April 25, 1939. J. J. NEUMAN ET AL 2,156,224

BAG FILLING DEVICE

Original Filed Aug. 5, 1937 3 Sheets-Sheet 1

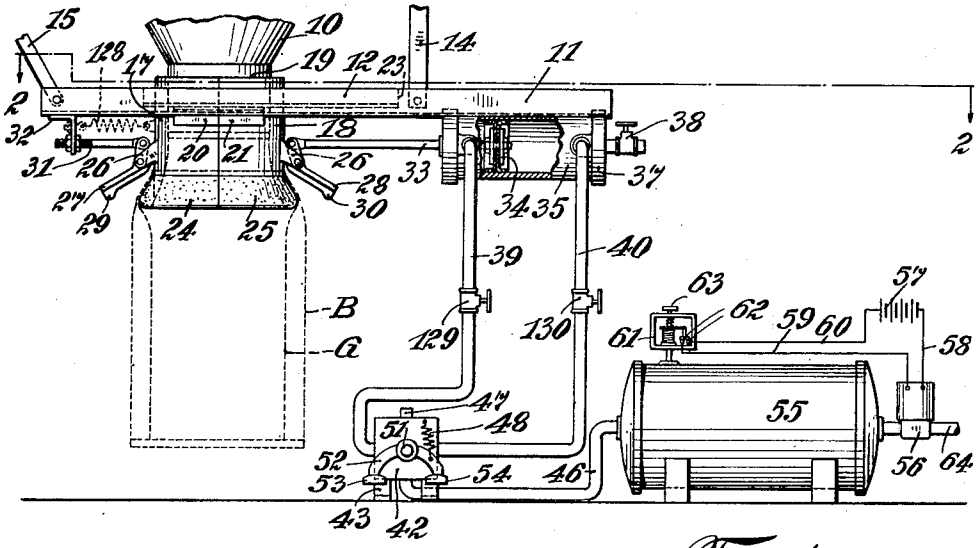


Fig. 1.

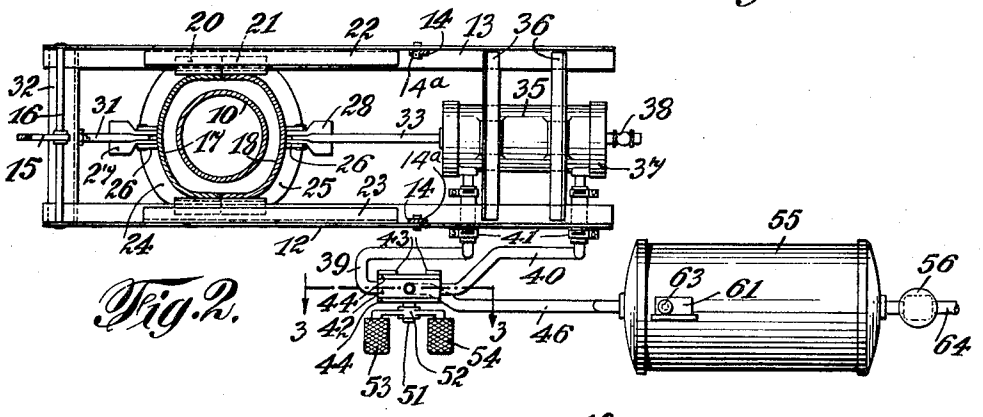


Fig. 2.

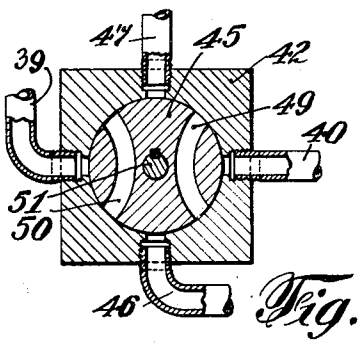


Fig. 3.

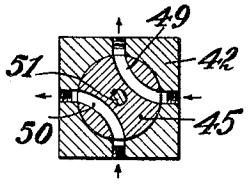


Fig. 4.

