

May 19, 1959

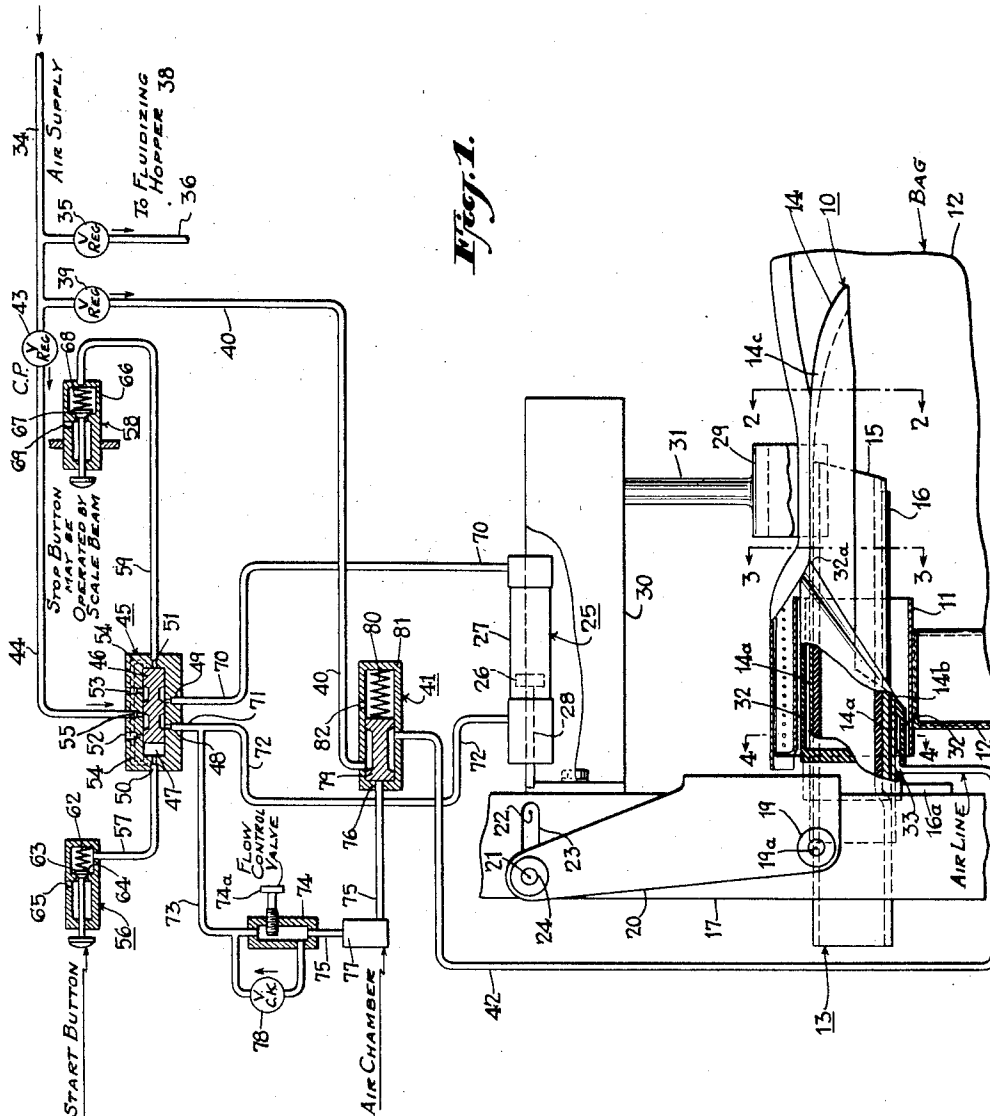
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2,887,292

VALVE BAG PACKING APPARATUS

Filed April 25, 1956

3 Sheets-Sheet 1



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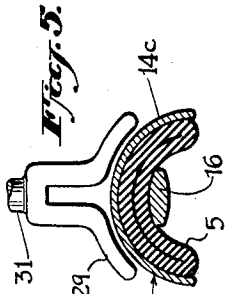
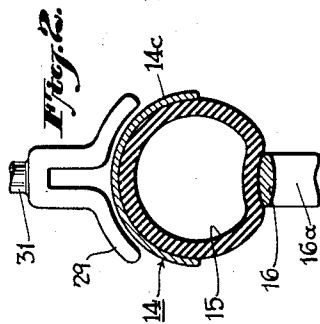
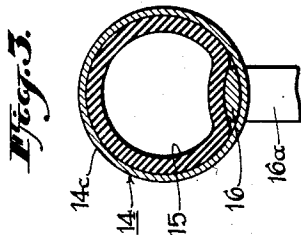
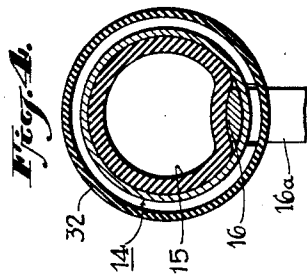
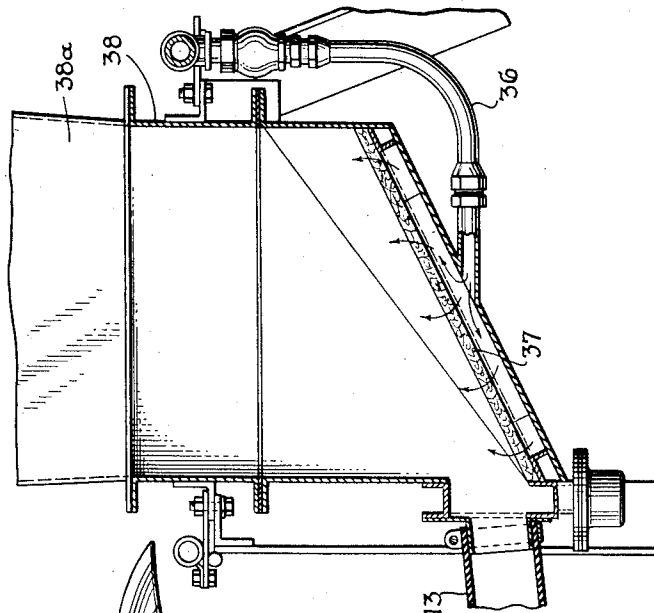
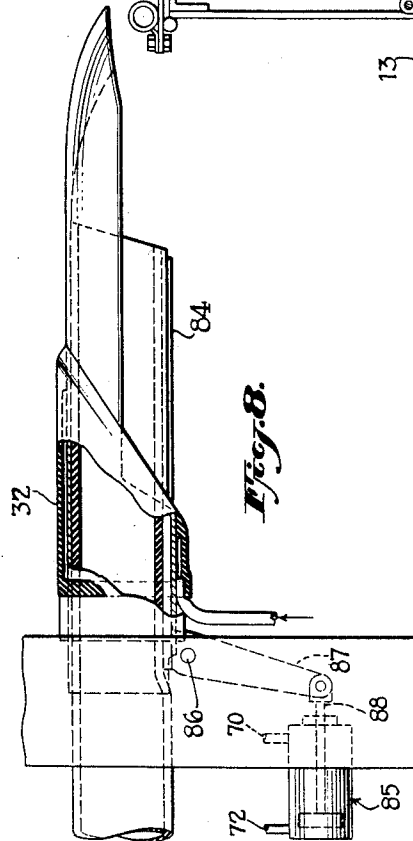
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3 Sheets-Sheet 2



