United States Patent

[11] 3,581,949

[72] Inventors **Lucas Jones Conrad;**
Jesse Randolph Pinkham, both of Winston-Salem, N.C.

[21] Appl. No. **775,004**
[22] Filed **Nov. 12, 1968**
[45] Patented **June 1, 1971**

[73] Assignee **R. J. Reynolds Tobacco Company**
Winston-Salem, N.C.

[54] **CONTROLLED VOLUMETRIC FEEDING APPARATUS**
8 Claims, 5 Drawing Figs.

[52] **U.S. Cl.** **222/167**
[51] **Int. Cl.** **B67d 5/64**
[50] **Field of Search** 222/167, 455, 369, 170, 169, 172

[56] **References Cited**

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Primary Examiner—Stanley H. Tollberg
Attorneys—Robert S. Dunham, P. E. Henninger, Lester W. Clark, Gerald W. Griffin, Thomas F. Moran, Howard J. Churchill, R. Bradlee Boal, Christopher C. Dunham and Thomas P. Dowd

ABSTRACT: An apparatus for feeding a supply of a multiple element material at a controlled volumetric rate comprising a drum mounted for rotation about an inclined axis with a large intake opening at its raised end and a feed scoop and discharge spout mounted on a removable discharge head on its lower end. As the drum rotates, longitudinal bars located on its inner surface near the discharge end keep the feed material tumbling and the feed scoop passing through the mass of material lifts a measured amount upwardly dumping it by gravity into the discharge spout. The discharge spout and its cooperating semicircular opening are axially offset on the head permitting the use of a larger spout for a given drum size and the lip of the intake opening is arranged to be lower than the upper edge of the discharge spout to prevent uncontrolled discharge of the material through the spout in the event of overfeeding of the drum.

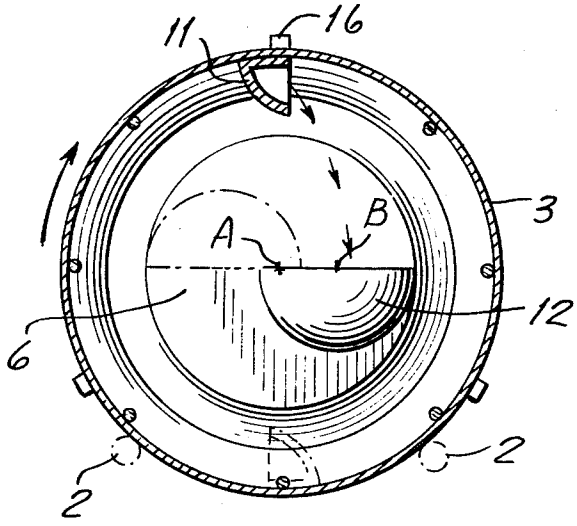


Fig. 1.

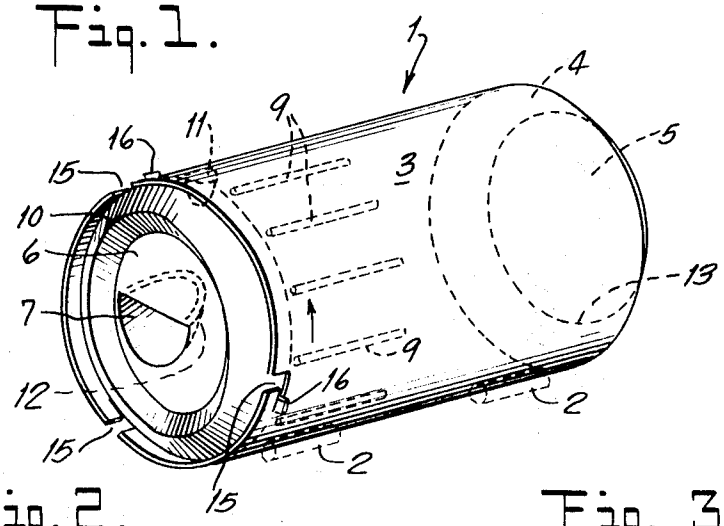


Fig. 2.

