Nov. 23, 1965 E. M. LAU 3,219,072

SELF-VENTING SPOUT FOR BAG FILLING MACHINES

Filed Feb. 28, 1963 2 Sheets-Sheet 1

FIG. 1

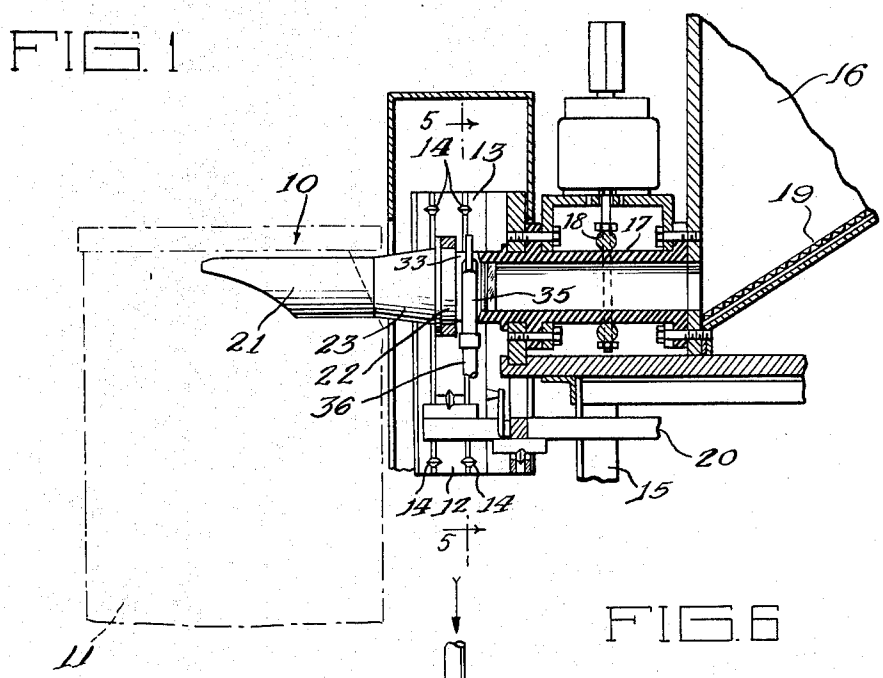
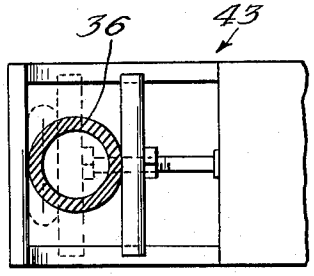


FIG. 6



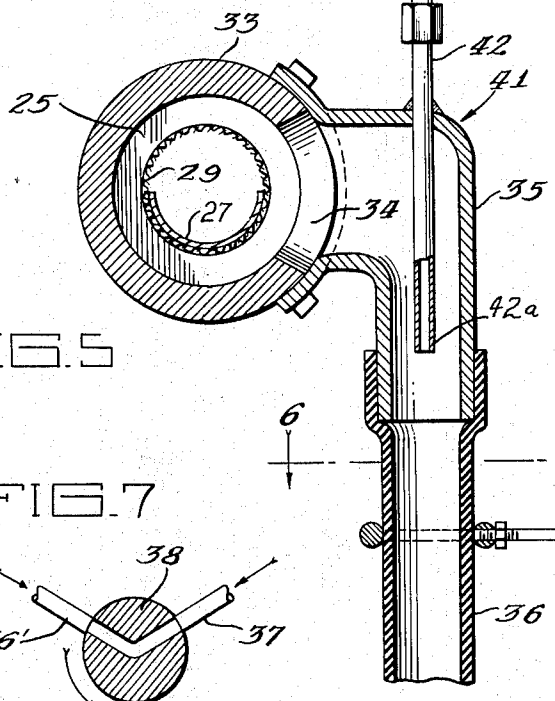


FIG. 5

FIG. 7

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Filed Feb. 28, 1963 2 Sheets-Sheet 2

