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(54) **FOLDING DEVICE, SYSTEM AND METHOD FOR PARTLY FOLDING A PACKAGE FROM A BLANK**

(57) A folding device for partly folding a package from a blank . The folding device comprises a rotating member comprising a suction area configured to hold the blank at a front end when the blank transitions from the blank to the partly folded package. The folding device further comprises a guiding member, and wherein the guiding member is arranged at a distance from the rotating member such that the blank abut or is closely arranged to the rotating member for partly folding the package.

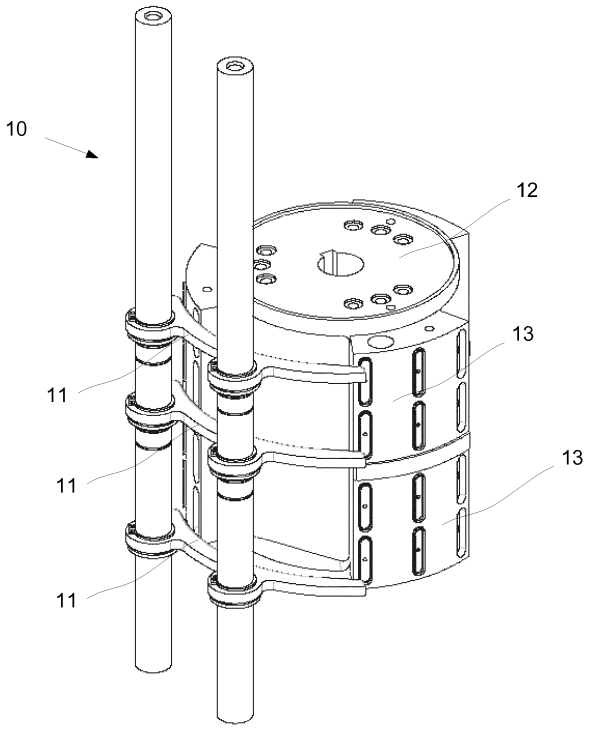

Fig. 1

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Description

Technical Field

[0001] The invention relates to a folding device for partly folding a package from a blank.

Background Art

[0002] Today folding devices for folding a package from a blank is widely known and used.

[0003] Several techniques for folding the blank into a package is known today and used. One known technique and system used today has a rotating member comprising suction cups in multiple rows, that can be switched on and off for temporarily holding the blank. The suction cups holds the blank when the folding of the blank into a partly folded package is performed and then releases the partly folded package into a carrier. The suction cups are thus exposed to wear and tear since the suction is switched on an off when grabbing a new blank and leaving it at the carrier. An effect of this is that the suction cups lose their suction after some time and which could result in a deformed package when folding the package.

[0004] Thus, there is a need for an improved folding system having a lower likelihood of producing a deformed package.

Summary

[0005] It is an object of the invention to at least partly overcome one or more of the above-identified limitations of the prior art. In particular, it is an object to fold a package without any deformation.

[0006] According to a first aspect, a folding device for partly folding a package from a blank. The folding device comprises, a rotating member comprising a suction area configured to hold the blank when the blank transitions from the blank to the partly folded package, a guiding member, and wherein the guiding member is arranged at a distance from the rotating member such that the blank abut or is arranged adjacent to the rotating member for partly folding the package.

[0007] According to a second aspect, a method of producing a partly folded package from a blank comprising, partly folding the package by a folding device.

[0008] According to a third aspect, a filing machine for blanks comprises a folding device.

[0009] Further examples of the disclosure are defined in the dependent claims, wherein features for the fifth and subsequent aspects of the disclosure are as for the first to fourth aspects mutatis mutandis.

[0010] Some examples of the disclosure provide for a blank being flexed open by an interaction between a rotating member and a guiding member.

[0011] Some examples of the disclosure provide for a guiding member pushing or counteracting any movement of a blank 15.

[0012] Some examples of the disclosure provide for a rotating member initiating a fold of a blank into a partly folded package.

[0013] Some examples of the disclosure provide for a guiding member supporting a blank so it abut or is arranged adjacent to a rotating member.

[0014] Some examples of the disclosure provide for mechanisms for holding or forming a guiding member at a desired height.

[0015] Some examples of the disclosure provide for a guiding members being adjustable to different sizes of a blank.

[0016] Some examples of the disclosure provide for a guiding member being configured to produce a low friction against a blank.

[0017] Some examples of the disclosure provide for a guiding member being movable to and/or from a rotating member.