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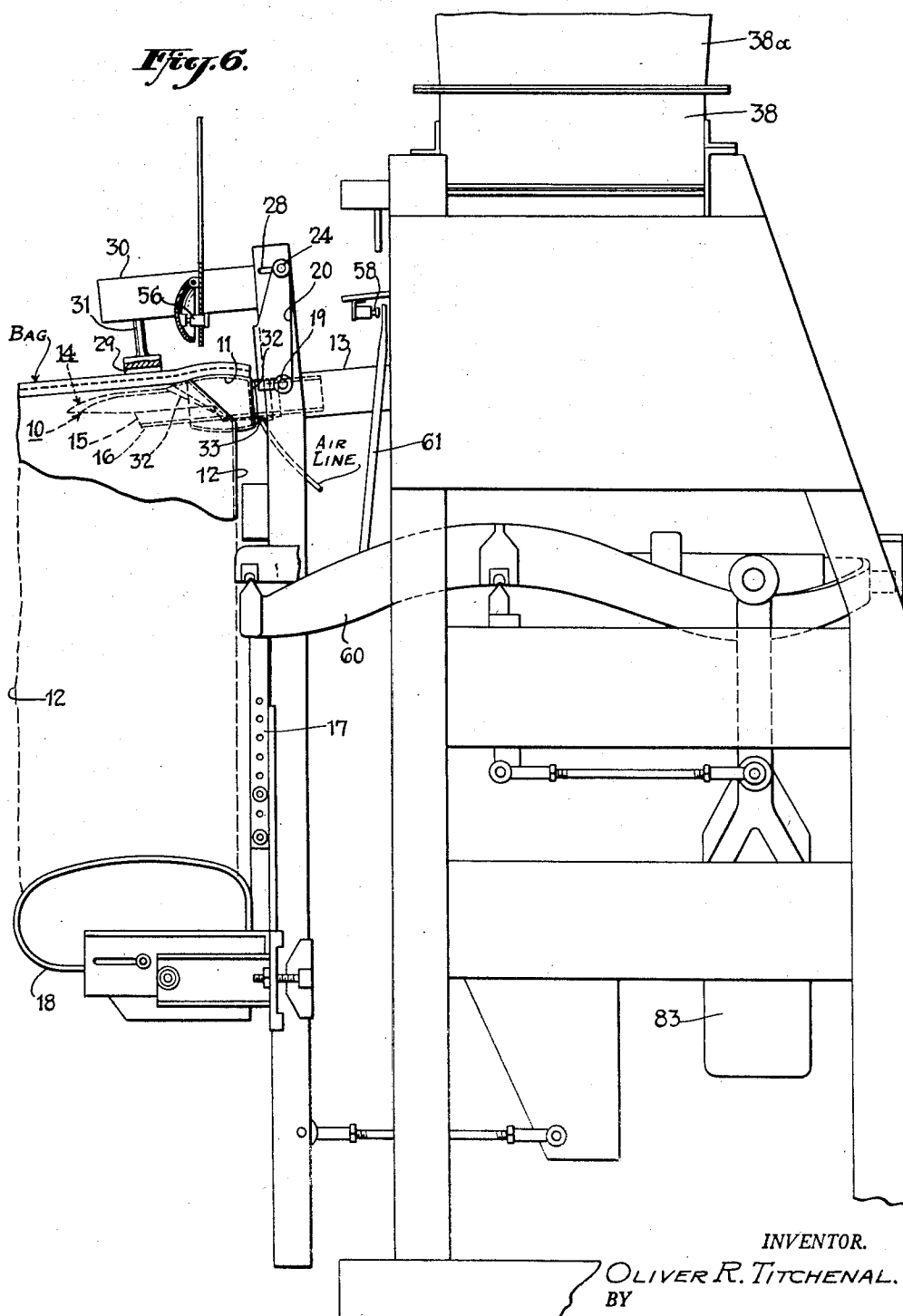
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VALVE BAG PACKING APPARATUS

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3 Sheets-Sheet 3

Fig. 6.



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2,887,292

VALVE BAG PACKING APPARATUS

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Application April 25, 1956, Serial No. 580,514

25 Claims. (Cl. 249—63)

This invention relates to machines for filling or packing valve bags, and more particularly to certain improvements in the filling spout of such machines and also to arrangements for the operation and control thereof.

Common types of filling machines of this character for packing material into valve bags via the valves of such bags include a movable bag supporting frame which is provided with a bag chair for supporting the bottom of the bag while it is being filled via such filling spout which is introduced into its valve, the frame being usually supported on a suitable scale beam or weighing scale arrangement whereby, when the bag becomes filled with the desired weight of material, the bag supporting frame, due to the weight of the bag and contents, 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 bag is supported while being filled not only by the aforementioned bag chair at its lower end but also by the filling spout which is inserted into its valve. It is possible for the bag to be supported entirely by the filling spout, the latter normally being mounted upon said movable supporting frame.

The usual valve bag filling machine spout terminates at its outer end in a tapered portion which is formed by a rigid upper part and a gradually receding lower part, the upper part normally being referred to as the "overhang" and the orifice thus being of relatively elongated oval configuration such as that formed by cutting a cylindrical tube in a plane substantially tilted with respect to the longitudinal axis thereof. Thus the upper outer lip of the filling tube orifice under these circumstances is substantially removed from the lower inner lip of such orifice in that it protrudes farther out from the machine. Pulverulent filling material tends to stick temporarily in such overhang and, after the removal of the valve bag from the filling spout, may drop therefrom, involving considerable spillage in and around the filling machine thereby causing some trouble and expense.

Furthermore, certain other common types of valve bag filling machines employ tiltable filling spouts which are in a raised or primary position during the filling of the bag but which are permitted to tilt downwardly to a lower or bag discharge position when it is desired to remove the bag, such tilting of the filling spout, of course, making it easier to remove the bag because of the force of gravity acting thereon. The aforementioned problem of spillage of material after cut-off and bag discharge also occurs particularly in such tiltable tube due, for example, to "fall off," that is, the aforementioned dropping of material from the underside of the tube. Such spillage not only soils the floor area adjacent the packing machine, but raises a dust problem, particularly with respect to the finely divided filling materials.

