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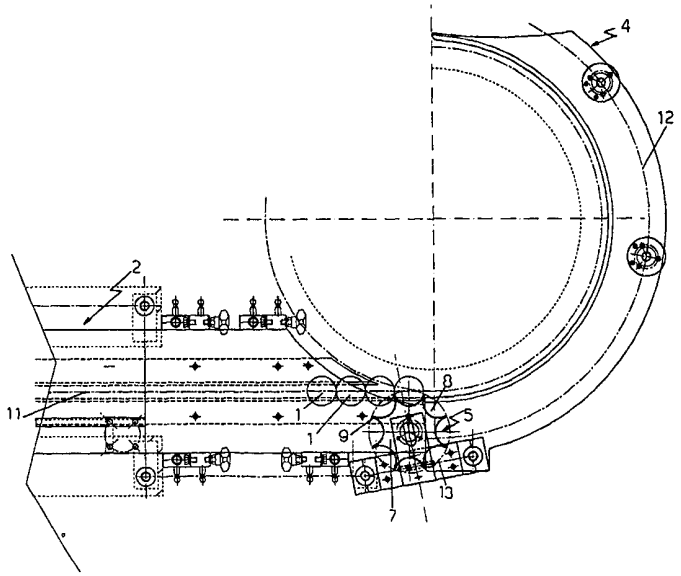

(57) Abstract

Device for spacing at a predefined interval containers (1) generally made of plastic and supplied by an overhead conveyor (2), along which they follow in a compact row a trajectory (11) suspended by their projecting neck (3), and entering into a star conveyor (4) designed to space them at a predefined interval, along which they follow a circular trajectory (12) suspended by their neck (3), in which an element (5) for separating and braking the containers, which is arranged between the overhead conveyor (2) and the star conveyor (4), is provided.

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DEVICE FOR SPACING AT A PREDEFINED INTERVAL CONTAINERS GENERALLY MADE OF PLASTIC, PROVIDED WITH AN ELEMENT FOR SEPARATING AND BRAKING THE CONTAINERS

TECHNICAL FIELD AND BACKGROUND ART.

The present invention relates to a device for spacing at a predefined interval containers generally made of plastic, provided with an element for separating and braking the containers.

The present invention falls within the sector of devices for conveying containers, in particular containers made of plastic or PET, and acts as a connection between successive workstations.

Containers made of plastic or PET, more specifically bottles, must undergo a sequence of processing operations such as blowing, rinsing, filling and labelling, for each of which a workstation operating at a predefined interval and speed is provided.

The conveying device as a whole must therefore ensure, in addition to transfer of the containers from one station to the other, also adaptation of the feeding movement of the containers to the operating parameters of the machine downstream, in particular using the same interval and synchronizing the speed.

Generally the transfer of containers made of plastic, in particular the transfer of PET bottles, is performed by means of overhead conveyors of the known type which are able to take advantage of the particular shape of the bottle which, in the vicinity of the mouth, has a projecting neck.

This type of conveyor, which is generally operated by air or by chains, is able to transfer the containers in a compact row, keeping them in a vertical position and suspended by their necks, but is unable to space the containers so as to adapt them to the next

workstation.

Chain conveyors suitable for this purpose are known, on which the containers rest with their bottom, synchronized with the workstation downstream, and which pick up the containers leaving the overhead conveyor and transfer them to a star conveyor. Along this path, the abovementioned containers are channelled between two screw feeders which space them by a distance equal to the operating step of the star conveyor and the workstation.

The drawbacks of this solution are obviously associated with the complexity, the cost and the dimensions of such a device, which also envisages a change in the type of conveying system, passing from one where the containers are suspended by their necks to one where they rest on the bottom.

During operation of the abovementioned device, further drawbacks have emerged, due to the fact that the screw feeders are unable to receive containers which are partially deformed following conveying or the processing operations undergone, with consequent interruption in the feeding movement of the containers, which must be restored manually.

