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(54) **PACKAGING MACHINE**

(57) A packaging machine (1) that comprises: a first conveyor (2), along which each product (P) to be packaged advances while keeping its top face, which is opposite to the bottom face that rests on the surface (3) of the first conveyor (2), coplanar with respect to the top face of other products (P) that are present on the surface of the first conveyor (2), thus defining an upper fixed line along the plane that comprises the top faces of the products (P); a second conveyor (4), along which each wrapped product (W) advances while keeping its bottom face, which is opposite to the top face that rests on the surface (5) of the second conveyor (4), coplanar with

respect to the bottom face of other products (W) that are present on the surface of the second conveyor (4), thus defining a lower fixed line along the plane that contains the surface (5); a primary wrapping wheel (6), which is interposed between the first conveyor (2) and the second conveyor (4) and is configured to receive at least one product (P) from the first conveyor (2) and at least one wrapping sheet (A), in order to wrap the at least one product (P) in the at least one wrapping sheet (A) and deliver the wrapped product (W) upside down to the second conveyor (4).

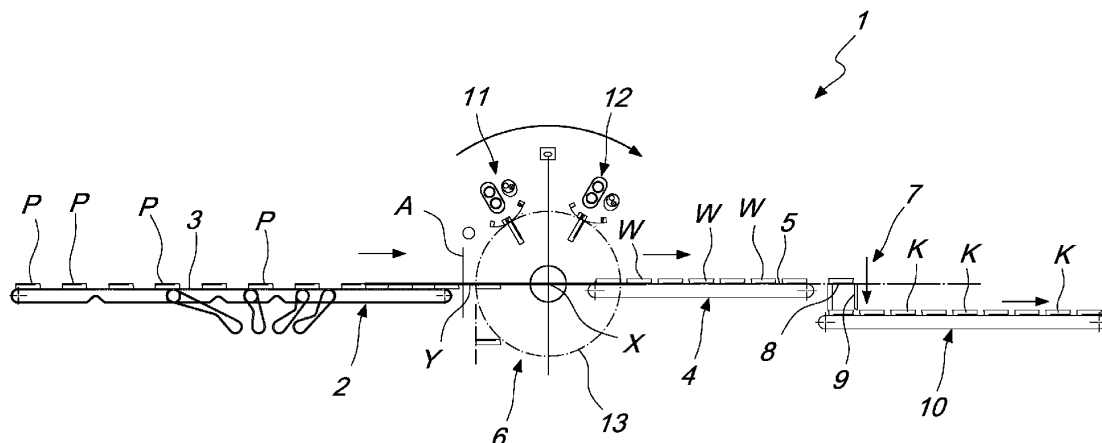


Fig. 1

Description

[0001] The present invention relates to a packaging machine, in particular of the type suitable for wrapping and sealing a product inside a package produced with a sheet that is folded and, optionally, heat-sealed.

[0002] For products such as bars of chocolate (but also snacks, candy bars, chocolates and the like), normally there is a first wrapping, produced with a sheet of minor thickness (generally made of aluminum or paper or polymeric material or combinations thereof), which constitutes what is termed primary packaging, and a second wrapping, produced with a carton or a sachet or a box-like element, which constitutes what is termed secondary packaging.

[0003] In conventional methods of packaging, the product is subjected to wrapping (enveloping or boxing or placing in a sachet), while a respective fixed line is maintained for the machine.

[0004] In automatic machines, the term "fixed line" means a line (or a plane) that corresponds to a part of the product to be packaged (or to a portion of the carton into which a product is to be inserted) with respect to which the movement and packaging operations will refer.

[0005] In the primary packaging of bars of chocolate (and the like), it is common to have a fixed line below the product, i.e. by maintaining a predefined alignment of the bottom faces of the bars (and the like) that advance along the machine. This option presents the drawbacks that any operations to evenly space the bars apart (and the like) could result in an abrasion of the top face which, normally, is the face that has the best aesthetic finish.

