Dec. 23, 1952 A. ACKERMAN 2,622,780

BAG FILLING DEVICE WITH VIBRATABLE BAG SUPPORT

Filed Dec. 20, 1945 2 SHEETS—SHEET 1

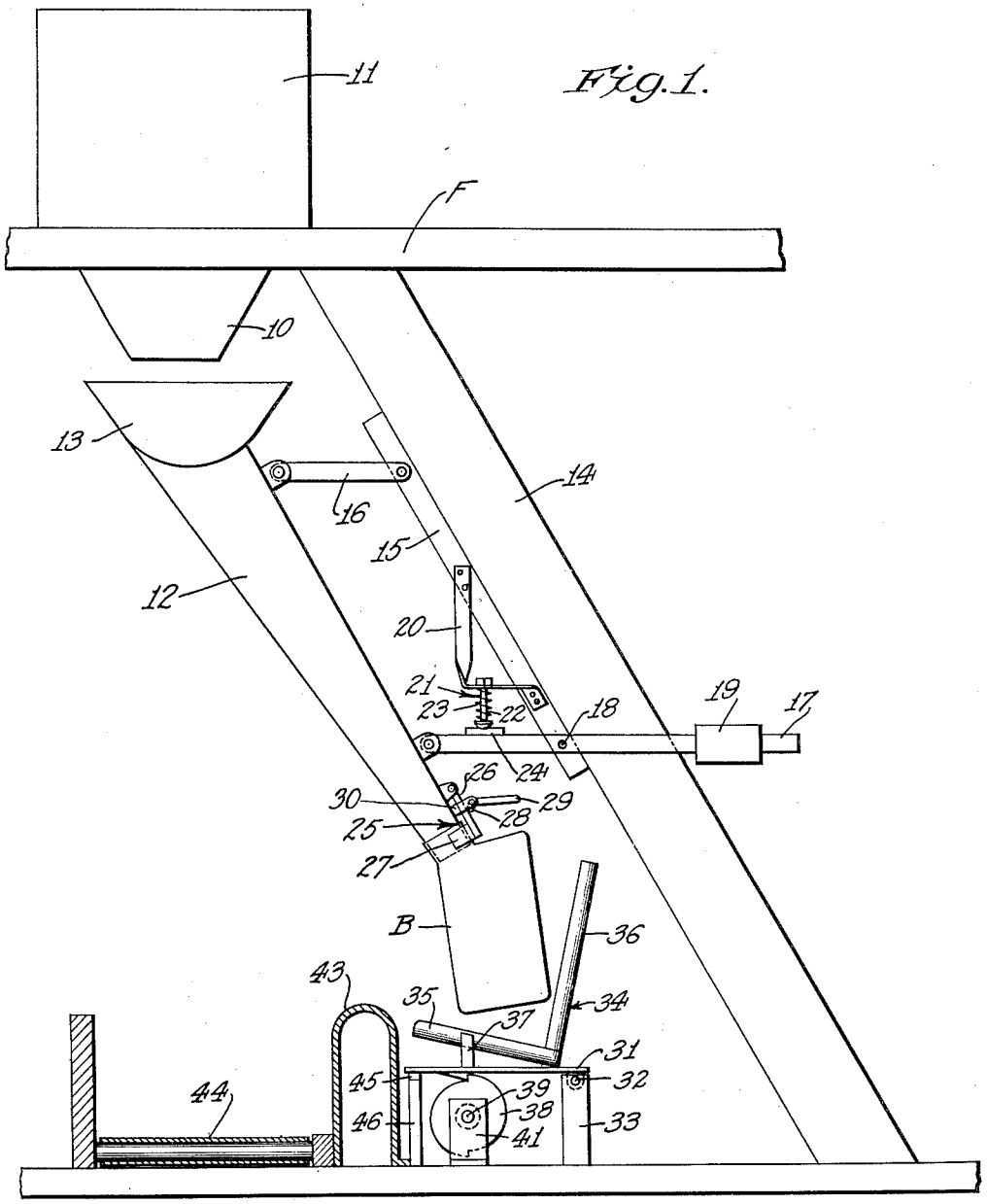


Fig. 1.