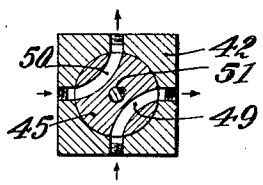


Fig. 5.

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Original Filed Aug. 5, 1937 3 Sheets-Sheet 2

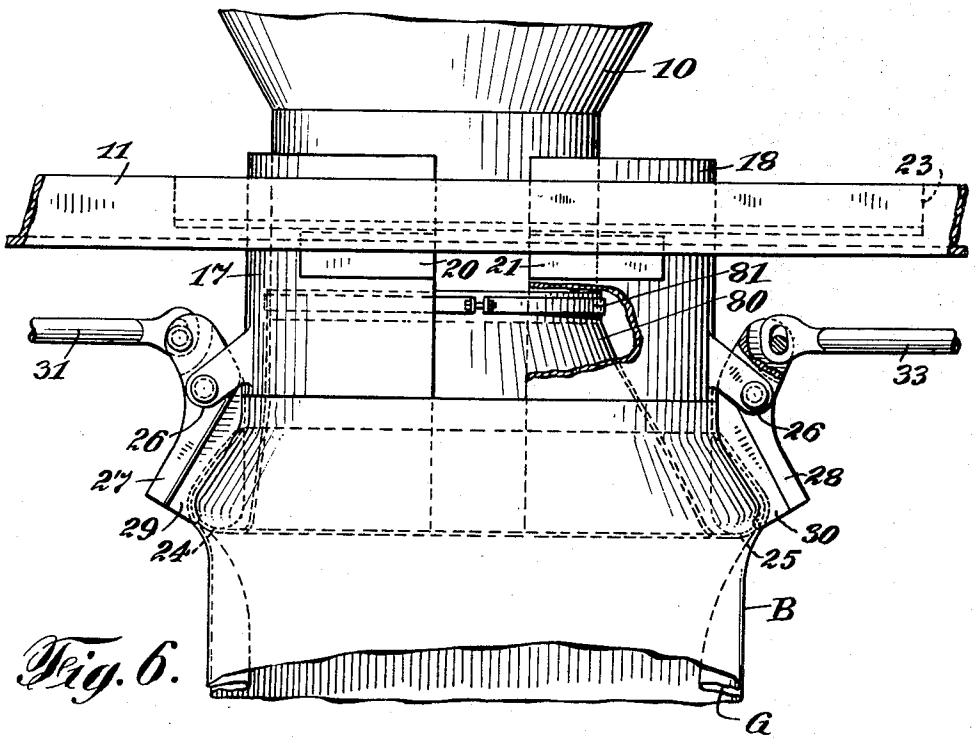


Fig. 6.

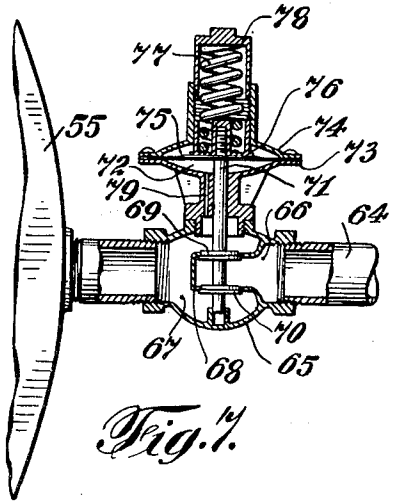


Fig. 7.

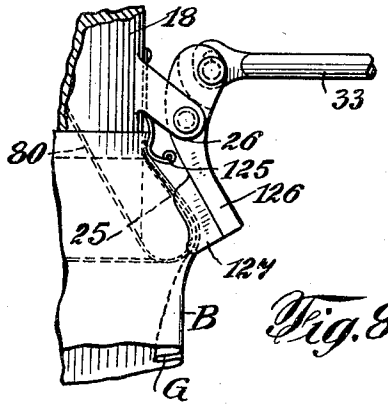


Fig. 8.

