(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 2 853 603 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
01.04.2015 Bulletin 2015/14

(21) Application number: **14184770.7**

(22) Date of filing: **15.09.2014**

(51) Int Cl.:
C14B 1/02 *(2006.01)* ***C14B 15/00*** *(2006.01)*
C14B 17/02 *(2006.01)*

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME

(30) Priority: **16.09.2013 DK 201300139 U**
24.04.2014 DK 201470238

(71) Applicant: **Hedensted Gruppen A/S**
8722 Hedensted (DK)

(72) Inventors:
- **Madsen, Jens Jørgen**
  5220 Odense SØ (DK)
- **Lange, Kent**
  8763 Rask Mølle (DK)

(74) Representative: **COPA Copenhagen Patents**
Vesterbrogade 10, 2nd floor
1620 Copenhagen V (DK)

(54) **Apparatus for processing the flesh side of pelts**

(57) An apparatus for processing the flesh side of a mink pelt comprising:
- a mandrel (2) for mounting a pelt (8), the fur side of the pelt facing inwards towards the surface of the mandrel and the flesh side of the pelt facing outwards;
- at least one first scraping roller pair (3), the scraping rollers (3a, 3b) of the first scraping roller pair (3) being arranged on opposing sides of the mandrel and each roller being operated to be rotatable about its rotation axis, and during operation of the apparatus to be engageable with the flesh side of the pelt, each scraping roller having a roller surface (11) with a plurality of teeth (12), being arranged mutually spaced along the circumference of the roller surface
- a drive for providing a linear movement of the mandrel (2) in relation to the scraping rollers in a direction of forward movement (M);
- the teeth on a first scraping roller (3a) of the first scraping roller pair (3) extending essentially helically along the roller surface and the teeth (12) on the second scraping roller (3b) of the first scraping roller pair (3) following an essentially V-shaped path between the end faces (10) of the scraping roller.

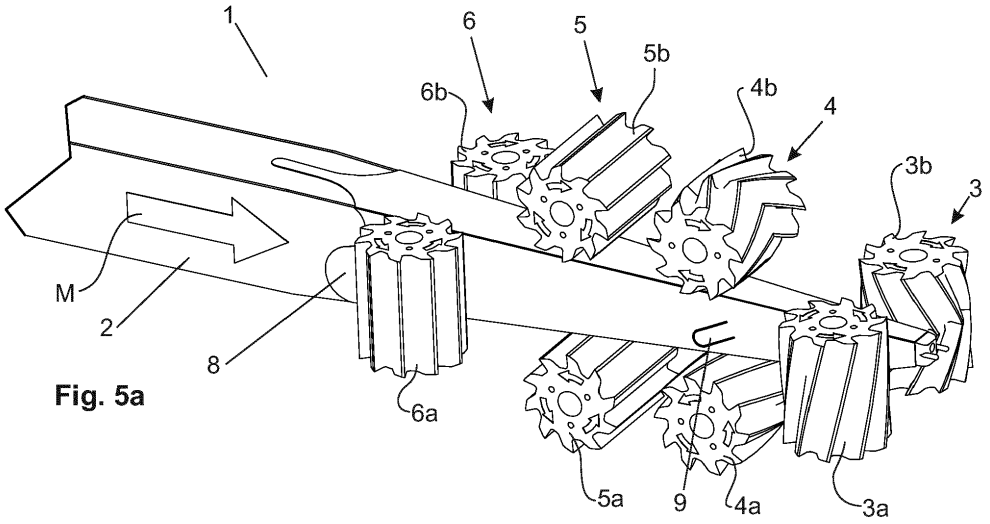

Fig. 5a

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Description

[0001] The present invention relates to an apparatus for processing the flesh side of a pelt, such as a mink pelt.

[0002] It is known to remove residues of fat and flesh from pelts by bringing the flesh side of pelts into contact with a rotating roller with teeth scraping clean the flesh side of the pelt.

[0003] Danish patent no. 177520 B1 discloses an apparatus comprising two front leg scraping rollers, each having a plurality of scraping edges and being arranged to engage a skin side of a pelt on opposing sides of the mandrel for supporting the pelt. The scraping edges extend substantially helically along the longitudinal direction of the front leg scraping rollers, and the two front leg scraping rollers are arranged to impose force components transversal to the mandrel acting in the same directions on the skin side of a pelt during their engagement with the skin side of a pelt.

[0004] In addition, apparatuses for the processing of pelts are known from e.g. Danish utility model DK 2013 00005 Y4, DK 2013 00137 U3, DK 2013 00136 U4 and Danish patent DK 156669 B3 as well as EP 2 093 299 A1.

[0005] When processing the flesh side of pelts, the aim is usually to exert a uniform and/or otherwise controlled scraping pressure on the entire width of the pelt, partly to ensure a sufficiently efficient scraping of the pelt and partly to ensure that the scraping is carried out as gently to the pelt as possible.

[0006] On this basis, it is an object of the present invention to provide an apparatus for the processing of the flesh side of a pelt, while ensuring an efficient scraping of the pelt, in a manner gentle to the pelt.

[0007] In order to obtain this object, the present invention provides an apparatus for the processing of the flesh side of pelts, such as minks, said apparatus comprising:

- a mandrel with a preferably tapering shape and with an essentially rectangular cross-section for mounting a pelt, the fur side of the pelt facing inwards towards the surface of the mandrel and the flesh side of the pelt facing outwards;

- at least a first scraping roller pair, the scraping rollers of the first scraping roller pair being arranged on opposing sides of the mandrel, and each scraping roller of the first scraping roller pair being by means of a motor rotatable about its rotation axis, said scraping rollers being arranged in such a manner in relation to the mandrel that during operation of the apparatus, the scraping rollers are engageable with the flesh side of the pelt, each scraping roller defining two end faces and a roller surface extending axially between the two mutually spaced end faces, and the roller surface comprising a plurality of teeth extending axially between the two end faces, and being arranged mutually spaced along the circumference of the roller surface, each tooth comprising an edge with two tooth flanks;

- a drive for providing a linear movement of the mandrel in relation to the scraping rollers in a direction of forward movement;

characterised by

the teeth of a first scraping roller of the first scraping roller pair being arranged so that the starting and end points of each tooth at the respective end faces of the scraping roller are displaced from each other, i.e. are positioned at different angle positions on the circumference of the scraping roller in such a manner that the teeth extend essentially helically along the roller surface, and the first scraping roller thereby exerting force components on a pelt on the mandrel transversal to the longitudinal direction of the mandrel, and by the teeth on the second scraping roller of the first scraping roller pair essentially following a V-shape between the end faces of the scraping roller.

[0008] The teeth of the first scraping roller of the first scraping roller pair are arranged so the starting and end points of each tooth at the respective end faces of the scraping roller are displaced from each other. This means that the teeth on the first scraping roller extend essentially helically along the roller surface like the scraping edges of the front leg rollers of the apparatus described in DK 177520 B1. In this way, the first scraping roller exerts a force component on the pelt transversal to the longitudinal direction of the mandrel. The part of the pelt engaged with the first scraping roller is thus pulled in this transverse direction.

[0009] However, the teeth of the second scraping roller of the first scraping roller pair essentially follow a V-shape between the end faces of the scraping roller as shown and described in for example DK 156669 B3. This V-shape ensures that the forces exerted on the pelt transversal to the longitudinal direction of the mandrel pull the pelt towards the middle of the second scraper roller.

[0010] This means that one part of the pelt is pulled in a transverse direction, away from the second scraping roller, by the first scraping roller, whereas the other part of the pelt arranged on an opposing side of the mandrel is pulled towards the middle of the second scraping roller. In this way, a controlled pull of the pelt is obtained by means of the first scraping roller.

[0011] It has further turned out that this approach is more gentle to the pelt than by pulling the pelt by means of both the first and the second scraping rollers as less stress is introduced to the pelt.

[0012] Preferably, the mandrel has a tapered shape with a square or rectangular cross-section.

[0013] The linear movement of the mandrel in relation to the scraping rollers may advantageously be provided by moving the mandrel along the longitudinal direction thereof. Alternatively, the scraping rollers may be moved, or both the mandrel and the scraping rollers may be moved.

[0014] Each of the teeth of the first and/or the second scraping roller of the first scraping roller pair may follow a waved course, the waved course of each tooth being continually curved. In this way, one of the scraping rollers or both scraping rollers have teeth with waved edges. The waved edges allow for the scraping to be carried out efficiently along the entire width of the pelt/mandrel.

[0015] If the teeth on the first scraping roller follow a waved course, the teeth on the first scraping roller follow a generally helically-shaped path along the roller surface, whereas wave troughs and wave crests are defined around the generally helically-shaped path.

[0016] Correspondingly, if the teeth on the second scraping roller follow a waved course, the teeth on the second scraping roller follow a generally V-shaped path along the roller surface, whereas wave troughs and wave crests are defined around the generally V-shaped path.

[0017] The waved shape of the teeth may be mutually phase-displaced or in mutual phase. The phase displacement may be advantageous for scraping efficiency, whereas it may ease the production of the roller's teeth by for example cutting that the teeth are in phase.

[0018] The scraping rollers of the first scraping roller pair may be fine-scraping rollers, i.e. scraping rollers designed to fine scrape the pelt following a rough scraping.

[0019] Alternatively, the scraping rollers of the first scraping roller pair may be rough-scraping rollers, i.e. scraping rollers designed to carry out a rough scraping of the pelt.

[0020] The apparatus may further comprise at least one additional scraping roller pair spaced from the first scraping roller pair as seen in the longitudinal direction of the mandrel, the scraping rollers of the second scraping roller pair being arranged on opposing sides of the mandrel, each scraping roller of the second scraping roller pair being by means of a motor rotatable about its rotation axis, said scraping rollers being arranged in such a manner in relation to the mandrel that during operation of the apparatus, the scraping rollers are engageable with the flesh side of the pelt, each scraping roller defining two end faces and a roller surface extending axially between the two mutually spaced end faces, and the roller surface comprising a plurality of teeth extending axially between the two end faces, and being arranged mutually spaced along the circumference of the roller surface, each tooth comprising an edge with two tooth flanks.

