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(54) **DEVICE FOR REMOVING AN END CLOSURE**

VORRICHTUNG ZUR ENTFERNUNG EINES ENDVERSCHLUSSES

DISPOSITIF DE RETRAIT D'UNE FERMETURE D'EXTRÉMITÉ

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(56) References cited:

EP-A1- 0 017 878 EP-A1- 0 330 729

EP-A1- 1 997 596 EP-A2- 1 283 094

WO-A1-99/41149 WO-A1-2005/058563

DE-A1- 2 836 374 US-A- 3 332 326

US-A- 6 089 136

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Description

Technical field

[0001] The present invention relates to a method and use of a device for removing an end closure of a collapsible-type packaging.

Background of the invention

[0002] It has become increasingly common to package products, and here above all, liquid comestibles such as water, milk, juice or wine, in collapsible-type packagings.

[0003] By a collapsible-type packaging is meant a packaging which has a chamber delimited by flexible walls, the volume of which chamber is dependent on the mutual position of the walls.

[0004] This type of packagings is preferably produced from a flexible, laminated packaging material. The packaging material can comprise a core layer of a polyolefin material. The core layer can further comprise a filler of mineral material, which can advantageously be constituted by chalk (calcium carbonate).

[0005] This packaging type can exist prior to filling in a flat and sealed state. It is hence possible to sterilize the chamber of the packaging in connection with the production and, with maintained sterility, to distribute the packaging to a filling plant, such as a dairy.

[0006] It is known to produce rolls consisting of webs of mutually connected packagings of the above-stated type, rolled up on a bobbin, and to dispose such a roll in a filling machine.

[0007] In the filling machine, the rolled-up web of packagings is fed out. In the filling operation, the packagings arrive, in turns, at a station for removing the end closure and hence for opening a filling channel in the respective packaging, at a filling station for filling each packaging, and at a sealing station for closing off the filled packagings.

[0008] The removal of the end closure can be realized in a number of different ways.

[0009] One way of removing the end closure is through the use of a device comprising a rotary cutting wheel provided with a cutting edge. Such a device can be seen, for example, from EP1997596. The cutting edge cooperates with a flat face of a abutmentabutment wheel. The axis of the cutting wheel can be somewhat tilted in relation to the axis of the abutmentabutment wheel, whereby a cutting nip is obtained at which shearing /cutting takes place for removal of the end closure. It has been shown that removal of the end closure of packagings which are made with this technique can sometimes lead to difficulties in subsequent production stages in which the walls of the filling channel are separated from one another to allow the introduction of a filling nozzle. This is due to the fact that the walls of the filling channel tend in certain cases to stick together precisely at the cut face. A contributory factor to this phenomenon is a smearing of the

packaging material, which smearing arises in the cut face in connection with the removal of the said end closure. Another contributory factor to this phenomenon is a cold weld, which arises in the cut face between the side walls of the packaging. The said cold weld is produced as a result of compression of the packaging material in connection with the cutting, i.e. all cut faces of the side faces of the packaging are pressed one against the other and molecular bonds are formed, which make the sides stick together. The term cold weld is used to convey that the adhesion takes place at a temperature which is substantially lower than the temperature at which the packaging material melts.

[0010] An alternative way of removing the end closure is to use a crushing knife, in which a rotatably arranged knife having a circumferential, peripheral cutting edge is placed against a fixed brace to form a nip into which the web of packagings is introduced for removal of the end closure. Even when the end closure is removed in this way, the above-stated problem, i.e. smearing of the packaging material, as well as a cold weld in the cut face, still arises.

[0011] Another alternative is to use a fixed knife of the razor blade type. A removal of the end closure is hereby achieved substantially without smearing of the packing material or cold welding of the walls of the filling channel at the cut face. Another problem which arises in this connection is, however, the wearing of the knife. The same point is always responsible for the cutting, so that the knife rapidly becomes worn and needs replacing, which leads to frequent production stoppages.

[0012] In EP1283094, a device is described which comprises a cutting wheel provided with a toothed cutting edge. The cutting wheel is disposed in overlapping arrangement in relation to a abutmentabutment wheel. A gap is arranged between the cutting wheel and the abutmentabutment wheel. If this device were to be used to remove an end closure of a collapsible-type packaging, the end closure would be removed by a sawing or milling-like method instead of by a shearing-like method, which, for obvious reasons, would give rise to dust formation.

[0013] Devices comprising a cutting wheel provided with a toothed cutting edge and disposed in overlapping arrangement in relation to an abutment wheel are also known from EP033729 and EP0017878.

[0014] There is thus a need to provide a reliable and simple method for removing an end closure of a collapsible-type packaging, which method also allows subsequent easy and reliable separation of the walls of the opened filling channel.

Summary of the invention

[0015] With the above in mind, an object of the present invention is to provide a method and use of a device for reliable and simple removal of an end closure of a collapsible-type packaging.

[0016] Another object of the present invention is that

the method and use of the device for reliable and simple removal of an end closure of a collapsible-type packaging shall also allow subsequent simple and reliable separation of the walls of the opened filling channel.

[0017] In order to achieve the above-specified and other non-specified objects which will emerge from the following description, the present invention relates to a method according to Claim 1 and use of a device according to Claim 6. Embodiments of the device emerge from the dependent claims.

[0018] A method and use of a device are hereby provided which allow reliable and simple removal of an end closure of a collapsible-type packaging. The removal of the end closure effected with the device also allows subsequent simple and reliable separation of the walls of the opened filling channel. The pointed teeth of the cutting wheel allow a snap-acting, pulsating shearing in the removal of the end closure. In trials, it has been shown that the removal of the end closure of packagings effected with the above-defined device deters smearing of the packaging material, as well as cold welding of the walls of the filling channel at the cut face. In addition, it has also been shown that small air pockets are formed between the two opposing side walls of the packaging when the end closure is removed with the device according to the invention. These air gaps are formed where the sharp-pointed teeth engage with the packaging. The air pockets allow air to be easily able to permeate between the two opposing side walls of the packaging when these are separated. The fact that air can flow easily into the packaging when the side walls of the packaging are separated means that the said separation of the side walls is much easier to carry out. This, together with the fact that the packaging material is not smeared or does not stick together in the section transversely to the side walls of the packaging, allows the channel of the packaging to be easily and reliably opened following the removal of the end closure.

[0019] Each tooth of the cutting wheel can have an angle-forming tip in a plane at right angles to the said first rotation axis. If the packaging whose end closure is to be removed is fed in towards the cutting nip in a plane which is substantially parallel with the said first and second rotation axis, a right-angled engagement between the packaging and the tip is allowed. In this way, a minimal contact surface between the packaging and the tip is obtained in the removal of the end closure.

[0020] The said tip can be situated at a greatest distance from the centre of rotation of the cutting wheel.

[0021] At least one of the abutment wheel and the cutting wheel can be axially biased against the other of the abutment wheel and the cutting wheel. In this way, a better cutting effect/shearing effect in the said nip is achieved. The biasing can be achieved by means of a spring which strives for axial displacement of one of the first or second axis in such a direction that the cutting wheel face of the cutting wheel and the abutment wheel face of the abutment wheel are pressed one against the

other. It will be appreciated that either the abutment wheel can be biased against the cutting wheel, or the cutting wheel can be biased against the abutment wheel. Alternatively, the abutment wheel can be biased against the cutting wheel, at the same time as the cutting wheel is biased against the abutment wheel.

[0022] The said abutment wheel can comprise a circumferentially continuously extended abutment wheel cutting edge, the said abutment wheel face partially defining the said abutment wheel cutting edge. The fact that the abutment wheel also has a cutting edge means that a better defined cutting nip is obtained.

[0023] The device can further comprise a drive member arranged for rotation of at least one of the abutment wheel and the cutting wheel.

[0024] The drive member can be arranged for simultaneous rotation of the cutting wheel and the abutment wheel.

[0025] The drive member can be arranged for rotation of the cutting wheel and the abutment wheel in opposite directions. In this way, the motional direction of the cutting wheel and the abutment wheel in which the two wheels overlap is made to be substantially the same as the motional direction of the packagings fed into the device, the end closures of which are to be removed.

[0026] The said cutting wheel face and the abutment wheel face can be complementary to allow the said overlapping contact. In particular, the said cutting wheel face and abutment wheel face can be flat. The cutting wheel and the abutment wheel can hence be easily rotated.

[0027] The said cutting wheel cutting edge can have a cutting edge angle within the range 10-60°.

[0028] The said abutment wheel cutting edge can have a cutting edge angle within the range 20-90°.

[0029] When both the cutting wheel cutting edge and the abutment wheel cutting edge have acute cutting edge angles, a well defined nip is obtained in which the cutting/shearing is realized, and thus the shearing effect is improved. The more sharp-pointed the cutting edges, the better defined is the nip which is obtained, which means that a better shearing effect is obtained. The pointedness must however be weighed against the service life of the respective cutting edge. The more sharp-pointed the cutting edge, the shorter the service life.