[0006] By contrast, maintaining the fixed line with respect to the top face would cause greater complications during the secondary packaging, so complicating the boxing operations.

[0007] The aim of the present invention is to solve the above-mentioned drawbacks, by providing a packaging machine that guards against any damage to the top face of the product to be packaged, by preventing abrasions thereof along the conveyance line.

[0008] Within this aim, an object of the invention is to provide a packaging machine that makes it possible to facilitate and speed up the secondary packaging operations, in particular the operations of cartoning and/or boxing.

[0009] Another object of the invention is to provide a packaging machine that makes it possible to carry out the primary packaging (wrapping) of products, while maintaining a predefined alignment thereof in various areas of the machine.

[0010] Another object of the invention is to provide a packaging machine that allows high operating speeds without this resulting in damage to the product.

[0011] Another object of the present invention is to provide a packaging machine that is of low cost, easily and practically implemented, and safe in use.

[0012] This aim and these and other objects that will

become better apparent hereinafter are achieved by a packaging machine, which is characterized in that it comprises:

- 5 - a first conveyor, along which each product to be packaged advances while keeping its top face, which is opposite to the bottom face that rests on the surface of said first conveyor, coplanar with respect to the top face of other products that are present on the surface of said first conveyor, thus defining an upper fixed line;
- 10 - a second conveyor, along which each wrapped product advances while keeping its bottom face, which is opposite to the top face that rests on the surface of said second conveyor, coplanar with respect to the bottom face of other products that are present on the surface of said second conveyor, thus defining a lower fixed line;
- 15 - a primary wrapping wheel, which is interposed between said first conveyor and said second conveyor and is configured to receive at least one product from said first conveyor and at least one wrapping sheet, in order to wrap said at least one product in said at least one wrapping sheet and deliver said wrapped product upside down to said second conveyor;
- 20 - the top face of each product arranged on said first conveyor, the bottom face of each product arranged on said second conveyor, and the rotation axis of said wrapping wheel lying on a same reference plane.
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[0013] Further characteristics and advantages of the invention will become better apparent from the detailed description that follows of a preferred, but not exclusive, embodiment of the packaging machine, which is illustrated by way of non-limiting example in the accompanying drawings wherein:

Figure 1 is a schematic perspective view of a possible embodiment of a packaging machine according to the invention;

Figure 2 is an enlargement of the central part of Figure 1.

45 **[0014]** With reference to the figures, the reference numeral 1 generally designates a packaging machine according to the invention.

[0015] The machine 1 according to the invention comprises a first conveyor 2, along which each product P to be packaged advances while keeping its top face, which is opposite to the bottom face that rests on the surface 3 of the first conveyor 2, coplanar with respect to the top face of other products P that are present on the surface 3 of the first conveyor 2, thus defining an upper fixed line along the plane that comprises the top faces of the products P.

[0016] The machine 1 further comprises a second conveyor 4, along which each wrapped product W advances

while keeping its bottom face, which is opposite to the top face that rests on the surface 5 of said second conveyor 4, coplanar with respect to the bottom face of other wrapped products W that are present on the surface of the second conveyor, thus defining a lower fixed line along the plane that contains the surface 5.

[0017] The machine 1 according to the invention comprises a primary wrapping wheel 6, which is interposed between the first conveyor 2 and the second conveyor 4 and is configured to receive at least one product P from the first conveyor 2 and at least one wrapping sheet A, in order to wrap the at least one product P in such at least one wrapping sheet A and deliver the wrapped product W upside down to the second conveyor 4.

[0018] It should be noted that, according to the invention, the top face of each product arranged on the first conveyor 2, the bottom face of each wrapped product W arranged on the second conveyor 4, and the rotation axis X of the wrapping wheel 6 advantageously lie on a same reference plane Y.