[0018] Some examples of the disclosure provide for a guiding member to produce a variable force relative to a rotating member.

[0019] Some examples of the disclosure provide for a guiding member comprising two sections which are disconnected to each other and operates independently to each other.

[0020] Some examples of the disclosure provide for a guiding member shaped independently to each other so that they can account for different aspects of the guiding.

[0021] Some examples of the disclosure provide for a distance being based on e.g. thickness of a blank, stiffness of the blank, length of the blank, size and/or shape of a rotating member, or any combination of the above.

[0022] Some examples of the disclosure provide for a blank being held by a suction area at at least one weakening line of the blank.

[0023] Some examples of the disclosure provide for a blank being freely movable.

[0024] Some examples of the disclosure provide for a blank being treated kindly when partly folding it into a package.

[0025] Some examples of the disclosure provide for a rotating member directing a blank in a smooth and less stressful way to the packaging material of the blank.

[0026] Some examples of the disclosure provide for a rotating member that introduces forces that partly fold the blank at weakening lines into a partly folded package.

[0027] Some examples of the disclosure provide for a low stress on a blank such that any defects of the blank is avoided when partly folding it.

[0028] Some examples of the disclosure provide for at least one suction cup arranged at an edge of a blank.

[0029] Still other objectives, features, aspects and advantages of the invention will appear from the following detailed description as well as from the drawings.

Brief Description of the Drawings

[0030] Examples of the invention will now be de-

scribed, with reference to the accompanying schematic drawings, in which

Fig. 1 is a perspective view of a folding device.
Fig. 2 is a top view of a folding device.
Fig. 3 is a side view of a folding device comprising moveable guiding members.
Figs. 4a-4f are a top views of a folding device when partly folding a package.
Fig. 5 is a flowchart of partly folding a package from a blank by a folding device.

Detailed Description

[0031] With reference to Fig. 1, an example of a folding device 10 for partly folding a package 16 from a blank 15 is disclosed. The folding device 10 comprises a rotating member 12 comprising a suction area 13 configured to hold the blank 15 when the blank 15 transitions from the blank 15 to the partly folded package 16. The folding device 10 further comprises a guiding member 11, and wherein the guiding member 11 is arranged at a distance X from the rotating member 12 such that the blank 15 abut or is arranged adjacent to the rotating member 12 for partly folding the package 16. By having the guiding member 11 arranged at the distance X from the rotating member 12 the blank 15 is flexed open by the interaction between the rotating member 12 holding the blank 15 and the guiding member 11 pushing or counteracting any movement of the blank 15, in a direction towards the rotating member 12 such that an initial folding of the blank 15 to a partly folded package 16 is initiated.

[0032] In an example, as e.g. illustrated in figs. 1 and 3, the guiding member 11 comprises three guiding member 11 s at various heights, but other variants are conceivable as well. Such as for example one guiding member 11 arranged at a height which corresponds to a center of the blank 15 or two guiding members 11 arranged at a top and bottom of the blank 15, or other variants wherein the blank 15 is supported such that the blank 15 abut or is arranged adjacent to the rotating member 12. In the illustrated example two posts hold the guiding member 11 or members 11 at a desired height but of course are other mechanisms for holding or forming the guiding member 11 at the desired height easily envisaged by the skilled person and is a part of this disclosure.

[0033] In an example, the guiding member 11 or guiding members 11, is adjustable to different sizes of the blank 15 and thus sizes of packages, such as 340 ml or 390 ml packages. In another example, the guiding member 11 is made of one piece, or assembled to be one piece, that extends along the length of the blank 15 and thus guides the blank 15 at its entire surface. In an example the guiding member 11 is configured to produce a low friction against the blank 15 when sliding on the guiding member 11.

[0034] In an example, illustrated in e.g. fig.2, the guiding member 11 is angled at an entry 20 of the blank 15 such that the blank 15 is directed into the space, originating from the distance X, between the guiding member 11 and the rotating member 12. In an example, illustrated in fig.3, the guiding member 11 is movable to and/or from the rotating member 12. This allows the guiding member 11 to produce a variable force relative to the rotating member 12 for example if a stiffness of the blank 15 need to be accounted for. This could be beneficial if the blank 15 is susceptible for scratches or other defects that could be made when contacting a surface of the blank with various members and/or forces. It can also seen that the guiding member 13 comprises of two sections which are disconnected to each other and operates independently to each other. They are also shaped independently to each other so that they can account for different aspects of the guiding such as entering the blank 15 into the space, having the blank 15 abut or being arranged adjacent to the rotating member 12.

