

April 9, 1968

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3,376,905

BAG SETTLER FOR BAG FILLING MACHINE

Filed Nov. 29, 1965

2 Sheets-Sheet 1

FIG. 1

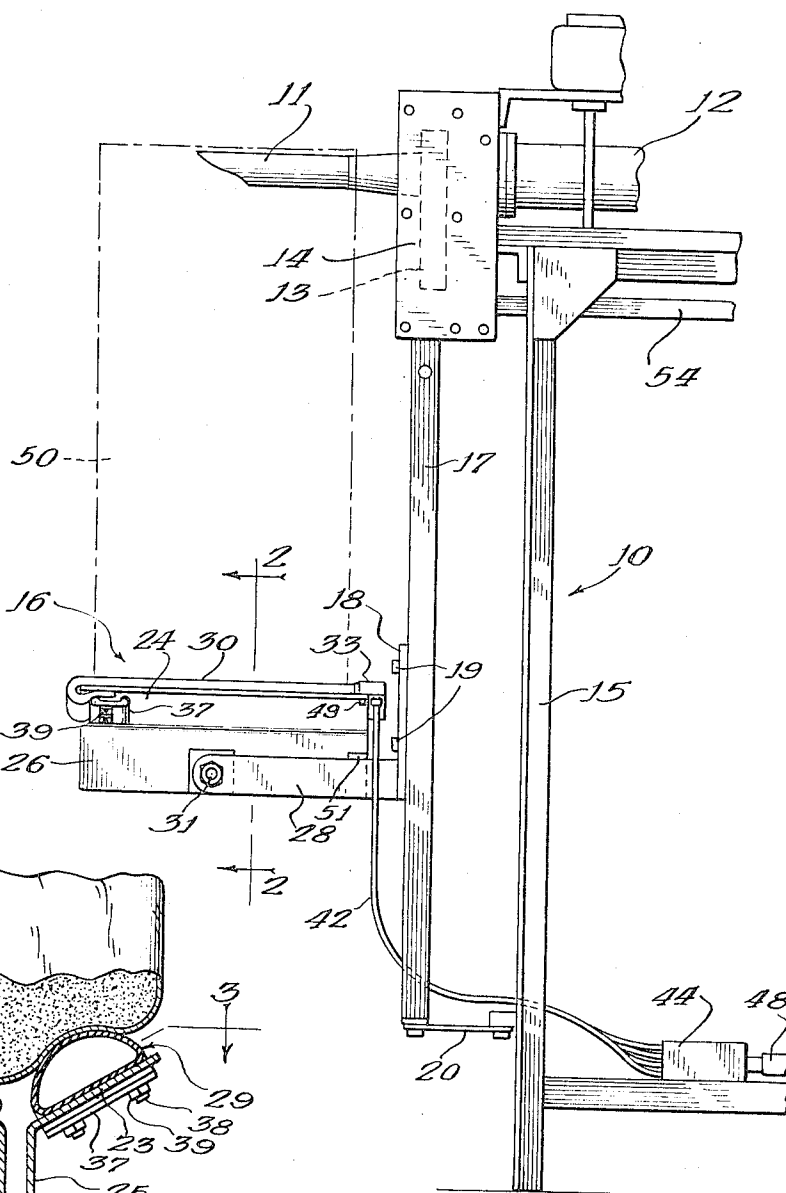
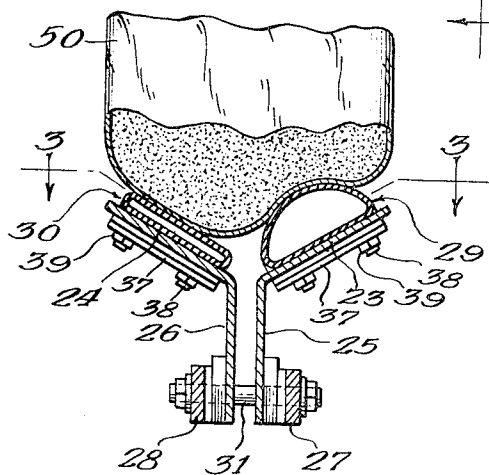