FIG. 2

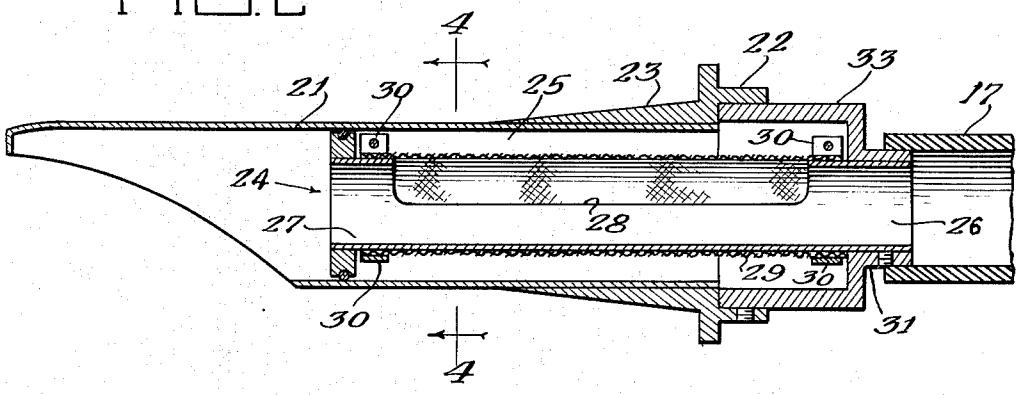


FIG. 4

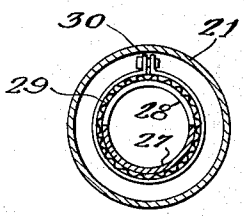
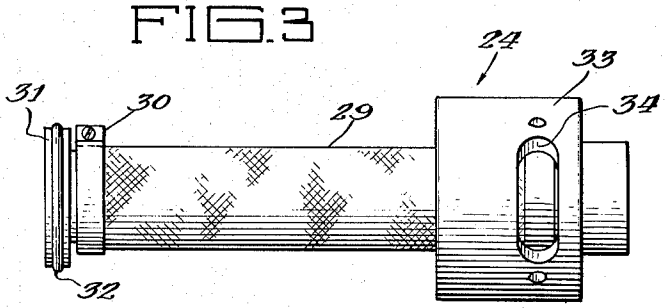


FIG. 3



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3,219,072

SELF-VENTING SPOUT FOR BAG FILLING MACHINES

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Filed Feb. 28, 1963, Ser. No. 261,898
6 Claims. (Cl. 141—286)

The present application is a continuation-in-part of my earlier application Serial No. 244,818, filed December 14, 1962, now abandoned, and the subject matter thereof is hereby incorporated by reference into this application, insofar as consistent with the present disclosure.

This invention relates to a filter type self venting spout for a bag filling machine, and has for its general object the provision of a construction which materially improves the overall efficiency of the venting arrangement and the bag filling operation.

During the operation of a bag filling machine, it is desirable to prevent the building up of a back pressure within the bag. This is particularly true in the case of a fluidizing type of machine.

However, the use of a filter in the venting means tends to slow up the filling operation very materially when operating with fine powders. This is for the reason that the efficiency of the venting arrangement is decreased both by the clogging or partial clogging of the filter and also by the excessive use of blowout means for cleaning the same, the reason for the latter being that during the blowout period, venting does not take place.

The present invention is an improvement over the invention of my prior application, Serial No. 118,165, filed June 19, 1961, now Patent No. 3,102,562, granted September 3, 1963, in which the filter was disposed transversely of the vent passageway provided by the spout structure. In a commercial embodiment of said prior application the transversely disposed filter was of annular shape and had an area of approximately four square inches. In the case of certain fine powders, it was necessary to provide a two second blowout period after every four seconds of venting, thus reducing the overall efficiency by one third.

According to the present invention I am enabled to provide a filter having several times the area, with the result that under similar conditions, only a single two to four second blowout period is required for an entire bag filling operation of from twenty to forty seconds in duration.

It is an object of the present invention to provide a self venting spout which includes a comparatively large area filter so that the filter does not have to be blown out as frequently in order to avoid clogging.

A further object is to provide a self venting spout in which the efficiency of the air removing arrangement is enhanced by the use of suction.

Still another object is to provide a self venting spout having an improved filter cleaning arrangement.

Other objects, features and advantages will become apparent as the description proceeds.

