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(54) **ROTARY DEFLESHING CUTTER**

DREHMESSER ZUM ENTFLEISCHEN

DISPOSITIF DE DECOUPE A ECHARNER ROTATIF

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(56) References cited:
**WO-A1-92/02643 CH-A- 152 023
DE-C- 939 948 FI-B- 67 877
GB-A- 707 891 US-A- 4 745 782**

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Description

[0001] The present invention relates to a rotary defleshing cutter comprising a central cutter head of a substantially circular or polygonal cross section having its periphery provided with substantially axially aligned grooves adapted to accommodate individually replaceable elastic cutting inserts. Such a rotary defleshing cutter is described in document FI utility model No. 3272.

[0002] In defleshing of animal hide, the hide is tensioned inside out on substantially conical defleshing drum actuated into a slow-motion rotation. A rapidly rotating cutter is adapted to meet the animal hide in such a position that its axis of rotation is situated in a plane perpendicular to the longitudinal axis of the defleshing drum, preferably in a vertical position. The cutter is driven in a slow motion on the defleshing drum from the nose end to the tail end of the animal hide so as to perform the defleshing operation along a helical line. The rotation of the defleshing drum and the drive speed of the cutter are synchronized with each other so that the forward motion of the cutter during one revolution of the defleshing drum corresponds to the width of the area defleshed by the cutter at the same time, where by the entire hide will become defleshed as the cutter reaches the tail end of the hide. An example of an apparatus operating according to these principles is described in WO 92/02643.

[0003] In a conventional cutter head designed to rotate in one direction only, and provided with stationary cutting edges e.g. as the cutter head disclosed in document FI 67877 B, a problem arises in the defleshing of the hide behind the ears and front feet when these parts cover a portion of the hide. This defleshing frequently causes undesirable winding of the hide about the defleshing drum thus causing locally incomplete defleshing or in the worst case, damage to the hide itself. This is also the case in the above mentioned cutter head of document FI utility model No.3272, which is provided with cutting inserts mounted fully rigidly in the cutter head grooves and having a cutting edge that provides an effective defleshing effect only, in one direction of rotation.

[0004] The above problem can be overcome by virtue of a cutter construction offering a sufficiently effective defleshing effect also when driven in a reverse direction of rotation thus allowing the flesh still adhering to the hide under the front-feet and ear portions thereof during back running of the defleshing machine, whereby also the rotating direction of the defleshing cutter is reversed.

[0005] In document FI utility model No.3763 a defleshing cutter of the above-described type is disclosed having a pair of cutting inserts mounted in a reversed position. Thus this pair of cutting inserts performs a certain degree of defleshing when the cutter is driven reverse to its normal rotating direction. A shortcoming of such a cutter is that notwithstanding the selected rotating direction, anyhow those cutting inserts that are at any time oriented in the "wrong" direction will contribute negatively to the defleshing effect.

[0006] It is an object of the present invention to overcome all of the above-mentioned problems and to provide a defleshing cutter with perfect defleshing performance irrespective of the selected rotating direction. This goal is attained by virtue of a defleshing cutter characterized in that the cutting inserts and mounting grooves of the cutter are shaped so as to allow a limited inclination of each cutting insert about the longitudinal axis of said insert, while the distal end of cutting insert is provided with two cutting edges running longitudinally along both edges of the distal end of the cutting insert. In this fashion, an optimized shaping of the insert and its mounting groove render at all times a desired cutting angle and inclination angle of the inserts irrespective of their rotating direction.

[0007] According to a first embodiment of the invention, the longitudinal mounting grooves on the periphery of the cutter head have a substantially keyhole-shaped cross section; on the periphery of the cutter head have a substantially keyhole-shaped cross section, whose inner portion is circularly rounded while its radially distal portion opening at the cutter head periphery is shaped slightly flaring with a width larger than the corresponding thickness of the cutting insert in this portion. The insert mounted in the groove, respectively, comprises an inner stem part having a circular cross section adapted to fit into the circularly rounded inner portion of the groove, and a distal tip part extending radially outwardly from the insert stem and having a thickness smaller than the width of the flaring slot portion of the mounting groove and is provided at its freely projecting distal end with two cutting edges running longitudinally along the insert tip. The insert tip part may have a constant width or, alternatively, be slightly flaring, however, with a flaring angle narrower than the flaring angle of the distal portion of the mounting groove. The circularly rounded inner portion of the mounting groove and the periphery of the insert stem form with each other such gliding surfaces that allow the insert to pivot around its longitudinal axis, whereby the walls of the flaring slot portion of the mounting groove serve as back stop surfaces for the tip of the insert thus determining the limit angles of insert inclination in either direction.

[0008] According to a second embodiment of the invention, the cross section of the mounting groove comprises a rounded main portion with circularly segmental walls, which main portion is recessed inwardly toward the cutter head center axis under a slot made to the cutter head periphery and has thereunder, still more inwardly radially situated under its circular shape, a key slot of a given width. The cross section of the key slot may be either rectangular or have the shape of an annular sector. A cutting insert designed insertable into this kind of mounting groove has a stem part of circular cross section that in cooperation with the main portion of the mounting groove forms a sliding bearing supporting the inclination of the cutting insert around its longitudinal axis. From the insert stem part extends radially outward a distal tip part of a slightly smaller thickness than the width of the slot that opens on the periphery of the lamellar cutter head

and thus allows the distal tip of the cutting insert to extend outward from the groove, whereby the two longitudinally running edges in the distal end of the insert serve as the two cutting edges of the insert. From the insert stem part, in opposite direction relative to the tip part, further a key portion projects radially inwardly, said key portion being adapted to cooperate with the key slot of the cutter head groove so as to limit the inclination angle of the cutting insert around its longitudinal axis in the mounting groove, whereby the width of the cutter head key slot and the insert key, respectively, are selected such that a desired cutting angle and inclination angle of the insert are obtained irrespective of the rotating direction of the defleshing cutter.

[0009] Having the cutting inserts shaped in the above-described fashion, each one of the inserts having two cutting edges of which the leading edge in regard to the rotating direction of the cutter is at all times the one actively performing defleshing. According to a preferred embodiment of the invention, the distal end of the radially outwardly projecting portion of the insert has a concave cross section resulting in sharper cutting edges, particularly if the insert tip cross section additionally is made outwardly flaring toward the distally projecting insert tip.