[0021] According to this embodiment, the apparatus has at least two scraping roller pairs spaced apart along the longitudinal direction of the mandrel. Like in the above description, the scraping rollers of the second scraping roller pair may also be either fine-scraping rollers or rough-scraping rollers.

[0022] The scraping rollers of the second scraping roller pair may be arranged on opposing sides of the mandrel, said opposing sides being essentially perpendicular to the opposing sides of the mandrel on which the scraping rollers of the first scraping roller pair are arranged.

[0023] According to this embodiment, the scraping rollers of the first scraping roller pair are arranged essentially perpendicular to the scraping rollers of the second scraping roller pair, thereby ensuring that residues of fat and flesh are efficiently removed from the entire pelt.

[0024] The teeth on at least one of the scraping rollers of the second scraping roller pair may follow a waved course, the waved course of each tooth being continually curved. The teeth may, along the roller surface, follow a general or mean path being essentially straight, essentially helically-shaped, or essentially V-shaped, the wave troughs and wave crests being defined around the general or mean path. As an alternative, the teeth may on at least one of the scraping rollers of the second scraping roller pair follow a straight, a helically-shaped or a V-shaped path along the roller surface without the teeth following a waved course.

[0025] According to an embodiment, the teeth on a first scraping roller of the second scraping roller pair are arranged so that the starting and end points of each tooth at the respective end faces of the scraping roller are displaced from each other, i.e. are positioned at different angle positions on the circumference of the scraping roller in such a manner that the teeth extend essentially helically along the roller surface, and the first scraping roller thereby exerts force components on a pelt on the mandrel transversal to the longitudinal direction of the mandrel, and the teeth on the second scraping roller of the second scraping roller pair are arranged so that they essentially follow a V-shape between the end faces of the scraping roller.

[0026] As mentioned above, part of the pelt will thus be pulled in a transverse direction, away from the second scraping roller, by the first scraping roller, while another part of the pelt, arranged on opposing sides of the mandrel, is pulled towards the middle of the second scraping roller. In this way, a controlled pull of the pelt is obtained by means of the first scraping roller. It has furthermore turned out that this is more gentle to the pelt than by pulling the pelt by means of both the first and the second scraping rollers, as less stress is introduced to the pelt. Thus, a more gentle scraping of the pelt is obtained across the entire flesh side thereof.

[0027] The apparatus may furthermore comprise additional scraping roller pairs, such as a third, a fourth, a fifth, etc. scraping roller pairs. The scraping rollers of such scraping roller pairs may be arranged on opposing sides of the mandrel, said opposing sides for instance being essentially perpendicular to or essentially parallel to the opposing sides on which the scraping rollers of the first scraping roller pair are arranged.

[0028] According to an embodiment of the invention, the apparatus further comprises a third scraping roller pair spaced from the first and second scraping roller pairs as seen in the longitudinal direction of the mandrel, the scraping rollers of the third scraping roller pair being arranged on opposing sides of the mandrel, each scraping roller of the third scraping roller pair being by means of a motor rotatable about its rotation axis, said scraping

rollers being arranged in such a manner in relation to the mandrel that during operation of the apparatus, the scraping rollers are engageable with the flesh side of the pelt, each scraping roller defining two end faces and a roller surface extending axially between the two mutually spaced end faces and the roller surface comprising a plurality of teeth extending axially between the two end faces, and being arranged mutually spaced along the circumference of the roller surface, each tooth comprising an edge with two tooth flanks.

[0029] According to this embodiment, the apparatus has at least three scraping roller pairs spaced apart as seen in the longitudinal direction of the mandrel. Like in the above description, the scraping rollers of the third scraping roller pair may also be either fine-scraping rollers or rough-scraping rollers.

[0030] The scraping rollers of the third scraping roller pair may be arranged on opposing sides of the mandrel, said opposing sides being essentially perpendicular to the opposing sides of the mandrel on which the scraping rollers of the first scraping roller pair or the second scraping roller pair are arranged. In this way, the third scraping roller pair will be arranged in such a manner that the pelt on one of the four sides of the mandrel is scrapped by two consecutive scraping rollers, thereby ensuring that residues of fat and flesh are efficiently removed from the pelt.

[0031] The teeth on at least one of the scraping rollers of the second scraping roller pair may follow a waved course, the waved course of each tooth being continually curved.

[0032] The teeth may, along the roller surface, follow a mean path being essentially straight, essentially helically shaped, or essentially V-shaped, the wave crests and wave troughs being defined around the mean path. As an alternative, the teeth on at least one of the scraping rollers of the second scraping roller pair may follow a straight, a helically-shaped or a V-shaped path along the roller surface, without the teeth following a waved course.

[0033] According to an embodiment of the invention, the third scraping roller pair is arranged on the same opposing sides of the mandrel as the second scraping roller pair.

[0034] According to yet an embodiment of the invention, the third scraping roller pair comprises on the one side of the mandrel a scraping roller with teeth following an essentially straight or an essentially V-shaped path, and on the opposing side of the mandrel a scraping roller with teeth following an essentially straight or an essentially helically-shaped path.

[0035] In this way, the third scraping roller pair may thus have a scraping roller with teeth following an essentially helically-shaped path, said scraping roller being arranged on the same side of the mandrel as the scraping roller with essentially helically-shaped teeth in the second scraping roller pair, the third scraping roller pair's scraping roller with helically-shaped teeth preferably being twisted in the direction opposite to the scraping roller with the helically-shaped teeth in the second scraping roller pair in such a manner that said two scraping rollers exert force components on a pelt on the mandrel transversal to the mandrel in opposite directions.

[0036] The third scraping roller pair's scraping roller with teeth following an essentially helically-shaped path may, however, also be arranged on the same side of the mandrel as the scraping roller with essentially helically-shaped teeth in the first scraping roller pair.

[0037] Moreover, the third scraping roller pair may thus have a scraping roller with teeth essentially following a V-shaped path, said scraping roller being arranged on the same side of the mandrel as the second scraping roller pair's scraping roller with teeth following an essentially V-shaped path.

[0038] The third scraping roller pair's scraping roller with teeth essentially following a V-shaped path may, however, also be arranged on the same side of the mandrel as the first scraping roller pair's scraping roller with teeth following an essentially V-shaped path.

[0039] The above scraping roller combinations have in practice obtained or are expected to obtain good scraping results, which also applies to the use of a single or two scraping rollers with straight teeth, i.e. teeth running parallel to the longitudinal axis of the scraping roller in the third scraping roller pair.

[0040] According to yet another embodiment of the invention, the apparatus comprises a fourth scraping roller pair spaced from the first, second and third scraping roller pairs as seen in the longitudinal direction of the mandrel, the scraping rollers of the fourth scraping roller pair being arranged on opposing sides of the mandrel, each scraping roller of the fourth scraping roller pair being by means of a motor rotatable about its rotation axis, said scraping rollers being arranged in such a manner in relation to the mandrel that during operation of the apparatus, the scraping rollers are engageable with the flesh side of the pelt, each scraping roller defining two end faces and a roller surface extending axially between the two mutually spaced end faces, the roller surface comprising a plurality of teeth extending axially between the two end faces, and being arranged mutually spaced along the circumference of the roller surface, each tooth comprising an edge with two tooth flanks.

[0041] According to an embodiment, the fourth scraping roller pair is arranged on the same opposing sides of the mandrel as the first scraping roller pair. In general, the fourth scraping roller pair is, however, arranged in such a manner that two consecutive scraping rollers are arranged on all four sides of the mandrel. Consequently, the pelt is scraped on the four sides of the mandrel by both a rough-scraping roller and a fine-scraping roller.

[0042] Like in the above description, the scraping rollers of the fourth scraping roller pair may be either fine-scraping rollers or rough-scraping rollers.

[0043] Moreover, the teeth on at least one of the fourth scraping roller pair' rollers may follow a waved course, the waved course of each tooth being continually curved.

[0044] The teeth may, along the roller surface, follow a mean path being essentially straight, essentially helically-shaped or essentially V-shaped, the wave troughs and wave crests being defined around the mean path. Alternatively, the teeth on at least one of the fourth scraping roller pair's scraping rollers may follow an essentially straight, an essentially helically-shaped or an essentially V-shaped path along the roller surface, without the teeth following a waved course. According to yet another embodiment, the fourth scraping roller pair has on the one side of the mandrel a scraping roller with teeth following an essentially straight or an essentially V-shaped path, and on the opposite side of the mandrel a scraping roller with teeth following an essentially straight or an essentially helically-shaped path.

[0045] In this connection, the fourth scraping roller pair may have a scraping roller with teeth following an essentially helically-shaped path, said scraping roller being arranged on the same side of the mandrel as the scraping roller with the essentially helically-shaped teeth in the first scraping roller pair, the fourth scraping roller pair's scraping roller with helically-shaped teeth preferably being twisted in the direction opposite to the scraping roller with helically-shaped teeth in the first scraping roller pair so that said scraping rollers exert force components on a pelt on the mandrel transversal to the mandrel in opposite directions.

[0046] In connection with the above embodiment, the fourth scraping roller pair may further have a scraping roller with teeth essentially following a V-shaped path, said scraping roller being arranged on the same side of the mandrel as the first scraping roller pair's scraping roller with teeth following an essentially V-shaped path.

[0047] The above scraping roller combinations have in practice obtained or are expected to obtain good scraping results, which also applies to the use of one single or two scraping rollers with straight teeth, i.e. teeth running parallel to the longitudinal axis of the scraping roller, on the third scraping roller pair.

