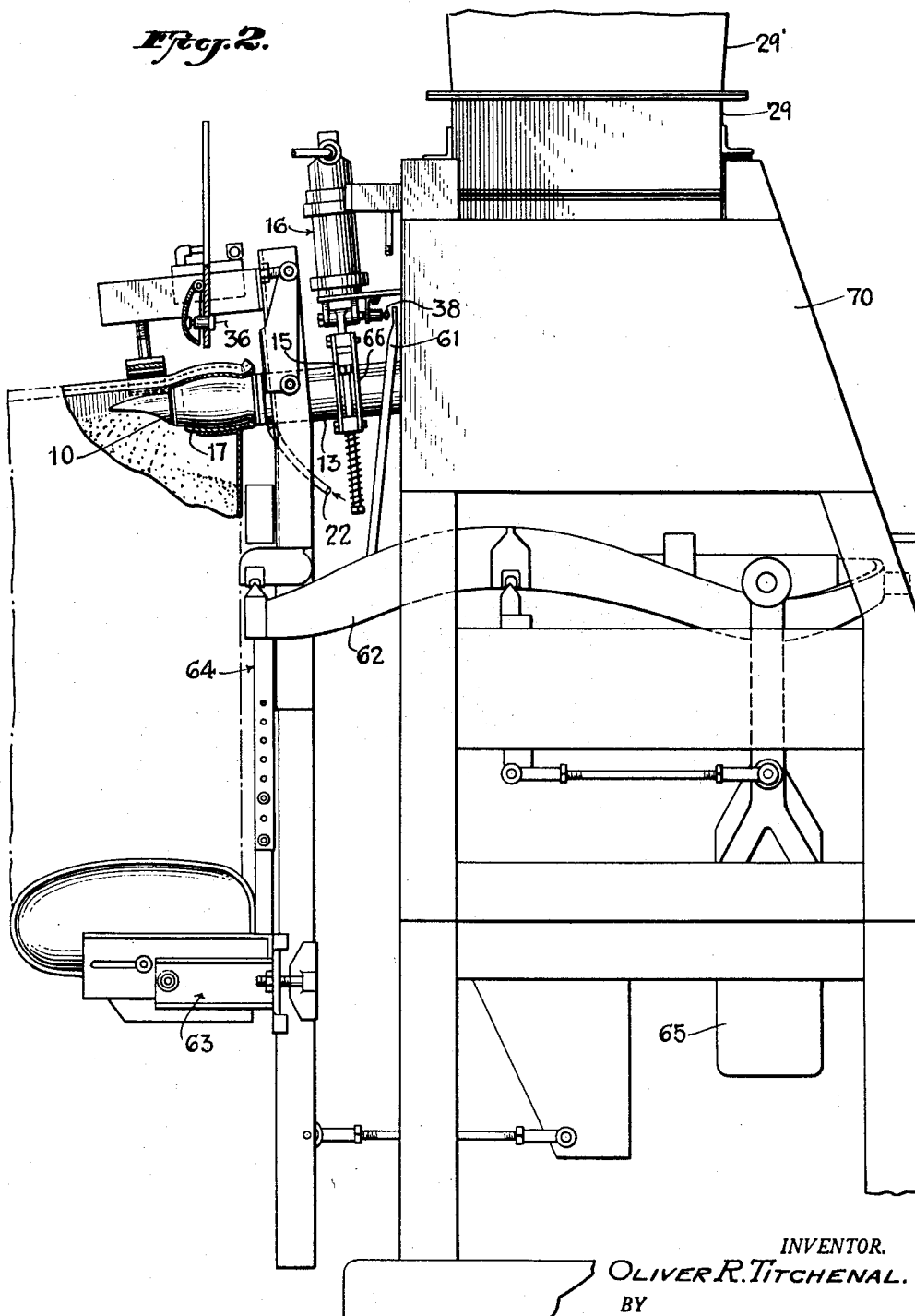
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Fig. 2.



INVENTOR.

OLIVER R. TITCHENAL.

BY

Ward & Haselton Orm & McElhannon
ATTORNEYS.