Devices for spacing containers which partly manage to overcome these drawbacks are also known, such as, for example, that described in the Italian patent No. 1260380 relating to a device for spacing at a predefined interval containers made of PET or plastic generally supplied in an erect position and in a single row by a conveyor in which the containers remain suspended by their necks and are spaced at a predefined interval without the introduction of screw feeders and chain conveyors.

In the abovementioned device, the containers, which are suspended by their necks and arranged in a row, reach the exit section of an overhead conveyor where they are received by a pair of guides and are introduced by the latter into a star conveyor which spaces them at a suitable interval. For this purpose the star conveyor has two disks which are arranged

above one another and coaxial and the external circumference of which, during rotation, comes into contact with the linear trajectory of the containers leaving the overhead conveyor.

The spacing of the containers is performed by means of recesses provided at a suitable angular interval in one of the two disks and formed so as to engage with and move the containers by means of their necks. The second disk allows the containers to be stabilized, preventing any oscillating movements.

Such a device, although simplifying the structure and accelerating the process, still has some drawbacks. Firstly the two guides are necessary for supporting the containers along the portion between the exit section of the overhead conveyor and the section for entry into the star conveyor.

Secondly, during use of the device operating at high speed, malfunctions have been encountered, such as lack of engagement by the recesses formed in the disk of the star conveyor or engagement of two containers in a single recess.

In particular, the abovementioned defects during engagement of the containers by the star conveyor must be attributed to an oscillating movement of the containers themselves in a plane parallel to the direction of movement along the overhead conveyor and tangential to the external circumference of the disk of the star conveyor.

This oscillation is due to the nature itself of the pneumatic overhead conveyor which imparts a thrust to the bottle by means of air jets which cause an inclination of the container about the point from where it is kept suspended. Since the air jet strikes the part closest to the mouth, when travelling through the overhead conveyor, the containers are not perpendicular to the direction of movement, but inclined with respect to the suspension point, arriving at the exit first with the mouth followed by the remainder of the container. When the container leaves the overhead conveyor, it travels along the guide,

pushed by the containers upstream and is straightened only because the abovementioned air thrust is no longer present. Two adjacent containers may therefore be inclined with respect to each other with consequent adjacent positioning of the two necks and the risk of simultaneous gripping of both of them by the star conveyor.

DISCLOSURE OF INVENTION.

The object of the present invention is that of eliminating the abovementioned drawbacks and providing a device for spacing containers at a predefined interval, provided with an element able to divide and brake the containers so as to allow the star conveyor to engage correctly with the neck.

Said objects are fully achieved by the device for spacing at a predefined interval containers generally made of plastic, according to the present invention, provided with an element for separating and braking the awaiting containers, which is characterized by the contents of the claims indicated below.

In particular, the device in question transfers directly to the star conveyor the containers leaving the overhead conveyor, with the aid of a separating and braking element which characterizes it. This element for separating and braking the awaiting containers is formed substantially as a star conveyor comprising at least one disk with generally semi-cylindrical recesses for accompanying and separating the containers.

The insertion of this characterizing element may be performed at different distances from the star conveyor so as to allow the seating of containers with variable dimensions.

BRIEF DESCRIPTION OF DRAWINGS.

These and other characteristic features will emerge more clearly from the following description of a preferred embodiment illustrated, purely by way of a non-limiting example, in the accompanying plates of drawings, in which:

- Figure 1 shows a plan view of the device;

- Figure 2 shows a front view of a detail of the device, comprising the separating and braking element.

BEST MODE FOR CARRYING OUT THE INVENTION.

With reference to the Figures, 1 denotes a container which is passing through the device according to the present invention, supplied by an overhead conveyor 2 along which the container 1 travels, suspended by its neck 3, following a substantially rectilinear trajectory 11. The overhead conveyor 2 is of the air-operated type and transfers the containers 1, keeping them vertical and in a compact row, namely not separate from each other. During the most common use of the abovementioned device, the containers 1 consist of bottles made of plastic, more particularly PET, which have the neck 3 in the vicinity of the mouth.