[0030] The cutting wheel can have a cross section in the shape of a truncated cone.

[0031] The cutting wheel can have a first cutting wheel principal face and a second cutting wheel principal face lying opposite the first cutting wheel principal face, as well as a radially external cutting wheel side face, which connects the first cutting wheel principal face to the second cutting wheel principal face.

[0032] The said cutting wheel side face can be grooved. The teeth of the cutting wheel can be easily formed by milling of the said grooves in the said cutting wheel side face.

[0033] The abutment wheel can have a cross section in the shape of a truncated cone.

Brief description of the drawings

[0034] Embodiments of the present invention will now be described for illustrative purposes with reference to the accompanying drawings.

Figure 1 is a schematic view of a process for producing collapsible-type packagings.

Figure 2 is a perspective view of an unfilled collapsible-type packaging.

Figure 3 is a perspective view of an embodiment of a device for removing an end closure of a collapsible-type packaging.

Figure 4 is a further perspective view of the embodiment of the device for removing an end closure of a collapsible-type packaging as shown in Figure 3.

Figure 5 is a side view of the device for removing an end closure of a collapsible-type packaging as shown in Figure 3.

Figure 6 is a bottom view of the device for removing an end closure of a collapsible-type packaging as shown in Figure 3.

Figure 7 is an enlarged top view of a collapsible-type packaging, whose end closure is removed.

Figure 8a-f are bottom views of alternative embodiments of the device for removing an end closure of a collapsible-type packaging.

Description of illustrative embodiments

[0035] Figure 1 illustrates an example of a method for producing collapsible-type packagings 1, which example is non-limiting for the invention. The packagings 1 are produced from an M-folded packaging web 2, which comprises two opposing side-wall-forming portions 2a, 2b and a folded bottom-wall-forming portion 3 arranged therebetween. The packaging web 2 is preferably produced from a flexible, laminated packaging material. The packaging material can comprise a core layer of a polyolefin material. The core layer can further comprise a filler of mineral material, which can advantageously be constituted by chalk (calcium carbonate).

[0036] For the formation of a packaging 1, the two side-wall-forming portions 2a, 2b and the bottom-forming portion 3 are brought together in a tool 10. The tool 10 connects the portions 2a, 2b, 3 along a connecting portion 4 for delimitation of a chamber 5. The tool 10 can connect the connecting portions 4, for example, by means of heat, pressure, ultrasound or a combination thereof. The finished packaging 1 has a leak-tight chamber 5.

[0037] The finished packagings 1 are mutually connected. In this way, an elongated web of packagings 1 is formed. Surplus material which does not form part of the packagings can be removed, for example, in a roll punch (not shown).

[0038] The elongated web of packagings 1 can afterwards be rolled up onto a bobbin to form a roll containing a web of mutually connected empty packagings 1. The

roll can then be distributed to a filling plant for use in a filling machine.

[0039] A packaging 1 of the above type is illustrated in Figure 2. The packaging 1 comprises two opposing side walls 6a, 6b and a bottom wall 7 folded into double-walled shape.

[0040] The side walls 6a, 6b of the packaging together delimit a channel 8 which, in the shown unfilled state of the packaging, is closed off. Through the removal of an end closure 9 of the packaging 1, the said channel 8 is opened, whereby the chamber 5 of the packaging 1 can be linked to the environment via the said channel 8 to allow the packaging to be filled. The channel 8 is arranged to be reclosed after filling, for example by heat-sealing.

[0041] The present invention relates to a method and use of a device 12 for removing an end closure 9 of a collapsible-type packaging 1 and inventive embodiments of the invention will be described below.

[0042] With reference to Figures 3-6, an embodiment of a device 12 for removing the end closure 9 of a collapsible-type packaging 1 is shown, which end closure 9 closes off the channel 8 delimited by the two opposing side walls 6a, 6b of the packaging 1.

[0043] The device 12 comprises a cutting wheel 20 and an abutment wheel 30. In the shown embodiment, the cutting wheel 20 has a cross section in the shape of a truncated cone, see especially Figure 5. In the shown embodiment, the abutment wheel 30 also has a cross section in the shape of a truncated cone, see especially Figure 5. The cutting wheel 20 is supported by a first shaft and is arranged for symmetrical rotation about a first rotation axis 26. The abutment wheel 30 is supported by a second shaft and is arranged for symmetrical rotation about a second rotation axis 36.

[0044] The said second rotation axis 36 is parallel to the said first rotation axis 26.

[0045] In the shown embodiment, the first and second shaft extend along the said first and second rotation axis 26, 36 respectively.

[0046] The cutting wheel 20 has a circumferentially continuously extended cutting wheel cutting edge 22. The cutting wheel 29 further has a radially extended, peripheral and circumferential cutting wheel face 24. The said cutting wheel face 24 partially defines the said cutting wheel cutting edge 22.

[0047] The abutment wheel 30 has a radially extended, peripheral and circumferential abutment wheel face 34. The said abutment wheel face 34 is facing towards the said first cutting wheel face 24. Furthermore, the cutting wheel face 24 of the cutting wheel 20 and the abutment wheel face 34 of the abutment wheel 30 are arranged with an overlapping contact for the formation of a cutting/shearing nip 45.

[0048] In order to allow the said overlapping contact, the said cutting wheel face 24 and the abutment wheel face 34 are complementary. Advantageously, the said cutting wheel face 24 and abutment wheel face 34 are flat.

[0049] In the embodiment shown in Figures 3-6, the cutting wheel 20 is disposed below the abutment wheel 30. It will be appreciated, however, that the cutting wheel 20 and the abutment wheel 30 can change places.

[0050] In order to achieve the necessary cutting effect/shearing effect in the said nip 45, the cutting wheel face 24 of the cutting wheel 20 and the abutment wheel face 34 of the abutment wheel 30 are arranged with a loaded overlapping contact, by which is meant that the wheels are pressed one against the other. This can be achieved by at least one of the abutment wheel 30 and the cutting wheel 20 being axially biased against the other of the abutment wheel 30 and the cutting wheel 20. This biasing can be achieved by means of a spring, which strives for axial displacement of one of the first or second shaft in such a direction that the cutting wheel face 24 of the cutting wheel 20 and the abutment wheel face 34 of the abutment wheel 30 are pressed one against the other. It will be appreciated that either the abutment wheel 30 can be biased against the cutting wheel 20 or the cutting wheel 20 can be biased against the abutment wheel 30. Alternatively, the abutment wheel 30 can be biased against the cutting wheel 20, at the same time as the cutting wheel 20 is biased against the abutment wheel 30. It is preferable, however, if one of the cutting wheel 20 and the abutment wheel 30 is fixed in the vertical direction. This so that a well defined cutting height is obtained.

[0051] In addition, the cutting wheel 20 has circumferentially arranged, pointed teeth 21. The teeth together define the said circumferentially continuously extended cutting wheel cutting edge 22.

[0052] Each tooth 21 has an angle-forming tip 23 in a plane at right angles to the said first rotation axis 26. In the illustrative embodiment shown in Figures 3-6, the said tip is situated at a greatest possible distance from the centre of rotation of the cutting wheel 20.

[0053] In the illustrative embodiment shown in Figures 3-6, the continuously extended cutting wheel cutting edge 22 is wave formed. Other types of configuration of teeth 21 and cutting wheel cutting edge 22 are also conceivable, see below.

[0054] As stated above, the cutting wheel 20 has a cross section in the shape of a truncated cone, and thus has a first cutting wheel principal face 27 and a second cutting wheel principal face 28 lying opposite the first cutting wheel principal face 27, as well as a radially external cutting wheel side face 29, which connects the first cutting wheel principal face 27 to the second cutting wheel principal face 28. As in the illustrative embodiment shown in Figures 3-6, the said cutting wheel side face 29 can be grooved. In the shown embodiment, the grooves are a result of the method for producing the teeth 21 of the cutting wheel 20. The teeth 21 of the cutting wheel 20 can be easily formed by the milling of grooves in the said cutting wheel side face 29.

[0055] The cutting wheel cutting edge 22 is defined by the said first cutting wheel principal face 27 and the said

cutting wheel side face 29. The cutting wheel cutting edge 22 has an acute cutting edge angle, i.e. the cutting edge angle is less than 90°. Advantageously, the said cutting wheel cutting edge 22 has a cutting edge angle which is less than 45°.

[0056] In the illustrative embodiment shown in Figures 3-6, the abutment wheel 30 comprises a first abutment wheel principal face 37 and a second abutment wheel principal face 38 lying opposite the first abutment wheel principal face 37, as well as a radially external abutment wheel side face 39, which connects the first abutment wheel principal face 37 to the second abutment wheel principal face 38. The abutment wheel side face 39 is bevelled. The bevel defines a circumferentially continuously extended abutment wheel cutting edge 32. The said abutment wheel cutting edge 32 is sharp-pointed. Advantageously, the said abutment wheel cutting edge 32 has an angle within the range 20-90°.

