ABSTRACT

The invention relates to a packaging system and a method for filling a collecting container (12) with articles (7), whereby a guide device (9) changes a first spatial distribution of the articles into a second spatial distribution from the discharge position (8) into the collecting container (12).
PACKAGING SYSTEM FOR FILLING A COLLECTING CONTAINER WITH ARTICLES

[0001] The invention relates to a packaging system according to the generic term of claim 1 as well as to a corresponding method.

[0002] In the case of tray sealing machines, also called tray sealers, product-filled trays are fed on a feeding conveyor and passed to a sealing station in which the trays are sealed with a cover film using a sealing process, creating individual packages. The packages are subsequently transported out of the sealing station and placed onto a conveyor belt. They are fed to the next production step via the conveyor belt. This next step can be a labelling or weighing station or an inspection station with a metal detector. The delivery of the trays from the feeding conveyor into the sealing station and the acceptance of the packages from the sealing station are executed by means of a gripper system.

[0003] Applications in which the packages are, after the sealing station, e.g., of a tray sealer, delivered directly into a final package, collecting package or intermediate package for a production process such as cooling are frequently executed with robots that pick up the packages that have been conveyed out of the tray sealer on the conveyor belt and put them down in the collecting package. This design requires a complex and expensive delivery system and has high space requirements that are similar to a design using operators for manual implementation.

[0004] The object of the present invention is to provide a packaging system and a method for operating a packaging system that eliminate the aforementioned disadvantages.

[0005] This object is solved by a packaging system with the features of claim 1 and by a method for operating a packaging system in accordance with claim 9. Advantageous further developments of the invention are given in the dependent claims.

[0006] The packaging system according to the invention preferably comprises a packaging machine, e.g., a tray sealing machine, in which a guide device is provided directly after the sealing station. The packaging system thereby comprises a gripper system that simultaneously transports a plurality of articles (for example, product-filled trays) out of a working station, preferably a sealing station. A first spatial distribution of the articles is hereby defined via the gripper system. The articles preferably are spaced a distance from one another, said distance being defined on the basis of the sealing process.

[0007] For the further course of the production in collecting containers, preferably Euro boxes or final packages, it is advantageous to reduce the spacing between the articles or to have the articles overlap in order to introduce a maximum number of articles into a collecting container in a space-saving manner. According to the invention, the guide device is formed in such a way that the articles can be conducted from a discharge position of the gripper to at least one collecting container and passed into the collecting container in a second spatial distribution that differs from the first spatial distribution of the articles. The design according to the invention has the advantage of a very space-saving arrangement without the use of conveyor belts and robots.

[0008] In the design according to the invention, the guide device is preferably arranged statically at a tray sealing machine because the defined first spatial distribution of the articles is stipulated by means of the gripper system.

[0009] The guide device thereby has, e.g., guide plates, that are especially space-saving and economical and that are executed as hoppers for largely falling articles or as support plates in the form of slides for a slanted feed into the collecting container. The development of the guide plates ensures a second spatial distribution of the articles in the collecting container in a very simple manner.

[0010] In a further form, the guide device is executed dynamically, in order to adapt to different dimensions of articles, e.g., different tray widths, lengths or heights. The masses and the sliding properties of the articles also play a large role and can be taken into account in this design according to the invention.

[0011] At least one actuating element is expediently provided for shifting the guide plates, whereby this actuating element can preferably be controlled by means of a controller of the packaging machine, in order to make it possible to automatically change the guide device with regard to the arrangement of the guide plates according to the different articles or also collecting containers.

[0012] According to the invention, the packaging system, in a variant, provides a receiving device for the collecting containers that defines the position of the collecting container to the guide device and is preferably equipped with a changing aid for a quick replacement of a filled collecting container with a collecting container that has not yet been filled. The receiving device is likewise suitable for receiving different dimensions and types of collecting containers. Preferably standardized Euro boxes and wire mesh boxes are thereby used as collecting boxes and cardboard packaging as the final packaging.

[0013] Conceivably would also be a variant in which the collecting container can automatically be changed in the receiving device in order to replace a full collecting container with an empty collecting container. For example, empty collecting containers could be removed from a magazine or an unstacking device for this purpose. Sensors monitor the filling of the collecting container. As soon as a stipulated filling level has been reached, the filled collecting container is transported away and replaced with an empty one. The filled collecting container can thereby be discharged to a conveyor belt or a magazine.

