

March 2, 1948.

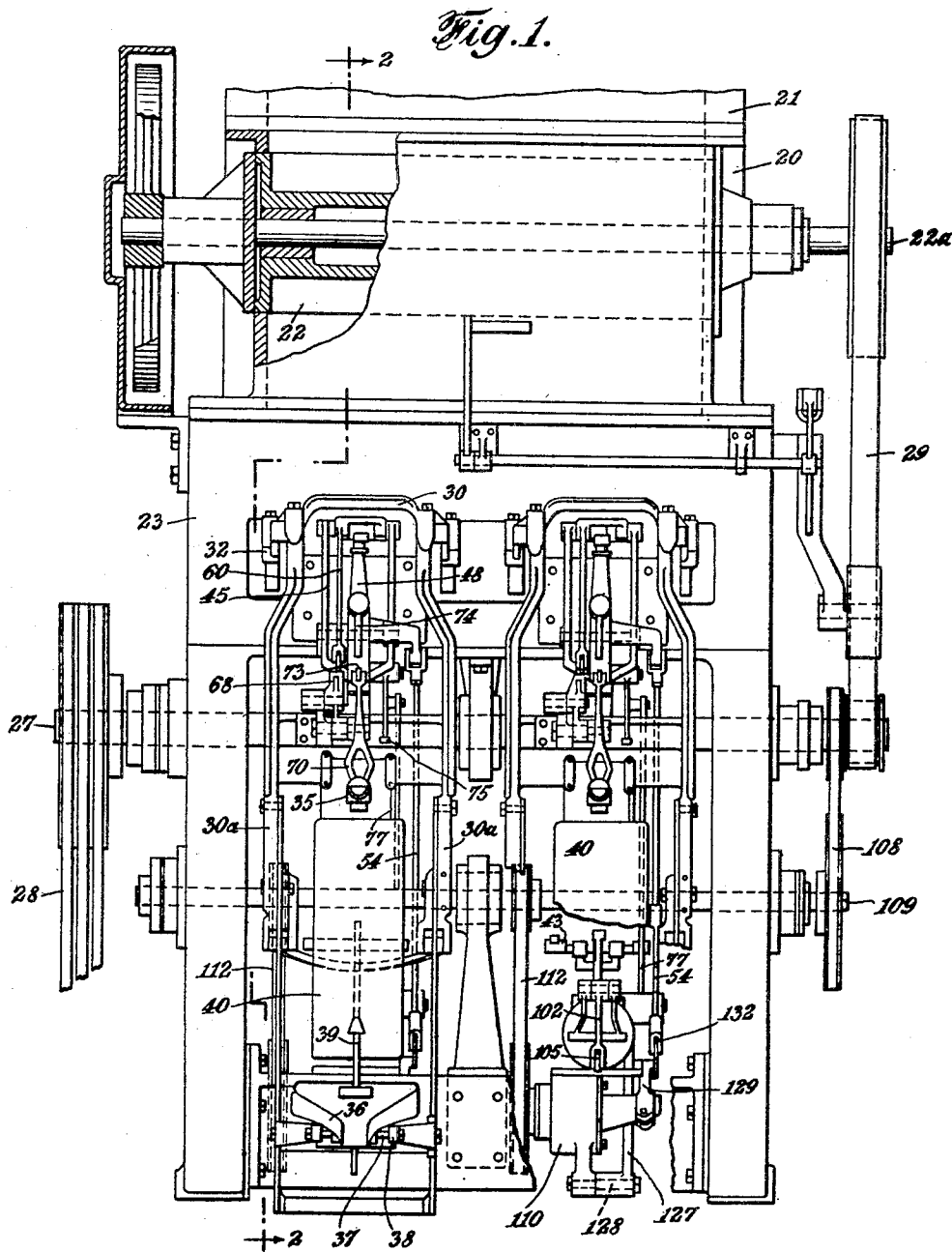
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2,437,172

VALVE BAG FILLER

Original Filed Oct. 25, 1943

5 Sheets-Sheet 1



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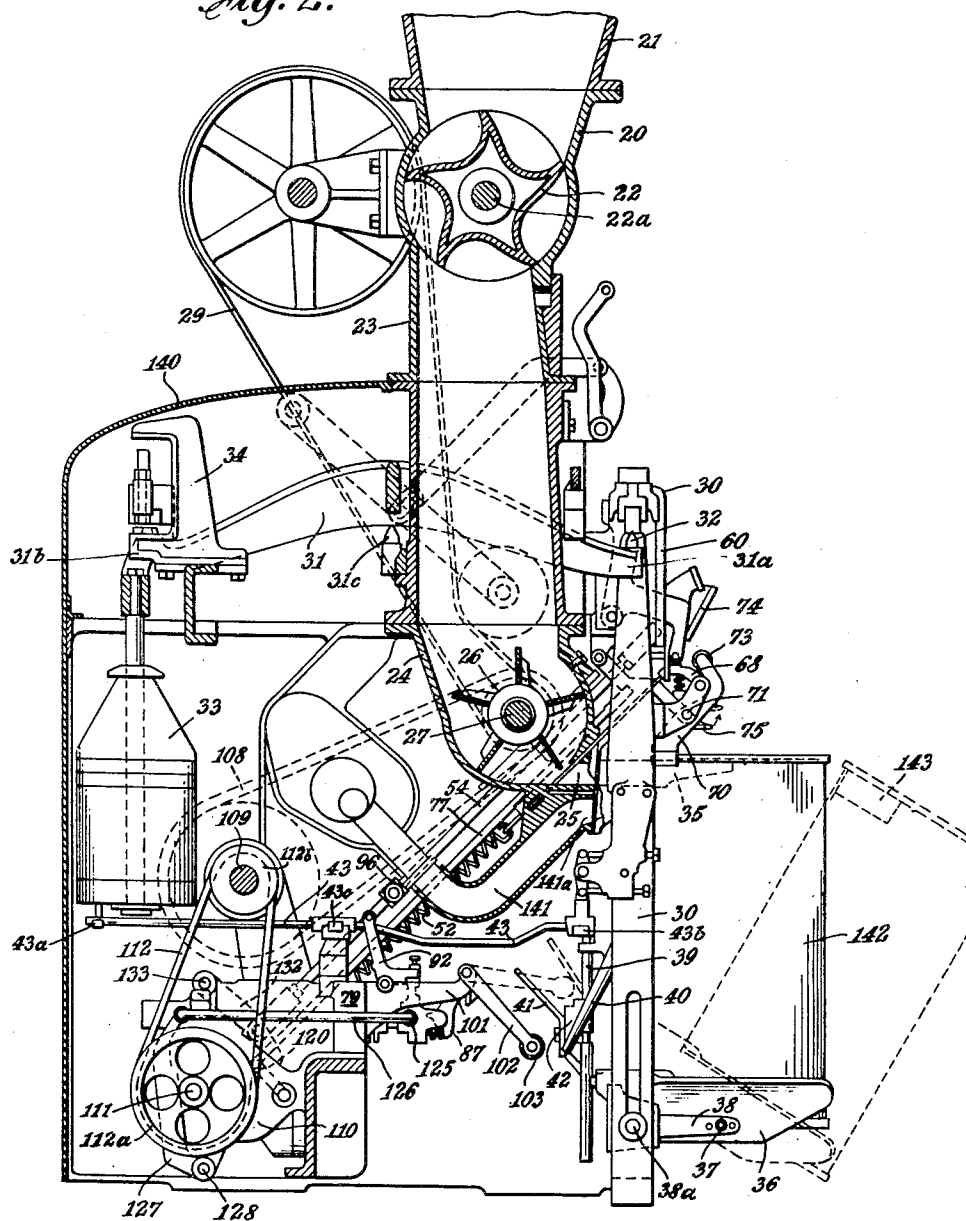
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Fig. 2.



