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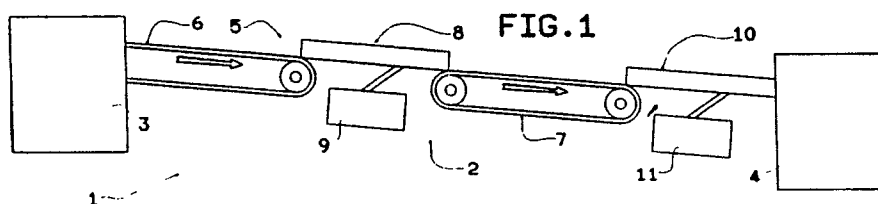
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I-20123 Milan(IT)(54) **Apparatus for feeding flat products to a machine.**

(57) An apparatus (2) for feeding flat products comprising at least one conveyance device (5) connected at its input end to a unit (3) for producing flat products and connected at its output end to a device for forming groups of products packed flat against each other and oriented edgewise on the surface of the conveyance device. The conveyance device (5) comprises at least one continuously moving conveyor (6,7) and at least one vibrating channel (8,10) arranged in series to facilitate the return of fallen products to their correct upright position and thus re-establish a continuous row.

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APPARATUS FOR FEEDING FLAT PRODUCTS TO A MACHINE

The present invention relates to an apparatus for feeding flat products to a machine.

More precisely, the invention relates to an apparatus that carries out the processing operation connecting a system for manufacturing products such as biscuits or crispbread to a machine comprising a device which forms groups of said products and feeds said groups to a receiving line.

According to the known art, products of the above-mentioned type exiting continuously from a cooking oven are fed directly into said apparatus. Said apparatus is constituted by a plurality of conveyance devices, each of which is constituted by at least two conveyor belts arranged in series and driven with speeds which increase along the direction of product advancement.

The products advance in continuous rows on these conveyance devices and are packed flat against each other and oriented edgewise on their respective advancement surfaces.

At the output ends of the conveyance devices, the products are divided into groups which are fed to a receiving line which in turn feeds said groups to a packaging or boxing machine. A device for forming said groups and for feeding them to said receiving line is described in European Patent No. 0 161 110 granted September 7, 1988 in the name of the same Applicant.

A condition for the correct operation and the high productivity of a system comprising machines and devices of the above-mentioned type is that the products must be arranged correctly, i.e. packed flat against each other and oriented edgewise on their respective conveyance devices, at the output of every conveyance device of said apparatus and therefore at the input of the group forming device.

In this kind of apparatus, it is observed that the unavoidable imbalances between the number of products fed onto the individual conveyance device and the number of products removed therefrom cause gaps in the otherwise continuous row of products. Due to these problems, the products closest to the gaps tip over onto the conveyor.

These products arranged face-down must be removed manually by the operator, since they are the main cause of the forming of defective or incomplete groups at the output ends of the conveyance devices being that they hinder the re-establishment of the continuity of the row.

The aim of the present invention is to provide a feeding apparatus of the above-mentioned type which eliminates the described disadvantages relative to the known art, i.e. an apparatus which feeds to a group forming device a continuous row of

products packed flat against each other and oriented edgewise on their respective conveyance device.

The present invention provides an apparatus for feeding flat products to a machine for handling groups of said products packed flat against each other and oriented edgewise, said apparatus comprising at least one conveyance device connecting a unit for producing said products to said machine, characterized in that said conveyance device comprises at least one continuously moving conveyor and at least one vibrating channel arranged in series.

The present invention is now described merely by way of non-limitative example with reference to the accompanying drawings, wherein:

figure 1 is a schematic elevation view of a system comprising a feeding apparatus according to the teachings of the present invention;

figures 2 and 3 are two sectional views of a first embodiment of the apparatus of figure 1; and

figures 4 and 5 are two sectional views of a second embodiment of the apparatus of figure 1.

With reference to figure 1, the reference numeral 1 indicates an overall system for manufacturing and handling flat products such as biscuits or crispbread.

Said system 1 comprises a feeder apparatus 2 suitable for connecting a unit 3 for producing said products to a machine 4 comprising a device (not illustrated) for forming groups each constituted by a given number of products. The apparatus 2 consists of a conveyance device 5 inclined in the direction of advancement of the products conveyed thereby and comprising a first conveyor belt 6 for the output of the production unit 3, a second conveyor belt 7 arranged after the conveyor belt 6 with respect to the product advancement direction, a first vibrating channel 8 interposed between the conveyor belts 6 and 7 and actuated by a vibrator device 9, and a second vibrating channel 10 interposed between the conveyor belt 7 and said machine 4 and actuated by a vibrator device 11. The conveyance device 5 is suitable for transferring said products packed flat against each other and oriented edgewise with respect to the conveyance surface.

