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(54) Title: BULK BAG FILLER

(57) Abstract

A bag holder (2) comprising a frame assembly (10, 30), a bag support (50), an attachment assembly (60) and a control assembly (40). The frame assembly (10, 30) includes a base assembly (10) with vertical posts (30) extending upward therefrom. The bag support (50) is mounted on the posts (30) for vertical movement by the control assembly (40). The control assembly (40) preferably includes a cable assembly (42) which is driven by a drive assembly (48).


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BULK BAG FILLER

BACKGROUND OF THE INVENTION

Field of the Invention

The present invention generally relates to bag filling machines. More particularly, the invention relates to a bag filling machine which allows easier loading, unloading and movement of bags.

Description of the Prior Art

Large bag like containers are often used for the shipment of bulk materials from one location to another. These bulk bags have a capacity ranging from twenty cubic feet up to seventy cubic feet and may vary in size from thirty-five inches wide by thirty-five inches long by twenty-three inches high up to the same width and length bag having a height of eighty-two inches unfilled.

These bags are constructed with bag loops on the top of the bag which are used for transporting the bags from one location to another and also for holding the bags while they are being filled in a filling machine. The bag loops are generally constructed of a strong web-like material which is sewn onto the upper corners of the square bag. The bulk bags also include an upper inlet spout which is connected to a bag filling apparatus provided in conjunction with the filling
machine. The material to be loaded into the bag is fed through the filling apparatus, through the inlet spout, and into the bag.

Many prior art bag filling machines include hooks for holding the bag loops while the bag is filled. The hooks are mounted on a horizontal frame which is moveably mounted on the filling machine frame. Typical filling machine frames include either four posts at the corners of the machine or two posts at the rear of the machine from which the horizontal frame is cantilevered. These prior art machines generally encounter problems in installing and removing the bags from the filling machine since the posts often encumber connection of the loops or the inlet spout.

The horizontal frames are generally moved up and down using hydraulics, pneumatics or screw drives. Since these prior art filling machines are generally very bulky, the drive mechanisms must be rather substantial in order to provide the large forces needed to move the horizontal frame. These drive mechanisms are typically limited in their range of motion or must be even more massive. The limited range of motion can be a problem if, for example, it is desired to move the filling apparatus away from the bag after filling to facilitate removal thereof. Additionally, the cantilevered horizontal frames require additional force to overcome the torsional force on the front of the frame.

As such, there is a need for a bag filling machine which allows easier loading, unloading and control of a bag.
SUMMARY OF THE INVENTION

The present invention relates to a bag holder comprising a frame assembly, a bag support, attachment means and a control assembly. The frame assembly preferably includes a base assembly with two vertical posts extending upward therefrom. The posts are positioned at the approximate mid-points of two sides of the base assembly. The bag support is mounted on the posts for vertical movement by the control assembly. The control assembly preferably includes a cable assembly which is driven by a drive assembly. The attachment means are interconnected to the bag support for connection of a bulk bag thereto.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is an elevation view of the preferred embodiment of the present invention.

Figure 2 is a side elevation view of the preferred embodiment.

Figure 3 is a plan view taken along the line 3-3 in Figure 1.

Figure 4 is a top plan view of the bag support.

Figure 5 is a side elevation view of the bag support.

Figure 6 is a top plan view of an alternative embodiment of the bag support.
Figure 7 is a partial elevation view of the bag loader showing the cable assembly.

Figure 8 is an elevation view taken along the line 7-7 in Figure 7.

Figure 9 is an elevation view of an alternative embodiment of the present invention.

Figure 10 is a plan view of the bag support of the embodiment shown in Figure 9.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

The preferred embodiment will be described with reference to the drawing figures wherein like numerals represent like elements throughout.

Referring to Figure 1, a first embodiment of the bag holder 2 of the present invention is shown. The bag holder 2 generally comprises a base 10, vertical supports 30 and a bag support 50. Base 10 generally comprises longitudinal and transverse frame members 16 and 18, and air spring supports 22, see Figure 3. The air spring supports 22 extend between and depend from the transverse frame members 18. A number of air springs 20 are positioned at various locations on the air spring supports 22. The air springs 20 are preferably joined together by pneumatic tubing 24.