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Fig. 4.

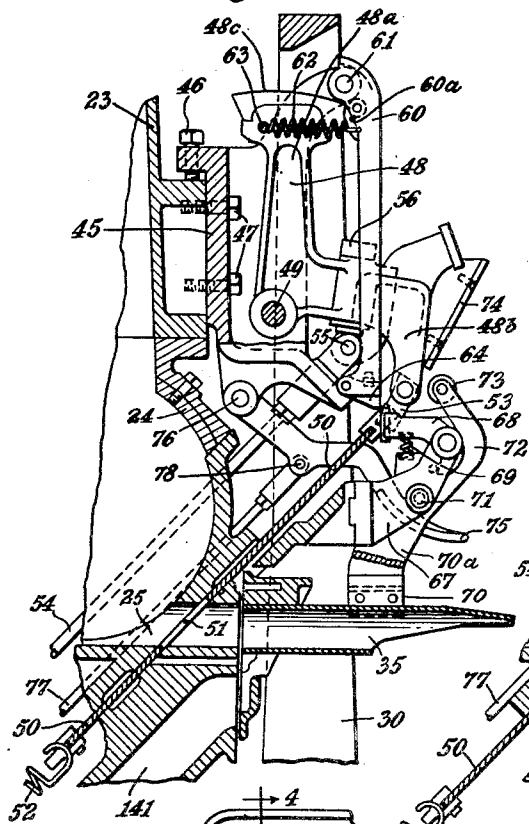


Fig. 5.

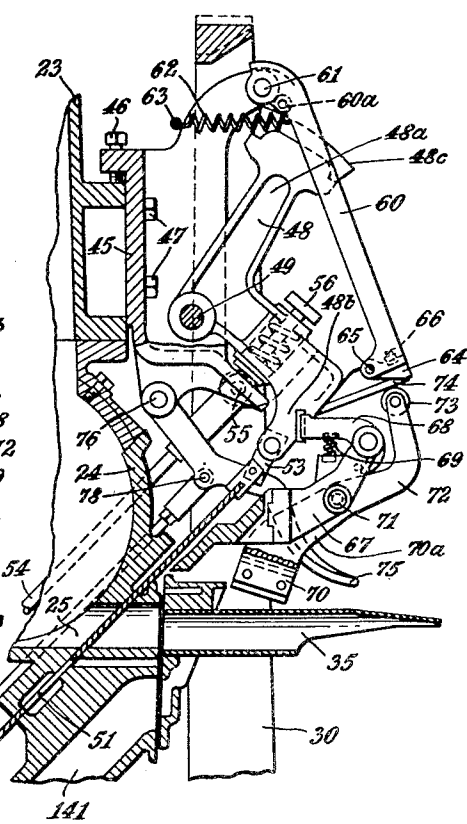
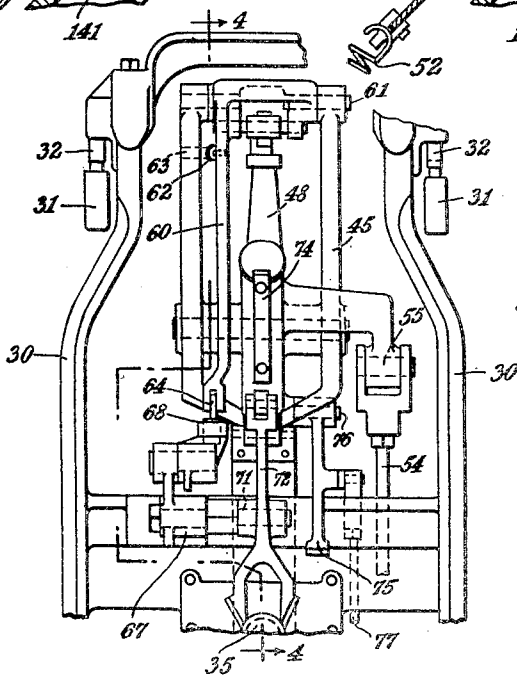


Fig. 3.

