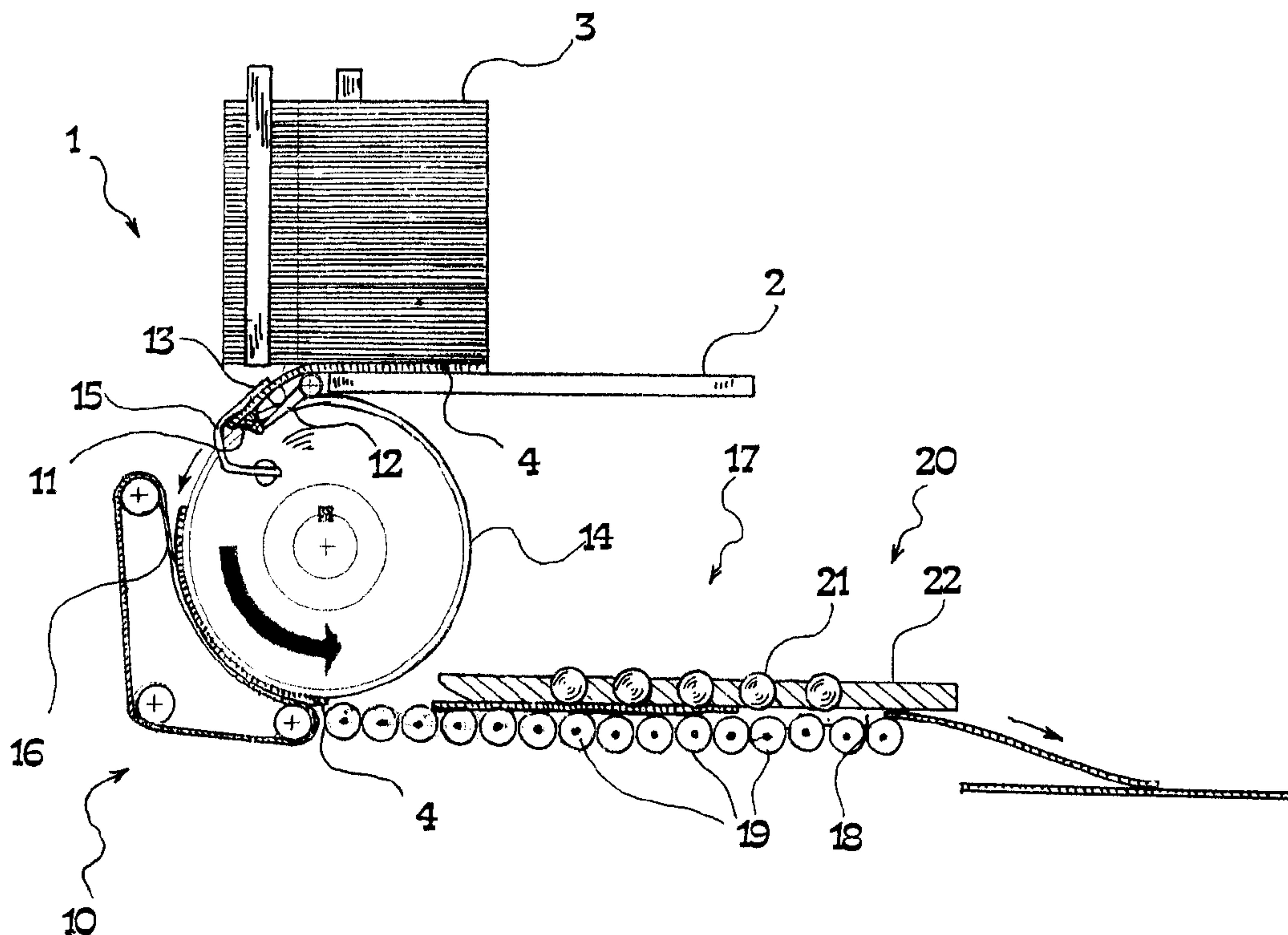




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(54) Title: SHEET FEEDING DEVICE



(57) **Abrégé/Abstract:**

A sheet feeding device (1) allows to grip and draw a single product (4) out of a pile (3) of products on an of the corners thereof, provided that it is adjacent to a closet edge, or even along the length of said closet edge, with one or more suction caps or equivalent means, arranging the related resting plane (2) parallel to the packaging direction (A) and delivering the single product (4) along a direction substantially parallel (B) to the packaging direction, and comprises means for rotating (20) each single product (4) drawn out of the pile (3) before the delivery along the packaging line (L), around an axis substantially perpendicular to said single product (4) and in a translation phase on a plane of the single product (4), so as said free edge is parallel or perpendicular to the packaging line (A).



