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

(11) **EP 1 961 536 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
27.08.2008 Bulletin 2008/35

(51) Int Cl.:
B27L 11/00 *(2006.01)* ***B27B 33/20*** *(2006.01)*

(21) Application number: **08151214.7**

(22) Date of filing: **08.02.2008**

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

(30) Priority: **23.02.2007 SE 0700461**

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(54) **A chipper disc, a chipping canter comprising such a chipper disc, and a set of cutters for such a chipper disc**

(57) According to a first aspect, the present invention relates to a chipper disc for plane machining of an axially fed log (3) passing the chipper disc (9) by chopping off wood material from said log (3) while forming, on one hand, a plane surface (4) extending along the log (3), and on the other hand wood chips of said wood material chopped off, the chipper disc (9) having a substantially frustoconical basic shape along the envelope surface of which a plurality of dismountable chopping devices (1, 7) are arranged. According to the invention, the chipper disc (9) comprises, on one hand, a plurality of first chopping devices (7) each of which has a major edge (14) located in a plane perpendicular to the centre axis of the chipper disc (9), and on the other hand at least one second chopping device (1) having a major edge (24) located at an obtuse angle to the above-mentioned perpendicular plane. According to a second aspect, the invention relates to a chipping canter comprising such a chipper disc, and according to a third aspect, the invention relates to a set of chopping devices for such a chipper disc.

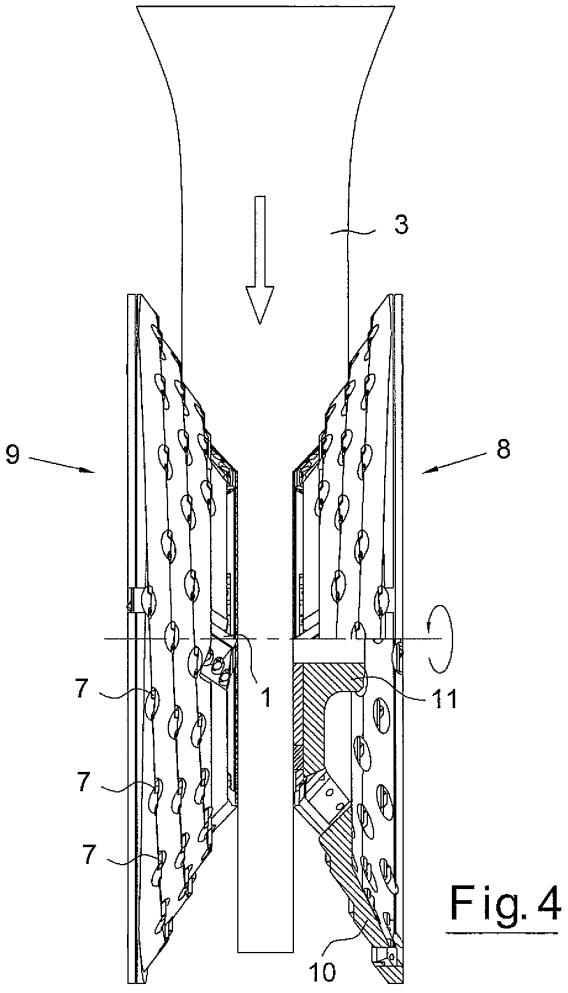

Fig. 4

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Description

Technical Field of the Invention

[0001] According to a first aspect, the present invention relates to a chipper disc for plane machining of an axially fed log passing the chipper disc by chopping off wood material from said log while forming, on one hand, a plane surface extending along the log, and on the other hand wood chips of said wood material chopped off, the chipper disc having a substantially frustoconical basic shape along the envelope surface of which a plurality of dismountable chopping devices are arranged. According to a second aspect, the present invention relates to a chipping canter comprising at least one chipper disc according to the above-mentioned type, and according to a third aspect, the present invention relates to a set of chopping devices for such a chipper disc.

Background of the Invention and Prior Art

[0002] Chipper discs of the above-mentioned type are used in the sawmill industry for plane machining at least one side of a log before or in direct connection with subsequent machining, for instance in the form of sawing planks or boards from the log. Generally, two chipper discs are arranged with the narrow ends thereof being opposite each other in a chipping canter to form a block from a length fed log in the gap between the same, which block has two opposite plane sides, also known under the designation bevels. Then the block may be machined by an additional chipping canter comprising two opposite chipper discs for the formation of a so-called four-sided block, in order to obtain an intermediate product even more suitable for continued machining. As a consequence of the above-mentioned reduction, a significant amount of wood material chopped off is formed, which since long has entailed a desire that the wood material removed from the log directly should be chopped into wood chips, which as for the shape and dimension is suitable as raw material for, for instance, paper-pulp manufacturing.