[0057] Since both the cutting wheel 20 and the abutment wheel 30 have cutting edges 22, 32 with acute cutting edge angles, a well defined nip 45 in which the cutting/shearing occurs is obtained, and thus the shearing effect is improved. The more sharp-pointed the cutting edges 22, 32, the better defined the nip 45 which is obtained and the better the shearing effect which is obtained. The pointedness must however be weighed against the service life of the respective cutting edge 22, 32. The more sharp-pointed the cutting edge, the shorter the service life. For example, the service life of the abutment wheel cutting edge 32 can be extended by the above-discussed bevel, which means that the cutting edge angle is less acute. Since the abutment wheel 30 comprises this bevel, a abutment wheel cutting edge 32 with greater cutting edge angle than the cutting edge angle of the abutment wheel side face 39 is obtained.

[0058] In addition, the device 12 comprises a drive member 40 which is arranged for rotation of the abutment wheel 30 and the cutting wheel 20. The drive member 40 can be a motor, especially an electric motor. The said drive member 40 is arranged to rotate the cutting wheel 20 about the first rotation axis 26 and the abutment wheel 30 about the second rotation axis 36. The said drive member 40 can rotate both the cutting wheel 20 and the abutment wheel 30, since the rotation axes 26, 36 thereof are linked together with a first and a second gearwheel 25, 35. It will be appreciated, however, that the abutment wheel 30 and the cutting wheel 20 can be rotated by their respective drive member.

[0059] The drive member 40 is arranged for rotation of the cutting wheel 20 and the abutment wheel 30 in opposite directions. The motional direction of the cutting wheel 20 and the abutment wheel 30 in which the two wheels 20, 30 overlap is substantially the same as the motional direction of the packagings 1 whose end closure 9 is to be removed.

[0060] The feed-in of the packaging web can be realized intermittently, which results in acceleration and retardation of the same web, so that the feed-in speed is

not constant. Alternatively, the packaging web can be fed in continuously at constant feed-in speed.

[0061] The peripheral speed of the cutting wheel and of the abutment wheel should be somewhat higher than or at least as high as the maximum feed-in speed. In the event of a continuous feed-in at constant speed, it is important that the peripheral speed is somewhat higher than or at least as high as this constant feed-in speed.

[0062] The peripheral speed of the cutting wheel 20 and the abutment wheel 30 should thus be somewhat higher than the maximum feed-in speed of the packaging web. As a non-limiting example, the peripheral speed of the cutting wheel 20 and the abutment wheel 30 is 5-10% higher than the feed-in speed of the packaging web. This since, if the peripheral speed of the cutting wheel 20 and the abutment wheel 30 is the same or slower than the speed of the fed-in packaging web, the nip 45 creates a resistance. This means, in turn, that the position of the shear in the vertical direction of the packaging is uncontrolled. In order to obtain a shearing cut which is vertically controllable, the peripheral speed of the cutting wheel 20 and the abutment wheel 30 must be somewhat higher than or at least as high as the maximum feed-in speed of the packaging web.

[0063] A typical feed-in speed of the packaging web is 0.5-2 m/s.

[0064] The packaging 1 whose end closure 9 is to be removed is fed in towards the cutting nip 45 in a plane which is substantially parallel with the said first and second rotation axis 26, 36.

[0065] As a non-limiting example, it can be stated that the abutment wheel 30 and the cutting wheel 20 can be configured with a diameter within the range 40 to 80 mm. One way of choosing the diameter of the wheels 20, 30 is for the diameter to be chosen such that the peripheral speed of the cutting wheel 20 and of the abutment wheel 30, at a rotation speed given by the drive member 40, somewhat exceeds the feed-in speed of the packaging 1 whose end closure 9 is to be removed. According to an actual embodiment, the cutting wheel 20 and the abutment wheel 30 have been configured with a 60 mm diameter.

[0066] In addition it can also be stated, now too as a non-limiting example, that the abutment wheel 30 and the cutting wheel 20 can be configured with a thickness within the range 2 to 8 mm. According to an actual embodiment, the cutting wheel 20 and the abutment wheel 30 have been configured with a 4 mm thickness.

[0067] As a non-limiting example, it can also be stated that the number of teeth 21 per unit of length of the cutting wheel 20 is between 0.1 and 2 teeth per mm. In an actual embodiment, the cutting wheel has been configured with 72 teeth along the circumference of a wheel with a 60 mm diameter, i.e. about 0.4 teeth per mm.

[0068] Since the peripheral cutting edge 22 of the cutting wheel 20 is pointedly toothed, a snap-acting pulsating shearing is achieved in the removal of the end closure 9.

[0069] In trials, it has been shown that the removal of the end closure 9 of packaging 1 made with the above-defined device 12 deters smearing of the packaging material and minimizes cold welding of the walls of the filling channel at the cut face. In addition, it has also been shown that small air pockets 50 are formed between the two opposing side walls 6a, 6b of the packaging 1 when the end closure 9 is removed with the device 12 according to the invention, see Figure 7. These air pockets 50 are formed in connection with the teeth 21 engaging with the packaging 1. The air pockets 50 allow air to permeate easily between two opposing side walls 6a, 6b of the packaging 1 when these are separated.

[0070] One way of separating the side walls 6a, 6b of the packaging 1 is to provide a gripping member which first grabs hold of both side walls of the packaging 1 by means of gripping arms provided with suction cups and then the gripping arms are moved apart for separation of the side walls 6a, 6b of the packaging 1. The fact that, owing to the said air pockets 50, air can flow easily into the packaging 1 when the side walls 6a, 6b of the packaging 1 are separated means that the said separation of the side walls 6a, 6b is much easier to carry out. This, together with the fact that the packaging material in the section transversely to the side walls 6a, 6b of the packaging 1 is subjected to a reduced smearing and cold welding, allows a simple and reliable opening of the channel 8 of the packaging 1 after the end closure 9 has been removed.

[0071] In the above-described illustrative embodiment, the device 12 has been described with a cutting wheel 20 having circumferentially arranged, pointed teeth 21, which teeth 21 together define a circumferentially continuously extended wavy cutting wheel cutting edge 22. As stated above, other configurations of teeth 21 and of cutting wheel cutting edges 22 are conceivable. An example of an alternative configuration of teeth 21 and of a cutting wheel cutting edge 22 can be found in Figure 8a. In this case, each tooth 21 has two mutually opposed angle-forming tips 23a, 23b, in a plane at right angles to the said first rotation axis 26. The said tips 23a, 23b can have a curvature in towards the centre of the cutting wheel 20.

[0072] Other examples of possible embodiments of teeth 21 are teeth 21 with shark's fin shape, triangular shape, square shape, etc. Some possible embodiments of teeth 21 are illustrated in Figures 6, 8a-f.

[0073] It will thus be appreciated that the present invention is not limited to the described embodiments. A number of modifications and variations are possible, so that the scope of the present invention is exclusively defined by the following claims.

[0074] It will thus be appreciated that the present invention is not limited to the described embodiments. A number of modifications and variations are possible, so that the scope of the present invention is exclusively defined by the following claims.