The containers 1 must follow a sequence of processing steps, such as blowing, rinsing, filling and labelling which result in their passing through stations with different operating parameters. Therefore the containers 1, before entering into the workstation in question, must undergo spacing so as to have the same interval as the machine downstream.

This spacing is performed by means of a star conveyor 4 which engages with and moves along a circular trajectory 12 the containers leaving the overhead conveyor 2, supporting the necks 3 of the containers which are thus conveyed in the suspended condition, without resting with their bottoms on a support surface.

The star conveyor 4 has a substantially circular shape and comprises at least one disk in which recesses are formed in a known configuration not shown in the figures.

Transfer of the containers 1 from the overhead conveyor 2 to the star conveyor 4 occurs directly, without the use of guides, which are required, on the other hand, in the device according to Italian Patent No. 1260380 mentioned above. This transfer is made possible and facilitated by the introduction of an original separating and braking element 5 which

has the function of separating one container from the others, when it reaches the transition point between the rectilinear trajectory 11 of the overhead conveyor and the circular trajectory of the star conveyor 12.

During its separating action, the element 5 is also able to brake the advancing movement of the row of containers 1, thus ensuring that the star conveyor 4 engages more easily and reliably with a single container per recess.

The separating and braking element 5 is formed substantially as a star conveyor, mounted idle and rotating about an axis 6, so that the external circular trajectory 13 is substantially tangential to the rectilinear trajectory 11 and to the circular trajectory 12 in the vicinity of their point of contact.

With particular reference to Figure 1, it is possible to understood the operating principle of the separating and braking element 5 which is inserted in the device at the point where the overhead conveyor 2 transfers directly, without the arrangement of guides, the containers 1 to the star conveyor 4.

The element 5, as can be seen in Figure 1, comprises an upper disk 7 in which recesses 8 with a substantially semi-cylindrical shape alternating with dividing portions 9 are formed. During the movement of the upper disk 7, which is driven by the star conveyor 4 as a result of the intervening arrangement of the containers 1, the recesses 8 receive a container and transfer it to the star conveyor 4 separated from the other containers by means of the dividing portion 9. This dividing portion 9 also performs the function of braking the feeding movement of the compact row of containers 1.

The original configuration of the disk 7 manages to avoid the malfunction defects which occurred in the known solutions, not only isolating the container being engaged and braking those upstream, but also stabilizing the engaged container, avoiding undesirable oscillations.

For this purpose, as illustrated in Figure 2, the separating and braking element 5 is provided with a lower disk 10 which is coaxial with the upper disk 7 and comes into contact with the containers 1 along a portion different from that of the upper disk 7 so as to accompany and stabilize the container.

According to an embodiment not shown, the separating and braking element 5 may be mounted so that its distance from the star conveyor 4 is adjustable according to the dimensions of the containers 1. This adjusting movement may be performed via adjusting means not shown, comprising means for locking the abovementioned axis in the chosen position and an eyelet, in which the axis 6 of rotation of the separating and braking element 5 is introduced free to slide in the longitudinal direction with respect to the eyelet itself.

The adjustment of the position of the axis 6 of the separating and braking element 5 may envisage some main positions for the containers which are most frequently used.

CLAIMS

1. Device for spacing at a predefined interval containers (1) generally made of plastic and supplied by an overhead conveyor (2), along which they follow in a compact row a trajectory (11) suspended by their projecting neck (3), and entering into a star conveyor (4) designed to space them at a predefined interval, along which they follow a circular trajectory (12) suspended by their neck (3), characterized in that it comprises an element (5) for separating and braking the containers, which is arranged between the overhead conveyor (2) and the star conveyor (4), said separating and braking element (5) being formed so as to separate and brake the containers 1 which are supplied by the overhead conveyor (2), creating a space between one container and the next one when the container (1) passes from the overhead conveyor (2) to the star conveyor (4).

2. Device for spacing containers (1) at a predefined interval according to Claim 1, characterized in that the element (5) for separating and braking the awaiting containers is configured in the manner of a star conveyor, comprising at least one disk (7) provided with recesses (8) and mounted idle and rotating with respect to an axis (6) with an external circular trajectory (13).

