Dec. 27, 1966 E. M. LAU 3,294,127

EXPANDABLE SPOUT FOR BAG FILLING MACHINE

Filed Nov. 16, 1964 4 Sheets-Sheet 1

FIG. 1

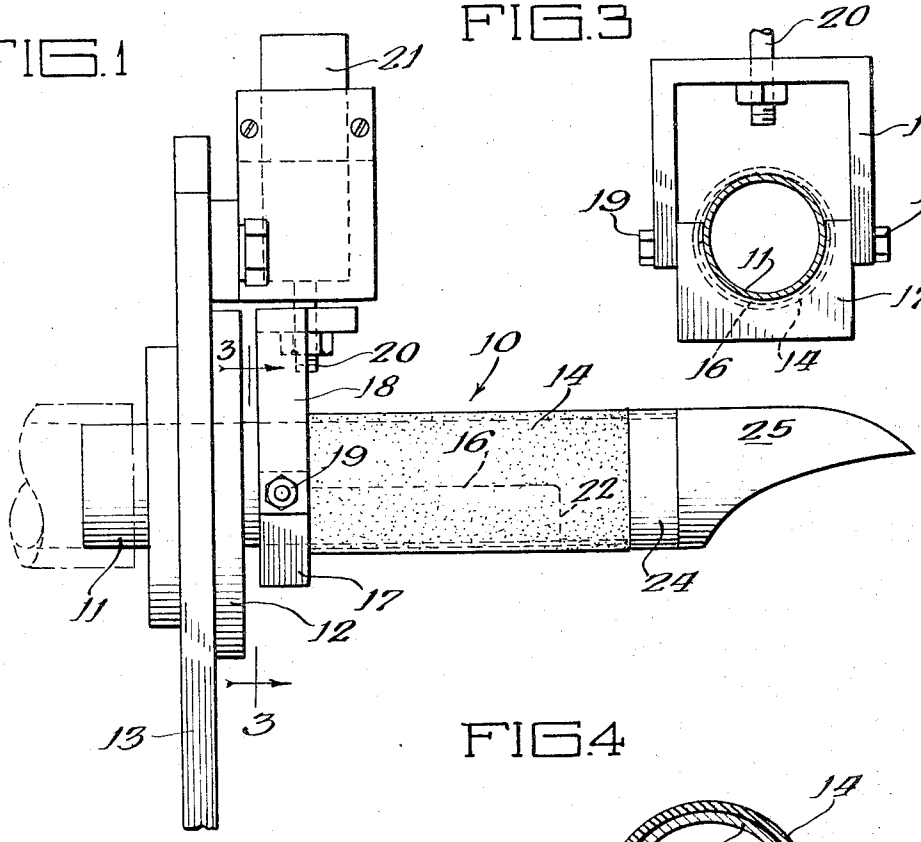


FIG. 3

FIG. 4

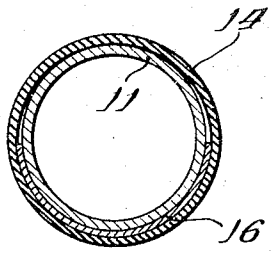


FIG. 2

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FIG. 6