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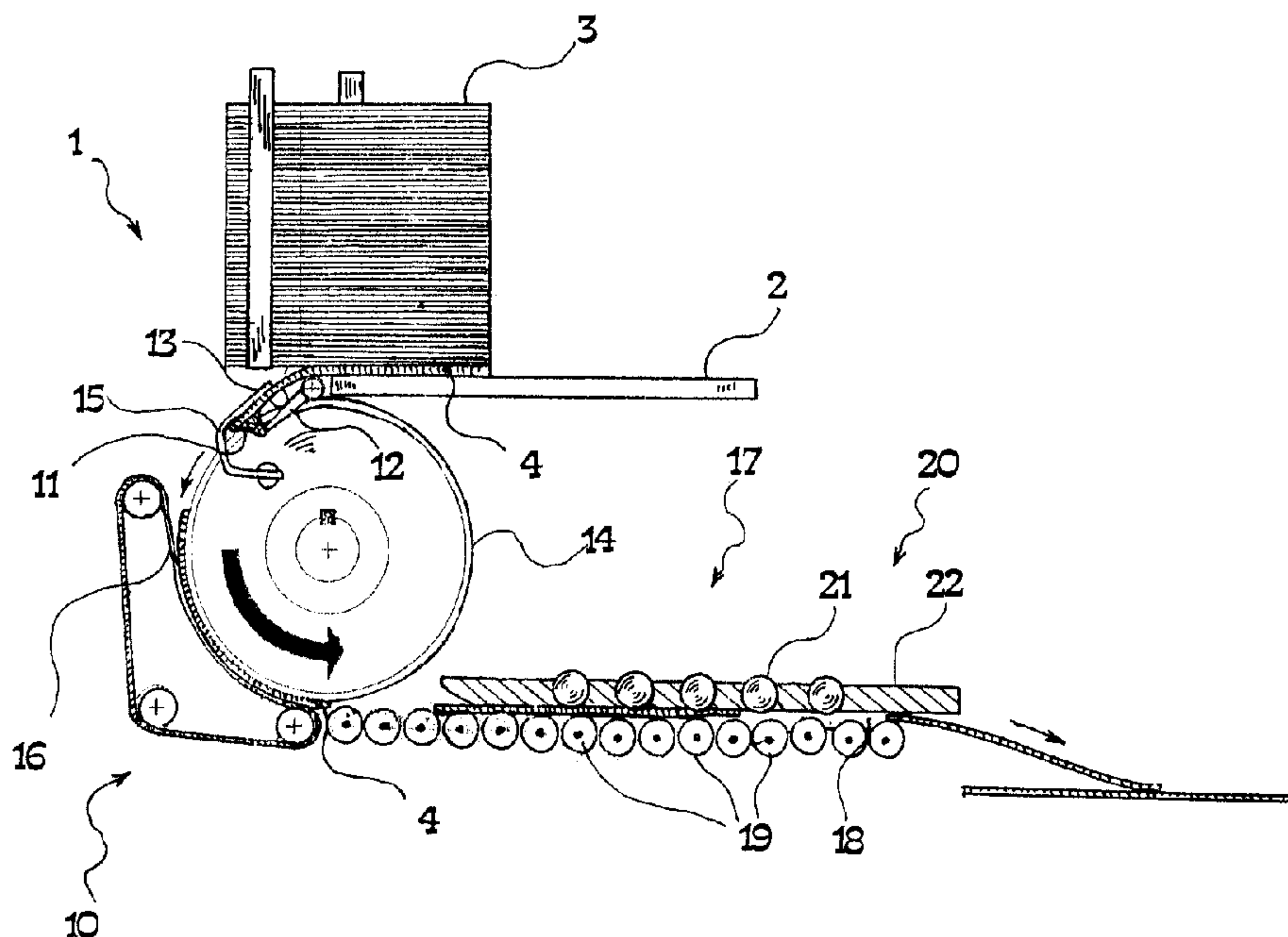
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(54) Title: SHEET FEEDING DEVICE WITH A SHEET ROTATING DEVICE