[0035] The folding device 10 and its operation will be further explained in relation to a partly folding of a package which is illustrated in figs. 4a-4f.

[0036] Illustrated in figs.4a-4f is a top view of the rotating member 12 and the guiding member 11 together with the blank 15 and a package carrier 17 which aids in folding and holds the partly folded package 16 for further handling. In fig.4a it is illustrated that the rotating member 12 holds the blank 15 at the suction area 13 within the space between the rotating member 12 and the guiding member 11. In an example, the distance X between the rotating member 12 and the guiding member 11 is 0.1-4 cm. Other distances X are also possible and the distance X between the rotating member 12 and the guiding member 11 is based on e.g. thickness of the blank 15, stiffness of the blank 15, length of the blank 15, size and/or shape of the rotating member 12, or any combination of the above.

[0037] In an example, the blank 15 is held by the suction area 13 at at least one weakening line of the blank 15. The weakening line is a part, section, line or similar of a blank 15 that is used for folding the blank 15 into the partly folded package 16 and/or completely folded package with a desired shape. In this example the blank 15 is held at the weakening line being an edge of partly folded package 16 and at a middle of the blank 15 or partly folded package 16, illustrated in e.g. 4c and 4d. In other examples the blank 15 is held other places, such as only at the package edge, at a middle of the blank 15 and so on.

[0038] The package carrier 17 is arranged outside of the rotating members 12 reach and is moving into position to aid in folding and holding the partly folded package 16 for further transport to filling and completely folding the package. In an example, the package carrier 17 is synchronized with the motion of the rotating member 12 to be at the rotating member 12 when the blank 15 extends a certain distance Y from the rotating member 12, such as half the length of the blank 15, 2/3 length of the blank 15, ¼ length of the blank 15 or any length in between.

[0039] Illustrated in fig.4b, the rotating member 12 have rotated some more and now the blank 15 is directed towards the rotating member 12 by the guiding member 11 at a trailing end and a front end of the blank 15 is freely movable.

[0040] As exemplified in fig.4b, the guiding member 11 guides the trailing end of the blank 15 towards the rotating member 12 but at the same time allows for the front end of the blank 15 being able to move freely. This will flex the blank 15 to start to open up which can be seen by the space created between walls of the blank 15. In an example, the guiding member 11 is shaped and arranged at the distance X from the rotating member 12 such that a trailing end of the blank 15 abut or is closely arranged to the rotating member 12, and the front end of the blank 15 is freely movable. In this example the blank 15 is held at what will be the front folding edge in a direction of travel of the partly folded package 16 in the package carrier 17.

[0041] Illustrated in fig.4c, the blank 15 contacts a wall of the package carrier when the rotating member 12 has rotated further. This will open up the blank 15 even more as can be seen by the walls being even more separated. In this example the blank 15 is still contacting the guiding member 11 at the same time as it is in contact with the package carrier 17. In an example, the guiding member 11 is shaped to extend to a position of the rotating member 12 such that the blank 15 is arranged in the space created by distance X between the rotating member 12 and the guiding member 11 and to a package carrier 17 for holding the partly folded package 16.

[0042] Moving on to fig.4d, the blank 15 still contacts the wall of the carrier 17 but now the blank 15 has been moved downwards to a bottom of the carrier 17. In fig.4e the blank 15 is moved even further down and now contact a corner between the wall and the bottom of the carrier 17. This will redirect the force from the rotating member 12 such that the blank 15 starts to be partly folded as desired. In fig.4f the rotating member 12 and the carrier 17 is now arranged such that the force from the rotating member 12 have open up the blank 15 and now being the partly folded package 16. From this point on the rotating member 12 will be detached from the partly folded package 16 by switching of the suction area 13, thus leaving the partly folded package 16 in the carrier 17 for further actions.

[0043] In an example, the rotating member 12 is circular. By having a circular rotating member 12 the blank 15 is treated kindly when partly folding the package. The circular rotating member 12 directs the blank 15 in various directions, as discussed above, in a smooth and less stressful way to the packaging material of the blank 15 but at the same time introduces forces that partly fold the blank 15 at the weakening lines.

[0044] In an example, the guiding member 11 is shaped in a complementary shape to the rotating member 12. By having the guiding member 11 shaped in the complementary shape the guiding member 11 follows the direction of the rotating member 12 and gently treats the blank 15 to introduce a low stress on the blank 15 for avoiding any defects of the blank 15 when partly folding it.