With reference now to the drawings in which like reference numerals represent like parts:

FIG. 1 is a sectional elevation showing a preferred embodiment of my invention as applied to a bag filling machine of the fluidizing type;

FIG. 2 is an enlarged vertical sectional elevation of the spout;

FIG. 3 is an elevation of the internal structure when removed from the spout;

FIG. 4 is a section taken along line 4—4 of FIG. 3;

FIG. 5 is a section taken along line 6—6 of FIG. 1 showing the aspirator of FIG. 1;

FIG. 6 is a plan section taken along line 6—6 of FIG. 5 showing the pinch valve on the vent tube; and

FIG. 7 is a diagram showing a modification of the blowout means.

With reference now to FIG. 1, the bag filling machine includes a spout 10 which is adapted to project through the opening of a valve bag 11. The spout 10 is mounted on a floating frame 12 which is supported in a support structure 13 by means of spacer points 14. The arrangement is such as to permit limited vertical movement of the floating frame with respect to the support structure 13 so that when a predetermined amount of material has been fed into the bag, the weight of the bag and its contents will actuate a scale mechanism 20 to terminate the bag filling operation. The floating frame is connected to the scale mechanism 20.

The bag filling machine includes a framework 15 on which the support structure 13 is mounted, and which framework also supports a chamber 16 which receives the material that is fed into the bag 11. A flexible tube 17, of rubber or the like, extends between the chamber 16 and the spout 10 so that the material within the chamber 16 can pass through the spout and into the bag. The flexibility of the tube 17 permits the up and down motion of the spout 10 and the floating frame 12 which is incident to the operation of the scale mechanism 20.

The flexible tube is engaged by an air actuated pinch valve 18 which serves to cut off the flow of material through the spout. The chamber 16 includes a diffuser pad 19 located near the outlet for fluidizing the material contained within the chamber 16 so that it will be caused to flow through the spout into the bag.

As shown in FIGS. 1 and 2, the spout includes an outer shell 21 having a support collar 22 by means of which it may be suitably mounted on the floating frame 12. The support collar 22 has integrally formed therewith a tapering shank portion 23 which forms a tight fit with the opening of the bag 11.

Disposed within the shell 21 is an internal structure 24 shown in FIGS. 2 and 3 which divides the interior of the shell 21 longitudinally into two parts, one part being a vent chamber 25, and the other being a material flow passageway 26 which communicates with the chamber 16. Communication between the portions 25 and 26 is provided by a porous wall or filter element 29 so that the fluidizing air may be removed from the material as it is passing through the spout. The porous wall serves as a filter, and suitable blowout means are provided so that dust or fine particles entrapped thereby can be returned to the stream of material flow.

The porous wall may be of any suitable filter material, such as sintered metal, wire screening, or a sleeve 29 of dust collector fabric as shown, the latter being preferred.

As shown in FIG. 2, the internal structure 24 comprises an inner tubular member 27 having an opening 28 formed in its upper half and extending for substantially its full length. The fabric sleeve 29 surrounds the tube 27 and is secured thereto by clamps 30. A front ring 31 and rubber O-ring gasket 32, mounted on the front end of the tube 27, seal off the front end of the vent chamber 25. The tube 27 is mounted within the shell by a collar 33 which engages the rear end of the support collar 22. The collar 33 has an opening 34 therein and a fitting 35 is secured thereto which communicates with the atmosphere, either directly or by means of a flexible vent tube 36.

Suitable means may be provided to blow out the tubular filter element 29 at intervals to avoid clogging of the pores of the fabric. Such means may be in the form of an air line 37 which communicates with the vent chamber 25 through a suitable two-way valve 38 interposed in the vent tube 36', as shown in the modification of FIG. 7.

In operation, as the powdered or granular material is fluidized by the diffuser pad **19**, it flows horizontally out of the chamber **16**, through the flexible tube **17** and passageway **26** and into the bag **11**. The fluidized material gives up its fluidizing air as it passes under the exposed portion of the filter element **29** in view of the pressure conditions present. As a result, the fluidizing air passes through the filter element **29** and thence is vented to the atmosphere, but the powdered or granular material retains sufficient fluidity so that it will continue in its horizontal movement and drop into the bag **11**.