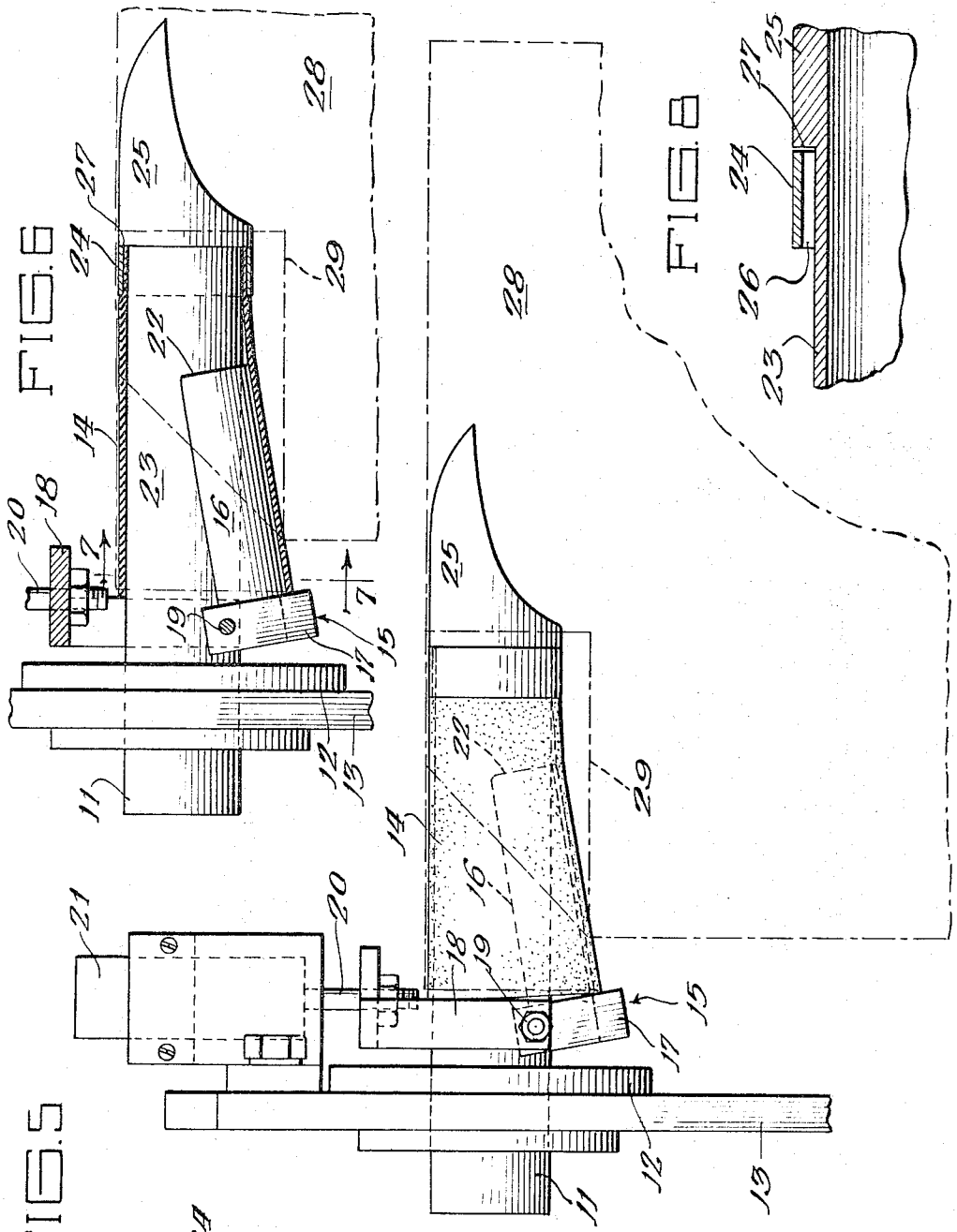
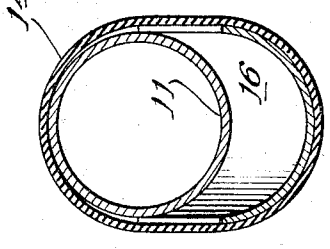


FIG. 8

FIG. 5

FIG. 7



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EXPANDABLE SPOUT FOR BAG FILLING MACHINE

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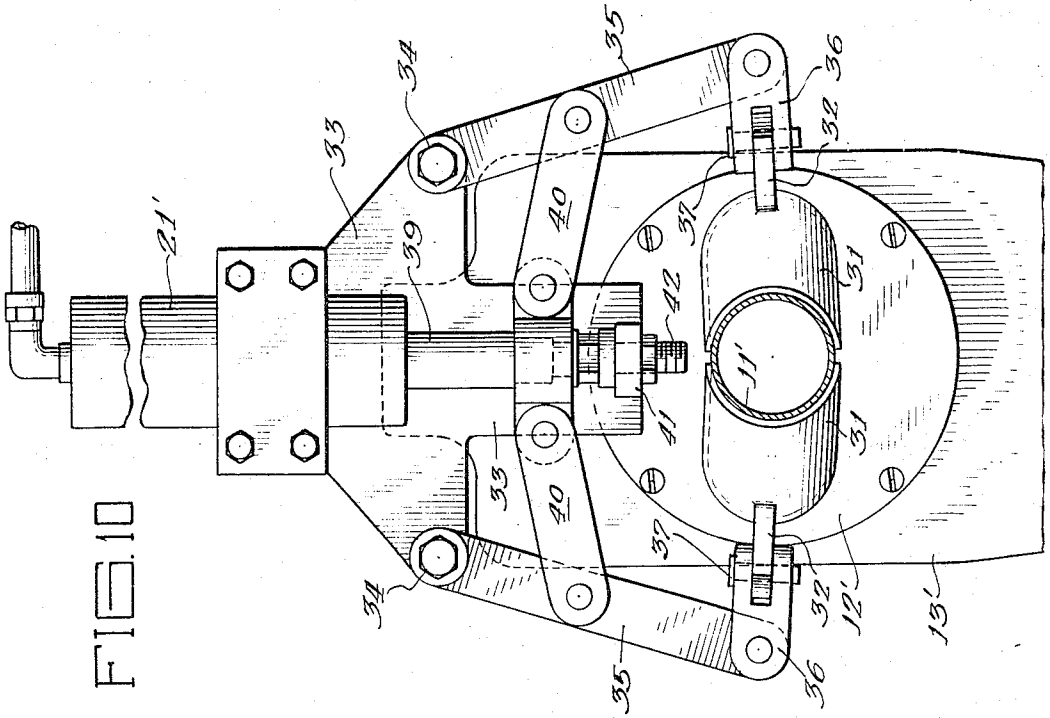