Claims

1. Method for removing an end closure (9) of a collapsible-type packaging (1) made of a packaging material comprising a core layer of polyolefin material, which end closure (9) closes off a channel (8) delimited by two opposing side walls (6a, 6b) of the packaging (1), comprising
 feeding the packaging (1) to a device (12) for removing said end closure (9), the device (12) comprising:
 - a cutting wheel (20) having circumferentially arranged, pointed teeth (21),
 which teeth (21) together define a circumferentially continuously extended cutting wheel cutting edge (22),
 which cutting wheel (20) is arranged rotatably about a first rotation axis (26), and
 a abutment wheel (30), which is arranged rotatably about a second rotation axis (36), which is parallel to the said first rotation axis (26),
 which cutting wheel (20) has a radially extended, peripheral cutting wheel face (24), which partially defines the said cutting wheel cutting edge (22), and
 which abutment wheel (30) has a radially extended, abutment wheel face (34), facing towards the said first cutting wheel face (24), wherein the cutting wheel face (24) of the cutting wheel (20) and the abutment wheel face (34) of the abutment wheel (30) are arranged with a loaded overlapping contact for the formation of a cutting nip (45), and
 wherein the packaging (1) is fed to the cutting nip (45) of the device (12) oriented in a plane which is substantially parallel with the first and second rotation axis (26, 36) such that the teeth (21) engage the packaging (1) for removal of the end closure (9).
2. Method according to claim 1, wherein the cutting wheel (20) and the abutment wheel (30) are rotated in opposite directions by means of a drive member (40).
3. Method according to claim 1 or 2, wherein the cutting wheel (20) and the abutment wheel (30) are rotated with a peripheral speed somewhat higher than the maximum feed-in speed of the packaging (1).
4. Method according to claim 3, wherein the peripheral speed is 5-10% higher than the maximum feed-in speed.
5. Method according to any of the preceding claims, wherein the teeth (21) are made to engage the packaging (1) with a snap-acting pulsating shearing for removal of the end closure (9).
6. Use of a device (12) for removing an end closure (9) of a collapsible-type packaging (1) made of a packaging material comprising a core layer of polyolefin material, which end closure (9) closes off a channel (8) delimited by two opposing side walls (6a, 6b) of the packaging (1), the device (12) comprising:
 - a cutting wheel (20) having circumferentially arranged, pointed teeth (21),
 which teeth (21) together define a circumferentially continuously extended cutting wheel cutting edge (22),
 which cutting wheel (20) is arranged rotatably about a first rotation axis (26), and
 a abutment wheel (30), which is arranged rotatably about a second rotation axis (36), which is parallel to the said first rotation axis (26),
 which cutting wheel (20) has a radially extended, peripheral cutting wheel face (24), which partially defines the said cutting wheel cutting edge (22), and
 which abutment wheel (30) has a radially extended, abutment wheel face (34), facing towards the said first cutting wheel face (24), wherein the cutting wheel face (24) of the cutting wheel (20) and the abutment wheel face (34) of the abutment wheel (30) are arranged with a loaded overlapping contact for the formation of a cutting nip (45).
7. Use of a device (12) for removing an end closure (9) of a collapsible-type packaging (1) according to claim 6, wherein at least one of the abutment wheel (30) and the cutting wheel (20) is axially biased against the other of the abutment wheel (30) and the cutting wheel (20).
8. Use of a device (12) for removing an end closure (9) of a collapsible-type packaging (1) according to any one of claims 6-7, wherein the said abutment wheel (30) comprises a circumferentially continuously extended abutment wheel cutting edge (32), and wherein the said abutment wheel face (34) partially defines the said abutment wheel cutting edge (32).
9. Use of a device (12) for removing an end closure (9) of a collapsible-type packaging (1) according to any one of claims 6-8, the device (12) further comprising a drive member (40) arranged for rotation of at least one of the abutment wheel (30) and the cutting wheel (20).
10. Use of a device (12) for removing an end closure (9) of a collapsible-type packaging (1) according to claim 9, wherein the drive member (40) is arranged for rotation of the cutting wheel (20) and the abutment wheel (30) in opposite directions.

11. Use of a device (12) for removing an end closure (9) of a collapsible-type packaging (1) according to any one of claims 6-10, wherein the said cutting wheel face (24) and the abutment wheel face (34) are complementary to allow the said overlapping contact. 5
12. Use of a device (12) for removing an end closure (9) of a collapsible-type packaging (1) according to any one of claims 6-11, wherein the said cutting wheel cutting edge (22) has an angle within the range 10-60°. 10
13. Use of a device (12) for removing an end closure (9) of a collapsible-type packaging (1) according to any one of claims 6-12, wherein the said abutment wheel cutting edge (32) has an angle within the range 20-90°. 15
14. Use of a device (12) for removing an end closure (9) of a collapsible-type packaging (1) according to any one of claims 6-13, wherein the cutting wheel (20) has a cross section in the shape of a truncated cone. 20
15. Use of a device (12) for removing an end closure (9) of a collapsible-type packaging (1) according to claim 14, wherein the cutting wheel (20) has a first cutting wheel principal face (27) and a second cutting wheel principal face (28) lying opposite the first cutting wheel principal face (27), as well as a radially external cutting wheel side face (29), which connects the first cutting wheel principal face (27) to the second cutting wheel principal face (28), and wherein the said cutting wheel side face (29) is grooved. 25 30

Patentansprüche

1. Verfahren zum Entfernen eines Endverschlusses (9) von einer Verpackung (1) zusammenklappbaren Typs, die aus einem Verpackungsmaterial hergestellt ist, das eine Kernschicht aus Polyolefinmaterial aufweist, wobei der Endverschluss (9) einen Kanal (8) verschließt, der durch zwei gegenüberliegende Seitenwände (6a, 6b) der Verpackung (1) begrenzt ist, umfassend
Vorschieben der Verpackung (1) in eine Vorrichtung (12) zum Entfernen des Endverschlusses (9), wobei die Vorrichtung (12) umfasst:

ein Schneidrad (20), das in Umfangsrichtung angeordnete, spitze Zähne (21) aufweist, wobei die Zähne (21) zusammen eine sich in Umfangsrichtung kontinuierlich erstreckende Schneidrad-Schneidkante (22) definieren, wobei das Schneidrad (20) drehbar um eine erste Rotationsachse (26) angeordnet ist, und eine Widerlagerscheibe (30), die drehbar um eine zweite Rotationsachse (36) angeordnet ist, 50 55

die zu der ersten Rotationsachse (26) parallel ist,
wobei das Schneidrad (20) eine sich radial erstreckende, periphere Schneidradfläche (24) aufweist, die teilweise die Schneidrad-Schneidkante (22) definiert, und
wobei die Widerlagerscheibe (30) eine sich radial erstreckende, Widerlagerscheibenfläche (34) aufweist, die der ersten Schneidradfläche (24) zugewendet ist, wobei die Schneidradfläche (24) des Schneirates (20) und die Widerlagerscheibenfläche (34) der Widerlagerscheibe (30) mit einem belasteten überlappenden Kontakt zur Bildung eines Schneidspalts (45) angeordnet sind, und
wobei die Verpackung (1), die in einer Ebene ausgerichtet ist, die im Wesentlichen parallel mit den ersten und zweiten Rotationsachsen (26, 36) liegt, derart in den Schneidspalt (45) der Vorrichtung (12) vorgeschoben wird, dass die Zähne (21) mit der Verpackung (1) zum Entfernen des Endverschlusses (9) in Eingriff treten.

2. Verfahren nach Anspruch 1, wobei das Schneidrad (20) und die Widerlagerscheibe (30) mittels eines Antriebselements (40) in entgegengesetzte Richtungen gedreht werden.
3. Verfahren nach Anspruch 1 oder 2, wobei das Schneidrad (20) und die Widerlagerscheibe (30) mit einer Umfangsgeschwindigkeit gedreht werden, die geringfügig höher ist als die maximale Vorschubgeschwindigkeit der Verpackung (1).
4. Verfahren nach Anspruch 3, wobei die Umfangsgeschwindigkeit 5 - 10 % höher als die maximale Vorschubgeschwindigkeit ist. 35
5. Verfahren nach einem der vorhergehenden Ansprüche, wobei die Zähne (21) hergestellt sind, in die Verpackung (1) mit einem einschnappenden pulsierenden Scheren zur Entfernung des Endverschlusses (9) einzugreifen. 40
6. Verwendung einer Vorrichtung (12) zum Entfernen eines Endverschlusses (9) von einer Verpackung (1) zusammenklappbaren Typs, die aus einem Verpackungsmaterial hergestellt ist, das eine Kernschicht aus Polyolefinmaterial aufweist, wobei der Endverschluss (9) einen Kanal (8) verschließt, der durch zwei gegenüberliegende Seitenwände (6a, 6b) der Verpackung (1) begrenzt ist, wobei die Vorrichtung (12) umfasst:

ein Schneidrad (20), das in Umfangsrichtung angeordnete, spitze Zähne (21) aufweist, wobei die Zähne (21) zusammen eine sich in Umfangsrichtung kontinuierlich erstreckende 50 55