According to the present invention, these difficulties are avoided by providing a rigid filling tube with a liner tube of rubber-like material, most of the lower half of the rigid tube being cut away exposing the lower portion

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of the rubber-like liner tube and adapting same to be easily collapsible against the rigid upper portion of the filling tube by means of a rigid tongue which is stationarily mounted beneath the liner tube and which contacts same along its underside. The filling spout, in one form of the invention, is adapted for tilting downwardly when the bag is filled and ready for discharge and thus causing the rigid tongue to collapse the liner tube and shut off the flow of material through the spout, that is, when the rigid tube portions are allowed to drop down, the rigid tongue, being stationary, will completely collapse the liner tube thus giving immediate and complete shut-off at a region nearly at the end of the filling tube by virtue of the fact that the rigid tongue preferably extends substantially all the way out to the outer end of the liner tube, the latter terminating near the outer end of the rigid upper portion of the filling spout, such collapsing of the rubber liner tube causing a final puff of air to occur to blow the remaining mass of filling material from the overhanging portion of the filling spout which protrudes outwardly past the end of the rubber liner thereby causing same to fall into the bag instead of falling on the floor after removal of the bag. At the same time, the collapse of the liner tube tends to blow pulverulent material in a reverse direction away from the end of the liner tube and toward the filling machine, thus further reducing spillage which might otherwise occur due to the retention of such pulverulent material in a relatively loose state near the end of such collapsible liner. Any pulverulent material which remains at the orifice of the rubber liner tube may be substantially compressed by the collapsing of the tube by means of the tongue and when thus compressed it is substantially impossible for such material to be spilled out of the collapsed end of such liner.

In one form of the invention the weight of the bag aids in creating the pressure to be applied to the rigid upper portion of the filling tube just at the right time to collapse the rubber liner firmly to a closed position as the tube tilts downwardly to discharge the bag. In another form of the invention wherein a tilted filling spout is not desired, and where an inflatable rubber sleeve surrounds the filling spout for the purpose of aiding in holding the valve bag on the filling spout when inflated and also serving to check the escape of air and dust through the valve space surrounding the spout, a pneumatic or fluid pressure operated means is employed for controlling the fluid pressure within such inflatable sleeve to cause inflation thereof when desired and deflation thereof when the bag is to be made free for discharging from the machine. Further, valve means and connections are combined with such fluid pressure operated means for collapsing the rubber-like liner tube under the influence of pneumatic pressure and at a region near the end of such liner tube, there being a suitable valved association between said valve means and connections whereby the collapsing of the filling spout liner is effected in timed relation with the deflation of the sleeve surrounding the filling spout or, alternatively, where the shut-off of the flow of material through the spout is caused first to occur, thereafter the deflation of such sleeve takes place after a selected delay at which time the bag is made free for discharge.

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 the introduction of air through a porous pad in the bottom of a hopper and whereby such material, due to its fluidized nature, is caused to flow out through the spout and into the bag. With such types of machines, the positive cut-off of the flow of material at a point near the outer extremity of the filling spout ef-

fects a substantial reduction in the spillage of material which otherwise might occur due to the aforementioned "fall off" after removal of the bag. The invention is further particularly well adapted for use on such fluidizing types of filling machines in that the same source of air pressure to accomplish the fluidizing effect may, by means of suitable air pressure control circuits (or equivalent electrical control circuit means), be employed to control the tilting of a tiltably mounted filling spout thereby to control positively the shut-off gate means, for example, the rigid stationary tongue and collapsible rubber-like liner tube. In those forms of filling machines where a non-tiltable filling spout is employed, the same source of air pressure used to accomplish the aforementioned fluidizing effect may also be employed to collapse the flexible liner tube of the filling spout by pneumatic pressure alone or by urging a rigid collapsing element against the rubber-like liner tube. In response to the action of such same source of air pressure a means for holding the bag on the spout, other than the aforementioned inflatable sleeve, may be operated.

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, 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 is a vertical sectional view of a filling spout made in accordance with one form of the invention and showing portions of a valve bag positioned thereon, and also showing air pressure control means for angularly shifting the filling spout, the latter being tiltably mounted, and also showing such air pressure control means for inflating and deflating the filling spout sleeve and for operating in suitably timed relation other parts of the filling machine;

Fig. 2 is a sectional view taken substantially on line 2—2 of Fig. 1;

Fig. 3 is a sectional view taken substantially on line 3—3 of Fig. 1;

Fig. 4 is a sectional view taken substantially along line 4—4 of Fig. 1;

Fig. 5 is an end view, partly in section, of the filling spout showing the shut-off gate means in closed position, that is, showing the collapsible liner tube of the filling spout in collapsed condition;

Fig. 6 is a side elevational view of a typical valve bag filling machine to which the features of the invention may be applied;

Fig. 7 is a vertical sectional view of the fluidizing hopper portion of such a machine located at the upper part of the apparatus shown in Fig. 6; and

Fig. 8 is a vertical sectional view of a modification of the apparatus shown in Fig. 1.

Referring now to Fig. 1, a filling spout is shown at 10 protruding within a valve portion 11 of a well known form of multi-ply sewn end type of paper shipping sack 12. The spout 10 as here shown is applied to the end of a tube 13 through which flows powdered material from, for example, a fluidizing hopper. The tube 13 may be of rubber or other elastic material.

In the form shown, the filling spout 10 comprises a rigid metal filling tube 14 having therein a flexible liner tube 15 which can be collapsed to shut off the flow of material through the spout as is well shown in Fig. 5. Most of the lower half of the rigid tube 14 is cut away or alternatively such tube is initially formed without such lower half. Thus the rigid filling tube 14 comprises an inner tubular portion 14a of tubular cross-section which, as measured from the root or base thereof, extends outwardly approximately to the point 14b, the remaining

portion of the tube 14 which is formed without the lower half thereof being indicated at 14c and being in the form of an inverted trough. A rigid and stationarily mounted tongue 16 is provided which is secured at 16a to a supporting frame or column 17 sometimes referred to as an A-frame, the lower extremity of which mounts a bag chair 18 (Fig. 6) and which is adapted for undergoing weighing movement as will appear more fully hereinafter. The rigid tongue 16 contacts the liner tube 15 of rubber or rubber-like material along the underside thereof. The rigid filling tube element 14 is, in the form shown, mounted upon the frame 18 for angular movement within preselected limits about a pivot 19 having a substantially horizontal axis 19a. Suitable means may be provided for restricting the pivotal movement of the filling spout within such preselected limits comprising a lever arm 20 which is connected to the filling spout 14 for angular movement therewith, the upper extremity of the lever 20 being angularly movable between the points 21 and 22 by virtue of a slot 23 of selected angular extent, the extremities of which act as limit-stops for a rod or bolt 24 which extends into such slot and which is located at the upper end of the lever 20. The lever 20 is urged into either one of its extreme positions by power means 25 which, in the form shown, are of the pneumatic type having a piston 26 which operates within a cylinder 27, the piston 26, by means of a rod 28, being operatively connected to the rod 24 at the upper end of the lever 20.