FIG. 10

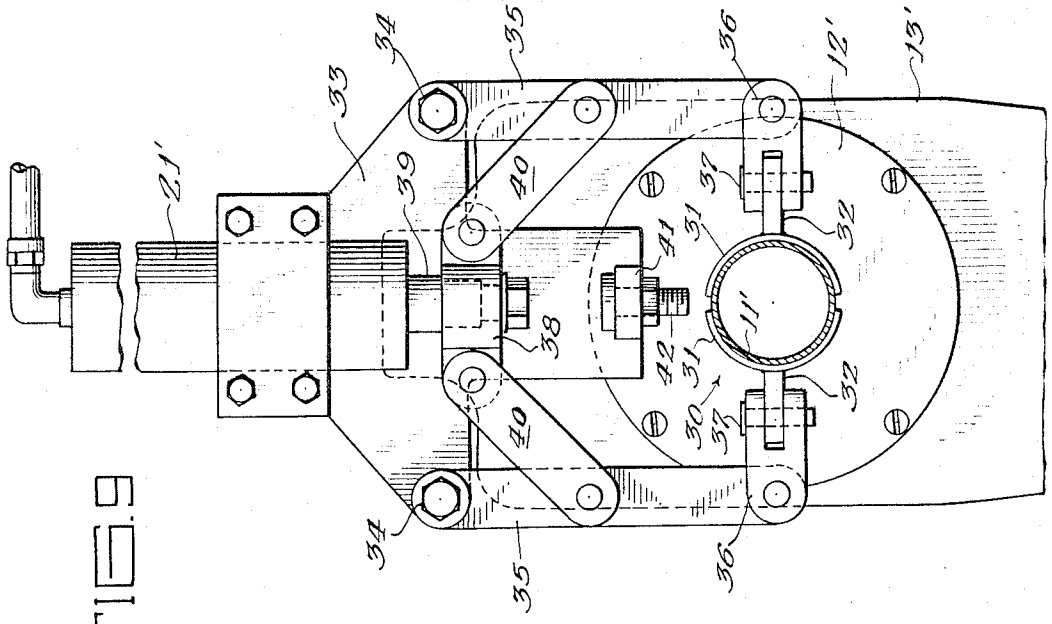


FIG. 9

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EXPANDABLE SPOUT FOR BAG FILLING MACHINE