- Schneidrad-Schneidkante (22) definieren, wobei das Schneidrad (20) drehbar um eine erste Rotationsachse (26) angeordnet ist, und eine Widerlagerscheibe (30), die drehbar um eine zweite Rotationsachse (36) angeordnet ist, die zu der ersten Rotationsachse (26) parallel ist,
- wobei das Schneidrad (20) eine sich radial erstreckende, periphere Schneidradfläche (24) aufweist, die teilweise die Schneidrad-Schneidkante (22) definiert, und
- wobei die Widerlagerscheibe (30) eine sich radial erstreckende Widerlagerscheibenfläche (34) aufweist, die der ersten Schneidradfläche (24) zugewendet ist,
- wobei die Schneidradfläche (24) des Schneidrades (20) und die Widerlagerscheibenfläche (34) der Widerlagerscheibe (30) mit einem belasteten überlappenden Kontakt zur Bildung eines Schneidspalts (45) angeordnet sind.
7. Verwendung einer Vorrichtung (12) zum Entfernen eines Endverschlusses (9) einer Verpackung (1) zusammenklappbaren Typs gemäß Anspruch 6, wobei mindestens eines von der Widerlagerscheibe (30) und dem Schneidrad (20) axial gegen das andere von der Widerlagerscheibe (30) und dem Schneidrad (20) vorgespannt ist.
8. Verwendung einer Vorrichtung (12) zum Entfernen eines Endverschlusses (9) einer Verpackung (1) zusammenfaltbaren Typs gemäß einem der Ansprüche 6 bis 7, wobei die Widerlagerscheibe (30) eine sich in Umfangsrichtung kontinuierlich erstreckende Widerlagerscheiben-Schneidkante (32) aufweist und wobei die Widerlagerscheibenfläche (34) teilweise die Widerlagerscheiben-Schneidkante (32) definiert.
9. Verwendung einer Vorrichtung (12) zum Entfernen eines Endverschlusses (9) einer Verpackung (1) zusammenfaltbaren Typs gemäß einem der Ansprüche 6 bis 8, wobei die Vorrichtung (12) ferner ein Antriebselement (40) aufweist, das zum Drehen von mindestens einem von der Widerlagerscheibe (30) und dem Schneidrad (20) eingerichtet ist.
10. Verwendung einer Vorrichtung (12) zum Entfernen eines Endverschlusses (9) einer Verpackung (1) zusammenfaltbaren Typs gemäß Anspruch 9, wobei das Antriebselement (40) zum Drehen des Schneidrades (20) und der Widerlagerscheibe (30) in entgegengesetzte Richtungen eingerichtet ist.
11. Verwendung einer Vorrichtung (12) zum Entfernen eines Endverschlusses (9) einer Verpackung (1) zusammenfaltbaren Typs gemäß einem der Ansprüche 6 bis 10, wobei die Schneidradfläche (24) und die Widerlagerscheibenfläche (34) komplementär sind, um den überlappenden Kontakt zu ermöglichen.
12. Verwendung einer Vorrichtung (12) zum Entfernen eines Endverschlusses (9) einer Verpackung (1) zusammenfaltbaren Typs gemäß einem der Ansprüche 6 bis 11, wobei die Schneidrad-Schneidkante (22) einen Winkel innerhalb eines Bereiches von 10 - 60° aufweist.
13. Verwendung einer Vorrichtung (12) zum Entfernen eines Endverschlusses (9) einer Verpackung (1) zusammenfaltbaren Typs gemäß einem der Ansprüche 6 bis 12, wobei die Widerlagerscheiben-Schneidkante (32) einen Winkel innerhalb eines Bereiches von 20 - 90° aufweist.
14. Verwendung einer Vorrichtung (12) zum Entfernen eines Endverschlusses (9) einer Verpackung (1) zusammenfaltbaren Typs gemäß einem der Ansprüche 6 bis 13, wobei das Schneidrad (20) einen Querschnitt in der Form eines Kegelstumpfes aufweist.
15. Verwendung einer Vorrichtung (12) zum Entfernen eines Endverschlusses (9) einer Verpackung (1) zusammenfaltbaren Typs gemäß Anspruch 14, wobei das Schneidrad (20) eine erste Schneidrad-Hauptfläche (27) und eine zweite Schneidrad-Hauptfläche (28) aufweist, die gegenüber der ersten Schneidrad-Hauptfläche (27) liegt, sowie eine radiale außenliegende Schneidrad-Nebenfläche (29), welche die erste Schneidrad-Hauptfläche (27) mit der zweiten Schneidrad-Hauptfläche (28) verbindet und wobei die Schneidrad-Nebenfläche (29) gerillt ist.

Revendications

1. Procédé de retrait d'une fermeture d'extrémité (9) d'un emballage (1) de type pliable se composant d'un matériau d'emballage comprenant une couche centrale de matériau polyoléfinique, laquelle fermeture d'extrémité (9) ferme un canal (8) délimité par deux parois latérales opposées (6a, 6b) de l'emballage (1), comprenant
- l'introduction de l'emballage (1) dans un dispositif (12) pour retirer ladite fermeture d'extrémité (9), le dispositif (12) comprenant :
- une roue de coupe (20) ayant des dents (21) pointues agencées de manière circonférentielle,
- lesquelles dents (21) définissent ensemble un bord de coupe (22) de roue de coupe se prolongeant de manière continue et de manière circonférentielle,
- laquelle roue de coupe (20) est agencée de ma-

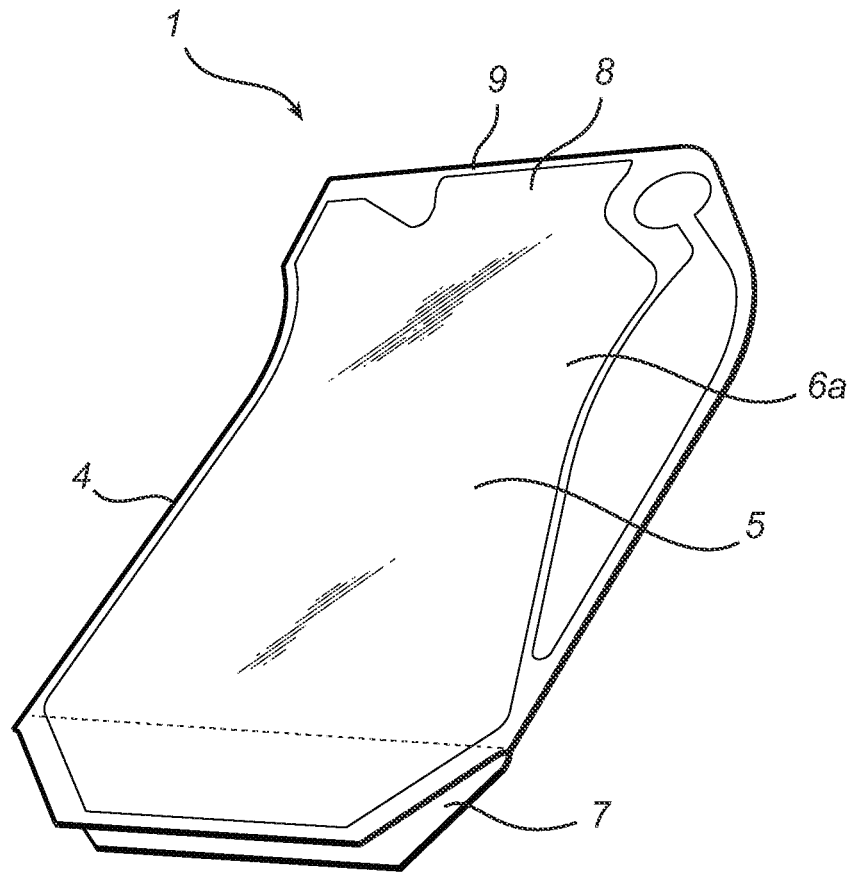
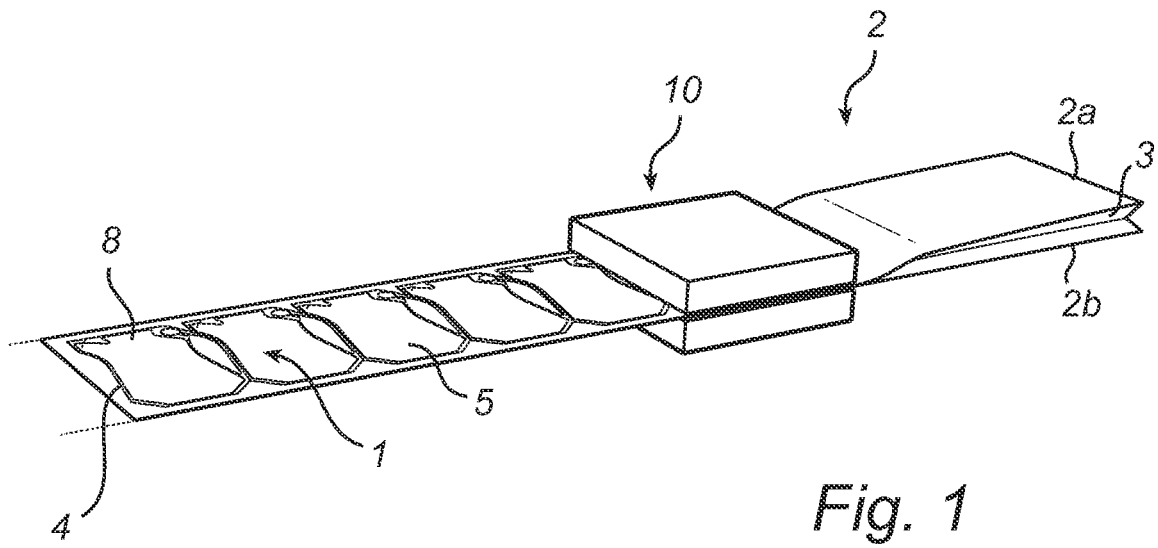
- nière rotative autour d'un premier axe de rotation (26), et
 une roue de butée (30) qui est agencée de manière rotative autour d'un second axe de rotation (36), qui est parallèle audit premier axe de rotation (26),
 laquelle roue de coupe (20) a une face (24) de roue de coupe périphérique se prolongeant de manière radiale, qui définit partiellement ledit bord de coupe (22) de roue de coupe, et
 laquelle roue de butée (30) a une face (34) de roue de butée se prolongeant de manière radiale, faisant face à ladite première face (24) de roue de coupe, la face (24) de roue de coupe de la roue de coupe (20) et la face (34) de roue de butée de la roue de butée (30) étant agencées avec un contact de chevauchement chargé pour la formation d'un écartement de coupe (45), et dans lequel l'emballage (1) est introduit dans l'écartement de coupe (45) du dispositif (12) orienté dans un plan qui est sensiblement parallèle aux premier et second axes de rotation (26, 36), de sorte que les dents (21) viennent en contact avec l'emballage (1) pour le retrait de la fermeture d'extrémité (9).
2. Procédé selon la revendication 1, dans lequel la roue de coupe (20) et la roue de butée (30) tournent dans des sens opposés au moyen d'un élément d'entraînement (40).
3. Procédé selon la revendication 1 ou 2, dans lequel la roue de coupe (20) et la roue de butée (30) tournent avec une vitesse périphérique quelque peu plus élevée que la vitesse d'introduction maximale de l'emballage (1).
4. Procédé selon la revendication 3, dans lequel la vitesse périphérique est 5 à 10 % supérieure à vitesse d'introduction maximale.
5. Procédé selon l'une quelconque des revendications précédentes, dans lequel les dents (21) sont conçues pour venir en contact avec l'emballage (1) avec un cisaillement pulsatoire à action brusque pour le retrait de la fermeture d'extrémité (9).
6. Utilisation d'un dispositif (12) destiné au retrait de la fermeture d'extrémité (9) d'un emballage (1) de type pliable se composant d'un matériau d'emballage comprenant une couche centrale de matériau polyoléfinique, laquelle fermeture d'extrémité (9) ferme un canal (8) délimité par deux parois latérales opposées (6a, 6b) de l'emballage (1), le dispositif (12) comprenant :
- une roue de coupe (20) ayant des dents (21) pointues agencées de manière circonférentielle,
- le,
- lesquelles dents (21) définissent ensemble un bord de coupe (22) de roue de coupe se prolongeant de manière continue et de manière circonférentielle,
- laquelle roue de coupe (20) est agencée de manière rotative autour d'un premier axe de rotation (26), et
- une roue de butée (30) qui est agencée de manière rotative autour d'un second axe de rotation (36), qui est parallèle audit premier axe de rotation (26),
- laquelle roue de coupe (20) a une face (24) de roue de coupe périphérique se prolongeant de manière radiale, qui définit partiellement ledit bord de coupe (22) de roue de coupe, et
- laquelle roue de butée (30) a une face (34) de roue de butée se prolongeant de manière radiale, faisant face à ladite première face (24) de roue de coupe, la face (24) de roue de coupe de la roue de coupe (20) et la face (34) de roue de butée de la roue de butée (30) étant agencées avec un contact de chevauchement chargé pour la formation d'un écartement de coupe (45).
7. Utilisation d'un dispositif (12) destiné au retrait de la fermeture d'extrémité (9) d'un emballage (1) de type pliable selon la revendication 6, dans laquelle au moins une de la roue de butée (30) et de la roue de coupe (20) est biaisée de manière axiale contre l'autre de la roue de butée (30) et de la roue de coupe (20).
8. Utilisation d'un dispositif (12) destiné au retrait de la fermeture d'extrémité (9) d'un emballage (1) de type pliable selon l'une quelconque des revendications 6 à 7, dans laquelle ladite roue de butée (30) comprend un bord de coupe (32) de roue de butée se prolongeant de manière continue et de manière circonférentielle, et dans laquelle face (34) de roue de butée définit partiellement ledit bord de coupe (32) de roue de butée.
9. Utilisation d'un dispositif (12) destiné au retrait de la fermeture d'extrémité (9) d'un emballage (1) de type pliable selon l'une quelconque des revendications 6 à 8, le dispositif (12) comprenant en outre un élément d'entraînement (40) agencé pour la rotation d'au moins une de la roue de butée (30) et de la roue de coupe (20).
10. Utilisation d'un dispositif (12) destiné au retrait de la fermeture d'extrémité (9) d'un emballage (1) de type pliable selon la revendication 9, dans laquelle l'élément d'entraînement (40) est agencé pour la rotation de la roue de butée (30) et de la roue de coupe (20) dans des sens opposés.

