

The Application of Taper Roller Transmission Mechanism in Manual Piece Food Automatic Forming Machine

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Keywords: Taper Roller Drive Mechanism; Handmade Cake Food; Automatic Molding Machine

Abstract: Various food automatic molding machines have been widely used in food production and processing. The article will take the manual cake-shaped food automatic molding machine as an example to discuss the design and application of the tapered roller transmission mechanism. Firstly, the characteristics of automatic processing and production of handmade cakes and the structural principle of the tapered roller transmission mechanism are introduced. Then explore its specific design and application, in order to provide reference for the relevant food processing industry.

1. Introduction

Many cakes, cakes and other cake-like foods are deeply loved by consumers, and their production and processing scale is also expanding. In order to improve the production and processing efficiency of the cake-like food and ensure the molding quality of the cake-shaped food, various food automatic molding machines have been developed. Among them, the taper roller transmission mechanism is an important component of the food automatic molding machine, which has a direct impact on the production quality of the product, and it is necessary to study its design and application.

2. The Characteristics of Automatic Processing and Production of Handmade Cakes

Many cake-like foods are traditional Chinese art with a special taste and flavor. In the past, these cake-like foods were mainly hand-made, with low production efficiency, high labor costs, and large differences in the quality of artificially produced products. Mechanized automatic processing and production is an inevitable trend in the development of the cake-like food production and processing industry. At present, there are more automatic cake-shaped food forming machines, but many of them cannot achieve the traditional manual craftsmanship. Under the traditional manual production process, the dough cake with the stuffing is uniformly spread by using a rolling pin, and the cake-like food obtained thereby is thin without sticking, and the mouthfeel of the original cake can be better maintained. Modern machining equipment mainly uses stamping and flattening, which not only makes the cake blank easy to be compacted, but also easily reveals the appearance and taste. In addition, in the process of brushing sugar and spreading, the traditional artificial production process is to first arrange the tray, and then to carry out the sugaring and spreading at one time, which is prone to uneven phenomenon of sugar coating and uneven spreading. When baking, the areas where the sugar is applied and the material is too small are easily scorched, and in too many places, it is not easy to be cooked, and it also affects the taste of the product. In the mechanized automatic production and processing process, it is also necessary to solve these problems[1].

3. Structural Principle of Taper Roller Drive Mechanism

The design of the taper roller transmission mechanism is mainly to imitate the processing process of the rolling pin in the artificial production, thereby replacing the stamping forming process, and can further improve the forming quality of the cake-shaped food production and processing. The cake-shaped food automatic forming machine adopting the taper roller transmission mechanism can automatically complete the processing processes of thinning, rounding, flattening,

shotcreting, and sesame seeding. The overall structure of the equipment mainly includes the fuselage, the cake blank introduction mechanism, the conveyor belt, the spreading mechanism, the sugar spraying mechanism, the pressing cake mechanism, and the thinning mechanism. In addition, auxiliary components such as a scraping device for the surface adhesive of the conveyor belt are included to ensure continuous and stable processing of the equipment. In the course of its operation, the cake blank is transferred to the spreading station by the introduction conveying mechanism, and the processes of sprinkling flour, sugar, sesame, crushed nuts and the like are completed, and the amount of spreading can be uniformly controlled to avoid uneven spreading. Then, the cake blank is transferred to the thinning mechanism for rolling, and the rolling process of the manual rolling pin is simulated to prevent the occurrence of damage to the cake blank and slurry leakage. Next, the sugar liquid is sprayed by the pressurized gas of the sugar spraying mechanism to form a highly atomized form so as to uniformly adhere to the surface of the cake. At the same time, the slurry suction mechanism is used for vacuum suction to achieve the purpose of recovering materials and preventing the mist syrup from entering the vacuum pump. The entire production process is completed in one go, without manual adjustment and processing, high production efficiency, and can ensure the consistency of the processing quality of the cake blank[2].

4. Application of Taper Roller Transmission Mechanism in the Design of Manual Piece Food Automatic Forming Machine

4.1 Application of the spreading mechanism

The spreading mechanism of the cake-shaped food automatic molding machine is mainly used to complete the processing of the sprinkling material. The spreading mechanism is composed of a conveyor belt, a storage hopper, a food material distributor, a granular food hopper, a motor and the like. Among them, the food material distributor is composed of a double auger conveyor at the bottom of the storage hopper, a driving motor and a transmission. The double screw conveyor installed at the bottom of the storage hopper, the two augers rotate in opposite directions, and adopt a partial closed or fully closed interval, and the respective end portions are connected to the return bin. The double auger conveyor is disposed at a position opposite to the position of the cake blank with an elongated discharge port along the axial direction, which are double spiral rods in opposite directions, respectively corresponding to the reciprocating conveying circuit. The conveyor is also provided with a long and narrow discharge port along the axial direction, and an adjustment valve is added to control and adjust the amount of the particles. According to the formula of the cake-shaped food, the specific amount of spreading can be determined, and the amount of spreading can be kept constant throughout the production process, thereby ensuring the uniformity of the spreading process. The spreading mechanism under this design mode has a large control range and high control precision, which can meet the requirements of actual production and processing[3].