[0003] In the sawmill industry, chipping canters are used comprising chipper discs belonging to one of two main categories, which are distinguished by the design of the chopping devices as well as the attachment thereof in the chipper discs. The first type of chipper discs, the function of which is schematically illustrated in Figure 1, has chopping devices the major edges of which are arranged to cut the fibres of the log while forming wood chips, the other type of chipper discs, the function of which is schematically illustrated in Figure 2, having chopping devices the major edges of which are arranged to cleave the wood material in the fibre direction of the log while forming wood chips. The first type of chipper discs, comprising so-called fibre-cutting chopping devices, is known under the designation long knife or step discs, and the other type of chipper discs, comprising so-called fibre-cleaving chopping devices, is known under the designation spiral discs.

[0004] The cutting depth, or cutting front, conventionally provided by the chipper discs varies from log to log and is of the order of 0-200 mm. Each individual log being machined has basically a certain conicity, which implies that the cutting depth also varies for each individual log. Thus, the need of chopping off may be zero or close to zero in the beginning of the log and along a great part of the log, up to maximum cutting depth in the end of the log. Gradually increasing machining also entails gradually increasing power output, since the load on the chipper discs and the chipping canter increases as more wood material is to be chopped off at the same time as the feed speed of the log when passing the chipping canter is more or less constant. In this connection, it should also be pointed out that the logs are fed along the saw line very closely upon each other, for instance with only a spacing of 10-30 cm, and at a very high speed, for instance 1-3 m/s.

[0005] Step discs comprising a few equidistantly arranged fibre-cutting chopping devices, each of which arranged along primarily the entire length of a generatrix that extends along the conical envelope surface of the chipper disc, experience strong load in connection with each individual chopping device being brought into engagement with the wood material. This implies that the power output of the chipping canter varies considerably as well as increases gradually while an individual top-fed log being machined to be terminated with a strong power output peak in connection with the butt end of the log being machined, and accordingly relatively speaking considerably more wood material is chopped off per time unit. The above-mentioned power output peak implies that the rotational speed of the chipper disc undesirably risks being somewhat lowered, which lowering possibly cannot be corrected before the machining of a subsequent log is commenced, with a continued decreased rotational speed as a consequence. Such a power output peak also implies that it is necessary to provide the chipping canter with more extensive control systems as well as greater motors and power feeding systems in order to avoid that the control system/power feeding system is overloaded, whereupon the saw line could stop. In addition, in the general case that the chipping canter comprises two opposite chipper discs that are in engagement with the log, but when the chipper discs generally are controlled asynchronously, the chopping devices of the chipper discs will come into alternate engagement with the wood material whereupon vibrations in the chipping canter and the log may arise, which may be harmful to the chipping canter and unfavourable to the quality of the machined sides of the log. A conventional solution to at least partly master such failings is to use two shorter fibre-cutting chopping devices instead of one long fibre-cutting chopping device, which shorter devices are mutually displaced in the direction of rotation and together cover the entire maximal cutting depth. This entails that the above-

mentioned power output peak is considerably decreased, at the same time as less vibrations and smoother chopping is obtained. However, the outer fibre-cutting chopping device creates a very rough surface that extends parallel to the feeding direction of the log and that precedes the inner fibre-cutting chopping device, because the outer fibre-cutting chopping device presses or splits off the wood chips from said surface instead of cutting off the same. This implies that more or less of the wood material being about to be chopped off by the inner fibre-cutting chopping device already is removed, which in turn affects the wood chips being about to be chopped off by the inner chopping device. The major edge of the fibre-cutting chopping device penetrates into the wood material transversely to the log feeding direction while cutting-off of the fibres, and when the major edge has reached a certain depth, which depends on the inherent properties of the log, one or more wood-material bodies are sheared off or split away having the final shape and dimension of the finished wood chips. It should be pointed out that the thickness of the wood-material bodies split away is strongly depending on the length thereof in the fibre direction, as a consequence of the fact that the major edge of the fibre-cutting chopping device can be fed down further before the wood-material body is split away if the length thereof is increased. Simultaneously, the length of the wood-material body, and accordingly of the wood chips, can be adjusted by a suitable adjustment of the log feeding speed and the speed of rotation of the chipper disc.