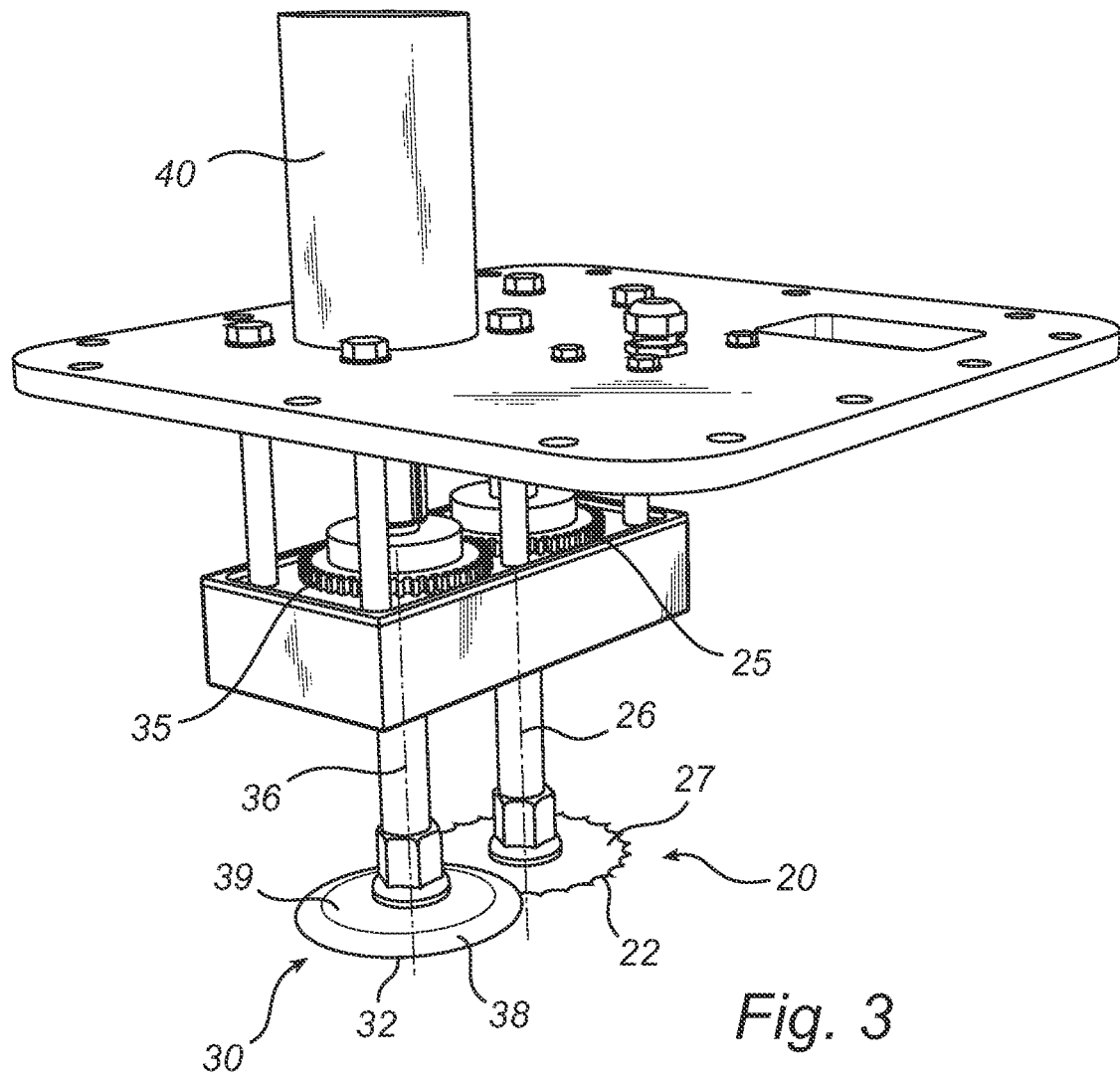
11. Utilisation d'un dispositif (12) destiné au retrait de la fermeture d'extrémité (9) d'un emballage (1) de type pliable selon l'une quelconque des revendications 6 à 10, dans laquelle ladite face (24) de roue de coupe et ladite face (34) de roue de butée sont complémentaires pour permettre ledit contact de superposition. 5
12. Utilisation d'un dispositif (12) destiné au retrait de la fermeture d'extrémité (9) d'un emballage (1) de type pliable selon l'une quelconque des revendications 6 à 11, dans laquelle ledit bord de coupe (22) de roue de coupe a un angle compris dans la plage allant de 10 à 60°. 10
13. Utilisation d'un dispositif (12) destiné au retrait de la fermeture d'extrémité (9) d'un emballage (1) de type pliable selon l'une quelconque des revendications 6 à 12, dans laquelle ledit bord de coupe (32) de roue de butée a un angle compris dans la plage allant de 20 à 90°. 15
20
14. Utilisation d'un dispositif (12) destiné au retrait de la fermeture d'extrémité (9) d'un emballage (1) de type pliable selon l'une quelconque des revendications 6 à 13, dans laquelle la roue de coupe (20) a une section transversale ayant la forme d'un cône tronqué. 25
15. Utilisation d'un dispositif (12) destiné au retrait de la fermeture d'extrémité (9) d'un emballage (1) de type pliable selon la revendication 14, dans laquelle la roue de coupe (20) a une première face principale (27) de route de coupe et une seconde face principale (28) de roue de coupe opposée à la première face principale (27) de route de coupe, ainsi qu'une face latérale (29) de roue de coupe externe de manière radiale, qui relie la première face principale (27) de route de coupe et la seconde face principale (28) de roue de coupe, et dans laquelle ladite face latérale (29) de roue de coupe est rainurée. 30
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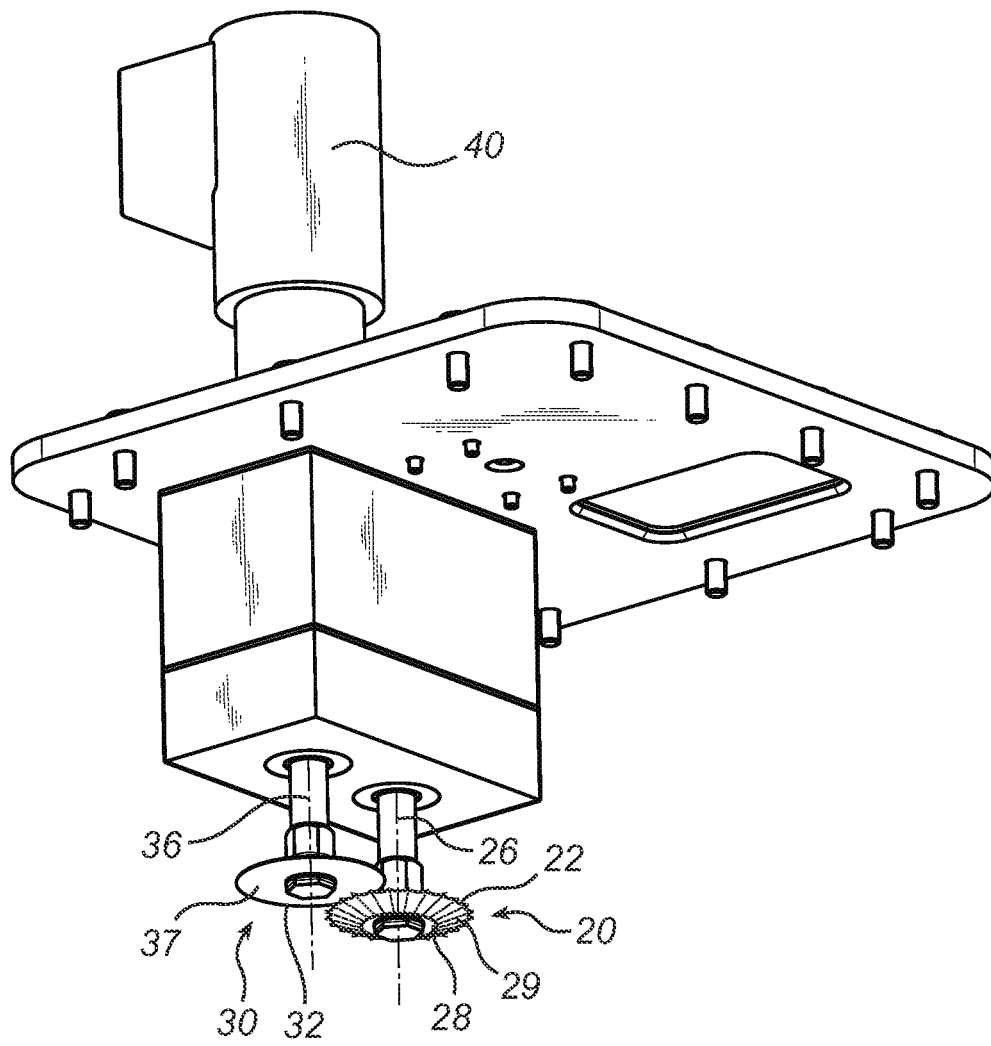