FIG. 2



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FIG. 3

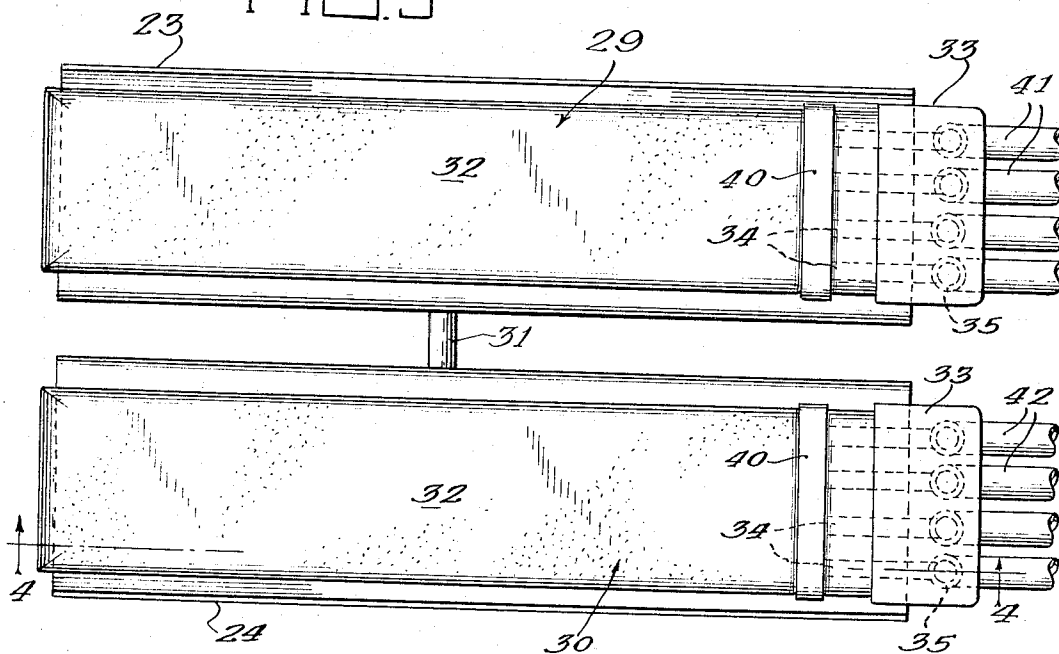


FIG. 4

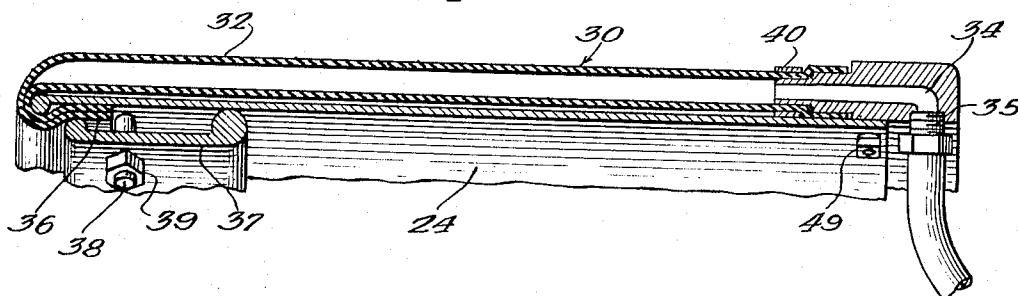
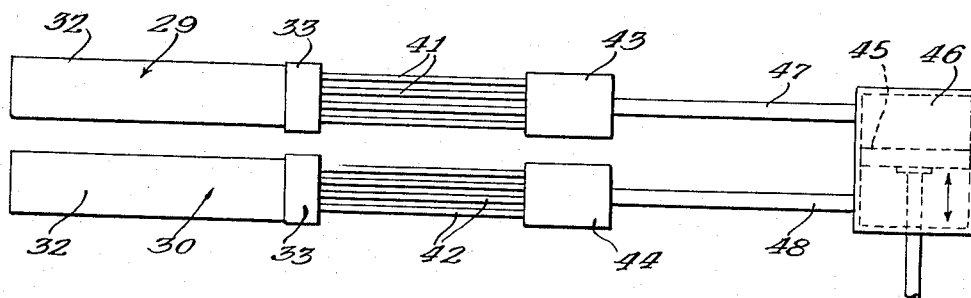


FIG. 5



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3,376,905

BAG SETTLER FOR BAG FILLING MACHINE
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 Filed Nov. 29, 1965, Ser. No. 510,279
 8 Claims. (Cl. 141-76)

