

(12) STANDARD PATENT
(19) AUSTRALIAN PATENT OFFICE

(11) Application No. **AU 2012202945 B2**

(54) Title
An assembly to apply a flavouring to snack food

(51) International Patent Classification(s)
A23P 20/12 (2016.01) **B65G 37/00** (2006.01)
B05D 1/12 (2006.01)

(21) Application No: **2012202945** (22) Date of Filing: **2012.05.18**

(30) Priority Data

(31) Number	(32) Date	(33) Country
2011902602	2011.06.30	AU

(43) Publication Date: **2013.01.17**

(43) Publication Journal Date: **2013.01.17**

(44) Accepted Journal Date: **2016.05.19**

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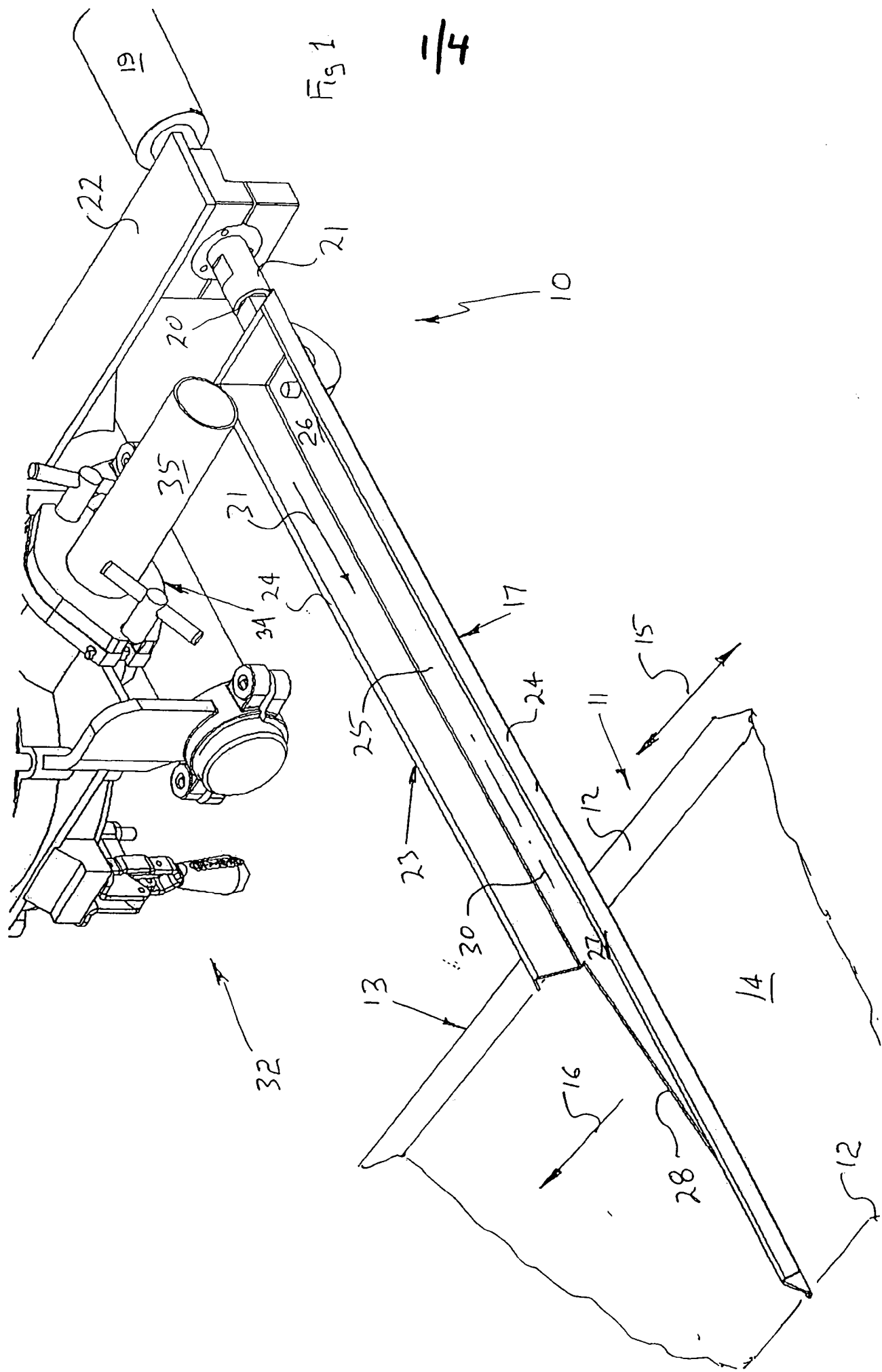
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(56) Related Art
GB 2397863 A
US 2003/0098220 A1

