

Nov. 25, 1930.

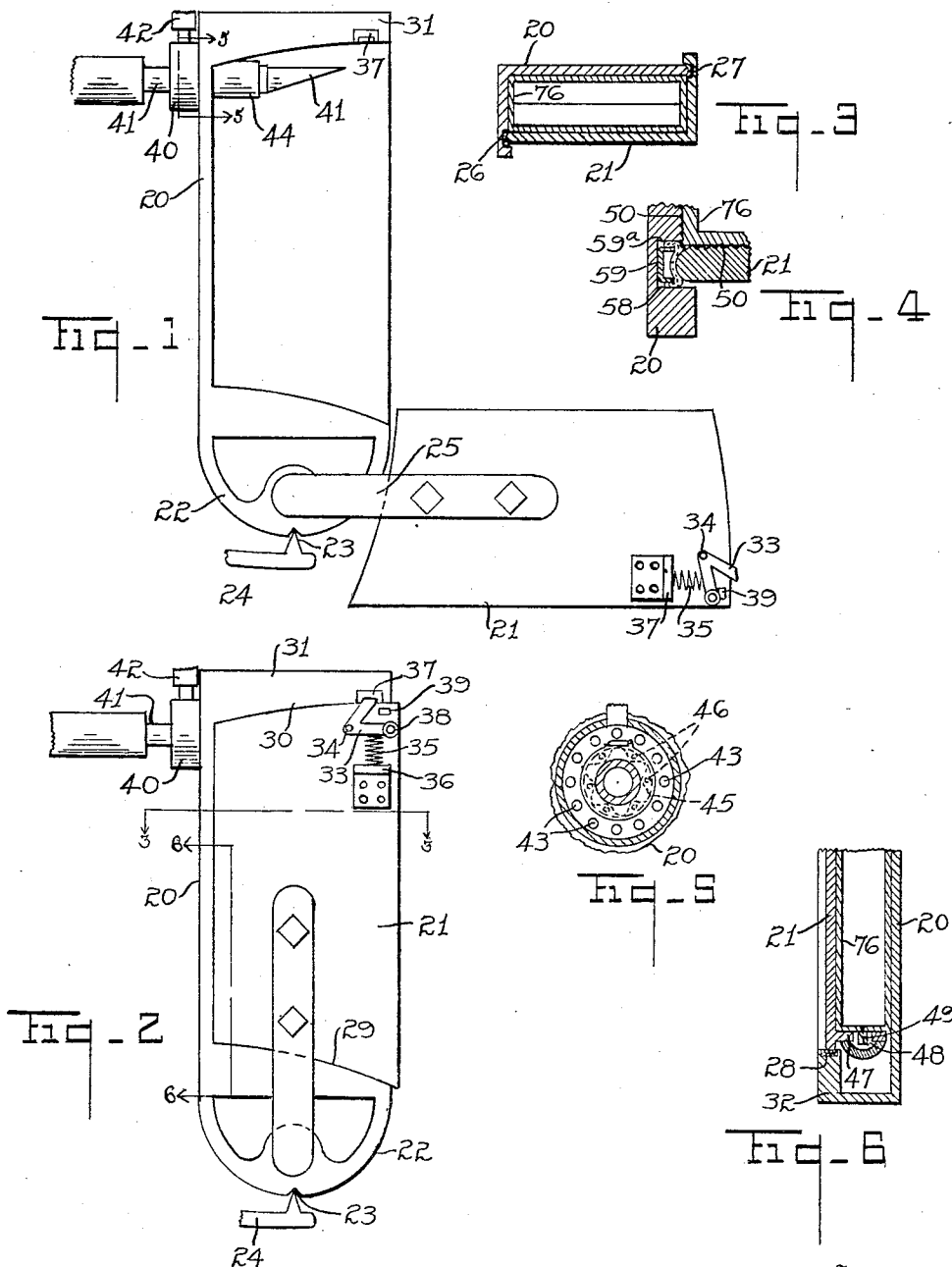
S. H. LILLY

1,782,733

BAG FILLING METHOD AND APPARATUS

Filed June 14, 1928

2 Sheets-Sheet 1



Inventor
Scott H. Lilly

By *Owen & Owen*

Attorney-S

Nov. 25, 1930.

