Nov. 6, 1962 E. M. LAU 3,062,307

BAG FILLING MACHINES

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FIG. 4

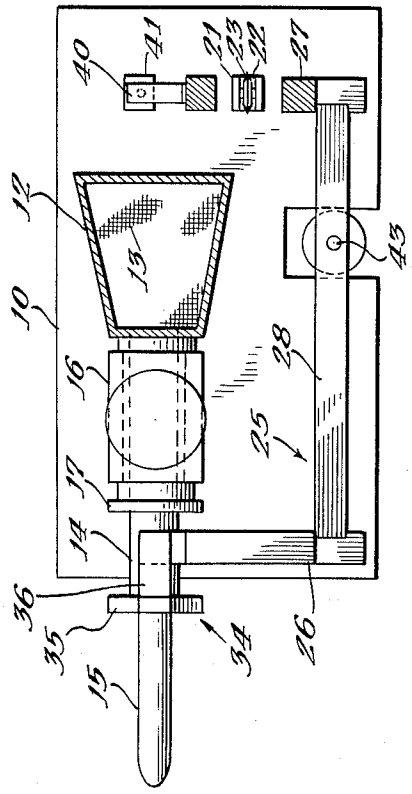

FIG. 5

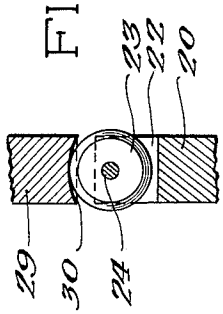

FIG. 7

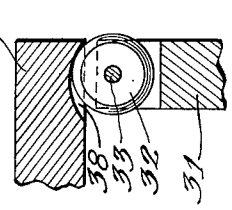

FIG. 1

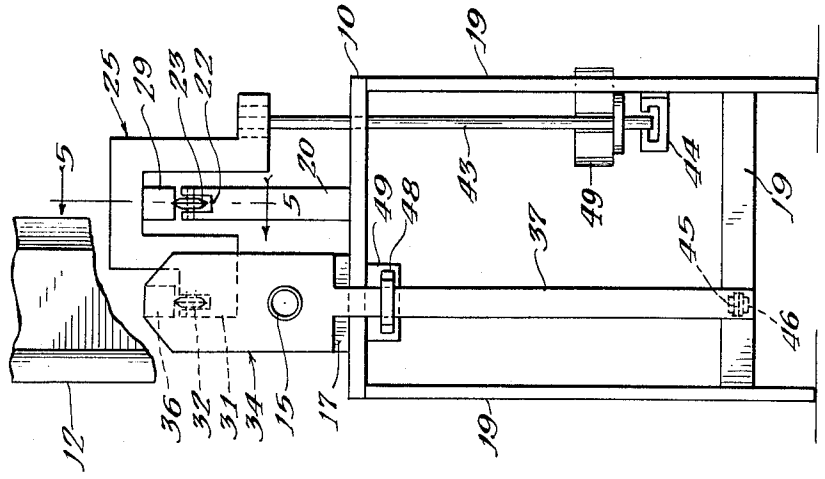

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FIG. 3

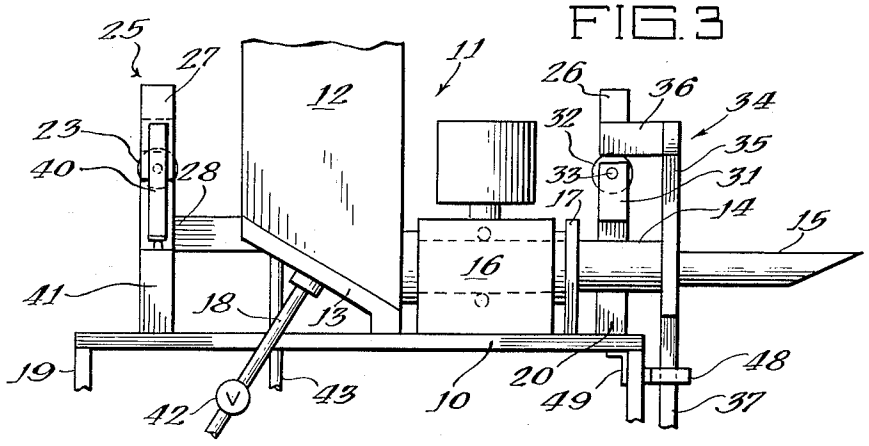


FIG. 2

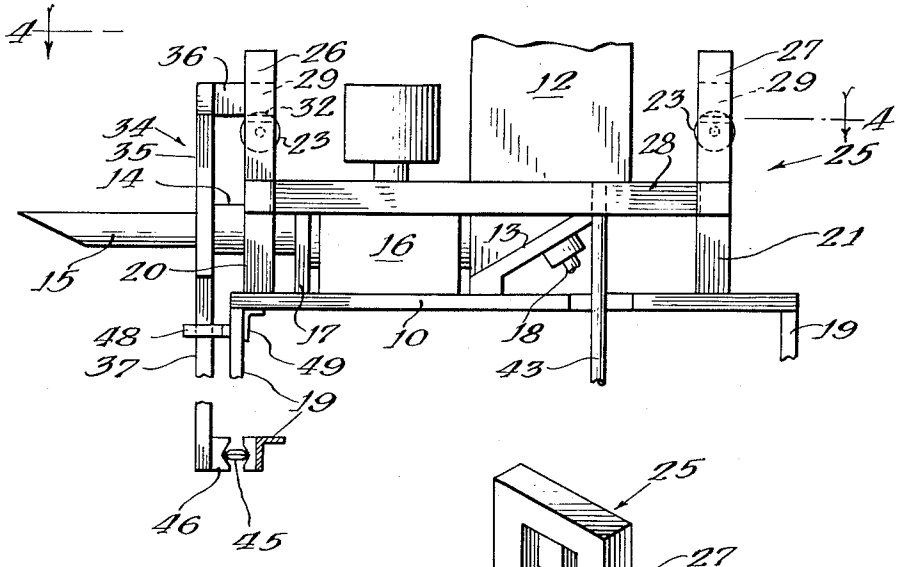
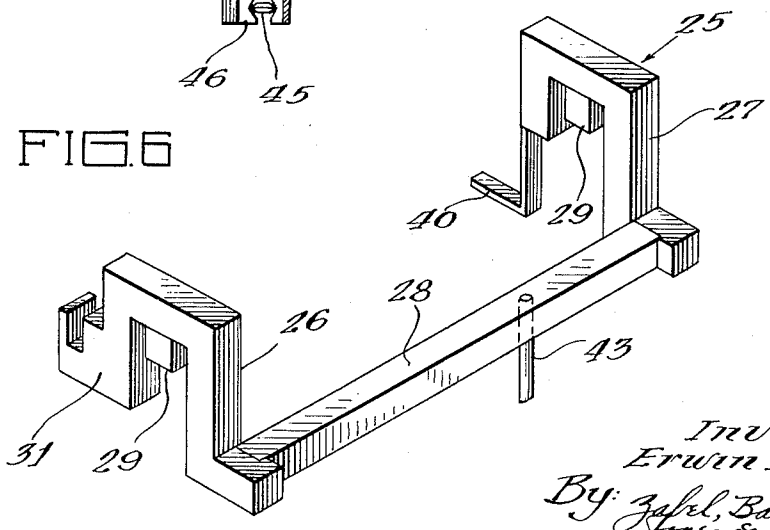


FIG. 6



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3,062,307

BAG FILLING MACHINES

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9 Claims. (Cl. 177—118)

This invention relates to improvements in bag filling machines of the automatic cut-off type.

In machines of this type, the bag is suspended from the filling spout. The filling spout is mounted on a frame which bears on the beam of scale mechanism. When a predetermined amount of material has been fed into the bag, the movement of the beam cuts off the filling operation.

An object of this invention is to provide a bag filling machine in which the beam axis is parallel to the spout axis so that the position of the bag on the spout will not vary the length of the lever arm, and hence affect the accuracy of the scale mechanism.

Another object is to provide a spout assembly in the form of a suspended frame, thus reducing the number of bearing points required and providing a simplified construction without sacrifice of sensitivity.

A still further object is to provide a beam construction which does not interfere with the location of the various parts of the feeding mechanism.

Still another object is to provide an improved bag filling machine which embodies a minimum number of bearing points, thus reducing the friction incident to operation and providing greater sensitivity.

The invention is shown with respect to feeding mechanism of the fluidizing type, such as shown in my copending application, Serial No. 608,760 filed September 10, 1956, now Patent No. 2,936,994, although it will be understood that this type of feeding mechanism is shown by way of example only, and the invention is equally applicable to other types of feeding mechanism.