[0048] The apparatus may further comprise one or more nozzles for spraying a fluid onto one or more of the scraping rollers and/or the pelt in the area where the teeth of the scraping rollers engage the flesh side of the pelt. In this way, a fluid film may be formed on the tooth flanks to help prevent fat and flesh from sticking to the tooth flanks.

[0049] The invention will be described in more detail below with reference to the drawings, in which

Figs. 1a and 1b show an apparatus according to a first embodiment of the invention,

Figs. 2a and 2b show an apparatus according to a second embodiment of the invention,

Figs. 3a and 3b show an apparatus according to a third embodiment of the invention,

Figs. 4a and 4b show an apparatus according to a fourth embodiment of the invention,

Figs. 5a and 5b show an apparatus according to a fifth embodiment of the invention,

Figs. 6a and 6b show an apparatus according to a sixth embodiment of the invention,

Figs. 7a and 7b show an apparatus according to a seventh embodiment,

Figs. 8-11 show different types of scraping rollers for use in an apparatus according to the invention.

[0050] Fig. 1a shows an apparatus according to a first embodiment of the invention in a perspective view. The apparatus 1 comprises a tapered mandrel 2 that defines a longitudinal direction and has a free, thin end 7 and an opposing end, and four scraping roller pairs 3, 4, 5, 6, each with two scraping rollers arranged on opposing sides of the mandrel 2. The scraping rollers of the scraping roller pairs 3 and 6 are arranged on the mandrel's opposing lateral sides, whereas the rollers of the scraping roller pairs 4 and 5 are arranged on the mandrel's opposing upper and lower surface.

[0051] A pelt 8 from a furred animal, such as a mink, is arranged on the mandrel 2 with its head and front legs 9 arranged closest to the thin, free tapering end 7 of the mandrel 2. The pelt 8 is arranged with the pelt side facing inwards towards the mandrel 2 and the flesh side facing outwards so that the scraping rollers are engageable with the flesh side of the pelt 8. The pelt's front leg area 9 is shown.

[0052] In the embodiment shown, the mandrel 2 is moved in its longitudinal direction in the direction shown by the arrow M during processing, whereas the scraping roller pairs are not moved in the longitudinal direction of the mandrel. During processing, they all rotate in the direction shown by the arrows, i.e. they all rotate in such a manner that the teeth engaged with the pelt are moved in the direction from the free, thin end of the mandrel towards the opposing thicker end.

[0053] The scraping rollers 3a,3b in the first scraping roller pair 3 are fine-scraping rollers, which means that they are designed to fine scrape the pelt 8 following a rough scraping. The first scraping roller pair 3 is arranged as the last scraping roller pair in the scraping sequence, i.e. a given part of a pelt processed by means of the apparatus 1 will be scrapped by the first scraping roller pair 3 after it has been scraped by the other scraping roller pairs 4, 5, 6. The first scraping roller 3a of the first scraping roller pair 3 has teeth following a helically-shaped path along the roller surface, and the second scraping roller 3b of the first scraping roller pair 3 has teeth following a V-shaped path along the roller surface. As in the above description, this results in that the second scraping roller 3b of the first scraping roller pair 3 pulls

the pelt 8 towards the middle of the scraping roller, whereas the first scraping roller 3a of the first scraping roller pair 3 exerts a controlled pull of the pelt 8, thereby stretching and efficiently scraping said pelt, but in a manner gentle to the pelt 8.

[0054] The scraping rollers 4a,4b of the second scraping roller pair 4 are also fine-scraping rollers.

[0055] The scraping rollers of the third 5 and the fourth 6 scraping roller pairs are rough-scraping rollers, i.e. they are designed to carry out a rough scraping of the pelt 8. As an alternative to the expression *fine-scraping rollers,* the expression *primary scraping rollers* may be used and as an alternative to using the term *rough-scraping rollers,* the term *secondary scraping rollers* may be used or vice versa.

[0056] The scraping rollers 4a,4b of the second scraping roller pair 4 both have teeth following a helically-shaped path along the roller surface. In this way, the scraping rollers 4a,4b of the second scraping roller pair 4 exert a force on the pelt 8 in essentially the same rotation direction about the mandrel 2, whereby the scraping rollers 4a,4b of the second scraping roller pair 4 attempt to rotate the pelt 8.

[0057] The scraping rollers 5a,5b of the third scraping roller pair 5 also both have teeth following a helically-shaped path along the roller surface. However, one of the scraping rollers is provided with teeth following a waved course.

[0058] The scraping rollers 6a,6b of the fourth scraping roller pair 6 also both have teeth following a helically-shaped path along the roller surface.

[0059] Fig. 1b shows the mandrel 2 with the pelt 8 in a perspective view. The arrows in Fig. 1b illustrate the forces exerted on the pelt 8 during operation by the scraping rollers, which are shown in Fig. 1a. However, it should be understood that all the scraping rollers exert a force component on the pelt in the direction from the mandrel's free, thin end towards its opposing thicker end. It is clear that the scraping rollers 3a,3b of the first scraping roller pair 3 exert forces on the pelt 8 in such a manner that the forces from the second scraping roller 3b pull the pelt 8 in towards the middle of the scraping roller, and the forces from the first scraping roller 3a exert a controlled pull of the pelt 8 on the upper surface of the mandrel 2.

[0060] Fig. 2a shows an apparatus 1 according to a second embodiment of the invention in a perspective view. The apparatus 1 shown in Fig. 2a resembles the apparatus 1 shown in Fig. 1a and will therefore not be described in detail here. In the apparatus 1 shown in Fig. 2a, the scraping rollers 4a,4b of the second scraping roller pair 4 are provided with teeth following a straight path along the roller surface, but with a waved form. This results in the forces exerted on the pelt 8 by the scraping rollers 4a,4b of the second scraping roller pair 4 being essentially in the longitudinal direction of the mandrel 2, i.e. the pelt 8 is not pulled transversal to the longitudinal direction of the mandrel 2.

[0061] Fig. 2b illustrates the forces exerted on the pelt 8 during operation by the scraping rollers shown in Fig. 2a. It is clear that the scraping rollers 3a,3b of the first scraping roller pair 3 exert forces on the pelt 8 in such a manner that the forces from the second scraping roller 3b pull the pelt 8 in towards the middle of the scraping roller, and that the forces from the first scraping roller 3a exert a controlled pull of the pelt 8 on the upper surface of the mandrel 2. It is also clear that the scraping rollers 4a,4b of the second scraping roller pair 4 exert forces on the pelt 8 in the longitudinal direction of the mandrel 2.

[0062] Fig. 3a shows an apparatus 1 according to a third embodiment of the invention in a perspective view. The apparatus 1 shown in Fig. 3a resembles the apparatuses 1 shown in Figs. 1a and 2a and will therefore not be described in detail here. In the apparatus 1 shown in Fig. 3a, the first scraping roller 3a of the first scraping roller pair 3 is provided with teeth following a waved course along the roller surface. The wave-formed teeth are moreover arranged along a helically-shaped path along the roller surface.

[0063] Fig. 3b illustrates the forces exerted on the pelt 8 by the scraping rollers shown in Fig. 3a. Again, it is clear that the scraping rollers 3a,3b of the first scraping roller pair 3 exert forces on the pelt 8 in such a manner that the forces from the second scraping roller 3b pull the pelt 8 in towards the middle of the scraping roller and that the forces from the first scraping roller 3a exert a controlled pull on the pelt 8 on the upper surface of the mandrel 2.

[0064] Fig. 4a shows an apparatus 1 according to a fourth embodiment of the invention in a perspective view. The scraping rollers 3a,3b of the first scraping roller pair 3 are fine-scraping rollers, i.e. they are designed to carry out a fine scraping of the pelt 8 following a rough scraping. However, the first scraping roller pair 3 is in this case arranged as the second to last scraping roller pair in the scraping sequence, and not as the last. Instead, the scraping rollers 4a,4b of the second scraping roller pair 4 are arranged as the last scraping roller pair in the scraping sequence.

[0065] Except for this, the scraping rollers 3a,3b of the first scraping roller pair 3 is similar to the scraping rollers of the first scraping roller pair 3 in the embodiment shown in Figs. 1a and 2a. Hence, this embodiment also illustrates that the first, second, third and fourth scraping roller pair do not contain any limitation with respect to the order in which the scraping rollers are arranged, and on which sides of the mandrel they are arranged.

[0066] Fig. 4b illustrates the forces exerted on the pelt 8 by the scraping rollers shown in Fig. 4a. Again, it is clear that the scraping rollers 3a,3b of the first scraping roller pair 3 exert forces on the pelt 8 in such manner that the forces from the second scraping roller 3b pull the pelt 8 in towards the middle of the scraping roller, and the forces from the first scraping roller 3a exert a controlled pull on the pelt 8 on the lower surface of the mandrel 2.

[0067] Fig. 5a shows an embodiment where the first scraping roller 3a;4a in both the first and the second scraping roller pair 3;4 has teeth following a helically-

shaped path along the roller surface, and the second scraping roller 3b;4b of both the first and the second scraping roller pair 3;4 has teeth following a V-shaped path along the roller surface.

[0068] As described above, this results in the second scraping roller 3b of the first scraping roller pair 3 pulling the pelt 8 in towards the middle of the scraping roller whereas the first scraping roller 3a of the first scraping roller pair 3 exerts a controlled pull on the pelt 8, which is thereby stretched and scraped efficiently, but in a manner gentle to the pelt 8. Correspondingly, the second scraping roller 4b of the second scraping roller pair 4 pulls the pelt 8 in towards the middle of the scraping roller, whereas the first scraping roller 4a of the second scraping roller pair 4 exerts a controlled pull of the pelt 8, which is thereby stretched out and scraped efficiently, but in a manner gentle to the pelt.

[0069] The scraping rollers 5a,5b;6a,6b in both the third scraping roller pair 5 and the fourth scraping roller pair 6 are both equipped with teeth following a straight path along the roller surface. This results in the forces exerted on the pelt 8 by the scraping rollers 5a,5b of the third scraping roller pair 5 and the scraping rollers 6a,6b of the fourth scraping roller pair 6 being essentially in the longitudinal direction of the mandrel 2, i.e. the pelt 8 is not pulled transverse to the longitudinal direction of the mandrel 2.