A platform 26 (shown in phantom in Figure 3) is positioned on the air springs 20 and may be raised and
lowered thereby. The platform 26 is preferably provided with a vibrating mechanism (not shown) whereby, vibration of the platform 26 vibrates the bag to deaerate and densify the loaded material. By raising the platform 26 with the air springs 20 prior to vibration, the vibration can be concentrated on the bag 4 and away from the remainder of the bag holder 2. The air springs 20 may also be used to tamp the platform 26 into a suspended bag or raise and drop a bag resting on the platform 26 to provide additional packing of the material.

Base 10 preferably sits on load cells 12 which measure the total weight of the bag 4 and the structural unit. The weight of the bag 4 can then be determined by subtracting the weight of the structural unit from the weight determined by the load cells 12. Bags 4 preferably rest on a pallet 15 loaded onto the platform 26, but may be positioned directly on the platform 26. The pallet 15 allows a filled bag to be removed from the device 2 with a forklift.

With reference to Figures 1 and 2, each vertical support 30 of bag holder 2 is comprised of a post member 31 which extends vertically from the approximate midpoint of a respective longitudinal frame member 16. Each post 31 has a plurality of apertures 32 beginning at about its midpoint and extending towards the free end thereof. The apertures
permit passage of stop pins (not shown) therethrough to define a lower limit to the range of motion of the bag support 50. The vertical posts 31 are supported by bracing members 38 which each extend from the longitudinal frame members 16 at about a forty-five degree angle until they contact the post 31.

The bag support 50 is shown in Figures 4 and 5. The bag support 50 generally comprises longitudinal bag support members 52 and transverse bag support members 54. The bag support 50 may also include a number of filling apparatus support members 58 arranged in various configurations between the longitudinal and transverse bag support members 52, 54. The filling apparatus support members 58 support the bag filling apparatus 80. Any one of a number of various bag filling apparatuses 80 can be used and the configuration of the filling apparatus support members 58 can be adjusted accordingly.

A sleeve 56 is provided perpendicular to each transverse bag support member 54 and is preferably positioned at the midpoint thereof. Each sleeve 56 is dimensioned to fit over and move vertically on a respective post 31. The sleeves 56 guide the vertical movement of the bag support 50. Control of this vertical movement will be described in further detail hereinafter.
The bag support 50 further includes attachment means 60 for attaching a bag 4 (See Figure 1) thereto. The attachment means 60 can include various means to grasp the bag 4 by its loops or sleeves or the like. The grasping means can be provided in various configurations to correspond to the configuration of the bag loops or sleeves.

The preferred attachment means 60 configuration is shown in Figures 4 and 5. In this preferred configuration, the bag support 50 includes two attachment means 60, one on each side of the filling apparatus 80. Each attachment means 60 includes an actuator 62 which is attached at one end by a pivotal mount 64 to the support members 58. The other end of the actuator 62 includes a shaft 66 which extends therefrom and attaches to a pivotal linkage 68. The pivotal linkage 68 interconnects the shaft 66 to a transverse axle 70 which extends between the two longitudinal bag support members 52. Each end of the transverse axle 70 is interconnected with a hook member 72. Activation of the actuator 62 pivots the hook members 72 between open and closed positions. In the closed position, each hook member 72 is positioned adjacent to a clasp member 74 which prevents inadvertent release of a bag loop 6 from hook 72. The actuators 62 are preferably controlled by fluid actuation.
As can be seen in Figure 4, the four hooks 72 of the bag support 50 are positioned proximate to the four corners thereof. With the vertical posts 31 extending at approximately the mid point of the transverse bag support members 54, the hook members 72 are spaced from the post 31 and are generally accessible by an operator moving about the bag holder 2.

In the alternate embodiment shown in Figure 6, the attachment means 60 are not connected directly to support members 52, 54 and 58. Instead, load cells 59 are positioned between the bag support 50 and the attachment means 60. The load cells 59 measure the weight of the bag 4 and attachment means 60 when the bag 4 is in a suspended position. The weight of the bag 4 can then be determined by subtracting the weight of the attachment means 60 from the weight determined by the load cells 59. This is preferred in hang filling applications wherein the bag 4 is suspended during filling.