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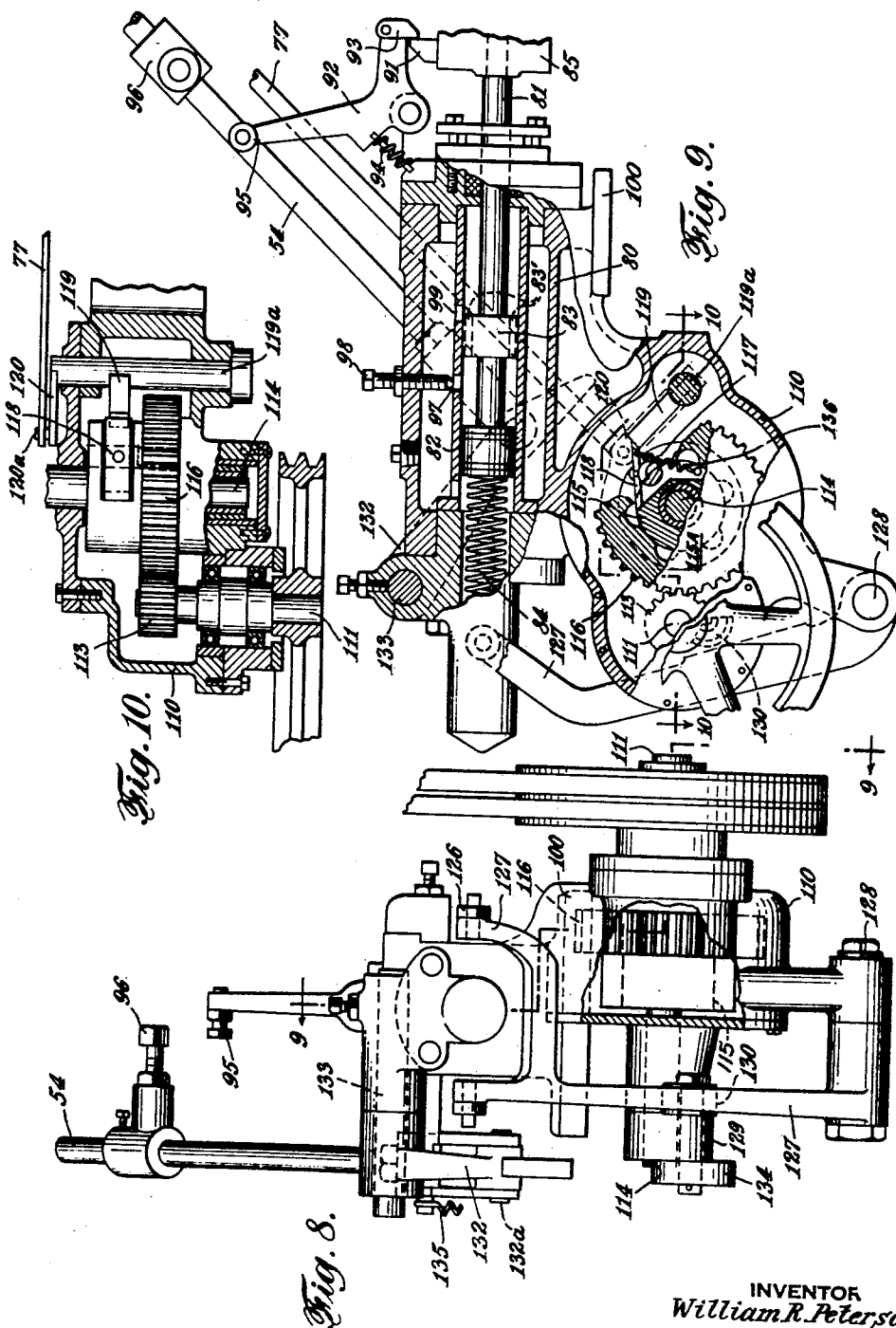
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VALVE BAG FILLER

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5 Sheets-Sheet 5



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UNITED STATES PATENT OFFICE

2,437,172

VALVE BAG FILLER

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Continuation of application Serial No. 507,521,
October 25, 1943. This application May 4, 1946,
Serial No. 667,418

12 Claims. (Cl. 249—60)

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This invention relates to bag filling apparatus, and more particularly to apparatus for filling and weighing valved bags.

This application is a continuation of my co-pending application Serial No. 507,521, filed October 25, 1943, now abandoned, which in turn was copending with my application Serial No. 361,609, filed October 17, 1940, upon which Patent 2,350,529 was granted June 6, 1944, with claims directed to a divisional species of the invention.

In apparatus heretofore employed of this type, the means for feeding the material into the bag has also forced air therein or permitted air to enter the bag. Immediately upon the completion of the filling, the bag has been discharged or ejected from the apparatus without relieving the resultant air pressure. If the bag is thus discharged the air therein puffs out through the valve opening and blows dust or powdered material into the air, onto the bag and into the adjacent machinery. This not only may disarrange the bag valve and interfere with its proper closing but is a positive hazard to the health of the machine operator because of respiratory disorders which may ensue, and is also detrimental to the machinery. The discharge of such dust is an especial disadvantage with respect to the cleanliness and salability of the bag and its contents. In order to assist in maintaining a competitive position in their markets many merchandisers of free flowing materials contained in bags have found that they must present a clean container to customers. Products in bags having dust laden outer surfaces are under a serious handicap as to salability.

According to the present invention, novel apparatus is provided whereby a filled bag is retained on a filling tube therefor after filling is complete until such pressure within the bag is relieved by harmless leakage, thus eliminating the above noted difficulties.

Various further and more specific objects, features and advantages of the invention will clearly appear from the detailed description given below taken in connection with the accompanying drawings which form a part of the specification and illustrate, by way of example, preferred arrangements of apparatus for carrying out the invention. The invention consists in such novel methods and combinations of features and method steps as may be shown and described in connection with the equipment herein disclosed.

In the drawings:

Fig. 1 is a front elevation partly in section and with parts broken away showing a two-unit valve

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bag filling device embodying one form of the invention;

Fig. 2 is a vertical section on line 2—2 of Fig. 1;

Fig. 3 is a front elevation on an enlarged scale showing details of a bag clamping and gate tripping mechanism shown in Fig. 1;

Fig. 4 is a vertical section on line 4—4 of Fig. 3;

Fig. 5 is a view of the same parts shown in Fig. 4, but in a different position;

Fig. 6 is an enlarged detailed side elevation partly in section and with parts broken away showing a bag ejection or discharge mechanism;

Fig. 7 is a plan view of parts shown in Fig. 6;

Fig. 8 is a further enlarged view of the discharge mechanism as viewed from the left of Figs. 6 and 7;

Fig. 9 is a view partly in section and with parts broken away taken on line 9—9 of Fig. 8; and

Fig. 10 is a view partly in section and with parts broken away taken substantially along line 10—10 of Fig. 9.

In Fig. 1 a bag filling apparatus is illustrated which has two identical units each adapted for filling a bag simultaneously with the other. For the sake of convenience a single unit only will be described.

Referring to the drawings in further detail, suitable means are provided for receiving a free flowing material such as lime or cement and directing it to a bag filling spout or tube, comprising (Figs. 1 and 2) a hopper 20 having a chute 21 superposed thereupon. In the hopper 20 is a rotatable feeder 22 of conventional design upon a shaft 22a for regulating the flow of material to a chute 23 therebelow. The latter is in register with a feeder housing 24 having a discharge throat 25 through which material is discharged by a propeller 26 of well known design.