[0010] The maximum allowable inclination of an insert about its longitudinal axis from its radially neutral position depends on the design of the insert tip, and particularly on the design of its cutting edges. Preferably, the insert inclination angle is in the range of 10° to 15°.

[0011] According to a preferred embodiment of the invention, the defleshing cutter head comprises a cylindrical, central clamping headstock member with a rigid flange at its one end plus a plurality of identical lamellar cutter members adapted rotatable on the cylindrical headstock center member and having above-described mounting grooves made on their periphery for accommodating the cutter inserts and the rigid flange as well as the lamellar cutter members are provided with mutually interacting elements that allow a given degree of mutual angular displacement between the adjacent lamellar members of the defleshing cutter head as well as between the rigid flange and the closest lamellar member abutting the same. The mutual angular displacement between the abutting lamellar members makes it possible during the rotation of the defleshing cutter against the animal hide to shift each cutting insert angularly so that a helical alignment of the cutting inserts along the cutter periphery results. As a result, the rotation of the cutter in a given direction causes each cutting insert sequentially counted from the rigid flange to become angularly displaced in regard to each other in the reverse direction to the rotation by the differential angle permitted by the limited mutual angular displacement facility provided between each two abutting lamellar cutter members. When the cutter rotation is reversed, the cutting inserts will in a similar fashion become angularly shifted in the opposite direction into new positions along the cutter periphery such that their helical alignment assumes the same la-

mellar member-to-member differential angles as those of the first helical alignment but now with a reversed handedness of the helical alignment. This mutual alignment arrangement of the cutting inserts serves to prevent the defleshed tissue from splashing around during defleshing, particularly as the cutter is arranged to be driven about a substantially vertically aligned axis of rotation having the rigid flange situated upmost. In this position of the cutter, the helical alignment of the cutting inserts force the defleshed tissue to be ejected downward so that the removed tissue can be readily collected into a container included in the defleshing machine construction.

[0012] The mutually cooperating elements permitting a certain mutual angular displacement between any two abutting lamellar cutter members, as well as between the rigid flange and the lamellar cutter member closest adjacent thereto, comprise in the first embodiment of the invention at least one guide pin projecting in the axial direction from each one of the lamellar cutter members and, respectively, at least one guide hole made in the rigid flange and each one of the lamellar cutter members at the same radial distance from the central axis of the cutter head as the respective guide pins are located, whereby the guide hole has a diameter larger than the outer diameter of the guide pin and the guide pins have a length so short as to extend only into the hole made in the rigid flange or the closest adjacent abutting lamellar cutter member as seen in the direction of the rigid flange. The difference between the diameters of the guide pin and the respective guide hole drilled in the lamellar cutter member allows a certain lamellar member during the rotation thereof in a given direction to rotate in the opposite direction by a differential angle in regard to the closest adjacent abutting lamellar cutter member as compared with the angular position of the rigid flange, whereby the differential angle of the mutual rotation between the members is determined by the difference between the diameters of the guide hole and pin. Obviously, the outcome of this arrangement is that the farther a given lamellar cutter member is situated from the rigid flange the greater is the angular shift of the given lamellar member from its neutral position, whereupon each one of the cutting inserts of the defleshing cutter assume a helically aligned disposition along the defleshing cutter periphery, whereby the tangential angle of the cutting insert helix in regard to the axial direction of the cutter is determined by the above-described difference of guide hole-to-pin diameter. When the cutter rotation is reversed, the cutting inserts will become angularly shifted in the opposite direction assuming new positions along the cutter periphery such that their helical alignment assumes the same lamellar member-to-member differential angles as those of the first helical alignment but now with a reversed handedness of the helical alignment. The mutual tangential displacement between any two adjacently abutting lamellar cutter members can be, e.g., 1 to 2 mm as measured between the cutting inserts along the cutter periph-

ery.

[0013] According to a second preferred embodiment of the invention, the mutually cooperating elements that limit the mutual angular rotation between the lamellar cutter members on the cylindrical center member of the cutter headstock supporting the lamellar cutter members comprise a key, which rigidly extends longitudinally on the cylindrical center member over the entire length thereof and has a width linearly flaring toward the rigid flange of the cutter headstock, whereby the key is adapted to cooperate with a key slot made on each one of the lamellar cutter members and having a width slightly wider than the maximum width of the cutter headstock key. Then, the difference between the lamellar member key slot and the headstock key at each lamellar member determines the maximum possible angular displacement of a given lamellar member about its neutral position. Alternatively, the key of the central headstock of the cutter can have a constant width, while the lamellar cutter members are machined to have key slots of different widths, whereby the lamellar members are stacked so that the lamellar member having the narrowest key slot is placed closest to the rigid flange of the cutter headstock, whereupon the other lamellar members are stacked on the headstock in a successive order of making the key slots to become the larger the farther the individual lamellar member is from the rigid flange of the headstock.

[0014] The number of cutting inserts on the cutter periphery is advantageously 4 to 12. Preferably, the number of inserts is eight. The cutting inserts are angularly displaced at equal distances from each other along the defleshing cutter periphery.

[0015] Defleshing cutters of different shapes can be constructed by way of varying the size of the uniform lamellar cutter members. If lamellar members of equal size are used, a substantially cylindrical cutter is formed. In contrast, stacking lamellar cutter members of linearly decreasing or increasing diameter on the headstock used in the assembly of the cutter results in a conical defleshing cutter and, respectively, the use larger-diameter lamellar members at the ends of the cutter with lamellar elements of a diameter stepwise decreasing toward the cutter middle portion gives an hourglass-shaped cutter having a larger diameter at its ends and a reduced diameter at its middle portion. This arrangement results in a defleshing cutter of maximized effective defleshing width that further is augmented by making the cutting inserts moderately elastic. Hereby the cutting inserts can comply very accurately with the conical shape of the defleshing drum when the cutter moves over the defleshing drum in the defleshing of an animal hide.

[0016] Next, the invention will be described in greater detail with reference to the attached drawings wherein

FIG. 1 shows a side view of one example of a headstock of a defleshing cutter according to the invention when rotating in a direction indicated by the arrow;

FIG. 2 shows a sectional view of FIG. 1 taken along line A-A and illustrating one cutting insert in more detail;

FIG. 3 shows a side view of a second embodiment of the headstock of a defleshing cutter according to the invention;

FIG. 4 shows a detail of a second embodiment of the lamellar cutter member and cutting insert for use in a defleshing cutter according to the invention; and

FIG. 5 shows a detail of a preferred embodiment of the cooperating elements that limit the mutual angular displacement of the lamellar cutter members about the cylindrical center member of the cutter headstock.

