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(54) LABELLING MACHINE CONFIGURED FOR LABELLING CONTAINERS BY MEANS OF PARTIAL LABELS BY SLIDING APPLICATION

(57) There is described a labelling machine (1) for labelling containers (2) adapted to contain a pourable product, and comprising: a carousel (6) for advancing a plurality of containers (2) to be labelled; a feed roller (10) for feeding a web (4) of labelling material along a feed path (P); a cutting unit (12) arranged along the feed path (P) and configured for repeatedly cutting the web (4) thereby separating a sequence of labels (2) therefrom; a transfer drum (13) rotatable about a rotation axis (X) and configured to sequentially receive the labels (3) and to transfer such labels (3) to an application station (A) for the application thereof onto respective containers (2); the transfer drum (13) comprises at least one retaining sector (15) configured to receive and retain a label (3) and including a leading pad (15a) configured for retaining a leading end (3a) of the label (3) and a trailing pad (15b) configured for retaining a trailing end (3b) of the label (3); the labelling machine (1) is configured for labelling the containers (2) by means of partial labels (3).

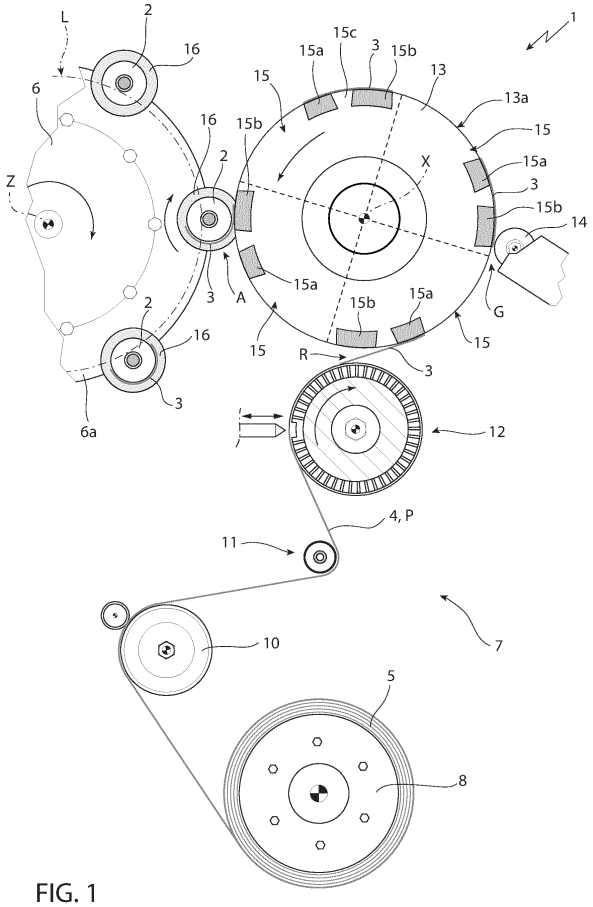


FIG. 1

EP 4 509 415 A1

Description

TECHNICAL FIELD

[0001] The present invention relates to a labelling machine configured for labelling containers adapted to contain a pourable product, preferably a pourable food product, by means of partial labels.

[0002] The present invention also refers to a related method for labelling containers.

BACKGROUND ART

[0003] Labelling machines are known, which are commonly used to prepare, transport and apply labels onto containers, such as bottles, flacons or the like, destined to be filled with a pourable product, in particular a pourable food product.

[0004] Particularly widespread is the use of glued labels, i.e. portions of a labelling material that are cut at appropriate lengths from a web of labelling material initially wound in form of continuous strip around one or more storage reels and then sprinkled with glue.

[0005] In detail, the web of labelling material is progressively unwound off the relative reel and then repeatedly cut to obtain successive labels of equal length, upon which glue is applied by gluing means, such as a gluing roller, spray or injector systems or the like.

[0006] Eventually, the labels so obtained are conveyed and applied onto the respective containers to be labelled.

[0007] Particularly widespread are also labels of the tubular kind, known as "sleeve labels" and obtained starting from a web of heat-shrinking film wound in form of a continuous strip around one or more storage reels; the sleeve labels are applied with a certain clearance on the respective containers and then heated in an oven to obtain their shrinking and perfect adhesion to the lateral surfaces of the containers themselves. Sleeve labels do not require the use of glue.

[0008] Regardless of the type of label used, a known labelling machine typically comprises:

- a carousel rotatable around a vertical axis and configured to convey a plurality of containers along a horizontal, arc-shaped labelling path; and
- a labelling module, peripherally arranged relatively to the carousel and configured to prepare, transport and feed a plurality of labels to the carousel at an application station, in order to apply such labels to respective containers.

[0009] According to a well-known configuration, the labelling module typically comprises:

- one or more storage units, for example reels or spools around which the web of labelling material is initially wound in form of a continuous strip;
- a feed roller for unwinding the web off the relative reel and advance it along a feed path;
- a plurality of unwinding rollers, which feed and support, in use, the web progressively unwound from the respective reel and guide it, in use, along a feed path;
- a cutting unit for repeatedly cut the web at a cutting station so as to separate a sequence of labels from the web itself; and
- a label transfer device configured to receive, retain and advance each label and to feed each label to the carousel, at the application station.

[0010] Typically, the transfer device is defined by a vacuum drum rotatable about a central axis (typically vertical) and configured to receive the previously cut labels, to retain them by means of suction and, after a rotation of a determined angle about its axis, to release these labels to the application station, so that they are applied onto the respective containers advanced by the carousel.

[0011] Furthermore, in case glued labels are used, the labelling module comprises at least one gluing roller arranged substantially tangent to the vacuum drum, in a position operatively downstream of the cutting unit and upstream of the application station, with respect to the direction of rotation of the vacuum drum, for spreading glue onto the leading and trailing ends of each single label, prior to their application onto the respective containers.

[0012] As it is known, the vacuum drum suction is exerted on the labels through a series of ports or holes obtained on an outer lateral surface of the vacuum drum itself.

[0013] In detail, the vacuum drum comprises a plurality of retaining sectors, each configured to cyclically receive and retain one label, previously cut by the cutting device, at a time.

[0014] Each retaining sector essentially comprises:

- a pair of pads, i.e. a leading pad, for supporting and retaining a leading end of the label, and a trailing pad, for supporting and retaining a trailing end of the label; and
- an interpad section which is angularly interposed between the two pads.

[0015] In practice, when a label is retained by the vacuum drum it will typically have the leading end arranged on the leading pad, the trailing end arranged on the trailing pad and the remaining intermediate part arranged on the corresponding interpad section.

[0016] Each of the pads and the interpad section presents a plurality of the aforementioned holes on an outer surface thereof.

[0017] According to a first labelling technique known as "pad-to-pad" labelling, for each retaining sector, the leading pad applies the leading edge of the label by pressing it on the respective container, and then the trailing pad applies the trailing end of the label by pressing it on

the same respective container, after such ends have been sprinkled with glue by the gluing roller.

[0018] Expediently, during the application the container revolves on its own axis, in particular with a peripheral speed equal to the one of the vacuum drum. That is, each container rotates in a homokinetic manner with respect to the vacuum drum.

[0019] According to a second labelling technique know as "flag" labelling, for each retaining sector the leading pad applies the leading edge of the label by pressing it on the respective container, then the trailing pad releases the trailing end of the label, which therefore would remain free of "flagging", i.e. of freely flapping or waving. To this end, in such a case the labelling module further comprises a wiping device, which is placed adjacent to the vacuum drum in a fixed position immediately downstream of the application station and which is configured for contacting the trailing end of the label once it has been released by the trailing pad, for supporting such trailing end and for completing the application of the trailing end on the respective container. Hence, the wiping device defines a sort of pad external to the vacuum drum. In this way, a mispositioning of the trailing end on the container is avoided.