AN ASSEMBLY TO APPLY A FLAVOURING TO SNACK FOOD

Abstract

A conveyor assembly (10) to deliver flavouring to a conveyor (11) upon which there is conveyed a product to be coated. The flavouring would be in granular form such as a powder. The assembly (10) includes a conveyor (17) consisting of a longitudinally elongated tray (23) that is vibrated by an actuator (19). The tray (19) and actuator (18) are adapted to distribute the flavouring transversely across the conveyor (11).



2012202945 18 May 2012

S&F Ref: P032859

AUSTRALIA

PATENTS ACT 1990

COMPLETE SPECIFICATION



FOR A STANDARD PATENT

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Invention Title: An assembly to apply a flavouring to snack food

Associated Provisional Application Details:

[33] Country:	[31] Appl'n No(s):	[32] Application Date:
AU	2011902602	30 Jun 2011

The following statement is a full description of this invention, including the best method of performing it known to me/us:

AN ASSEMBLY TO APPLY A FLAVOURING TO SNACK FOOD

Technical Field

The present invention relates to conveyors that convey a flowable substance in granular (including powder) form, and more particularly but not exclusively to conveyors that deliver the flowable substance for the purposes of coating product on another conveyor to which the substance is delivered.

Background of the Invention

In the snack food industry many snack foods are coated with a flavouring. There are machines that provide for the coating of the snack food, such as the machine described in USA Patent 7878142.

A disadvantage of some previous machines is that they do not uniformly coat the snack food and/or have significant waste.

A further disadvantage of some previous machines is that they can be complex and therefore unreliable.

A still further disadvantage of some previous machines is that they are frequently difficult to clean.

Object of the Invention

It is the object of the present invention to overcome or substantially ameliorate at least one of the above disadvantages.

Summary of the Invention

There is disclosed herein a conveyor assembly to deliver a flowable substance in granular form, said assembly including:

an elongated tray having a longitudinal axis and a floor provided to receive the substance, the floor sloping downward from a substance receiving portion to a substance delivery portion;

an actuator to cause vibration of the tray to cause the substance to travel along the floor from the receiving portion to the delivery portion at which the substance is delivered from the floor; and wherein

said delivery portion includes an edge of the floor so the substance falls from the floor, and said actuator vibrates the floor at a frequency with an amplitude with a vertical component, with said frequency being at least 20,000hz.

Preferably, the frequency is less than 70,000hz.

Preferably, the frequency is 30,000hz to 40,000hz.

More preferably, the frequency is 36,000hz to 38,000hz.

Preferably, said amplitude has effectively a negligible horizontal component.

Preferably, said horizontal component is approximately zero.

There is still further disclosed herein a conveyor assembly to deliver a flowable substance in granular form, said assembly including:

an elongated tray having a longitudinal axis and a floor provided to receive the substance, the floor sloping downwardly from the substance receiving portion to a substance delivery portion;

an actuator to cause vibration of the tray to cause the substance to travel along the floor from the receiving portion to the delivery portion at which the substance is delivered from the floor; and wherein

the floor at the delivery portion including an edge so that the substance falls from the floor, and said actuator vibrates the floor at a frequency with an amplitude extending generally perpendicular to said axis, with the frequency being at least 20,000hz.

Preferably, said frequency is less than 70,000hz.

Preferably, the frequency is 30,000hz to 40,000hz.

More preferably, the frequency is 36,000hz to 38,000hz.

Preferably, the amplitude is 1 μ m to 130 μ m.

Preferably, the amplitude is 2.5 μ m to 5 μ m.