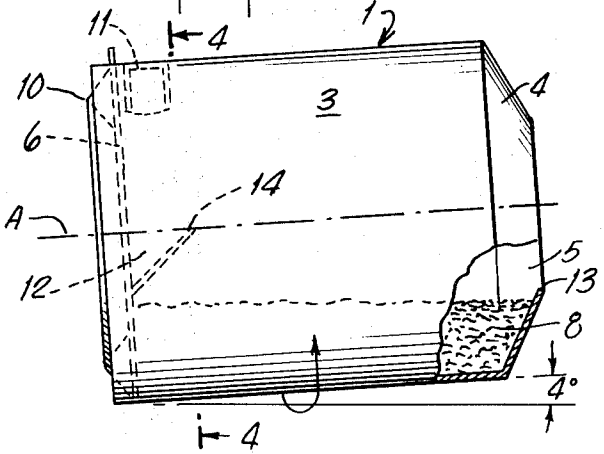
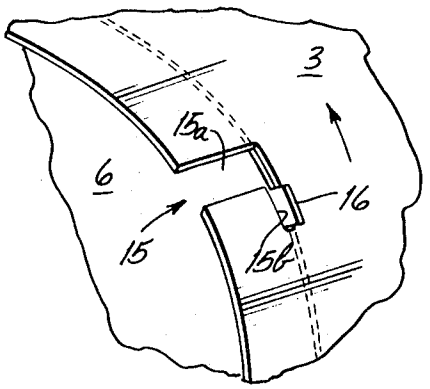


Fig. 3.



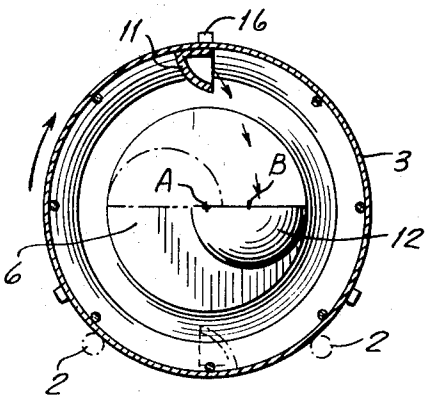


Fig. 4.

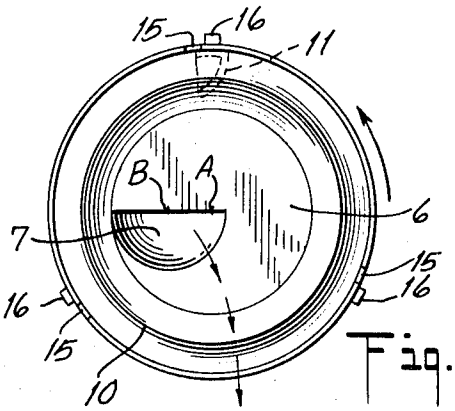


Fig. 5.

INVENTOR.
LUCAS J. CONRAD
BY JESSE R. PINKHAM
Lester H. Clark
ATTORNEY

CONTROLLED VOLUMETRIC FEEDING APPARATUS

BACKGROUND OF THE INVENTION

The present invention relates to a volumetric feeding apparatus and more particularly to a rotating drum for feeding a multiple element material at a controlled volumetric rate to appropriate processing equipment.

The volumetric feeding apparatus of the present invention is particularly intended for feeding poultry parts such as chicken wings, necks and the like at a uniform rate to processing machinery which bones and separates the meat from the inedible portions. Suitable processing machinery of this type is disclosed in the copending application of Cyrus A. Alldred, Jr. and Lucas J. Conrad, Ser. No. 679,498, filed Oct. 31, 1967 now abandoned, and assigned to the same assignee as the present application.

In the past, the boning and separating machinery used in this processing has normally been manually fed so that the feed rate has fluctuated considerably. Such fluctuation has resulted in low machine output efficiency as well as low efficiency in the manual inspection. It therefore is desirable to provide a means for regulating the feeding operation to improve the operating efficiency of the entire process. Any means so provided, however, must meet the sanitary requirements of the food processing industry and therefore should be simply constructed to permit ready dismantling to reduce shut-down time for cleaning and maintenance.

The apparatus of the present invention reduces the feed fluctuation in this process from about 30 percent to approximately 10 percent by providing controlled volumetric feeding for the poultry parts and is of simple and durable construction permitting ready dismantling for frequent cleaning and maintenance.