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

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

FIG. 1 is a front elevation of a preferred embodiment of my invention;

FIG. 2 is a right side elevation thereof;

FIG. 3 is a left side elevation thereof;

FIG. 4 is a plan view taken along line 4—4 of FIG. 2;

FIG. 5 is a vertical section through the fulcrum;

FIG. 6 is an isometric view of the beam; and

FIG. 7 is a view similar to FIG. 5 showing the bearing means.

With reference now to FIGS. 1 to 4, the bag filling machine comprises a bed plate **10** and suitable supporting framework **19**. Mounted on the bed plate are feeding mechanism designated generally by the reference numeral **11** and scale mechanism which includes a beam **25**, and a suspended spout assembly **34**.

The feeding mechanism **11** shown herein by way of example comprises a conditioning chamber **12** having as its bottom wall a diffusing pad **13**. A flexible flanged tube **14**, such as a rubber tube, extends forwardly from an opening in the front wall of the conditioning chamber **12** and communicates with the rear end of a spout **15** on which the bag is to be suspended. The flanged tube **14** is supported at an intermediate point by a vertical plate **17** which is mounted on the bed plate **10**.

Material is caused to flow from the conditioning chamber **12** through the flanged tube **14** and into a bag when the diffuser pad **13** is energized by means of an air supply **18**.

Cut-off means to discontinue the feeding operation are

provided in the form of a pinch valve **16** for the tube **14**, and a valve **42** for the air supply **18**. The feeding mechanism is described in greater detail in my aforesaid copending application to which reference is hereby made.

Scale mechanism is provided to actuate the cut-off means when the weight of the bag contents reaches a predetermined amount. The scale mechanism comprises a beam **25** which is mounted on vertical fulcrum posts **20** and **21** in such a manner that the fulcrum axis of the beam is parallel to the axis of the spout **15**.

The fulcrum posts **20** and **21** project upwardly from the bed plate **10** to which they are suitably secured and are provided at their upper ends with suitable fulcrum means, such as the edge disks **23**. The disk **23** is shown in detail in FIG. 5, and is mounted in a slot **22** in each post by means of an axle **24**, the ends of the axle being received in suitable bores formed in the post.

The beam **25**, as shown in FIG. 6, comprises front and rear inverted U-shaped members **26** and **27** which are connected by a longitudinally extending side bar **28**. A hardened fulcrum pad **29** is secured to each of the members **26** and **27** and is provided with a notch **30** into which the fulcrum edge disk **23** extends. As more fully pointed out in the aforesaid copending application, the notch **30** is cut on a radius which is somewhat greater than the radius of the edge disk **23**, this arrangement providing a very sensitive and substantially frictionless bearing for the beam.

The front member **26** of the beam also includes a slotted support **31** which accommodates an edge disk **32**, mounted on an axle **33**.

A spout assembly **34** is suspended from the edge disk **32** as shown in FIGS. 1 and 3. The spout assembly **34** includes the spout **15**, a mounting plate **35** therefor, a support pad **36** which extends rearwardly from the upper portion of the mounting plate **35**, and a tail **37**. A suitable notch **38** similar to the notch **30** but of greater angular length of arc is formed in the lower surface of the support pad **36** and cooperates with the edge disk **32**, as shown in FIG. 7.

Thus the medial plane of the suspended spout assembly **34** will tend to remain vertical during the rocking of the beam **25**, and the lever arm, which constitutes the horizontal distance between the fulcrum points **23** and **32**, will be maintained constant at all times. According to this arrangement, the location of the bag upon the spout **15** will not affect the lever arm.

An actuating arm **40** is secured to the rear member **27** of the beam and engages the plunger of a microswitch **41** to stop the feeding operation when the beam is rotated in the counterclockwise direction, as viewed in FIGS. 1 and 6, the microswitch being suitably connected to the pinch valve **16** and to the cut-off valve **42** by means not shown herein.

The beam is loaded by applying suitable balance weights **49** to a weight rod **43** which, as shown in FIG. 1, depends from the side bar **28** from the beam. The weight rod may be rigidly secured to the side bar **28** as shown, or it may be linked thereto. Suitable stop means may be provided to limit the throw of the beam, and in the case of the rigidly connected weight rod shown, the stop means may be in the form of a yoke **44** which is suitably mounted on the framework and which engages the lower end of the weight rod.