(57) Abstract: A sheet feeding device (1) allows to grip and draw a single product (4) out of a pile (3) of products on an of the corners thereof, provided that it is adjacent to a closet edge, or even along the length of said closet edge, with one or more suction caps or equivalent means, arranging the related resting plane (2) parallel to the packaging direction (A) and delivering the single product along a direction substantially parallel (B) to the packaging direction, and comprises means for rotating (20) each single product (4) drawn out of the pile (3) before the delivery along the packaging line (L), around an axis substantially perpendicular to said single product (4) and in a translation phase on a plane of the single product (4), so as said free edge is parallel or perpendicular to the packaging line (A).

WO 2007/132400 A3

SHEET FEEDING DEVICE

Description

The present invention is related to a sheet feeding device, of the type used for feeding a packaging line
5 with laminar inserts.

Typically, along a continuously operated packaging line feeders and sheet feeding devices are arranged to place in juxtaposition elements to be wrapped, e.g. by a cellophane film or another heat-sealable film or even by
10 reeled off paper, possibly provided with a heat-sealable layer of adhesive resin, according to a packaging procedure known as *flow pack*.

Elements to be packaged in such a way are, by way of example, magazines, newspapers, flat parcels and more,
15 and inserts associated thereto, formed by a single sheet or even by a brochure provided with a closed edge or by a binding, e.g. formed by a folding line, or an envelope. Generally, in the following said inserts will be referred as sheet-like single products.

20 Examples of the above kind are magazines separately sold or in a pair, supplied to a packaging line by means of devices known as feeders, and inserts of various kind (advertising or promotional leaflets etc.) packaged together with the magazines.

25 In a sheet feeding device, said single products are generally collected in a pile rested on a table. A portion of the pile projects from the table so that gripping means can remove the last product at the bottom of the pile for sending it to the packaging line, along a
30 predetermined path.

In consideration with the very high flowing speed of the packaging line, the correct positioning of each insert coming from the respective sheet feeding device, in
35 synchronization with the elements already flowing along the line, and layered with the correct orientation, e.g. in parallel with the packaging line and at the centre of

the underlying elements, is a particularly felt problem.

As a matter of fact, the high flowing speed requires the sheet feeding device to impart strong accelerations to the inserts, along transversal or longitudinal directions
5 with respect to the flowing direction, which should be anyway put under control to ensure a correct positioning.

In the state of the art, sheet feeding devices are known, delivering the single products according to parallel or even perpendicular directions with respect to the
10 packaging line, by virtue of means gripping each single products at more than one point of a free edge of the product, the edge being wholly projected from the resting table.

The US patent No. 5,174,559-A and the European patent No.
15 1,160,186 discloses a sheet feeding device wherein the single products is gripped by a single suction cap dragging the product at an corner thereof. Further, the table, on which the product pile is rested, is placed oblique with respect to the direction of the packaging
20 line, shortly the packaging direction.

Thus, the single product is delivered according to an oblique direction with respect to the packaging direction, so as to resolve the acceleration vector in two components: one parallel and the other perpendicular
25 to the packaging line.

Each of said components has a size or magnitude lower than the overall vector; the components are controlled independently to each other, by side stoppers or by the friction of the product on the other products already
30 placed along the line, further considering that the longitudinal component can be coupled with the line speed.

However, such devices of the known art are not completely satisfactory, because the orientation imparted to the
35 single product motion is generally fixed, and it is not adaptable to inserts having different sizes which need dedicated devices.

Moreover, the control of the acceleration longitudinal component is particularly difficult, because it should be synchronized with the flowing speed of the line, the latter not having a necessarily predetermined entry.

- 5 The technical problem at the root of the present invention is to provide a sheet feeding device allowing to obviate to the drawbacks mentioned with reference to the known art.

Such a problem is solved by a device as above specified,
10 comprising means for rotating each single product drawn out of said pile before the delivery to the packaging line, around an axis substantially perpendicular to said single product and in a translation phase on a plane of the single product, so as said free edge is parallel or
15 perpendicular to the packaging line.