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BAG FILLING DEVICE

Original Filed Aug. 5, 1937 3 Sheets-Sheet 3

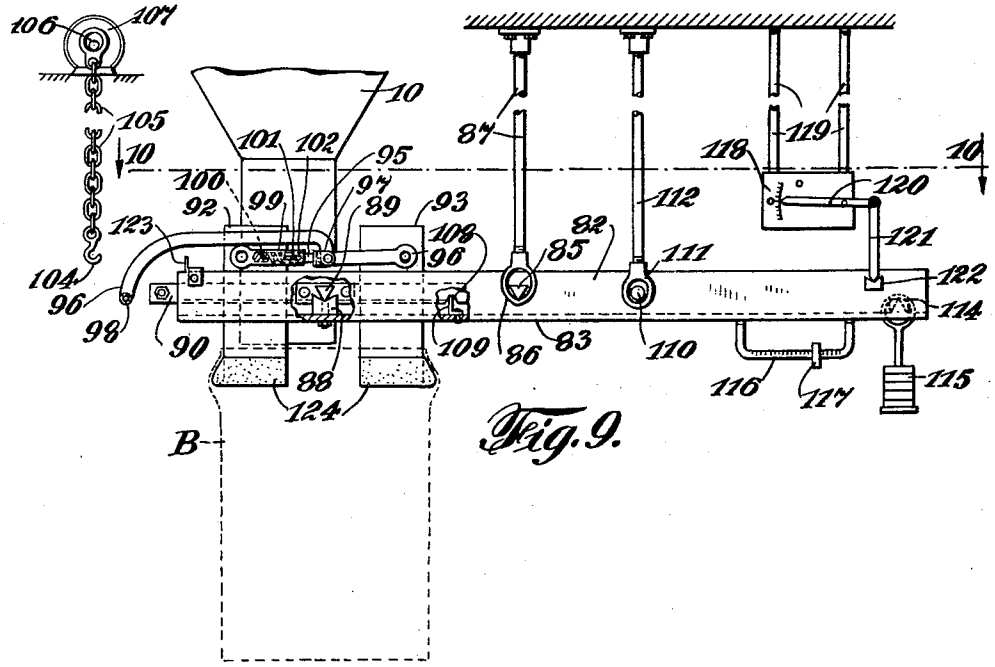


Fig. 9.

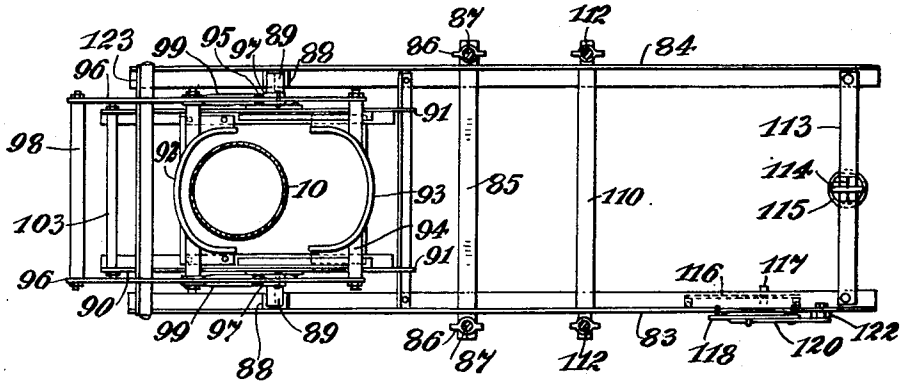


Fig. 10.

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2,156,224

UNITED STATES PATENT OFFICE

2,156,224

BAG FILLING DEVICE

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Original application August 5, 1937, Serial No. 157,480. Divided and this application December 23, 1937, Serial No. 181,326

6 Claims. (Cl. 226—59)

This invention relates to automatic packing and weighing apparatus, and is an improvement over the bag-holding means embodied in U. S. Patent No. 1,823,283. This application is a division of our pending application Ser. No. 157,480 of Aug. 5, 1937.