Fig. 4

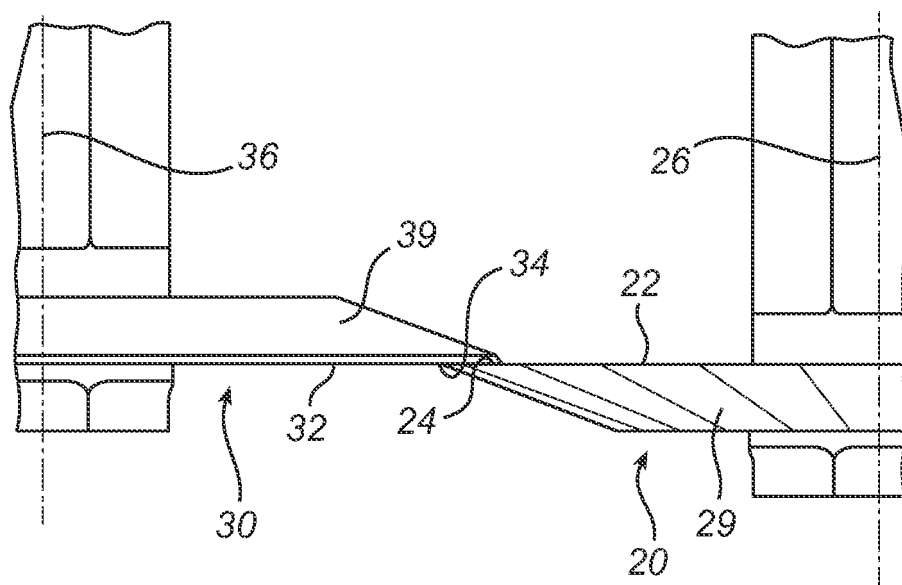


Fig. 5

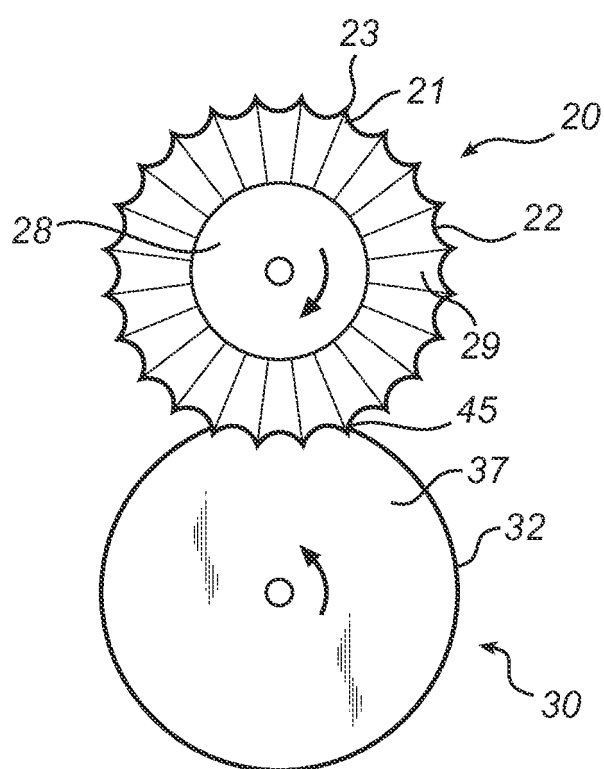


Fig. 6

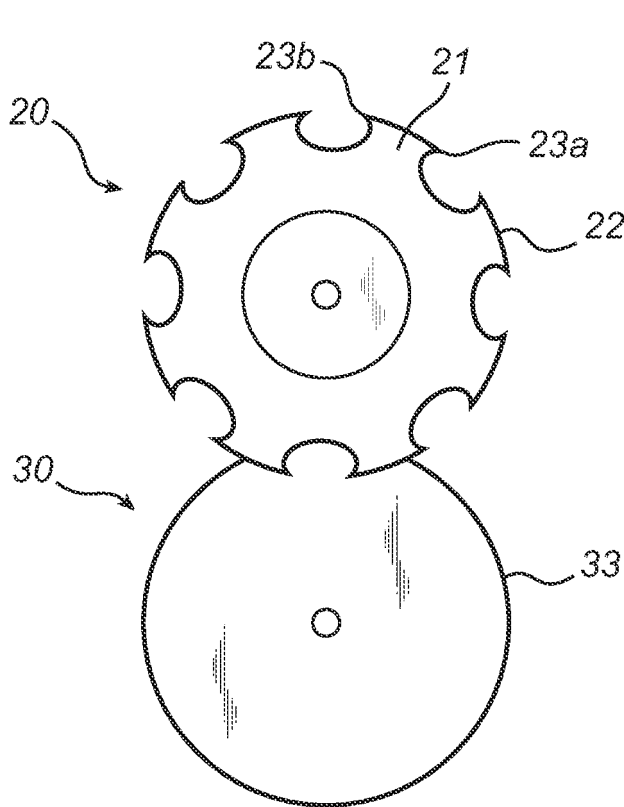
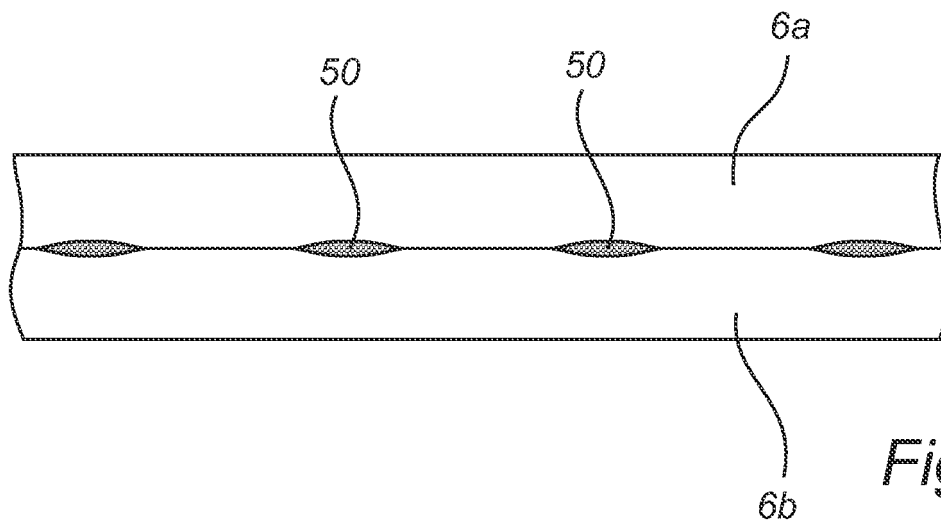