[0070] Fig. 5b illustrates the forces exerted on the pelt 8 during operation by the scraping rollers shown in Fig. 5a. It is clear that the scraping rollers 3a,3b of the first scraping roller pair 3 and the scraping rollers 4a,4b of the second scraping roller pair 4 exert forces on the pelt 8 in such a manner that the forces from the second scraping roller 3b;4b pull the pelt 8 in towards the middle of the scraping roller, and that the forces from the first scraping roller 3a;4a exert a controlled pull of the pelt 8 transversal to the mandrel 2. It is also clear that the scraping rollers 5a,5b of the third scraping roller pair 5 and the scraping rollers 6a,6b of the fourth scraping roller pair 6 exert the forces on the pelt 8 in the longitudinal direction of the mandrel 2 without forces being essentially exerted on the pelt transversal to the mandrel.

[0071] Alternative to the embodiment shown in Fig. 5a, the second scraping roller, i.e. the upper scrapping roller 5b in Fig. 5a, of the third scraping roller pair 5 may have teeth following an essentially V-shaped path along the roller surface, thereby exerting forces on the pelt pulling it towards the middle of the scraping roller. This roller is, as shown, arranged on the same side of the mandrel as the second scraping roller pair's 4 second scraping roller, i.e. the upper scraping roller 4b in Fig. 5a, with teeth following an essentially V-shaped path along the roller surface. Moreover, also the second scraping roller, i.e. the rear scraping roller 6b in Fig. 5a, of the fourth scraping roller pair 6 may have teeth following an essentially V-shaped path along the roller surface and preferably be arranged on the same side of the mandrel as the first scraping roller pair's 3 second scraping roller, i.e. the rear scraping roller 3b in Fig. 5a, with teeth following a V-shaped path along the roller surface.

[0072] Fig. 6a shows a modification of the embodiment shown in Fig. 5a, the only change being that the first scraping roller, i.e. the front scraping roller 6a in Fig. 6a, of the fourth scraping roller pair has teeth following a helically-shaped path along the roller surface, thereby exerting a controlled, transverse pull on the pelt. It should furthermore be noted that said scraping roller 6a is arranged on the same side of the mandrel as the first scraping roller pair's 3 first scraping roller 3a with teeth following a helical path along the roller surface, and that the scraping roller's 6a teeth are preferably essentially helically-twisted in the direction opposite to the teeth of the scraping roller 3a.

[0073] Fig. 6b illustrates the forces exerted on the pelt 8 during operation by the scraping rollers shown in Fig. 6a. It is clear that the only difference from Fig. 5b is that the scraping roller 6a with teeth following an essentially helically-shaped path along the roller surface in the direction opposite to the scraping roller 3a acts in the direction of pulling the pelt transverse to the mandrel in a direction opposite to that of the scraping roller 3a.

[0074] As an alternative to the embodiment shown in Fig. 6a, the fourth roller pair's 6 second scraping roller, i.e. the rear scraping roller 6b in Fig. 6a, may have teeth following a V-shaped path on the roller surface and be arranged on the same side of the mandrel as the first scraping roller pair's 3 second scraping roller 3b with teeth following a V-shaped path on the roller surface. Moreover, as mentioned above, the third scraping roller pair's 5 upper roller 5b may have teeth following a V-shaped path along the roller surface and be arranged on same side of the mandrel as the second scraping roller pair's 4 upper scraping roller with teeth following a V-shaped path along the roller surface.

[0075] Finally, in yet a modification of both embodiments mentioned with reference to Figs. 5a,b and 6a,b, the third scraping roller pair's 5 first scraping roller, i.e. the lower scraping roller 5a in Figs. 5a and 6a, may have teeth following a helically-shaped path along the roller surface and be arranged on the same side of the mandrel as the second scraping roller pair's 4 first scraping roller, i.e. the lower scraping roller 4a in the mentioned figures, with teeth following a helically-shaped path along the roller surface and be helically-twisted in the direction opposite to the lower helical roller 4a.

[0076] In summary, as a modification to the embodiment shown in Fig. 5a:

- the third scraping roller pair's 5 first scraping roller, i.e. the lower scraping roller 5a in Fig. 5, may have helically-shaped teeth twisted opposite to the second scraping roller pair's 4 first scraping roller, i.e. the lower scraping roller 4a in Fig.5, and be arranged on the same side of the mandrel as the latter scraping roller.

- the third scraping roller pair's 5 second scraping roller, i.e. the upper scraping roller 5b in Fig. 5, may have V-shaped teeth and be arranged on the same side of the mandrel as the second scraping roller pair's 4 second scraping roller, i.e. the upper scraping roller 4b in Fig. 5.

- The fourth scraping roller pair's 6 first scraping roller, i.e. the front scraping roller 6a in Fig. 5, may have helically-shaped teeth twisted in the direction opposite to the first scraping roller pair's 3 first scraping roller, i.e. the front scraping roller 3a in Fig. 5, and be arranged on the same side of the mandrel as the latter scraping roller 3a.

- The fourth scraping roller pair's 6 second scrapping roller, i.e. the rear scraping roller 6b in Fig. 5, may have V-shaped teeth and be arranged on the same side of the mandrel as the first scraping roller pair's 3 second scraping roller, i.e. the rear scraping roller 3b in Fig. 5.

[0077] Fig. 7a shows an embodiment, which is currently preferred, where the one scraping roller 3b;4a of both the first and the second scraping roller pair 3;4 has teeth following a helically-shaped path along the roller surface, and the other scraping roller 3a;4b of both the first and the second scraping roller pair 3;4 has teeth following a V-shaped path along the roller surface.

[0078] As described above, this results in the first scraping roller 3a of the first scraping roller pair 3 pulling the pelt 8 in towards the middle of the scraping roller, whereas the second scraping roller 3b of the first scraping roller pair 3 exerts a controlled pull on the pelt 8, thereby stretching and scraping it efficiently, but in a manner gentle to the pelt 8. Correspondingly, the second scraping roller 4b of the second scraping roller pair 4 will pull the pelt 8 in towards the middle of the scraping roller, whereas the first scraping roller 4a of the second scraping roller pair 4 exerts a controlled pull of the pelt 8, thereby stretching and scraping it efficiently, but in a manner gentle to the pelt 8.

[0079] The first scraping roller 5a of the third scraping roller pair 5 has helically-shaped teeth that are twisted in a direction opposite to the teeth on the first scraping roller 4a of the second scraping roller pair 4. The third scraping roller pair's second scraping roller 5b has V-shaped teeth and is arranged on the same side of the mandrel as the second scraping roller pair's 4 second scraping roller 4b. The fourth scraping roller pair's 6 first scraping roller has V-shaped teeth and is arranged on the same side of the mandrel as the first scraping roller pair's 3 first scraping roller 3a. The fourth scraping roller pair's 6 second scraping roller 6b has helically-twisted teeth twisted in a direction opposite to the teeth on the first scraping roller pair's 3 second scraping roller 3b.

[0080] Fig. 7b illustrates the forces exerted on the pelt 8 during operation by the scraping rollers shown in Fig. 7a. It is clear that the scraping rollers 3a,3b of the first scraping roller pair 3 and the scraping rollers 4a,4b of the second scraping roller pair 4 exert forces on the pelt 8 in such a manner that the forces from the one scraping roller 3a;4b pull the pelt 8 in towards the middle of the scraping roller, and that the forces from the second scraping roller 3a;4a exert a controlled pull of the pelt 8 transversal to the mandrel 2. It is also clear that the scraping rollers 5a,5b of the third scraping roller pair 5 and the scraping rollers 6a,6b of the fourth scraping roller pair 6 exert forces on the pelt 8 in such a manner that the forces from the one scraping roller 5b;6a pull the pelt 8 in towards the middle of the scraping roller, and the forces from the other scraping roller 5a;6b exert a controlled pull of the pelt 8 transverse to the mandrel.

[0081] Figs. 8-11 show four different scraping rollers that may be used in an apparatus according to the invention. The scraping rollers have two end faces 10 and a roller surface 11. The roller surface 11 comprises a plurality of teeth 12 extending axially along the circumference of the roller surface 11 between the two end faces 10.

[0082] The teeth 12 on the scraping roller shown in Fig. 8 follow a V-shape along the roller surface 11 between the end faces 10.

[0083] The teeth 12 on the scraping roller shown in Fig. 9 follow a helically-shaped path along the roller surface 11 between the end faces 10.

[0084] The teeth 12 on the scraping roller shown in Fig. 10 follow a waved course along the roller surface 11 between the end faces 10. The end points of the teeth 12 on the two end faces 10 are not angularly displaced, which means that the teeth 12 follow an essentially straight mean path along the roller surface 11.

[0085] The teeth 12 on the scraping roller shown in Fig. 11 also follow a waved course along the roller surface 11 between the end faces 10. The end points of the teeth 12 on the two end faces 10 are, however, angularly displaced in relation to each other, which means that the teeth 12 follow an essentially helically-shaped mean path along the roller surface 11.

[0086] For the purpose of processing mink pelts, the scraping rollers may, for example, have a diameter of 100 mm - 200 mm, such as 110 mm - 160 mm, such as 125 mm - 140 mm.

[0087] The length of the scraping rollers may, for example, be 100 mm - 200 mm, such as 120 mm - 180 mm, such as 150 mm - 170 mm. In a specific embodiment, the scraping rollers have a diameter of 132 mm and a length of 160 mm.

[0088] It should be noted that the shown scraping rollers with teeth following a V-shaped path on the roller surface are shaped in such a manner that the tip of the V faces backwards when seen in the rotation direction of the scraping roller, and the scraping roller pulls the pelt in towards the middle.