It is one of the objects of our invention to provide a simple, reliable, and yet quick acting means for firmly holding a flexible container wall at the open end thereof in an expanded condition for the feeding of the material into the container, and also to provide means for vibrating the container or shaking the same and its contents for the purpose of compacting the material during the filling operation subsequent to removal from the filling means.

In the past considerable difficulty has been experienced in quickly forming the mouth of a flexible container for sewing or other sealing operation subsequent to the filling operation due to the distended condition of the filled container. It is therefore an additional object of the invention to provide means for firmly holding the open mouth of the container in such a position during the filling operation that a predetermined amount of material may be received in a container of minimum size and still leave slack at the open end to permit forming of the mouth thereof for the sealing operation in a minimum period of time.

Another object of our invention is to provide means whereby flexible containers of varying sizes may be automatically held with a predetermined uniform pressure regardless of the size thereof, thus preventing the rupturing of the material of a small container or the holding of a large container with insufficient pressure to permit the vibrating thereof.

With the foregoing and other objects in view, the invention will be more fully described hereinafter, and will be more particularly pointed out in the claims appended hereto.

Similar characters of reference refer to similar parts throughout the several views.

In the accompanying drawings:

Figure 1 is a fragmentary side element of a portion of the bag filling machine having a bag holding and operating means therefor;

Figure 2 is a sectional view taken on the line 2—2 of Figure 1;

Figure 3 is a vertical section taken on the line 3—3 of Fig. 2 showing the arrangement of the air passages in the air control valve;

Figure 4 is a diagrammatic view of the air control valve showing the direction of the flow of air when the left hand pedal, shown in Fig. 2, is depressed;

Figure 5 is a view similar to Fig. 4 showing the direction of the flow of air when the right hand pedal shown in Fig. 2, is depressed;

Figure 6 is an enlarged detail side elevation, partly cut away, of the bag holding means showing a bag in applied position;

Figure 7 is a sectional view of an alternate embodiment of the means for regulating pressure in the air supply tank illustrated in Fig. 1;

Figure 8 is a fragmentary side elevation showing an alternate embodiment of the means for clamping the container to the bag holding means.

Figure 9 is a detail side elevation partly cut away, and showing another embodiment of the invention with means for weighing; and an arrangement for manual operation of the holding means; and

Figure 10 is a horizontal section taken on the line 10—10 of Fig. 9.

Referring to the drawings, and more particularly to Figs. 1 to 6, a suitable hopper designated by the reference character 10 receives a commodity of a granulated or comminuted nature and feeds it into flexible containers such as bags or sacks one of which is indicated in dotted lines at B in Fig. 1. A horizontally positioned frame 11 having opposite side members 12 and 13, is fulcrumed at 14a to the vertically disposed bars 14, which are suitably fixed at their upper ends to ceiling beams or similar stationary structure. At the end of frame 11, cross bar 16 extends between the side members 12 and 13 of the frame 11. To the bar 16, there is fulcrumed a rod 15. The upper end of the rod 15 is fastened to a suitable means for vertically oscillating the frame 11. Means for this purpose are shown and described in the above identified patent, and form no part of this invention.

Halves 17 and 18 of a split sleeve, generally designated by the numeral 19, comprise a channel or duct through which material passes from the hopper structure 10 to the container B, said hopper structure being positioned above and extending into the split sleeve 19. The halves 17 and 18 of the split sleeve 19 form the bag supporting and expanding structure and have shoes or side plates 20 and 21 secured thereto, said shoes engaging for longitudinal motion thereon, auxiliary side members 22 and 23 which form a guide or channel and are suitably fastened to the side members 12 and 13. At the lower extremities of the members 17 and 18 there are secured yieldable beadings comprising the bodies 24 and 25.

The hopper 10 has a flexible rubber tube 80 clamped about its lower extremity by a suitable means such as the strap 81. The lower edge of the tube 80 is turned up around the beading 24 and 25 at the lower portion of the split sleeve 19 and suitably secured thereto as by cement or other adhesive to form an air tight joint. Due to its flexible nature, the tube 80 is adapted to stretch when the halves of the split sleeve 19 are separated to clamp a container thereon and forms an air tight yet flexible connection or duct between the hopper 10 and the container B and thereby prevents the loss of any material. This is especially advantageous in the handling of finely divided material such as powdered sugar, flour, or cement.