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FIG. 12

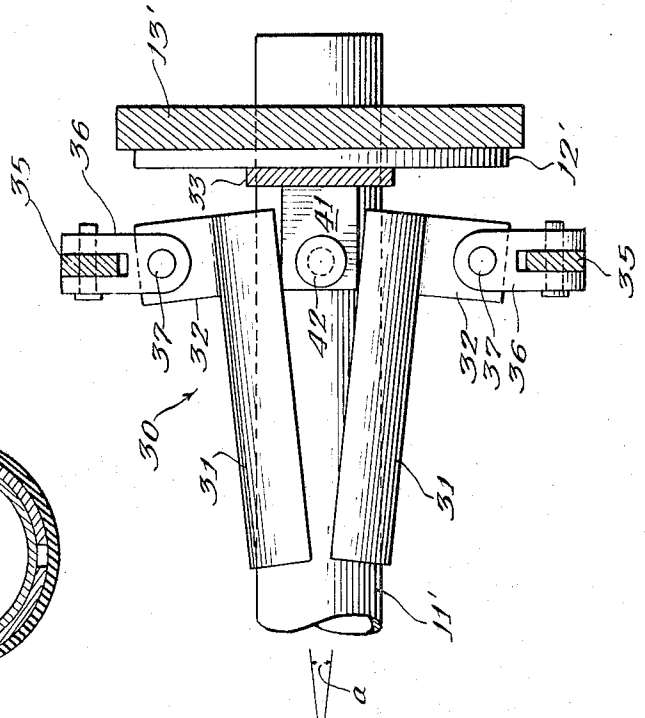


FIG. 13

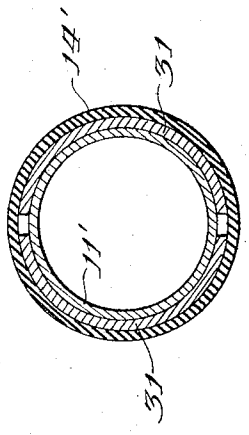
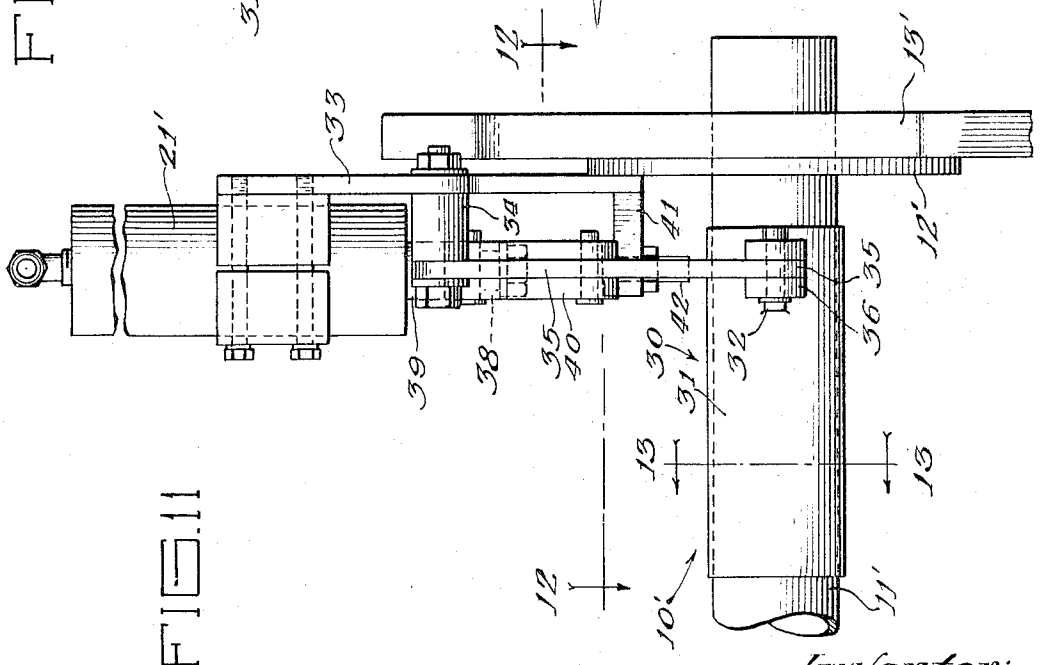


FIG. 11



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3,294,127

EXPANDABLE SPOUT FOR BAG FILLING MACHINE

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Filed Nov. 16, 1964, Ser. No. 411,469
7 Claims. (Cl. 141—68)

This invention relates to an expandable spout for bag filling machines, and is particularly well adapted for use in a bag filling machine of the fluidizing type, as shown in my Patent No. 2,936,994, granted May 17, 1960.

The problem of providing a seal between the spout and the valve of a bag has been recognized in Titchenal Patent No. 2,955,796, to which reference is hereby made. Briefly, the bag, or its valve, which is a tubular sleeve type of arrangement, should be enough larger than the spout diameter so as to facilitate placement of the bag. However, clearance between the two permits air to escape from the bag into the surrounding atmopshere. When the material being packed is a powder, there is much dust suspended in the air. This dusty environment, in addition to being unpleasant and messy, is a health hazard. This is particularly true of machines of the fluidizing type for the reason that the fluidized material passing into the bag has a great deal of air entrapped in it. Therefore, it has been proposed to provide an inflatable sleeve around the spout which can be inflated after the bag has been positioned in order to seal off the clearance between the bag valve and the spout.