The propellers for each unit are preferably mounted upon a common shaft 27 which may be driven by any suitable source of power by means of belts 28 upon a suitable wheel keyed to shaft 27. It is desirable for the same source of power to be employed for driving the feeder 22, for example, by means of a belt 29 which, through suitable drive wheels on their respective shafts, interconnects shafts 27 and 22a.

Suitable means are provided for carrying and weighing a bag and its contents comprising, in the form shown in Figs. 1 and 2 a conventional bag carrying frame 30, in the general shape of an A, having parallel arms 30a, 30a to which a suitable bag saddle is attached in a manner to appear hereinafter. The frame 30 is suspended in a well known manner upon a weighing device

comprising a forked scale beam 31 having a load end 31a, a weight end at 31b and resting upon a central knife bearing 31c. Bearings such as knife bearings 32 at load end 31a are provided upon which frame 30 rests.

A suitable counter-balance weight 33 is attached by conventional means to the weight end 31b of scale beam 31. The swing or angular movement of the scale beam may be limited by a suitable limit-stop or fork 34.

Means for conveying material from throat 25 to a bag are provided comprising a filler tube or spout 35 which is adapted to enter the valve of a bag. Tube 35 is in alignment with throat 25 prior to a weighing movement of the weighing device. When the latter occurs it descends, under the weight of material in the bag in a manner to appear later, and moves partially out of register with the throat.

Means are provided for tiltable mounting a bag upon the frame 30, comprising, in the form shown in Figs. 1 and 2, a bag saddle 36 pivotally mounted at 37 upon a saddle bracket 38 which is attached to frame 30, for example, by vertically adjustable clamps 38a. The pivot 37 is preferably so located that the center of gravity of the bag and its mount is to the left thereof, as viewed in Fig. 2, whereby a filled bag will not be urged by gravity to tilt the bag saddle to the right to discharge the bag.

A conventional shield or spill guide 40 for the bag mount is provided which is connected to frame 30 by means of a rod 39 (Fig. 2) which is preferably in an upright position.

Means upon the tiltable bag mount for co-operating with a forceful bag ejector to shift the mount an angular amount sufficient for bag discharge are provided consisting of, for example, a discharge arm 41 (Fig. 2) which functions as a cam to tilt said mount in collaboration with said ejector in a manner to appear hereinafter. Discharge arm 41 is preferably mounted, by means of a vertically adjustable connection 42, upon the upright arm 39.

Conventional means are shown in Fig. 2 for assisting in maintaining the frame 30 and weight 33 in vertical positions, and to prevent their free swinging, comprising a link 43 pivotally connected to weight 33 and to frame 30 at 43a and 43b respectively, and pivotally mounted at 43c upon a fixed base. Link 43 also acts to maintain tube 35 in proper spacial relation to the throat 25 during the relative motion of these parts.

Suitable means are provided for (1) controlling a clamp for holding a bag on the tube 35, (2) for governing material flow through the throat 25, and (3) for starting the operation of the bag ejector, all in response to weighing movement of the weighing device comprising, for example, in the form shown in Figs. 3, 4 and 5 a control linkage having a bell-crank lever 48 which is operatively associated with:

(1) A gate 50 for throat 25;

(2) A bag clamp 70;

(3) A bag ejector mechanism 79 (Figs. 6 to 10); and

(4) A power source controlled by a clutch 115A (Fig. 9) for energizing the bag ejector and adapted to move the bell-crank lever to an initial locked or latched position in a manner to be described hereinafter.

The bell-crank lever 48 is initially latched or locked in an upright position (Fig. 4) by suitable latch means after the bag is first inserted upon the tube 35. In this position the bag is empty

and therefore light in weight. Simultaneous with said locking in an upright position the feed gate 50 is opened, and the bag clamp is rendered effective to hold the bag on the tube 35. When the bag has reached the desired weight it counter-balances weight 33, and the bag frame and bag descend to release a bell-crank lever latch 64, 65 (Fig. 4) whereupon the lever 48 moves to a position shown in Fig. 5, and the gate 50 is immediately closed, the bag clamp 70 is lifted and the bag ejector is started in operation in a manner to appear later.

The bell-crank lever 48 has an upper arm 48a, a lower arm 48b, and is pivotally mounted at 49 upon a suitable fixed support 45 which does not participate in the movement of the weighing device. The fixed support 45, in the embodiment of Figs. 1, 3, 4 and 5, is in the form of a bracket mounted upon the fixed chute 23 by means of screws 47 and adapted for vertical adjustment by means of screw 46.

The bell-crank lever 48 is connected to the gate 50, for example, by means of a link 53 which is pivoted to the lower arm 48b and attached to the upper extremity of said gate. The latter may be slantingly mounted, as shown in Figs. 4 and 5, and is provided with an orifice 51 adapted for moving in and out of register with throat 25.

Gate 50 is at all times urged toward a closed position by means, for example, of a spring 52 which also urges, through link 53, the bell-crank lever 48 in a clockwise direction as viewed in Figs. 4 and 5.

A means for opening the gate 50, lowering clamp 70, and moving bell-crank lever 48 to an upright or latched position (Fig. 4) comprises a power transmission means, to appear later, which acts, for example, through a push-rod 54 to urge the lever 48 in a counter-clockwise direction against the action of spring 52. Push-rod 54 is pivotally connected to bell-crank lever 48 at 55. The latter pivotal connection is preferably in association with the lever 48 through the intermediary of a spring buffer 56 of conventional design, which is adapted to cushion the mutual thrusts of rod 54 and the lever 48.

When said rod 54 acts to thrust the lever 48 to the position shown in Fig. 4 wherein the gate 50 is open and the bag may be filled, suitable means must be provided for retaining the parts in this position during the filling operation. Such means, in the embodiment illustrated in Figs. 3, 4 and 5, are constituted by a latching device comprising a retaining arm 60 pivotally mounted (preferably adjacent the upper extremity of upper arm 48a) at 61 to bracket 45. Retaining arm 60 is adapted to contact the arm 48a through the intermediary of a roller 60a mounted, for example, adjacent the pivot 61 and capable of holding arm 48a in an upright position when arm 60 is latched as shown in Fig. 4. By means of a spring 62 the arm 60 is urged in a clockwise direction as viewed in Figs. 4 and 5. The spring is fixedly attached to bracket 45 by means of a pin 63. Roller 60a is also adapted for rolling contact with an upper surface 48c of lever arm 48a. Said upper surface preferably acts as a cam which, in cooperation with the roller 60a, is able to swing retaining arm 60 outwardly in a counter-clockwise direction, as viewed in Fig. 5, against the action of spring 62 when the retaining arm is unlatched in a manner to appear hereinafter.