[0017] Referring to the drawings, the defleshing cutter according to the invention comprises a central cutter head 1 having a substantially circular or polygonal cross section and of a plurality of cutting inserts 2 mounted thereon in substantially axially aligned grooves 3 that are angularly displaced at equal distances from each other along the defleshing cutter periphery. In the embodiment shown in FIG. 2, the mounting groove 3 has a substantially keyhole-shaped cross section, whose inner portion 3a is circularly rounded while the radially distal portion 3b opening at the cutter head periphery is shaped slightly outwardly flaring. The insert 2 mounted in the groove 3 is provided with an inner stem part 2a having a circular cross section adapted to fit into the circularly rounded inner portion of the groove 3, and with a distal tip part 2b extending radially outwardly via the flaring slot portion of the groove and having a thickness smaller than the width of the flaring slot portion 3b of the mounting groove. The cutting insert 2 is provided at its freely projecting distal end 2c with two cutting edges 4, 5, both of them running longitudinally along the insert tip. This shape of the mounting groove 3 and of the insert 2 allow the insert 2 to rotate around its longitudinal axis from its one limit position shown in FIG. 2, wherein the insert 2 with one lateral surface of its distal tip part 2b abuts the respective wall of the flaring slot portion 3b of the mounting groove, to its other limit position, wherein the other lateral surface of its distal tip part 2b abuts the other wall of the flaring slot portion 3b of the mounting groove 3. The insert 2 assumes the limit position shown in FIG. 2 when the cutter rotates in the direction indicated by arrow C. With a properly selected width of the flaring portion 3b of the mounting groove and a thickness/shape of the insert distal tip part 2b, an equally optimal defleshing effect irrespective of the rotation direction of the cutter is assured. By shaping the free end of insert distal part 2b to have a concave cross section (see hatched shape in FIG. 4) and by shaping the distal end 2b such that its thickness flares toward its free end 2c, an extremely advantageous shape of both cutting edges 4 and 5 of the insert distal tip is

received.

[0018] In FIG. 4 is shown an alternative embodiment of the longitudinal mounting groove 3 on the periphery of the cutter head 1 with a cutting insert 2 placed in the groove 3. In this embodiment, the cross section of the mounting groove 3 comprises a rounded main portion 3a with circularly segmental walls, the main portion being recessed inwardly toward the cutter head center axis under a slot 3b of the periphery of cutter head 1. Additionally, the cutter head 1 is provided with a key slot 3c having a given width and extending still more inwardly radially from the most proximal portion of the above-mentioned rounded mounting groove main portion. Respectively, the cutting insert 2 placed in the mounting groove 3 has a cross section that generally is similar to the cutting insert 2 used in the above-described first embodiment, but differs therefrom by having its stem part 2a complemented with a projection 2d directed in the opposite direction in regard to the distal tip part 2b of the insert. The projection 2d fits into the key slot 3c of mounting groove 3 by way of having a width smaller than the width of the key slot 3c. The difference between the widths of mounting groove key slot 3c and cutting insert projection 2d is employed to set the angle of inclination that the cutting insert 2 can assume as it is inclined about its longitudinal axis in the mounting groove 3. FIG. 4 shows the uppermost cutting insert 2 in the limit position which the cutting insert assumes when the cutter is driven in a counter clock direction, while the other insert is shown in its neutral middle position with the distal tip 2 of the insert oriented entirely radially, from which neutral position the insert can be inclined by about 10° to 15° to either side depending on the rotating direction of the defleshing cutter.

[0019] In its simplest embodiment the defleshing cutter comprises an entirely rigid headstock 1, which in the embodiment shown in FIG. 3 is slightly conical. The cutter head is connected to the drive shaft of the defleshing machine by the uppermost part of the cutter head in the diagram.

[0020] According to a preferred embodiment of the invention, the cutter head 1 comprises a cylindrical, central clamping member 6 having a rigid flange 7 adapted at its one end. On the cylindrical member 6 are rotatably mounted a plurality of uniform lamellar members 8 incorporating the above-described mounting grooves for accommodating the cutting inserts 2 of the defleshing cutter. The flange 7 and all the lamellar members 8 are provided with a guide hole 9 at a given and same radial distance from the center axis of the cutter head. Additionally, each one of the lamellar members carries an axially projecting guide pin 10 of a diameter smaller than the diameter of the respective guide hole 9, the guide pins 10 being placed at the same radial distance from the center axis of the cutter head as the respective guide holes 9. The guide pins 10 project from the side of their respective lamellar member 8 by a length not exceeding the thickness of the adjacent lamellar member 8. In the assembly of the cutter, the first lamellar member 8 is in-

serted onto the central clamping cylindrical member 6 of the cutter head so that the guide pin 10 of the lamellar member goes into the guide hole 9 of the flange 7. Thereupon, the next lamellar member 8 is inserted so that the guide pin of this lamellar member 8 goes into the guide hole 9 of the previously inserted lamellar member as shown in the sectional view of FIG. 1. As all the lamellar members 8 are uniform, the mounting grooves 3 on their periphery are initially aligned along axially straight lines on the periphery of the defleshing cutter. In the illustrated situation, the cutter is driven to rotate in the direction indicated by arrow C, whereby as a result each lamellar member 8 becomes angularly shifted in a reverse direction in regard to the next adjacent lamellar member 8 closer to the rigid flange 7 by an angle permitted by the difference between the diameters of guide hole 9 and guide pin 10. As a result, the lamellar members 8 rotate into positions such that the mounting grooves 3 on the periphery of the defleshing cutter align into helical lines as shown in FIG. 1 wherein a complete track of adjacent mounting grooves 3 is shown entirely. Herein, the cutting inserts 2 placed in the mounting grooves 3 respectively align themselves helically into positions wherein defleshing takes place in a fashion preventing the removed tissue from splashing around and instead the tissue is forced downward toward the lower end of the cutter wherefrom the tissue falls down into a container (not shown).

[0021] In another preferred embodiment, the guide pins 10 and guide holes 9 of the lamellar members 8 are replaced by a key 10' which rigidly extends longitudinally on the cylindrical center member 6 of the cutter over the entire length of the center member and has a width linearly flaring toward the rigid flange 7, whereby the key 10' is adapted to cooperate with a key slot 9' made on each one of the lamellar cutter members 8 and having a width slightly wider than the maximum width of the cutter headstock key 10'. Then, at each lamellar member 8, the width difference between the lamellar member key slot 9' and the cutter headstock key 10' determines the maximum possible angular displacement of a given lamellar member 8 about its neutral position on the cutter center member 6.