[0019] With particular reference to an embodiment of undoubted practical and applicative interest, it should be noted that the machine 1 according to the invention can conveniently comprise, downstream of the second conveyor 4, a cartoning assembly 7 provided with a receiving station 8 for receiving at least one wrapped product W with the bottom face lying on the reference plane Y, and a stage for supplying a contoured laminar element (such as a die-cut sheet of cardboard), not shown in the accompanying figures.

[0020] Such stage will profitably be configured to arrange the laminar element below the wrapped product W which is present in the receiving station 8.

[0021] The machine 1 according to the invention can further comprise a folding hopper 9 for the laminar element, which is arranged below the laminar element and the wrapped product W when it is accommodated in the station 8, and an actuator (not visible in the accompanying figures) configured to make the wrapped product W pass through the hopper 9, with consequent entrainment and juxtaposition of the contoured laminar element onto surfaces of the wrapped product W.

[0022] The machine 1, again with reference to this specific embodiment, can usefully also comprise a third conveyor 10, arranged below the hopper 9, for receiving the wrapped product W partially covered by the contoured laminar element (i.e. by the secondary wrapping).

[0023] If the product P is a bar of chocolate, it should be noted that the primary wrapping sheet A will generally be constituted by a sheet of aluminum or of paper or of polymeric material (or a combination thereof), while the contoured laminar element will generally be constituted by a sheet of cardboard or polymeric material (or a combination thereof).

[0024] It should be noted that the first conveyor 2 can profitably comprise adjustment means for changing the format of the product P to be translated, which are configured at least to change the elevation of the surface 3

of the first conveyor 2 on which the bottom face of the product P rests.

[0025] This ability to change the elevation of the surface 3 will determine the consequent adjustment of its distance from the reference plane Y (which constitutes the upper fixed line of the first conveyor 2) as a function of the thickness of the product P.

[0026] It should furthermore be noted that specific elements can profitably be arranged along the second conveyor 4 and are configured for at least one action chosen among folding, adhesive bonding and heat-sealing of the protruding lateral flaps of the wrapping sheet A which is partially wrapped around the product P. That is to say, in practice, during the first steps of translation of each product P, the wrapping sheet A will be closed around it until the complete achievement of the wrapped product W, which corresponds to the completion of the primary wrapping.

[0027] It should be noted that these specific elements comprise at least one adjustment device, for changing the format of the product P to be translated, which is configured at least to change the elevation of these elements with respect to the surface 5 of the second conveyor 4 which is aligned with the reference plane Y and which constitutes the upper fixed line.

[0028] This adjustment device will make it possible to modify the elevation, described above, as a function of the thickness of the wrapped product W.

[0029] The machine 1 according to the invention can furthermore advantageously comprise adjustment elements for changing the format of the product P to be translated, which are configured at least to change the elevation of at least one component chosen among the stage for supplying a contoured laminar element and the actuator.

[0030] These elements will be configured to also modify the stroke envisaged for the actuator. The finished products K (i.e. which comprise the primary wrapping and the secondary wrapping) will be transported along the third conveyor 10.

[0031] The primary wrapping wheel 6 comprises grip means for at least one product P which is at least partially wrapped in the wrapping sheet A and at least one operating module 11, 12 which is arranged along the trajectory 13 defined by the grip means. The at least one operating module 11, 12 is adapted for performing at least one activity chosen among folding, adhesive bonding, heat-sealing, cooling, and cutting/scoring of flaps of the wrapping sheet A.

[0032] It should be noted that at least one component chosen among the first conveyor 2, the second conveyor 4 and the third conveyor 10 can positively comprise protrusions distributed on its surface that is designed for the resting and conveyance of the bottom face of the products P.

[0033] These protrusions will be adapted to abut against an edge of a respective product P (or wrapped product W, or final product K) for a predefined linear spac-

ing of the respective products P (or W or K) that are present on the respective surface.