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O. R. TITCHENAL
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3 Sheets-Sheet 3

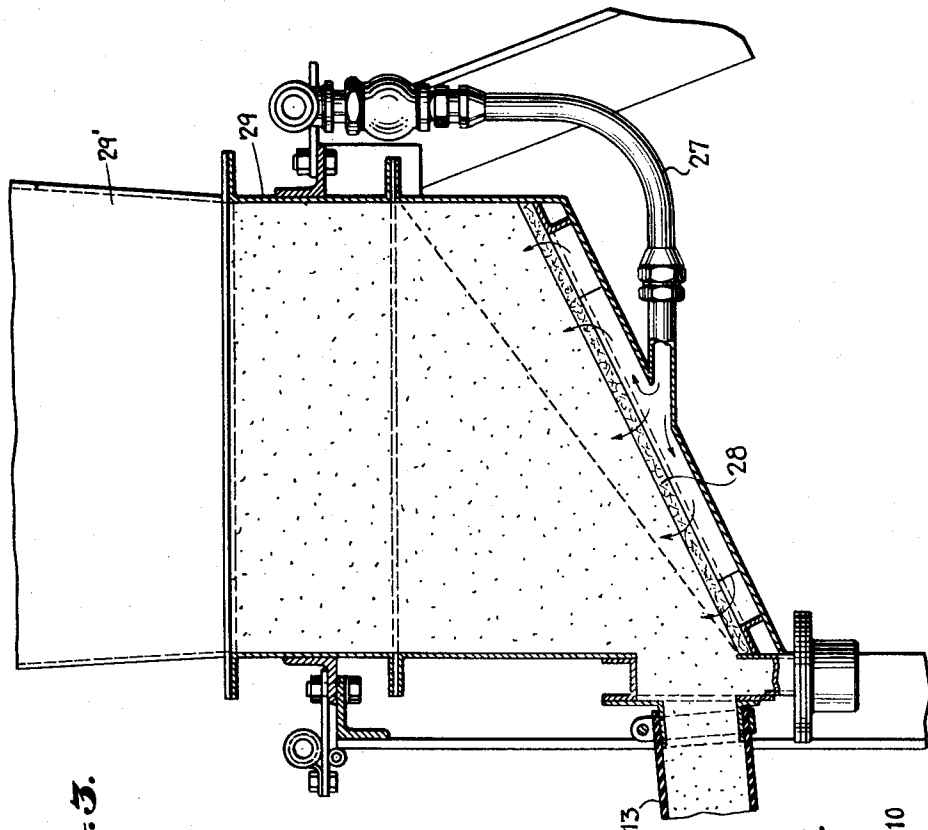


Fig. 3.

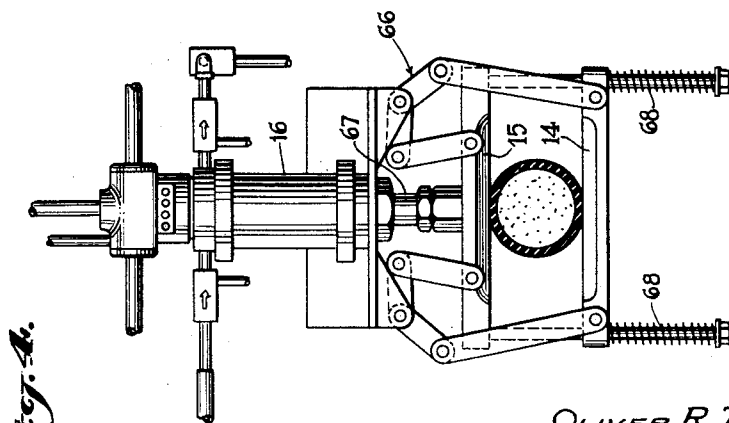


Fig. 4.

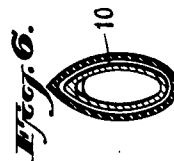


Fig. 6.

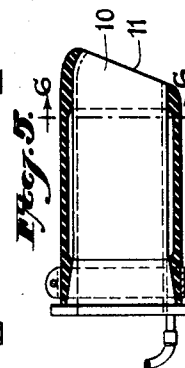


Fig. 5.

INVENTOR.

OLIVER R. TITCHENAL.
BY

Ward Hunt Haselton Dome & McElhannon.
ATTORNEYS.

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2,955,796

VALVE BAG FILLING MACHINES

Oliver R. Titchenal, Orinda, Calif., assignor to St. Regis Paper Company, New York, N.Y., a corporation of New York

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7 Claims. (Cl. 249—60)

This invention relates to packing or filling machines for filling valve bags and more particularly to certain improved filling spout features and arrangements for the operation and control thereof.