The means for latching or locking the retaining arm 60 and lever 48 in an upright position are constituted, for example, by a spring loaded detent

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64 pivoted on the lower end of arm 60 at 65 which is adapted to cooperate with a latch 68. A spring 66 associated with detent 64 urges the latter downward.

The latch 68 is pivotally mounted upon the bag frame 30 by means of a bracket 67 and is yieldingly urged upwardly against a suitable limit stop by a spring 69. The detent 64 is thus relatively fixed because it does not participate in the descending movement of the weighing device, whereas the latch 68 does so participate and is therefore vertically movable.

The above-mentioned bag clamp 70 is operatively associated with the control linkages of Figs. 3, 4 and 5, for example, by means of an arm 72, which constitutes the upper portion of a clamp arm 70a. Arm 72 is pivoted at 71, and is provided at the extremity thereof with a roller 73 adapted to contact a cam 74 mounted upon bell-crank lever arm 48b, and to move in response to movements of the latter. When bell-crank lever 48 is in a latched or upright position, as shown in Fig. 4, the cam 74 is withdrawn from contact with roller 73 and the clamp 70 is thus free to move to a bag clamping position as illustrated in said Fig. 4 under the influence, for example, of a suitable spring (not shown). However, when the lever 48 is unlatched in response to weighing movement of the weighing device, that is, when latch 68 descends to a point out of contact with detent 64, then cam 74 engages roller 73 and through arm 72 moves clamp 70 out of clamping engagement with tube 35 (see Fig. 5).

Manually operable means are provided for initiating the operation of the filling and weighing apparatus which means are constituted, for example, by a starting handle 75 (Fig. 4) pivoted at 76 to bracket 45 and in pivotal connection at 78 with a clutch control rod 77 which is associated with a clutch in a manner to appear later.

Novel bag ejector or discharge means are provided which are governed by a timing device whereby a bag may be ejected from the apparatus a selectable time interval after the bag has been filled and the gate 50 has been closed. Such timing device is variously termed as a "timer," "time delay means," and "ejector delay means."

The novel means comprise in the form shown in Figs. 6, 7, 8 and 9, for example, a piston and fluid-filled cylinder mechanism wherein a piston and ejector rod attached thereto are effective to discharge the bag when urged toward one limit of their movement. The timing device may be constituted, for example, by a suitable fluid flow control means which is adapted to control the flow of a fluid in and from said cylinder when the piston is moved, in such a manner that the movement of the piston may be retarded by a selectable interval from the time that it is first actuated.

The bag ejector 79 as shown in the embodiment of Fig. 6 is constituted by an ejector cylinder 80 having a piston rod or ejector rod 81 to which is attached a piston 82. Cylinder 80 is mounted upon a suitable fixed frame 100 (Fig. 6) within a housing 110 (Fig. 1). Fixed upon the rod 81 in spaced relation to piston 82, is a timer sleeve 83 having perforations 83' in the web thereof for interconnecting opposite faces of the sleeve.

As above mentioned, the portion of the cylinder 80 which is to the right of piston 82, is filled with a suitable fluid, for example oil which acts as a retarding medium to the motion of the piston 82 in a well known manner. There are provided in cylinder 80 two openings for the passage of said fluid comprising, (1) a primary discharge orifice

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or timing outlet 87, which in the form shown, is disposed approximately centrally of said cylinder and (2) a secondary discharge orifice which is designated as a relief opening 99. A suitable annular discharge chamber 80a is provided having walls 80b, which chamber receives the fluid discharged from cylinder 80.

Suitable means are provided for governing the flow of fluid through the timing opening, said means being constituted in the form shown in Figs. 6 and 9 by a suitable needle valve 98.

It will be understood that the sleeve 83 constitutes a flow control means for the orifice 99. However, any other suitable means may be employed for closing orifice 99 during the initial part of the stroke of piston 82.

The ejector rod 81 and its piston 82 are at all times strongly urged toward one end of the cylinder 80, toward the right as viewed in Fig. 6, by means of, for example, a spring 84 mounted in a suitable recess adjacent one extremity of the cylinder 80. When the spring 84 is in an extended condition and the piston 82 and rod 81 are in the position shown in Fig. 6, the bag ejector is effective through the intermediary of a linkage to be described later to thrust the discharge arm 41 of the tiltable bag mount 36, in a clockwise direction as viewed in Fig. 6 to discharge or eject the bag.

On the extremity of ejector rod 81 opposite to that on which piston 82 is located, there is mounted a head 85 which serves the dual purpose of acting as a support for an ejector rod catch 91, and for a ram 88 which is pivotally mounted on said head at 86 and yieldingly urged against a limit stop 89 by means of a suitable spring 90. The latter engages an arm 87 of said ram. Ram 88 is yieldingly urged in such a manner in order to permit a return motion thereof to a latched position whereby the ram is yieldingly movable out of the path of an obstructing member which will appear more fully hereinafter. The ejector rod catch 91 is adapted for cooperating with an ejector rod latch 92 comprising, for example, a bell-crank lever which is pivoted at 107 on a suitable fixed portion of the frame 100. The ejector rod latch 92 is provided with a conventional spring loaded detent 93 at one extremity thereof adapted to contact and lock the catch 91.

The above described ejector rod latch mechanism is, of course, designed to retain the ejector rod and the piston attached thereto in such a position that the ejector spring 84 is held in a compressed condition.

The ejector rod 81 is released by a tripping of the latch 92 in response to a weighing movement of the weighing device transmitted through the linkage described in connection with Figs. 4 and 5, namely, the bell-crank lever 48, the push-rod 54 and suitable means mounted on said rod 54 comprising, for example, a roller 96 (Fig. 6). The latter is adapted to contact an extremity 95 of said latch 92 and to urge same in a counter-clockwise direction as viewed in Fig. 6 against the pressure of a spring 94 whereby the ejector rod catch 91 is released.