[0034] It can be seen in the accompanying figures that the product P, by virtue of the movement performed by the wrapping wheel 6, is overturned through 180° along the machine 1.

[0035] As a consequence, the fixed line engineered in the front plane is also overturned as it moves from upstream to downstream of the wheel 6. In order to avoid complicated adjustments to much of the components of the machine 1 as the format of the product to be processed varies, but especially in order to avoid adjustments that could affect a face of the product P for which a specific surface texture and an optimal appearance are required, the machine 1 according to the invention takes the plane containing the top faces of the product P as the fixed line of its first part (corresponding to the first conveyor 2). The adjustments to change format in this part of the machine 1 will therefore be performed by moving the conveyor 2 so that the products P conveyed always keep their top face lying on this plane.

[0036] With particular reference to the wrapping of a bar of chocolate, taken as an example, in this manner, from the time when the bar is wrapped by the primary wrapping sheet, the rotation imposed by the wrapping wheel 6 will ensure that the upper part (the part for which maintenance of the aesthetic characteristics must be ensured) is no longer affected by any adjustments to components dependent on change of format, which will always operate on the bottom face of the product and on its sides.

[0037] It is particularly important to highlight that the machine 1 according to the invention can ensure that the fixed line of the initial part (corresponding to the first conveyor and to the area for receiving the product P and the sheet A in the wrapping wheel 6), which will be an upper fixed line, is aligned with the lower fixed line exiting the wheel 6, since both lie on the reference plane Y.

[0038] It should further be noted that the rotation axis X of the wheel 6 will also lie on the plane Y.

[0039] From the wheel 6 onward, the overturned product W proceeds, with the face the aesthetic qualities of which are to be preserved directed downward, up until the subsequent cartonning assembly 7 which is designed to perform the secondary wrapping (or outer wrapping).

[0040] Proximate to the hopper 9 of the cartonning assembly 7, the drawing-through will necessarily be performed downward, with the advantage that the component that is designed to support the wrapped product W and the laminar element (a lowering device which faces the face bearing the aesthetic qualities of the product P which are to be preserved) no longer has to abandon it in order to make space for other components intended for specific movements (something that does not occur in the known art, in which a classic architecture is adopted in which such drawing-through is performed upward).

[0041] In other words, with the embodiment according to the known art of drawing-through upwardly, the ele-

ment that supports the product W and the laminar element after they have passed through the hopper 7 must be moved away from the hopper 7 and the product K (understood as the set of the product W and of the laminar element) would have to be supported by other components which have the twofold purpose of folding the flaps and, indeed, supporting it.

[0042] It is therefore evident that the solution provided in the machine 1 according to the invention is innovative and very efficient with respect to what is offered in the known art.

[0043] Advantageously the present invention solves the above-mentioned problems, by providing a packaging machine 1 that avoids any damage to the top face of the product P to be packaged, by preventing abrasions thereof along the conveyors 2, 4 and 10.

[0044] Conveniently the machine 1 according to the invention makes it possible to facilitate and speed up the secondary packaging operations, in particular of cartonning and/or boxing.

[0045] Advantageously the machine 1 according to the invention makes it possible to carry out the primary packaging (wrapping) of products P, while maintaining a pre-defined alignment thereof in various areas of the machine 1.

[0046] Usefully the machine 1 according to the invention allows high operating speeds without this resulting in damage to the product P.

[0047] Positively the machine 1 according to the invention is easily and practically implemented and is of low cost: such characteristics make the machine 1 according to the invention an innovation that is safe in use.

[0048] The invention thus conceived is susceptible of numerous modifications and variations, all of which are within the scope of the appended claims. Moreover, all the details may be substituted by other, technically equivalent elements.

[0049] In the embodiments illustrated, individual characteristics shown in relation to specific examples may in reality be interchanged with other, different characteristics, existing in other embodiments.

[0050] In practice, the materials employed, as well as the dimensions, may be any according to requirements and to the state of the art.

