

TITLE OF THE INVENTION

TOPPING MATERIAL ADHERING APPARATUS

FIELD OF THE INVENTION

5 [0001]

The present invention relates to a topping material adhering apparatus for adhering topping material to solid food products, more specifically, to a topping material adhering apparatus for adhering melted topping material to the same.

10 BACKGROUND OF THE INVENTION

[0002]

Conventionally, a method of adhering topping material such as flakes of processed fat-oil food product to solid food products such as snack foods, typically, potato chips has been known (please refer to Patent Publication 1 below). For example, in the method described in
15 the Patent Publication 1, potato chips discharged at a high temperature from a fryer are carried by means of a conveyor, and flakes of processed fat-oil food product including cheese are dropped onto the potato chips carried on the conveyor. The flakes of processed fat-oil food product dropped onto the potato chips are melted by a heat of the potato chips and then adhere thereto. Then, the potato chips are cooled to solidify the melted flakes of processed fat-oil
20 food product.

[0003]

Patent Publication 1: Japanese Patent Laid-Open Publication No. 5-64546 (please refer to paragraph 0019)

25 DISCLOSURE OF THE PRESENT INVENTION

PROBLEM TO BE SOLVED BY THE PRESENT INVENTION

[0004]

In the above conventional method, the flakes of processed fat-oil food product may not be dropped evenly onto the potato chips. For example, the flakes of processed fat-oil food

product may roll down from the potato chips before the flakes are melted by the heat of the potato chips. Further, when the potato chips overlap each other while they are being carried on the conveyor, the flakes of processed fat-oil food product may not be dropped onto the lower potato chips. In these cases, a percentage of potato chips to which the flakes of processed fat-oil food product are adhered is decreased. Although it is not necessary to adhere the flakes of processed fat-oil food product to all of the potato chips, it is preferable that the percentage of the potato chips to which the flakes of processed fat-oil food product are adhered be as large as possible.

[0005]

Further, when the flakes of processed fat-oil food product are dropped onto a location where there are no potato chips, the flakes adhere onto the conveyor. In this case, after the production of the potato-chip product, the adhered processed fat-oil food product needs to be removed from the conveyor.

[0006]

Embodiments of the present invention provide a topping material adhering apparatus which can increase a percentage of solid food products to which meltable topping material is adhered.

Embodiments of the present invention provide a topping material adhering apparatus which can collect meltable topping material which does not adhere to the solid food products.

MEANS FOR SOLVING THE PROBLEM

[0007]

According to an aspect of the invention, there is provided a topping material adhering apparatus for adhering grains of meltable topping material on a solid food product comprising: a topping material supplying section for supplying melted topping material; a topping material delivering section for delivering the topping material, which is supplied from the supplying section, downward in a line form; and a solid-food-product moving section for moving solid food products to an adhering region below the

delivering section to adhere the topping material onto the food products; wherein the topping material delivered downward in the line form is separated into grains while it is falling, and the grains of the topping material reach the adhering region.

[0008]

In the topping material adhering apparatus according to an embodiment of the present invention, melted topping material is supplied to the topping material delivering section by the topping material supplying section and delivered downward from the topping material delivering section in the line form. While the topping material delivered in the line form is falling, it is drawn apart due to its viscosity to become grains and then the grains of the topping material reach the adhering region. The grains of the topping material adhere onto the solid food products moved to the adhering region by means of the solid-food-product moving section.

[0009]

In the conventional art, when flakes of the processed fat-oils food product (topping material) adhere onto the potato chips (solid food products), the flakes may roll down from the potato chips and drop therefrom before the flakes are melted by a heat of the solid food products. On the contrary, in the topping material adhering apparatus according to the present invention, since the grains of the melted topping material adhere onto the solid food products, it is easy for the topping material to adhere thereonto. As a result, a percentage of the solid food products onto which the topping material is adhered can be increased.

[0010]

In an embodiment of the topping material adhering apparatus, the solid-food-product moving section includes an ejecting section for ejecting the solid food products into the adhering region, and a receiving section for receiving the solid food products ejected into the adhering region.

[0011]

In this embodiment of the topping material adhering apparatus, when the solid food products are ejected into the adhering region, the overlapping solid food products can be shifted relative to each other. This increases the chance of the topping material adhering onto the solid food products. Further, the topping material which does not adhere onto the solid food products passes

through the solid food products to the opposite side thereof. This enables the topping material to be collected on the opposite side of the solid food products, which material instead adheres onto a conveyor in the prior art.

[0012]

In an embodiment of the topping material adhering apparatus, the topping material supplying section has a reservoir disposed below the topping material delivering section for receiving the topping material delivered from the delivering section, and a pump for supplying the topping material from the reservoir to the delivering section.