The main advantage of the sheet feeding device according to the present invention lies in allowing to grip and to draw the single product out of the pile, which can occur on any of the corners thereof, provided that the latter
20 is adjacent to a close edge, or even along the length of the close edge, by one or more suction caps or equivalent means, arranging the resting table perpendicular or parallel to the packaging direction and delivering the single product according to a direction substantially
25 parallel or perpendicular to the packaging direction respectively.

The present invention will be hereinafter described according to a preferred embodiment thereof, provided to exemplificative and non-limitative purpose with reference
30 to the annexed drawings wherein:

* Figures 1A, 1B and 1C show perspective views of a sheet feeding device according to the invention, in different operation condition;

* Figure 2 shows a cross-sectional view according to a
35 vertical plane of the device in figure 1A; and

* Figures 3A and 3B show perspective view of a detail of the device of figure 1A, in different operation moments.

With reference to figure 1A and 2, a sheet feeding device is described, indicated 1 as a whole.

The device 1 comprises a resting table 2, on which a pile of sheet-like products 4 is placed, arranged in such a way that the products project at a delivery side, indicated as 5, of the table 2.

The delivery side 5 is substantially parallel to the packaging direction involved in the continuous packaging line on which the device 1 is mounted, and in this way the single product will be delivered perpendicularly to the packaging line.

However, it is understood that the delivery side could be also perpendicular to the packaging direction, and then the product would be delivered in a concordant direction, i.e. parallel, to the packaging direction.

The products project with at least one portion of a free edge of the sheet-like products 4, where for free edge it is intended the edge of a single sheet or envelope, the binding of a leaflet, the folding of a flyer.

In figures 1A and 1C, said free edge is the long side of the products, in figure 1B it is the short side.

In figures 1A and 1B the products only project of a corner, i.e. of a triangular portion, while in figure 1C the products project along all the edge length, parallel to the delivery side 5.

For correctly positioning piles of products having different sizes, the sheet feeding device 1 comprises, on the resting table 2, adjusting means 6 for positioning a corner of the pile 3 of sheet-like products 4, such corner being movable along at least two directions over the table.

Such means comprises an angular blocking member 7 (figures 1A and 1B) or even a straight blocking member 8 (figure 1C), slidably mounted parallel to the delivery side 5 on a support 9 slidably mounted on the table 2 perpendicularly to the delivery side 5.

The device 1 comprises therefore gripping and extracting means of a single sheet-like product 4 from the bottom of said pile 3 rested on said table 2. The gripping and extracting means are indicated 10 as a whole.

- 5 They comprise at least one suction cap 11 mounted on an mobile arm 12 which may house either a single or multiple suction caps, according to the operation needing.

Such suction cap 11, for the movement of the arm 12, lower the projecting portion, indicated 13, of the single
10 product 4 toward a rotating drum 14 placed below the table 2.

The drum is provided by grasping pliers 15 catching the projecting portion 13 and dragging in extraction the single product 4 which is interposed between the surface
15 of the drum 14 and the surface of a tape 16 adjacent to the drum 14.

In such a way, the single product rotates for 180° and is supplied to delivery means 17 of said single products toward a packaging line L, continuously operated
20 according to a packaging direction indicated by an arrow A.

Said delivery means 17 comprises a sliding plane which, in the present embodiment, is constituted by a roller table 18 even if, as it can be easily understood, the
25 sliding plane could be embodied by a tape or belts.

The roller 19 of the roller table 18 are motor-driven and oblique with respect to a delivery direction B which is substantially perpendicular to the packaging direction A.

At said sliding plane 18, the device 1 comprises means
30 for rotating 20 each single product 4 drawn out of the pile 3 before the delivery along the packaging line P, around an axis substantially perpendicular to said single product 4 and in a translation phase of the single product 4 over the sliding plane 18 of the single
35 product, so as said free edge is parallel or perpendicular to the packaging direction A.

The means for rotating 20 comprises a system for increasing the interference between the single product 4 and the movable sliding plane 18. Such a system increasing the interference comprises a plurality of idle
5 rolling members 21, sphere shaped, kept at a predetermined and adjustable distance from the surface of the sliding movable plane 18, under which the single product 4 is introduced along its path.

Said spheres 21 are mounted on a support 22 whose
10 position with respect to the sliding plane, is also adjustable.