In order to prevent pivoting of the spout assembly **34** about the fulcrum **32**, suitable strut means, such as a spacer point **45**, is provided at the lower end of the tail **37**. By locating the spacer point at the lower portion of the tail **37**, the lever arm with respect to the point of support **32** is sufficiently great as to develop only a compara-

tively small reaction force. Thus the load on the spacer point **45** is reduced and hence the frictional wear.

More specifically, the vertical distance between the point of support **32** and the spacer point **45** may be, for example, three times the horizontal distance between the center of gravity of the bag and the point of support. Therefore, the reaction force between the spacer point **45** and the tail **37** will be only one third of the bag weight, or about 33 pounds in the case of a one hundred pound bag. By thus reducing the reaction force and the friction, sensitivity is correspondingly increased.

Furthermore, the suspended spout assembly construction requires the use of only one spacer point as contrasted with the eight spacer points which are required in the floating frame type of construction shown in my earlier Patent No. 2,733,040, dated January 31, 1956. Thus, the problem of parallel alignment of a plurality of spacer points is eliminated, and greater sensitivity is obtained.

The spacer point **45** is located between notched plates **46** and **47**, one plate being mounted on the tail **37**, and the other being connected to a suitable cross member of the framework.

The suspended spout assembly **34** is confined against inadvertent removal by means of a yoke **48** which loosely surrounds a portion of the tail **37**. However, the yoke **48** should have sufficient clearance to permit the spout assembly to move forwardly and upwardly to a slight extent from the centered position. The yoke **48** may be removably secured to a plate **49** which depends from the bed plate **10**.

The means by which the spout assembly is suspended from the beam, namely the edge disk **32** and the notched support pad **36**, in addition to providing a very sensitive bearing or fulcrum point, also permits the parts to seek a position of equilibrium in which the spout assembly moves forwardly and climbs slightly on the edge disk **32**, as shown in FIG. 7. This is due to the fact that there is also a horizontal reaction force between the edge disk **32** and the support pad **36** which corresponds in magnitude to the reaction force of the spacer point **45**.

To the extent that the tangent of the line of contact between the edge disk **32** and notch departs from the horizontal, this climbing tends to reduce slightly the sensitivity of the bearing point, but the extent of climbing is minimized by locating the spacer point **45** so as to reduce the reaction force as pointed out above. However, the horizontal reaction force has no effect on the lever arm of the beam because it is parallel to the fulcrum axis.

Thus it will be seen that the edge disk **32** provides bearing means in which sensitivity of action in one direction is not affected by a horizontal reaction force which is exerted in a direction perpendicular thereto.

In operation, the weight rod **43** is first loaded in accordance with the amount of material to be packed in the bag. Then the bag is slipped over the spout **15** and the filling operation is initiated by causing the pinch valve **16** to be opened and by supplying air to the diffusing pad **13**. At this time the weight rod **43** engages the left arm of the yoke **44** as shown in FIG. 1. Then, when the desired amount of material has been fed into the bag the beam **25** will be tripped causing the beam to be rotated in the counterclockwise direction and operating the microswitch **41** to actuate the cut-off means **16—42**.

By providing a beam in which the longitudinal member **28** is disposed at one side, interference with the feeding mechanism **11**, and in particular with the conditioning chamber **12**, is avoided, thus providing a more compact arrangement and permitting application of the invention to various types of feeding mechanisms.

The invention is equally applicable to other types of bag filling machines, such as an auger type of machine, the fluidizing type being shown herein for purposes of illustration only.

Although a preferred embodiment of this invention has been shown and described herein, it will be understood that various modifications and changes may be made in the construction shown without departing from the spirit of this invention as pointed out in the appended claims.

I claim:

1. A bag filling machine comprising material feeding mechanism and scale mechanism, said scale mechanism including a beam, said beam comprising spaced front and rear beam arms and a longitudinal connecting member, a spout assembly supported by said beam forwardly of said front beam arm and including a bag supporting spout communicating with said feeding mechanism, means for mounting said beam on a fulcrum axis which is parallel to the axis of said spout whereby the longitudinal position of a bag which is suspended from said spout will not affect the lever arm of the force exerted by said bag upon said beam, said feeding mechanism including cut-off means for discontinuing the feeding operation, means actuated by the movement of said beam when the material fed into said bag reaches a predetermined weight for actuating said cut-off means, said beam mounting means comprising two spaced aligned fulcrum members engaging said two beam arms, and balance weight means connected to said beam at a point rearwardly of said front beam arm.