[0014] The packaging system according to the invention preferably provides at least one slide that can receive articles in order to receive or stop these preferably shortly before the collecting container. It is consequently possible in the case of packaging machines that continue to run further continuously to replace a filled collecting container with an empty collecting container. It is hereby also made possible for further articles arriving by means of the guide device to be received or stopped and, after a change of the collecting container, passed into this collecting container together as soon as the slide releases these articles. The slide is preferably connected to the controller of the packaging system. The controller also receives signals regarding the status of the receiving device, i.e., information as to whether or not there is a container at the receiving device and which type of container it is. The information can be conveyed via a barcode or an RFID tag that is attached to the collecting container, whereby this is read by a reading or evaluation unit that is connected to the controller.

[0015] The guide plates are provided for lateral guidance of the articles particularly in the case of a largely falling move-
The method according to the invention for filling a collecting container with articles, preferably at or in connection with a tray sealing machine, provides the following steps. A gripper system transports articles that have been manufactured in a working station, e.g., from a product-filled tray and a cover film, out of the working station in a first defined spatial distribution. By opening the preferably at least two gripper arms of the gripper system, the gripper system releases the articles at a discharge position. From the discharge system, the articles pass by means of a guide device into a collecting container, whereby the second spatial distribution in the collecting container differs from the first spatial distribution. This method requires no conveyor belts or robots for moving the articles and it leads to an economical and also space-saving packaging system.

The articles pass into the collecting container by means of independent, gravitationally-induced sliding on and/or in the guide device.

The packaging system according to the invention is also conceivable with a guide device in which rolls or non-driven, free-running conveyor belts are provided in connection or in place of guide plates, by means of which the articles pass from the discharge position into the collecting container.

In the case of a multi-track packaging machine, the guide plates can change their lateral distance to one another in the transport direction in a form equivalent to the guide device according to the invention.

In the following, an advantageous embodiment of the invention is described in more detail using a drawing.

FIG. 1 shows a schematic view of a tray sealing machine of the packaging system according to the invention;

FIG. 2 shows a schematic side view of a packaging system according to the invention;

FIG. 3a shows a schematic top view of a gripper system in the closed position in the discharge position;

FIG. 3b shows a schematic top view of a gripper system in the open position in the discharge position;

FIG. 4 shows a schematic side view of a variant of the packaging system according to the invention.

Components that are the same are given the same reference numbers in the figures throughout.

FIG. 1 shows a tray sealing machine with a working station that seals trays with a top film and with a gripper system having a first gripper arm and a second gripper arm that moves the trays from the working station into the working station of the feeding conveyor.

FIG. 2 shows, in the transport direction R, a tray that is being transported on the feeding conveyor and fed to the working station 2 with the gripper system (not shown). The trays that are closed with the top film are transported together as the articles 7 from the working station 2 and into a discharge position by means of the gripper system with two gripper arms 4, 5.

The gripper arms 4, 5 are closed while they transport the articles 7 in the transport direction R into the discharge position, as is shown in FIG. 3a. FIG. 3b depicts how the gripper system opens in the discharge position in that the two gripper arms 4, 5 move away from the articles 7 and release the articles 7 so that the articles 7 can fall into the guide device 9.

FIG. 2 furthermore depicts the guide device 9 with guide plates 10, 11. After the gripper arms 4, 5 open, the articles 7 fall downwards into the guide device 9. The articles 7 thereby draw nearer due to the guidance of the outer guide plates 10, the direction of the central guide plate 11, and the first defined distance A is reduced to a second distance B between the articles 7 in the collecting container 12 in order to maximally exploit the space in the collecting container 12.

Due to the form of the gripper arms 4, 5, the articles 7 gripped by these gripper arms take on a defined first spatial distribution, while the gripper arms 4, 5 are closed around the articles 7. In this first spatial distribution, neighboring articles 7 have a distance A from one another. Due to the arrangement of the guide plates 10, 11 of the guide device 9, said guide plates converging towards one another in this arrangement, this distance between two articles 7 changes while the articles 7 move due to the guide device 9. When the articles 7 come to a stop in the collecting container 12, there is a distance B between neighboring articles 7 in the horizontal direction. A second spatial distribution of the articles 7 is therewith defined that is different from the first spatial distribution A. In the second spatial distribution, the distances B are smaller than the distances A in the first spatial distribution. The limited space in the collecting container 12 is consequently better used. Slides 13, each of which is held in a guide 14 in a manner that allows sliding and each of which is shifted by an actuating element (not shown) are held in an open position and release the feed of articles 7 into the collecting container 12 until such a time as the collecting container 12 is replaced by a new one. Further articles 7 fed during the changing procedure of the collecting container 12 are consequently received by means of the sliders 13. After the change of the collecting container 12, the slides 13 are pulled back into the open position with a swift movement and the articles 7 received until that time pass into the collecting container 12.