[0051] The disclosures in Italian Patent Application No. 102022000016458 from which this application claims priority are incorporated herein by reference.

[0052] Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly, such reference signs do not have any limiting effect on the interpretation of each element identified by way of example by such reference signs.

Claims

1. A packaging machine, **characterized in that** it comprises:

- a first conveyor (2), along which each product (P) to be packaged advances while keeping its top face, which is opposite to the bottom face that rests on the surface (3) of said first conveyor (2), coplanar with respect to the top face of other products (P) that are present on the surface of said first conveyor (2), thus defining an upper fixed line along the plane that comprises said top faces of said products (P);

- a second conveyor (4), along which each wrapped product (W) advances while keeping its bottom face, which is opposite to the top face that rests on the surface (5) of said second conveyor (4), coplanar with respect to the bottom face of other products (W) that are present on the surface of said second conveyor (4), thus defining a lower fixed line along the plane that contains the surface (5);

- a primary wrapping wheel (6), which is interposed between said first conveyor (2) and said second conveyor (4) and is configured to receive at least one product (P) from said first conveyor (2) and at least one wrapping sheet (A), in order to wrap said at least one product (P) in said at least one wrapping sheet (A) and deliver said wrapped product (W) upside down to said second conveyor (4);

the top face of each product (P) arranged on said first conveyor (2), the bottom face of each product (P) arranged on said second conveyor (4), and the rotation axis of said wrapping wheel (X) lying on a same reference plane (Y).

2. The machine according to claim 1, **characterized in that** it comprises, downstream of said second conveyor (2), a cartoning assembly (7) provided with:

- a receiving station (8) for receiving at least one wrapped product (W) in which the face that is opposite to the bottom face lies on said reference plane (X),

- a stage for supplying a contoured laminar element, configured to arrange said laminar element below said wrapped product (W) which is present in said receiving station (8),

- a folding hopper (9) for said laminar element, which is arranged below said laminar element and said wrapped product (W) accommodated in said station (8),

- an actuator, configured to make said wrapped product (W) pass through said hopper (9), with consequent entrainment and juxtaposition of

said contoured laminar element onto surfaces of said wrapped product (W),

- a third conveyor (10), arranged below said hopper (9), for receiving said wrapped product (W) partially covered by said contoured laminar element.

3. The machine according to one or more of the preceding claims, **characterized in that** said first conveyor (2) comprises adjustment means for changing the format of the product (P) to be translated, which are configured at least to change the elevation of the surface (3) of said first conveyor (2) on which said bottom face of said product (P) rests, with consequent adjustment of the distance from said reference plane (X) coincident with the upper fixed line of said first conveyor (2), as a function of the thickness of the product (P).

4. The machine according to one or more of the preceding claims, **characterized in that** specific elements are arranged along said second conveyor (4) and are configured for at least one action chosen among folding, adhesive bonding and heat-sealing of the protruding lateral flaps of said wrapping sheet (A) which is partially wrapped around said product (P).

5. The machine according to claim 4, **characterized in that** said elements comprise at least one adjustment device for changing the format of the product (P) to be translated, which is configured at least to change the elevation of said elements with respect to the surface (5) of said second conveyor (4), said device being aligned with the reference plane (X) and coincident with the upper fixed line of said second conveyor (2), as a function of the thickness of the wrapped product (W).

6. The machine according to claim 5, **characterized in that** it comprises adjustment elements for changing the format of the wrapped product (W) to be translated, which are configured at least to change the elevation of at least one component chosen among said stage for supplying a contoured laminar element and said actuator, said elements being configured to also modify the envisaged stroke for said actuator.

7. The machine according to one or more of the preceding claims, **characterized in that** said primary wrapping wheel (6) comprises grip means for at least one product (P) which is at least partially wrapped in said wrapping sheet (A) and at least one operating module (11, 13) which is arranged along the trajectory (13) defined by said grip means for at least one activity chosen among folding, adhesive bonding, heat-sealing, cooling, and cutting/scoring of flaps of said wrapping sheet (A).