3. Device for spacing containers (1) at a predefined interval according to Claim 1, characterized in that the element (5) for separating and braking the containers (1) comprises an upper disk (7) which has, formed in it, recesses (8) alternating with dividing portions (9) and formed so as to surround a portion of the container (1) and separate it from a container which is situated immediately upstream and braked in this way by means of the insertion of the dividing portion (9) between the two.

4. Device for spacing containers (1) at a predefined interval according to Claim 3, characterized in that the recesses (8) formed in the upper disk (7) have a substantially semi-cylindrical shape.

5. Device for spacing containers (1) at a predefined interval according to Claim 3, characterized in that the separating and braking element (5) comprises a lower disk (10) formed so as to be adapted to the containers (1), stabilizing it at the moment of engagement by the star conveyor (4).

6. Device for spacing containers (1) at a predefined interval according to any one of the preceding claims, characterized in that it comprises adjusting means which allow the movement of the axis (6) of the separating and braking element (5) away from or towards the star conveyor (4) according to the size of the containers (1).

7. Device for spacing containers (1) at a predefined interval according to Claim 6, characterized in that the means for adjusting the position of the axis (6) of the separating and braking element (5) with respect to the star conveyor (4) comprise means for locking the axis (6) displaceable in an eyelet according to predefined positions on the basis of the dimensions of the containers.

8. Device for spacing containers (1) at a predefined interval according to Claim 1, characterized in that the overhead conveyor (2) terminates directly in the star conveyor (4) supplying it, and the separating and braking element (5) supplies directly the star conveyor (4) without the need for intermediate guides supporting the containers (1).

9. Bottling plant, characterized in that it comprises at least one device for performing spacing at a predefined interval according to any one of the preceding claims.