[0045] In an example, the suction area 13 comprises at least one row of at least one suction cup. In an example as also discussed above, the at least one row is arranged at the weakening line being an edge of the blank 15. By having at least one suction cup arranged at the edge of the blank 15, the blank 15 will flex open to become a partly folded package by the trailing end of the blank 15 being pushed against the guiding member 11.

[0046] In an example, a filing machine for filling blanks 15 comprises the folding device 10. In an example, the filing machine further comprises a carton carrier for holding the partly folded package 16.

[0047] In an example, illustrated in fig.5, a method of producing a partly folded package 100 from a blank 15 is disclosed. The method comprises partly folding 110 the package 16 by the folding device 10. In an example, the partly folded package is further completely folded to become a package, such as a retortable package.

[0048] In the above description the use of blank 15, partly folded package 16 and package is used and their meaning should be understood to encompass also any transitional phases in between or overlapping meaning. From the description above it follows that, although various examples of the invention have been described and shown, the invention is not restricted thereto, but may also be embodied in other ways within the scope of the subject-matter defined in the appended claims.

Claims

1. A folding device for partly folding a package from a blank , the folding device comprises,

   - a rotating member comprising a suction area configured to hold the blank when the blank transitions from the blank to the partly folded package,
   - a guiding member, and

   wherein the guiding member is arranged at a distance from the rotating member such that the blank abut or is arranged adjacent to the rotating member for partly folding the package.

2. A folding device according to claim 1, wherein the guiding member is shaped and arranged at the distance from the rotating member such that a trailing end of the blank abut or is arranged adjacent to the rotating member, and a front end of the blank is freely movable.

3. A folding device according to claims 1 or 2, wherein the guiding member extend to a position of the rotating member such that the blank is arranged in the distance between the rotating member and the guiding member and to a package carrier for holding the

partly folded package.

4. A folding device according to any of the preceding claims, wherein the guiding member is movable to and from the rotating member.

5. A folding device according to any of the preceding claims, wherein the distance is between 0.1-4 cm.

6. A folding device according to any of the preceding claims, wherein the rotating member is circular.

7. A folding device according to any of the preceding claims, wherein the guiding member is shaped in a complementary shaped to the rotating member.

8. A folding device according to any of the preceding claims, wherein the suction area comprises at least one row of at least one suction cup.

9. A method of producing a partly folded package from a blank comprising,

- partly folding the package by the folding device according to claims 1-8.

10. A method according to claim 9, wherein the partly folded package is completely folded to a package.

11. A filing machine for blank s comprising,

- A folding device according to claims 1-8.

12. A filing machine for blank s according to claim 11 further comprising,

- a carton carrier for aiding in and holding the partly folded package.