Common types of valve bag filling machines comprise a movable supporting frame including a so-called bag chair for supporting the bags when being filled by the introduction of a filling spout into the valves of the bags, such frame being usually supported on a suitable scale beam arrangement whereby when the bag becomes filled with the desired weight of material, the bag supporting frame will cause the scale beam to move and to actuate means for cutting off the flow of further material into the bag and for discharging or releasing the bag from the filling spout.

The usual valve bag filling machine spout when inserted into the bag valve, necessarily fits rather loosely in the valve to permit same to be easily introduced into valves of various sizes and to permit the bags to be easily discharged therefrom. Considerable air is ordinarily forced through the filling spout into the bags during the filling, along with the finely divided material being introduced into the bag, and thus with the usual spout constructions, some of such air tends to blow out around the filling spout carrying dust therewith, and this often necessitates the use of dust collecting systems involving some trouble and expense.

According to the present invention these difficulties are avoided by surrounding the filling spout with an inflatable sleeve-like means, which, after the spout has been inserted in the bag valve, may be inflated so as to expand and substantially seal the exterior surfaces of the spout with respect to the inside wall surfaces of the bag valve. Then when the bag is filled and ready to be discharged, arrangements are provided for deflating such sleeve so that then the spout is loose within the valve, whereby the bag may be readily released or allowed to drop off from the spout. Preferably such deflation is arranged to take place after a brief time delay, so that air under pressure within the bag may have opportunity to escape through the more or less porous paper walls of the bag before the inflated sleeve is deflated, thereby keeping the valve around the spout sealed against the escape of dust until the pressure subsides in the bag.

The invention is particularly well adapted for use in connection with the type of valve bag filling machines in which a hopper is provided in which the powdered material is "fluidized" by introducing air through a porous pad in the bottom of the hopper and thereby such material, due to its fluidized nature, is caused to flow out through the spout into the bag. With such types of machines, the sealing of the valve around the spout against free escape or leakage of air appears to make possible a substantial reduction in the time required for filling the bag. The invention is further particularly well adapted for use on fluidizing types of filling machines in that the same source of air pressure used to accomplish the

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fluidizing effect may, by means of suitable air pressure control circuits (or equivalent electrical control circuit means), be utilized to inflate and deflate the spout sleeve as well as to control shut-off gate means in the spout and to clamp and unclamp a means for holding the bag on the spout, although if desired, the inflated spout sleeve may be relied on to retain the bag in place on the spout and so that when the sleeve is deflated, the bag will be free to fall off the spout if the latter is at a downwardly directed angle or the bag is made free to be thrust away automatically by known means.

Various further and more specific objects, features and advantages of the invention will appear from the detailed description given below taken in connection with the accompanying drawings which form a part of this specification and illustrate merely by way of example, preferred forms of apparatus for the practice of the invention. The invention consists in such novel features, arrangements and combinations of parts as may be shown and described herein.

In the drawings:

Fig. 1 shows a vertical sectional view of a filling spout made in accordance with the invention, showing portions of a valve bag positioned thereon, as well as also showing air pressure control means for inflating and deflating the spout sleeve and for operating in suitably timed relation other parts of a packing machine;

Fig. 2 is a side elevational view of a typical form of valve bag filling machine to which the features of the invention may be applied;

Fig. 3 is a vertical sectional view of the fluidizing hopper portion of such a machine, located at the upper part of Fig. 2;

Fig. 4 is an elevational view of one form of air-pressure operated shut-off means which may be used to open and close the filling spout;

Fig. 5 is a side elevational view of a somewhat differently shaped filling spout particularly well adapted for use with the invention; and

Fig. 6 is a sectional view taken substantially along line 6—6 of Fig. 5.

Referring now to Fig. 1 in further detail, a tubular metal filling spout is shown at 10 in a position to protrude within a valve portion 11 of a well-known form of multi-ply sewn end type paper shipping sack 12. The spout as here shown is applied to the end of a tube of rubber or other elastic material 13 through which powdered material from a fluidizing hopper of the machine flows into and through the spout 10. In order to shut off such flow of material, the tube 13 may be collapsed by pressing members such as at 14, 15 against the tubing to squeeze and close the same indicated in dotted lines. These members may be controlled by suitable linkage means (such as shown in Fig. 4 and which per se form no part of the present invention) and which in turn are operated by an air piston and cylinder means 16.