[0013]

In this embodiment of the topping material adhering apparatus, supplying fresh topping material in the reservoir to the topping material delivering section and supplying the collected topping material to the same can be done by means of a single pump.

[0014]

In the topping material adhering apparatus, the diameters of the grains of the topping material are within 1-10 mm.

[0015]

As mentioned above, the topping material adhering apparatus according to embodiments of the present invention can increase a percentage of solid food products onto which meltable topping material adheres.

Further, the topping material adhering apparatus according to embodiments of the present invention can collect meltable topping material which does not adhere onto the solid food products.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a schematic view of a whole topping material adhering apparatus according to an embodiment of the present invention.

Figure 2 is a bottom view of a topping material delivering section in the apparatus shown in Figure 1.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0016]

Referring to Figures 1 and 2, an embodiment of a topping material adhering apparatus according to the present invention will now be explained. Figure 1 is a schematic view of a whole topping material adhering apparatus which is an embodiment of the present invention. Figure 2 is a bottom view of a topping material delivering section for delivering topping material. In the embodiment explained below, solid food products will be exemplarily explained as potato chips.

[0017]

As shown in Figure 1, a topping material adhering apparatus 1 has a topping material supplying section 2 for supplying melted topping material F, a topping material delivering section 4 for delivering the topping material, which is supplied from the supplying section 2, downward in a line form, and a solid-food-product moving section 6 for moving potato chips P to an adhering region or space A below the delivering section 4 to adhere the topping material F onto the potato chips P.

[0018]

The topping material supplying section 2 has a reservoir 2a for containing melted topping material F, the reservoir 2a being disposed in a lower location, a duct 2b connected to the reservoir 2a, a pump 2c for supplying the topping material F in the reservoir 2a to the topping material delivering section 4, the pump 2c being connected to the duct 2b and another duct 2d extending from the pump 2c to the topping material delivering section 4. The reservoir 2a is disposed below the topping material delivering section 4 to allow it to receive the topping material F delivered from the delivering section 4, and has an opening 2e opened upward and opposing the delivering section 4 in a vertical direction. The opening 2e is preferably provided with a mesh 2f for preventing pieces of potato chips and so on from entering the reservoir 2a. Preferably, the topping material F is melted in a melting kettle 8 provided separately from the topping material supplying section 2 and is fed into the reservoir 2a. The pump 2c is disposed in a lower location and, preferably, the duct 2d extends upward from the pump 2c, bends around and extends downward to be connected to the topping

material delivering section 4.

[0019]

The topping material F is preferably solidified within an arbitrary range of 0-50°C and, when it is melted, it can become grains preferably having diameters within 0.1-10 mm, more preferably, 1.0-10 mm. Further, the topping material F has a property of becoming grains by
5 being drawn apart while it is falling after the material F is delivered downward in a line form.

[0020]

The topping material is, for example, a processed fat-oil food product including fat and oils. Such fat and oils includes vegetable oil, animal oil and fat and a combination thereof.
10 The vegetable oil includes, for example, rape oil, soy bean oil, sunflower kernel oil, peanut oil, rice bran oil, corn oil, safflower oil, olive oil, kapok oil, sesame oil, evening primrose oil, palm oil, shea butter, sal butter, cacao butter such as chocolate, cocoanut oil, and palm kernel oil. The animal oil and fat includes, for example, cream, beef tallow, lard, fish oil and whale oil. Further, the processed fat-oil food product may be processed oil obtained, for example,
15 by curing, fractionlating or ester exchanging these fat and oils, or include at least one of sugar group, dry milk group, amino acid group and emulsifying agent. The topping material can be any food material which can be melted and delivered from a nozzle, for example, food including fat and oils such as chocolate. A softening point of a food including a processed fat-oil food product or food including fat and oils by means of a ring-and-ball method based
20 on JIS (Japanese Industrial Standards)-K2207 is preferably 20-50°C, more preferably, 30-45°C.

[0021]

The topping material delivering section 4 has a body 4a defining a hollow space, and a plurality of openings 4c provided in a lower surface 4b of the body 4a. As shown in Figure
25 2, each of the openings 4c is circular and preferably has a diameter of 1-10 mm. The flow rate of the topping material F delivered from one openings 4c is preferably 1-100 g/minute, more preferably, 5-25 g/minute.

[0022]

The melting kettle 8, the topping material supplying section 2 and the topping material

delivering section 4 are preferably warmed, for example, by means of hot water jackets, to maintain the topping material F in a melted state.