[0089] It is, however, also possible to design a scraping roller with V-shaped teeth in such a way that the tip of

the V faces forwards when seen in the rotation direction of the scraping roller, whereby the scraping roller will be pulling the pelt outwards towards the sides.

LIST OF REFERENCE NUMERALS

[0090]

1	apparatus
2	mandrel
3	first scraping roller pair
4	second scraping roller pair
5	third scraping roller pair
6	fourth scraping roller pair
7	the free, thin end of the mandrel
8	pelt
9	the front leg area of the pelt
10	end faces
11	roller surface
12	teeth
M	the direction of forward movement of the mandrel

Claims

1. An apparatus for processing the flesh side of a pelt, such as a mink pelt, said apparatus comprising

- a mandrel (2) with a preferably tapering shape and with an essentially rectangular cross-section for mounting a pelt (8), the fur side of the pelt facing inwards towards the surface of the mandrel and the flesh side of the pelt facing outwards;
- at least a first scraping roller pair (3), the scraping rollers (3a, 3b) of the first scraping roller pair (3) being arranged on opposing sides of the mandrel, and each scraping roller of the first scraping roller pair being by means of a motor rotatable about its rotation axis, said scraping rollers being arranged in such a manner in relation to the mandrel (2) that during operation of the apparatus, the scraping rollers are engageable with the flesh side of the pelt, each scraping roller defining two end faces (10) and a roller surface (11) extending axially between the two mutually spaced end faces (10), and the roller surface (11) comprising a plurality of teeth (12) extending axially between the two end faces (10), and being arranged mutually spaced along the circumference of the roller surface, each tooth (12) comprising an edge with two tooth flanks;
- a drive for providing a linear movement of the mandrel (2) in relation to the scraping rollers in a direction of forward movement;

characterised by

the teeth of a first scraping roller (3a) of the first scraping roller pair (3) being arranged so that the starting and end points of each tooth (12) at the respective end faces (10) of the scraping roller are displaced from each other, i.e. are positioned at different angle positions on the circumference of the scraping roller in such a manner that the teeth extend essentially helically along the roller surface, and the first scraping roller thereby exerting force components on a pelt on the mandrel transversal to the longitudinal direction of the mandrel, and by the teeth (12) on the second scraping roller (3b) of the first scraping roller pair (3) essentially following a V-shape between the end faces (10) of the scraping roller.

2. An apparatus according to claim 1, said apparatus further comprising at least a second scraping roller pair (4) spaced from the first scraping roller pair (3) as seen in the longitudinal direction of the mandrel (2), the scraping rollers (4a,4b) of the second scraping roller pair (4) being arranged on opposing sides of the mandrel, each scraping roller of the second scraping roller pair being by means of a motor rotatable about its rotation axis, said scraping rollers being arranged in such a manner in relation to the mandrel (2) that during operation of the apparatus, the scraping rollers are engageable with the flesh side of the pelt, each scraping roller defining two end faces (10) and a roller surface (11) extending axially between the two mutually spaced end faces (10), and the roller surface (11) comprising a plurality of teeth (12) extending axially between the two end faces (10), and being arranged mutually spaced along the circumference of the roller surface (11), each tooth (12) comprising an edge with two tooth flanks.

3. An apparatus according to claim 2, where the opposing sides, on which the scraping rollers (4a,4b) of the second scraping roller pair (4) are arranged, are essentially perpendicular to the opposing sides of the mandrel on which the scraping rollers of the first scraping roller pair (3) are arranged.

4. An apparatus according to claim 2 or 3, where the teeth on a first scraping roller (4a) of the second scraping roller pair (4) are arranged so that the starting and end points of each tooth (12) at the respective end faces (10) of the scraping roller are displaced from each other, i.e. are positioned at different angle positions on the circumference of the scraping roller in such a manner that the teeth extend essentially helically along the roller surface, and the first scraping roller thereby exerting force components on a pelt on the mandrel transversal to the longitudinal direction of the mandrel, and by the teeth (12) on the second scraping roller (4b) of the second scraping roller pair (4) essentially following a V-shape between the end faces (10) of the scraping roller.

5. An apparatus according to any of the preceding claims, said apparatus further comprising at least a third scraping roller pair (5) spaced from the first and the second scraping roller pairs (3) as seen in the longitudinal direction of the mandrel (2), the scraping rollers (5a,5b) of the third scraping roller pair (5) being arranged on opposing sides of the mandrel, each scraping roller of the third scraping roller pair (4) being by means of a motor rotatable about its rotation axis, said scraping rollers being arranged in such a manner in relation to the mandrel (2) that during operation of the apparatus, the scraping rollers are engageable with the flesh side of the pelt, each scraping roller defining two end faces (10) and a roller surface (11) extending axially between the two mutually spaced end faces (10), and the roller surface (11) comprising a plurality of teeth (12) extending axially between the two end faces (10), and being arranged mutually spaced along the circumference of the roller surface (11), each tooth (12) comprising an edge with two tooth flanks.

6. An apparatus according to claim 5, where the scraping rollers (5a,5b) of the third scraping roller pair (5) are arranged on the same opposing sides of the mandrel as the scraping rollers of the second scraping roller pair (4).

7. An apparatus according to claim 5 or 6, where the third scraping roller pair (5) on the one side of the mandrel comprises a scraping roller (5b) with teeth following an essentially straight or an essentially V-shaped path on the roller surface, and where said third scraping roller pair comprises on the other side of the mandrel a scraping roller (5a) with teeth that follow an essentially straight or an essentially helical path on the roller surface.

8. Apparatus according to claim 7 where the third scraping roller pair (5) has a scraping roller (5a) with teeth that follow an essentially helically-shaped path, said scraping roller being arranged on the same side of the mandrel as the scraping roller (4a) with essentially helically-shaped teeth in the second scraping roller pair (4), and where the third scraping roller pair's (5) scraping roller (5a) with helically-shaped teeth is preferably twisted in the opposite direction of the scraping roller (4a) with helically-shaped teeth in the second helical roller pair (4) so that said two scraping rollers exert force components on a pelt on the mandrel transversal to the mandrel in opposite directions.

9. An apparatus according to one or more of the preceding claims, where the third scraping roller pair (5) has a scraping roller (5b) with teeth that essentially follow a V-shaped path, said scraping roller (5b) being arranged on the same side of the mandrel as the second scraping roller pair's (4) scraping roller (4b) with teeth that follow an essentially V-shaped path.

10. An apparatus according to any of the preceding claims, said apparatus further comprising at least a fourth scraping roller pair (6) spaced from the first, second and third scraping roller pairs as seen in the longitudinal direction of the mandrel (2), the scraping rollers (6a,6b) of the fourth scraping roller pair (6) being arranged on opposing sides of the mandrel, each scraping roller of the fourth scraping roller pair (6) being by means of a motor rotatable about its rotation axis, said scraping rollers being arranged in such a manner in relation to the mandrel (2) that during operation of the apparatus, the scraping rollers are engageable with the flesh side of the pelt, each scraping roller defining two end faces (10) and a roller surface (11) extending axially between the two mutually spaced end faces (10), and the roller surface (11) comprising a plurality of teeth (12) extending axially between the two end faces (10), and being arranged mutually spaced along the circumference of the roller surface (11), each tooth (12) comprising an edge with two tooth flanks.

11. An apparatus according to claim 10, the scraping rollers (5a,6b) of the fourth scraping roller pair (6) being arranged on the same opposing sides of the mandrel as the scraping rollers (3a, 3b) of the first scraping roller pair (3).

12. An apparatus according to claim 10 or 11, the fourth scraping roller pair (6) on the one side of the mandrel comprising a scraping roller (6b) with teeth that follow an essentially straight or an essentially V-shaped path, and said fourth scraping roller pair on the other side of the mandrel comprising a scraping roller (6a) with teeth that follow an essentially straight or an essentially helically path.

13. An apparatus according to claim 12, where the fourth helical roller pair (6) has a scraping roller (6a) with teeth that follow an essentially helically-shaped path, said scraping roller (6a) being arranged on the same side of the mandrel as the scraping roller with essentially helically-shaped teeth in the first helical roller pair (3), and where the fourth helical roller pair's (6) scraping roller (6a) with helically-shaped teeth is preferably twisted in the opposite direction of the scraping roller (3a) with helically-shaped teeth in the first helical roller pair (3) so that said two scraping rollers (6a;3a) exert force components on a pelt on the mandrel transversal to the mandrel in opposite directions.

14. An apparatus according to one or more of the preceding claims, the fourth scraping roller pair (6) having a scraping roller (6b) with teeth that essentially

follow a V-shaped path, said scraping roller (6b) being arranged on the same side of the mandrel as the first scraping roller pair's (3) scraping roller (3b) with teeth that follow an essentially V-shaped path.

15. An apparatus according to any of the preceding claims, said apparatus further comprising one or more nozzles for spraying a fluid onto one or more of the scraping rollers and/or the pelt in the area where the teeth (12) of the scraping rollers engage the flesh side of the pelt.