Claims

1. A rotary defleshing cutter comprising a central cutter head (1) of a substantially circular or polygonal cross section having its periphery provided with substantially axially aligned mounting grooves (3) adapted to accommodate individually replaceable elastic cutting inserts (2), **characterized in that** said cutting inserts (2) and mounting grooves (3) are shaped so as to allow a limited inclination of each cutting insert (2) about the longitudinal axis thereof, while the distal end of the cutting insert (2) is provided with two cutting edges (4, 5) running longitudinally along both

edges of the distal end of the cutting insert.

2. The rotary defleshing cutter according to claim 1, **characterized in that** the mounting grooves (3) for accommodating the cutting inserts (2) on the periphery of the cutter head (1) have a substantially key-hole-shaped cross section, whose inner portion (3 a) is circularly rounded while its radially distal portion (3b) opening at the periphery of the cutter head (1) is shaped slightly flaring with a width larger than the corresponding thickness of the cutting insert (2) in this portion.
3. The rotary defleshing cutter according to claim 2, **characterized in that** the cutting inserts (2) have a cross section comprising an inner stem part (2a) of a circular cross section adapted to fit into the circularly rounded inner portion (3a) of the mounting groove, and a distal tip part (2b) of the insert extending radially outward from the stem part and having a thickness smaller than the width of the flaring slot portion (3b) of the mounting groove and at its freely projecting distal end the edges extending longitudinally along the insert tip form the two cutting edges (4, 5) of the cutting insert.
4. The rotary defleshing cutter according to claim 1, **characterized in that** the mounting grooves (3) on the periphery of the cutter head (1) for accommodating the cutting inserts (2) have a cross section with a rounded main portion (3a) provided with circularly segmental walls, the main portion being recessed inwardly toward the cutter head center axis under a slot (3b) of the periphery of cutter head (1) and further provided with a key slot (3c) of a given width in the direction toward the cutter head (1) center.
5. The rotary defleshing cutter according to claim 4, **characterized in that** the cutting insert (2) has a cross section wherein the stem part (2a) has a circularly rounded cross section being adapted to fit into the main portion (3 a) of the mounting groove, and extending from said stem part a distal tip part (2b) having a width slightly narrower than the width of the slot portion (3b) of the mounting groove at the periphery of the cutter head, and at its freely projecting distal end the edges extending longitudinally along the insert tip form the two cutting edges (4, 5) of the cutting insert, and further provided with a projection (2d) extending from said stem part (2a) in opposite direction in regard to the distal tip part of the insert, said projection having a width narrower than the width of the key slot (3c) of the mounting groove (3) on the cutter head.
6. The rotary defleshing cutter according to any of the preceeding claims, **characterized in that** the cutting inserts (2) have a cross section with a concave sur-

face (2c) at the distal tip part of the insert.

7. The rotary defleshing cutter according to any of claims 1-6, **characterized in that** the maximum inclination of the inserts (2) around their longitudinal axis to either direction from their radially neutral position is limited to an angle of about 10° to 15°.
8. The rotary defleshing cutter according to any of claims 1-7, **characterized in that** the defleshing cutter head (1) comprises a cylindrical, central clamping headstock member (6) with a rigid flange (7) at its one end and freely rotating on said cylindrical headstock member (6) a plurality of uniform lamellar cutter members (8) having said mounting grooves (3) for accommodating the cutting inserts (2), and that said rigid flange (7) as well as said lamellar cutter members (8) include mutually interacting elements (9, 10; 9' 10') allowing a given degree of mutual angular displacement between any ones of adjacent lamellar members (8) of the defleshing cutter head as well as between the rigid flange (7) and the closest lamellar member (8) abutting the same.
9. The rotary defleshing cutter according to claim 8, **characterized in that** said mutually cooperating elements comprise at least one axially projecting guide pin (10) on each one of said lamellar cutter members (8) and at least one guide hole (9) on said rigid flange (7) and on each one of said lamellar cutter members (8), each guide hole being situated at the same radial distance from the center axis of the cutter head as said guide pin (10), whereby the diameter of said guide hole (9) has a diameter larger than the diameter of said guide pin (10) and said guide pins (10) have such a length that only reaches into said guide hole (9) of said rigid flange (7) or into said guide hole (9) of the closest abutting lamellar cutter member (8) in regard to the location of said rigid flange (7).
10. The rotary defleshing cutter according to claim 8 or 9, **characterized in that** the angular displacement between any two abutting lamellar cutter members (8) corresponds to a displacement of about 1 to 2 mm along the periphery of the lamellar cutter members.
11. The rotary defleshing cutter according to claim 8, **characterized in that** the mutually cooperating elements serving to limit the mutual angular displacement between any two abutting lamellar members (8) about the central clamping member (6) of the cutter head comprise a key (10') which rigidly extends longitudinally on said member (6) and has a width linearly flaring toward the rigid flange (7) and a key slot (9') made on each one of the lamellar cutter members (8) so as to cooperate with said key (10') by way of having a width slightly wider than the max-

imum width of said key (10').

12. The rotary defleshing cutter according to claim 1, **characterized in that** the number of cutting inserts (2) is 4 to 12.

13. The rotary defleshing cutter according to any of claims 8-12, **characterized in that** all the lamellar elements (8) of the cutter head are identical in size.

14. The rotary defleshing cutter according to any of claims 8-12, **characterized in that** the lamellar elements (8) of the cutter head are of different size such that the shape of the cutter becomes conical or, alternatively, hourglass-shaped with a narrowed waist.