[0006] Spiral discs, comprising a plurality of fibre-cleaving chopping devices arranged along paths that extend in a helical shape along the conical envelope surface of the chipper disc, experience a lower load than step discs, primarily because spiral discs may, for instance, comprise 100 fibre-cleaving chopping devices in relation to, for instance, 10 fibre-cutting chopping devices of an equivalent step disc. Thus, also the difference of power output over the length of the log becomes lower, because a great plurality of chopping devices are in engagement with the log simultaneously, which gives a smoother power output as well as smoother and more vibration-free chopping of the log. Fibre-cleaving chopping devices have a major edge that in the spiral disc is arranged primarily parallel to the fibre direction of the axially fed log so as to chop off so-called parallel-cut wood chips by cleaving off wood material along the fibres of the log, and in addition fibre-cleaving chopping devices have a, relatively speaking, short minor edge that is transverse to the major edge and has the purpose of cutting the fibres that are cleaved off from the log. Thus, said minor edge is arranged radially outside the appurtenant major edge, when the fibre-cleaving chopping device is mounted on the spiral disc. By means of such a configuration, together with a plurality of other factors, such as log feeding speed, the of speed of rotation the spiral disc, the mutual location of the chopping devices, etc., the shape and dimension of the chip body chopped off is determined. Thus, it can be said that the thickness of the chip body is well-defined as the same is determined by the mutual distance between the vertical planes in which the major edges of adjacent chopping devices in the same helical path are arranged, and the length of the chip body in the fibre direction is adjustable by suitable adjustment of the speed of rotation of the spiral disc in relation to the log feeding speed. However, the width of the fibre body, transverse to the fibre direction, cannot be controlled by adjustable parameters since the breakage of the parallel-cut wood-material bodies that have been released from the log, into wood chips, primarily takes place depending on the inherent properties of the log that are determined by the tree species, toughness, temperature/coldness degree, etc. For one and the same sort of wood, spiral discs may be optimal for the formation of wood chips from logs having a relatively high temperature, so-called unfrozen timber, at the same time as the wood chips become brittle and are decomposed into splinters from logs having a relatively low temperature, so-called frozen timber.

[0007] In addition, it should be pointed out that the paper-pulp manufacturing industry requires that the wood chips do not collapse during the proper boiling in the paper-pulp manufacturing process, and thereby the wood chips have to have dimensions that are within certain fixed limits, also known as belonging to a certain fraction. There are generally applied standardized methods to determine how great part of the wood chips formed from a specific chipping canter that belongs to a certain fraction. For instance, optimum wood chips should pass a screen having holes the diameter of which is 45 mm, and then a lattice having slots the width of which is 8 mm, but get caught on a screen having holes the diameter of which is 13 mm.

Brief Description of Objects and Features of the Invention

[0008] The present invention aims at obviating the above-mentioned disadvantages and failings of previously known chipper discs and providing an improved chipper disc. A primary object of the invention is to provide an improved chipper disc of the type defined by way of introduction, which provides optimum wood chips what relates to shape and dimension independently of the temperature of the log.

[0009] Another object of the present invention is to provide a chipper disc that has low vibration levels and low power output levels during operation. An additional object of the present invention is to provide a chipper disc that generates a plane surface along the machined log.

[0010] According to the invention, at least the primary object is attained by means of the chipper disc defined by way of introduction, which is characterized in that the chipper disc comprises, on one hand, a plurality of first chopping devices each of which has a major edge located in a plane perpendicular to the centre axis of the chipper

disc and arranged to cleave the fibres of the log while forming wood chips, and on the other hand at least one second chopping device having a major edge located at an obtuse angle to the above-mentioned perpendicular plane and arranged to cut the fibres of the log while forming wood chips, the first fibre-cleaving chopping devices being arranged in at least one helical path, which extends along the conical envelope surface of the chipper disc from an outer fibre-cleaving chopping device in the area of the thick end of the conical envelope surface toward the narrow end of the conical envelope surface and ends by means of an inner fibre-cleaving chopping device in the axial direction situated at a distance from the narrow end of the conical envelope surface, the at least one second fibre-cutting chopping device being arranged along the conical part envelope surface that is present between the narrow end of the conical envelope surface and said inner fibre-cleaving chopping device.

[0011] Thus, the present invention is based on the appreciation of utilizing fibre-cutting chopping devices and the inherent advantages thereof for the principal chopping off of wood material situated closest to the obtained plane surface of the formed block, and of utilizing fibre-cleaving chopping devices and the inherent advantages thereof for chopping off the outer wood material when large cutting depths are required, for instance in the area of the butt-end of the log where great chopping off generally is required.

[0012] Preferred embodiments of the present invention are furthermore defined in the depending claims.

[0013] Preferably, the majority of the first fibre-cleaving chopping devices are, in the axial direction in relation to the centre axis of the chipper disc, equidistantly arranged in said helical path, which provides a uniform thickness of the wood chips chopped off.

[0014] According to another preferred embodiment, the majority of the first fibre-cleaving chopping devices are arranged in three mutually uniformly spaced-apart helical paths, which allows to feed the logs at a higher speed through the chipping canter in which the chipper disc is arranged. In an additional preferred embodiment, the chipper disc comprises four second fibre-cutting chopping devices, which are equidistantly arranged in the peripheral direction of said conical envelope surface, whereupon the optimum chip length is obtained simultaneously by the fibre-cutting chopping devices and the fibre-cleaving chopping devices, respectively.

[0015] Preferably, the chipper disc comprises a separation means in the form of a circular saw blade arranged at the area of the narrow end of the conical envelope surface thereof, in order to provide said plane surface extending along the log.

[0016] The object of the invention is also attained by means of the chipping canter defined by way of introduction, as well as the set of chopping devices defined by way of introduction.