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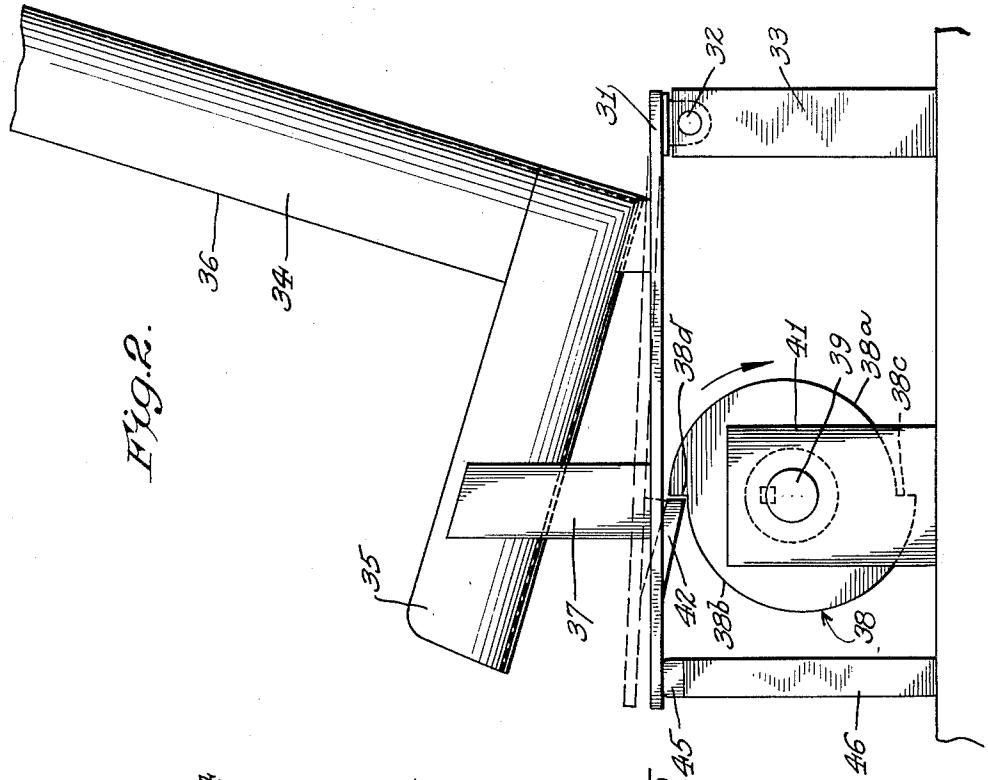


Fig. 2.