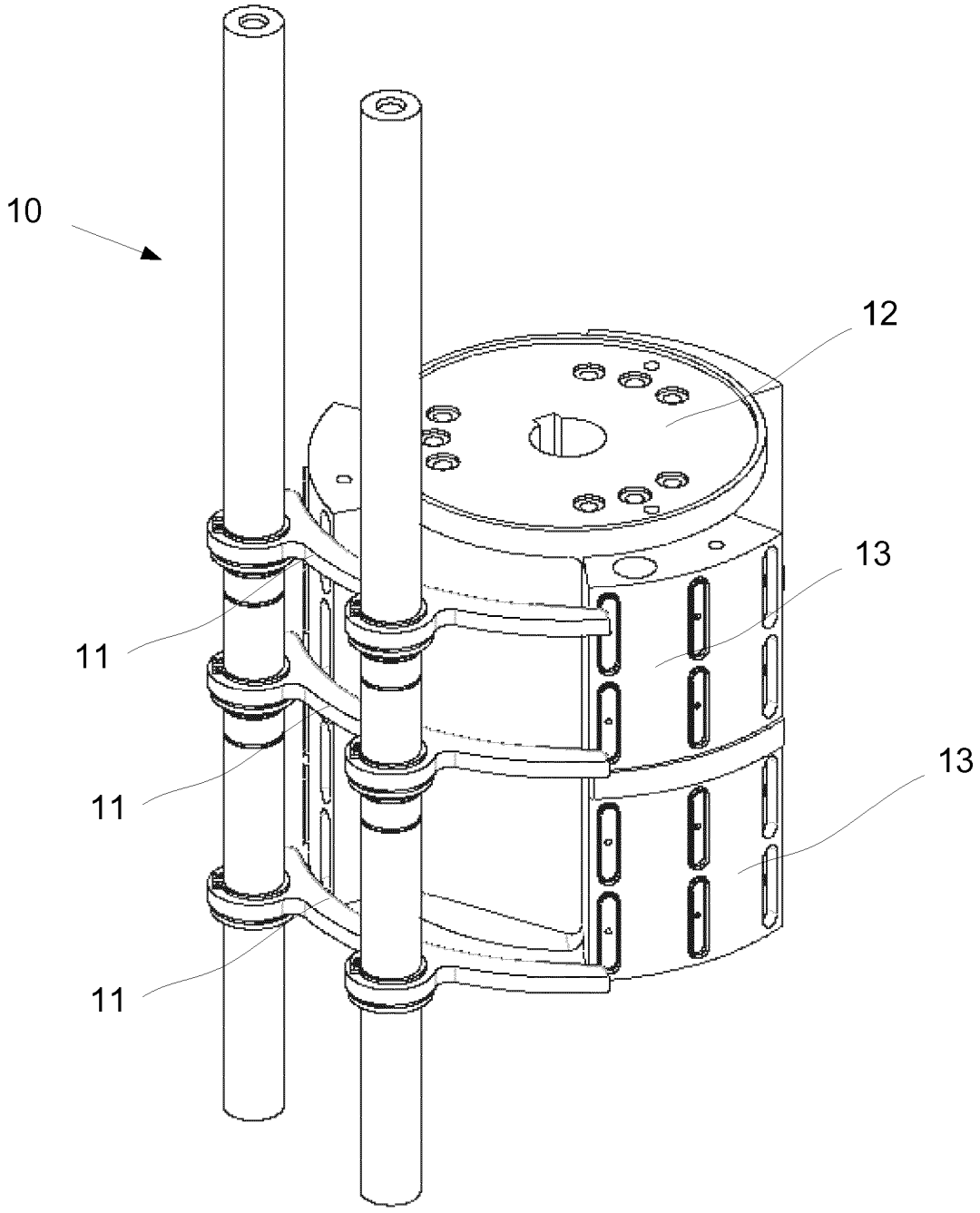

Fig. 1

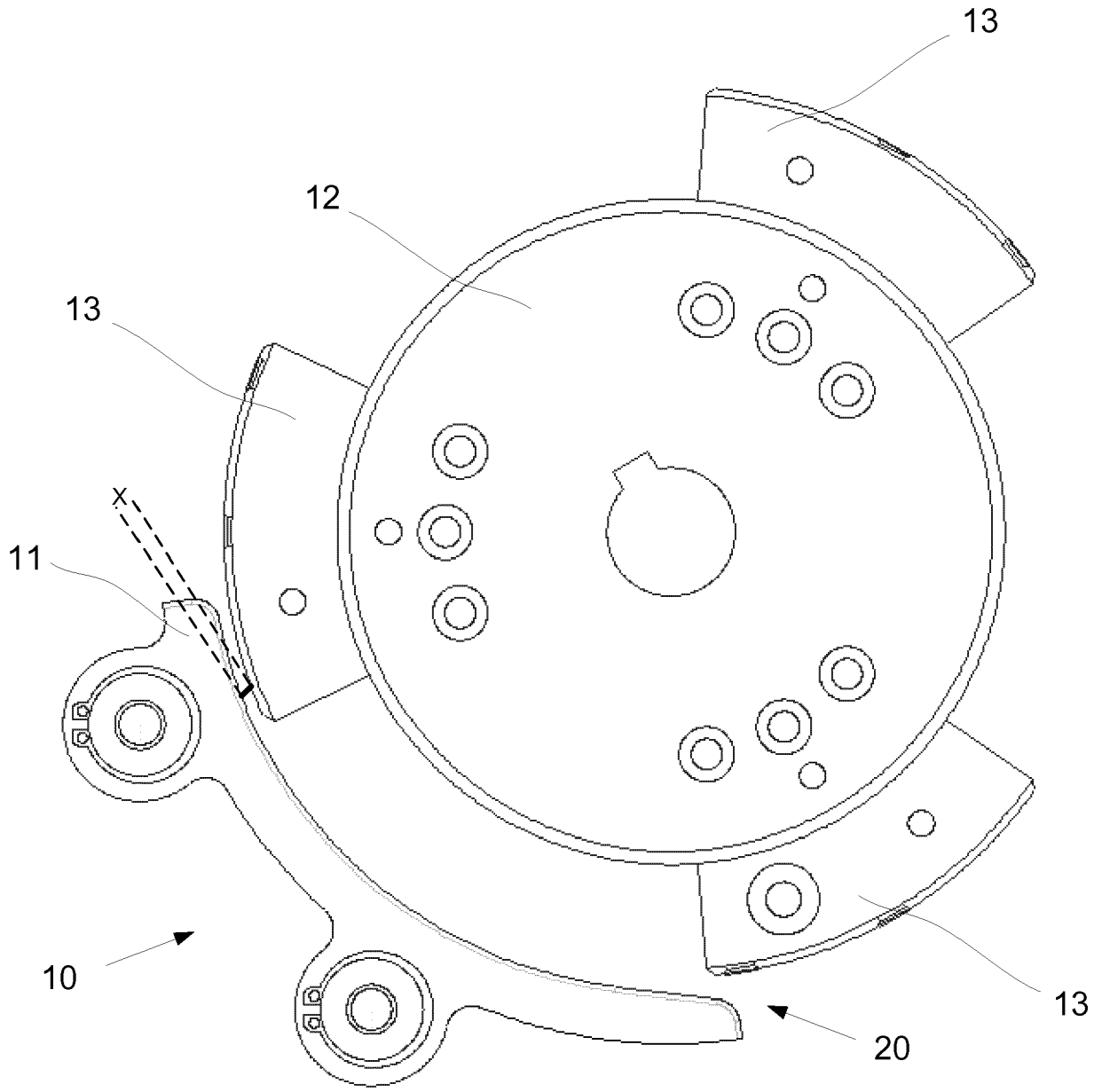

Fig. 2

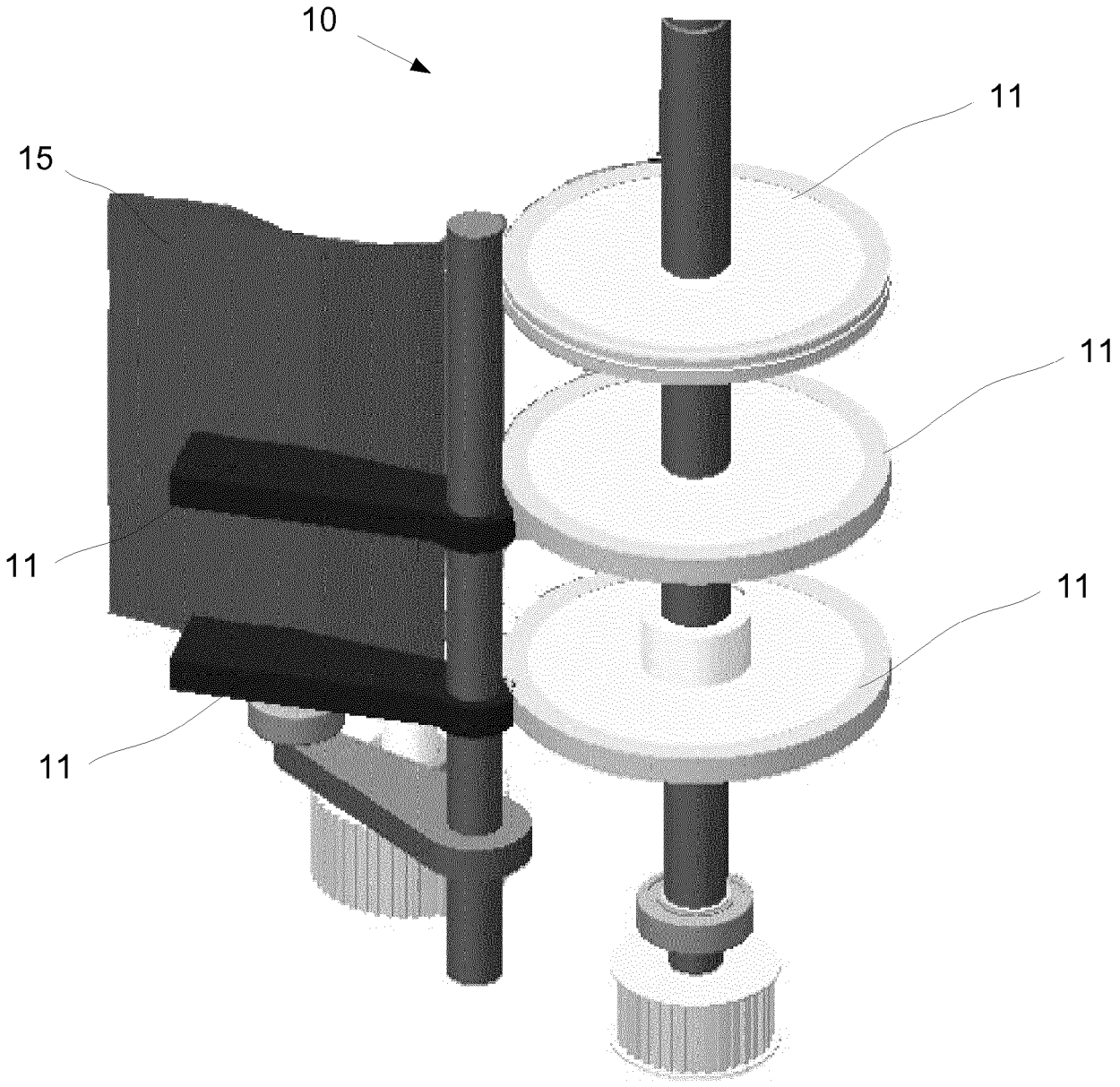

Fig. 3

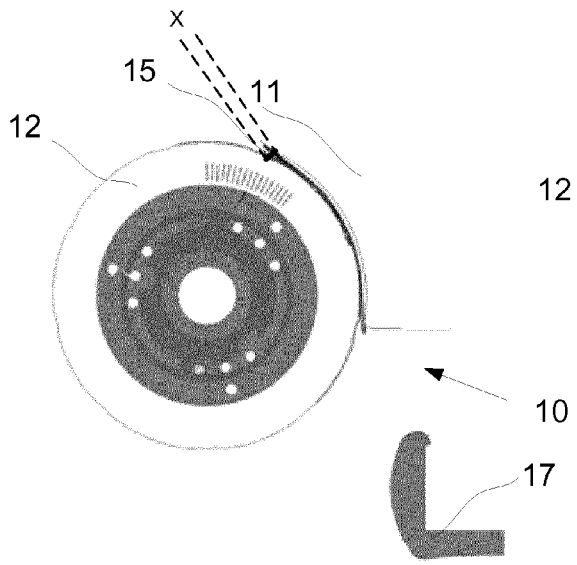

Fig. 4a

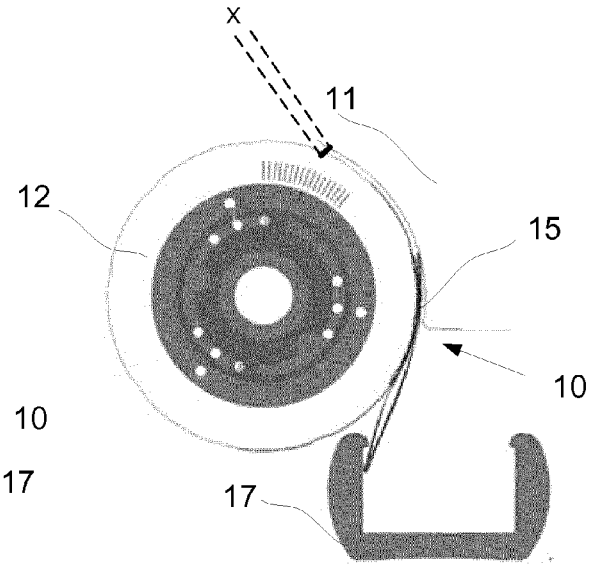

Fig. 4b

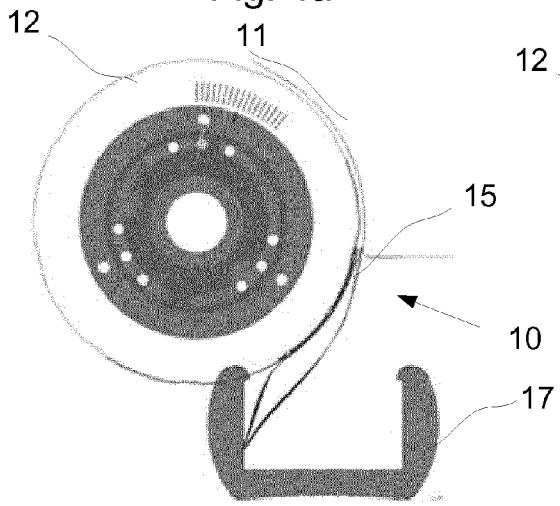

Fig. 4c

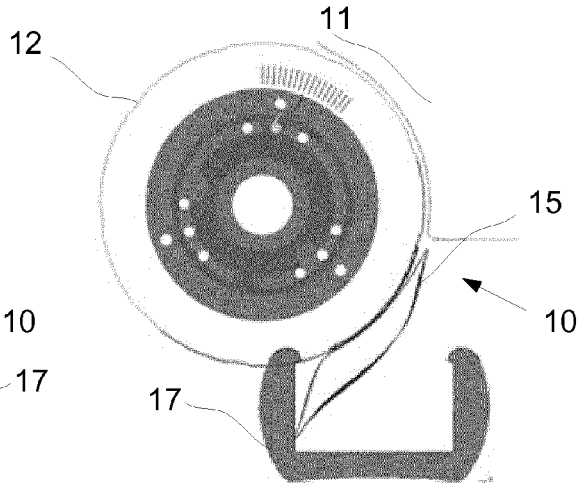