ABSTRACT OF THE DISCLOSURE

A bag filling machine includes a bag, a saddle hanger, and a settler, all being mounted on the scale mechanism of the machine. The settler includes a pair of inclined saddle plates spaced from each other and pivotally mounted on bracket arms extending forwardly from the saddle hanger. Overlying each saddle plate is a pneumatic pad which serve as vibrating elements and also perform a cushioning function. An air pump is mounted on the machine frame or on the floor. The two ends of the pump cylinder are each connected to a separate manifold. Each manifold is connected to one of the pneumatic pads by a plurality of flexible conduits. The conduits being flexible do not interfere with the tilting or vertical movement of the saddle plates. Each pneumatic pad comprises a length of flexible rubber tubing having header means at one end to provide a connection with the plurality of flexible conduits. The other end of the rubber tubing is folded under the saddle plate and secured thereto by a clamping plate.

This invention relates to a bag settler for bag filling machines of the weighing or automatic cutoff type, and is an improvement on the invention of my earlier Patent No. 3,115,905, granted Dec. 31, 1963.

In that patent, the settler was actuated by motor driven eccentrics, and both the saddle and the actuating means were mounted on the scale mechanism. The disadvantage of this arrangement is that the scale mechanism is called upon to support the weight of the motor and the actuating means, and under certain circumstances, the additional weight of the motor will diminish the sensitivity of the scale mechanism.

It is an object of the present invention to provide a saddle type of settler which can be mounted on the scale mechanism but in which the actuating means is not mounted on the scale mechanism.

Another disadvantage of the earlier arrangement is that it is difficult to combine a tilting saddle with a settling device where the motor and actuating means are also mounted on the scale mechanism.

An object of my invention is to provide a saddle type of settler which is operative during the bag filling operation, and which can be tilted at the conclusion of the bag filling operation to facilitate removal of the bag from the spout. In other words, according to my invention, settling can be combined with bag ejection.

According to my invention, I provide a pneumatic type of settler in which the actuating means is in the form of a motor driven pump which can be located either on the framework of the machine, or on the floor, and which is connected to the saddle by a flexible conduit which does not interfere either with the sensitivity of the weighing operation, or with the tilting of the saddle incident to bag ejection.

A further advantage of my invention is that any vibration of the actuating means will not be transmitted to the scale mechanism, due to the flexibility of the connecting means.

I have also found that where the bag contacting portions of the saddle are in the form of pneumatic pads, an improved type of settling action is provided as contrasted

with the usual vibrating saddle plates which tend to slap the bag.

It is another object of my invention to provide a settler which provides an effective settling action and at the same time largely eliminates the transmission of vibratory motion to the scale points.

A further object of my invention is to provide an improved settler device which eliminates the use of bearings and pivoted connections in the proximity of the saddle, and thus avoids the clogging of bearings and pivoted connections occasioned by the powdered material that dribbles from the spout after removal of the bag.

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

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

FIG. 1 is a side elevation of a portion of a bag filling machine embodying my invention;

FIG. 2 is a vertical section taken along line 2-2 of FIG. 1 showing the relationship of the saddle to the bag to be filled;

FIG. 3 is a plan view taken along line 3-3 of FIG. 2; FIG. 4 is a section taken along line 4-4 of FIG. 3; and

FIG. 5 is a diagram illustrating the operation.

In FIG. 1 the reference numeral 10 designates generally a bag filling machine on which is mounted a settling device 16. The bag filling machine includes a spout 11 which communicates with the hopper (not shown) of the bag filling machine by means of a flexible tube 12. The spout 11 and the settling device 16 are both mounted on the scale mechanism of the machine, the scale mechanism including a spout supporting frame 13 and a scale beam 54. In the embodiment shown, the scale mechanism is of the floating frame type shown and described in the aforesaid Patent No. 3,115,905, in which frame 13 and its associated parts are supported from side brackets 14 in such a manner as to provide for substantially frictionless movement in the vertical direction only. However, my invention is equally adapted for use with other types of scale mechanism, such as that shown in my Patent No. 3,113,608, granted May 19, 1964.

The bag filling machine 10 also includes a framework 15 upon which the side brackets 14 are mounted, the side brackets also supporting the fulcrum of the beam 54.

Forming a part of the frame 13 and depending therefrom are a pair of spaced saddle rails 17 on which the settling device is adjustably mounted by means of base plate 18 and bolts 19.