Patentansprüche

1. Drehbares Entfleischungsmesser, umfassend einen zentralen, im Querschnitt im wesentlichen kreisförmigen oder mehreckigen Messerkörper (1), der an seinem Umfang mit im wesentlichen axial ausgerichteten Halterungsnuten (3) versehen ist, von denen jede zur Aufnahme eines gesondert einsetzbaren elastischen Schneideeinsatzes (2) ausgebildet ist, **dadurch gekennzeichnet, dass** die Schneideeinsätze (2) und die Halterungsnuten (3) so ausgebildet sind, dass sie eine beschränkte Neigung jedes Schneideeinsatzes (2) um dessen Längsachse ermöglichen, während das Distalende des Schneideeinsatzes (2) mit zwei in Längsrichtung entlang der beiden Kanten des Distalendes des Schneideeinsatzes verlaufenden Schneidekanten (4,5) versehen ist.
2. Drehbares Entfleischungsmesser nach Anspruch 1, **dadurch gekennzeichnet, dass** die am Umfang des Schneidekörpers (1) zur Aufnahme der Schneideeinsätze (2) angeordneten Halterungsnuten (3) einen im wesentlichen Schlüssellochförmigen Querschnitt aufweisen, dessen innerer Abschnitt (3a) kreisförmig ausgebildet ist, während dessen radial in den Umfang des Messerkörpers (1) mündender, sich leicht ausbreitender Distalabschnitt (3b) eine Breite aufweist, die größer ist als die entsprechende Dicke des jeweiligen Schneideeinsatzes (2) in diesem Abschnitt.
3. Drehbares Entfleischungsmesser nach Anspruch 2, **dadurch gekennzeichnet, dass** die Schneideeinsätze (2) im Querschnitt ein inneres, im Querschnitt kreisförmiges, zur Aufnahme in den kreisförmigen inneren Abschnitt (3a) der Halterungsnut (2) ausgebildetes Grundteil (2a) sowie eine sich radial von dem Grundteil erstreckende Distalspitze (2b), deren Dicke kleiner ist als die Breite des sich erweiternden

Schlitzabschnitts (3b) der Halterungsnut, aufweisen, wobei die in Längsrichtung entlang der Spitze des Einsatzteils verlaufenden Kanten an den frei vorstehenden Distalende Spitze des Einsatzteils die zwei Schneidekanten (4,5) des Schneideeinsatzes bilden.

4. Drehbares Entfleischungsmesser nach Anspruch 1, **dadurch gekennzeichnet, dass** die am Umfang des Messerkörpers (1) zur Aufnahme der Schneideeinsätze (2) angeordneten Halterungsnuten (3) im Querschnitt einen mit kreisrunden Segmentwänden versehenen kreisförmigen Hauptabschnitt (3a) aufweisen, wobei der Hauptabschnitt (3a) unterhalb der am Umfang des Messerkörpers (1) befindlichen Öffnung (3b) nach innen in Richtung auf die Mittelachse des Messerkörpers (1) ausgehöhlt ist und ferner mit einer Schlüsselaussparung (3c), die eine vorgegebene Breite in Richtung auf die Mitte des Messerkörpers (1) aufweist, versehen ist.
5. Drehbares Entfleischungsmesser nach Anspruch 4, **dadurch gekennzeichnet, dass** der Schneideeinsatz (2) im Querschnitt mit einem kreisförmigen Grundteil (2a), das zur Aufnahme in den Hauptabschnitt (3a) der Halterungsnut ausgebildet ist, und einer von dem besagten Grundteil vorstehenden Distalspitze (2b), deren Breite etwas schmaler ist als die Breite der am Umfang des Messerkörpers (1) befindlichen Öffnung (3b) der Halterungsnut, und die an deren frei vorstehendem Distalende in Längsrichtung verlaufenden Kanten zwei Schneidekanten (4,5) des Schneideeinsatzes bilden, sowie einem sich von dem Grundteil (2a) bezüglich der Distalspitze des Einsatzes in die entgegengesetzte Richtung erstreckenden Vorsprung (2d), deren Breite etwas kleiner ist als die Breite der in der Halterungsnut (3) des Messerkörpers befindlichen Schlüsselaussparung (3c), versehen ist.
6. Drehbares Entfleischungsmesser nach einem der vorangehenden Ansprüche, **dadurch gekennzeichnet, dass** die Schneideeinsätze (2) im Querschnitt eine konkave Außenkontur (2c) der Distalspitze aufweisen.
7. Drehbares Entfleischungsmesser nach einem der Ansprüche 1-6, **dadurch gekennzeichnet, dass** die maximale Neigung der Schneideeinsätze (2) um ihre Längsachse in beide Richtungen von ihrer radialen Grundposition ca. 10 bis 15° beträgt.
8. Drehbares Entfleischungsmesser nach einem der Ansprüche 1-7, **dadurch gekennzeichnet, dass** der Körper (1) des Entfleischungsmessers aus einem zylinderförmigen, zentralen, an einem Ende mit einem feststehenden Flansch (7) versehenen Halterungselement (6) und einer Vielzahl von auf dem be-

sagten zylinderförmigen Element (6) frei drehbar angeordneten gleichförmigen lamellenartigen Schneideelementen (8), die mit den besagten Halterungsnuten (3) zur Aufnahme der Schneideeinsätze versehen sind, besteht, und dass der feststehende Flansch (7) und die lamellenartigen Schneideelementen (8) miteinander in Zusammenwirkung stehende Elemente (9, 10; 9', 10') aufweisen, die eine vorgegebene Verstellung zwischen den einzelnen benachbarten Lamellen (8) des Entfleischungsmesserkörpers sowie zwischen dem feststehenden Flansch (7) und dem diesem am nächsten benachbarten lamellenartigen Element (8) ermöglichen.

9. Drehbares Entfleischungsmesser nach Anspruch 8, **dadurch gekennzeichnet, dass** die miteinander in Zusammenwirkung stehenden Elemente wenigstens einen von jedem lamellenartigen Schneideelement (8) axial vorstehenden Führungsstift (10) sowie wenigstens ein in dem feststehenden Flansch (7) und in jeder lamellenartigen Element (8) gebildetes Führungsloch (8) aufweisen, wobei jedes Führungsloch sich in demselben radialen Abstand von der Mittelachse des Messerkörpers wie der Führungsstift (10) befindet, wobei der Durchmesser des Führungsloches (9) größer ist als der Durchmesser des Führungsstiftes (10), und die Führungsstifte (10) eine solche Länge aufweisen, dass sie nur in das in dem feststehenden Flansch (7) befindliche Führungsloch (9) oder in das in Richtung des feststehenden Flansches (7) am nächsten benachbarten lamellenartigen Schneideelement (8) befindliche Führungsloch (9) eindringen können.
10. Drehbares Entfleischungsmesser nach Anspruch 8 oder 9, **dadurch gekennzeichnet, dass** die schräge Verstellung zwischen jeweils zwei benachbarten lamellenartigen Schneideelementen (8) einer Verstellung von ca. 1 bis 2 mm entlang des Umfangs der lamellenartigen Schneideelementen entspricht.
11. Drehbares Entfleischungsmesser nach Anspruch 8, **dadurch gekennzeichnet, dass** die miteinander in Zusammenwirkung stehenden Elemente zur Beschränkung der schrägen Neigung zwischen jeweils zwei lamellenartigen Elementen (8) um das zentrale Halterungselement (6) des Messerkörpers mit einem Keil (10'), der sich auf dem besagten Element (6) steif in der Längsrichtung erstreckt und eine Breite aufweist, die sich linear in Richtung auf das feststehende Flansch (7) ausweitert, sowie mit einem an jedem lamellenartigen Schneideelement (8) zur Zusammenwirkung mit dem Keil (10') gebildeten Keilschlitz (9'), dessen Breite etwas größer ist als die maximale Breite des Keils (10'), versehen sind.
12. Drehbares Entfleischungsmesser nach Anspruch 1, **dadurch gekennzeichnet, dass** die Anzahl der

Schneideeinsätze (2) 4 bis 12 beträgt.