A suitable linkage for operatively connecting the ram 88 and said discharge arm 41 of the tiltable bag mount are provided comprising, for example, a ram arm 102 which is pivotally mounted at 103 upon a frame bracket 101 (Figs. 6 and 7). Arm 102 is provided with a suitable ram plate 104 thereon which is normally in the path of the ram 88. The ram arm 102 normally may hang as shown in dotted lines in Fig. 6 against a limit

stop 106 when the ejector rod is in a latched position and the spring 84 is compressed. When ram 88 is urged to the right by spring 84, it contacts the plate 104 and by means of the arm 102 thrusts the tiltable bag mount in a clockwise direction to discharge the bag.

The ram arm 102 may be provided with a roller 105 at the extremity thereof for reducing the friction between arms 102 and 41 during the bag ejecting action thereof.

Suitable means are provided for urging the bag ejector rod to a latched position as shown in Fig. 9, and for actuating the push-rod 54 whereby the control linkages shown in Figs. 3, 4 and 5 are also thrust to a latched position as shown in Fig. 4, comprising, for example, a drive shaft 111 which is drivably connected to the power shaft 27 by any suitable means such as a belt 112 upon pulleys 112a and 112b which in turn are mounted respectively upon shaft 111 and a countershaft 109. The latter may be drivably connected to the power shaft 27 by a belt 108 also upon suitable drive wheels on their respective shafts.

The drive shaft 111 is operatively connected to the bag ejector means for withdrawing same to a latched position, and to said push-rod 54 for thrusting the bell-crank lever 48 to a latched position, through the intermediary of a clutch 115A of conventional design to be herein described.

The above mentioned drive shaft 111 has thereupon a gear 113 which is in mesh with a gear 116, the latter comprising the driving member of said clutch 115A. The driving member 116 is brought into and out of a driving engagement with a suitable linkage for compressing the spring 84 and moving the arm 54 by means of a driven clutch member 115 which is adapted for movement into and out of engagement with the driving clutch member 116 as described below.

The driven clutch member 115 is mounted upon a driven shaft 114 which is parallel to the drive shaft 111. The clutch is opened and closed in a well known manner by angularly shifting a clutch pin 117. The latter opens the clutch when it is angularly shifted by a pin arm 118 which is fixedly mounted thereupon and which is yieldingly urged in a clockwise direction as shown in Fig. 9 by means of a suitable spring 136. The means provided for controlling the angular position of arm 118, and thus for controlling the engagement or disengagement of the clutch are constituted, in the form shown in Figs. 9 and 10, by a clutch control arm 119 which is pivotally mounted upon a shaft 119a, and which is positioned so as to be in the path of movement of the pin arm 118 as the latter rotates. Clutch control arm 119 is adapted for being angularly shifted upon the shaft 119a in such a manner as to release the arm 118 and thus cause engagement of the clutch.

The clutch control arm 119 is operatively associated with the above described starting handle 75 through the intermediary of a linkage consisting of an arm 120 attached to said shaft 119a and pivotally connected to rod 77 at 120a (Fig. 10).

As shown in Fig. 9, if the clutch control arm 119 is moved out of engagement with pin arm 118, the clutch will be closed and will remain closed during one revolution of the clutch until the clutch pin 118 is rotated back to its initial position and the pin arm 118 strikes the clutch control arm 119 to reopen the clutch.

The movement of the driven member 115 of the clutch is communicated to the bag ejector for withdrawing same to a latched or cocked position,

and such movement is also communicated to said push-rod 54 for actuating the feed gate and bag clamp linkages of Figs. 3, 4 and 5, by a suitable arm 129 (Figs. 6 and 8) operatively associated with driven shaft 114 and preferably mounted thereon. Arm 129 is provided at the extremity thereof with rollers 130 and 134 which are adapted for contacting respectively the bag ejector and the cocking or latching linkage, to be described later, and a push-rod lever 132 which is pivotally mounted at 133 upon the frame 100 and in pivotal connection with push-rod 54 at 132a (Figs. 6 and 8) in such a manner that a thrust upon push-rod lever 132 will axially shift the push-rod 54 and thereby communicate the thrust to the bell-crank lever 48 of the above-described feed gate and bag clamp control linkage.

The linkage for communicating the thrust of rotatable arm 129 to the bag ejector mechanism for cocking or latching the same comprises in the form shown in Figs. 6, 7 and 8 a bridle 126 having a cross pin 125 at one extremity thereof which is inserted through the head 85. The bridle 126 is in pivotal connection at the opposite extremity thereof with a forked lever 127 which is pivotally mounted upon the frame 100 at 128. The roller 130 of the rotatable arm 129 is thus adapted for contacting the forked lever 127 and as shown in Fig. 9, thrusting same to the left to compress the spring 84 and to latch the bag ejector in a manner which will appear more fully hereinafter.

The thrust of the driving mechanism is communicated through said rotatable arm 129 to the push-rod lever 132 during the rotation of the arm 129 by the action of the roller 134 contacting the under-surface of said push-rod lever 132.

A spring 135 (Fig. 6) is connected to a pin on arm 129 in order to keep the driven portion of the clutch from turning backward under the influence of spring 136 attached to pin arm 118, when the clutch is open. Spring 136 turns the clutch pin 117 to a clutch-closing position when the clutch control arm 119 is moved out of engagement with the arm 118.

A suitable casing 140 may be provided for surrounding the apparatus.

As above discussed, it is desirable to delay the ejection or discharge of a bag from this apparatus for a time sufficient to enable the dust laden air under pressure therein to be relieved or dissipated during the delay between the time the bag is filled and the instant of its ejection. This is to prevent the disadvantageous puff of dust or powdered material from the valve bag when it is discharged. Suitable means are provided for assisting in the dissipation of this air pressure which comprise in the form shown in Fig. 2, for example, a suction tube 141 having an outlet 141a. The latter is positioned in such a manner that it comes nearer to the filling tube 35 when it has descended under the influence of the weight of the material in the bag. The suction tube 141 may be connected to any suitable source of suction and is effective to collect or convey away the dust laden air or puff which issues from bag 142 through valve 143 due to the air pressure in the bag when the flow of material is shut off.

In operation, the feeder 22, propeller 26 and the drive shaft 111 rotate constantly. Material is thus discharged through the throat 25 of the filling tube 35 into a bag whenever the gate 50 is open.