Fig. 4d

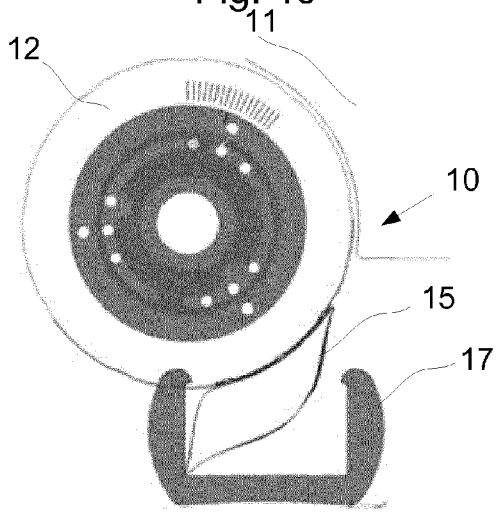

Fig. 4e

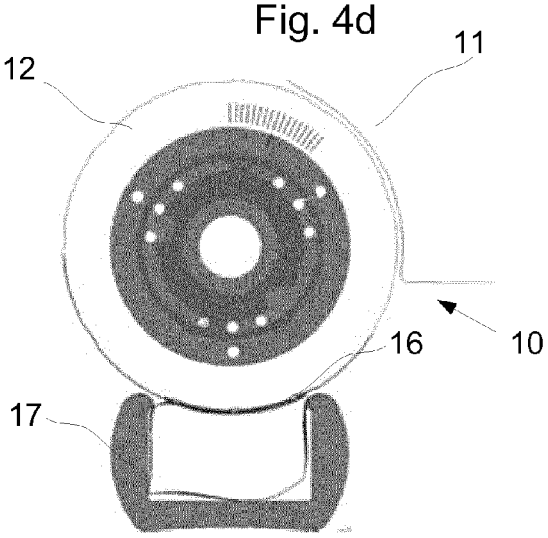

Fig. 4f

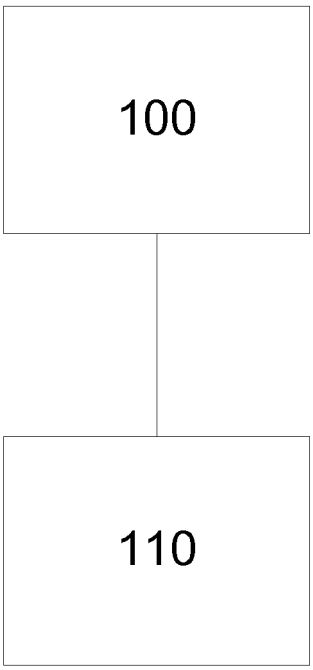

Fig. 5

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EUROPEAN SEARCH REPORT

Application Number
EP 17 19 7431

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 3 122 071 A (VOGEL WALTER H) 25 February 1964 (1964-02-25) * column 3, line 23 - column 4, line 37; figures 1-11 *	1-12	INV. B31B50/78
X	US 2 671 385 A (FRANZ JOHENNING ET AL) 9 March 1954 (1954-03-09) * column 3, line 53 - column 5, line 23; figures 1-6 *	1-3,5-12	
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X	FR 2 642 039 A1 (GD SPA [IT]) 27 July 1990 (1990-07-27) * page 8, line 7 - page 9, line 16; figures 1-4i *	1-3,5-12	
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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
Munich	23 January 2018	Grondin, David

CATEGORY OF CITED DOCUMENTS

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