VIBRATORY APPARATUS FOR TREATING GRANULAR MATERIAL

Johan F. Witte, Amsterdam, Netherlands, assignor to Werkspoor N.V., Amsterdam, Netherlands, a company of the Netherlands

Filed June 14, 1961, Ser. No. 117,056
Claims priority, application Netherlands, June 24, 1960, 253,017
7 Claims. (Cl. 34—164)

The invention relates to an apparatus for treating granular material, such as sugar with gas, e.g., with air, comprising a shaking or vibrating gutter, the bottom of which is provided with passage openings for the gas and a casing is located below said bottom, said casing having an inlet for the gas. An apparatus of this kind may be used for drying humid material or for cooling warm material, but also for heating cold material or for humidifying dry material.

With the hitherto known apparatus of this kind the bottom of the gutter constituting the conveying surface consists of slats which are slightly inclined in such a manner that each slat overlaps the next slat. Said known arrangement presents the drawback that the material to be treated can pass through the gaps between the slats and adhere in the gap when the material is sticky, whereby the passage for the gas after some time is clogged. Also the conveying surface is trusted by the material.

The invention has for its object to remove said drawback and to this end according to the invention strips of thin flexible material are arranged on the bottom of the gutter, said strips being secured to said bottom at one of their transverse edges, but are free for the rest. The arrangement may be such that each strip at its free edge overlaps the adjacent strip. The strips may form a horizontal surface on which the material is conveyed. The strips may consist e.g. of rubber or thin sheet metal and are urged away from the perforated bottom by the gas supplied below the bottom of the gutter, so that the gas may pass through the material to be treated.

When the supply of gas below the bottom of the gutter is cut off the strips are closed on the bottom as non-return valves, so that no material can enter between and below the strips. Moreover the floating of the strips, under the influence of the gas supplied below the strips prevents the material from adhering to the conveying surface.

The invention will be further described with reference to the accompanying drawing showing an embodiment of the apparatus according to the invention.

In the drawing FIG. 1 is a side view of part of a vibrating gutter of which the foremost portion is shown in section.

FIG. 2 is a longitudinal sectional view of the conveying surface and FIG. 3 is a plan view thereof.

The casing 1 is supported by flexible strips 2 which at their lower end are secured to the base 3 and at their upper end are connected to the casing. In the casing 1 the strips 4 of perforated metal are secured between the side walls, of the casing. Said strips constitute a horizontal bottom surface and between each pair adjacent strips a strip 6 of thin flexible sheet material, such as rubber, is secured to said one strip and extends on the one metal strip 4 onto the adjacent flexible strip 6.

The casing 1 at one end has a connection 7 for a conduit supplying gas for drying or cooling material into the casing. Material to be dried or cooled, such as sugar, is introduced into the casing at 8 on the conveying surface constituted by the flexible strips 6.

The casing 1 together with the conveying surface is shaken or vibrated with the desired frequency by a device not shown in the drawing so that the sugar is displaced on the conveying surface. The gas is blown through the perforations of the bottom constituted by the strips 4 and slightly urges the flexible strips 6 away from said bottom of the gutter, so that they are floating. Said strips 6, however, always fall down onto the bottom of the gutter, so that a horizontal surface is maintained.

It is to be noted that the invention is not limited to the above described embodiment and several modifications may be made. Thus instead of the perforated strips 4 for the bottom of the gutter serving to support the flexible strips 6 a single continuous sheet of wire gauze or other pervious material may be used. The connection 7 for introducing gas below the bottom of the gutter may be provided on the side or at the bottom of the casing.

What I claim is:

1. In a vibratory apparatus, in combination, a material receiver that is subjected to vibration having at least a vertical component, said receiver having a bottom provided with a plurality of apertures, and at least one member operatively connected to said receiver to cover said apertures, said member being cyclically movable by the vertical component of vibration to cyclically open said apertures for the admission of fluid into the receiver.

2. In a vibratory apparatus, in combination, a material receiver, means for vibrating the receiver, means for the receiver having a vertical component, said receiver having at least one row of perforations through its bottom, and at least one flexible, impervious member that has a free portion that overlies the row of perforations and that has one edge attached to the receiver, said free portion of the member being movable relative to the receiver bottom in response to the vibration to cyclically expose said perforations.

3. In a vibratory apparatus, in combination, a material receiver, means for vibrating the receiver along a path having at least a vertical component, said receiver having a perforated bottom, and flexible members attached to the bottom and overlying the perforations, said members being adapted to vibrate relative to the receiver bottom in response to vibration of the receiver to cyclically admit fluid through the perforations, said members being arranged to direct the fluid issuing from the members along the surface of the bottom of the receiver.

4. In a vibratory apparatus, in combination, a material receiver, means for vibrating the receiver along a path having at least a vertical component, said receiver having a plurality of perforations in its bottom, said perforations being arranged in groups, and a flap valve for each group attached along one of its edges to the receiver in position to cover its group of perforations.

5. In a vibratory apparatus, in combination, a material receiver that is subjected to vibration having at least a vertical component, said receiver having a perforated bottom, at least one flexible member operatively connected to the receiver in position to cover the perforations in the receiver bottom, said flexible member having its portion over the perforations movable with respect to the perforated bottom in response to the vibration to cyclically open the perforations for the admission of fluid into the receiver, a plenum chamber beneath and generally coextensive with said perforated bottom, and means for supplying gaseous fluid under pressure in said plenum chamber.

6. In a vibratory apparatus, in combination, a material receiver, means for vibrating the receiver along a path having at least a vertical component, said receiver having a plurality of perforations in its bottom, said perforations being arranged in groups, and a flap valve for each group of perforations, each flap valve being attached to the receiver bottom along one edge of the valve and having a portion overlying the next adjacent valve.
7. In a vibratory apparatus in combination, a material receiver that is subjected to vibration having at least a vertical component, said receiver having a bottom provided with a plurality of perforations arranged in groups and a flap valve of flexible material for each group of perforations attached along one of its edges to the receiver to cover its group of perforations, each of said valves having a portion overlying the next adjacent valve and said valves being cyclically moveable by the vertical component of vibration to cyclically open said perforations for the admission of fluid into the receiver, a plenum chamber beneath said bottom and communicating with said perforations, and means for supplying aeriform fluid to said plenum chamber.

References Cited in the file of this patent

UNITED STATES PATENTS

2,094,786 Flint ---------------------- Oct. 5, 1937
2,498,218 Nielsen ------------------- Feb. 21, 1950
2,750,681 Berry --------------------- June 19, 1956
2,795,318 Morris ------------------- June 11, 1957

FOREIGN PATENTS

574,158 Great Britain --------------- Dec. 21, 1945