Initially the gate control and the bag clamp linkage is in the position shown in Fig. 5 wherein

the gate 50 is closed and the bag clamp 70 is held in a disengaged position. The bag 142 is placed upon the saddle 36 and the valve 143 is inserted over the filling tube 35. The operator next thrusts the handle 75 upwardly thus communicating to the clutch control arm 119 a clockwise angular movement as viewed in Fig. 9 through the connecting linkage 120 and 119a. The clutch control arm 119 is thus moved out of engagement with the pin arm 118 whereupon the clutch is closed in a well known manner by the action of spring 136. Clutch control arm 119 returns to its initial position as soon as the pin arm 118 is clear and the handle 75 is released. The driven member 115 of the clutch is thus placed in operative engagement with the driving member 116 and the shaft 114 and the arm 129 are thus rotated in a clockwise direction as viewed in Fig. 6. The roller 134 (Fig. 8) upon the extremity of arm 129, is thus brought into contact with the under-surface of push-rod lever 132 and an upward thrust is communicated to the bell-crank lever 48 through the intermediary of the rod 54, and said bell-crank lever is angularly shifted to the position shown in Fig. 4, an upright position. In this position the retaining arm 60 swings to the left under influence of spring 62 and the detent 64 yieldably passes over latch 68 in response to springs 66 and 69. The angular movement of the bell-crank lever 48 to an upright position accomplishes simultaneously two results:

(1) The gate 50 is pulled against the action of the spring 52 to an open position whereby orifice 51 is in register with the throat 25; and

(2) The cam 74 which is mounted upon the lower arm 48b of lever 48 is withdrawn from engagement with roller 73 of the bag clamp arm 72 and thus the bag clamp is urged to a closed position as shown in Fig. 4 whereby the bag is clamped to the filling tube 35.

Material is then forced into the bag as above discussed through the throat 25 and filling tube 35.

While the bag is being filled, the arm 129 continues to rotate in a clockwise direction (Figs. 6 and 9) and the roller 130 will very shortly contact the forked lever 127 to withdraw the bag ejector mechanism from its extended position as shown in Fig. 6 to a cocked or latched position as shown in Fig. 9 whereby the spring 84 is compressed. During the course of the latching of the bag ejector mechanism, the ram 88 will contact the rear of the ram plate 104 which is in a position at rest against the limit stop 106. The ram 88 will move yieldingly under the action of spring 90 to clear said ram plate 104 and will thereafter snap back into its normal position as shown in Fig. 6. The bag ejector catch 91 thereafter contacts the latch 92 and moves past the spring loaded detent 93 to a latched position as shown in Fig. 9.

Thereafter the clutch mechanism will continue to rotate until pin arm 118 once more engages the clutch control arm 119, thereby opening the clutch and arresting the movement of the rotatable arm 129 substantially in the position shown in Fig. 6.

The rotation of the arm 129 is accomplished in a short interval of time during the course of the filling of the bag.

When the bag is filled, the weight of the material therein causes a weighing movement of the weighing device whereby the bag and contents balance with the weight 33. Consequently,

there is a descending movement, as viewed in Fig. 4, of the bag frame 30 and of the latch 68 which becomes disengaged from detent 64. The retaining arm 60 is thus released, and under the influence of spring 52, the bell-crank lever 48 is immediately pulled to the position shown in Fig. 5 through the intermediary of the gate 50 which is simultaneously closed. When bell-crank lever 48 is thus released, the upper surface of arm 48a engages the roller 60a and is effective by the cam action thereof to thrust the retaining arm 60 to the position shown in Fig. 5 against the action of spring 62 attached to the arm 60.

Simultaneously with the closing of the gate, the cam 74 (Fig. 5) is brought into engagement with the bag clamp roller 73 and the bag clamp 70 is lifted by means of the arm 72.

Simultaneously with the closing of the gate and the lifting of the bag clamp, the bag ejector mechanism is released. This is accomplished by means of the resulting downward thrust of arm 54 which occurs when the bell-crank lever 48 attached thereto moves to a tilted position. The roller 96 on the rod 54 is thrust against the upper arm 95 of latch 92 thereby lifting the latch in a counter-clockwise direction and releasing the bag ejector rod.

The bag ejector rod is forcefully thrust to the right, as shown in Fig. 6, under the influence of spring 84. As shown in Fig. 9 during the initial portion of the movement of the bag ejector rod and the piston and sleeve mounted thereupon, the only orifice for the escape of fluid from in front of the piston 82 is the restricted orifice 97 controlled by the needle valve 98. During the interval that the sleeve 83 covers the relief orifice 99 the movement of ejector rod 81 will be retarded. Of course, fluid will flow through the small perforations 83' interconnecting the opposite faces of the timer sleeve 83.

However, after the sleeve 83 passes the relief orifice 99 the movement of the ejector rod 81 will be relatively unrestricted and will be at a rapid rate compared to the rate of its initial movement. The period of time for the ejector rod to move from its latched position as shown in Fig. 9 to its extended position as shown in Fig. 6 is, of course, a function of the size of the orifice 97 which is variable by the adjustable needle valve 98. During this delay the dust laden excess air contained in the bag spurts out of the valve and is conveyed away through the tube 141 which is now substantially in register with spout 35. Excess air pressure in the bag thus is dissipated harmlessly.

After relief valve 99 is opened the ejector rod 81 moves rapidly to the right and the ram 88 strikes the ram plate 104 and by means of ram arm 102 tilts the bag saddle 36 with the cooperation of arm 41 whereby the bag is immediately ejected.

The ejector rod remains in its extended position until the above described cycle is repeated and the arm 129 withdraws it to a latched position.

While the invention has been described with respect to a preferred embodiment, it will be understood by those skilled in the art after understanding the invention that various changes and modifications may be made without departing from the spirit and scope of the invention, and it is intended therefore in the appended claims to cover all such changes and modifications.

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

1. In apparatus for filling valve bags comprising a scale beam, a spout mounted on the load end of the scale beam and adapted to enter the valve of a bag, means to feed material to and through the spout, and means operative immediately upon the lowering of the load end of the beam to stop the feed of material to the bag, a cylinder and piston, a spring urging the piston towards one end of the cylinder, an adjustable passage governing the escape of fluid from in front of the piston when the piston is moved by the spring, a latch holding the piston against movement responsive to the spring, connections releasing the latch upon the lowering of the load end of the beam, and means operated by the movement of said piston to discharge the filled bag from the spout.