13. Drehbares Entfleischungsmesser nach einem der Ansprüche 8-12, **dadurch gekennzeichnet, dass** alle lamellenartigen Elemente (8) des Messerkörpers der Größe nach identisch sind.
14. Drehbares Entfleischungsmesser nach einem der Ansprüche 8-12, **dadurch gekennzeichnet, dass** die lamellenartigen Elemente (8) des Messerkörpers der Größe nach verschieden sind, so dass der Messerkörper eine konische Form, oder alternativ die Form einer Sanduhr, die in seinem Mittelteil schmaler ist, bekommt.

Revendications

1. Dispositif de découpe à écharner rotatif comprenant une tête de coupe centrale (1) de section transversale sensiblement circulaire ou polygonale dont la périphérie comporte des encoches de montage sensiblement axialement alignées (3) prévues pour recevoir des inserts de coupe élastiques individuellement remplaçables (2), **caractérisé en ce que** les dits inserts de coupe (2) et les encoches de montage (3) sont profilés de manière à permettre une inclinaison limitée de chaque insert de coupe (2) autour de son axe longitudinal, tandis que l'extrémité distale de l'insert de coupe (2) présente deux arêtes coupantes (4, 5) s'étendant longitudinalement le long des deux bords de l'extrémité distale de l'insert de coupe.
2. Dispositif de découpe à écharner rotatif selon la revendication 1, **caractérisé en ce que** les encoches de montage (3) pour recevoir les inserts de coupe (2) sur la périphérie de la tête de coupe (1) ont une section sensiblement en forme de trou de serrure, dont la portion intérieure (3a) est circulairement arrondie tandis que sa portion radialement distale (3b) débouchant à la périphérie de la tête de coupe (1) est de forme légèrement évasée avec une largeur plus grande que l'épaisseur correspondante de l'insert de coupe (2) dans cette portion.
3. Dispositif de découpe à écharner rotatif selon la revendication 1, **caractérisé en ce que** les inserts de coupe (2) ont une section transversale comprenant une partie de queue intérieure (2a), de section transversale circulaire prévue pour s'ajuster dans la portion intérieure circulairement arrondie (3a) de l'encoche de montage, et une partie d'extrémité distale (2b) de l'insert qui s'étend radialement vers l'extérieur à partir de la partie de queue et a une épaisseur plus petite que la largeur de la portion en fente évasée (3b) de l'encoche de montage et, à leur extrémité distale librement saillante, les bords s'étendant lon-

gitudinalement le long de l'extrémité de l'insert forment les deux arêtes coupantes (4, 5) de l'insert de coupe.

4. Dispositif de découpe à écharner rotatif selon la revendication 1, **caractérisé en ce que** les encoches de montage (3) sur la périphérie de la tête de coupe (1) pour recevoir les inserts de coupe (2) ont une section transversale avec une partie principale arrondie (3a) présentant des parois en segments circulaires, la partie principale étant en retrait vers l'intérieur, vers l'axe central de la tête de coupe, sous une fente (3b) de la périphérie de la tête de coupe (1), et comportant en outre une rainure de clavette (3c) d'une largeur donnée dans la direction vers le centre de la tête de coupe (1). 5
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5. Dispositif de découpe à écharner rotatif selon la revendication 4, **caractérisé en ce que** l'insert de coupe (2) a une section transversale dans laquelle la partie de queue (2a) a une section transversale circulairement arrondie prévue pour s'ajuster dans la partie principale (3a) de l'encoche de montage, et, s'étendant à partir de la dite partie de queue, une partie d'extrémité distale (2b) a une largeur légèrement plus étroite que la largeur de la fente (3b) de l'encoche de montage à la périphérie de la tête de coupe, et, à son extrémité distale librement saillante, les bords s'étendant longitudinalement le long de l'extrémité de l'insert forment les deux arêtes coupantes (4, 5) de l'insert de coupe, et l'insert comporte en outre une saillie (2d) s'étendant à partir de la dite partie de queue (2a) dans une direction opposée par rapport à la partie d'extrémité distale de l'insert, la dite saillie ayant une largeur plus étroite que la largeur de la rainure de clavetage (3c) de l'encoche de montage (3) sur la tête de coupe. 20
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6. Dispositif de découpe à écharner rotatif selon une quelconque des revendications précédentes, **caractérisé en ce que** les inserts de coupe (2) ont une section transversale avec une surface concave (2c) à la partie d'extrémité distale de l'insert. 40
7. Dispositif de découpe à écharner rotatif selon une quelconque des revendications 1 à 6, **caractérisé en ce que** l'inclinaison maximale des inserts (2) autour de leur axe longitudinal dans chaque direction par rapport à leur position radialement neutre est limitée à un angle de 10 degrés à 15 degrés environ. 45
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8. Dispositif de découpe à écharner rotatif selon une quelconque des revendications 1 à 7, **caractérisé en ce que** la tête de coupe d'écharnage (1) comprend une broche de blocage cylindrique centrale (6) avec une bride rigide (7) à sa première extrémité et, en rotation libre sur la dite broche cylindrique (6), une pluralité d'éléments de coupe lamellaires unifor-

mes (8) comportant les dites encoches de montage (3) pour recevoir les inserts de coupe (2), et **en ce que** la dite bride rigide (7) ainsi que les dits éléments de coupe lamellaires (8) comprennent des éléments mutuellement coopérants (9, 10 ; 9', 10') qui permettent un degré donné de décalage angulaire mutuel entre des éléments quelconques parmi les éléments lamellaires adjacents (8) de la tête de coupe d'écharnage ainsi qu'entre la bride rigide (7) et l'élément lamellaire le plus proche (8) en butée contre cette dernière.