The action may be enhanced by reducing the pressure in the vent chamber **25** by suitable means, such as the aspirator arrangement **41** shown in FIG. 5.

According to this aspect of my invention, the fitting **35** is in the form of an elbow, and an air supply tube **42** extends through the wall of the elbow, its outer end being concentrically located with respect to the outer end of the fitting and constituting a jet tube **42***a*. Thus a vacuum is produced in the vent chamber **25** which increases the pressure differential across the filter element **29** to increase the rate of air removal.

The aspirator **41** also provides an effective blowout means. As shown in FIGS. 5 and 6, a pinch valve **43** engages the flexible tube **36** to cut off the venting action. When this occurs, the air passing through the air supply tube **42** will build up a pressure within the vent chamber **25**, causing the reverse flow of air through the pores of the fabric of the filter element **29**, thus cleaning the same.

It has been found that this arrangement provides a very effective means of cleaning the horizontally disposed filter for the reason that the passage of air through the fabric in the reverse direction dislodges the dust by a fluidizing action at a time when it can be picked up by other fluidized material which is flowing horizontally from the chamber **16** into the bag.

The reverse flow of air through the filter preferably takes place during the first several seconds of the bag filling operation, because the fluidizing air, if not removed, can be used to expand the empty collapsed bag. The duration of the blowout is controlled by a suitable time delay switch.

In the FIG. 3 embodiment shown, the opening **28** is seven inches long, and the tube **27** is two inches in diameter. This provides a filter area of about twenty-two square inches. This can be compared with the four square inch area of the previously mentioned arrangement.

It will be seen therefore that according to the arrangement of FIGS. 2 and 3, I am enabled to provide a filter having about five times the filter area of the earlier arrangement in which the area of the filter is limited by the diameter of the spout.

Furthermore, the pressure conditions in a fluidizing machine are such that the efficiency of the air removal or venting action can be doubled by the aspirator arrangement shown.

At the conclusion of the bag filling operation, the bag is left on the spout for a second or two after the flow of material through the spout has been cut off by the operation of the scale mechanism. Thus, the vacuum serves to evacuate the bag so that a more compact package is provided.

The present invention profides a very efficient means of removing a comparatively large volume of air from the material as it is passing through the spout, and for filtering the same without interrupting the venting action during the period subsequent to the initial expansion of the collapsed bag.

The inner tube construction of FIGS. 2 and 3 is preferred because the lower portion of the wall of the material flow passageway **26** is non-porous, thus avoiding a situation in which the wall friction is increased due to adherence of fine particles to the filter element **29** along the bottom of the passageway **26**.

In FIG. 1, the spout is shown as being mounted on a scaling mechanism such as that shown in my Patent No. 2,936,994, but it is understood that the same is equally suitable for use in connection with other scaling mechanisms.

Although only preferred embodiments of my invention have been shown and described herein, it will be understood that various modifications and changes may be made in the constructions shown without departing from the spirit of my invention as pointed out in the appended claims.

I claim:

1. A self venting spout for a bag filling machine comprising an outer shell adapted for cooperation with a bag to be filled, means providing a vent chamber located within said shell, said vent chamber providing means including a filter element extending longitudinally of said shell, conduit means providing communication between said vent chamber and the atmosphere, a jet tube located in said conduit means to reduce the pressure within said vent chamber below atmospheric pressure, and air supply means communicating with said jet tube.

2. A self venting spout as claimed in claim **1** which includes valve means located in said conduit means at a point between said jet tube and the outlet end of said conduit means whereby operation of said valve means will cause air to be supplied under pressure to said vent chamber.

3. A self venting spout as claimed in claim **1** including suction means communicating with said vent outlet.

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LAVERNE D. GEIGER, *Primary Examiner.*

UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,219,072 November 23, 1965

Erwin M. Lau

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

Column 4, lines 45 and 46, strike out "3. A self venting spout as claimed in claim 1 including suction means communicating with said vent outlet."; in the heading to the printed specification, line 7, for "6 Claims" read -- 2 Claims --.

Signed and sealed this 6th day of September 1966.

(SEAL)
Attest:

ERNEST W. SWIDER
Attesting Officer

EDWARD J. BRENNER
Commissioner of Patents