2. In apparatus for filling valve bags comprising a scale beam, a spout mounted on the load end of the beam and adapted to enter the valve of a bag, means to feed material to and through said spout, and means operative immediately upon the lowering of the spout to stop the flow of material from said feeding means, a timer comprising a piston and a cylinder having an adjustable restricted outlet for fluid on one side of the piston, a spring tending to force the piston towards said side, a latch holding the piston against movement, means releasing the latch upon the lowering of the load end of the beam, means pressable against a filled bag below the spout for forcing the bag from the spout after said piston has been moved a predetermined distance by said spring, and mechanical connections rendering the movement of the last said means responsive to the movement of the piston.

3. Apparatus for filling valve bags comprising a scale beam, a bag support mounted on the load end of the beam and comprising a spout adapted to enter the valve of a bag, a housing having a discharge opening normally in line with the spout, means to drive powdered material and air from the housing through the opening and spout into a bag thereon, a gate for the opening, a spring urging the gate toward closing position, mechanical means for opening the gate, a latch for holding the gate open, means releasing the latch when the load end of the beam descends in response to a charge in a bag on the support, a clamp for clamping a bag on the spout, means connected to the gate and releasing the clamp when the gate is closed, a spring operated pusher for discharging a filled bag, mechanical means for compressing the last said spring and a latch for holding it compressed, means connected with the gate for releasing the latch when the gate is closed, and timing means connected with the pusher for delaying the effective discharging action of the pusher for a predetermined interval after the gate is closed before the bag is discharged.

4. In an apparatus for filling valve bags: feed mechanism including a spout and power actuated means, for filling a bag; a displaceable weighing device, including means for supporting a bag in filling relation to said spout, said device being adapted for undergoing weighing movement in response to the filling of the bag with a preselected weight of material; manually operable mechanism for controlling said feed mechanism; feed shut-off mechanism responsive to weighing movement of said weighing device for arresting the filling of the bag; a bag ejector; and a

timer operatively connected to said weighing device and rendered operative in response to weighing movement thereof, said timer also being operatively connected to said bag ejector for actuating the latter after the expiration of an interval commencing at the arresting of the filling of the bag, said interval being sufficient to permit dissipation of air pressure within the bag substantially to atmospheric pressure, whereby a blow-off of dust laden air from the bag is substantially prevented when the bag is ejected from the apparatus.

5. Apparatus for filling a valve bag comprising in combination: a filling tube for receiving a bag to be filled; a weighing device for said bag, including a support for holding the bag in filling relation to said tube, said device being adapted for undergoing weighing displacement upon the filling of the bag with a preselected weight of material; a power actuated feed mechanism for injecting material through said tube and into the bag; a gate for shutting off a flow of material to the bag in response to weighing movement of said weighing device; a chamber for receiving air blown from said bag through said tube after the closing of said gate, said tube and chamber being adapted for moving into communication in response to weighing movement of the weighing device; a bag ejector; a bag ejector control mechanism operatively connected to said weighing device, said control mechanism including a timer for actuating said bag ejector, the timer being so constructed and arranged that the control cycle thereof is initiated by said weighing movement and the ejection of the bag is postponed until the expiration of a time interval commencing at the closing of said gate, the interval being sufficient to permit dissipation of air pressure within the bag substantially to atmospheric pressure.

6. In an apparatus for filling bags: feed mechanism including a spout and power actuated means, for filling a bag; a displaceable weighing device, including means for supporting a bag in filling relation to said spout, said weighing device undergoing weighing displacement in response to a filling of the bag with a preselected weight of material; means responsive to weighing displacement of said device for arresting the filling of the bag; a bag ejector; a timer operatively connected to said weighing device and rendered operative by weighing movement thereof; and mechanism for operatively connecting said timer to said bag ejector for actuating the latter after the expiration of an interval commencing at the arresting of the feed to the bag, said interval being sufficient to permit reduction of air pressure within the bag substantially to atmospheric pressure, whereby a blow-off of dust laden air from said bag is substantially prevented when the bag is ejected by said ejector.

7. In apparatus for filling valve bags comprising a weighing device, a spout mounted upon the weighing device and adapted to enter the valve of a bag, means to feed material through the spout into a bag thereon, means rendered operative by weighing movement of the weighing device for stopping the feed of material, and automatic means for discharging the bag from the spout, an adjustable timer including means for operatively connecting same with said feed stopping means and said automatic means for determining the interval between the stopping of the feed and the discharge of the bag.

8. In a valve bag filling apparatus comprising a filling spout adapted to enter the valve of a

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bag, a gate for shutting off the flow of material through the spout, an automatic means for discharging a filled bag, and an adjustable timer including means for operatively associating same with said gate and said automatic means and actuable in response to the closing of said gate for postponing the effective action of the automatic means and determining the interval between the shutting of the gate and the discharge of the bag.

9. In a valve bag filling and weighing apparatus comprising a filling spout adapted to enter the valve of a bag, a weighing device for weighing a bag being filled through the spout, a gate for shutting off the flow of material through the spout, means controlled by the weighing device for closing the gate, and an automatic bag discharging means, an adjustable timer including means for operatively connecting same to said gate and to said automatic discharging means for delaying the effective action of said discharging means and determining the interval between the stopping of the feed and the discharge of the bag.

10. Apparatus in accordance with claim 9 and in which the gate is closed by a spring and is held open by a latch which is released by the action of the weighing device.

11. Apparatus for filling valve bags comprising a spout adapted to enter the valve of a bag, means to drive material through the spout into the bag, means to clamp the bag on the spout during filling, means to stop the drive of material through the spout when the bag is filled, means to release the clamp simultaneously with said stopping, automatic means for discharging the filled bag from the spout, and an adjustable timer

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including means for operatively connecting same to said means for stopping the drive of material to the spout and to said automatic means for postponing the discharge action of said automatic means and thereby determining the interval between the release of the clamp and the discharge of the bag.

12. Apparatus for filling valve bags, comprising a spout adapted to enter the valve of a bag, means to forcibly feed powdered material and air through the spout into the bag, means to stop the feed when a charge has been filled into the bag, automatic means to discharge the filled bag from the spout, and a timer including means for operatively associating same with said feed stopping means and said automatic means and actuable when the feed is stopped by said stopping means for delaying the action of said automatic means and for determining the interval between the stopping of the feed and the discharge of the bag, whereby the air pressure in the bag may return to substantially atmospheric before the bag is discharged.

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