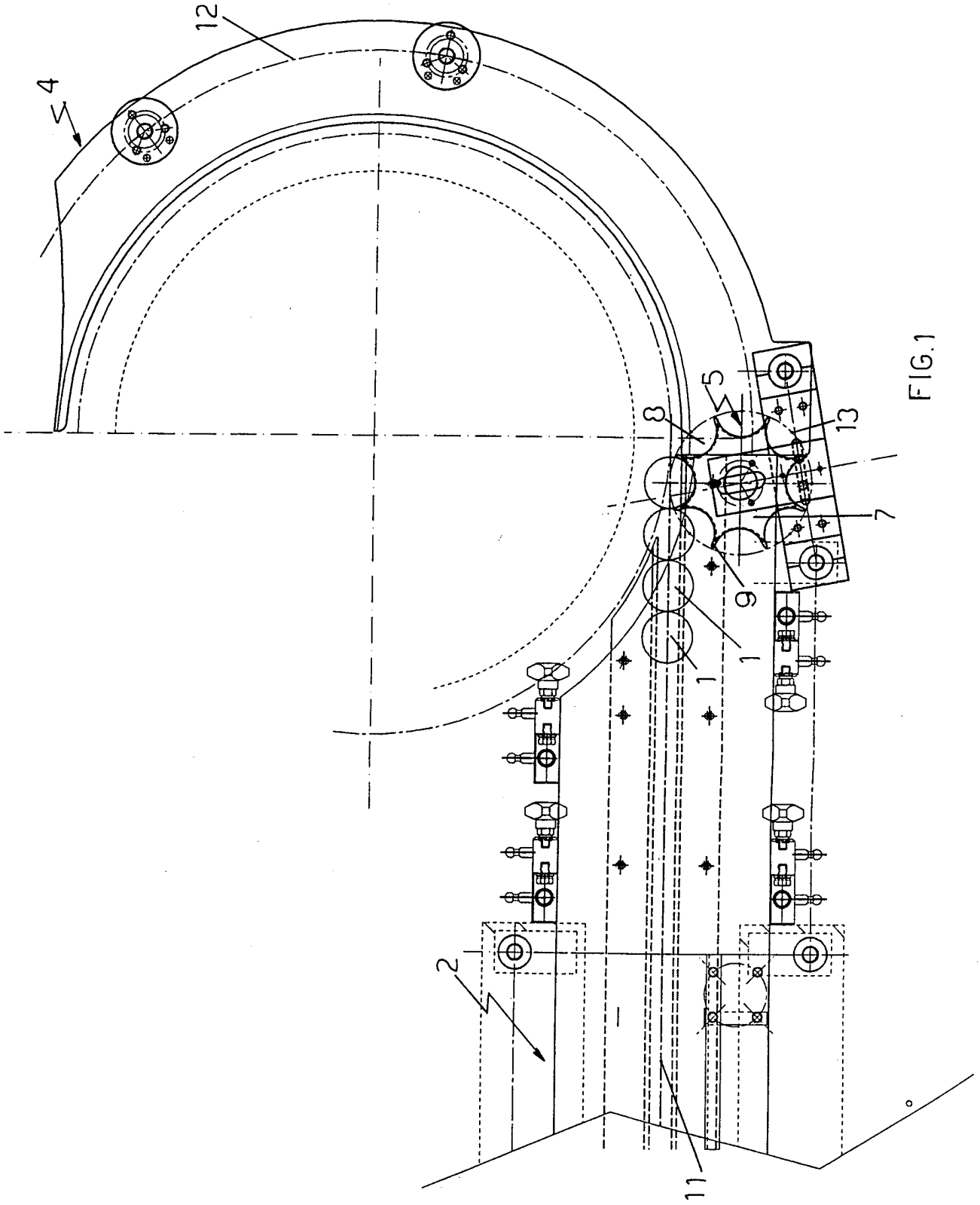

FIG.1

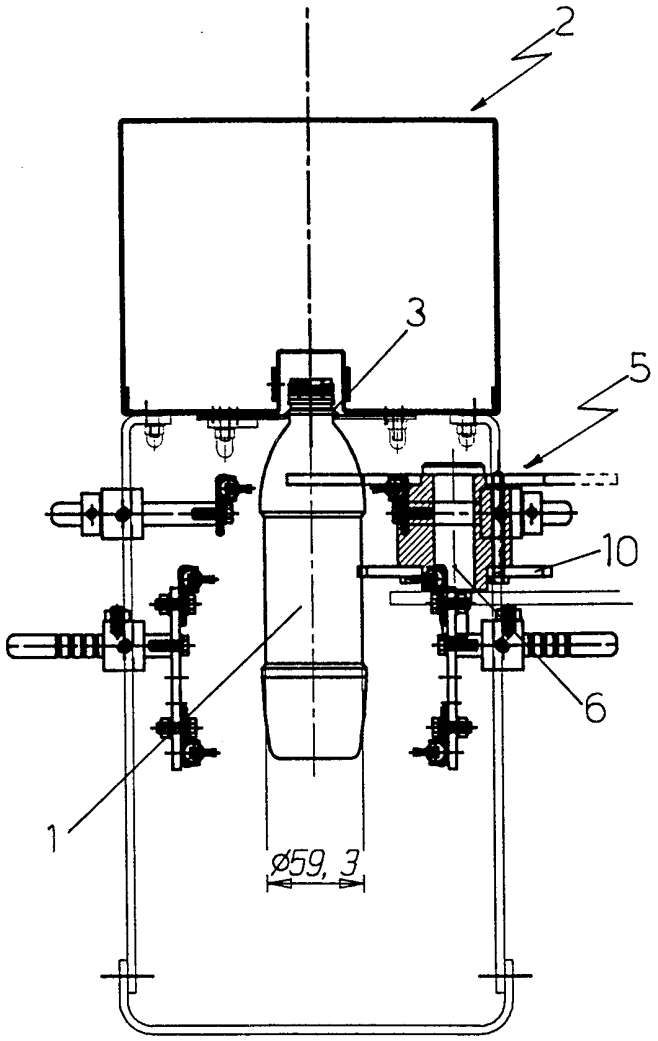

FIG. 2