Thus when it is desired to effect a shut-off of the flow of pulverulent material through the filling spout 10, the rigid tube 14 is caused to drop or to shift angularly downwardly about the axis 19a. The rigid tongue 16 being stationary relative to such pivot, will completely collapse the rubber liner 15, as shown in Fig. 5, thus giving an immediate and positive shut-off at a point nearly at the extremity of the filling tube, it being noted that the outer extremity of the collapsible liner 15 is near the end of the inverted trough-like portion 14c but does not necessarily extend fully to the extremity of the latter.

A bag clamp 29 is rigidly secured to the supporting frame 17 by means of a bracket 30 on an arm 31 in such a position that when the filling spout 10 is in its uppermost or raised position, as shown in Fig. 1, the upper surfaces of the bag 12 are clamped between the filling tube portion 14c and the bag clamp 29. Of course, when the filling spout 10 is dropped to its lowermost or downwardly tilted position, which takes place about the axis 19a, the bag clamp 29 is separated from the rigid portions of the filling tube 14 thereby, in so far as such clamp is concerned, making the bag free to be discharged.

The filling tube portion 14a is surrounded by an inflatable sleeve 32 formed of rubber or other similar yieldable and elastic material so that it may be inflated to assume a shape as indicated in Fig. 6 for filling the space around the spout within the bag valve for the purpose of substantially sealing the valve against the escape of air or dust from the bag out around the spout. The sleeve 32 surrounds not only the tubular portion 14a of the filling tube 14 but extends outwardly over a portion of the inverted U-shaped or inverted trough-shaped portion 14c, namely, to the point 32a. Such inflatable sleeve tapers to the point 32a from its cylindrical portion. The sleeve 32 thus is preferably formed from a cylindrical rubber tube portion and the outer extremity thereof is formed by cutting same along a plane which is substantially tilted with respect to the longitudinal axis thereof. Such sleeve 32 is provided with a fluid inlet 33.

It is to be understood that the inflatable sleeve 32 may be employed alone for holding the valve portions of the bag in place on the spout but if it is not so relied upon the aforementioned bag clamp 29 may be used. Alternatively both may be so employed concurrently.

Air pressure from a suitable source of supply for operating the system enters through a pipe 34 and a portion thereof passes through a pressure regulator 35 to a

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pipe 36 and thence to an air pad 37 (Fig. 7) or the like in the aforementioned fluidizing hopper which is indicated at 38. Thus again referring to Fig. 7, the portion of the air supply entering through pipe 36 is caused to flow up through the porous pad 37 into the body of divided material in the hopper 38. The spout connection 13 is attached to the lower portion of the hopper 38. The pressure of this air supply as regulated by the regulator 35 is selected such that the air substantially fluidizes the material in the hopper. An attached upper portion 38a is provided which may extend up for a distance considerably beyond the portion shown in Fig. 7.

Another portion of the incoming air supply passes through a pressure regulator 39 and on through a pipe 40 to a three-way valve means 41 for controlling the flow of air into a pipe 42 and thence into the inflatable sleeve 32 via the inlet 33. This supply of air will ordinarily be regulated at a pressure, for example, between 3 to 20 lbs. p.s.i. 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 lbs. p.s.i.

A third portion of the air supply passes through a pressure regulator 43 and serves to operate the cylinder and piston means 25 which control the position of the filling spout 10 relative to the stationary tongue 16 thereby to control the flow of material through the spout. Fluid pressure through the regulator 43 also serves to operate the aforementioned three-way valve means 41 in a manner to appear more fully herebelow. It should be noted that the cylinder and piston means 25 not only controls the position of the filling spout 10 as aforementioned but also controls the operation of the bag clamp 29 in that such clamp is urged against the filling spout portion 14c when the filling spout is in its uppermost position but is disengaged therefrom when the latter is in its down position. The invention, however, is not necessarily limited to the use of the bag clamp 29, it being possible for the inflatable sleeve 32 to hold a valve bag in position upon the filling spout during filling. All of the pressure regulators 35, 39 and 43 may be of a type to provide a constant pressure on the outlet sides which can be variable within considerable limits, if desired.

From the regulator 43 an air supply passes through a pipe 44 into a multi-way valve 45. The latter valve is provided with a valve piece 46 which is shiftable within a fitted valve chamber 47. The body of the valve 45 is provided with four valve ports as follows: ports 48, 49 located intermediate the extremities of the chamber 47 and ports 50 and 51 located respectively at the left- and right-hand extremities of the chamber 47. Also the valve 45 is provided with exhaust ports 52 and 53. The pipe 44 supplies air under pressure to the valve 45, in the form shown, centrally of the chamber 47. The left- and right-hand extremities of the chamber 47 are in direct communication with the pipe 44 via a passage 54 formed in the body of the valve 45, which passage is in communication with an inlet orifice 55 to which the pipe 44 is connected.

Thus from the regulator 43 the air supply passes through the pipe 44 into the multi-way valve 45, and also to a "start button" valve 56 via a pipe 57 connected to the valve port 50. Also the air passes into a "stop button" valve 58 via a pipe 59 which is connected to the valve port 51.

Such stop button means may be positioned and connected so as to be operated automatically by the movement of a scale beam 60 (Fig. 6) of the filling machine, on which frame 17 rests, when a desired weight of material has been fed into a bag. For example, an arm 61 may be secured to the scale beam 60 and the stop button valve 58 positioned as shown thereby to be actuated in response to weighing movement of the scale beam.

The start button valve 56 is provided with a valve chamber 62 which is normally closed by a valve piece

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63 under the influence of a spring 64. The pushing in of the start button opens the valve chamber 62 to the atmosphere via an exhaust port 65. The stop button valve 58 is analogously constructed in that its chamber 66 is normally closed to the atmosphere by a valve piece 67 which is urged to a closed position by the spring 68. The pushing open of the stop button places the chamber 66 in connection with the atmosphere via an exhaust port 69.

The action of the passage 54 is to place the opposite faces of the valve piece 46 under equal pressure. However, the operation of one of the button valves, such as 58, will upset the balance of pressures on the opposite faces of the valve piece 46 and cause the latter to be urged to the right, as viewed in Fig. 1, thereby to place the pipe 44 with its air under pressure in communication with the outlet port 48. The pushing in of the start button 63, on the other hand, will have the effect of urging the valve piece 46 to its lefthand limit of motion (Fig. 1) thereby placing the pipe 44 in communication with the outlet port 49 as will be explained more fully hereinafter. It should be noted that when pipe 44 and port 48 are in communication the port 49 is in communication with the exhaust port 53. Conversely, when the pipe 44 is in communication with the port 49, the port 48 is in communication with the exhaust port 52.