The spout 10 is surrounded by an inflatable sleeve 17 formed of rubber or other similar yieldable and elastic material so that it may be inflated to assume a shape as indicated by the dotted lines 17' for filling the space around the spout within the bag valve and so as substantially to seal the valve against the escape of air or dust from the bag and out around the spout. The sleeve may be formed at one end as at 18 with a suitable shape and dimensions securely to grip the spout and if desired a hose clamp or the like 19 may be used more securely to affix this end of the sleeve tightly against the spout. The other end of the inflatable sleeve as at 20 may be secured in place as by a hose clamp or the like 21 so as to grip the spout tightly, except for an air inlet pipe 22 through which the air for inflating the sleeve may enter

and be discharged at the proper times for deflation of the sleeve.

If the inflated sleeve alone is not relied on for holding the valve portions of the bag in place on the spout, a suitable bag clamp, as somewhat schematically indicated at 23, may be used and operated by a cylinder and piston means 24.

Air pressure from a suitable source of supply for operating the system enters through pipe 25 and a portion thereof passes through a pressure regulator 26 to pipe 27 and thence to an air pad or the like in the fluidizing hopper. For example, referring to Fig. 3, the portion of the air supply entering through pipe 27 is arranged to flow up through a porous pad 28 into a body of finely divided material contained in hopper 29 and to the lower portion of which the spout connection 13 is attached. The pressure of this air supply as regulated by the regulator 26 is made such as substantially to fluidize the material in the hopper 29 and an attached upper portion thereof as at 29' which may extend up for a distance considerably beyond the portions shown in Fig. 3.

Another portion of the incoming air supply passes through a pressure regulator 30 and on through a pipe 31 to a three-way valve means 32 for controlling the flow of air into pipe 22 and thence into inflatable tube sleeve 17. This supply of air will ordinarily be regulated at a pressure for example from 3 to 20 pounds per square inch and may be considerably above or below the pressure to the fluidizing hopper, which may for example be in the neighborhood of 2 to 5 pounds per square inch.

A third portion of the air supply passes through a pressure regulator 33 and serves to operate the cylinder and piston means 16 for the spout shut-off gate. Pressure through regulator 33 also serves to operate valve 32 in a manner more completely described below as well as the cylinder and piston means 24 for operating the bag clamp 23, if one is used. All of the pressure regulators 26, 30, 33 may be of a type to provide a constant pressure on their outlet sides and preferably variable within considerable limits if desired.

From the regulator 33, an air supply passes through a pipe 34, into multi-way valve 40, also to line 50 into "start button" 36, also through line 60 into "stop button" 38. The stop button means may be positioned and connected so as to be operating automatically by movement of the scale beam of the filling machine when the desired weight of material has been fed into a bag.

The multi-way valve 40 has a pipe connection 41 extending to the cylinder and piston means 16 for supplying air pressure to open the spout gate. Another branch 42 of this same connection runs to the cylinder and piston means for actuating the bag clamp 23 if one is used. Another outlet from the multi-way valve 40 has a branch 43 connected to operate the cylinder and piston means 16 for purposes of closing the shut-off gate whereas another branch connection 44 extends to a flow control valve 45, and thence preferably through a small air reservoir 46 and pipe 55 to the three-way valve 32. The flow control valve 45 is by-passed by a check valve 47 permitting escape therethrough of air allowing restoration of the valve-piece in the three-way valve 32 following the desired actuation of the same as will be hereinafter explained.

To actuate the arrangement of Fig. 1, the operator first presses the start button means 36 which constitutes a valve normally closed by a spring, but, when the button is pressed, momentarily allows air to pass through connection 50 from the multi-way valve 40 causing the valve-piece 51 therein to be urged to the left into the position shown. In this position this valve-piece allows air from pipe 34 to pass through to pipe 41 for raising the piston in gate control means 16, thereby opening the spout gate and allowing material to start to flow from the fluidizing hopper through the spout into the bag. Concurrently air pressure is admitted also to pipe 42 for actuating the bag clamp means 23, 24, if used. Upon pressing

the start button, the multi-way valve-piece 51 in moving to the left, as shown, permits the valve-piece 52 to move to the left within valve housing 53, that is, by allowing air to escape from the chamber of the three-way valve 32 through a pipe 55, reservoir 46, check valve 47, pipe 44, and through orifice 56 in the valve-piece 51. Thus in the three-way valve 32, the valve-piece 52 is moved by the valve spring toward the left, whereby air pressure from pipe 31 passes through valve 32, pipe 22 and into the inflatable sleeve 17 and at the pressure regulated by the regulator 30. Thus inflation of the sleeve is made to occur about concurrently with the opening of the shut-off gate.