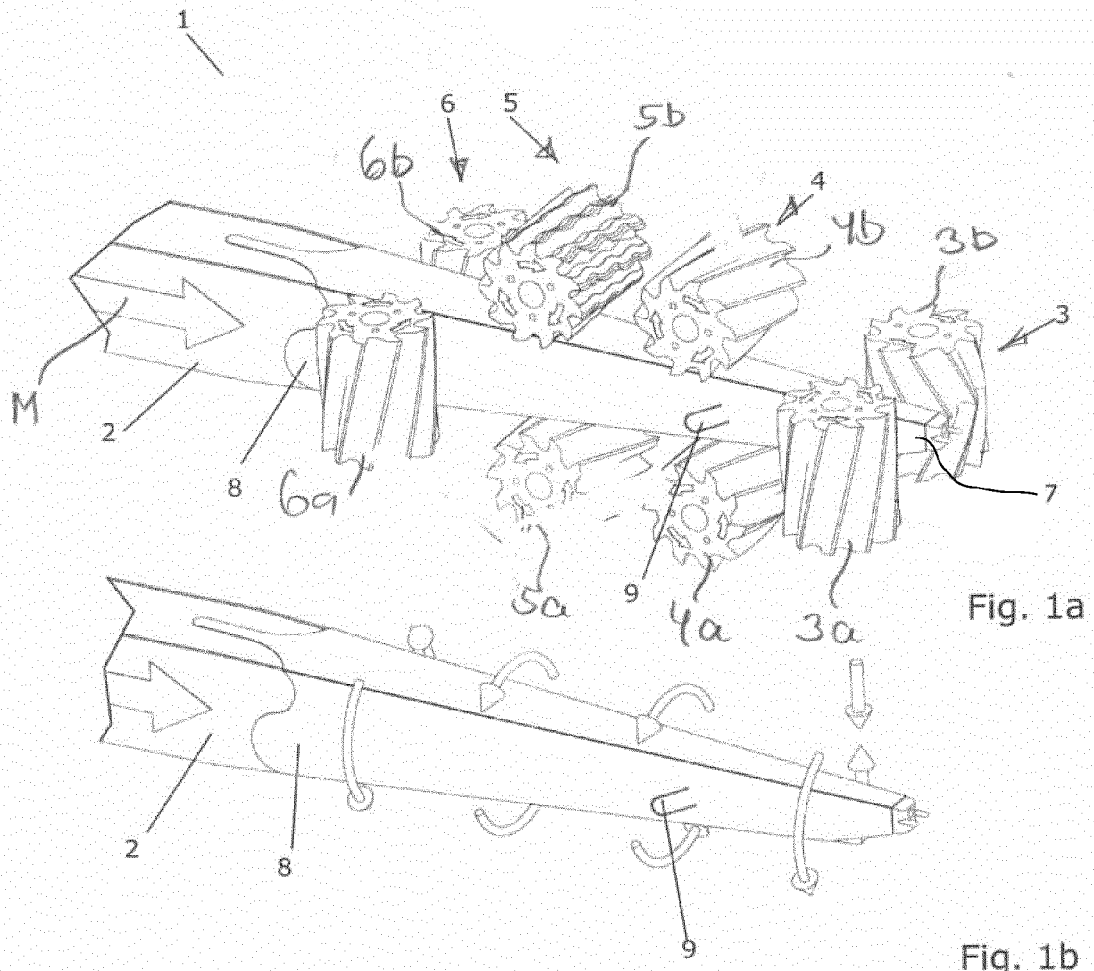

Fig. 1a

Fig. 1b

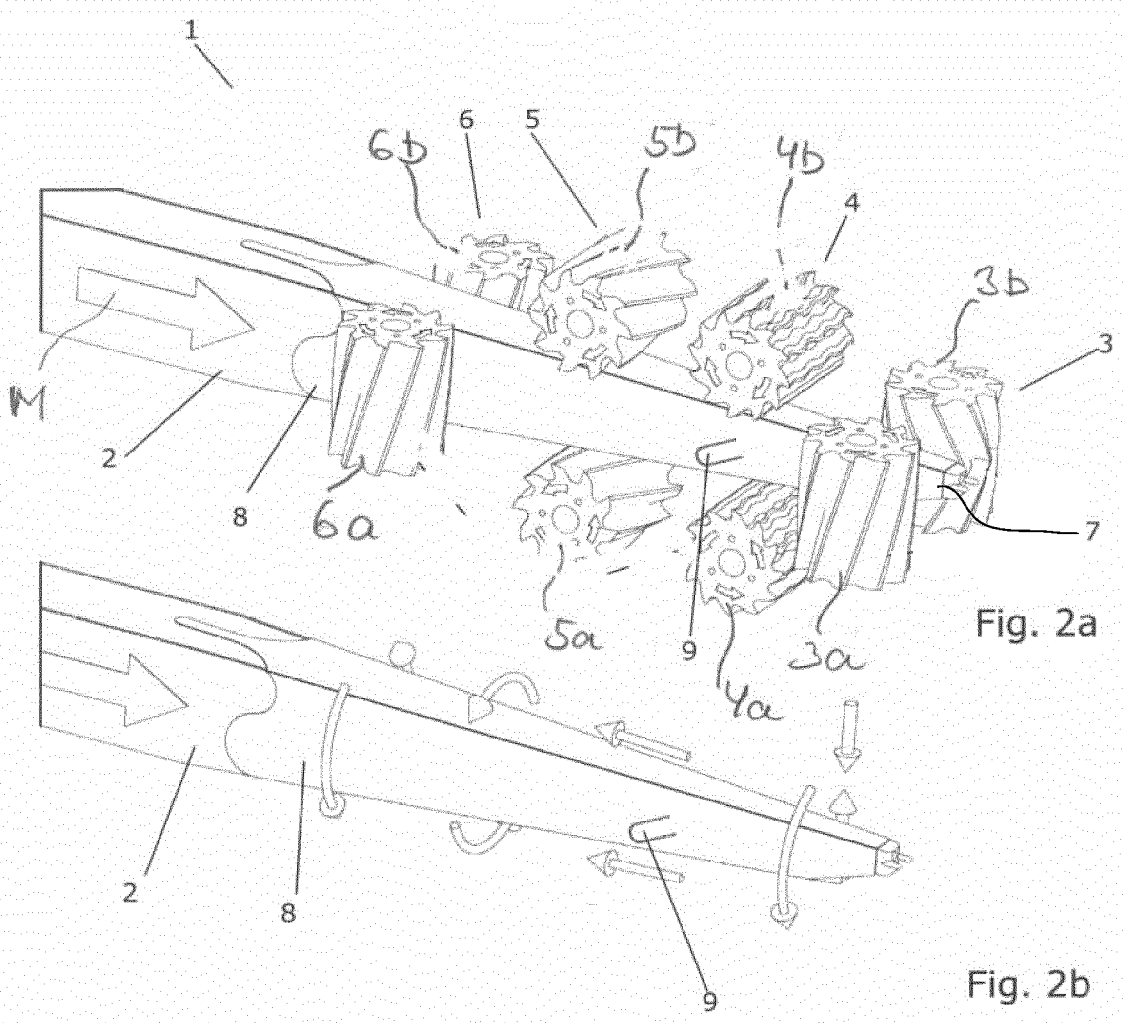

Fig. 2a

Fig. 2b

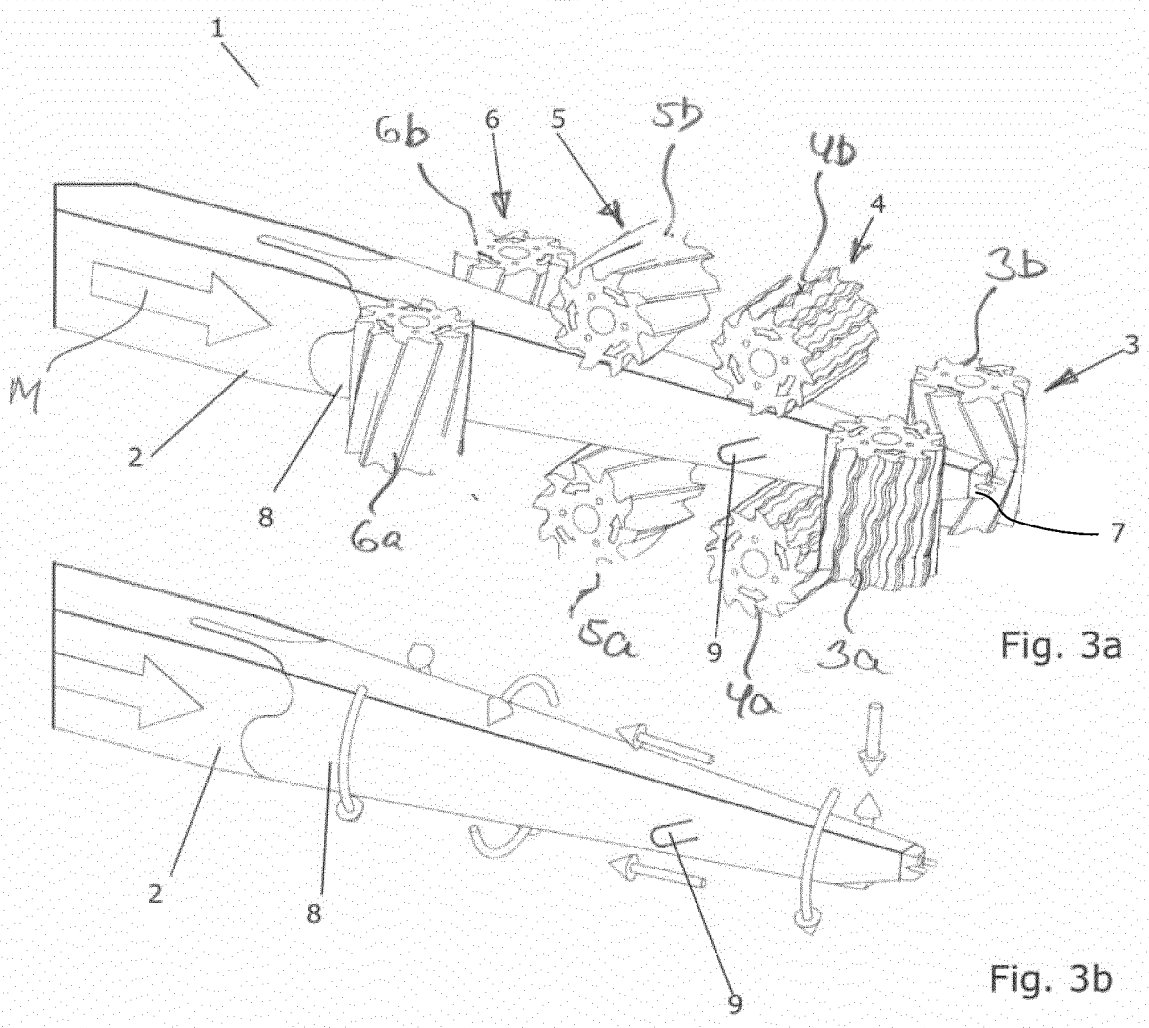

Fig. 3a

Fig. 3b

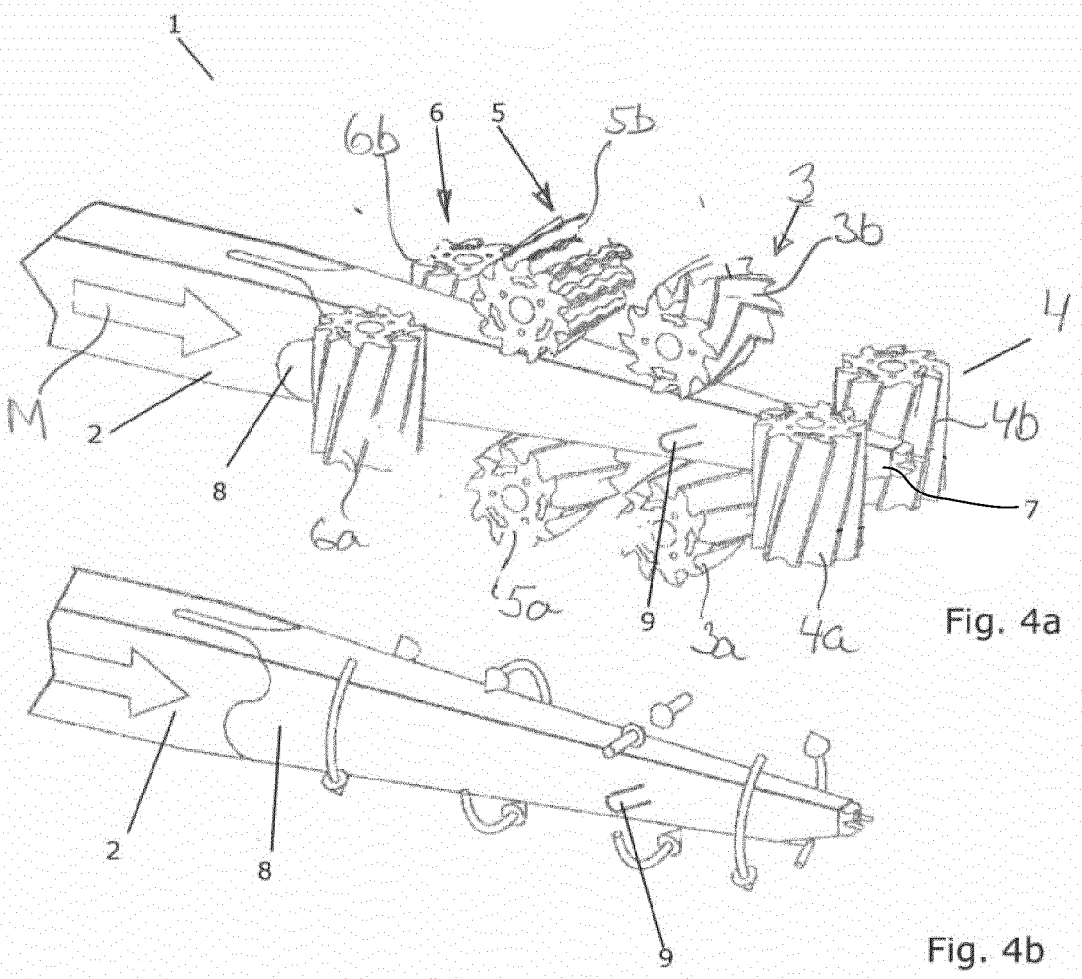

Fig. 4a

Fig. 4b

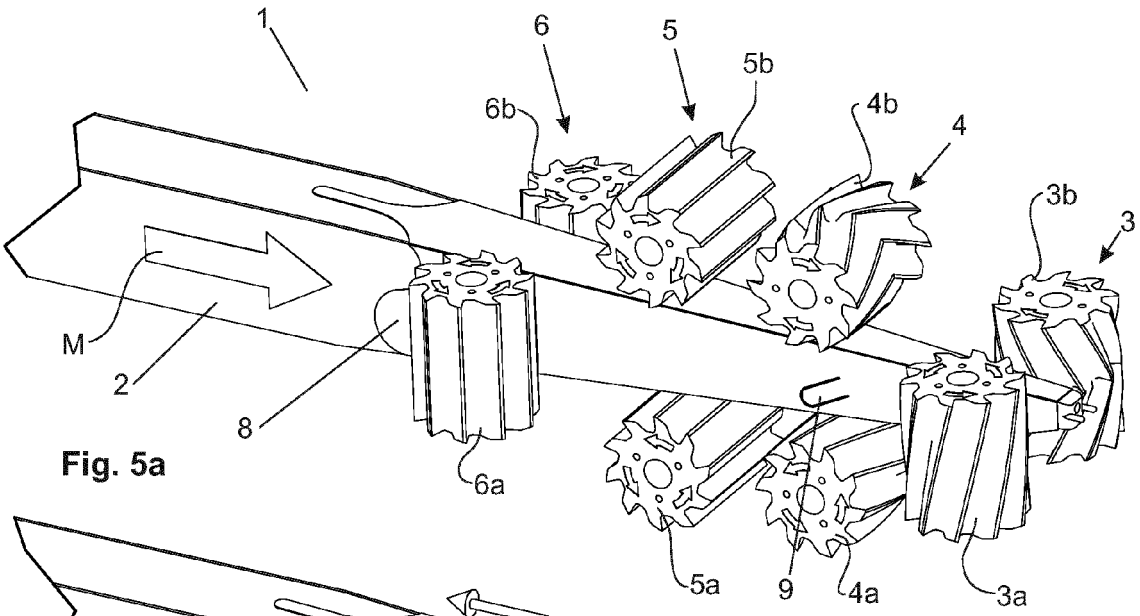

Fig. 5a

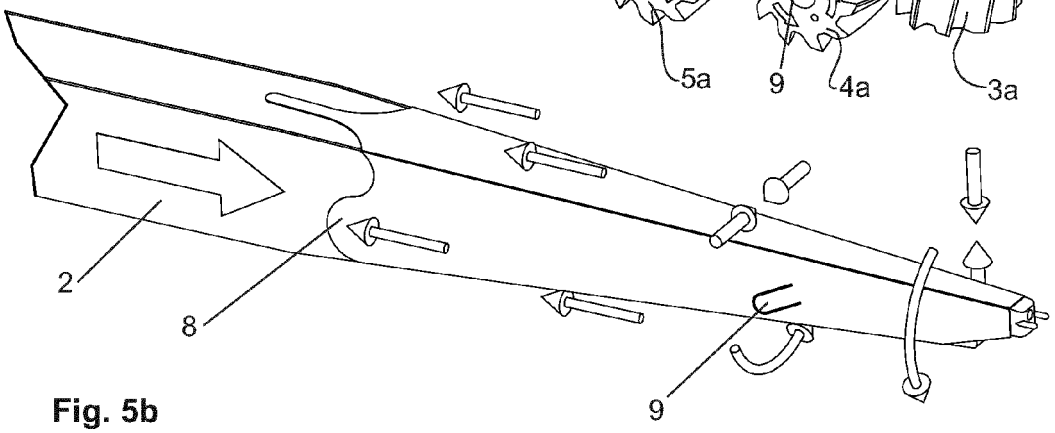

Fig. 5b