Fulcrumed between the lugs 26 of the members 17 and 18 are the sack clamping members 27 and 28 having secured thereto the yieldable cushion portions or pads 29 and 30. The sack clamping member 27 is pin connected at its upper extremity to the rod 31, the opposite end of which is adjustably secured to the transverse cross member 32 of the frame 11. The sack clamping member 28 is pin connected to the rod 33, the opposite end of said rod 33 being connected to the reciprocating piston 34 in the cylinder 35. The cylinder 35 is supported by the transverse members 36 extending across the frame members 12 and 13 and secured thereto. In the head 37 of the air cylinder 35 is a needle valve 38, which forms an adjustment for the speed of action of the piston 34 by controlling the back pressure in the cylinder 35.

Pressure fluid is admitted to either side of the piston 34 in the cylinder 35 by means of the pipes 39 and 40 having suitable flexible connections interposed therein, such as the hose connections 41 in Fig. 2, to permit oscillation of the frame 11. The pipes 39 and 40 have valves 129 and 130 to control the flow of pressure fluid to the cylinder 35 and may be of any suitable type, their purpose being to form a means of adjusting the speed of action of the piston 34 in said cylinder 35. The pipes 39 and 40 are connected to the valve 42 which is of a suitable type and in this case is mounted on the floor level by means of the brackets 43 and is designed to be actuated by the operator's foot. The valve embodiment 42 consists of a casing with the plates 44 bolted thereto. The cylinder 45, Figs. 3 to 5, fitting in the casing, is adapted to move about its axis, and said casing 42 has four openings spaced substantially 90° apart about the circumference of the cylinder 45, said openings communicating with the pipes 39, 40, 46 and the exhaust port 47. The cylinder 45 has the passages 49 and 50 opening at points substantially 90° apart on the circumference thereof, which are adapted to be brought in line with openings in the casing 42 connecting to pipes 39, 40, 46 and 47, thereby serving to direct the flow of pressure fluid in said pipes. The cylinder 45 is mounted on the shaft 51 which projects through one of the plates 44 and has an arm 52 which carries the foot pedals 53 keyed thereto. A suitable tension spring such as spring 48 is fastened at the upper end thereof to plate 44 and at its lower extremity to the arm 52 and serves to return the arm 52 and pedals 53 and 54 to the position shown in Fig. 1, turning the cylinder 45 with the passages 49 and 50 to the neutral position shown in Fig. 3. Pipe 46 connects valve 42 with the storage tank 55 which may be of any suitable type. The tank 55 has a pressure regulating means which in the embodiment shown in Fig. 1, has the valve 56 electrically operated by means of the battery 57, or other convenient source of electrical energy, transmitted through the conductors 58, 59, and 60 and controlled by the pressure switch 61 which may be of any suitable type, being designed to open the set of contacts 62 and thus interrupt the flow of current to the solenoid valve 56 (not shown in detail), when the fluid pressure in the tank 55 reaches a predetermined value. This is set by the adjusting knob 63 thus permitting the valve 56 to close and shut off the flow of fluid through the pipe 64 to the tank 55.

In Figure 1, a tension spring 128 shown in dotted lines, has one end secured to the bag-holding member 17 and the opposite end secured to the cross member 32 of the frame 11. The purpose of this spring 128 is to effect a quick release of the sack clamping member 27. When this spring 128 is not used it is necessary that the holding member 18 be entirely closed against the holding member 17 before the sack clamping member 27 will be released, whereas where the spring 128 is used it will move the holding member 17 to the left and release the clamping member 27 as soon as the tension on the container B is released. When filling large containers, the spring 128 is not necessary as the weight of the filled container will be sufficient to release it.