However, this inflatable sleeve arrangement is unsatisfactory in certain respects. For instance, if the inflating mechanism is actuated when a bag is not on the spout, it is likely to blow out or explode, injuring the operator who is standing right next to it. Thus, the prior device is a distinct safety hazard.

Another objection to the prior device is that both the interior and the exterior of the filling tube or spout should be a smooth surface without any abrupt interruptions or changes in diameter. In the prior device, the inflatable sleeve constitutes an enlargement in the external diameter of the spout which interferes with rapid bag placement. In many instances, it is also a specially moulded rubber product, which represents an additional element of cost.

It is an object of the present invention to provide an expandable spout in which the sleeve is mechanically expanded. This eliminates the possibility of blowout.

Another object is to provide a spout and sleeve construction which is of substantially uniform external diameter, when in contracted position, so as to facilitate bag placement.

According to my invention, I provide an expander device which is in the form of a shell disposed between the filling tube and the sleeve, and the arrangement is such that there is a pivoting or hinging action incident to the expanding operation, but the parts are constructed and arranged in such a manner that no pivot or hinge means is required at the front end of the shell. Thus, it is possible to provide a filling tube, the internal surface of which is uninterrupted by pivot pins which would necessarily have to penetrate the wall of the filling spout, and cause a build up of material which would interfere with rapid bag filling action.

Furthermore, my invention does not require, as a sleeve, a specially moulded rubber product. Rather, an ordinary piece of rubber tubing will suffice.

Also, by using a mechanically expanding sleeve, even though it may be actuated by an air cylinder, it is possible to eliminate certain complexities of the air supply system customarily used in a spout of the inflatable sleeve type.

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

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

FIG. 1 shows an elevation of a spout embodying my invention;

FIG. 2 is a sectional elevation of the same;

FIG. 3 is a vertical section taken along line 3—3 of FIG. 1;

FIG. 4 is a vertical section taken along line 4—4 of FIG. 2;

FIG. 5 is a view similar to FIG. 1 but showing the sleeve in its expanded position;

FIG. 6 is a view similar to FIG. 5, but with the sleeve shown in section so that the expander device may be shown in elevation;

FIG. 7 is a vertical section taken along line 7—7 of FIG. 6;

FIG. 8 is an enlarged section similar to FIG. 6, with the sleeve omitted to show the clearance;

FIG. 9 is a front elevation of a modified expander device, the rubber sleeve being removed for the purpose of clarity;

FIG. 10 is a view similar to FIG. 9 but showing the same in changed position;

FIG. 11 is a side elevation of FIG. 10;

FIG. 12 is a plan view taken along line 12—12 of FIG. 11, but showing the expander device in partially opened position; and

FIG. 13 is a vertical section similar to FIG. 4, taken along line 13—13 of FIG. 11, but also showing the rubber sleeve.

The spout **10** comprises a filling tube **11** having a mounting flange **12** by means of which the spout may be mounted on a part of the scale mechanism **13** of a bag filling machine such as that shown in my aforesaid patent, and the scaling mechanism of which member **13** is a part, can be either as shown in the aforesaid patent, or of the type shown in my Patent No. 3,133,608 granted May 19, 1964.

A rubber sleeve **14** surrounds the filling tube **11**. The expander device **15** comprises a shell **16** which is disposed between the rubber sleeve **14** and the filling tube **11**, together with a base portion **17** which is in the form of a block as shown in FIG. 3.

The expander device **15** is pivotally connected to a yoke **18** by means of pivot pins **19**, as shown in FIG. 3, and the yoke **18** is mounted on the piston **20** of an air cylinder **21**. The air cylinder is suitably mounted on the member **13** on which the spout **10** is also mounted.

In operation, when the air cylinder **21** is energized, the expander device moves downwardly into the FIG. 5 position, thus expanding the sleeve **14**.

A feature of my invention is that the rubber sleeve **14** cooperates with the free end **22** of the shell **16** to provide a hinging action which does not require the use of any pivot pins. Thus the internal surface of the filling tube **11** is smooth and uninterrupted by pivot pins or the like. In other words, the free end **22** loosely engages the outer surface of the filling tube **11** so that it is free for a certain amount of sliding movement; nevertheless the resilience of the rubber sleeve **14** maintains the free end **22** in contact with the filling tube surface at all times.