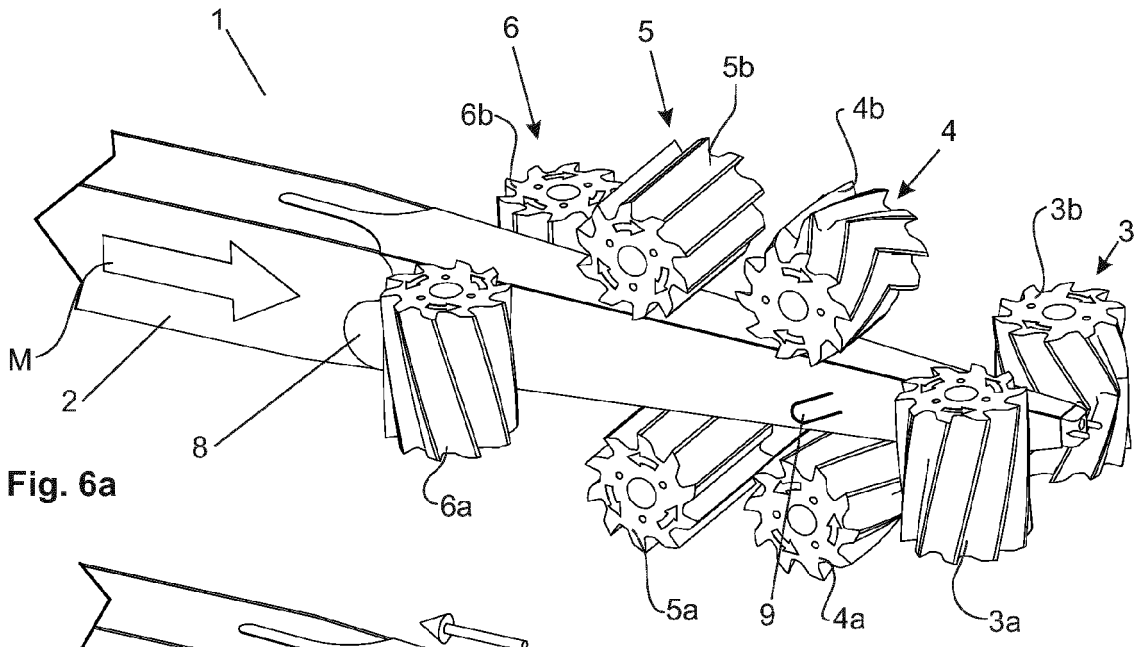

Fig. 6a

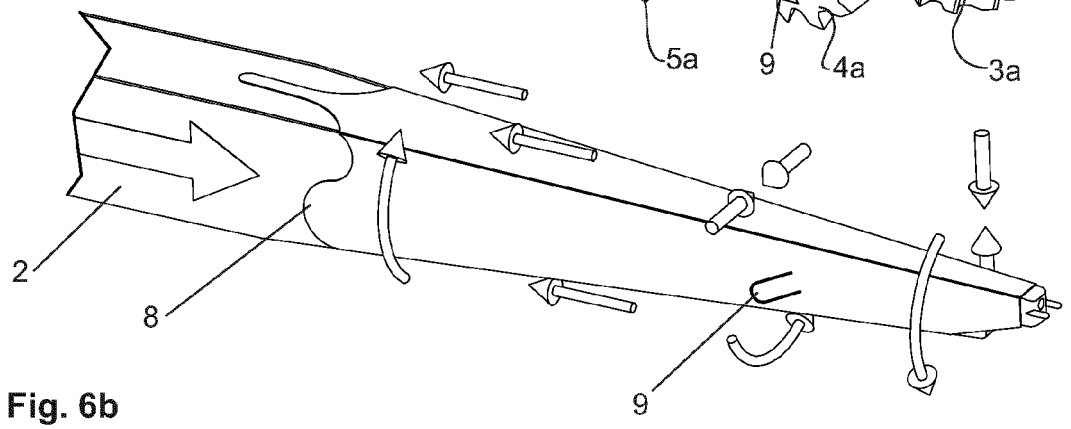

Fig. 6b

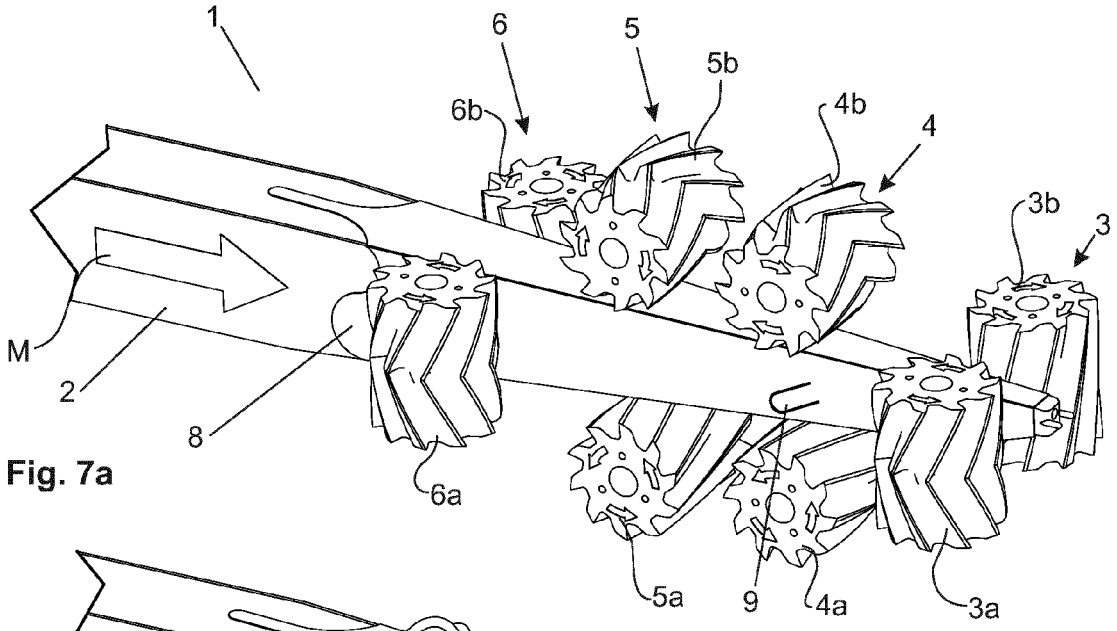

Fig. 7a

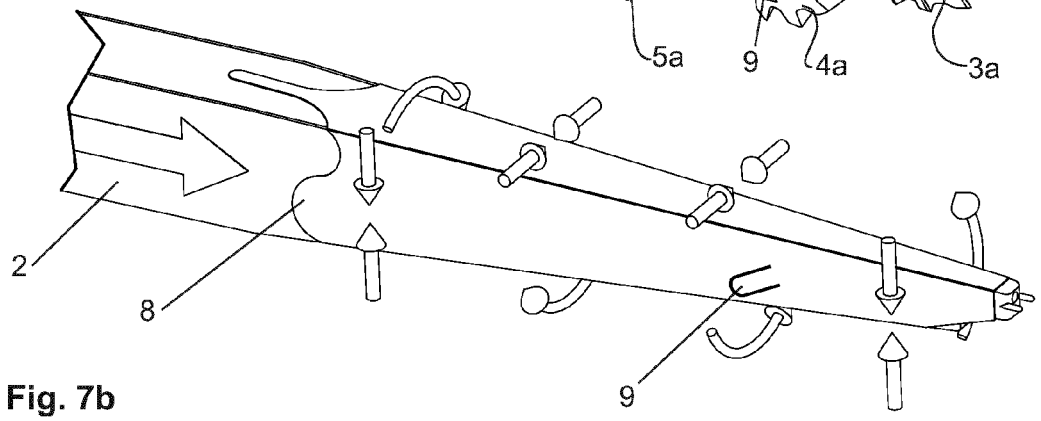

Fig. 7b

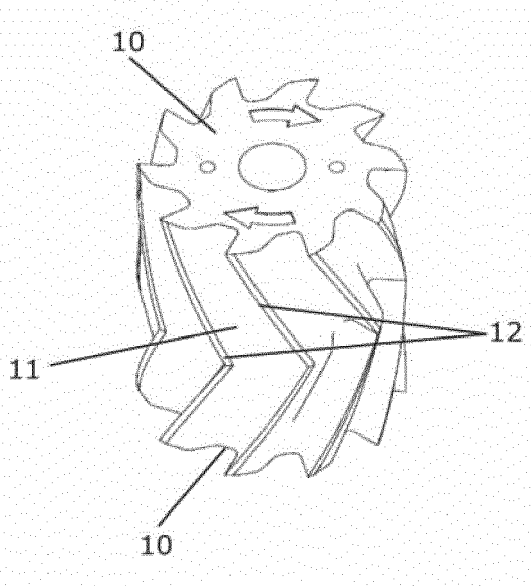

Fig. 8

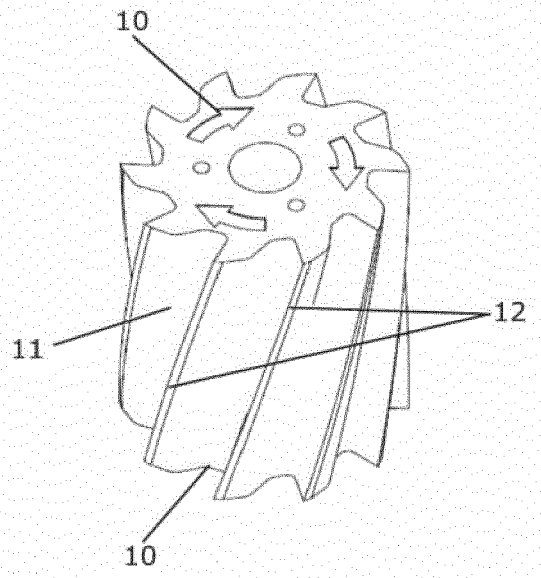

Fig. 9

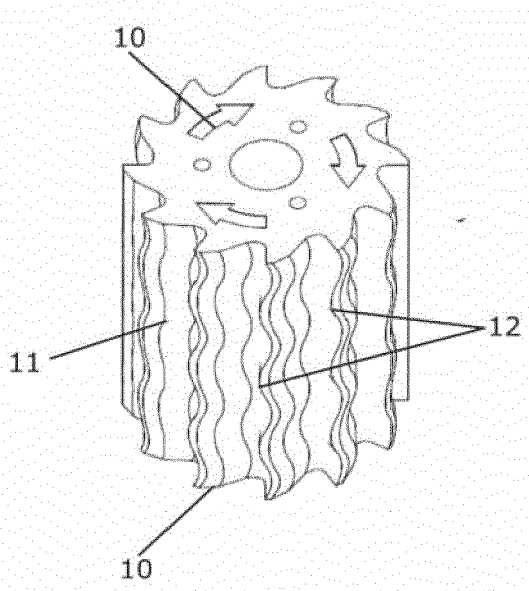

Fig. 10

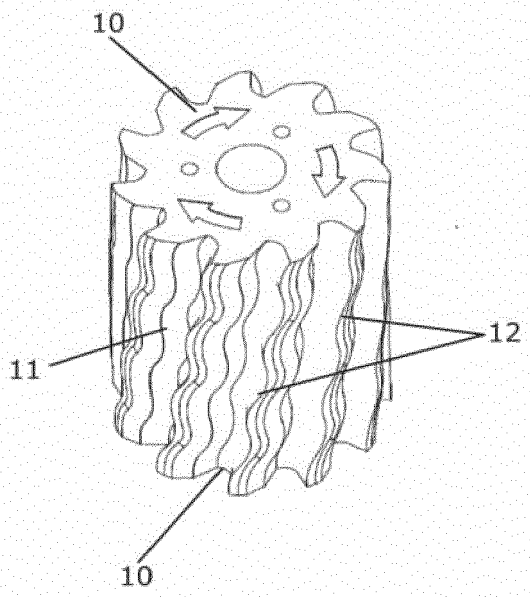

Fig. 11

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EUROPEAN SEARCH REPORT

Application Number
EP 14 18 4770

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C14B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	23 February 2015	Bichi, Marco

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