The multi-way valve 45 is provided with a pipe connection 70 connected to valve port 49, which pipe extends to the righthand chamber of the cylinder and piston means 25 for supplying air under pressure thereto. The other port 48 of the multi-way valve 45 is provided with a pipe 71 having a branch 72 which is connected to the lefthand chamber of the cylinder and piston means 25. Another branch 73 from the pipe 71 extends to a flow control valve 74, and thence via a pipe 75 to a port 76 in the lefthand extremity of the aforementioned three-way valve means 41. A small air reservoir 77 is interposed in the pipe 75. The flow control valve 74 is by-passed by a check valve 78 which permits escape therethrough of air allowing restoration to an initial position of a valve piece 79 in the three-way valve 41 following a desired actuation of the same as will be hereinafter more fully set forth.

In order to initiate the operation of the apparatus shown in Fig. 1, an operator first presses the start button valve 56 which momentarily reduces the pressure in the lefthand extremity of the chamber 47 causing the valve piece 46 therein to be urged to the left limit of its motion in which position such valve piece allows air from the pipe 44 to pass through the valve 45 and into the pipe 70, thereby raising the theretofore downwardly tilted filling spout 10 and thus opening the latter for the flow of material therethrough from the fluidizing hopper 38 through the spout 10 into the bag. Concurrently a bag upon the spout 10 is clamped thereupon by the action of the bag clamp 29, the bag being urged between the rigid filling tube 14 and such clamp 29. The movement of the valve piece 46 of the valve 45 to its left limit of motion, as caused by pressing the start button 56, permits the valve piece 79 of the three-way valve 41 to move to its leftmost position under the influence of a spring 80 within the body 81 thereof. This occurs because the port 76 of the three-way valve 41 is placed in communication with the atmosphere via the exhaust port 52, this occurring via the pipe 75, the reservoir 77, the one-way check valve 78, pipes 73, 71 and the suitable passages within the valve 45. Thus in the three-way valve 41 the valve piece 79 is moved to the left whereby air pressure from pipe 40 passes through such three-way valve 41 and into the inflatable sleeve 32 via the pipe 42, this occurring at the pressure regulated by the regulator 39. Thus inflation of the sleeve 32 is made to take place substantially concurrently with the opening of the theretofore collapsed liner tube 15, that is, about concurrently with the opening of the shut-off gate means.

Thereafter, when a bag upon the filling spout is filled to a preselected weight of material, the stop button valve or means 58 is actuated either manually or in response to the movement of the scale beam 60 (Fig. 6) whereby, for a selected short period of time, the righthand end of the valve chamber 47 of the four-way valve 45 is placed in communication with the atmosphere and the valve piece 46 is urged to its righthand position as shown in Fig. 1. This allows air to escape from the righthand chamber of the piston and cylinder means 25 via the pipe 70 and exhaust port 53 and also allows air to flow under pressure from the pipe 44 through the four-way valve 45 and the pipe 72 into the lefthand chamber of the piston and cylinder means 25 thereby immediately to force the piston angularly in a clockwise direction down upon the rigid tongue 16 and thereby collapsing the outer end of the liner tube 15 to the condition shown in Fig. 5 and thus shutting off the flow of material through the spout. Should it be desired not to employ the pipe 72 and the forcing of the spout downwardly under fluid pressure, the weight of the filling bag can be employed for this purpose, it being understood that suitable means for controlling the bag chair 19 should then be provided to permit the lowering of the bag under the influence of gravity. Alternatively, such bag chair may be eliminated in the latter modification. At the same time as the introduction of air under pressure to the lefthand chamber of the cylinder and piston means 25, air pressure is conducted through the pipe 73 through the flow control valve 74, reservoir 77 and pipe 75 and thence into the three-way valve 41 causing its valve piece 79 to move to the right (Fig. 1) thereby causing the deflation of the inflatable sleeve 32 by placing the conduit 42 in communication with the atmosphere via an exhaust port 32. The movement of the valve piece 79 may be caused to occur after the expiration of a preselected delay period following the collapsing of the liner tube 15 by adjusting the aperture through the flow control valve 74, for example, by adjusting a screw 74a. Such delay, as aforementioned, allows the air pressure within a bag on the filling spout 10 to subside, for example, by the escaping of such air through the pores of the bag following the collapsing of the liner tube and before the deflation of the sleeve 32.

Thereafter when the start button valve 56 is again actuated, the movement of the valve piece 46 of the multi-way valve 45 again takes place to the left limit thereof and air will again escape from the three-way valve 41 via pipe 75 and succeeding parts including the check valve 78 and the exhaust port 52 and the above-described series of operations will be repeated.

The air reservoir 77 may be used for providing a place to receive air from the valve 74 and momentarily to insure delay in the deflation of the sleeve 32 by reason of the fact that it will delay the movement of the valve piece 79 toward the right. The invention, however, is not limited to the use of the air reservoir 77.

In Fig. 6 some of the parts of the schematic diagram of Fig. 1 are mounted at suitable places on the filling machine and identified by the same reference numbers as in Fig. 1. The bag chair means 18 of a known type are supported on the movable frame means 17. The frame means 17 in turn are supported by the scale beam 60, the filled bag serving to actuate the scale beam when it has received a charge of weight sufficient to raise a counterweight 83 in a well known manner. The power means 25 may be mounted upon any suitable means with respect to the filling spout 10 and arranged to shift same angularly.

Those parts of the machine of Figs. 6 and 7 which have not been described above may be constructed in accordance with the known practice of the valve bag filling machine art.

Referring now to Fig. 8, a form of the invention is disclosed which is identical to that above described with the exception that the filling spout 10 instead of being

tiltable is mounted stationarily relative to a rigid tongue 84 which is analogous in function to the tongue 16. The tongue 84 is angularly shiftable under the influence of power means 85, the tongue 84 being pivotally mounted at 86 and a lever 87 thereof being connected to the power means 85 by means of a rod 88.

Reverting to Fig. 1 and to the inflatable sleeve 32, it is to be noted that such sleeve is in the form generally of a section of a hose which is substantially coaxial with the filling spout 10 but the inner diameter of which before inflation preferably but not necessarily is greater than the outer diameter of such spout. That is, at the inner and tubular portion of the filling tube 14a, the outer diameter of the latter is less than the inner diameter of such sleeve 32, it being understood, of course, that the outer diameter of the sleeve 32, in its deflated condition, is somewhat smaller than the inner diameter of the bag valve portion 11. The air for inflating the sleeve 32 is directed into the space between the outer surface of the filling tube and the inner surface of such sleeve.