Then when the bag is filled, the stop button means 38 is either actuated manually manually or by reason of the movement of the scale beam, whereby for a moment air passes through the stop button means and pipe 60 from the multi-way valve 40, causing its valve-piece 51 to move to the right. This allows air to escape from below the piston in the shut-off gate operating means 16 through pipe 41 to the atmosphere and also allows air to flow from pipe 34 through orifice 56, pipe 43 to the upper side of the piston in device 16 for promptly closing the shut-off gate. At the same time, air pressure is conducted through pipe 44, through the flow control valve 45, chamber 46, pipe 55 and into the three-way valve 32, causing its valve-piece 52 to move to the right. After valve-piece 52 has moved to the right, air from tube sleeve 17 passes through pipe 22 into the three-way valve 32 and out to atmosphere through port 54, thereby deflating tube sleeve 17. This latter movement may be caused to occur with an adjustable delay following the actuation of the shut-off gate, by adjusting the aperture through the flow control valve as by turning the screw 45'. This delay, as above indicated, allows the air pressure within the bag to subside by the escaping of air through the pores of the bag following closing of the shut-off gate, before the tube sleeve 17 is deflated.

The upon the next actuation of the start button and the movement of the valve-piece in the multi-way valve 40 to the position shown, air will again escape from the three-way valve 32 through pipe 55 and succeeding parts including the check valve 47 and the above-described series of operations will be repeated.

Although the air reservoir 46 need not necessarily be used, it may be used for providing a space to receive air from valve 45 and momentarily to insure delay in deflation of the sleeve 17 by reason of the fact that it will delay movement of the valve-piece 52 toward the right.

In Fig. 2, some of the parts of the schematic diagram of Fig. 1 are shown mounted at suitable places on the machine and identified by the same reference characters as in Fig. 1. The start button means 36 may, as shown, be mounted at a suitable position on the front of the machine, convenient to the operator, whereas the stop button means 38 may be operated by a lever as at 61 mounted on a scale beam of well-known type, as indicated at 62. Bag chair means of a known type are indicated at 63, supported on a movable frame means also of conventional type, as indicated at 64, and which in turn is supported by and serves to actuate the scale beam when the filled bag has received a charge of the desired weight sufficient to raise the counterweight 65 in well-known manner. The gate operating cylinder and piston means 16 may be mounted, as shown in Fig. 2, above the tube 13 and arranged to operate the linkage mechanism indicated generally at 66 in Fig. 4, through a piston rod 67 and in opposition to restoring springs 68. The various valve units indicated in the diagram of Fig. 1 may be mounted upon or within wall portions of a casing 70 on the machine.

It should be mentioned that the filling spout 10, as above described, may either be of circular cross-section or, as indicated at 10' in Figs. 5 and 6, of an oval cross-section and with a blunt end portion as at 11. The tube

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shape here shown is sometimes preferable to prevent powdered material from adhering to the end of the tube and dropping off after the bag is removed, and the oval cross-section in a vertical direction being adapted to minimize leakage of air around the spout, since such cross-section will more closely fit the natural shape of the valve, particularly in the case of the usual type of multiwall sewn end bags, this cross-section also facilitating easy insertion of such a spout in the valve.

Such parts of the machine of Fig. 2, as have not been above described, may be constructed in accordance with known practice in the valve bag filling machine art.

Although certain particular embodiments of the invention are herein disclosed for purposes of explanation, various further modifications thereof, after study of this specification, will be apparent to those skilled in the art to which the invention pertains. Reference should accordingly be had to the appended claims in determining the scope of the invention.

What is claimed and desired to be secured by Letters Patent is:

1. A valve bag filling machine having a substantially horizontally extending rigid tubular filling spout adapted for introduction into the bag valves, and means for feeding material through such spout into the bags, characterized by the provision of an inflatable sleeve tubular in form and surrounding the spout, said sleeve having a longitudinal axis extending in the same direction as and in close relation to that of said filling spout, the latter spout and said sleeve being normally exposed to atmospheric pressure and means for introducing fluid under pressure greater than atmospheric into such sleeve exteriorly of said spout and interiorly of said sleeve to inflate the latter when in a bag valve and to allow the fluid to escape to deflate same to permit the spout to be disengaged from the bag valve, a receptacle being formed interiorly of said sleeve and exteriorly of said spout for containing fluid under pressure whereby said sleeve under fluid pressure is inflatable, such receptacle being sealed from communication with the interior of said spout, the inflation of said sleeve in a bag valve acting to provide a seal between said spout and the inner surfaces of the bag valve, such sleeve, when inflated during filling of the bag, serving to check the escape of air and dust through the valve space surrounding the spout.