In Fig. 7 of the drawings, I have shown an alternate form of the means for regulating the pressure in the tank 55. Thus in lieu of the electrically operated solenoid valve 56 and the pressure switch 61, a mechanical pressure regulating valve may be interposed in the pipe 64 in place of said valve 56. The embodiment shown consists of the casing 65 having the chamber 66 communicating with the supply pipe 64 and the chamber 67 connected with the tank 55, said chambers 66 and 67 being separated by a partition 68 having two ports adapted to be closed by the valve discs 69 and 70 carried by the stem 71. These are so disposed that the pressure fluid in the chamber 66 acts to force the disc 70 downward with the same pressure acting to force the disc 69 upward thus balancing these forces and offering no restraint to either opening or closing of the valve due to the said forces. The stem 71 extends upward into the bonnet or chamber 72, formed by the casing 73 and the cap 74, and is secured to the center of the diaphragm 75 by the nut 76. The diaphragm 75 is clamped between the casing 73 and the cap 74 and is restrained from upward motion by the spring 77 which is in turn restrained at the upper end thereof by the adjustable part 78 of the cap 74, which is adapted to be screwed down into the cap 74 to increase the compression of said spring 77. The lower side of the diaphragm 75 is adapted to be acted upon by pressure fluid in the chamber 67 through the passage 79 in the valve casing 73.

In Figure 8, there is shown another embodiment of the sack clamping member in which the numeral 126 designates a sack clamping member of somewhat different shape than the sack clamping members 27 and 28. The yieldable pad 127 is smaller than the pads 29 and 30 and engages with the bag over the beading 25 only. A flat spring 125 is secured to the sack holding member 18 and extends down from between the lugs 26, the purpose of said spring 125 being to form a means to hold the container in position on the holding member 18 prior to the operation of the clamping member 126 by the actuating mechanism.

In Figs. 9 and 10, a substantially horizontal

frame 82 is fulcrumed at its opposite side members 83 and 84 by the bar 85 having the ends thereof V shaped to form a knife edge support for said frame 82 upon the rings 86 which are supported by the rods 87 from ceiling beams or other suitable stationary superposed structure. Blocks 88 of the frame 82 having V shaped recesses therein, are rigidly fastened in transverse alignment, one to each of the side frame members 83 and 84 and are adapted to support the bag holding and expanding means, by the knife edges 89 carried by the auxiliary frame 90. The auxiliary frame 90 is composed of two short longitudinally disposed side members 91 to which one-half designated by reference character 92, is rigidly fastened and upon which the other half designated 93 of the hollow sleeve is adapted to slide in a longitudinal direction. The bag holding members 92 and 93 have the bosses 94 appended thereto, to which the levers 95 and the levers 96 are pivotally secured, the levers 95 having the clevices 97 which are pivotally connected to the levers 96. The levers 96 are connected by the rod 98 at their outer extremities, said rod 98 being adapted to be raised and lowered by the operator to thereby move the half 93 of the sleeve towards or away from the other half of the sleeve 92. The levers 95 are composed of hollow sections 99 into which the parts carrying the clevices 97 are adapted to slide, compression springs 100 being carried in said hollow parts 99 which tend to yieldably urge the clevis parts 97 out of said hollow parts 99, said clevis parts 97 being limited in their motion relative to the hollow parts 99 by the pins 101 operating in slots 102. At one end of the auxiliary frame 90, the side members 91 thereof are spaced apart by the rod 103, which is adapted to be raised and hooked to the shaking means. This shaking means comprises the hook 104, the chain 105, the eccentric cam 106 and the motor 107. The side members 91 of said frame 90 have notches 108 adapted to engage the transverse member 109 of the main frame 82, when the rod 103 is hooked to said chain 105 during the shaking operation. The cross member 123 of the main frame 82 forms a stop for the opposite end of the auxiliary frame 90. The main frame 82 has the transverse rod 110 fitting in the side members 83 and 84, and extending through the slots 111 at the lower ends of the vertical rods 112, said rods 112 being fastened to ceiling beams or other suitable stationary structure. The slots 111 thereby limit the motion of the frame 82 about its fulcrum 85. The frame 82 has at the opposite end from the bag supporting mechanism, a transverse cross member 113 with the knife edge section 114 supporting the weights 115 which may be varied at will, and in addition the side member 83, has the graduated bar 116 fastened thereto, with the weight 117 slidably mounted thereon. A suitable dial 118 is supported from ceiling beams by the members 119 and has the pointer 120 pivoted thereto and linked to the frame 82 by the member 121 which rests in the V block 122 fastened to the side member 83 of said frame 82.