SUMMARY OF THE INVENTION

The invention comprises a drum mounted for rotation about an inclined axis with a large intake opening at its raised end and a removable discharge head at its lower end. The discharge head is attached to the drum by a bayonet-type mounting, which permits easy manual removal for cleaning, and has a feed scoop and discharge spout mounted on its inner surface. The discharge spout and a cooperating semicircular discharge opening are axially offset on the head permitting the use of a larger spout for a given drum size. As the drum rotates, longitudinal bars located on its inner surface near the discharge end keep the feed material tumbling and the feed scoop, passing through the mass of material, lifts a measured amount upwardly, dumping it by gravity into the discharge spout and out the discharge opening. The upper edge of the discharge spout is arranged to be higher than the lower lip of the intake opening so that excess material will spill from the rear of the drum preventing uncontrolled discharge of the material through the spout in the event of overfeeding of the drum.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of the volumetric feeder of the present invention;

FIG. 2 is a side view of the volumetric feeder shown in FIG. 1;

FIG. 3 is a detailed view of the means for mounting the discharge head on the discharge end of the drum;

FIG. 4 is a sectional view taken along the lines 4–4 in FIG. 2; and

FIG. 5 is an end view of the discharge end of the drum.

DETAILED DESCRIPTION

FIG. 1 shows the improved drum 1 of the present invention mounted for rotation on any suitable bearing means 2. The drum 1 may be fabricated of thin aluminum or similar material and comprises a cylindrical body portion 3 with a frustoconical surface 4 surrounding a large intake opening 5 at one end and a discharge head 6 mounted at the other end. The poultry parts or other material to be fed are introduced by shoveling or other means through the intake opening 5 and are discharged at a controlled volumetric rate through a semicircular discharge opening 7 in the discharge head 6.

As seen in FIG. 2, the axis of rotation A of the drum 1 is inclined about 4° from the horizontal so that the feed material 8 collects in the discharge end of the drum 1 and builds up in such a manner that the plane of its upper level will be inclined with respect to the drum axis A. Longitudinal bars 9 located on the inner surface of the drum 1 near the discharge end act to keep the feed material 8 agitated or tumbling during rotation of the drum 1 thus reducing the oscillation of the center of gravity of the feed material 8.

The discharge head 6 is in the form of a circular plate with a concentric annulus 10 of conical cross section about its periphery which forms a feed chute. A feed scoop 11 is detachably mounted on the inner surface of the head 6 near its periphery and cooperates during drum rotation with a discharge spout 12 disposed at the discharge opening 7 to meter the feeding of the material 8 from the drum 1. The discharge spout 12 is mounted or integrally formed opposite the semicircular discharge opening 7 in the face of the discharge head 6. It will be seen in FIGS. 4 and 5 that the center of revolution B of the semicircle is offset along a radial line containing its straight edge from the center of the discharge head which is coincident with the axis A of drum rotation. By virtue of this offset, the bottom of the discharge spout 12 passes through the material 8 in the drum 1 during rotation blocking any uncontrolled flow of the material 8 through the semicircular discharge opening 7, while the discharge spout 12 is reversely oriented in its rotational path. This offset feature also permits the use of a large discharge spout in a comparatively small drum. For example, it has been found that for a drum with a diameter of 22 inches, and a discharge spout of 8 inches diameter, by locating the center of rotation of the semicircular discharge opening 3 inches from the axis of rotation of the drum, the drum may be filled with material to a depth of 10 inches at the head end before uncontrolled feeding through the discharge opening would ordinarily start.

To insure against uncontrolled feeding at any time, the lower lip 13 of the intake opening 5 as seen in FIG. 2 is arranged to be lower than the upper edge 14 of the discharge spout 12. Thus, if overfeeding of the material to the drum occurs, the excess material will drop or be regurgitated from the intake end 5 rather than resulting in uncontrolled feeding through the discharge spout 12. It is an improved feature of this device that it will always provide controlled volumetric feeding of the material introduced therein without danger of uncontrolled feeding at certain intervals due to overfeeding of the drum.

The means for mounting the discharge head 6 on the drum 1 is shown in detail in FIG. 3. The discharge end of the drum 1 is provided in its edge with a number of slots 15 having enlarged entrance portions 15*a* and narrow offset legs 15*b*. Suitable projections or lugs 16 on the periphery of the discharge head 6 are fitted for insertion in the entrance portions 15*a* of the slots 15 and the head 6 may then be rotated in a clockwise direction as shown in the figure, sliding the lugs 16 into the narrow offset legs 15*b*. The discharge head 6 is thus held against axial displacement with respect to the drum 1 by the engagement of the lugs 16 with the sides of the slot offset legs 15*b*. The discharge head 6 supports the weight of the material 8 pressing against it by means of this engagement. Counterclockwise rotation of the drum 1 causes the head 6 to be synchronously rotated therewith by the engagement of the lugs 16 and the ends of the slot offset legs 15*b*.