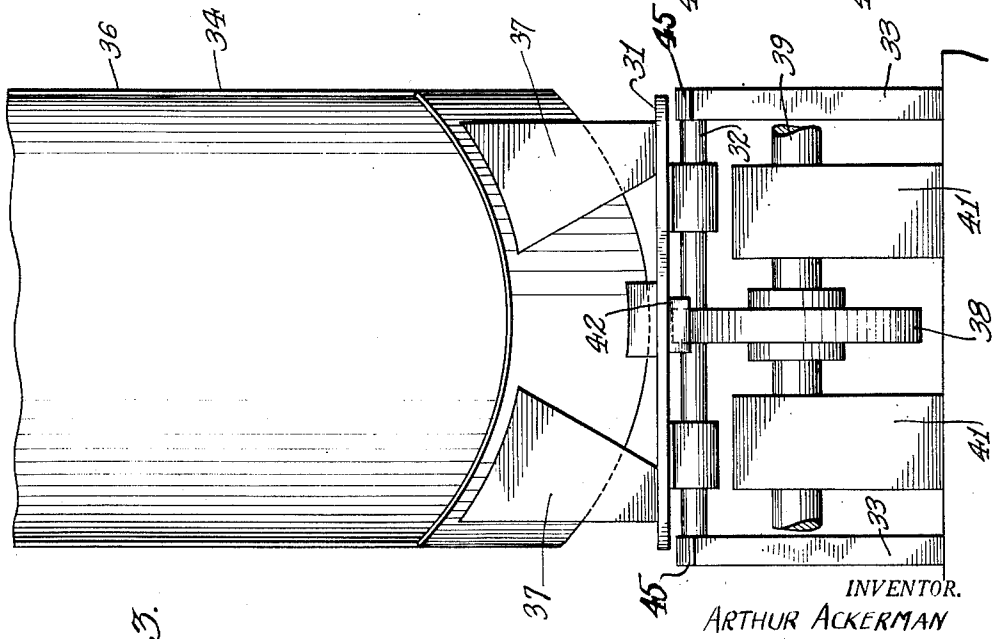


Fig. 3.

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BAG-FILLING DEVICE WITH VIBRATABLE BAG SUPPORT

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4 Claims. (Cl. 226—48)

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This invention relates to devices for filling bags, and it relates particularly to devices for filling bags with finely divided material such as, for example, crushed limestone or oyster shells, grain, animal and poultry feeds, cement and the like.

One of the greatest difficulties encountered in the filling of bags, such as, for example, paper or burlap bags, with finely divided materials is to prevent voids from forming in the material. In the past, it has been necessary to use bags that are somewhat oversize so that all of a predetermined weight or volume of material can be introduced into the bag without overflowing. This causes considerable waste in the material from which the bags are made and, moreover, the bags after being transported and handled are frequently shaken up so that the material becomes more compact, with the result that the bag then appears to be incompletely filled. Moreover, when paper bags are used, the danger of puncturing or tearing the bags is greatly increased if the bags are not filled substantially completely, for the reason that a partially filled bag bends easily and breaks or tears at the bending lines.

An object of the present invention is to provide a bag-filling device that will fill a bag completely by the elimination of all voids of large size therein.

Another object of the invention is to provide a bag-filling device that is particularly adapted for use with automatic weighing machines whereby the bags in every instance can be filled with a predetermined weight of material without loss due to overflow of the material.

Other objects of the present invention will become apparent from the following description of a typical form of device embodying the present invention.

For a better understanding of the invention, reference may be had to the accompanying drawings in which:

Figure 1 is a view in side elevation and partly in vertical section of a typical form of device embodying the present invention;

Figure 2 is a view in side elevation of a shaking device for packing the material in the bag; and

Figure 3 is a view in front elevation of the shaking device.

As illustrated in Figure 1, a typical bag-filling installation may include a hopper member 10, preferably supported in the floor F of a building, for receiving material from an automatic weighing machine 11. The automatic weighing machine 11 may be of any conventional type and is

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not illustrated in detail herein, inasmuch as it does not form a part of the present invention.

Beneath the hopper 10 is positioned a tubular chute 12 having an upper hopper-like end 13 for receiving the material from the hopper 10. The chute 12 is supported movably upon a frame member or brace 14 in the building with capacity for up and down movement. One way in which the chute 12 may be supported is illustrated in Figure 1. This supporting mechanism may include a bracket 15 such as an angle or channel iron fixed to the underside of the brace 14. The upper end of the chute is connected to the bracket 15 by means of a pivotally supported arm 16. The lower end of the chute is pivotally connected to a lever 17 which is pivotally connected to the bracket 15 by means of a bolt or pivot pin 18. The lever 17 is provided with an adjustable counterweight 19 of sufficient weight to lift the chute upwardly into position beneath the hopper 10, but of insufficient weight to prevent downward movement of the chute 12 when it receives a charge of material from the hopper 10.