8. The machine according to one or more of the preceding claims, **characterized in that** said first conveyor (2) comprises protrusions distributed on its surface that is designed for the resting and conveyance of the bottom face of said products (P), said protrusions being adapted to abut against an edge of a respective product (P) for a predefined linear spacing of said products (P) that are present on said surface (3).

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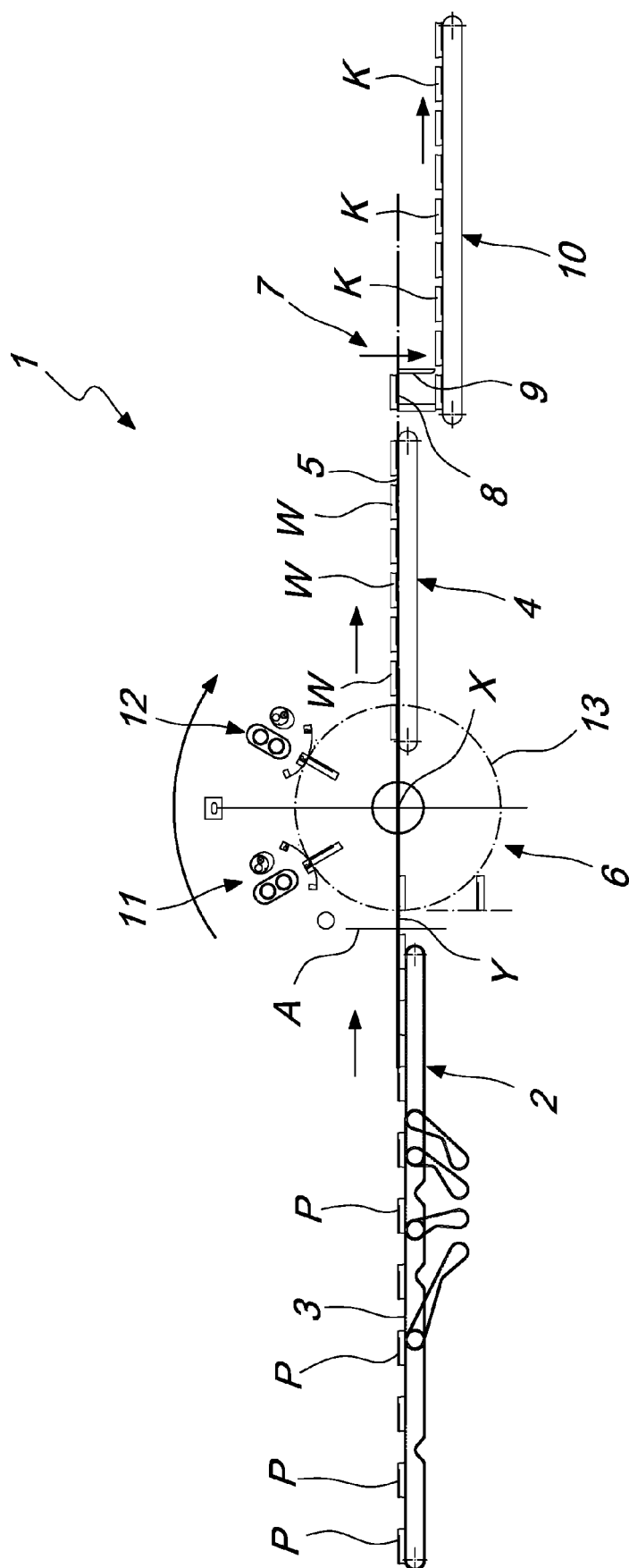