[0020] Although being functionally valid, the Applicant has observed that the labelling machines of the aforementioned type are still open to further improvement, in particular as per the application of so called "partial labels", i.e. labels which have a longitudinal extension so as to cover an angular portion on the outer surface of the respective containers measuring less than 360°, for example between 180° and 360°, namely labels which extension does not suffice to wrap completely around the outer lateral surface of the containers, namely labels the longitudinal extension of which is smaller than the total angular extension of the outer lateral surface of the containers.

[0021] In fact, the shorter the label, the smaller the angular distance between each leading pad and the respective trailing pad.

[0022] In particular, the shorter the label, the earlier the trailing end is released by the trailing pad.

[0023] Therefore, the shorter is the label the more difficult is the application of the label by means of the pad to pad technique and/or by means of the flag application technique.

[0024] In relation to the flag technique, there is a lower limit for the distance at which the aforementioned wiping device can be placed with respect to the vacuum drum, in order to avoid interference with this latter. Hence, the trailing end of a shorter partial label would freely waving or flapping for an excessive amount of time.

DISCLOSURE OF INVENTION

[0025] It is therefore an object of the present invention to provide a labelling machine which is designed to overcome at least one of the above-mentioned drawbacks in a straightforward and low-cost manner.

[0026] This object is achieved by a labelling machine as claimed in claim 1.

[0027] It is a further object of the present invention to provide a method for labelling containers which is designed to overcome at least one of the above-mentioned drawbacks in a straightforward and low-cost manner.

[0028] This object is achieved by a method for labelling containers as claimed in claim 14.

BRIEF DESCRIPTION OF THE DRAWINGS

[0029] Non-limiting embodiments of the present invention will be described by way of example with reference to the accompanying drawings, in which:

Figure 1 is a schematic top view, with parts removed for clarity, of a labelling machine according to the present invention;

Figures 2A to 2C are larger-scale top views, with parts removed for clarity, of part of a transfer drum and a carousel of the labelling machine of Figure 1, during distinct and successive operative conditions; and

Figures 3A and 3B are larger-scale top views, with parts removed for clarity, of part of a transfer drum and a carousel of a labelling machine according to a further preferred embodiment of the present invention, during distinct and successive operative conditions.

BEST MODE FOR CARRYING OUT THE INVENTION

[0030] With reference to Figure 1, number 1 indicates as a whole a labelling machine configured for labelling containers 2, such as bottles, flacons or the like, adapted to contain a pourable product, preferably a pourable food product (such as water, soft drinks, beer, wine, juice, milk, or the like).

[0031] In particular, machine 1 is configured for labelling containers 2 by means of labels 3 obtained from a web 4 of labelling material.

[0032] According to this preferred and non-limiting embodiment, labels 3 are defined by glued labels, i.e. strips of labelling material that are cut at predetermined lengths from web 4 and then sprinkled with glue before their application on the respective containers 2.

[0033] Web 4 is provided in the form of a continuous strip initially wound in a reel 5 and is progressively unwound, in use, off reel 5, according to a known manner.

[0034] As visible in figure 1, labelling machine 1 comprises:

- a carousel 6 rotatable about a central axis Z, preferably vertical, and configured to advance a plurality of containers 2 along an arc-shaped labelling path L, preferably horizontal, around axis Z; and
- a labelling module 7 (only schematically shown),

arranged peripherally to carousel 6 and configured for preparing a plurality of labels 3 starting from web 4 and feeding such labels 3 to carousel 6 at an application station A, so as to apply them onto respective containers 2.

[0035] Labelling module 7 is substantially of the known type and comprises:

- a support member, preferably in the form of at least one support shaft 8, for supporting one reel 5 at a time in an unwindable manner;
- a feed roller 10 mounted in a rotatable manner to module 7, actuatable in rotation for feeding web 4 along a feed path P which extends within and through labelling module 7, and conveniently arranged downstream of support shaft 8 along feed path P;
- a plurality of guide rollers 11 (only one shown), arranged downstream of support member 8, and configured to support the web 4 progressively unwound from reel 5 and to guide web 4 along feed path P;
- a cutting unit 12 (known per se and not described in detail) arranged downstream of guide rollers 11, along feed path P, and configured to repeatedly cut web 4 thereby obtaining a sequence of labels 3 therefrom; and
- a transfer drum 13, preferably a vacuum drum of the known type, arranged downstream of cutting unit 12, and mounted on module 7 in a rotatable manner about a central axis X which is preferably parallel to axis Z.

[0036] Preferably, drum 13 has a substantially cylindrical or toroidal-lobed configuration, with axis X defining a central rotation axis thereof.

[0037] Drum 13 has an outer lateral surface 13a and is configured to receive the previously cut labels 3 from cutting unit 12 at a receiving station R, to retain such labels 3, and to transfer labels 3 to application station A by means of a rotation about axis X, for the application thereof onto respective containers 2.

[0038] It can be possible that the cutting unit acts on the web carried by the drum 13. Therefore, in this case the cutting unit 12 is configured for separating each label from the web while the label is carried by the drum 13.In this case, the drum 13 receives the labels 3 while the labels 3 are still joined to each other to define the web.

[0039] Labelling module 7 further comprises at least one glue roller 14 arranged peripherally (and substantially tangent) to drum 13, at a gluing station G, and configured for spreading glue on at least the leading and trailing ends of each individual label 3, before the application thereof on the respective containers 2.

[0040] In detail, glue roller 14 is configured to sequentially spread glue on a leading end 3a and on a trailing end 3b of each label 3 carried by drum 13.

[0041] In light of the above:

- cutting unit 12 is arranged peripherally to drum 13;
- gluing station G is operatively upstream of application station A and operatively downstream of receiving station R, with respect to the direction of rotation (counterclockwise in figure 1) of drum 13 about axis X.

[0042] Advantageously, carousel 6 comprises a plurality of support plates 16 for supporting containers 2 during their advancement along labelling path L.

[0043] In detail, each support plate 16 is configured for cyclically receiving and supporting one respective container 2, and is rotatable for determining a rotation of the supported container 2 on its own longitudinal axis during its advancement along labelling path L.

[0044] In greater detail, support plates 16 are rotatably mounted to a peripheral portion 6a of carousel 6.

[0045] The revolution of each container 2 eases the wrapping of the respective label 3 around the outer lateral surface thereof.

[0046] Drum 13 comprises at least one retaining sector 15 configured to cyclically receive and retain a label, by means of suction.

[0047] In detail, as visible in Figure 1, drum 13 comprises a plurality of retaining sectors 15 which are angularly distributed around axis X.

[0048] In the preferred embodiment shown, drum 13 comprises four retaining sectors 15.

[0049] Each retaining sector 15 is configured to cyclically receive one label 3 at a time at receiving station R, to retain said label 3 by suction, and to release said label 3, at application station A, to a respective container 2 to be labelled.

[0050] To this end, retaining sectors 15 are provided with vacuum ports or slots or holes (not shown) as described in the introductory portion of the present description.

[0051] Surface 13a is defined by the assembly of the outer lateral surfaces of all retaining sectors 15.

[0052] For the sake of brevity, reference will be made in the following to a single retaining sector 15, to a single label 3 retained thereon, and to a single container 2 to be labelled supported by a respective support plate 16. However, all the features described and illustrated for such sector 15 are equally applicable to all sectors 15 of drum 13 and to all the containers 2 supported by carousel 6.

[0053] As visible in particular in Figures 2A-2C, retaining sector 15 includes:

- a leading pad 15a configured for retaining leading end 3a of label 3;
- a trailing pad 15b configured for retaining trailing end 3b of label 3; and
- an interpad region 15c interposed, and in particular angularly interposed, between leading pad 15a and trailing pad 15b.