The bag or sack 12 may have a valve portion 11 which preferably but not necessarily is provided with a supplemental sheet folded to form a bag valve sleeve of well known type.

The inflatable sleeve 32 is secured to the rigid filling tube portion 14 by suitable bonding means, for example, by suitable clamp means (not shown) or alternatively the inner marginal surfaces at the opposite ends thereof may be bonded to the rigid tube 14 which, for example, may be a rubber to metal bond.

Although certain particular embodiments of the invention have been herein disclosed for purposes of explanation, various further modifications thereof, after consideration of this specification, will be apparent to those skilled in the art to which the invention pertains. Accordingly, reference should be made to the appended claims in determining the scope of the invention.

What is claimed is:

1. In a machine for filling valve bags with divided material from a hopper, the combination comprising: a filling spout in communication with such hopper, such spout being formed with a rigid upper portion for supporting a bag and a flexible under portion adapted to be collapsed against such upper portion for shutting off the flow of such material therethrough; a rigid member mounted along said flexible under portion for collapsing the latter in response to relative movement of such spout and member; a bag clamp for clamping a bag on such spout, said clamp and spout also being mounted for relative movement; and means for controlling the relative movement of said spout, rigid member and clamp for simultaneously releasing said clamp and collapsing said flexible portion thereby to shut off the flow of material and make the valve bag on said spout free for discharge, said control means also being adapted for effecting a reverse relative movement to open said spout and urge said clamp thereupon.

2. In a machine for filling valve bags with divided material from a hopper, the combination comprising: a filling spout in communication with such hopper, such spout being formed with a rigid upper portion for supporting a bag and a flexible under portion adapted to be collapsed against such upper portion for shutting off the flow of such material therethrough; a rigid member mounted along said flexible under portion for collapsing the latter in response to relative movement of such spout and member; and means for controlling the relative movement of said spout and rigid member for collapsing said flexible portion thereby to shut off the flow of material, said control means also being adapted for effecting a reverse relative movement to open said spout.

3. In a machine for filling valve bags, the combination comprising: a filling spout adapted to be introduced into the valve of a valve bag; a hopper for containing material to be filled into such bags through such spout; means

including a porous pad in such hopper and connections for forcing air through such pad into the hopper to fluidize the material therein and to cause such material to be blown out through the spout into the bag; means for supporting said filling spout including means upon which such spout is mounted for angular movement about a selected pivot having a substantially horizontal axis; such spout being angularly movable about said axis within preselected limits from an initial position to a position adapted for the discharging of a bag into the valve of which said spout is inserted; power means for urging said filling spout to one or the other of the limits of the angular movement thereof; said filling spout including an outer tube-like element of rigid material which at least over a part of the length thereof, including the outer end, is formed without the lower portion thereof, and also including a liner tube of rubber-like material positioned within the tube-like element and extending outwardly within and beneath that part formed without the lower portion; a rigid tongue element stationarily mounted and positioned for engaging the underside of such rubber liner and for collapsing the latter near the outer end thereof in response to the tilting of the filling spout from its initial to its bag discharge position; the rigid portion of said filling spout also having an inflatable sleeve surrounding same and adapted when inflated to check the escape of air and dust from the bag through the space in the valve surrounding the filling spout; valve means and connections for introducing fluid under one pressure to inflate said sleeve and to discharge such fluid to permit deflation of the sleeve, said power means for controlling the angular position of the tiltable filling spout being actuatable in response to a different fluid pressure to urge the filling spout to its bag discharge position; and additional valve means for controlling such different fluid pressure to actuate said first-named valve means and said power means to cause inflation of said sleeve and the opening of the collapsible rubber liner, such additional valve means being also movable to a position to pass fluid at said different pressure to actuate said power means to shift said filling spout to collapse such liner thereby to shut off the flow of material through the spout and to actuate said first-named valve means after a desired delay to permit deflation of said sleeve.

4. In a machine for filling valve bags, the combination comprising: a filling spout adapted to be introduced into the valve of a valve bag; means for supporting said filling spout including means upon which such spout is mounted for angular movement about a selected pivot having a substantially horizontal axis; such spout being angularly movable about said axis from an initial position to a position adapted for the discharging of a bag into the valve of which said spout is inserted; power means for urging said filling spout selectively to said initial position and said position adapted for discharging a bag; said filling spout being of tube-like configuration and comprising an upper portion of rigid material and an under portion which is movable relative thereto and against the under surface thereof to shut off the flow of material therethrough; a rigid tongue element stationarily mounted and positioned for engaging such under portion and for urging the latter against said upper portion in response to the tilting of the filling spout from its initial to its bag discharge position; said filling spout also having an inflatable sleeve surrounding same and adapted when inflated to engage the inner surfaces of a bag valve and to check the escape of air and dust from the bag which otherwise might occur through the space in the valve surrounding the filling spout; valve means and connections for introducing fluid under pressure to inflate said sleeve and to discharge such fluid to permit deflation of the sleeve, said power means for controlling the angular position of the tiltable filling spout being actuatable in response to a different fluid pressure to urge the filling spout to its bag discharge position; and additional valve

means for controlling such different fluid pressure to actuate said first-named valve means and said power means to cause inflation of said sleeve and the opening of the collapsible rubber liner, such additional valve means being also movable to a position to pass fluid at said different pressure to actuate said power means to shift said filling spout to shut off the flow of material therethrough and to actuate said first-named valve means to permit deflation of said sleeve.

5. 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 to such hopper and adapted to be introduced into a bag valve; means for forcing material from said hopper through the spout into the bag; filling spout support means including means for mounting such spout for angular movement within preselected limits about a substantially horizontal axis, said filling spout being of tubular configuration and having a rigid upper portion and a collapsible under portion of yieldable material; a rigid tongue element mounted beneath said filling spout and normally engaging along the underside of said under portion and being mounted stationarily relative to said axis whereby angular movement of the spout about such axis from its uppermost to its lowermost angular position is adapted to urge said under portion of the filling spout against the upper inner surface thereof thereby to shut off the flow of material therethrough; supporting means for the bag; weighing scale means associated with said bag supporting means; an inflatable sleeve for surrounding the spout within the bag valve; power means for controlling the angular position of 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 movement of such filling spout from its lowermost shut position to its uppermost open position and automatically actuatable in response to action of the weighing scales when a bag has been filled to a preselected weight to actuate said power means to shift said filling spout angularly downwardly upon said stationarily mounted tongue element thereby to shut off the flow of material through said spout and to permit discharge of fluid for deflating said sleeve in timed relation to such shutting off of the flow of material through said 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 to such hopper and adapted to be introduced into a bag valve; means for forcing material from said hopper through the spout into the bag; said filling spout being of tubular configuration and having a rigid upper portion and an under portion which is collapsible against the upper portion; a rigid tongue element mounted beneath said filling spout and normally engaging along the underside of such under portion thereof, said spout and element being mounted for relative movement thereby to open or shut the filling spout depending on the direction of such movement; supporting means for the bag; weighing scale means associated with said bag supporting means; an inflatable sleeve for surrounding the spout within the bag valve; power means for controlling the relative movement of said filling spout and element; and fluid pressure operated means including valve means and connections for introducing fluid to inflate said sleeve in timed relation with the relative movement of such filling spout and element from a shut position to an open position and automatically actuatable in response to action of the weighing scales when a bag has been filled to a preselected weight to actuate said power means to cause further relative movement of said spout and element thereby to shut off the flow of material through said filling spout and to permit discharge of fluid for deflating said sleeve in timed relation to such shutting off of the flow of material through said spout.