[0017] Preferably, said chipping canter comprises two opposite rotatably arranged chipper discs according to the invention.

[0018] Additional advantages of and features of the invention are seen in the other dependent claims as well as in the following, detailed description of preferred embodiments.

Brief Description of the Drawings

[0019] A more complete understanding of the above-mentioned and other features and advantages of the present invention will be clear from the following, detailed description of preferred embodiments, reference being made to the accompanying drawings, wherein:

Fig. 1	is a schematic illustration of the function of a chipper disc comprising only fibre-cutting chopping devices,
Fig. 2	is a schematic illustration of the function of a chipper disc comprising only fibre-cleaving chopping devices,
Fig. 3	is view from the outfeed side of a chipping canter of two opposite chipper discs between which a log is fed while being machined,
Fig. 4	is a view from above of the state shown in Fig. 3, where one of the chipper discs is partly sectioned,
Fig. 5	is a view from the side of a chipper disc,
Figs. 6-8	are perspective views of a fibre-cleaving chopping device, and
Figs. 9-11	are perspective views of different alternative embodiments of a fibre-cutting chopping device.

Detailed Description of Preferred Embodiments

[0020] Before the invention is described in detail, reference is made to the schematic illustrations of the functional differences between step discs and spiral discs according to Figures 1 and 2.

[0021] In Figure 1, the principle of operation is shown for a chipper disc having fibre-cutting chopping devices 1 and a pre-sawing circular saw blade 2. The log 3 being axially fed through a chipping canter and passing two opposite chipper discs will be formed into a block having two opposite plane surfaces 4 at the same time as wood material chopped off is machined into wood chips 5. By the fact that each chopping device 1 has the major edge 6 thereof arranged transversely to the feeding direction of the log 3, the wood-chip formation will primarily take place by fibre cutting, such as has been accounted for above.

[0022] In Figure 2, the principle of operation is shown for a chipper disc having fibre-cleaving chopping devices 7 and a pre-sawing circular saw blade 2. Each chopping device 7 has the major edge thereof arranged parallel to the feeding direction of the log 3, whereupon the wood-chip formation primarily will take place by fibre cleaving

such as has been accounted for above.

[0023] In Figures 3 and 4, there are shown a chipper disc of the left-hand type and a chipper disc of the right-hand type, as viewed in the log feeding direction illustrated in Figure 4, in its entirety designated 8 and 9, respectively. As is seen from Figures 3 and 4, the log 3 is top fed into the chipping canter with the core thereof essentially under the centre axis of the chipper discs 8, 9, whereupon the chopping devices 1, 7 of the chipper discs 8, 9 will come into engagement with the log 3 in the direction from above. Thus, Figure 3 is a view from the outfeed side of the chipping canter and Figure 4 a view from above of the two chipper discs 8 and 9. The chipper discs 8, 9 are included in a chipping canter (not shown) and are rotatably supported around a common axis in order to machine by chipping cantering a top-fed log 3 passing in the gap between the chipper discs 8, 9, in the making of a block having two opposite plane surfaces 4 as well as wood chips 5 of the wood material being chopped off from the log 3. Furthermore, the chipper discs 8, 9 are displaceable laterally in relation to the log feeding direction in order to provide the desired block dimensions.

[0024] Each of the chipper discs 8, 9 has a substantially frustoconical basic shape, the narrow ends of which are facing the passing log 3 and the thick ends of which are turned from the passing log 3. Furthermore, the chipper discs 8, 9 are almost in the form of shells 10 having a "hollow" back side and a centrally situated hub 11, as is seen in Figure 4. Along the envelope surface of each chipper disc 8, 9, a plurality of dismountable chopping devices 1, 7 are arranged, which will be described in detail below. The chopping devices 1, 7 are arranged, for instance by means of screw joints, in openings in the chipper discs 8, 9, which openings also provide passage of the wood chips to the back sides of the chipper discs 8, 9 for further collection and handling. It should be pointed out that the cutting depth illustrated in Figures 3 and 4 in relation to the diameter of the log 3 is considerably exaggerated for exemplifying purposes.

[0025] Reference is now made also to Figure 5, which is a view from the side, in the direction from the passing log 3, of the chipper disc of the right-hand type 9. However, it should be pointed out that the chipper disc of the left-hand type 8 is a mirror image of the chipper disc of the right-hand type 9, and that the following description accordingly is applicable to both types of chipper discs. From Figure 5, it is clearly seen that the chipper disc 9 comprises a plurality of first chopping devices 7 that are arranged in at least one helical path 12, which extends along the conical envelope surface of the chipper disc 9 from an outer first chopping device 7 in the area of the thick end of the conical envelope surface toward the narrow end of the conical envelope surface and which ends by means of an inner first chopping device 7 situated at a distance from the narrow end of the conical envelope surface. Preferably, the majority of the first chopping devices 7 are arranged evenly distributed in three mutually uniformly spaced-apart helical paths 12, each helical path 12 in the embodiment shown comprising nineteen first chopping devices 7, which are, in the axial direction in relation to the centre axis of the chipper disc 9, equidistantly arranged in said helical path 12. Each helical path 12 preferably extends essentially 330° around the centre axis of the chipper disc 9. As is seen in Figures 3 and 4, the conical envelope surface is not entirely smooth but has steps in the area of each helical path 12. Furthermore, the chipper disc 9 comprises at least one second chopping device 1 arranged along the conical part envelope surface that is present between the narrow end of the conical envelope surface and said inner first chopping device 7. Preferably, the chipper disc 9 comprises four second chopping devices 1, which are equidistantly arranged in the peripheral direction of said conical part envelope surface.