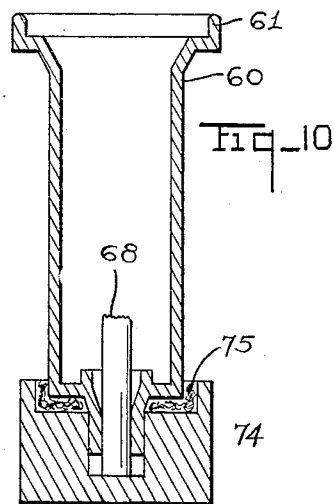
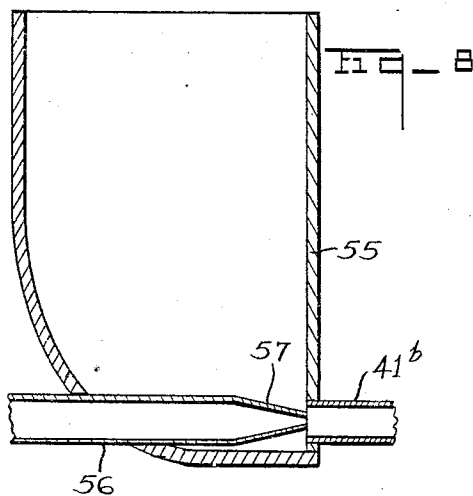
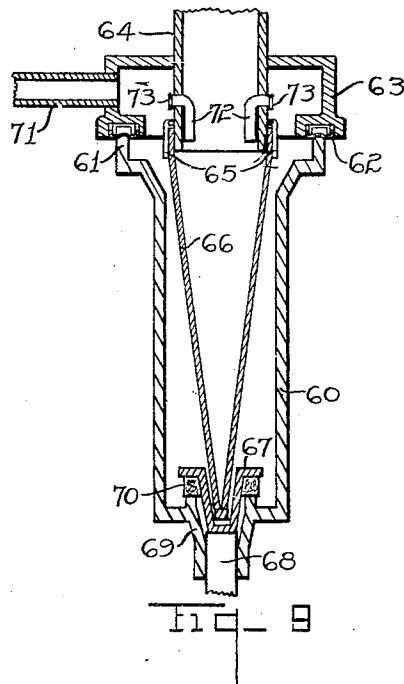
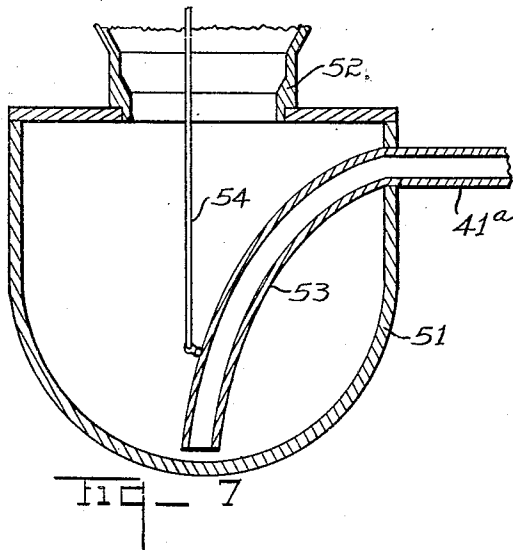
S. H. LILLY

1,782,733

BAG FILLING METHOD AND APPARATUS

Filed June 14, 1928

2 Sheets-Sheet 2



Inventor
Scott N. Lilly

By *Owen & Owen*

Attorneys

UNITED STATES PATENT OFFICE

SCOTT H. LILLY, OF TOLEDO, OHIO

BAG-FILLING METHOD AND APPARATUS

Application filed June 14, 1928. Serial No. 285,432.