4.2 Application of thin body

The thinner mechanism is the core part of the whole taper roller mechanism. It is realized by a taper roller device that rotates and rotates around the central axis. The effect is similar to that of the manual pancake method, which can flatten and round the surface of the cake blank. At the same time, by supporting the lifting device, the conical roller can be moved up and down, and at the same time, the requirements for the roundness and thinness of the cake blank are satisfied. Among them, the taper wheel in the taper wheel set is usually set to 2 or more, and can rotate or rotate around the central axis. By designing the tapered surface of the taper roller and the conveyor belt to be inclined, it is possible to avoid the occurrence of a convex drum at the edge of the blank. The thickness of the cake blank can be controlled by controlling the rotating mechanism and height. The processing process is very similar to the manual rolling pin processing, and the processing speed is fast, the molding quality is good, and the process is easy to control, which is very suitable for the production line assembly. The lifting device of the tapered wheel set is composed of a cylinder, a cylinder shaft and a connecting frame, the guiding member is mounted on the frame, the cylinder is also fixed on

the frame, and the tapered wheel gear is connected with the connecting frame. During the movement of the motor electric belt, the tapered wheel set is driven by the cylinder to move up and down. The cylinder movement speed can be adjusted by using the cylinder adjusting device and the pressure regulating valve, and the cylinder connecting plate and the slider connecting plate are integrally formed and slide on the line rail. The slider connecting plate is also integrated with the head gear connecting plate, and can be driven up and down by the cylinder to realize the up and down movement of the taper wheel set, so as to realize a processing process similar to the rolling pin.

4.3 Sugar spray mechanism application

The sugar spraying mechanism is mainly composed of a sugar storage, a nozzle, a conveying table and the like. The sugar storage bucket is arranged above the spray head, and the transport workbench is arranged below the spray head. The sugar hopper is arranged at the corresponding position under the conveying workbench, and the specific design is the shape of the open funnel to facilitate the collection of the syrup. The nozzle adopts a design form of a double nozzle, and the syrup is formed into a mist by a pressurized gas, and is sprayed from the nozzle, and a mist cover is further disposed on the nozzle to ensure that the sugar mist can be uniformly scattered on the cake. The sugar hopper corresponding to the sugar mist coverage area can limit the slurry to the range of the mist cover. As the mist falls, it finally falls into the sugar hopper, which realizes the recovery of the material and prevents the slurry from diffusing in the air. A filter can be placed inside the sugar storage bucket, and a filter is arranged at the syrup outlet to achieve a filtration process. The syrup outlet can be placed at the waist of the storage hopper to prevent crystallization of the sugar liquid into the nozzle to cause blockage. This design ensures the cleanliness of the production process and ensures the continuity of the production process. During the operation, the inductive switch can automatically capture the incoming cake, control the starting nozzle, start the sugar spraying operation, stop after the design amount, and ensure the uniformity of the sugar spray of each cake.

4.4 Application of slurry mist suction mechanism

The slurry mist suction mechanism is composed of a vacuum pump, a water storage tank, a water storage cup, a filter box, a flow tube, a vacuum suction pipe and an outlet pipe. The vacuum pump is disposed on the side of the filter box and connected to the filter box through the flow tube. A filter mesh, a filter sponge, and a vacuum pipette interface are disposed in the filter box. Connect the flow tube to the end object of the filter sponge and set the outlet pipe below. Install the suction controller on the vacuum pipette to adjust the suction volume. By using a vacuum suction method, the mist that is diffused in the air is absorbed, and then the material is cleaned and recovered by multi-layer filtration treatment. In this case, the syrup can be prevented from entering the vacuum pump, causing pollution and influence. In the process of use, the value needs to start the vacuum pump, and the slurry mist that is filled in the air will be automatically absorbed by the slurry mist suction mechanism, and after the filter box is processed, the material is recycled. The entire production process is convenient, clean and has many application advantages.

5. Conclusion

In summary, the application of the tapered roller transmission mechanism in the automatic molding machine for cakes can simulate the manual production process and process the cake-shaped food to maximize the molding quality of the cake. At the same time, the use of this automatic molding machine for production and processing can effectively improve the production and processing efficiency of the cake-like food, ensure the consistency of product quality, and promote the large-scale development of the production and processing of cake-shaped food.

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