[0026] Reference is now made primarily to Figures 6, 7 and 8, which show the first chopping device 7 as viewed in different directions. Each one of the first chopping devices 7 comprises a main body 13 that at one end has a, relatively speaking, long major edge 14, which is formed between a chip surface 15 that is plane in the embodiment shown and an end surface or clearance surface 16 that is chamfered in relation to the main body 13. In the end opposite the major edge 14, the main body 13 has, in the preferred embodiment, two mutually spaced-apart branches 17, which preferably are parallel. Said branches 17 are arranged to co-operate with the corresponding seats in the openings in the chipper disc 9. In Figures 6 and 7, it is seen that each individual first chopping device 7 has a threaded hole 32 that mouths in the bottom surface between said branches 17, for the receipt of a set screw (not shown) having the purpose of locating the major edge 14 of the first chopping device 7 in relation to a guide in the chipper disc 9, as well as a guide in a grinding fixture. Furthermore, the main body 13 has a, relatively speaking, short minor edge 18 connecting to the major edge 14 and arranged transversely to the major edge 14, for instance 30-60°. Said minor edge is formed between a chip surface 20 situated on a bulge 19 and a chamfered end surface or clearance surface 21. The bulge is located along the long side edge of the main body 13. In the embodiment shown, the first chopping device 7 is provided with longitudinal chamfered surfaces 22, which extend along the entire length of the main body 13 and of the branches 17.

[0027] Reference is now made primarily to Figures 9 and 10, which show a first embodiment of the second chopping device 1 as viewed in different directions. Each one of the second chopping devices 1 comprises, similar to the first chopping devices 7, a main body 23 that at one end has a, relatively speaking, long major edge 24, which is formed between a chip surface 25 that is plane in the embodiment shown and an end surface or clearance surface 26 that is chamfered in relation to the main body 23. In the end opposite the major edge 24, the main body 23 has, in the preferred embodiment, a plurality of

mutually spaced-apart branches 27, which preferably are parallel. Said branches 27 are arranged to co-operate with the corresponding seats in the openings in the chipper disc 9. In Figures 9-11, it is seen that each individual second chopping device 1 has one or more set screws 33 in the free ends of one or more branches 27. Which set screws 33 are received in threaded holes (not shown). The set screws 33 have the purpose of locating the major edge 24 of the second chopping device 1 in relation to a guide in the chipper disc 9, as well as a guide in a grinding fixture. Furthermore, the main body 23 has a minor edge 28 connecting to the major edge 24. Said minor edge 28 is formed between the chip surface 25 and a chamfered surface 29. In Figure 11, an alternative embodiment of the second chopping device 1 is shown, the main body 23 being divided into two part bodies, whereupon the first part body 30 comprises the major edge 24 and the second part body 31 comprises the minor edge 28.

[0028] The major edge 14 of each first chopping device 7 is, when it is mounted in a chipper disc 9, located in a vertical plane that is perpendicular to the centre axis of the chipper disc. In other words, the major edges 14 are arranged parallel to the log feeding direction and are accordingly arranged to cleave the fibres of the log 3 while forming wood chips 5. The axial distance between each vertical plane corresponding to two adjacent first fibre-cleaving chopping device 7 in the same helical path 12, constitutes the theoretical maximum thickness that the created parallel-cut wood chips 5 can have, which preferably amounts to approximately 7 mm. The above-mentioned minor edge 18 of each first fibre-cleaving chopping device 7 has, when the chopping device is mounted in a chipper disc 9, an axial extension that corresponds to said axial distance, whereupon the length of the wood chips 5 in the fibre direction may be adjusted by means of a suitable adjustment of the log feeding speed and the speed of rotation of the chipper disc 9 as well as the selection of the number of helical paths 12. Preferably, the major edge 14 is arranged in a plane comprising the centre axis of the chipper disc 9.