[0054] Preferably, retaining sector also comprises a pre-pad region located upstream of (i.e. angularly preceding) leading pad 15a, and configured for providing an initial sliding of web 4 on surface 13a at receiving station R, known per se and not described in detail.

[0055] In light of the above, retaining sector 15 is, and in particular leading pad 15a and trailing pad 15b are, configured to release the respective label 3 to the container 2 supported by the respective support plate 16 at application station A.

[0056] More precisely, leading pad 15a is configured to apply leading end 3a to the container 2 supported by the respective support plate 16 at application station A; similarly, the trailing pad 15b is configured to apply trailing end 3b to the same container 2 at application station A.

[0057] According to an aspect of the invention, labelling machine 1 is configured for labelling containers 2 by means of partial labels 3, each partial label being a label 3 the longitudinal extension of which is smaller than the total angular extension of the outer lateral surface of the respective container 2, or a label 3 which, once completely applied on the respective container 2 or at the end of the labelling process, covers an angular sector of the outer lateral surface of the container 2 the angular extension of which is smaller than 360°, or smaller than 200°, or smaller than 180°. This is schematized in the appended figures. The invention is in particular configured for allowing a correct application of very short labels, for example wherein said angular sector is less than 200° or less than 180°.

[0058] In one embodiment, the angular extension of such angular sector is between 180° and 360°.

[0059] In one embodiment, the angular extension of such angular sector is less than 30°.

[0060] As said, the shorter the label, the more difficult and complicated is the transfer of such partial label 3 from drum 13 to carousel 6, i.e. from receiving sector 15 to container 2.

[0061] The labelling machine 1 is configured to control the angular speed of each support plate 16, so that the peripheral speed of the supported container 2 is higher than a peripheral speed of the transfer drum 13 in at least one instant during the release of the respective label 3 by the respective retaining sector 15.

[0062] In this way, the application of the label can be quicker, so that the label can be applied with a pad to pad technique also in case the label is very short.

[0063] According to an important aspect of the invention, labelling machine 1 is configured to control an increase of the angular speed of said respective support plate 16, with respect to the axis thereof, during the release of label 3 onto the container 2 supported thereon (figures 2A-2B).

[0064] In particular, labelling machine 1 is configured to control the aforesaid increase of the angular speed of said respective support plate 16 such that a peripheral speed of the supported container 2 increases and is higher than a peripheral speed of drum 13 in at least one instant during the release of label 3 by retaining sector 15.

[0065] More in particular, labelling machine 1 is configured to control the aforesaid increase between the application of leading end 3a by leading pad 15a and the application of trailing end 3b by trailing pad 15b onto the container 2 supported by said respective support plate 16.

[0066] Even more in particular, labelling machine 1 is configured to control the aforesaid increase after the application of leading end 3a by leading pad 15a and prior to the application of trailing end 3b by trailing pad 15b onto the container 2 supported by said respective support plate 16.

[0067] This configuration is schematized in Figure 2B.

[0068] Drum 13 is configured to rotate about axis X with a peripheral speed having a first value V1.

[0069] According to the invention, labelling machine 1 is configured to increase the aforesaid peripheral speed of the supported container 2, during the release of label 3 by retaining sector 15, up to a second value V2 which is higher than said first value V1 (Figure 2B).

[0070] More specifically, labelling machine 1 is configured so that the supported container 2 rotates with a peripheral speed having the first value V1 during the application of leading end 3a by leading pad 15a (Figure 2A), and so that the supported container 2 rotates with a peripheral speed having the second value V2 during the application of trailing end 3b by trailing pad 15b (Figure 2B).

[0071] In other words, said respective support plate 16 is configured to rotate so that the supported container has a peripheral speed having the first value V1 during the application of leading end 3a by leading pad 15a, and has a peripheral speed having the second value V2 during the application of trailing end 3b by trailing pad 15b.

[0072] Hence, due to the above-described operative configuration of labelling machine 1 according to the invention, said respective support plate 16 is configured to determine, by means of said increase in its peripheral speed, a sliding of trailing end 3b onto trailing pad 15b (schematized in Figure 2B).

[0073] Thanks to this advantageous and peculiar configuration, label 3 is withdrawn from drum 13, by means of the sudden acceleration of support plate 16, in a shorter time, with respect to a completely homokinetic label application as described in the introductory portion of the present description.

[0074] This is particularly advantageous when and for labelling containers 2 with partial labels 3, either with the aforementioned pad-to-pad technique or with the aforementioned flag labelling technique.

[0075] In fact, as for the pad-to-pad technique, the transferring (i.e. the application) of partial label 3 is faster, namely is completed while the relative support plate 16 (and therefore the relative container 2) has traveled a shorter angular distance with respect to the carousel axis Z. Therefore, container 2 is closer to drum 13 and to

application station A when trailing end 3b is to be applied thereon, also because drum 13 has traveled a shorter angular distance with respect to its axis X. In this way, the labelling by means of partial labels and through the pad to pad technique can occur correctly also in case of partial very short labels.

[0076] Hence, for these reasons the Applicant has observed that the transfer of partial labels 3 is largely improved, with respect to a completely homokinetic label application (i.e. an application during which support plate 16 is always homokinetic with drum 13). The labelling machine according to the invention is configured for applying label with overspeed of the containers with respect to the drum, and in this way obtains an accurate application of the labels also in case of very short labels.

[0077] As for the flag labelling technique, the aforementioned flapping or waving of the trailing end 3b of a partial label 3 is highly reduced, since the transfer of label 3 is faster.

[0078] Conveniently, once label 3 is completely released from retaining sector 15, i.e. once trailing end 3b is completely applied on container 2, the respective support plate 16 is configured to decelerate so that the supported container 2 has again a peripheral speed having the first value V1 (Figure 2c).

[0079] More specifically, the respective support plate 16 is configured to decelerate so that the supported container has a peripheral speed having the first value V1 when passing again at application station A for receiving the leading end 3a of a subsequent label 3.

[0080] In other words, labelling machine 1 is configured so that the peripheral speed of each supported container 2 is decreased up to the first value V1 after application of trailing end 3b thereon and until the leading end 3a of a subsequent label 3 is applied thereon.

[0081] As visible in the appended Figures, each leading pad 15a and each trailing pad 15b extends angularly onto outer lateral surface 13a of drum 13, with respect to axis X.

[0082] Advantageously, the angular extension of the trailing pad 15a is greater than the angular extension of leading pad 15b.

[0083] In this way, trailing end 3b is well supported during its sliding on trailing pad 15b during the increase of angular/peripheral speed of the respective support plate 16.

[0084] Conveniently, labelling machine 1 comprises a plurality of actuators, such as servomotors or electric motors or pneumatic actuators or fluid-dynamic actuators (not shown), each coupled to one respective support plate 16 for driving the rotation thereof.

[0085] Therefore, the support plates 16 are thereby configured to be accelerated and decelerated in their rotation about their own axes independently from one another.

[0086] Thanks to this configuration, flexibility of control of support plates 16 is largely improved.

[0087] Alternatively, labelling machine 1 comprises a single actuator, for example of the type described above (not shown), coupled to all the support plates 16 via a single transmission system (not shown).

[0088] Hence, the support plates 16 are thereby configured to be accelerated and decelerated in their rotation about their own axes jointly with one another.

[0089] This alternative configuration allows for a simpler architecture of machine 1.

[0090] Figures 3A and 3B show an alternative preferred embodiment of labelling machine 1 according to the present invention.