As best shown in FIG. 2, the filling tube **11** has a portion **23** of reduced diameter which extends over the greater part of its length. The rubber sleeve **14** overlies this reduced portion so that the over all outer diameter of the spout **10** will be substantially uniform, thus facilitating bag placement.

The front end of the rubber sleeve **14** is secured to the filling tube by means of a clamp ring **24**, the outer diameter of which is substantially the same as the outer

diameter of the front or thick portion **25** of the filling tube **11**.

However, the inner diameter of the clamp ring **24** is sufficiently larger than the outer diameter of the reduced portion **23** as to provide a clearance **26** which, although of smaller dimensions than the normal wall thickness of the rubber sleeve **14**, is nevertheless sufficient to accommodate the same if the sleeve has previously been stretched.

In other words, as shown in FIG. 2, the over all outer diameter of the spout **10** is substantially uniform from the front end back to the yoke **18** and base portion **17**. There are slight variations due to the thickness of the shell **16** which is interposed between the sleeve **14** and the reduced portion **23**, but the over all impression is one of substantially uniform diameter. Thus there is no obstruction which interferes with rapid bag placement.

The parts **11**, **14** and **24** may be assembled by taking a section of tubing which is somewhat longer than what is ultimately required, and stretching it axially over the filling tube **11**.

The operation may be facilitated by using a hose clamp to temporarily secure the front end rubber sleeve to the front portion **25** of the filling tube. This leaves both hands free to manipulate the tensioned rear end of the sleeve, and to effect the tensioning or drawing out of the sleeve so that its wall thickness is reduced by somewhat more than 50%. This permits the operator to slip the clamp ring **24** over both the reduced portion **23** and the sleeve **14**. In this position of parts, it will be understood that the rear end of the sleeve **14** extends considerably beyond the rear end of the filling tube **11**, and permits the operator to thread the sleeve **14** through the clamp ring **24**. After sleeve **14** is thus maintained in its extended and tensioned position, it will be seen that it is possible to move the ring forwardly, particularly if the sleeve has been lubricated with a soap solution. The ring may thus be readily moved forwardly until further movement is prevented by the increase in sleeve diameter represented by the shoulder **27** which separates the front portion **25** from the reduced portion **23** of the filling tube.

Then the rear end of the sleeve **14** is released which causes the same to expand in thickness. The front end of the rubber tubing is then trimmed at the shoulder **27**, and the rear end is trimmed to its final length as shown in FIG. 2. By suitable manipulation of the parts so as to maintain a certain amount of tension on the sleeve, it is possible to cause the front end of the sleeve **14** to contract or withdraw entirely within the confines of the clamp ring **24**, as shown in FIGS. 2 and 6, so that there will be no rubber flange projecting outwardly at the shoulder **27**.

After trimming, then the expander device **15** can be readily inserted between the sleeve **14** and the filling tube **11**, and then the remaining parts assembled to each other.

The shell **16** may be fabricated by splitting a short length of thin wall tubing, the rear end being received within the saddle of the base portion **17** and welded thereto.

In the embodiment shown, the rubber sleeve **14** has a wall thickness of slightly more than one-sixteenth of an inch, and the clamp ring **24** has a wall thickness of slightly less than one-sixteenth of an inch, and the clearance **26** is substantially one thirty-second of an inch.

FIG. 5 shows a bag **28** in broken lines which has a tubular portion **29** which constitutes the valve or flap thereof.

After the valve **29** has been placed over the spout **10**, the air cylinder **21** is actuated to expand the sleeve **14** as shown in FIGS. 5 and 6. Thus, the sleeve engages the rear edge of the tubular valve portion **29**, and stretches or deforms the same so that the rear edge of the tubular portion conforms itself to the oval shape of the sleeve when expanded, as shown in FIG. 7. Thus an effective

seal is provided which prevents the escape of powder laden air from the bag into the surrounding atmosphere.

I have found not only that the sealing action is effective for this purpose, but in some instances the engagement is sufficiently firm as to enable me to dispense with the usual bag clamp.

In the case of porous wall bags, the expander device is not released until the air pressure within the bag has had an opportunity to escape through the bag wall. However, the present invention can be used in connection with a self venting spout, of the general type shown in my Patent 3,102,561, granted September 3, 1963, so as to enable the use of my expanding spout with moisture barrier bags, the walls of which are not porous. Also, my invention is useful in connection with types of feeding arrangements other than the fluidizing type, although the need for a sealing arrangement is greater with the fluidizing type of material feed than it is with the auger type or the paddle type.