The settler includes a pair of inclined saddle plates 23 and 24 each having vertical portions 25 and 26 which are spaced from each other so as to define a slot into which the seam of the unfilled bag can extend. The saddle plates are pivotally mounted on bracket arms 27 and 28 respectively by means of a pivot pin 31. The bracket arms are secured to the clamp plate 18.

Overlying each saddle plate 23 and 24 is a pneumatic pad 29 and 30 respectively. Since the pads are of identical construction, only one pad will be described.

As shown in FIG. 3 each pad comprises a length of rubber tubing 32 having at one end a header 33 in the form of a block having four passageways 34 formed therein. Nipples 35 extend from the undersurface of the header 33, each passageway connecting one nipple with the interior of the tube 32. The header is secured to its saddle plate by suitable screws 49.

The other end 36 of the tube 32 is gripped by a clamp plate 37 to close same. By means of a stud 38 and nuts 39, the clamp plate 37 may be drawn up tightly against the resiliency of the rubber tube 32 to form a very tight seal which prevents any air leakage. The header 33 is sealed to the tube 32 by a clamping band 40.

Thus a pneumatic pad is provided for each saddle plate, and means are provided to supply air alternately to the two pads 29 and 30 at a high frequency and in opposed phase relationship.

As shown in FIG. 5 each pad 29 and 30 is connected to a manifold 43 and 44 respectively by a series of flexible tubes 41, 42.

A reciprocating piston 45 in a closed cylinder 46 provides means for energizing the pads 29, 30. One end of the cylinder 46 is connected to the manifold 43 by a tube 47, and the other end of the cylinder 46 is connected to the manifold 44 by a tube 48. Thus, reciprocation of the piston 45 causes first one pad and then the other to be expanded. The piston is preferably reciprocated at a frequency of 16 complete cycles per second, and the volume of the cylinder is such that the amplitude of vibration of the pads will be substantially $\frac{1}{2}$ inch.

Due to the relatively high frequency and the volume of air involved, the conduit means 41, 42, must be of substantial cross section; however the conduit means must also be flexible so as not to interfere with the action of the scale mechanism. I have found that the desired combination of cross sectional area and flexibility can best be obtained by providing a plurality of smaller tubes rather than a single tube of large diameter. In the embodiment shown in which the pads are substantially 16 inches long and 4 inches wide, I have found that $\frac{3}{4}$ inch high pressure flexible rubber tubing ($\frac{3}{8}$ inch I.D.) is satisfactory, the total cross sectional I.D. area of the four tubes of each group thus being about one-half a square inch. The tubes 47, 48, connecting the manifold with the cylinder 46 are at least equal to, and preferably somewhat greater, in cross sectional I.D. area than the total cross sectional I.D. area of the corresponding tube groups 41 and 42.

One advantage of my arrangement is that full surface contact is obtained between the vibrating elements and the corresponding portion of the bag surface, thus providing an improved settling action.

Furthermore my settler device is adapted for use with tilting saddle plates so as to facilitate removal of the bag from the spout 11 at the conclusion of the bag filling operation. If desired, mechanical means, such as an air cylinder, may be provided for automatically tilting the saddle plates.

When my settler device is used in connection with tilting saddle plates, I find it advisable to provide a leaf spring 20 between the lower end of the hanger rails 17 and the framework 15 of the machine, the leaf spring stabilizing the lower end of the hanger rails against lateral movement without interfering with the friction free vertical movement which is desired.

The present invention also provides a simple and inexpensive way of fabricating the pneumatic pads and for attaching same to the saddle plates. For instance, the tubing 32 may be ordinary three inch rubber tubing, $\frac{1}{8}$ inch wall thickness. The alternate setting action, first on one side and then on the other, is shown in an exaggerated manner in FIG. 2 for purpose of illustration.

The double ended cylinder 46 provides separate means for energizing each pad in opposed phase relationship. However separate pistons and cylinders may be used, with the pistons moving in 180° phase relationship.

The vertical portions 25, 26 of the saddle plates are provided with stop lugs 51 to prevent backward tilting movement. It will be noted that the pivot pin 31 is located forwardly of the center of gravity of the saddle plates and of the bag 50 which is supported thereby so that the weight of the bag and contents will maintain the saddle plates in the horizontal position shown in FIG. 1. After the filling operation has been completed, the upper portion of the bag is pulled forwardly, thus rocking the saddle plates about the pivot pin to an extent wherein the center of gravity of the bag moves forwardly of the pivot pin 31. Thereupon as the valve of the bag slides off of the spout 11, the weight of the bag will cause further

tilting movement up to the point where the bag will slide off of the pads 29, 30 of its own accord, and can be guided by the operator on to a pallet or cart. Suitable stops may be provided, if desired, to limit the forward tilting movement.