[0029] The major edge 24 of each second chopping device 1 is, when it is mounted in a chipper disc 9, located at an obtuse angle to the above-mentioned vertical plane that is perpendicular to the centre axis of the chipper disc 9. In other words, the major edges 24 are arranged transversely to the log feeding direction and are accordingly arranged to cut the fibres of the log 3 while forming wood chips. The minor edge 28 is arranged parallel to the plane surface 4 created on the log 3, in the area of the narrow end of the conical envelope surface. The number of second fibre-cutting chopping devices 1, together with the log feeding speed and the speed of rotation of the chipper disc 9, determines the length in the fibre direction of the created wood chips 5. In addition, it is pointed out that the thickness of the created wood chips 5 is strongly depending on the length of the wood chips 5, as has been mentioned above. Preferably the major edge 24 of the second fibre-cutting chopping device 1 extends in the axial direction in relation to the chipper disc 9, over an axial distance that is considerably greater than the above-mentioned axial distance between each vertical plane corresponding to two adjacent first fibre-cleaving chopping devices 7 in the same helical path 12. Preferably, the axial extension of the major edge 24 of the second fibre-cutting chopping device 1 amounts to approximately 50-60 mm.

[0030] Reference is now made once again primarily to Figure 5, from which it is seen that the chipper disc 9, in the area of the narrow end of the conical envelope surface, also comprises a separation means 32 arranged to provide said plane surface 4 extending along the log 3. In the shown preferred embodiment, the separation means is in the form of a circular saw blade. Alternatively, the separation means may consist of a plurality of cutting inserts (not shown) equidistantly arranged along the peripheral edge of the narrow end of the conical envelope surface. The separation means 32 is of a so-called pre-sawing type, whereupon the wood material of the wood chips that are formed by the second fibre-cutting chopping devices 1 is separated from the log 3 before the individual second fibre-cutting chopping device 1 comes into engagement with the wood material for the formation of wood chips. The above-mentioned minor edge 28 is arranged to abut against the web of the saw blade 32 with the purpose of preventing wood chips from passing between the saw blade 32 and the second fibre-cutting chopping device 1. Furthermore, it should be pointed out that the divided second fibre-cutting chopping device 1 has, as is seen in Figure 11, a displacement of the major edge 24 in relation to the minor edge 28, with the purpose of allowing the projecting corner of the major edge 24 to be arranged between two teeth of a pre-sawing saw blade 32. And when the major edge 24 is ground, still a correct mutual displacement between the major edge 24 and the minor edge 28 can be obtained by the corresponding adjustment of the set screws 33.

[0031] Thus, the invention is based on the use of a set of chopping devices mounted on a chipper disc 9 and comprising, on one hand, a plurality of first fibre-cleaving chopping devices 7 essentially arranged to cleave the fibres of the log 3 while forming wood chips 5 of outer wood material spaced apart from the formed plane surface of the log, and on the other hand at least one second fibre-cutting chopping device 1 essentially arranged to cut the fibres of the log 3 while forming wood chips 5 of inner wood material closest to the formed plane surface of the log.

Feasible Modifications of the Invention

[0032] The invention is not limited only to the embodiments described above and shown in the drawings, which only have the purpose of illustrating and exemplifying. This patent application is intended to cover all adaptations and variants of the preferred embodiments described herein, and consequently the present invention

is defined by the wording of the accompanying claims and the equivalents thereof. Thus, the equipment may be modified in all feasible ways within the scope of the accompanying claims.

[0033] It should be pointed out that even if the invention has been described with two co-operating chipper discs, a chipping canter may comprise only one chipper disc.

[0034] It should also be pointed out that with the term "fibre-cleaving chopping device", which for the sake of simplicity has been used in the claims as well as in the description, reference is made to chopping devices which cleave/split the wood material of the log in the longitudinal fibre direction of the log, and it should be pointed out that a person skilled in the art realizes that it is not the individual fibres of the log that are cleaved by means of the chopping device.

[0035] It should also be pointed out that all information about/regarding terms such as upper, under, etc., should be interpreted/read with the equipment orientated in accordance with the figures, with the drawings orientated in such a way that the reference designations can be read in a proper way. Thus, such terms only indicate mutual relationships in the shown embodiments, which relationships may be changed if the equipment according to the invention is provided with another construction/design.

[0036] It should be pointed out that even if it is not explicitly mentioned that features from one specific embodiment can be combined with the features of another embodiment, this should be regarded as evident when possible.

Claims

1. A chipper disc for plane machining of an axially fed log (3) passing the chipper disc (9) by chopping off wood material from said log (3) while forming, on one hand, a plane surface (4) extending along the log (3), and on the other hand wood chips of said wood material chopped off, the chipper disc (9) having a substantially frustoconical basic shape along the envelope surface of which a plurality of dismountable chopping devices (1, 7) are arranged, **characterized in that** the chipper disc comprises, on one hand, a plurality of first chopping devices (7) each of which has a major edge (14) located in a plane perpendicular to the centre axis of the chipper disc (9) and arranged to cleave the fibres of the log (3) while forming wood chips, and on the other hand at least one second chopping device (1) having a major edge (24) located at an obtuse angle to the above-mentioned perpendicular plane and arranged to cut the fibres of the log (3) while forming wood chips, the first fibre-cleaving chopping devices (7) being arranged in at least one helical path (12), which extends along the conical envelope surface of the chipper disc (9) from an outer fibre-cleaving chopping device in the area of the thick end of the conical envelope surface toward the narrow end of the conical envelope surface and ends by means of an inner fibre-cleaving chopping device in the axial direction situated at a distance from the narrow end of the conical envelope surface, the at least one second fibre-cutting chopping device (1) being arranged along the conical part envelope surface that is present between the narrow end of the conical envelope surface and said inner fibre-cleaving chopping device.