7. A valve bag filling machine having a filling spout adapted for introduction into the valve of a valve bag, means for feeding material through such spout into such a bag thereon characterized by the provision of a liner tube for such spout of yieldable rubber-like material, a rigid member mounted stationarily along and beneath said resilient liner tube, mounting means for said spout for supporting same for angular movement within preselected angular limits, said liner tube at one position of such spout being open for the passage of pulverulent material therethrough and in another angular position thereof being closed as a result of the tilting of the spout downwardly from the first-mentioned position thereof against said rigid member, means for holding said spout in said first-mentioned angular position, and means for releasing such holding means responsive to receipt of a preselected weight of material in a bag upon such spout thereby to shut off the flow of pulverulent material to the bag in response to such tilting of the spout under the influence of the weight of the bag and contents.

8. A valve bag filling machine having a filling spout adapted for introduction into the valve of a valve bag, means for feeding material through such spout into such a bag thereon characterized by the provision of a liner tube for such spout of resilient material, a rigid member mounted stationarily along and beneath said resilient liner tube, mounting means for said spout for supporting same for movement in a substantially vertical plane, said liner at one position of such spout being open for the passage of pulverulent material therethrough and in another angular position thereof being closed as a result of the movement of the spout downwardly from the first-mentioned position thereof and against said rigid member, means for holding said spout in said first-mentioned position, and means for releasing such holding means responsive to receipt of a preselected weight of material in a bag upon such spout thereby to shut off the flow of pulverulent material to the bag in response to the movement of the spout under the influence of such weight of the bag and contents, at least a part of said rigid member being positioned near the outer extremity of said liner tube near the outer end of said filling spout, said means for supporting the filling spout for movement being constructed and arranged whereby such movement occurs to collapse such liner tube near the outer extremity thereof thereby to produce a puff of air and pulverulent material directed outwardly of the filling spout tending to dislodge any pulverulent material stuck in the filling spout between the end of said liner tube and the outer extremity of the filling spout.

9. A valve bag filling machine having a filling spout adapted for introduction into the valve of a valve bag, means for feeding material through such spout into a bag thereon, and shut-off gate means for controlling such feeding characterized by the provision of a flexible liner tube for such filling spout which liner tube is of resilient material, said filling spout being of rigid material and a substantial portion of the length thereof being in the form of an inverted trough, thereby exposing on the underside thereof a substantial length of said liner tube, the upper portion of the latter being in engagement with the under surface of said inverted trough portion of the spout, the latter thereby being adapted for the supporting of a valve bag into the valve of which it is inserted, a liner collapsing element mounted along and adjacent said liner tube, at least a portion of which element is located near the outer end of said liner tube, and means for effecting relative movement of said liner tube and collapsing element.

10. A valve bag filling machine having a filling spout adapted for introduction into the valve of a valve bag, means for feeding material through such spout into a bag thereon, and shut-off gate means for controlling such feeding characterized by the provision of a liner tube for such filling spout which is of yieldable material, said

filling spout being of rigid material and a substantial portion of the length thereof being in the form of an inverted trough, thereby exposing on the underside thereof a substantial length of said liner tube the upper portion of which is in engagement with the under surface of said inverted trough portion of the spout, said filling spout and liner being bonded together at least along the marginal parts of such filling spout adjacent such liner tube and along the marginal parts of said liner adjacent said filling spout, a rigid member positioned along and beneath at least the outer portion of said flexible liner thereby to collapse the latter in response to relative movement of said member and liner, means for mounting said liner and member for such relative movement, the liner tube being open and adapted for passage of material therethrough in one position and being collapsed and shutting off the flow of such material in another position.

11. A valve bag filling machine having a filling spout adapted for introduction into the valve of a valve bag, means for feeding pulverulent material in fluidized condition through such spout and into a bag thereon, and shut-off gate means for controlling such feeding characterized by the provision of a liner tube of rubber-like material within the filling spout, means for collapsing said liner tube in response to movement of such filling spout, such means including a rigid element positioned along the side of such liner tube near the outer end thereof, and means for effecting relative movement of such spout and rigid element thereby to collapse such liner tube in response to the receipt in a bag on such spout of a preselected quantity of material thereby to shut off the flow of such material through the tube.

12. In a machine for the filling of the 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; means for forcing material from said hopper through said spout and into the bag; shut-off gate means for controlling the flow of such material through said spout including a collapsible liner within said filling spout, said liner being of yieldable material and being collapsible in response to the application of pressure exteriorly thereof, fluid pressure operated means including valve means and connections for controlling fluid to collapse said liner thereby to shut said gate means; supporting means for the bag; weighing scale means associated with said supporting means, an inflatable sleeve for surrounding the spout within the bag valve; and fluid pressure operated means including valve means and connections for introducing fluid to inflate said sleeve in timed relation with the release of fluid pressure upon said collapsible liner and automatically actuatable responsive to such weighing scale means sensing a preselected weight of material in a bag to operate said first-mentioned fluid pressure operated means to close said gate means and to permit discharge of fluid for deflating said sleeve in timed relation to such closing of said gate means.

13. In a machine for filling valve bags, the combination comprising: a filling spout having a rigid upper portion and a flexible collapsible portion therebeneath, said rigid upper portion being adapted for the supporting of a bag into the valve of which the spout is inserted and said flexible under portion being collapsible against said upper portion for shutting off the flow of material therethrough, an inflatable sleeve surrounding the spout at a selected point along the length thereof having both a rigid upper and under portion, means for introducing fluid into such sleeve to inflate same when in a bag valve, and means for collapsing said flexible portion of the filling spout and also for allowing the fluid to escape to deflate said sleeve in response to the filling of a preselected weight of material into a bag upon the spout, such sleeve when inflated during the filling of the bag serving to check the escape of air and dust through the valve space surrounding the spout.