This invention relates to a method and apparatus for filling bags, and is more specifically directed to the opening up of the bag preparatory to receiving a charge of material and the removal of air from the interior of the bag so that it does not interfere with the filling of the bag. Details of the invention will appear as the description proceeds.

In the accompanying drawings forming a part of this specification, Figure 1 is a somewhat diagrammatic side elevation of a portion of apparatus adapted to carry out this invention; Fig. 2 is a side elevation of the same apparatus shown in Fig. 1, but in a different position; Fig. 3 is a section on the line 3—3 of Fig. 2; Fig. 4 is an enlarged detail of a portion of Fig. 3; Fig. 5 is an enlarged section on the line 5—5 of Fig. 1; Fig. 6 is a partial section approximately on the line 6—6 of Fig. 2; Fig. 7 is a diagrammatic view of a device which may be used to feed material to the construction shown in Fig. 1; Fig. 8 is a diagrammatic section of another form of construction adapted to feed material to the apparatus shown in Fig. 1; Fig. 9 is a somewhat diagrammatical section of a device adapted to utilize the principles of this invention in filling open mouth bags; Fig. 10 is a view of a different position of the casing shown in Fig. 9.

In the construction shown in Fig. 1, there is a casing comprising a substantially stationary section 20 and an oscillating section 21. The stationary section 20 is supported upon brackets 22 which in turn may be mounted upon a knife edge pivot 23 at the end of a scale beam 24. A single scale beam 24 may be used, but preferably, parallel beams are used with a pivotal support under each side of the casing.

Swinging section 21 is pivotally supported on bracket 22 by arms 25. Each section is substantially L-shaped in cross section, as shown in Fig. 3. Section 20 is provided with a packing joint 26 against which the edge of section 21 rests when in closed position and a similar packing joint 27 is provided in section 21 to receive the edge of section 20. A similar packing joint 28 is provided along

curved line 29 where the bottom of section 21 rests on section 20, and a similar packing joint, not shown, is provided along line 30 where the top of section 21 wedges against the upper end 31 of section 20. The top 31 and bottom 32 of section 20 are closed so that a substantially air-tight casing is formed when section 21 is swung into the position in which it is shown in Fig. 2. A latch 33 is pivoted at 34 on section 21. A spring 35 is provided between a lug 36 on section 21 and one arm of latch 33. The other arm of latch 33 is adapted to enter a notch in lug 37 on member 20 in order to hold the casing in closed position. A handle 38 is provided on the latch for opening the casing when desired. A stop 39 on section 21 stops the latch in position so that it will encounter lug 37 and automatically move to closed position under the influence of lug 37 and spring 35 when section 21 is moved to closed position.

Projecting from the side of section 20 there is a box 40. A feed tube 41 projects through box 40 into the casing. A pipe 42, leads from box 40 to any suitable means for exhausting air. Box 40 may communicate directly with the interior of the casing formed by sections 20 and 21 or it may communicate by means of a series of openings 43, as shown in Fig. 5. Preferably, a meshed sleeve 44 is provided around feed tube 41 within the casing and is maintained spaced from tube 41 by a corrugated metal member 45 or similar means which presents passageways inside of the sleeve 44. The ends of these passageways at the wall of section 21 may lead directly into box 40 or may be connected to box 40 by perforations 46 through the wall of the casing of section 20, as shown in Fig. 5.

The operation of the device thus far described is as follows. With the apparatus in the position in which it is shown in Fig. 1, a valve bag may be positioned within section 20 with its valve placed over feed spout 41 and sleeve 44. In the construction shown, the lower portion of section 22 is provided with a bottom 47 which may be provided with a slot 48 for receiving the seam 49 of a bag, where the bag used has an outstanding seam. After the bag has been placed in position,