FIGS. 9 to 13 show a modified expander device **30** which comprises two shells **31** located at the sides of the spout **10''** instead of a single shell **16** located below the spout, as in FIGS. 1 to 8. The two-shell arrangement makes a better seal with the pasted valves of pasted bags than does the single shell arrangement. Also, it accommodates itself to a greater latitude in size of valve opening than does the single shell device.

In the modification, the base portion of each shell **31** is in the form of a lug **32**. The actuating means includes an air cylinder **21'** mounted on the scale part or plate **13'** by means of a bracket **33**. Pillars **34** extend forwardly from the bracket **33**. Levers **35** are pivotally mounted on the pillars **34** and are connected to the lugs **32** by links **36** and pins **37**. Thus, a spreading of the levers **35** moves the shells **31** outwardly to expand the sleeve **14'**, in substantially the same manner as described in the single shell embodiment.

A bracket **38** is mounted on the lower end of the piston **39** of the air cylinder **21**. Thrust links **40** extend between the bracket **38** and each of the levers **35**. Thus, actuation of the air cylinder **21'**, causes a spreading of the levers **35** as shown in FIG. 10.

To avoid a tearing of the valve which can occur due to the fact that the force exerted by the air cylinder **21** and the linkage may be greater than the strength of the paper and the pasted or stitched seams, adjustable stop means are provided to limit the throw of the piston **39**. As shown in FIGS. 9 and 11, a horizontal lug **41** extends forwardly from the bracket **33** and carries a stop screw **42** which is threaded therethrough. Suitable adjustment of the stop screw will limit the throw of the piston **39** and of the linkage so that the limiting position of the two shells **31**, as shown in FIG. 12, will approximate the size of the opening of the bag valve **29**. Thus, a tight seal may be provided without encountering the risk of tearing. Similarly, the actuating mechanism can be adjusted for different sizes of bag valves.

The two-shell modification provides a symmetrical arrangement in which the angular extent of expansion (angle *a* in FIG. 12) may be 25° or more without encountering any tendency wherein the bag would be cammed off of the spout. Thus a very substantial latitude in size of bag opening can be accommodated without detracting from the effectiveness of the seal which is provided.

Although only preferred embodiments of my invention have been shown and described herein, it will be understood that various changes and modifications 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. An expandable spout for a bag filling machine comprising a filling tube, a flexible resilient sleeve surrounding said filling tube, an expander device disposed between

said sleeve and said filling tube, and means for moving one end of said expander device away from said filling tube against the resilience of said sleeve to engage the valve of a bag which has been fitted over said spout.

2. An expandable spout as claimed in claim 1 in which said expander device comprises a shell and a base portion, said base portion being disposed beyond the rear edge of said sleeve, said shell extending forwardly of said base portion between said sleeve and said filling tube, and the front end of said shell being free, the resilience of said sleeve maintaining the free front end of said shell in contact with the outer surface of said filling tube during the expanding movement of the rear end thereof.

3. An expandable spout as claimed in claim 2 which includes a yoke pivotally connected to said base portion, and an air cylinder for actuating said yoke.

4. An expandable spout for a bag filling machine as claimed in claim 1 in which said filling tube has a front portion of a given outer diameter, and rear and intermediate portion of reduced outer diameter, a clamp ring having an outer diameter substantially the same as the outer diameter of said front portion, the front end of said sleeve being confined between said clamp ring and the front end of said reduced portion, the clearance between said clamp ring and said reduced portion being less than the normal wall thickness of said sleeve.

5. An expandable spout as claimed in claim 1 in which said expander device comprises a pair of oppositely disposed shells located at either side of said filling tube and overlying same, each shell having an arcuate length of substantially 180° in a direction perpendicular to the axis of said filling tube.

6. An expandable spout as claimed in claim 1 in which said expander device comprises a pair of oppositely disposed shells overlying said filling tube, a supporting bracket, an air cylinder mounted on said bracket, a pair of levers pivotally mounted at one end on said bracket, means connecting the other end of said levers to the rear end of each shell, said air cylinder including a piston, and link means connecting each lever with said piston for spreading said levers and expanding said shells, the front end of each shell being free.

7. An expandable spout as claimed in claim 6 in which said bracket includes a forwardly extending lug, and a stop screw mounted in said lug for engagement with said piston to limit the throw of said piston and the expansion of said shells.

No references cited.

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