The sheet feeding device 1 hence comprises a second system for increasing the interference between the single product 4 and the sliding plane 18, exerting a pressure
15 lower with respect than the preceding first system, and comprising a series of idle wheels 23 mounted on elastic support 24.

In connection with the operation of the above described sheet feeding device 1, it is apparent how, according to
20 the type of the insert and in particular to the position of the free edge, it is possible to place the pile of products to be delivered to the packaging in a position with either the required corner or the whole edge projecting.

25 The product can be dragged by only one suction cap, as in the angular gripping, or by more than one suction caps which can be provided in the case.

Once the product has been drawn out of the pile, it is delivered toward the packaging line. In the case
30 described herein, each product rotates of 180° at the drum.

Then, it is delivered over the sliding plane, formed by the roller table. In this position, before being delivered to the packaging line, it interferes with the
35 wheel 21 of the means for rotating. The greater friction with the rollers 19 of the roller table 18 causes the rotation of the product until it rests against the edge of the table or a stopping edge mounted at said means for

rotating, i.e. the support 22 of the wheel 21.

The same rotation is also imparted to the products placed on the table 2 with the whole free edge projecting: in this case, the product will undergo a rotation of 90°.

- 5 In case no rotation is required, it is sufficient to raise the level of the means for rotating with respect to the sliding plane.

In any event, it is however possible to deliver any insert correctly positioned at the packaging line.

- 10 To the above described sheet feeding device a man skilled in the art, to satisfy further and contingent needing, can bring several further changes and variations, in any case all of them falling within the protection scope of the present invention, as defined by the attached claims.

CLAIMS

1. Sheet feeding device (1) comprising:
- * a resting table (2) on which a pile (3) of sheet-like product is placed, projecting at a delivery side (5)
5 of said resting table (2) with at least one portion (13) of a free edge of the sheet-like products;
 - * means for gripping and extracting (10) of a sheet-like single product (4) from the bottom of said pile (3) rested onto said resting table (2);
 - 10 * delivery means (17) of said single product (4) toward a continuously operated packaging line (L) along a packaging direction (A),
- characterized in that it comprises means for rotating (20) each single product (4) drawn out of said pile (3)
15 before the delivery on the packaging line (L), around an axis substantially perpendicular to said single product (4) and in a translation phase on a plane of the single product (4), so as said free edge is parallel or perpendicular to the packaging line (A).
- 20 2. Sheet feeding device (1) according to claim 1, wherein said single product (4) is delivered according to a delivery direction (B) substantially parallel or perpendicular to the packaging direction (A).
3. Sheet feeding device (1) according to claim 1 or 2,
25 wherein said delivery side (5) is substantially perpendicular or parallel to the packaging direction (A).
4. Sheet feeding device (1) according to any one of the preceding claims, wherein the gripping and extracting means (10) positions said single products (4) on a
30 sliding mobile plane (18), over which said translation occurs.
5. Sheet feeding device (1) according to claim 4, wherein said means for rotating (20) comprises a system increasing the interference between the single product
35 (4) and the sliding mobile plane (18).
6. Sheet feeding device (1) according to claim 5, wherein said system increasing the interference comprises

a plurality of idle rolling members (21), at a distance from the surface of the sliding mobile plane (18), under which the single product (4) is introduced along the path thereof.

5 7. Sheet feeding device (1) according to claim 6, wherein said idle rolling members are spheres (21).

8. Sheet feeding device (1) according to any one of the preceding claims 4 to 7, wherein said sliding mobile plane (18) comprises a motor-driven roller table.

10 9. Sheet feeding device (1) according to claim 8, wherein the rollers (19) transversally extend with respect the single product translation direction, but they are oblique with respect to the latter.

15 10. Sheet feeding device (1) according to any one of the preceding claims 5 to 9, comprising a further system for increasing the interference between the single product (4) and the sliding plane (18), exerting a pressure lower than the preceding.

20 11. Sheet feeding device (1) according to claim 10, wherein said further system increasing the interference comprises a series of wheels (23) mounted on elastic supports (24).

25 12. Sheet feeding device (1) according to any one of the preceding claims, wherein the resting table (2) comprises mean for positioning (6) a corner of the pile (3) of sheet-like products, movable according to at least two directions.