[0091] Being such alternative embodiment similar to the embodiment described above, only the difference between them will be highlighted hereinafter, using the same reference numbers for corresponding or equal parts.

[0092] According to this alternative embodiment, each support plate 16 is homokinetic with drum 13 during the release of the respective label 3, i.e. during complete application of such label 3 onto the respective container 2 supported thereon.

[0093] Advantageously, trailing pad 15b is configured to switch from a suction configuration, in which it retains trailing end 3b by suction (Figure 3A), to a blowing configuration, in which it emits a jet of air (Figure 3B), between the application of leading end 3a by leading pad 15a and the application of trailing end 3b by trailing pad 15b on the respective container 2.

[0094] In other words, labelling machine 1 is configured so that trailing pad 15b switches from the suction configuration to the blowing configuration between the application of leading end 3a by leading pad 15a and the application of trailing end 3b by trailing pad 15b.

[0095] More specifically, trailing pad 15b is configured for blowing trailing end 3b, with said jet of air, off outer lateral surface 13a of drum 13 and towards the respective container 2 at application station A.

[0096] Thanks to this configuration, the transfer of each label 3 from the respective receiving sector 15 to the respective container 2 is highly improved.

[0097] In detail, this configuration is particularly advantageous in case the flag labelling technique is used: the blowing effect on trailing end 3b can replace the function of the aforementioned wiping device. The architecture of labelling machine 1 is therefore improved.

[0098] From the foregoing, it is clear how labelling machine 1 allows for implementing a method for labelling containers adapted to contain a pourable product with partial labels, the method comprising the steps of:

a) advancing a plurality of containers to be labelled along a labelling path and through an application station;

b) feeding a web of labelling material along a feed path;

c) repeatedly cutting the web thereby separating a sequence of labels therefrom;

d) receiving such labels onto a transfer drum rota-

table about a rotation axis and comprising a plurality of retaining sectors each configured to cyclically receive and retain a label and each including a leading pad for retaining a leading end of the label and a trailing pad for retaining a trailing end of the label;
e) cyclically conveying the leading pad and the trailing pad at the application station for the application of the labels on the respective containers;
f) releasing the leading end at the application station, so as to apply the leading end on the respective container by means of the leading pad;
g) releasing the trailing end at the application station, so as to apply the trailing end on the respective container by means of the trailing pad;
h) rotating each container about its own longitudinal axis at least at the application station;
wherein the method comprises the step of:

i) controlling the angular speed of each container (2) transiting at the application station (A) in at least one instant between the step f) of releasing the leading end (3a) and the step g) of releasing the trailing end (3b), so that the peripheral speed of the supported container (2), in at least one instant during the application of the respective label, is higher than the peripheral speed of the transfer drum.

[0099] In particular, the step i) of increasing comprises increasing a peripheral speed of each container transiting at the application station so that the peripheral speed of such container is higher than the peripheral speed of the transfer drum in at least one instant between the step f) of releasing the leading end and the step g) of releasing the trailing end.

[0100] The advantages of labelling machine 1 according to the present invention will be clear from the foregoing description.

[0101] In particular, thanks to a peripheral speed of the container which is higher than the peripheral speed of the drum in at least one instant during the release of the label, the transfer of partial labels 3 is largely improved, with respect to a completely homokinetic label application (i.e. an application during which support plate 16 is always homokinetic with drum 13).

[0102] This in fact allows a faster withdraw of the partial label 3 from the drum 13, which thereby results in a transfer of such label 3 completed while the relative support plate 16 (and therefore the relative container 2) has traveled a shorter angular distance with respect to the carousel axis Z, and while drum 13 has traveled a shorter angular distance with respect to its axis X.

[0103] Therefore, container 2 is closer to the relative retaining sector 15 and application station A when trailing end 3b is released and applied thereon.

[0104] Furthermore, if the second preferred embodiment is used, labelling machine 1 according to the invention is particularly advantageous for the flag labelling technique: the blowing effect on trailing end 3b can replace the function of the aforementioned wiping device. The architecture of labelling machine 1 is therefore improved.

[0105] Clearly, changes may be made to labelling machine 1 as described herein without, however, departing from the scope of protection as defined in the accompanying claims.

Claims

1. - Labelling machine (1) for labelling containers (2) adapted to contain a pourable product, the labelling machine (1) comprising:

- a carousel (6) for advancing a plurality of containers (2) to be labelled along a labelling path (L) ;
- a feed roller (10) for feeding a web (4) of labelling material along a feed path (P);
- a cutting unit (12) arranged along the feed path (P) and configured for repeatedly cutting the web (4) thereby separating a sequence of labels (2) therefrom;
- a transfer drum (13) rotatable about a rotation axis (X) and configured to sequentially receive the labels (3) and to transfer such labels (3) to an application station (A) for the application thereof onto respective containers (2);
the transfer drum (13) comprising at least one retaining sector (15) configured to cyclically receive and retain a label (3), the retaining sector (15) including a leading pad (15a) configured for retaining a leading end (3a) of the label (3) and a trailing pad (15b) configured for retaining a trailing end (3b) of the label (3);
wherein the labelling machine (1) is configured for labelling the containers (2) by means of partial labels (3), each partial label (3) being a label the longitudinal extension of which is smaller than the total angular extension of the outer lateral surface of the respective container (2), or a label which, once completely applied on the respective container (2) or at the end of the labelling process, covers an angular sector of the outer lateral surface of the container (2) the angular extension of which is smaller than 200°, and preferably smaller than 180°.

2. - Labelling machine as claimed in claim 1, wherein the carousel (6) comprises a plurality of support plates (16), each configured for cyclically receiving and supporting one respective container (2), and each rotatable on its own axis for determining a rotation of the supported container (2);

wherein said retaining sector (15) is configured to release the respective label (3) to the container (2) supported by a respective support plate (16) at the application station (A);
and wherein the labelling machine (1) is configured to control the angular speed of each support plate (16), so that the peripheral speed of the supported container (2) is higher than a peripheral speed of the transfer drum (13) in at least one instant during the release of the respective label (3) by the respective retaining sector (15).

3. - Labelling machine as claimed in claim 2, wherein the labelling machine (1) is configured to control an increase of said angular speed such that a peripheral speed of the supported container (2) increases to be higher than a peripheral speed of the transfer drum (13) in at least one instant during the release of the label (3) by the retaining sector (15).

4. - Labelling machine as claimed in claim 3, wherein, for each retaining sector (15), the leading pad (15a) is configured to apply said leading end (3a) to the container (2) supported by the respective support plate (16) at the application station (A) and the trailing pad (15b) is configured to apply said trailing end (3b) to the same container at the application station (A); and wherein the labelling machine (1) is configured to control said increase of the angular speed (16) between the application of the leading end (3a) by the leading pad (15a) of the respective sector (15) onto the container (2) supported by the respective support plate (16), and the application of the trailing end (3b) by the trailing pad (15b) of the respective sector (15) onto the container (2) supported by said respective support plate (16).

5. - Labelling machine as claimed in claim 4, wherein the labelling machine (1) is configured to control said increase after the application of the leading end (3a) by the leading pad (15a) of the respective sector (15) onto the container (2) supported by said respective support plate (16), and prior to the application of the trailing end (3b) by the trailing pad (15b) onto the container (2) supported by said respective support plate (16).

6. - Labelling machine as claimed in any of the claims 2 to 5, wherein the transfer drum (13) is configured to rotate about said rotation axis (X) with a peripheral speed having a first value (V1);
and wherein the labelling machine (1) is configured so that the peripheral speed of each supported container (2), in at least one instant during the release of the respective label (3) by the respective retaining sector (15), has a second value (V2) which is higher than said first value (V1).