2. Chipper disc according to claim 1, **characterized in that** the major edge (14) of the inner fibre-cleaving chopping device (7) in the axial direction is situated more than 50 mm from the narrow end of the conical envelope surface.

3. Chipper disc according to claim 1 or 2, **characterized in that** the major edge (14) of each first fibre-cleaving chopping device (7) is arranged in a plane comprising the centre axis of the chipper disc (9).

4. Chipper disc according to claim 1, 2 or 3, **characterized in that** the majority of the first fibre-cleaving chopping devices (7) are, in the axial direction in relation to the centre axis of the chipper disc (9), equidistantly arranged in said helical path (12).

5. Chipper disc according to any one of claims 1-4, **characterized in that** the majority of the first fibre-cleaving chopping devices (7) are arranged in three mutually uniformly spaced-apart helical paths (12).

6. Chipper disc according to any one of claims 1-5, **characterized in that** each helical path (12) extends in the order of 330° around the centre axis of the chipper disc (9) .

7. Chipper disc according to any one of claims 1-6, **characterized in that** the same comprises four second fibre-cutting chopping devices (1), which are equidistantly arranged in the peripheral direction of said conical part envelope surface.

8. Chipper disc according to any one of the preceding claims, **characterized in that** the same, in the area of the narrow end of the conical envelope surface, comprises separation means (32) arranged to provide said plane surface (4) extending along the log (3).

9. Chipper disc according to claim 8, **characterized in that** said separation means consists of a circular saw blade (32) .

10. Chipper disc according to claim 8, **characterized in that** said separation means consists of a plurality of cutting inserts equidistantly arranged along the pe-

ripheral edge of the narrow end of the conical envelope surface.

11. A chipping canter for plane machining of an axially fed log (3) passing the plane machining machine by chopping off wood material from said log (3) while forming, on one hand, a plane surface (4) extending along the log (3), and on the other hand wood chips of said wood material chopped off, **characterized in that** the same comprises at least one rotatably arranged chipper disc (9) according to any one of claims 1-10.

12. Chipping canter according to claim 11, **characterized in that** the same comprises two opposite rotatably arranged chipper discs (8, 9).

13. A set of chopping devices for a chipper disc (9) according to any one of claims 1-10, **characterized in that** the same comprises, on one hand, a plurality of first chopping devices (7) each of which has a major edge (14) arranged to be located in a plane perpendicular to the centre axis of the chipper disc (x) and arranged to cleave the fibres of the log (3) while forming wood chips (5), and on the other hand at least one second chopping device (1) having a major edge (24) arranged to be located at an obtuse angle to the above-mentioned perpendicular plane and arranged to cut the fibres of the log (3) while forming wood chips (5).