[0023]

5 The solid-food-product moving section 6 has an electromagnetic feeder 6a for feeding potato chips P, an ejecting chute 6b disposed downstream of the electromagnetic feeder 6a for ejecting the potato chips P to the adhering region or space A, a receiving chute 6c for receiving the potato chips P ejected into the adhering region A, and a carry-out conveyor 6e disposed at a downstream outlet 6d of the receiving chute 6c. The adhering region A is defined so that, after a topping material FL delivered from the topping material delivering
10 section 4 in a line form is drawn apart to become grains, the grains reach the adhering region A. Between the electromagnetic feeder 6a and the ejecting chute 6b, a sizer 10 is preferably provided for removing pieces of the potato chips P which have broken apart in the electromagnetic feeder 6a. The sizer 10 has apertures 10a through which only such broken-apart pieces of potato chips can pass through. A receiver 12 is preferably provided
15 below the sizer 10 for receiving the pieces of the potato chips which have passed through the apertures 10a.

[0024]

Next, an operation of the topping material adhering apparatus which is an embodiment of the present invention will be explained.

20 [0025]

Potato chips P, for example, fried by means of a fryer (not shown), are supplied to the electromagnetic feeder 6a, and fed thereby. The potato chips P in a multiple-layer state are shifted by the feeder 6a to become close to a single-layer state. Broken-apart pieces of potato chips pass through the apertures 10a in the sizer 10 and are collected into the receiver
25 12. After the potato chips P reach the ejecting chute 6b, they drop obliquely from the ejecting chute 6b toward the adhering region or space A in a first-come-first-out way. When the overlapped potato chips P drop from the ejecting chute 6b, they are further shifted to become closer to the single-layer state.

[0026]

On the other hand, the topping material F in a melted state in the reservoir 2a is pumped by the pump 2c through ducts 2b, 2d and supplied to the topping material delivering section 4. The topping material F supplied to the delivering section 4 is continuously delivered through the apertures 4c in the lower surface 4b of the delivering section 4. The topping material F delivered through the apertures 4c is in a form of lines, as indicated by a reference FL shown in Figure 1. While the topping material FL delivered in the form of lines is falling, it is drawn apart due to its viscosity to become grains. After that, the grains of the topping material reach the adhering region A.

[0027]

The grains of the topping material F adhere onto the potato chips P by hitting them. Portions of the topping material F which do not adhere to the potato chips P pass beyond the potato chips P to return to the reservoir 2a. The pieces of the potato chips falling toward the reservoir 2a are captured by the mesh 2f so that they are prevented from entering the reservoir 2a.

[0028]

The potato chips P onto which the topping material F is adhered are received by the receiving chute 6c, and moved from the downstream outlet 6d onto the carry-out conveyor 6e to be discharged.

[0029]

In the topping material adhering apparatus 1 which is the embodiment of the present invention, diameters of the grains of the topping material F can be relatively increased. Such diameters of the grains of the topping material F are preferably within 0.1-10 mm, more preferably, 1-10 mm.

[0030]

The embodiment of the present invention has been explained, but the present invention is not limited to the above-mentioned embodiment and it is apparent that the embodiment can be changed within the scope of the present invention set forth in the claims.

In the above embodiment, the solid food product is explained as potato chips, but such solid food products may be, for example, other snack foods if the topping material can adhere

thereonto.

Further, in the above embodiment, the solid-food-product moving section 6 is disposed so that it has the ejecting chute 6b and the receiving chute 6c and the adhering region A is defined in an empty or open space. However, in order to adhere the grains of the topping
5 material onto the solid food products such as potato chips P, the solid-food-product moving section may be a tumbler or a carry conveyor and the adhering region may be defined on the tumbler or the carry conveyor.

What is claimed is:

1. A topping material adhering apparatus for adhering grains of meltable topping material on a solid food product comprising:

5 a topping material supplying section for supplying melted topping material;

a topping material delivering section for delivering the topping material, which is supplied from the supplying section, downward in a line form; and

a solid-food-product moving section for moving solid food products to an adhering region below the delivering section to adhere the topping material onto the food products;

10 wherein the topping material delivered downward in the line form is separated into grains while it is falling, and the grains of the topping material reach the adhering region.

2. The topping material adhering apparatus according to claim 1, wherein

15 the solid-food-product moving section includes an ejecting section for ejecting the solid food products to the adhering region, and a receiving section for receiving the solid food products ejected into the adhering region.

3. The topping material adhering apparatus according to claim 1 or 2, wherein

20 the topping material supplying section has a reservoir disposed below the topping material delivering section for receiving the topping material delivered from the delivering section, and a pump for supplying the topping material from the reservoir to the delivering section.

4. The topping material adhering apparatus according to any one of claims 1-3, wherein

25 diameters of the grains of the topping material are within 1-10 mm.