FIG. 4 depicts a variant of the invention. In this design, the articles 7 fall on to the guide plates 15 after the gripper arms 4, 5 open. The articles 7 hereby slide with the bottom surface in the direction of the collecting container 12. At the end of the slide path, the article 7 moves against the limiting stop guide plate with which the position of the article 7 in the collecting container 12 is defined. Particularly in the case of flat articles 7, this is a design for obtaining a high level of process reliability and preventing tipping or tilting of the articles 7. The guide plates 15 can ensure that the articles 7 fall staggered in time from one another and fall into the collecting container 12 such that they overlap one another.

FIG. 4 also depicts a receiving device 17 in the form of two receiving rails 17 by means of which the position of the collecting container 12 to the packaging machine 1 or to the guide device 9 is defined in the transport direction R and in the vertical direction. A limit stop (not shown) in the direction of the receiving rails 17 defines the position in a direction at a right angle to the transport direction R.

A single-track, two-row design is shown in FIGS. 1 to 4. Designs with a plurality of tracks and a plurality of rows are also conceivable. Additional guide plates for the guidance and change of the distance in the transport direction of neighboring articles 7 are also provided, in addition to guide plates for the guidance and change of the distance A in the transport direction.

Also conceivable is a variant in which the guide plates 10, 11, 15 can be shifted with the help of suitable
actuating elements. In this way, the guide device 9 can be adapted to different forms or sizes of collecting containers 12.

1. A packaging system for filling a collecting container with articles, the packaging system comprising:
   a gripper system including at least two gripper arms for simultaneously gripping a plurality of articles and for transporting the gripped articles from a working station to a discharge position, the gripper system defining a first spatial distribution of the articles during transportation of the articles; and
   a guide device provided between the discharge position and the collecting container for guiding the articles from the discharge position to the collecting container, the guide device guiding the articles in such a manner that the articles pass into the collecting container in a second spatial distribution differing from the first spatial distribution.

2. The packaging system according to claim 1 wherein the guide device is static.

3. The packaging system according to claim 1 wherein the guide device comprises guide plates.

4. The packaging system according to claim 1 wherein the guide device is dynamic.

5. The packaging system according to claim 3 further comprising an actuating element for shifting the guide plates.

6. The packaging system according to claim 1 further comprising a receiving device for the collecting container.

7. The packaging system according to claim 1 further comprising at least one slide for receiving articles.

8. The packaging system according to claim 1 wherein the guide device comprises guide plates for guidance and/or support of a bottom side of each of the articles.

9. A method for filling a collecting container with articles, the method comprising:
   transporting articles from a working station to a discharge position by means of a gripper system, the gripper system including at least two gripper arms that define a first spatial distribution of the articles during transportation;
   releasing the articles at the discharge position by opening the gripper arms; and
   passing the articles from the discharge position into a collecting container by means of a guide device, such that the articles in the collecting container assume a second spatial distribution, wherein the second spatial distribution in the collecting container differs from the first spatial distribution.

10. The method according to claim 9 wherein the articles pass by way of gravitationally-induced sliding on or in the guide device into the collecting container.

11. The packaging system according to claim 1 wherein the guide device comprises two guide plates that are spaced apart at a first distance proximate the discharge position and that are spaced apart at a second distance proximate the collecting container, and wherein the second distance is smaller than the first distance.

12. The packaging system according to claim 1 wherein the guide device comprises multiple guide plates that converge toward each other between the discharge position and the collecting container.

13. The packaging system according to claim 1 wherein the articles travel in a first direction toward the working station, and the guide device comprises multiple guide plates that each extend at an angle relative to the first direction between the discharge position and the collecting container, and multiple stop plates that are each positioned proximate an end of a respective guide plate.

14. The packaging system according to claim 13 wherein each guide plate is configured to contact a bottom surface of a respective article, and the stop plates are configured to stop lateral movement of the articles after passing from the guide plates.

15. The packaging system according to claim 1 wherein the at least one slide extends beneath the discharge position and is configured to receive one or more of the articles prior to the one or more articles being passed into the collecting container.

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