7. - Labelling machine as claimed in claim 6, wherein the labelling machine (1) is configured so that each supported container (2) rotates with a peripheral speed having said first value (V1) during the application of the leading end (3a) by the leading pad (15a) of the respective sector (15), and so that each supported container (2) rotates with a peripheral speed having said second value (V2) during the application of the trailing end (3b) by the trailing pad (15b) of the respective sector (15).

8. - Labelling machine as claimed in any of the claims 2 to 7, wherein each support plate (16) is configured to determine, by means of said control of the angular speed, a sliding of the trailing end (3b) of the respective label onto the trailing pad (15b) of the respective sector (15).

9. - Labelling machine as claimed in any one of the claims 2 to 8, wherein each leading pad (15a) and each trailing pad (15b) extends angularly onto an outer lateral surface (13a) of the transfer drum (13), with respect to said rotation axis (X);
and wherein, for each retaining sector (15), the trailing pad (15b) has an angular extension greater than the angular extension of the leading pad (15a).

10. - Labelling machine as claimed in any of claims 2 to 9, comprising a plurality of actuators, each coupled to one respective support plate (16) for driving the rotation thereof, the support plates (16) being thereby configured to be accelerated and decelerated in their rotation about their own axes independently from one another.

11. - Labelling machine as claimed in any of claims 2 to 9, and comprising a single actuator coupled to each support plate (16) via a single transmission system, the support plates (16) being thereby configured to be accelerated and decelerated in their rotation about their own axes jointly with one another.

12. - Labelling machine as claimed in claim 1, wherein the leading pad (15a) and the trailing pad (15b) are configured to cyclically retain a respective label (3) by means of suction,

wherein, for each retaining sector (15), the leading pad (15a) is configured to apply said leading end (3a) to the respective container (2) at the application station (A) and the trailing pad (15b) is configured to apply said trailing end (3b) to the same container (2) at the application station (A), and wherein the trailing pad (15b) is configured to switch from a suction configuration, in which it retains the trailing end (3b) by suction, to a blowing configuration, in which it emits a jet of air, between the application of the leading end

(3a) by the leading pad (15a) and the application of the trailing end (3b) by the trailing pad (15b).

13. - Labelling machine as claimed in claim 12, wherein the trailing pad (15b) is configured for blowing the trailing end (3b), with said jet of air, off the outer lateral surface (13a) of the transfer drum (13) and towards the respective container (2) at the application station (A).

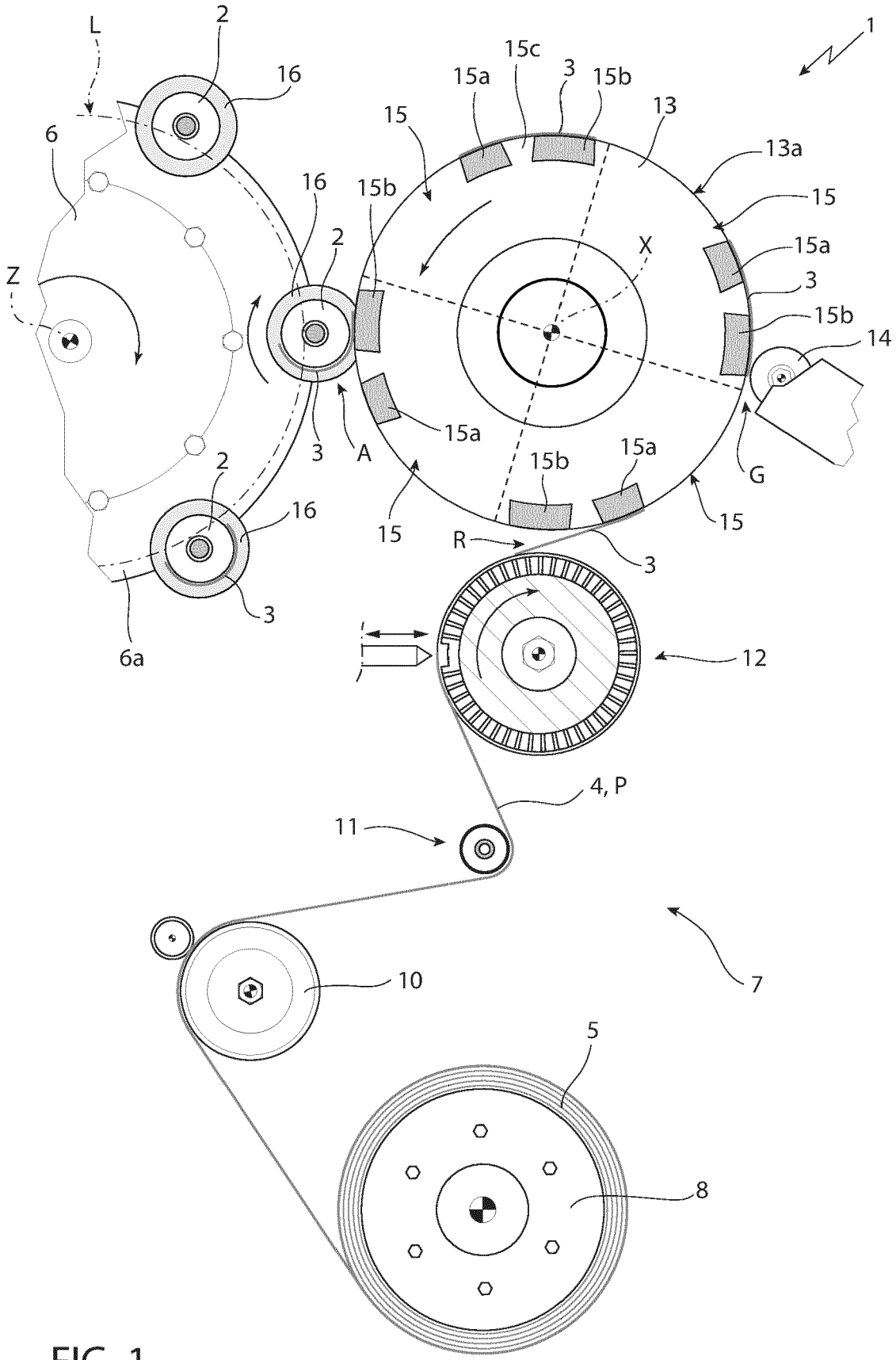
14. Machine according to any of the previous Claims, wherein the cutting unit (12) is configured for separating each label from the web while the label is carried by the drum.

15. - Method for labelling containers (2) adapted to contain a pourable product with partial labels (3), each partial label (3) being a label the longitudinal extension of which is smaller than the total angular extension of the outer lateral surface of each respective container (2), or a label which, once completely applied on the respective container (2) or at the end of the labelling process, covers an angular sector of the outer lateral surface of the container (2) the angular extension of which is smaller than 360°, the method comprising the steps of:

a) advancing a plurality of containers (2) to be labelled along a labelling path (L) and through an application station (A);
b) feeding a web (4) of labelling material along a feed path (P);
c) repeatedly cutting the web (4) thereby separating a sequence of labels (3) therefrom;
d) receiving such labels (3) onto a transfer drum (13) rotatable about a rotation axis (X) and comprising a plurality of retaining sectors (15) each configured to cyclically receive and retain a label (3) and each including a leading pad (15a) for retaining a leading end (3a) of the label (3) and a trailing pad (15b) for retaining a trailing end (3b) of the label (3);
e) cyclically conveying the leading pad (15a) and the trailing pad (15b) at the application station (A) for the application of the labels (3) on the respective containers (2);
f) releasing the leading end (3a) at the application station (A), so as to apply the leading end (3a) on the respective container (2) by means of the leading pad (15a);
g) releasing the trailing end (3b) at the application station (A), so as to apply the trailing end (3b) on the respective container (2) by means of the trailing pad (15b);
h) rotating each container (2) about its own longitudinal axis at least at the application station (A) ;
wherein the method comprises the step of:

i) controlling the angular speed of each container (2) transiting at the application station (A) in at least one instant between the step f) of releasing the leading end (3a) and the step g) of releasing the trailing end (3b), so that the peripheral speed of the supported container (2), in at least one instant during the application of the respective label, is higher than the peripheral speed of the transfer drum.