section 21 is raised and closed, as shown in Fig. 2. Thereafter, material is supplied to pipe 41 in any suitable manner. At the same time, or just prior to, the supplying of material to pipe 41, air is exhausted through pipe 42 and box 40, thereby exhausting the interior of the casing through the openings 43 and the interior of the bag through comparatively small openings 46 and the cloth or reticulated material 44. Since the escape of air from the casing outside of the bag is freer than from within the bag, a higher degree of vacuum will be created, at least momentarily, outside of the bag than exists within the bag. As a result of this differential pressure, the bag is at once expanded against the inclosing walls of the casing. In order to prevent the walls of the bag from contacting the casing adjacent box 40 and preventing the escape of air completely around the bag, the interior of the casing walls may be provided with small channels or grooves 50, as shown in detail Fig. 4. Continued exhaustion of the air through pipe 42 maintains the bag in its expanded shape and at the same time withdraws from the interior of the bag any air which may enter the bag with the filling material. In this way there is provided a ready means for expanding the bag in the proper manner to receive material and at the same time for withdrawing air from the interior of the bag.

After the bag has received its proper charge, the vacuum connection may be broken, latch 33 released and the oscillatable section swung about its pivot to the position in which it is shown in Fig. 1. It will be readily seen that the bag will rest initially upon bottom 47 connected to section 21 and as it is swung over to the position in which the section is shown in Fig. 1, the bag will rest more and more upon the short side of section 21. In this way the bag is removed from section 20 and placed in position to be conveyed away in any desired manner.

The material may be supplied to pipe 41 in any desired manner. In Fig. 7, there is disclosed an extension 41^a which may be connected with pipe 41 and which leads from a casing 51. This casing may be filled through hopper 52 with a charge of material sufficient to fill a bag. Pipe 41^a has a flexible end 53 which may be raised and lowered by means of a rod 54. With certain kinds of material, said filling may be accomplished by initially raising the end of pipe 53 until it rests upon the top of the charge in container 51, so that when air is exhausted through pipe 42, the material will be driven into pipe 53 and through pipes 41^a and 40 into the bag by air pressure. The end of pipe 53 may be lowered as the material is transferred from container 51 so that the material continues to be drawn into pipe 53 and carried by the passing air into the bag.

The air entering the bag with the material may be exhausted through sleeve 44 into box 40 and pipe 42.

In Fig. 8, there is shown a pipe 41^b which may be connected with pipe 41 and material fed therethrough from a container 55. In this case, there is an air pipe 56 provided in the bottom of the container with a nozzle 57 directed towards the inlet opening of pipe 41^b. When it is desired to fill the bag, a proper charge may be introduced into container 55 and the material drawn into the evacuated bag by air pressure entering through pipe 56, if desired, or if preferred, pressure above atmospheric may be applied through pipe 56.

It will be readily understood that with either of the devices shown in Figs. 7 or 8, the containers may be fed with charges more than sufficient to fill a bag or fed continuously, if desired, and the completion of the charge may be made dependent upon the actuation of scale beam 24. Also, any desired mechanical means for forcing the material through pipe 41 may be substituted for the means disclosed in Figs. 7 or 8 and other modifications of air means for propelling the material may be selected, if desired.

The interior of the casing and also of the bag will be evacuated to less than atmospheric pressure at the conclusion of the filling operation, and when pipe 42 is disconnected from the source of vacuum and atmospheric air is allowed to enter, it will release the walls of the bag from the surrounding casing and at the same time, a slight amount of air will enter through sleeve 44 to make the pressure within the bag equal to atmospheric pressure. This puff of air will ordinarily be sufficient to clean any material out of sleeve 44; but if this does not prove sufficient, the sleeve may be cleaned additionally by air introduced through pipe 42 and box 40 under pressure.

In Figs. 9 and 10, there is shown a casing 60 which has an upwardly directed flange 61 adapted to be raised against a packing ring 62 in an air box 63 surrounding a feed tube 64. At the bottom end of feed tube 64 there are provided suitable devices 65 for fastening thereon the upper ends of a bag 66. A support 67 for the bottom end of the bag may be provided upon the upper end of a column 68 which passes through the bottom 69 of casing 60. A packing 70 may be provided between the bottom 69 and support 67 so as to provide a substantially air-tight joint. Box 63 may be evacuated by means of a pipe 71 leading to any suitable means for evacuating air. If desired, provision may be made for exhausting air from within the bag by tubes 72 leading to the air box through feed tube 44 and having their inner ends directed downwardly. The outer ends of these air tubes 72 may be provided with flap valves 73 which are normally closed and require, either be-

cause of gravity or spring pressure applied in a well known manner, a certain degree of differential pressure before they open.