To summarize the operation, the pump 45, 46 is driven during the bag filling operation and shut off by the tripping of the scale mechanism 13, 54. The frequency of the vibration of the pads 29, 30 is sufficiently high as not to interfere with the accuracy of the weighing operation, and there are no eccentrics or counterweights mounted on the saddle itself which would cause such interference. As the bag becomes filled, more and more of the weight of the bag contents is taken up by the pneumatic pads as contrasted with the spout 11, with the result that the vibratory motion of the pads 29, 30 will be transmitted to the bag contents to settle the same and to provide a greater density of packed material. At the conclusion of the bag filling operation, the operator can easily remove the bag from the spout and from the pads without lifting same, due to the tiltable mounting of the saddle plates and the flexible connections 41, 42.

Although only a preferred embodiment of my 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 my invention as pointed out in the appended claims.

I claim:

1. A settler for a bag filling machine which includes a bag supporting spout, and scale mechanism for supporting said spout and said settler, said settler comprising a saddle hanger, a pair of spaced saddle plates mounted on said hanger, expansible means overlying each of said saddle plates for engaging the lower end of a bag as it is being filled for transmitting vibrations to the material within a bag supported by said spout, air supply means mounted independently of said saddle and said scale mechanism for supplying pulsing air to said bag engaging means to expand and contract same in a vertical direction, and flexible conduit means extending from said pad to said air supply means, said bag engaging means comprising a pneumatic pad for absorbing at least a portion of the vibratory reactive force between the bag and the saddle plates to reduce the transmission of vibratory motion to said scale mechanism through said saddle hanger.

2. A settler as claimed in claim 1 in which said air supply means includes double ended pump means for supplying air to said pads separately and in opposed phase relationship.

3. A settler as claimed in claim 1 in which said pneumatic pad comprises a length of flexible rubber tubing, a header connected to one end of said rubber tubing, means closing the other end of said rubber tubing, said header being secured to one of said saddle plates, and a plurality of passageways extending through said header, said flexible conduit means including a plurality of flexible tubes connected to said header, one for each of said passageways.

4. A settler as claimed in claim 3 in which said other end of said rubber tubing extends beyond the edge of the saddle plate and is folded up against the under surface thereof, and in which said closing means comprises a clamping plate engaging said other end and clamping same against said under surface.

5. In a bag filling machine which includes scale mechanism, the combination of a settling device comprising a saddle hanger mounted on and extending downwardly from said scale mechanism, a pair of saddle plates supported from said hanger at a point forwardly thereof and beneath the spout of said bag filling machine, pivot means for supporting said saddle plates to permit forward tilting movement thereof for ejecting said bag from said spout, a pneumatic pad overlying each saddle plate and secured thereto, pump means for supplying air to each pad

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in opposed phase relationship, and flexible conduit means extending from each pad and communicating with said pump means to permit tilting movement of said saddle plates.

6. A bag filling machine as claimed in claim 5 which includes a manifold located between each pneumatic pad and said pump means, and in which said flexible conduit means comprises a plurality of flexible conduits for each pad, extending from one of said pads to its associated manifold.

7. A bag filling machine as claimed in claim 5 which includes a plate adjustably mounted on said saddle hanger, a pair of bracket arms extending forwardly from said plate, said spaced saddle plates each including an inclined saddle plate portion, and a vertical portion, said vertical portions being spaced from each other, and pivot means comprising a pivot pin mounted in said bracket arms and extending through said vertical portions.

8. A bag filling machine comprising scale mechanism, a spout, a saddle located beneath said spout, said spout and said saddle each being supported by said scale mecha-

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nism and movable therewith, pivot means for supporting said saddle with respect to said scale mechanism to permit forward tilting movement of said saddle for ejecting said bag from said spout, a pneumatic pad overlying said saddle and secured thereto, pump means for supplying air to said pad to expand and contract same in a vertical direction at a high frequency, and flexible conduit means extending from said pad and communicating with said pump means to permit said tilting movement of said saddle.

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