16. - Method as claimed in claim 15, wherein the step i) of controlling comprises increasing a peripheral speed of each container (2) transiting at the application station (A) so that the peripheral speed of such container (2) is higher than the peripheral speed of the transfer drum (13) in at least one instant between the step f) of releasing the leading end (3a) and the step g) of releasing the trailing end (3b).


L
2
16
6
16
15b
2
Z
3
A
2
16
3
6a
15
15a
15c
3
15b
13
13a
15
15a
3
15b
14
X
15a
15b
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8

FIG. 1

FIG. 2A

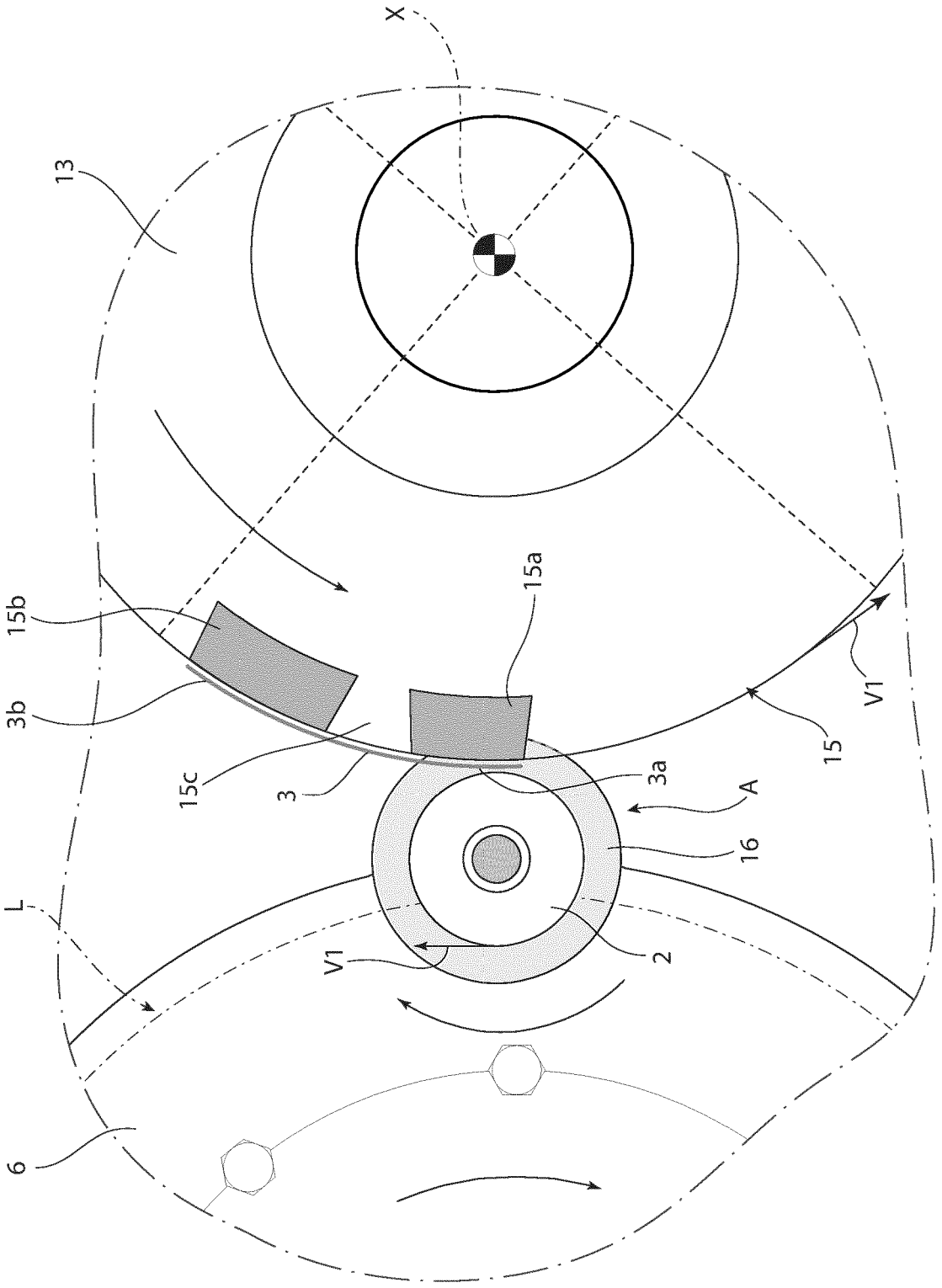


FIG. 2B

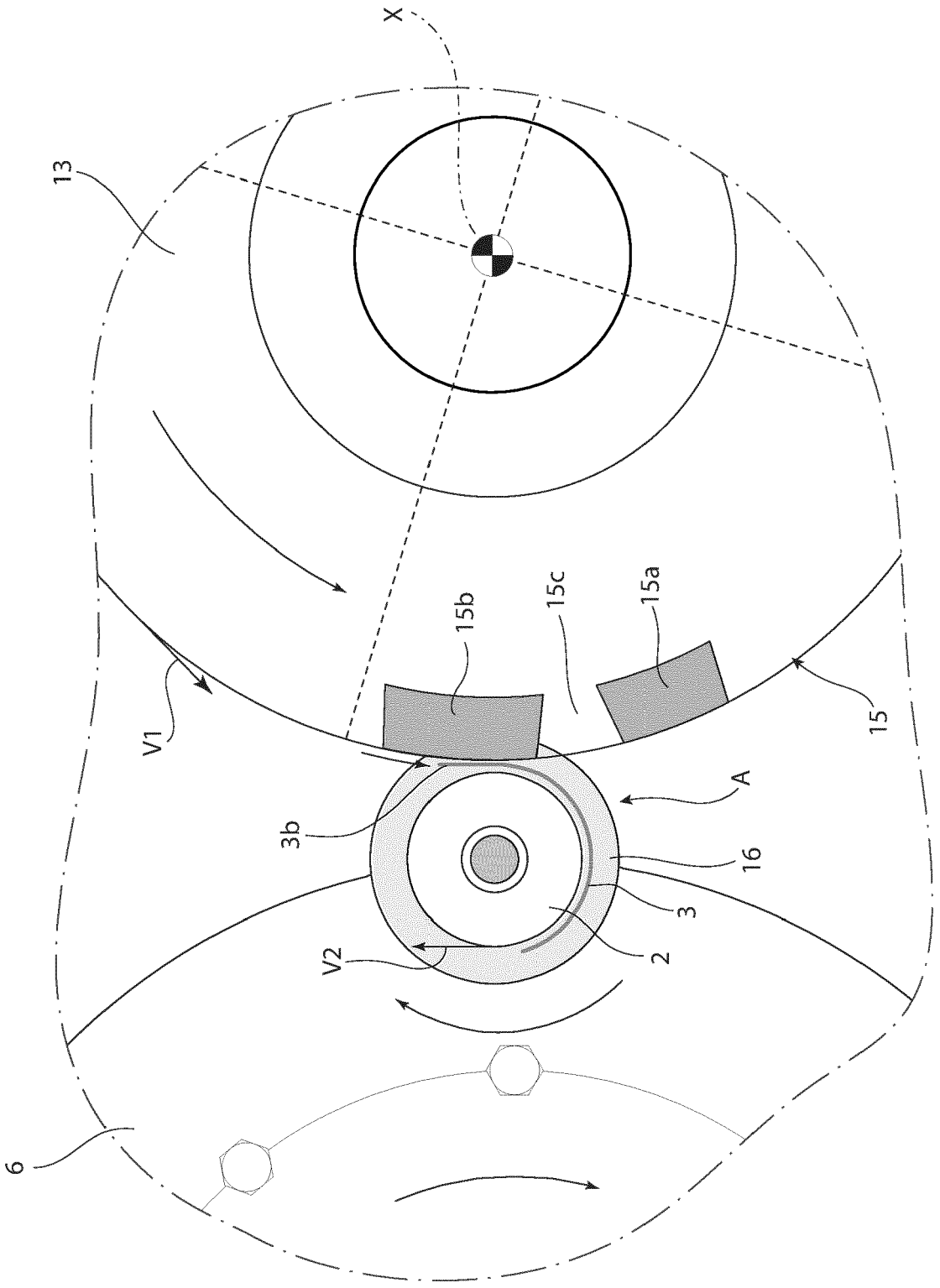


FIG. 2C

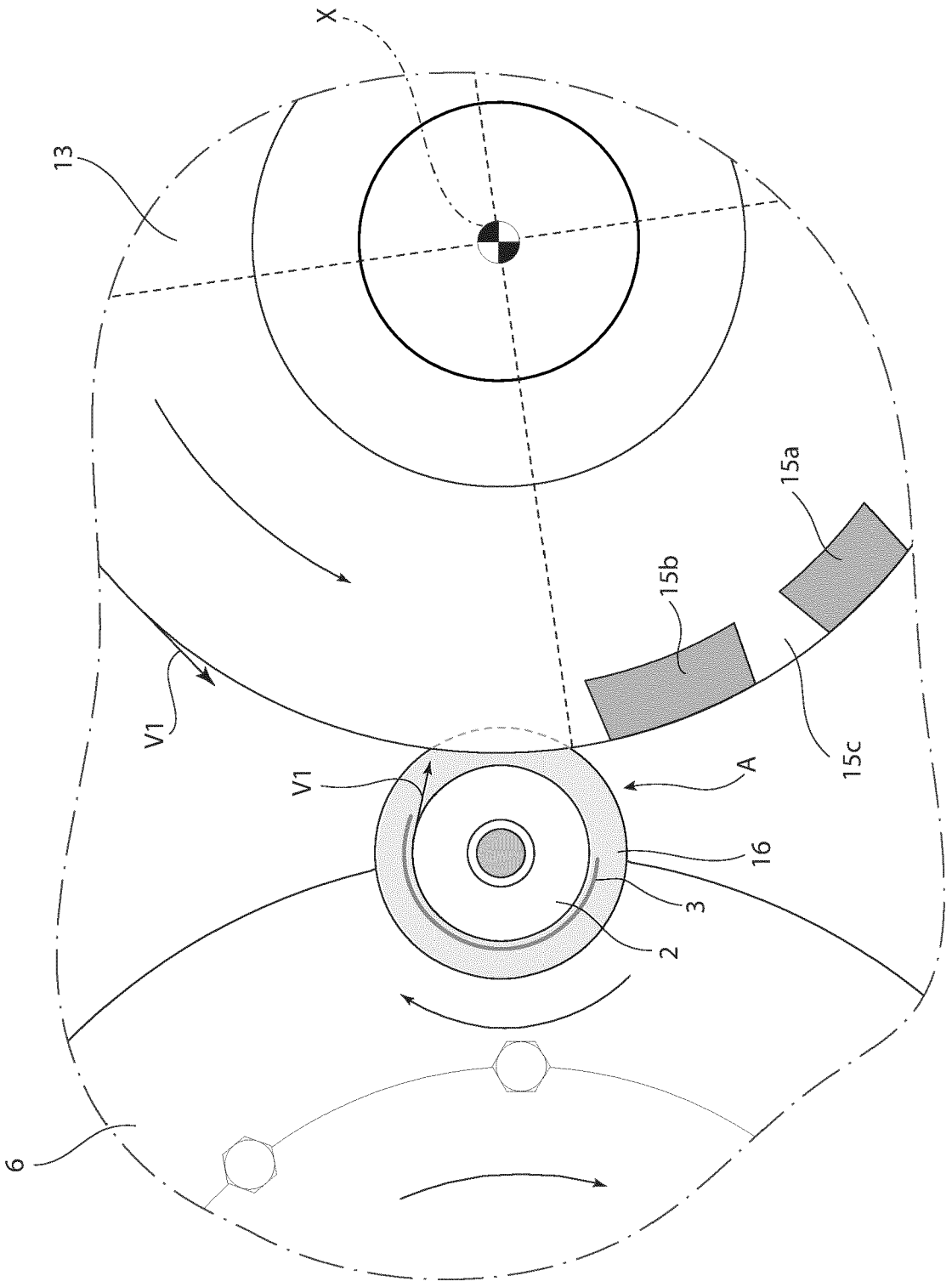


FIG. 3A

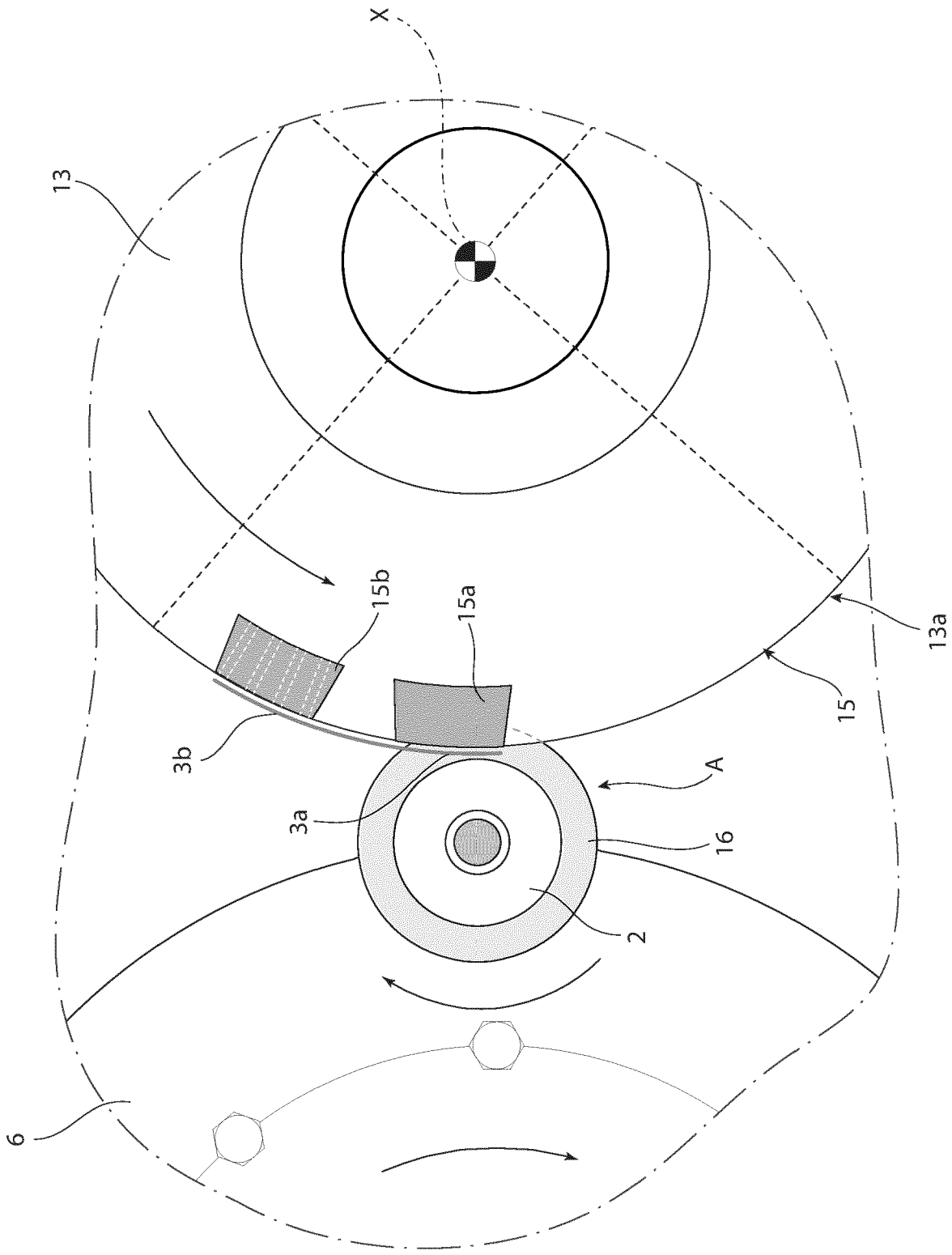
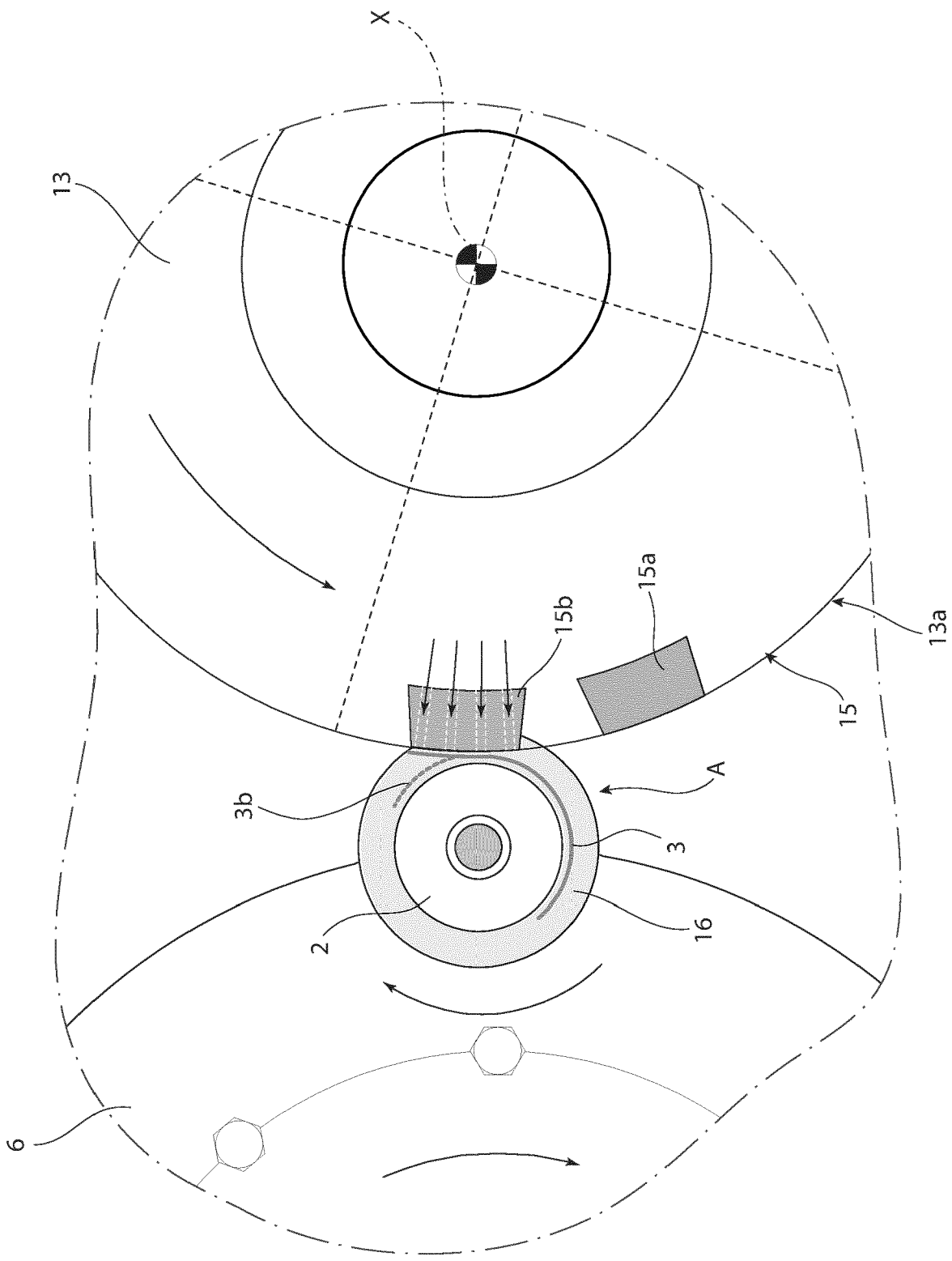


FIG. 3B



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EUROPEAN SEARCH REPORT

Application Number
EP 23 19 1679

DOCUMENTS CONSIDERED TO BE RELEVANT

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X Y A	WO 2010/016187 A1 (FUJI SEAL INT INC [JP]; HOTTA YOSHINORI [JP] ET AL.) 11 February 2010 (2010-02-11) * paragraph [0074]; figures 7, 8 *	1-8,10,11 15,16 9	
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	19 March 2024	Nicolas, Pascal

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X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

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Application Number
EP 23 19 1679

CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing claims for which payment was due.

☐ Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due and for those claims for which claims fees have been paid, namely claim(s):

☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due.

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

☒ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.

☐ As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.

☐ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:

☐ None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:

☐ The present supplementary European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims (Rule 164 (1) EPC).

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LACK OF UNITY OF INVENTION
SHEET B

Application Number
EP 23 19 1679

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. claims: 2-11, 14-16(completely); 1(partially)

systems and methods comprising:
- the carousel comprises a plurality of support plates, each configured for cyclically receiving and supporting one respective container, and each rotatable on its own axis for determining a rotation of the supported container; wherein said retaining sector is configured to release the respective label to the container supported by a respective support plate at the application station; and wherein the labelling machine is configured to control the angular speed of each support plate, so that the peripheral speed of the supported container is higher than a peripheral speed of the transfer drum in at least one instant during the release of the respective label by the respective retaining sector;
The technical effect of these features is to make the label slide on the transfer drum during its transfer to the container to create tension on the label.
The problem solved by these features is how to apply the label on the container without wrinkles.

1.1. claims: 14(completely); 1(partially)

system comprising:
the cutting unit is configured for separating each label from the web while the label is carried by the drum
The problem solved by this feature is how to cut the label at the right dimension.

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2. claims: 12, 13(completely); 1(partially)

systems comprising:
the leading pad and the trailing pad are configured to cyclically retain a respective label by means of suction, wherein, for each retaining sector, the leading pad is configured to apply said leading end to the respective container at the application station and the trailing pad is configured to apply said trailing end to the same container at the application station, and wherein the trailing pad is configured to switch from a suction configuration, in which it retains the trailing end by suction, to a blowing configuration, in which it emits a jet of air, between the application of the leading end by the leading pad and the application of the trailing end by the trailing pad
The problem solved by these features is how to retain and detach the label from the transfer drum.

Please note that all inventions mentioned under item 1, although not necessarily linked by a common inventive concept, could be searched

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LACK OF UNITY OF INVENTION
SHEET B

Application Number
EP 23 19 1679

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

without effort justifying an additional fee.

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 23 19 1679

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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