Casing 60 may be slidable vertically upon column 68 and may be adapted to rest upon a support 74 at the bottom of column 68. In Fig. 10, this support is shown provided with a pad 75 for receiving casing 60 when it is dropped.

In operating the device shown in Figs. 9 and 10, a bag may be positioned on the lower end of feed spout 64 and held thereon by latches 65. Thereafter, casing 60 is raised in any suitable manner to the position in which it is shown in Fig. 9, thereby inclosing the bag in a substantially air-tight casing. Thereafter, air is exhausted through pipe 71 to evacuate the casing around the bag and expand it to proper open position. At the same time, air is exhausted through the pipe 72 and valve 73 from within the bag to a less degree than from without the bag, but sufficiently to prevent objectionable trapping of air within the bag when the charge is fed therinto through feed pipe 64. After the bag has received its charge, the vacuum in box 63 and casing 60 is broken and the casing is lowered to the position in which it is shown in Fig. 10, leaving the bag resting upon support 67 and readily removable therefrom.

While any desirable means may be employed for making the joints of the casing substantially air tight, a construction is shown in detail in Fig. 4 which is suitable for making a readily separable joint that is substantially air tight regardless of slight irregularities in the closing of the sections. In this construction, a groove 58 is formed in one member along the line of the joint. This groove may be slightly dovetailed if desired. A strip 59 of metal or similar material has the edges of an impervious flexible strip 59^a folded along its sides, and is then thrust into the groove. The parts should fit tightly enough to hold strip 59^a in place. Strip 59^a may be made of rubber, if desired.

In filling bags which are sufficiently pervious to allow the escape of air without interfering with the filling operation, no special arrangement for connecting the interior of the bag to evacuating means is necessary; and even when the walls of the bags are impervious, there may be sufficient vent around the filling tube without special provision therefor. This is particularly apt to be true when the joint between the bag and filling tube is long, as in filling open mouth bags. The interior of the casing may be made larger than the filled bag, so that the bag expands approximately to the shape forming the largest cavity therein allowed by its walls; but in the majority of cases it is preferable to have the interior of the casing but slightly larger than the expanded bag and shaped to form the package in the manner desired. For packing

and handling it is generally preferable to have the filled bag form packages with approximately square corners, and for this purpose the casing shown in Figs. 1 to 6 is illustrated as being just large enough to receive the expanded bag, so that the bag walls 76 follow quite closely the contour of the interior of the casing. This same arrangement forms a support for the walls of the bag so that material may be crowded in under pressure if desired, or the casing may be given any jiggling motion desired for settling or packing material within the bag without putting any undue strain upon the walls of the bag.

While two methods of employing the invention have been shown, one adaptable for use with valve bags and the other for open mouth bags, it will be readily understood that the applications disclosed are by way of example and that details may be modified within the scope of the appended claims.

What I claim is:

1. The method of filling a bag, which comprises enclosing the bag in a casing, evacuating air from the casing outside of the bag and thereby expanding the bag into contact with the casing, and filling material into the expanded bag within the casing.

2. The method of filling a paper bag, which comprises enclosing the collapsed bag in a casing, reducing the pneumatic pressure in the casing outside of the bag below the pneumatic pressure within the bag and thereby expanding the bag, and filling material into the expanded bag within the casing.

3. The method of filling a bag, which comprises enclosing a bag in a casing having an interior cavity having approximately the shape it is desired to give the filled bag, expanding the bag by pneumatic pressure until its walls contact the casing, and filling material into the expanded bag.