In order to cushion the upward movement of the chute 12 when it is empty, an L-shaped bracket 20 may be supported on the bracket 15 and is provided with a shock absorber 21 consisting of a bolt 22 passing loosely through an aperture in the bracket and having a spring 23 interposed between the head of the bolt and the lower arm of the bracket 20. The lever 17 may be provided with a transversely extending plate 24 having leather, rubber, or other shock-absorbing material thereon for engagement with the head of the bolt.

The lower or spout end of the chute 12 is adapted to enter an opening in a bag B either of the fabric or paper type. Preferably, paper bags of the valve type are used for finely divided materials, although burlap or other fabric bags which are partially sewn across the top may be filled with equal facility.

The bag B is retained on the end of the chute 12 during a filling operation by means of a releasable clamp 25. The clamp includes a lever 26 pivotally mounted on the top of the chute and having a semi-circular clamping band 27 on its lower end. The clamping band may be forced into engagement with the bag B by means of a cam 28 having an operating lever 29 thereon. The cam 28 is rotatably supported between the lugs 30 on opposite sides of the lever 26. When the mouth of the bag B is passed over the end of the chute 12 and the lever 29 is pulled down-

wardly, the clamping band 27 will retain the bag firmly on the end of the chute 12.

The material being introduced into the bag B may be packed therein by the vibrator or shaker disclosed in Figure 1 and in greater detail in Figures 2 and 3. The shaker includes a platform 31 which is hingedly or pivotally supported at one end by means of a shaft 32 on the uprights 33 secured to a suitable base or to the floor of the building. The platform 31 is provided with a bag support 34 which, as illustrated, may consist of a concave or convex bottom-engaging plate 35 and a similarly shaped angularly related plate 36 for engaging a side of the bag. Preferably the plates 35 and 36 are arranged at a right angle to each other and both are inclined at an acute angle to the platform 31 by means of the spacer blocks 37.

The platform and the bag support may be rocked about the shaft 32 by means of a toothed cam member 38 which is fixed to a shaft 39 mounted in suitable bearings 40 and 41. Preferably, these bearings are of the anti-friction and dustproof type in order to increase the efficiency and reduce the amount of power required for operating the shaking device. As best shown in Figure 2, the cam 38 is provided with two spirally arranged cam portions 38*a* and 38*b* and steps 38*c* and 38*d* for dropping the platform 31 abruptly after it has been rocked upwardly or counter-clockwise about the shaft 32. The platform 31 may be provided with a cam follower tooth or projection 42 for engaging the periphery of the cam.

Preferably the cam 38 is rotated at relatively low speed by means of reduction gearing so that the bag is subjected to about 80 to 100 impacts per minute during the filling operation.

The above described device operates as follows: When the chute 12 is empty and has been lifted to its uppermost position by means of the counterweight 19, a bag B is slipped on the end of the chute and is clamped in position by means of the clamping mechanism 25. Thereafter, the automatic weighing machine discharges into the hopper 10 and thence into the hopper 13 and the chute 12. The weight of the material will cause the chute 12 and the bag B thereon to drop, bringing the bag into contact with the bag support 34 which is being vibrated continuously. Thus, as soon as the material begins to enter the bag, it will be subjected to vibration, thereby tending to pack it into the bottom of the bag. As the material continues to flow into the bag, more and more of the weight of the material is supported by the bag support 34 and less and less by the chute 12. As a result, the chute 12 tends to move upwardly, thereby stretching the bag and permitting it to be filled completely to the top. When all of the material has been discharged into the bag, the clamp may be released, thereby dropping the bag completely on the support and permitting it to be pushed over the discharge rail 43 onto a conveyor 44. When valve type bags are used, the impact of the bag falling onto the conveyor 44 is sufficient to close the valve and seal the bag against escape of material therefrom. Because of the inclination of the support 34, the material, while being shaken, is not thrown out through the valve of the bag, inasmuch as the surface level of the material is substantially horizontal while the bag is inclined to the vertical at an angle corresponding to the angle of the side-engaging plate. Therefore, as the bag is shaken, the material is thrown back and forth more or less parallel to the valve opening in the bag B, and not through the valve opening. This action permits the bags to be filled almost to their tops.