Preferably, the amplitude has effectively no component parallel to said axis.

Preferably, said amplitude has approximately zero component parallel to said axis.

Preferably, said actuator is attached to said tray by a coupling member, with said tray having a bottom surface to which the coupling member is directly attached.

Preferably, the tray and coupling member have a resonant frequency at approximately the frequency provided by the actuator.

Preferably, said edge is generally linear so as to have a direction of extension transverse of said axis and parallel to said axis.

Preferably, the edge has a length in the direction of extension parallel to said axis and a length in the direction transverse of said axis that is less than the length in the direction of extension parallel to said axis.

Preferably, the tray is inclined by 1° to 10° to the horizontal.

5 Preferably, the tray is inclined by 3° to 5° to the horizontal.

There is further disclosed herein, the above assembly and a further conveyor, and wherein said edge extends generally transverse of further conveyor so that the substance is spread transversely across the further conveyor.

Brief Description of the Drawings

10 Preferred forms of the present invention will now be described by way of example with reference to the accompanying drawings wherein:

Figure 1 is a schematic isometric view of portion of an assembly to deliver a flowable substance in granular form to a conveyor;

Figure 2 is a schematic top plan view of the machine of Figure 1;

15 Figure 3 is a schematic front elevation of the machine of Figure 1; and

Figure 4 is a schematic rear elevation of the machine of Figure 1;

Detailed Description of the Preferred Embodiment

In the accompanying drawings there is schematically depicted a conveyor assembly 10. The assembly 10 delivers flavouring to a conveyor 11 upon which there is
20 conveyed a product to be coated. The flavouring would be in granular forms, this includes the flavour being a powder. As a particular example, the assembly 10 may deliver a flavouring to a snack food being conveyed by the conveyor 11. Although many types of different conveyors may be employed, typically the conveyor 11 would be a slip conveyor having a longitudinally extending tray 13 that includes a pair of longitudinally
25 extending side walls 12 between which a tray floor 14 extends. The tray 13 would be reciprocated in the direction 15 so as to convey product in the longitudinal direction 16. Typically the snack food would be distributed transversely across the tray 13.

The assembly 10 includes a conveyor 17 consisting of a longitudinally elongated tray 23 that is vibrated by an actuator 19. Preferably the actuator 19 is electrically
30 operated and provides a vibration in the frequency range of 20,000hz to 70,000hz, most preferably about 36,000hz to 38,000hz. Supporting the tray 23 is a shaft 20 that is fixed to the tray 23. The shaft 20 is supported by a collar 21, with the collar 21 being mounted

on a bracket 22. The actuator 19 is also mounted on the bracket 22 so as to be supported thereby.

The actuator 19 vibrates the floor 14 so that the floor 14 has an amplitude with a vertical component, and most preferably with a vertical component and essentially negligible or zero horizontal component. In an alternative preferred form, the actuator 19 vibrates so as to vibrate the floor 14 so as to have an amplitude with a component perpendicular to the longitudinal axis 30, and most preferably with a component perpendicular to the axis 30 with essentially negligible or zero component parallel to the axis 30. When vibrated at the above frequency, the flavouring delivered to the tray 13 is essentially "fluidised". Preferably, the actuator 19 is a ultra high frequency (ultra-sonic frequency) "Sonotrode" actuator. Typically the actuator 19 would be a piezo electric motor with a vertical amplitude (or an amplitude perpendicular to the axis 30) of between 1.0µm and 130µm, preferably 2.5 µm to 5µm.

Preferably, the floor 25 is inclined to the horizontal by an acute angle of 1° to 10°, preferably about 3° to 5°.

The tray 23 includes a pair of longitudinally extending sides 24 between which there is located a longitudinally extending floor 25. The sides 24 extend upwardly from the floor tray 25. The shaft 20 is fixed to the bottom surface of the tray 23.

The tray 23 has a receiving portion 26 to which the flavouring is delivered, and a delivery portion 27. The delivery portion 27 includes an edge 28 of the floor 25, the edge 28 extending at an acute angle 29 to the longitudinally axis 30 of the tray 23. The edge 28 has a major direction of extension parallel to the axis 30 as well as a direction of extension transverse of the axis 30 so as to be inclined by the angle 29. The length of the edge 28 is greater in the longitudinal direction than the length of the edge 28 in the transverse direction.