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14. In a machine for filling valve bags, the combination comprising: a filling spout formed with a rigid upper portion and a flexible collapsible portion therebeneath, said rigid upper portion being adapted for the supporting of a bag into the valve of which the spout is inserted and said flexible under portion being collapsible against said upper portion for shutting off the flow of material there-through, an inflatable sleeve surrounding the spout at a selected point along the length thereof having both a rigid upper and under portion, means for introducing fluid into such sleeve to inflate same when in a bag valve and to allow the fluid to escape to deflate same when the bag is to be withdrawn from the spout, such sleeve when inflated during the filling of a bag serving to check the escape of air and dust through the valve space surrounding the spout, and means for collapsing said flexible under portion of the filling spout thereby to shut off the flow of material therethrough in timed relationship with the exit of fluid from such sleeve whereby the flow of material through said filling spout is shut off and thereafter said sleeve is deflated.

15. A valve bag filling machine having a filling spout adapted for introduction into the valve of a valve bag and means for feeding material through such spout into a bag thereon characterized by the provision of an inflatable sleeve surrounding the spout, the latter including a rigid upper portion all along the length thereof and a collapsible under portion positioned near the outer end thereof, such collapsible portion being of flexible yieldable material, means for introducing fluid into such sleeve to inflate same when in a bag valve and to allow the fluid to escape to deflate same when the bag valve is to be withdrawn from the spout, and means for collapsing said yieldable portion of the filling spout thereby to shut off the flow of material therethrough in preselected timed relationship with the deflation of said sleeve, the latter when inflated in a bag valve acting to retain the bag in position on the spout.

16. In a valve bag filling machine, the combination comprising: a filling spout adapted for introduction into the valve of a valve bag, means for feeding material through said spout and into a bag, an inflatable sleeve surrounding the spout, such sleeve when inflated in a valve of a valve bag acting to retain same in position on the spout, said filling spout including a rigid upper portion adapted for supporting at least the valve corner region of a valve bag thereupon and having near the outer end thereof a flexible portion adapted to be collapsed to shut off the flow of material therethrough, means for introducing fluid into such sleeve to inflate same 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, and pneumatically operable means for collapsing such flexible portion of said filling spout in selected timed relationship with the deflation of said sleeve.

17. A valve bag filling machine having a filling spout adapted to be introduced into the valve of a valve bag, means for directing divided material through such spout and into a bag thereon, and shut off gate means for controlling the flow of material through such spout, characterized by the provision of a liner tube of resilient rubber-like material within the filling spout, means for collapsing said liner tube including a rigid element positioned along the side of such liner tube, and means for mounting such rigid element and spout for relative movement, said liner tube being collapsible in response to such relative movement.

18. In a machine for filling valve bags with divided material from a hopper, the combination comprising: a filling spout in communication with such hopper, such spout having an upper portion of adequate rigidity for supporting a bag and a flexible under portion which is collapsible against such upper portion for shutting off the flow of such material therethrough; means for so collapsing said flexible under portion for shutting off the

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flow of material through the filling spout; a bag clamp for clamping a bag on such spout, said clamp and spout being mounted for relative movement; and means for controlling the relative movement of said spout and clamp and also for controlling said means for collapsing said flexible under portion thereby to shut off the flow of such material and to make the valve bag on said spout free for discharge.

19. In a machine for filling valve bags with granular material from a hopper, the combination comprising: a filling spout in communication with such hopper, such spout being formed with an upper portion of adequate rigidity for supporting a valve bag and a flexible under portion adapted to be collapsed against such upper portion for shutting off the flow of such material therethrough; and means for collapsing said flexible under portion.

20. In a machine for filling valve bags with granular material from a hopper, the combination comprising: a filling spout in communication with such hopper, such spout being formed with a portion of adequate rigidity for supporting a valve bag and a flexible inner liner positioned within such rigid portion of the spout and adapted to be collapsed for shutting off the flow of such material therethrough; and means for collapsing said inner liner.

21. In a machine for filling valve bags with divided material from a hopper, the combination comprising: a filling spout in communication with such hopper, said filling spout comprising an outer tube-like element of relatively rigid material and a liner tube of resilient yieldable rubber-like material positioned within such tube-like element, said liner tube being collapsible within said tube-like element under the influence of fluid pressure, means for holding a bag upon such spout, means for controlling a flow of fluid to said outer tube-like element for collapsing said liner tube, means for controlling said bag holding means, and means for operatively interconnecting said last two mentioned control means for actuation in timed relationship to one another, the means for controlling such flow of fluid being actuated to shut off the flow of material in advance of the release of said bag holding means.

22. A valve bag filling machine having a filling spout adapted for introduction into the valve of a valve bag, characterized by the provision of an inflatable sleeve surrounding said spout, the latter including an upper portion of adequate rigidity for the support of a bag and a collapsible portion therein of flexible yieldable material for shutting off the flow of material through the spout, means for introducing fluid into such sleeve to inflate same when in a bag valve and to allow the fluid to escape to deflate same when the bag valve is to be withdrawn from the spout, and means for collapsing said collapsible portion of the filling spout thereby to shut off the flow of material therethrough in preselected timed relationship with the deflation of said sleeve, the latter when inflated in a bag valve acting to retain the bag in position on the spout, said means for collapsing said collapsible portion of the filling spout including means for collapsing such portion in response to fluid pressure.

23. A valve bag filling machine having a filling spout adapted for introduction into the valve of a valve bag, characterized by the provision of an inflatable sleeve surrounding the spout and a collapsible liner within the spout, means for controlling a flow of fluid to inflate and deflate said sleeve, means for controlling the flow of fluid to collapse said liner, the latter being of resilient material capable of resuming a selected tubular conformation in response to the occurrence of a selected fluid pressure external thereto, and means for effecting a collapse of the filling spout liner in timed relationship with the deflation of said sleeve, the deflation of such sleeve occurring after a selected delay measured from the collapse of said liner.

24. In a valve bag filling machine, the combination comprising: a filling spout adapted for introduction into

the valve of a valve bag, an inflatable sleeve surrounding said spout, such sleeve when inflated within the valve of a valve bag acting to retain same in position on the spout, a collapsible liner tube of resilient material within said spout, and means for controlling a flow of fluid to said sleeve for selectively inflating and deflating same and for controlling a flow of fluid externally to said collapsible liner selectively to collapse same and to enable same to assume its normal uncollapsed condition, said fluid control means including means for the collapsing of the filling spout liner in timed relation with the deflation of said sleeve.

25. Apparatus in accordance with claim 24, characterized in that means are provided for first collapsing the

collapsible liner, said sleeve at the time being inflated and for thereafter deflating the sleeve after the expiration of a selected delay.

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