9. Dispositif de découpe à écharner rotatif selon la revendication 8, **caractérisé en ce que** les dits éléments mutuellement coopérants comprennent au moins une tige de guidage axialement saillante (10) sur chacun des dits éléments de coupe lamellaires (8) et au moins un trou de guidage (9) dans la dite bride rigide (7) et dans chacun des éléments de coupe lamellaires (8), chaque trou de guidage étant situé à la même distance radiale de l'axe central de la tête de coupe que la dite tige de guidage (10), de sorte que le diamètre du dit trou de guidage (9) a un diamètre plus grand que le diamètre de la dite tige de guidage (10) et les dites tiges de guidage (10) ont une longueur telle qu'elles pénètrent seulement dans le dit trou de guidage (9) de la dite bride rigide (7) ou dans le dit trou de guidage (9) de l'élément de coupe lamellaire en butée le plus proche (8) avec référence à la position de la dite bride rigide (7). 15
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10. Dispositif de découpe à écharner rotatif selon la revendication 8 ou 9, **caractérisé en ce que** le décalage angulaire entre deux éléments de coupe lamellaires en butée quelconques (8) correspond à un déplacement de 1 à 2 mm environ le long de la périphérie des éléments de coupe lamellaires. 25
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11. Dispositif de découpe à écharner rotatif selon la revendication 8, **caractérisé en ce que** les éléments mutuellement coopérants servant à limiter le décalage angulaire mutuel entre deux éléments lamellaires en butée quelconques (8) autour de la broche de blocage centrale (6) de la tête de coupe comprennent une clavette (10') qui s'étend de façon rigide longitudinalement sur la dite broche (6) et qui a une largeur s'évasant linéairement vers la bride rigide (7) et une rainure de clavette (9') réalisée sur chacun des éléments de coupe lamellaires (8) de façon à coopérer avec la dite clavette (10') en ayant une largeur légèrement plus grande que la largeur maximale de la dite clavette (10'). 35
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12. Dispositif de découpe à écharner rotatif selon la revendication 1, **caractérisé en ce que** le nombre d'inserts de coupe (2) est de 4 à 12.
13. Dispositif de découpe à écharner rotatif selon une

quelconque des revendications 8 à 12, **caractérisé en ce que** tous les éléments lamellaires (8) de la tête de coupe sont de dimension identique.

- 14.** Dispositif de découpe à écharner rotatif selon une 5
quelconque des revendications 8 à 12, **caractérisé en ce que** les éléments lamellaires (8) de la tête de coupe sont de dimension différente de sorte que la forme de la tête de coupe devienne conique ou, en variante, en forme de sablier avec une région centrale plus étroite. 10

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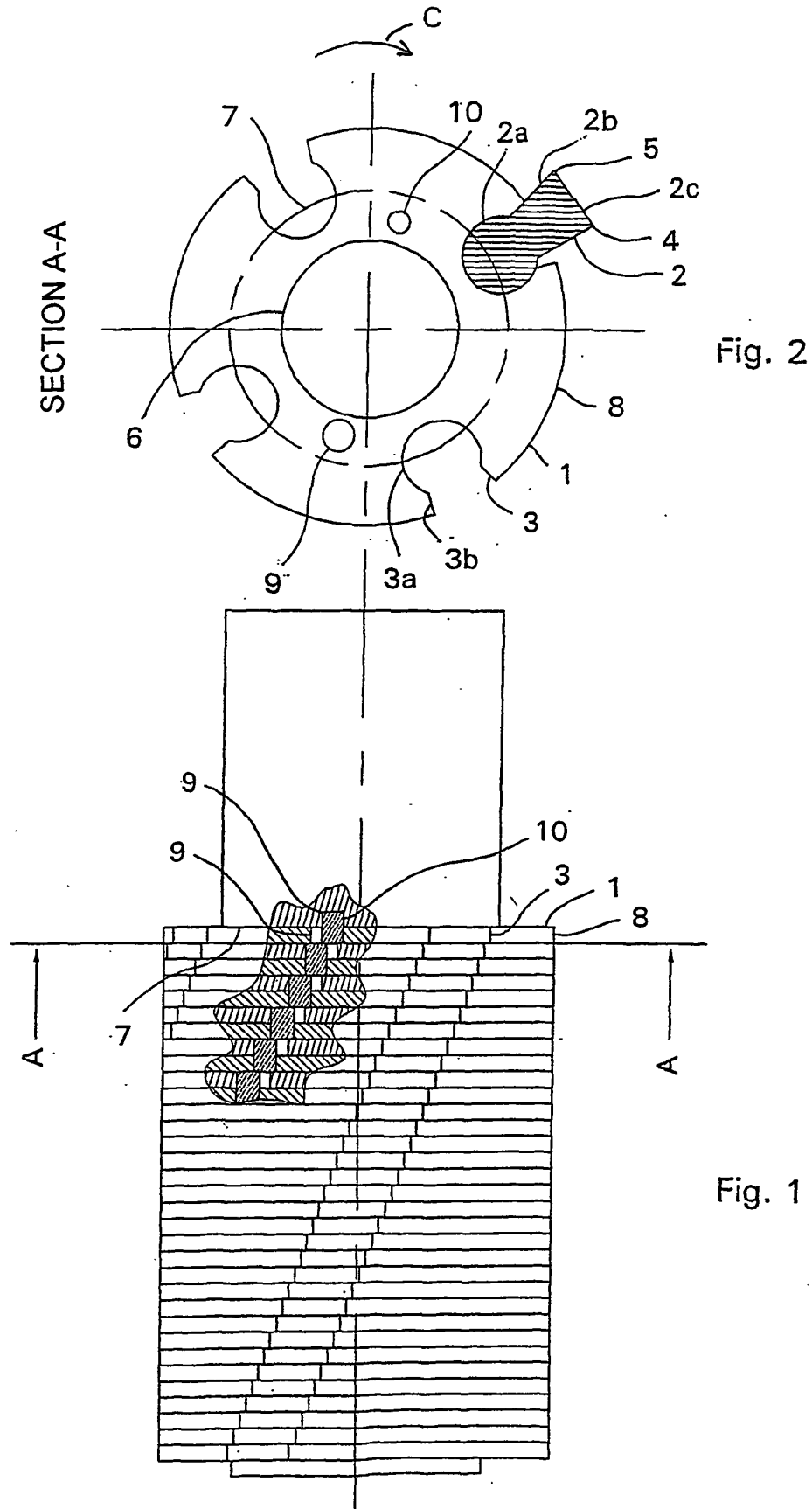
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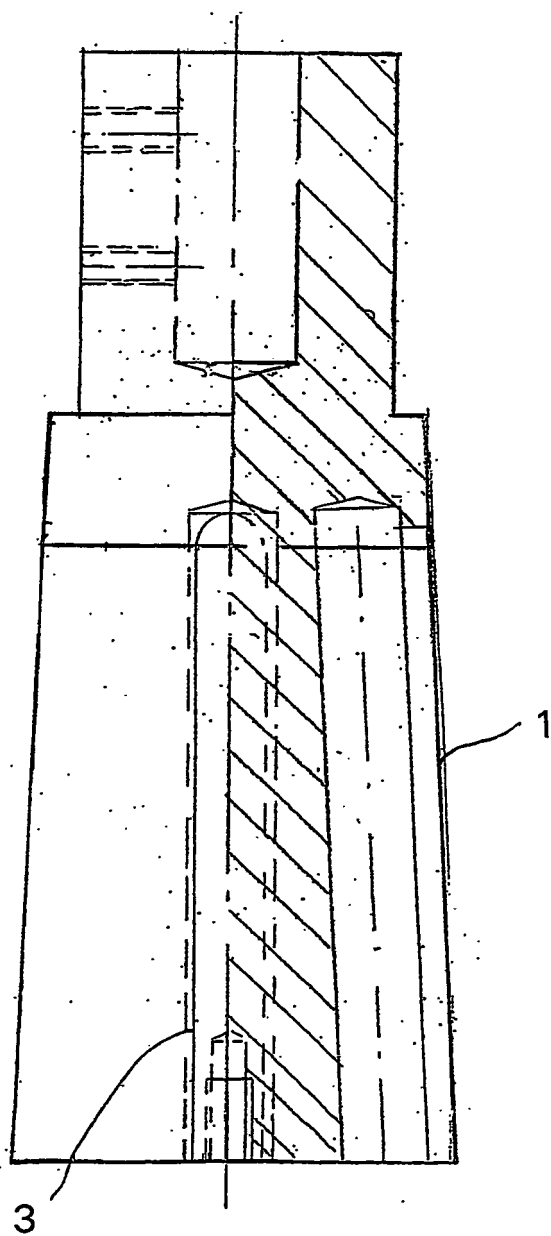