Vibration of the tray 23 (floor 25) causes the flavour to travel in the direction 31 from the receiving portion 26 to the delivery portion 27 as the floor slopes downwardly at an acute angle from the receiving portion 26 to the delivery portion 27. Ultimately product passing along the tray 23 reaches the edge 28 at which time it falls from the edge 28 to be deposited on product on the floor 25 of the tray 13. The product is coated by the flavouring. As the edge 28 extends substantially across the entire width of the floor 25, product scattered across the floor 25 is coated.

Preferably, the direction 31 is generally perpendicular to the direction 16.

The flavour is delivered to the tray 23 from a flavour delivering assembly 32. The assembly 32 includes a hopper 33 that stores a volume of the flavouring in granular or powder form. The hopper 33 communicates with an auger assembly 34 that delivers the flavouring to a tube 35 via which the flavouring is delivered to the tray 23 at the
s delivery portion 26. The auger assembly 34 would include an auger that passes through the lower end of the hopper 33, or is in communication with the lower end of the hopper 33, with the auger being driven by a motor and gearbox assembly 36.

CLAIMS

1. A conveyor assembly to deliver a flowable substance in granular form, said assembly including:

an elongated tray having a longitudinal axis and a floor provided to receive the substance, the floor sloping downward from a substance receiving portion to a substance delivery portion;

an actuator to cause vibration of the tray to cause the substance to travel along the floor from the receiving portion to the delivery portion at which the substance is delivered from the floor; and wherein

said delivery portion includes an edge of the floor so the substance falls from the floor, and said actuator vibrates the floor at a frequency with an amplitude with a vertical component, with said frequency being at least 20,000hz.

2. A conveyor assembly to deliver a flowable substance in granular form, said assembly including:

an elongated tray having a longitudinal axis and a floor provided to receive the substance, the floor sloping downwardly from the substance receiving portion to a substance delivery portion;

an actuator to cause vibration of the tray to cause the substance to travel along the floor from the receiving portion to the delivery portion at which the substance is delivered from the floor; and wherein

the floor at the delivery portion including an edge so that the substance falls from the floor, and said actuator vibrates the floor at a frequency with an amplitude extending generally perpendicular to said axis, with the frequency being at least 20,000hz.

3. The assembly of claim 1, 2 or 7, wherein said frequency is less than 70,000hz.

4. The assembly of claim 3, wherein the frequency is 30,000hz to 40,000hz.

5. The assembly of claim 4, wherein the frequency is 36,000hz to 38,000hz.

6. The assembly of anyone of claim 1 to 5, wherein the amplitude is 1 μ m to 130 μ m.

7. The assembly of claim 6, wherein the amplitude is 2.5 μ m to 5 μ m.

8. The assembly of any one of claims 1 to 5, wherein the amplitude has effectively no component parallel to said axis.
9. The assembly of anyone of claims 1 to 5, wherein said amplitude has approximately zero component parallel to said axis.
10. The assembly of anyone of claim 1 to 9, wherein said actuator is attached to said tray by a coupling member, with said tray having a bottom surface to which the coupling member is directly attached.
11. The assembly of anyone of claims 1 to 10, wherein the tray and coupling member have a resonant frequency at approximately the frequency provided by the actuator.
12. The assembly of anyone of claims 1 to 11, wherein said edge is generally linear so as to have a direction of extension transverse of said axis and parallel to said axis.
13. The assembly of anyone of claims 1 to 12, wherein the edge has a length in the direction of extension parallel to said axis and a length in the direction transverse of said axis that is less than the length in the direction of extension parallel to said axis.
14. The assembly of claim 13, wherein the tray is inclined by 1° to 10° to the horizontal.
15. The assembly of claim 14, wherein the tray is inclined by 3° to 5° to the horizontal.
16. In combination the assembly of anyone of claim 1 to 15 and a further conveyor, and wherein said edge extends generally transverse of further conveyor so that the substance is spread transversely across the further conveyor.

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