In practical operation of the device, it has been found that the material can be packed uniformly into the bags and with substantially the same volume displacement per unit of weight. As a result, the size of the bag may be adjusted closely to the volume or weight of the material in the bag and corresponding savings in material are attained.

The vibrating mechanism can be rendered very quiet in operation by placing blocks of rubber 45 on the uprights 46 in a position to engage the forward edge of the platform 31 when it is dropped by the cam 38. The rubber blocks 45 should be so located that the cam follower 42 does not drop into direct contact with the cam surface directly behind the cam steps 38*c* and 38*d* to reduce the noise to a minimum.

While the above described embodiment of the invention is preferred, it will be understood that the chute may be modified in design and in the mechanism for supporting it during its upward and downward movements. Also, the clamp for retaining the bag on the spout is susceptible to modification and the shape of the bag support 34 can also be modified to accommodate bags of different shapes and sizes without departing from the invention. Therefore, the form of the invention described above should be considered as illustrative and not as limiting the scope of the following claims:

I claim:

1. A bag-filling device comprising an elongated chute for receiving material to be introduced into a valved bag, a support for said chute, substantially parallel links spaced apart lengthwise of said chute connecting said chute to said support for lengthwise up and down movement of said chute in a direction inclined to the horizontal, means on the lower end of said chute for supporting a valved bag in a position to receive material from said chute, a vibratable support for said bag below said chute, and counterbalancing means for said chute normally urging it upwardly away from said bag support but permitting downward movement of said chute when said material is introduced into it whereby the introduction of said material into said chute moves the bag into engagement with said support, and discharge of said material from said chute into said bag causes upward movement of said chute to extend said bag.

2. In a bag filling device, the subcombination of a frame, a platform hingedly connected at one end to said frame and having an opposite free end, a bag supporting member fixed to said platform and having portions engageable with the bottom and side of a bag, a rotary cam member beneath said platform having at least one substantially spiral surface portion terminating in a substantially radial edge portion extending inwardly from the outer end of said spiral portion to form a step, means on said platform in spaced relation to said one end engageable with said rotary cam member to lift said platform at said spiral portion and drop said platform at said step upon rotation of said cam member, means for rotating said cam member, and means adjacent to said opposite end of said platform to engage and stop said platform abruptly as it drops.

3. In a bag filling device, the subcombination

of a platform hingedly supported at one end for rocking movement and having an opposite free end, a bag supporting member fixed to said platform and having right angularly related, concave portions engageable with the bottom and a side of a bag, said portions being inclined at acute angles to said platform, a rotary cam member beneath said platform having at least one substantially spiral surface portion terminating in a substantial radial edge portion extending inwardly from the outer end of said spiral portion to form a step, cam following means on said platform in spaced relation to said one end engageable with said rotary cam member to lift said platform at said spiral portion and to drop said platform at said step upon rotation of said cam member, means for rotating said cam member, and means adjacent to said opposite end of said platform to engage and stop said platform abruptly as it drops.

4. In a bag filling device, the subcombination of a platform pivotally supported at one end and having an opposite free end, an L-shaped member on said platform for engaging the bottom and a side of a bag, a rotary cam member below said platform, said cam member having at least one spiral surface portion terminating in a substantially radial edge extending inwardly from

the outer end of said spiral surface portion to form a step, a cam follower on said platform engaging said cam member to rock said platform upwardly as said follower engages the spiral surface portion and drop said platform freely at said step in response to rotation of said cam, and stop means engageable with said platform adjacent to its free end for stopping abruptly the dropping movement of the platform before the follower engages said cam member.

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