2. A valve bag filling machine having a filling spout adapted for introduction into the bag valves, means for feeding material through such spout into the bags, and a shut-off gate means for controlling such feeding, characterized by the provision of an inflatable sleeve surrounding the spout, means for introducing fluid under pressure greater than atmospheric interiorly of said sleeve and exteriorly of said spout to inflate said sleeve when in a bag valve and to allow the fluid to escape to deflate same when the spout is to be withdrawn from the bag valve, said sleeve being inflatable by virtue of its exterior surface being exposed to atmospheric pressure, and means for automatically controlling the latter means whereby such inflation will occur in timed relation to the opening of the gate means and such deflation will occur after an interval of delay following closure of the gate means, said sleeve when inflated within a bag valve forming a seal between said spout and valve thereby to prevent during bag filling the escape of air and dust from the bag through the valve space surrounding the spout.

3. A valve bag filling machine having a substantially horizontally extending rigid filling spout of tubular form adapted for introduction into the bag valves, means for feeding material in fluidized condition through such spout into the bags, and a shut-off gate means for controlling such feeding, characterized by the provision of an inflatable sleeve surrounding the spout, said sleeve being in the form of a tube of resilient material and thus having a longitudinal axis which extends in the same direction as that of said filling spout, means for introducing fluid un-

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der pressure greater than atmospheric interiorly of said sleeve and exteriorly of said spout to inflate said sleeve when in a bag valve and to allow the fluid to escape to deflate same when the spout is to be withdrawn from the bag valve, such sleeve being inflatable by virtue of its exterior surface being exposed to atmospheric pressure, a receptacle being formed interiorly of said sleeve and exteriorly of said spout for containing fluid under pressure whereby said sleeve under the influence of such fluid under pressure is inflatable, such receptacle being free of communication with the interior of said spout when inflated, such sleeve when inflated during filling of the bag serving to check the escape of fluid through the valve space surrounding the spout.

4. In a machine for filling valve bags, the combination comprising: a filling spout adapted to be introduced into a bag valve; a hopper for containing material to be filled into the bags; means including a porous pad in such hopper and connections for forcing air through such pad into the hopper to fluidize the material in the hopper and to cause same to be blown out through the spout into the bag; fluid pressure operated shut-off gate means for said spout; an inflatable sleeve surrounding said spout and adapted when inflated to check the escape of air and dust from the bag through the space in the valve surrounding the spout; valve means and connections for introducing fluid under one pressure greater than atmospheric interiorly of said sleeve and exteriorly of said spout to inflate said sleeve and to discharge such fluid to permit deflation of the sleeve, said fluid pressure operated gate means being activatable responsive to a different fluid pressure; said sleeve being inflatable by virtue of its exterior surface being exposed to atmospheric pressure and its interior surface exposed to pressure greater than atmospheric; and additional valve means for controlling said latter fluid pressure to actuate said first-named valve means and said fluid pressure operated gate means to cause inflation of said sleeve and the opening of the shut-off gate, said second-named valve means being also movable to a position to pass fluid at said different pressure to actuate said fluid pressure operated means to close the shut-off gate and to actuate said first-named valve after a desired delay to permit deflation of said sleeve, a receptacle being formed interiorly of said sleeve and exteriorly of said spout for containing the fluid under pressure whereby said sleeve under the influence of such fluid under pressure is inflatable, such receptacle being free of communication with the interior of said spout.

5. A valve bag filling machine having a filling spout adapted for introduction into the bag valves, and means for feeding material through such spout into the bags, characterized by the fact that said spout is formed with an oval cross-section adapted to be loosely received in a bag valve having a somewhat flattened cross-section, an inflatable sleeve surrounding said spout, the exterior surface of said sleeve normally being exposed to atmospheric pressure, and means for introducing fluid under pressure greater than atmospheric exteriorly of said spout and interiorly of said sleeve thereby to inflate said sleeve when in a bag valve and to allow the fluid to escape to deflate same when the spout is to be withdrawn from the bag valve, a receptacle being formed interiorly of said sleeve and exteriorly of said spout for containing fluid under pressure whereby said sleeve under the influence of such fluid under pressure in such receptacle is inflatable, such receptacle being sealed from communication with the interior of said spout, the inflation of said sleeve in a bag valve acting to provide a seal between such spout and the inner surfaces of the bag valve thereby to prevent during bag filling the escape for air and dust from the bag through the valve space surrounding the spout.