Fig. 1

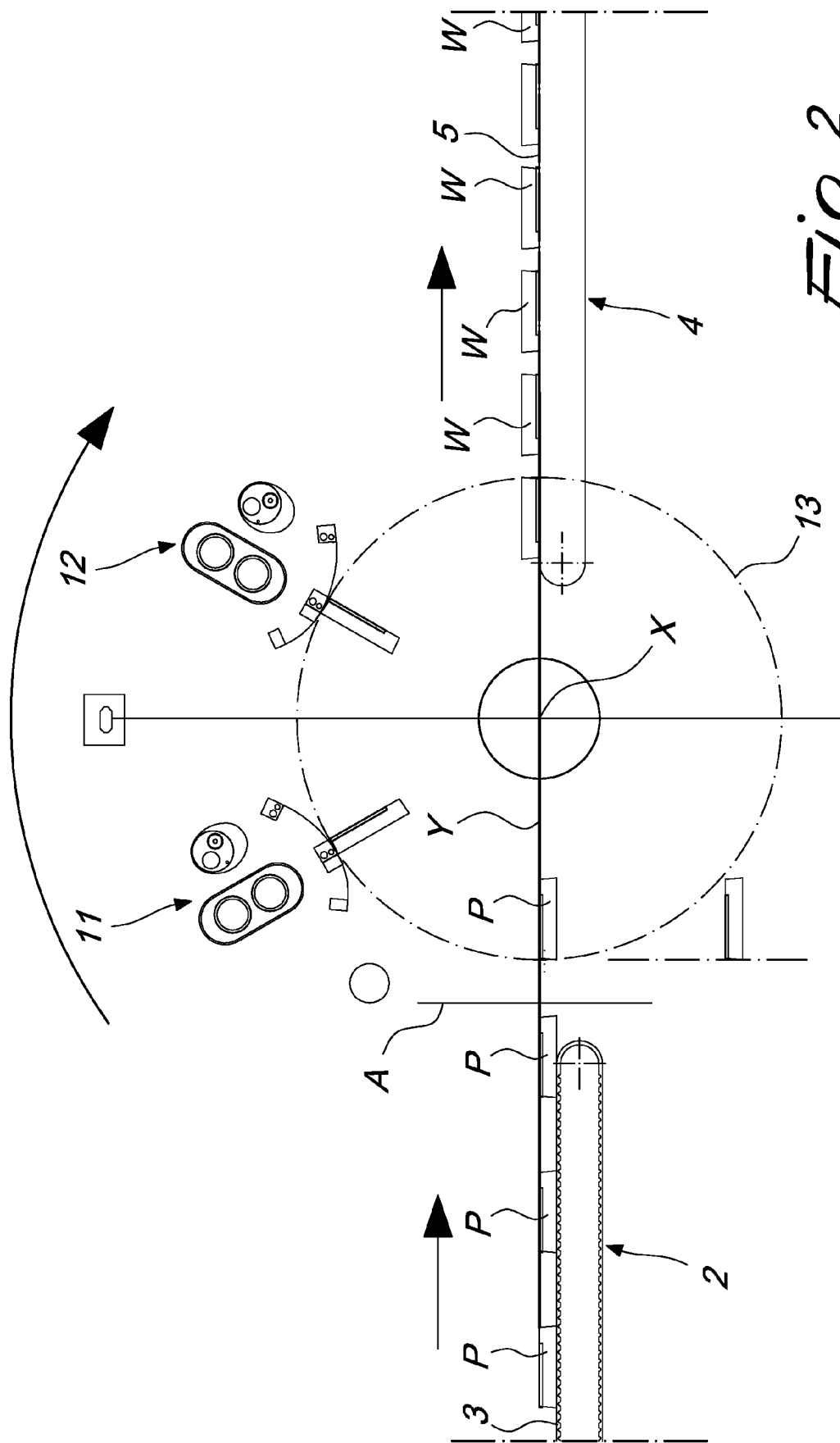


Fig. 2

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- IT 102022000016458 [0051]