Fig. 8a

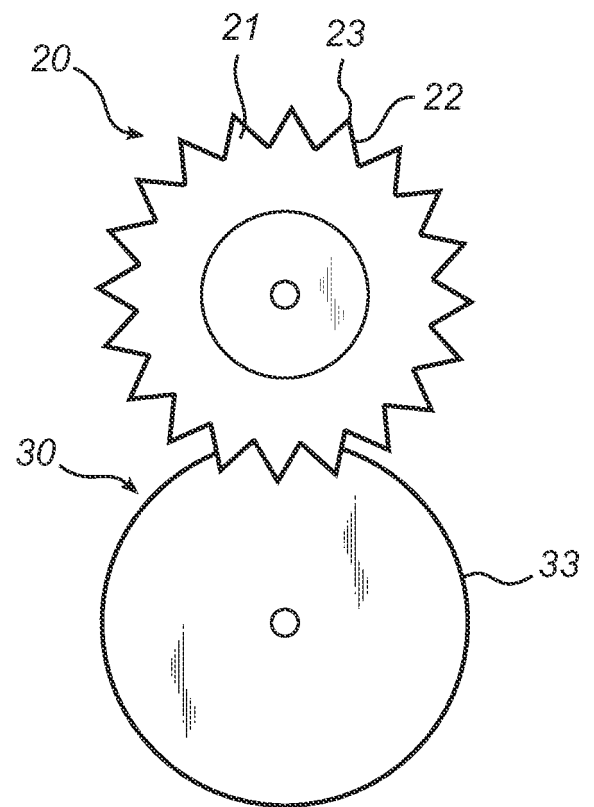


Fig. 8b

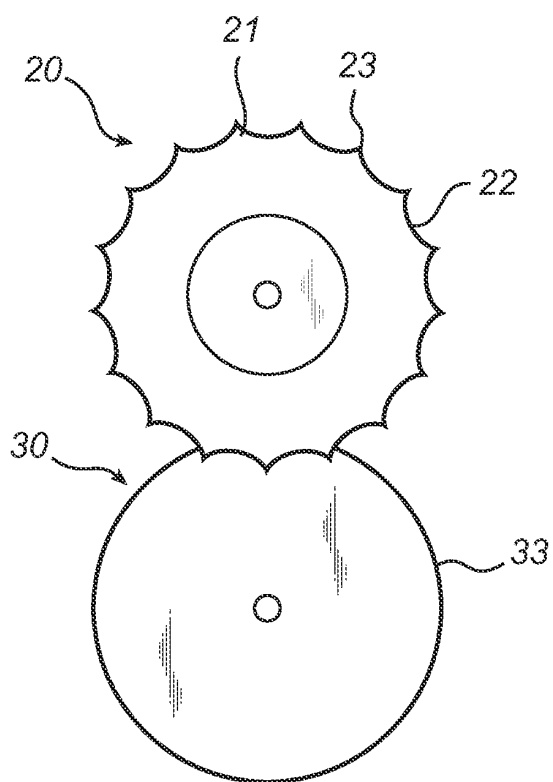


Fig. 8c

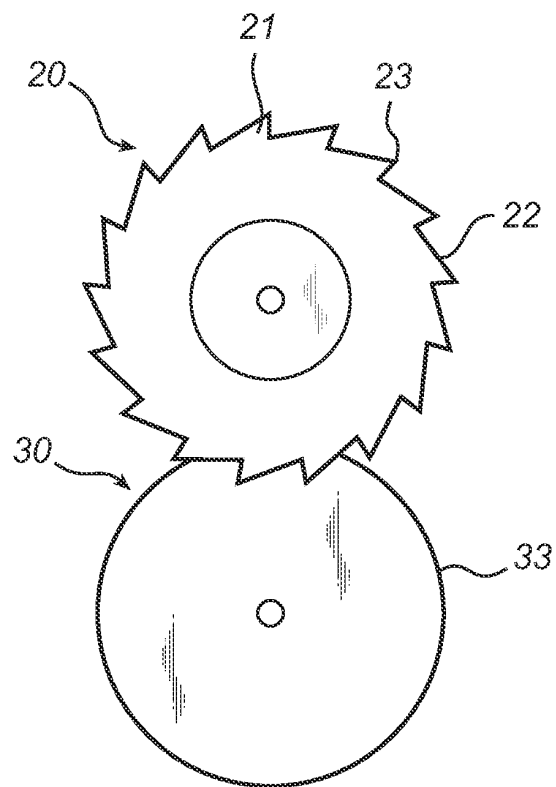


Fig. 8d

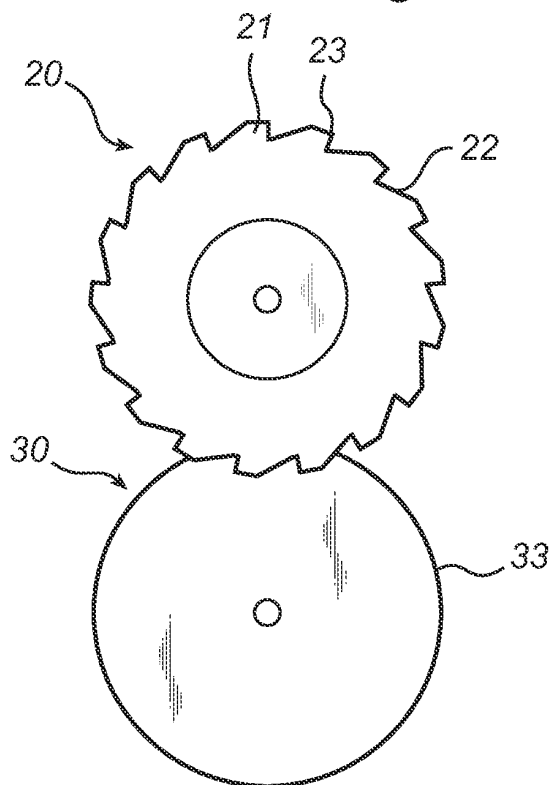


Fig. 8e

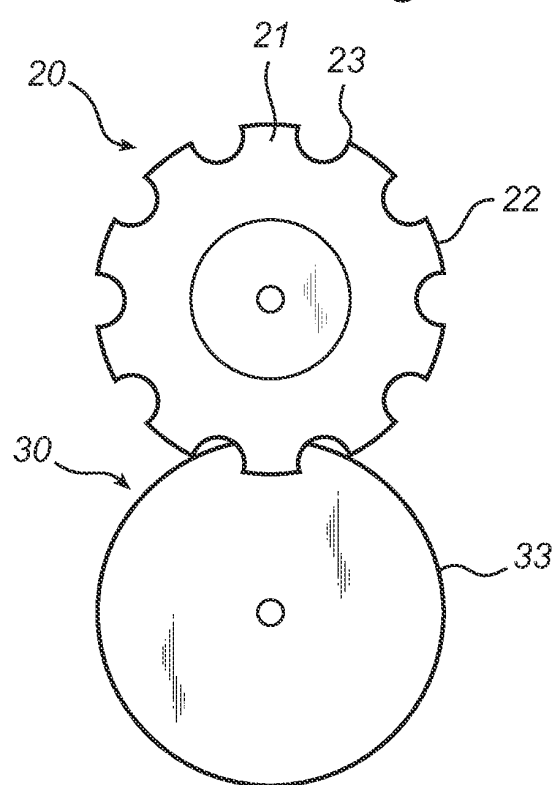


Fig. 8f

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- EP 1997596 A [0009]
- EP 1283094 A [0012]
- EP 033729 A [0013]
- EP 0017878 A [0013]