In the use of the embodiment of this bag filling equipment as shown in Figs. 1 to 6, the mount of the bag B is disposed about the holders 17 and 18 when they are in an initially contracted position as shown in Fig. 1, the gussets indicated by the dotted lines G being folded against the side wall of the bag B at the upper edge thereof. The surfaces of the pads 29 and 30 are so shaped at the upper portion thereof, that they are in close proximity to the holders 24 and 25 thereby enabling the operator to insert the folded gussets of the empty bag between the yieldable pads 29 and 30 and the sides of the holder 24 and 25, the said pads then serving to support the weight of the empty container B without further aid from the operator. This function may also be performed by the springs 125, as shown in Fig. 8. With the bag B now in position on the holders 17 and 18, the operator then presses the pedal 53, as will be seen in Fig. 2, thus admitting pressure fluid from tank 55 through the pipe 46 through the passage 50 of the valve 42, as shown in Fig. 4, to the pipe 39 and the cylinder 35, where it expands and moves the piston 34 to the right, the air on the opposite side of the piston 34 escaping through the pipe 40 and the passage 49 of the valve 42 and the pipe 47 to the atmosphere. As the piston 34 and the rod 33 move to the right, the clamp 28 is turned about its pivot until the pad 30 is brought to a stop against the side of the bag B clamping it against the side of the holder 18. The rod 33 continues to move, sliding the holder 18 along the members 12 and 13 until the slack in the bag B is taken up. The bag B then pulls the holder 17 to the right which causes the clamp 27 to move about its pivot and clamp the bag B against the holder 17. Since the rod 31 is fastened to the stationary cross member 32, the piston 34 can move no further and is brought to a stop holding the bag B under tension. Since the pressure in tank 55 is maintained at a predetermined constant value by the pressure switch 61, the pressure in the cylinder 34 is the same, and bag B is always held under the same tension for a given setting of the knob 63 of the pressure switch 61.

It is necessary that the tension with which the container B is held on the holders 17 and 18 be sufficient to prevent it from slipping off said holders 17 and 18 due to the weight of the said container B when filled, and also due to the oscillation thereof by the shaking means, and yet the tension must not be so great that the material of the container B is ruptured. That the container B will be held with a predetermined force regardless of the size thereof is insured by the use of the pressure regulating means in combination with the cylinder 35, as an operating means. Once that the pressure in the tank 55 is set at the correct value by means of the adjusting screw 63 or 78, the force due to pressure fluid acting on the piston 34 will remain constant regardless of the variations of the position, due to change in bag size, at which the piston 34 is brought to a stop. This is an important advantage since containers which are ostensibly of a uniform size will nevertheless be found to vary somewhat and although a means may be provided for making adjustments for variations in bag size it is obviously not practical to adjust the machine for all these small variations which nevertheless are an important factor especially in the filling of paper containers which are relatively non-yielding in nature.

Material is now fed into the container B and the shaking means is started in order to oscillate the frame 11 during the filling operation. When the proper amount of material has been fed into the container B, the feed is cut off and the shaking means stopped. The operator then presses the pedal 54 (Fig. 2) which turns the cylinder 45 of the valve 42 into the position shown in Fig. 5, thus bringing the passage 49 in line with pipes 46 and 40. This admits air to the right side of the piston 34 and moves the half 18 against the half

17 turning the clamps 27 and 28 to their initial positions and releasing the bag B therefrom. A means such as the spring 48 returns the valve 42 to the neutral position, as shown in Fig. 3, when the operator removes his foot from the pedal and the air pressure in the cylinder is released through the needle valve 38.