The preferred method of controlling movement of the bag support 50 will be described with reference to Figures 7 and 8. The bag support 50 is raised and lowered using a cable assembly 40. The assembly 40 includes a cable 42 which is connected at one end to a connection means 46 attached to the transverse bag support member 54. The cable 42 extends up and around a pulley 41 positioned proximate to the top of the
post 31, down through the post 31, through a pulley assembly 47 and to a drive mechanism 48. The pulley assembly 47 is preferably configured such that the cables 42 extending from both sides of the bag holder 2 can be simultaneously controlled by a single drive mechanism 48. The drive mechanism 48 preferably includes a motor, but can be any desired drive means including an electric motor, a hand crank, a powered winch or the like.

In the preferred embodiment, the drive mechanism 48 is activated to position the bag support 50 in various positions. First, the bag support 50 is lowered to height which is comfortable for the operator to connect the bag loops 6 and the bag inlet spout. Once connected, the bag support 50 is moved to the proper height for bag filling. The height will depend on the size of the bag 4, the length of the loops 6, and whether the bag 4 will be suspended during filling or rest on the platform 26. After the bag 4 is filled, the drive mechanism is lowered to provide slack in the loops 6. Once the loops 6 are slacked, the attachment means 60 is activated to release the loops 6 and the inlet spout is automatically released from the filling apparatus 80. Once the bag 4 is released, the bag support 50 is raised to a position which does not encumber removal of the bag 4 from the bag holder 2.
The cable assembly 40 may also be used to tamp the bag 4 during or after filling of the bag 4. This is achieved by cycling the drive mechanism 48 to quickly raise and lower the bag support 50 to tamp the bag 4 against the pallet 15 or platform 26.

It is understood that the movement of the bag support 50 may be controlled by other means, including the use of hydraulics, pneumatics, screw drives, manual manipulation or other similar means.

An alternate embodiment of the bag holder 102 is shown in Figures 9 and 10. Bag holder 102 generally includes the same components as bag holder 2, but the vertical supports 130 are positioned adjacent to the corners of the base 110. The vertical posts 131 may be attached to either the longitudinal frame members 116 or the transverse frame members 118. Bracing members 138 are preferably provided to stabilize the bag holder 102.

As shown in Figure 10, the sleeves 156 of bag support 150 are aligned with the position of the posts 131. Movement of the bag support 150 is preferably controlled by a cable assembly 140 similar to that described above, but may also include other means.
We claim:

1. A bag holding apparatus comprising:
   a base assembly;
   a pair of posts extending from the base assembly;
   a bag support assembly including at least two opposed frame members, each frame member having first and second ends and a post engagement means positioned between its ends.

2. The bag holding apparatus of claim 1 wherein the two opposed frame members are interconnected by two additional frame members to define a generally rectangular frame assembly including four corners.

3. The bag holding apparatus of claim 2 wherein a hook member is positioned proximate to each of the corners of the frame assembly whereby the hook members are spaced from the posts.

4. The bag holding apparatus of claim 1 wherein each post engagement means includes a sleeve connected to a respective opposed frame member and dimensioned to correspond to a respective post.

5. The bag holding apparatus of claim 1 wherein the bag support assembly is moveably engaged with the posts.
6. The bag holding apparatus of claim 5 wherein movement of the bag support assembly is controlled by a drive mechanism.

7. The bag holding apparatus of claim 6 further comprising a cable assembly including a cable supply which is connected at a first end to the bag support assembly and associated at a second end with the drive mechanism such that the drive mechanism controls movement of the bag support by varying the amount of cable supplied.

8. The bag holding apparatus of claim 6 further comprising means for selectively activating the drive mechanism to lift the bag and deactivating the drive mechanism to drop the bag and tamp it as it is filled.

9. The bag holding apparatus of claim 1 wherein the bag is suspended above a platform as it is filled with a desired material.

10. The bag holding apparatus of claim 9 further comprising means for moving the platform against the bag as it is being filled to cause compaction of the material.

11. The bag holding apparatus of claim 10 wherein the means for moving the platform includes at least one air spring.
12. The bag holding apparatus of claim 1 further comprising a bag attachment means including:
   at least one hook member rotatably supported by the bag support assembly;
   a clasp member supported by the bag support assembly;
   and
   an actuator that moves the hook member between a first position spaced from the clasp member and a second position adjacent the clasp member.

13. The bag holding apparatus of claim 1 further comprising a bag support control assembly including:
   a drive mechanism;
   a cable; and
   connectors for attaching the cable to the bag support and the drive mechanism whereby activation of the drive mechanism results in movement of the bag support along the posts.