6. In a machine for filling valve bags and weighing the contents during filling, the combination comprising: a hopper for finely divided solid material; a filling spout

connected thereto and adapted to be introduced into a bag valve, said filling spout extending generally horizontally; means for forcing material from said hopper through the spout into the bag; shut-off gate means for said spout; supporting means for supporting the bottom surface of the bag; weighing means connected to said supporting means and movable upon the filling of the bag to a predetermined weight; fluid pressure operated means for clamping a bag on the spout; means for retaining the valve parts of the bag in position for filling the bag and thus for preventing such valve parts from tilting off of the filling spout, including an inflatable sleeve for surrounding the spout within the bag valve, said inflatable sleeve comprising a length of hose-like tube substantially coaxial with said filling spout; and fluid pressure operated means including valve means and connections for introducing fluid to inflate said sleeve in timed relation with the opening of said gate means and actuation of the clamping means, and automatically actuatable responsive to movement of the weighing means upon filling a bag to close said gate means and to permit discharge of fluid for deflating said sleeve and release of said clamping means in timed relation to the closing of the gate means, the inflation of said sleeve in a bag valve acting also to provide a seal between such spout and the inner surfaces of the bag valve thereby to prevent during bag filling the escape of air and dust from the bag through the valve space surrounding the spout.

7. A valve bag filling machine having a rigid filling spout of tube-like form adapted for introduction into the bag valves, and means for feeding material through such spout into the bags, characterized by the provision of an inflatable sleeve surrounding the spout, said sleeve also being of tube-like form, the longitudinal axis of which is positioned within such filling spout and which extends in the same direction as the longitudinal axis of the filling spout, and means for introducing fluid under

pressure greater than atmospheric interiorly of said sleeve and exteriorly of said spout thereby to inflate said sleeve when in a bag valve and to allow the fluid to escape to deflate same when the spout is to be withdrawn from the bag valve, such sleeve when inflated in a bag valve, acting to retain the bag in position on the spout, the exterior surface of said sleeve normally being exposed to atmospheric pressure, a receptacle being formed interiorly of said sleeve and exteriorly of said spout for containing such fluid under pressure whereby said sleeve is so inflatable, such receptacle being sealed from communication with the interior of said spout, the inflation of said sleeve in a bag valve acting also to provide a seal between such spout and the inner surfaces of the bag valve thereby to prevent during bag filling the escape of air and dust from the bag through the valve space surrounding the spout.

References Cited in the file of this patent

UNITED STATES PATENTS

Re. 23,504	Carter	May 27, 1952
619,834	Nickerson	Feb. 21, 1899
2,046,761	Andreas	July 7, 1936
25 2,050,496	Mayo	Aug. 11, 1936
2,064,848	Neuman	Dec. 22, 1936
2,181,756	Cook	Nov. 28, 1939
2,251,659	Bushman	Aug. 5, 1941
2,262,620	Neuman	Nov. 11, 1941
30 2,317,865	Talbot	Apr. 27, 1943
2,328,165	Peterson	Aug. 31, 1943
2,436,983	Vredenburg	Mar. 2, 1948
2,613,053	Dorrington et al.	Oct. 7, 1952
2,720,375	Carter	Oct. 11, 1955
35 2,770,439	Stafford	Nov. 13, 1956
2,799,465	Carter	July 16, 1957
2,852,045	Goodner	Sept. 16, 1958

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 2,955,796

October 11, 1960

Oliver R. Titchenal

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 2, line 13, for "anud" read -- and --; column 4, line 15, strike out "manually", first occurrence; line 32, for "fololwing" read -- following --; line 39, for "The upon" read -- Then upon --; column 6, line 70, for "for" read -- of --; column 7, line 6, for "surface" read -- surfaces --.

Signed and sealed this 11th day of April 1961.

(SEAL)

Attest:

ERNEST W. SWIDER

Attesting Officer

ARTHUR W. CROCKER

Acting Commissioner of Patents

UNITED STATES PATENT OFFICE
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