This mounting arrangement permits the discharge head 6 to be easily removed from the drum 1 for cleaning, adjusting, and maintenance, and replaced by merely a slight manual rotation, without the need for special tools or other dismantling operations.

The controlled volumetric feeding operation of the drum 1 is performed as follows. The drum 1 is rotated in a clockwise direction, as shown in FIG. 4, on suitable support bearings 2 by a suitable drive means (not shown). As the discharge head 6 is rotated along with the drum 1, the feed scoop 11 passes into the mass of poultry parts 8 at the bottom of the drum 1 after the bottom of the discharge spout 12 is rotated therethrough as shown by the dotted lines. The scoop 11 picks up a measured amount of the parts 8 within its recess and carries them upwardly, until as shown by the full lines in FIG. 4, it becomes reversely oriented with respect to the vertical causing the feed material 8 therein to drop out by the force of gravity. The discharge spout 12 is positioned and oriented at this time to receive the dropping material 8 and direct it through the discharge opening 7 and down the discharge chute 10 (FIG. 5). Thus, during each rotation of the drum 1, a measured amount of material 8 is fed through the discharge opening 7 to be received by the next adjacent machine in the process line and passed for further processing. Within a given range, the drum speed controls the feed rate. However, to change the range, the position of the feed scoop may be changed or a larger or smaller feed scoop may be used. A plurality of discharge spouts and feed scoops may also be used to obtain smaller feed increments, if desired.

It will be seen that a controlled volumetric feeder apparatus is provided which is simply constructed for easy and rapid cleaning and maintenance and which will never result in uncontrolled feeding even in the event of overfeeding of the material to the apparatus. While the device has been described in connection with the feeding of poultry parts, it is obvious that by no more than a simple modification of the elements when necessary, a variety of materials may be handled, such as granular materials, produce, shellfish and the like.

What we claim is:

1. In a volumetric feeder of the type including a drum for holding the material to be fed, said drum rotating about an inclined axis and having an input opening at its raised end and a discharge opening at its lower end, the improvement which comprises a discharge head at the lower end having a spout member thereon defining said discharge opening, said spout member blocking the discharge of the material in the bottom of said drum and directing material through said discharge opening when fed from above and the entrance of said discharge opening being disposed farther from the bottom of the drum than the edge of said input opening to prevent uncontrolled feeding through said discharge opening when the drum is oversupplied.

2. A controlled volumetric feeder apparatus comprising:

a. drum for holding material to be fed, said drum being mounted for rotation about an inclined axis and having an intake opening at its raised end;

b. a discharge head mounted on the lower end of said drum for rotation therewith, said head having a discharge opening therein with its center offset from the axis of said drum;

c. means disposed near the periphery of said discharge head and rotating therewith for picking up a given amount of material during each rotation and dropping the material during a particular portion of its rotation; and

d. a spout member on said head defining said discharge opening, and for blocking the discharge of the material in the bottom of said drum through said offset discharge opening and receiving the material dropping from said pickup means and directing it through said discharge opening.

3. An apparatus as claimed in claim 2 wherein said pickup means is mounted on said discharge head.

4. An apparatus as claimed in claim 1, comprising a plurality of lugs on the periphery of said discharge head and means on the discharge end of said drum defining slots having an entrance portion accommodating the passage of said lugs and an offset portion extending from said entrance portion in a direction opposite to the direction of drum rotation and holding said lugs therein during drum rotation so as to permit the mounting and removal of said head on said drum by simple manual manipulation.

5. An apparatus as claimed in claim 1 comprising means on the inner surface of said drum near said discharge head for agitating the material therein during drum rotation.

6. An apparatus as claimed in claim 2 wherein the entrance to said discharge opening is disposed farther from the bottom of said drum than the edge of said intake opening.

7. An apparatus as claimed in claim 1 wherein said discharge opening comprises a semicircle with its center of revolution offset along a radial line containing its straight edge from the axis of rotation of said drum.

8. An apparatus as claimed in claim 2 wherein said discharge head comprises a circular plate with a concentric annulus of conical cross section at its periphery.