14. A bag holding apparatus comprising:
   a base assembly;
   a pair of posts extending from the base assembly;
   a bag support assembly including two longitudinal frame members connected to two transverse frame members, each transverse frame member including first and second ends, to define a generally rectangular frame assembly including four corners;
10 a hook member positioned proximate to each of the corners of the frame assembly; and

a post engaging sleeve positioned along each transverse frame member at a position between its ends such that the hook members are spaced from the posts when the bag support assembly is engaged therewith.

15. The bag holding apparatus of claim 14 wherein the bag support assembly is moveably engaged with the posts.

16. The bag holding apparatus of claim 15 wherein movement of the bag support assembly is controlled by a drive mechanism.

17. The bag holding apparatus of claim 16 further comprising a cable assembly including a cable supply which is connected at a first end to the bag support and associated at a second end with the drive mechanism such that the drive mechanism controls movement of the bag support by varying the amount of cable supplied.

18. The bag holding apparatus of claim 16 further comprising means for selectively activating the drive mechanism to lift the bag and deactivating the drive mechanism to drop the bag and tamp it as it is filled.
19. The bag holding apparatus of claim 14 wherein the bag is suspended above a platform as it is filled with a desired material.

20. The bag holding apparatus of claim 19 further comprising means for moving the platform against the bag as it is being filled to cause compaction of the material.

21. The bag holding apparatus of claim 20 wherein the means for moving the platform includes at least one air spring.

22. The bag holding apparatus of claim 14 further comprising a bag attachment means including:
   at least one hook member rotatably supported by the bag support assembly;
   a clasp member supported by the bag support assembly;
   and
   an actuator that moves the hook member between a first position spaced from the clasp member and a second position adjacent the clasp member.

23. The bag holding apparatus of claim 14 further comprising a bag support control assembly including:
   a drive mechanism;
   a cable; and
   connectors for attaching the cable to the bag support and the drive mechanism whereby activation of the drive
mechanism results in movement of the bag support along the post.

24. A bag holding apparatus of a type having a base, at least one post, a bag support mounted for movement along the post, and a drive mechanism for moving the bag support, the apparatus characterized by:

a cable assembly including a cable supply which is connected at a first end to the bag support and associated at a second end with the drive mechanism such that the drive mechanism controls movement of the bag support by varying the amount of cable supplied.

25. The bag holding apparatus of claim 24 wherein the apparatus includes four posts.

26. The bag holding apparatus of claim 24 wherein the apparatus includes two posts.

27. The bag holding apparatus of claim 26 wherein the bag support includes two longitudinal frame members interconnected by two transverse frame members and each post engages a respective transverse frame member between the two longitudinal frame members.

28. The bag holding apparatus of claim 26 wherein the bag support includes first and second longitudinal frame members interconnected by two transverse frame members and
both posts engage the bag support adjacent to the first longitudinal frame member.

29. The bag holding apparatus of claim 24 further comprising means for selectively activating the drive mechanism to lift the bag and deactivating the drive mechanism to drop the bag and tamp it as it is filled.

30. The bag holding apparatus of claim 24 wherein the bag is suspended above a platform as it is filled with a desired material.

31. The bag holding apparatus of claim 30 further comprising means for moving the platform against the bag as it is being filled to cause compaction of the material.

32. The bag holding apparatus of claim 31 wherein the means for moving the platform includes at least one air spring.

33. The bag holding apparatus of claim 32 further comprising a bag attachment means including:
   at least one hook member rotatably supported by the bag support assembly;
   a clasp member supported by the bag support assembly; and
an actuator that moves the hook member between a first position spaced from the clasp member and a second position adjacent the clasp member.

34. A bag holding apparatus of a type having a base, a post, and a bag support mounted for movement along the post, the apparatus characterized by:
   a bag support control assembly comprised of:
   a drive mechanism;
   a cable; and
   connectors for attaching the cable to the bag support and the drive mechanism whereby activation of the drive mechanism results in movement of the bag support along the posts.
### INTERNATIONAL SEARCH REPORT

**A. CLASSIFICATION OF SUBJECT MATTER**

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**B. FIELDS SEARCHED**

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Minimum documentation searched (classification system followed by classification symbols)

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

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<td>US 5 069 596 A (MUELLER HERMANN ET AL) 3 December 1991 (1991-12-03) column 4, line 41 - column 6, line 11; figures</td>
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**X** Patent family members are listed in annex.

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