In the use of the embodiments shown in Figs. 9 and 10, the mouth of the bag B is disposed about the lower part of the holders 92 and 93 in their initially contracted condition, and the handle 98 is lowered to move the holder 93 away from the holder 92 thus placing the mouth of the bag under tension, the beading 124 frictionally engaging the material of the bag B, and supporting it upon said holders 92 and 93 in a position to be filled. Material is now fed into the bag B from the hopper structure 10 disposed above, it being advantageous to first feed the greater portion into the bag rapidly and then add additional material in small amounts until the scale is balanced as indicated by the pointer 120 on the dial 118, the weights 115 and the weight 117 having been adjusted to the predetermined setting desired. The operator now raises the bar 103 of the auxiliary frame 90 and hooks it to the chain 105 of the shaker motor 107. The first effect of raising the bar 103 is to tilt the auxiliary frame 90 until the base of the notches 108 is brought to bear upon the cross member 109 of the frame 82. Upon further upward movement of the bar 103, the knife edges of the auxiliary frame are raised off the V blocks 88 of the main frame 82, and the side members 91 of the auxiliary frame 90 are brought to bear against the cross member 123 at the left end of the main frame 82. Since the chain 105 is of such a length that still further movement is required before the bar 103 may be hooked thereon, the main frame 82 is tilted until the bar 110 is brought to bear upon the base of the slots 111, the frame 82 now being supported by the rods 112, the knife edges of the bar 85 being lifted clear of the rings 86, thus permitting the frame 82 to be oscillated by the shaker motor 107 without injury to the knife edges 85 and 89, or their supports 86 and 88.

When the bag has been shaken for a sufficient length of time the motor 107 is stopped, the handle 98 is raised and the holder 93 is moved towards the holder 92, thereby the bag B is released.

Among the essentials of the invention are: the constant pressure feature permitting bags to be held with a readily adjustable predetermined uniform tension regardless of the size thereof; the arrangement of the arms 27 and 28 to clamp the gussets in folded condition; the operation of said clamping arms 27 and 28 and holding members 17 and 18 to hold the bag inside and outside; the sealing holder device with the rubber tube 80; the raising of the knife edges 85 and 89 off the supports so that scales may be oscillated; the manual method of operating the bag holder; the compensating of the manual holder for the size of the bag by the springs 100; the springs 125 for holding the empty bag when first applied to the holder; and the spring 128 for effecting quick release of bag B when desired.

It is obvious that various changes and modifications may be made in the details of construction and the method of use of the above described embodiment of our invention without departing from the spirit thereof, such changes and modifications being restricted only by the scope of the following claims:

We claim:

1. A bag filling machine comprising relatively movable members, beadings on said members, a hopper within said members, and an elastic apron secured to said hopper and extending over said beadings.

2. A bag filling machine comprising movable members, beadings on said members, a hopper within said members, an elastic apron secured to said hopper and extending over said beadings, and yieldable clamping means by which a bag is secured to said covered beadings.

3. A bag filling machine comprising movable members, beadings on said members, a hopper within said members, an elastic apron secured to said hopper and extending over said beadings, and clamping means securing a bag to said covered beadings, said clamping means acting upon the gussets of the bag so held.

4. A bag filling machine comprising movable members, beadings on said members, a hopper within said members, an elastic apron secured to said hopper and extending over said beadings, and resilient means for holding a bag to said apron covered beadings.

5. A bag filling machine comprising a pair of members one of which is movable with respect to the other, feeding means within said members, an elastic apron secured to said feeding means and extending over said members, and means by which a bag is secured to said apron covered members.

6. A bag filling machine comprising feeding means, relatively movable members capable of vertical and horizontal movement with respect to the feeding means, said members having a larger diameter than said feeding means and receiving said feeding means, and an elastic circular apron having one end of larger diameter than the other end, the smaller end of said apron being secured to said feeding means and the larger end of the apron being secured to the members, whereby the vertical and horizontal movement is absorbed by the apron without disturbing its connection with the feeding means and the members.

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