Figures 2 and 3 relate to a first embodiment, in which the vibrating channels 8 and 10 are suitable for transferring disk-like products 12. In this embodiment, the vibrating channels 8 and 10 have an arc-like transverse cross-section and their dimensions are such that they adhere for a set portion to the contour of the products 12.

Figures 4 and 5 relate to a second embodiment in which the channels 8 and 10 are suitable for transferring products 13 in the shape of parallelograms. In this embodiment, the vibrating channels 8 and 10 have a C-shaped cross-section with a bottom or base wall 14 and two lateral walls 15, and their dimensions are such that they adhere for a set portion to the contour of the products 13.

The base wall 14 of the channel 8 has a plurality of steps 16 descending in the direction of advancement of the products 13 along the conveyance device 5. The height of said steps 16 is just in excess of the thickness of the products 13 and their width is substantially equal to the height of said products 13.

In operation, with reference to figures 1 to 5, the products 12 or 13 are transferred by the conveyance device 5 while packed flat against each other and oriented edgewise on the conveyance surface. Due to the unavoidable imbalances between the number of products supplied by the production unit 3 and the number of products removed by the machine 4 the continuity of the row is occasionally broken, so that some products 12 or 13 tip over and arrange themselves substantially horizontally.

Every time such an event occurs for a disk-like product 12 (see figures 2 and 3), the products 12 oriented horizontally on the vibrating channels 8 to 10 are subject to an uprighting torque by the products 12 which follow them and precede them by virtue of said inclination of the conveyance device 5 and of the arc-like configuration of the channels 8 and 10; said torque is indicated by two arrows 17 and causes the fallen products 12 to gradually resume their correct position by means of a counterclockwise rotation with respect to figure 2. The rotation of the products 12 due to said uprighting torque occurs about an axis passing through the tangency points between said product 12 and the walls of the channel 8 or 10.

In the embodiment illustrated in figures 4 and 5, every time a product 13 arranges itself substantially horizontal in contact with the base wall 14, the step-like configuration of the vibrating channel 8 and the dimensions of the steps 16 aid said product 13 in resuming its vertical position. In fact, according to what is illustrated in particular in figure 4, the fallen products 13 tend to progressively resume their correct substantially vertical position as soon as one of their ends makes contact with a vertical oriented product 13 preceding them along the conveyance path with no jamming due to the level difference between the successive steps 16.

In this manner, the continuous row of products packed against each other and oriented edgewise with respect to the resting surface of the conveyance device 5 is reconstituted allowing said device

(not illustrated) for forming groups of products to operate correctly.

Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly such reference signs do not have any limiting effect on the scope of each element identified by way of example by such reference signs.

Claims

1. Apparatus for feeding flat products (12 or 13) to a machine (4) for handling groups of said products (12 or 13) packed flat against each other, said apparatus (2) comprising at least one conveyance device (5) for connecting a unit (3) producing said products (12 or 13) to said machine (4), characterized in that said conveyance device (5) comprises at least one continuously moving conveyor (6,7) and at least one vibrating channel (8,10) in series.