4. The method of filling a paper bag, which comprises enclosing a collapsed bag in a casing, evacuating air from the casing both from inside and outside of the bag but more rapidly from the outside than from the inside of the bag and thereby expanding the bag and thereafter filling material into the bag while continuing to exhaust air therefrom.

5. The method of filling a paper bag, which comprises enclosing a bag in a casing, evacuating air from the casing, both from outside and inside the bag but more rapidly from the outside than from the inside of the bag, and introducing air together with filling material into the interior of the bag while continuing to evacuate air therefrom.

6. The method of filling a bag, which comprises enclosing a bag in a casing, evacuating air from the casing outside of the bag, filling material into the bag and at the same time evacuating air from the bag through a screened opening, and, after the bag is filled,

clearing the screen by passing air there-through into the bag.

7. The method of filling a bag, which comprises enclosing a bag in a casing, evacuating
5 air from the casing outside of the bag and from the inside of the bag through a screened opening, filling material into the bag while continuing to withdraw air therefrom
10 through said screened opening, and clearing the screen by permitting the entrance of air under atmospheric pressure through the screen into the bag to break the vacuum therein.

8. In bag filling apparatus, a casing adapted
15 ed to enclose a bag, means to fill material into a bag within the casing, means to evacuate the casing outside of the bag, and means providing an obstructed opening connecting the interior of the bag with the interior of the
20 casing outside of the bag.

9. In bag filling apparatus, a casing, a filling tube entering the casing and adapted to be connected with the filling opening of a bag within the casing, means to evacuate the
25 casing outside of the bag, and means associated with the filling tube and providing an obstructed passageway leading from the interior of the bag to said evacuating means.

10. In apparatus for filling bags, a filling
30 tube adapted to enter the filling opening of a bag, a screen outside of a portion of the tube adapted to enter the bag, there being a space between the screen and the tube, and means providing a vent opening for said
35 space.

11. In apparatus for filling valve bags, a filling tube adapted to enter the valve of a bag, a screen outside a portion of said tube adapted to enter the bag, there being a space
40 between the screen and the tube, and means to evacuate said space.

12. In apparatus for filling valve bags, a casing, a filling tube entering the casing and adapted to enter the valve of a bag, a screen
45 outside a portion of said tube adapted to enter the bag, means to evacuate air from the casing outside of the bag, and means providing a passageway between said space and the interior of the casing outside of the bag.

13. In apparatus for filling bags, a casing comprising relatively movable sections, a filling tube entering through one section, a connection from the same section to evacuating means, and means on a relatively movable
50 section for supporting a filled bag.

14. In bag filling apparatus, a casing adapted to enclose a bag, the interior of said casing being approximately the size and shape desired to be imparted to the filled bag,
60 means to evacuate the casing outside of a bag, and means to fill a bag within the casing.

15. In apparatus for filling valve bags, a casing comprising a relatively stationary section and a section oscillatable with respect to

said stationary section about a substantially horizontal axis, said oscillatable section being provided with a bottom support for a bag and both of said sections being substantially L-shaped in horizontal section, a filling tube entering the casing through said stationary section, means connected with the stationary section for evacuating the interior of the casing, and packing strips adapted to make air tight joints between said sections.

16. In apparatus of the character described, a sectional casing having a substantially air tight joint between two sections comprising a groove in one section along a line where the edge of the other section is adapted to come in contact therewith, a comparatively stiff member seated in the bottom of the groove and a flexible member positioned across the outer side of the groove and having its edges between the edges of the groove and said stiff member, said members being arranged to provide an air space there-between.

17. In bag filling apparatus, a casing mounted upon a weighing device, a vacuum connection adapted to exhaust air from within the casing and expand a bag therein into contact with the walls of the casing, and means to fill material into the expanded bag.

18. In bag filling apparatus, a casing mounted upon a weighing device and adapted to enclose a bag, the interior of said casing being approximately the size and shape desired to be imparted to the filled bag, means to evacuate the casing outside of a bag, and means to fill the bag within the casing.

In testimony whereof I have hereunto signed my name to this specification.

SCOTT H. LILLY.