2. A bag filling machine comprising material feeding mechanism and scale mechanism, said scale mechanism including a beam, said beam comprising spaced front and rear beam arms and a longitudinal connecting member, a spout assembly having a spout and a supporting frame therefor, means for suspending said spout assembly from said beam, fulcrum means for mounting said beam on a fulcrum axis which is parallel to the axis of said spout whereby the longitudinal position of a bag which is suspended from said spout will not affect the lever arm of the force exerted by said bag upon said beam, said feeding mechanism being in communication with said spout so that material may be fed through said spout and into a bag which is suspended therefrom, and said feeding mechanism including cut-off means for discontinuing the feeding operation, means actuated by the movement of said beam when the material fed into said bag reaches a predetermined weight for actuating said cut-off means, and balance weight means connected to said beam at a point rearwardly of said front beam arm.

3. A bag filling machine as claimed in claim 2 in which said beam mounting means comprises a pair of aligned edge disks and arcuate notched fulcrum pads for supporting said beam at said front and rear beam arms, said balance weight means being located between said front and rear beam arms but being offset on the opposite side of said fulcrum axis from said spout assembly, and in which said spout assembly suspending means comprises an edge disk and an arcuate notched support pad cooperating therewith.

4. A bag filling machine as claimed in claim 2 in which said means for suspending said spout assembly from said beam comprises bearing means for taking up a horizontal reaction force imposed on said spout assembly by the weight of a bag suspended thereby, and for providing a knife edge type of bearing which provides sensitivity of movement of said spout assembly in a plane perpendicular to said beam axis while said reaction force is present.

5. In a bag filling machine of the automatic cut-off type, the combination of a spout from which a bag may be suspended, a beam mounted for movement about a fulcrum axis which is parallel to the axis of said spout, and means for supporting said spout from said beam, said support means comprising a support plate, bearing means for supporting said support plate from said beam so that said support plate may hang freely in a plane perpendicular to asid fulcrum axis, a tail for said support plate, and strut means engaging the lower portion of said tail in order to provide a reaction point, the lever arm of said reaction point with respect to said bearing means being substantially greater than the lever arm of a spout sus-

pended bag with respect to said bearing means so that the force exerted on said strut is substantially less than the force exerted by the weight of said bag on said spout, thereby reducing frictional wear of said strut means, and balance weight means connected to said beam at a point which is offset in a direction parallel to said fulcrum axis from said spout suspended bag.

6. A bag filling machine as claimed in claim 5 in which said bearing means comprises an edge disk carried by said beam and an arcuately notched bearing pad cooperating therewith and carried by said support plate, the edge of said edge disk being parallel to said fulcrum axis whereby said bearing means can accommodate a horizontal reaction force without substantially impairing the sensitivity thereof with respect to movement in said perpendicular plane.

7. In a bag filling machine of the automatic cut-off type the combination of a bed plate, feeding mechanism located on said bed plate, a bag supporting spout communicating with said feeding mechanism, fulcrum means mounted on said bed plate and providing a fulcrum axis which is parallel to said spout, beam means mounted on said fulcrum means, said beam means comprising front and rear inverted U-shaped members and a longitudinal member connecting said front and rear members, said longitudinal member being located on the opposite side of said fulcrum axis from said feeding mechanism so as to avoid interference between said beam means and said feeding mechanism, a portion of said feeding mechanism extending into the space between said front and rear beam members, said spout being supported by said beam means at a point forwardly of said front member, and a balance-weight connected to said beam means at a point rearwardly of said front member.

8. A bag filling machine as claimed in claim 7 in which said fulcrum means comprises a pair of spaced posts mounted on and projected upwardly from said bed plate and extending into the spaces defined by the inverted U-shape of said front and rear members respectively, the upper end of each post being notched, an edge disk rotatably mounted in each notch, and an arcuately notched fulcrum pad carried on the under surface of the connecting portion of each of said U-shaped members for cooperation with said edge disk.

9. In a bag filling machine of the automatic cut-off type, the combination of a bag supporting spout, a beam mounted for movement about a fulcrum axis which is parallel to the axis of said spout, said beam comprising spaced front and rear beam arms and a longitudinal connecting member, a suspended spout assembly for supporting said spout from said beam, bearing means for suspending said spout assembly from said beam and providing an upper reaction point for said spout assembly means providing a lower reaction point for said spout assembly, the vertical distance between said upper and lower reaction points being substantially greater than the horizontal distance between the outer end of said spout and said bearing means, and balance weight means connected to said beam at a point rearwardly of said front beam arm.

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