2. Feeding apparatus according to claim 1, characterized in that said channel (8,10) has an arc-like cross-section.

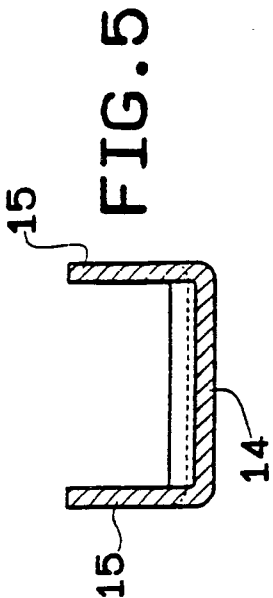
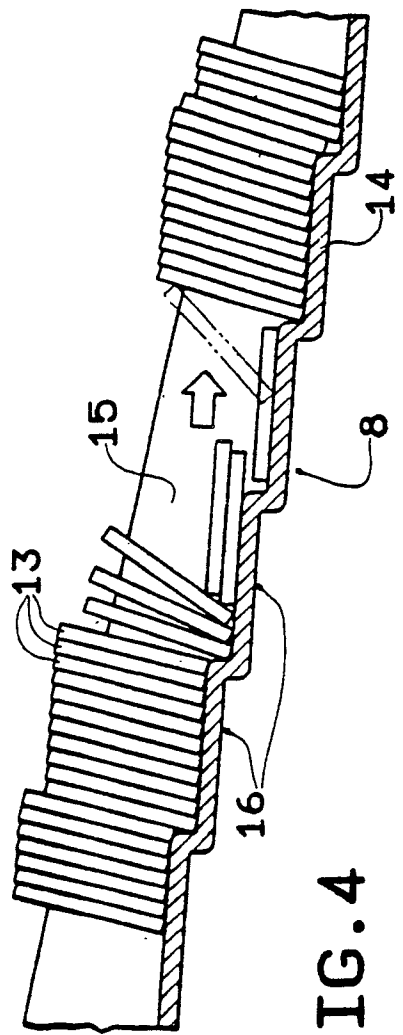
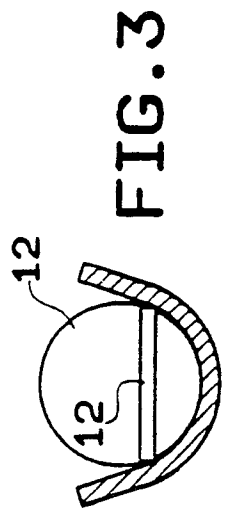
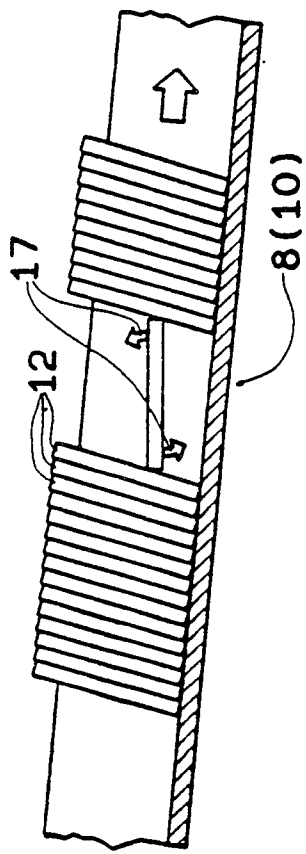
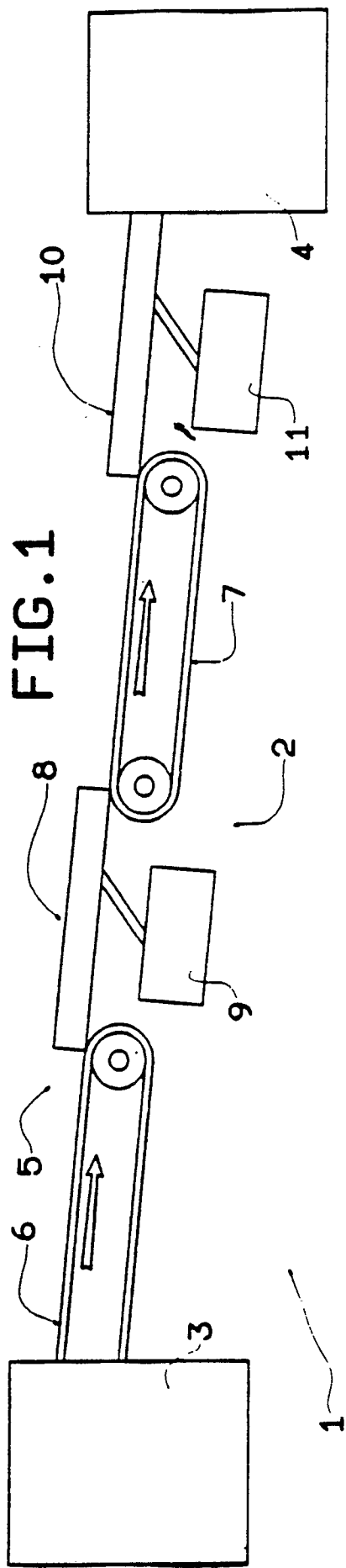
3. Feeding apparatus according to claim 2, characterized in that said channel (8,10) is downwardly inclined in the direction of advancement of said conveyance device.

4. Feeding apparatus according to claim 1, characterized in that said channel (8,10) has a flat bottom (14) and two substantially vertical lateral walls (15).

5. Feeding apparatus according to claim 4, characterized in that the bottom (14) of said channel (8) has steps (16) descending in the direction of advancement of said conveyance device (5).

6. Feeding apparatus according to claim 5, characterized in that the height of said steps (16) is just in excess of the thickness of said products (13) and their width is just in excess of the height of said products (13) oriented edgewise on said conveyance device (5).

7. Feeding apparatus according to any of the preceding claims, characterized in that said conveyance device (5) is constituted by two conveyor belts (6,7) arranged in series, the first conveyor belt being connected to said production unit (3), said belts being followed by respective vibrating channels (8,10).





DOCUMENTS CONSIDERED TO BE RELEVANT			EP 89101778.2
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)
X	US - A - 508 092 (DANEHY)	1-3	B 65 B 23/14
A	* Pos. E,F,H' * --	7	
A	DE - A1 - 2 802 188 (KRAEMER MASCHINENF.) * Pos. 9 *	5,6	
A	EP - A2 - 0 077 753 ("SIG") * Claim 1 * ----	1	
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (Int. Cl.4)
			B 65 B 23/00 B 65 B 35/00 B 65 G 47/00
Place of search VIENNA		Date of completion of the search 17-05-1989	Examiner MELZER
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	