Fig. 3

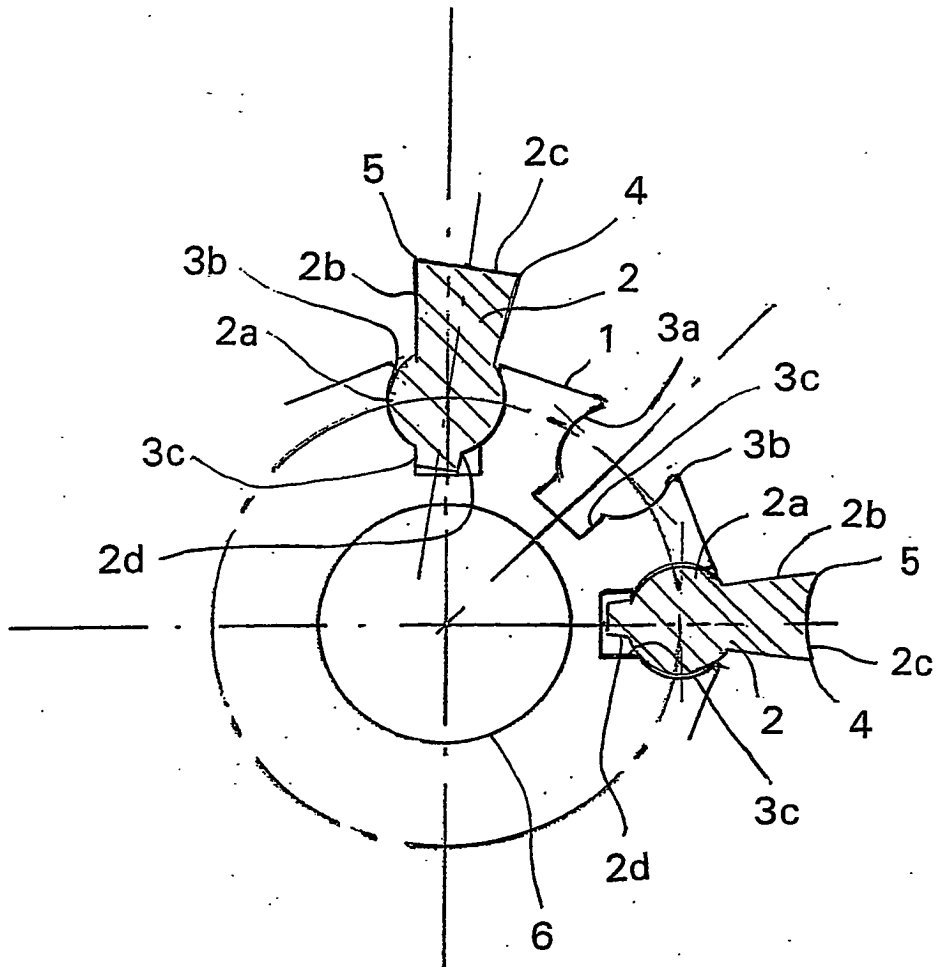


Fig. 4

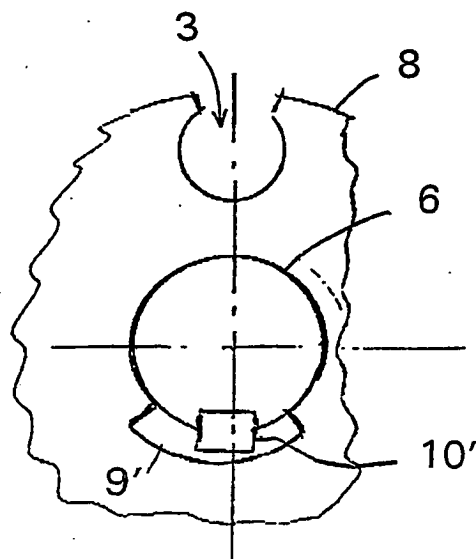


Fig. 5

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- WO 3272 A [0001]
- WO 9202643 A [0002]