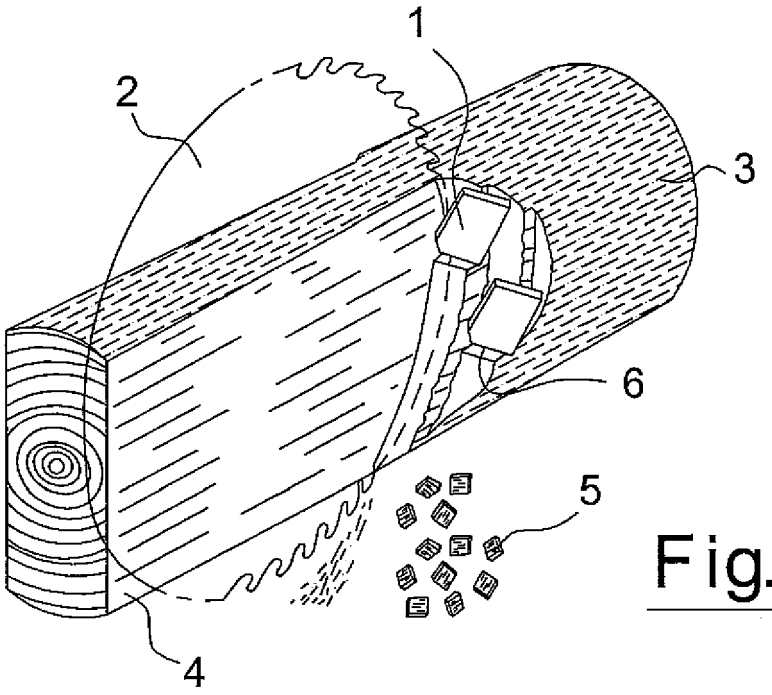

Fig. 1

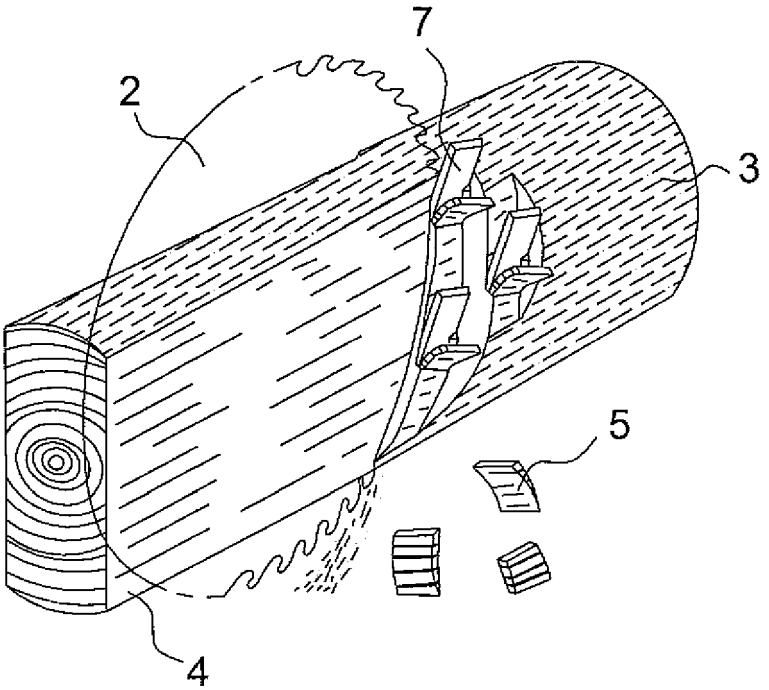

Fig. 2

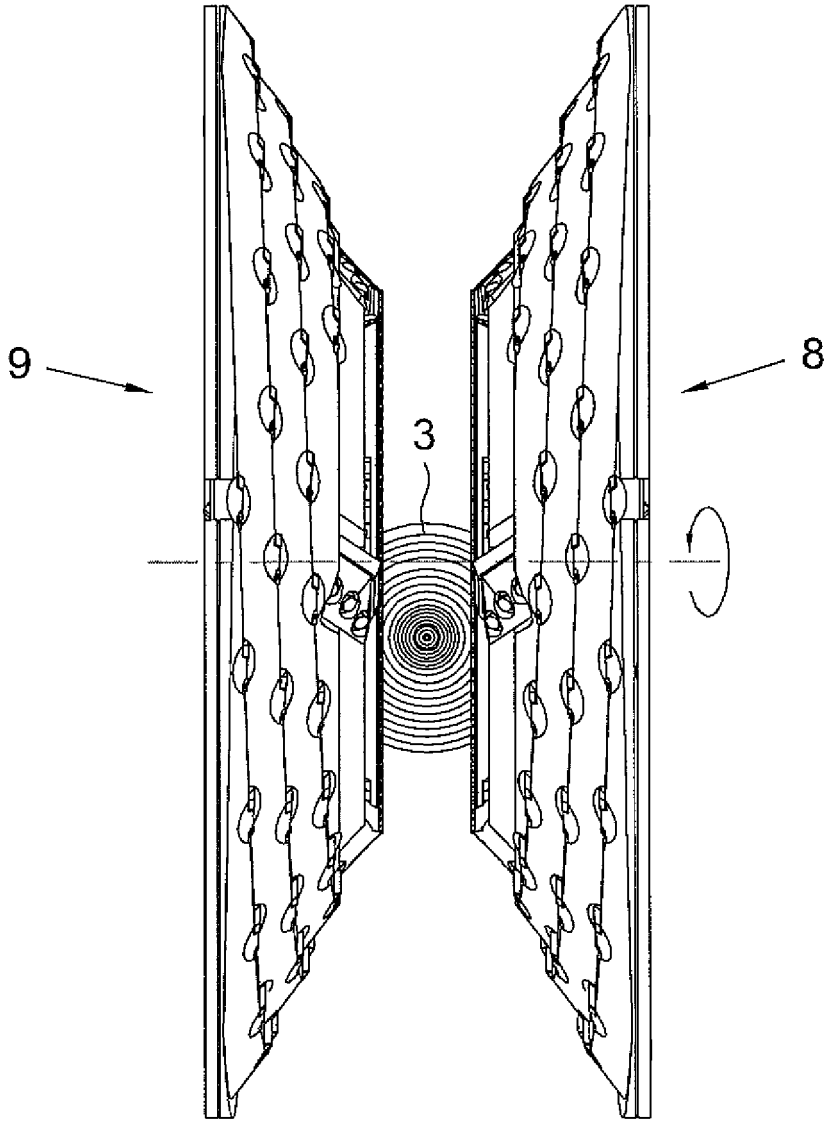

Fig. 3

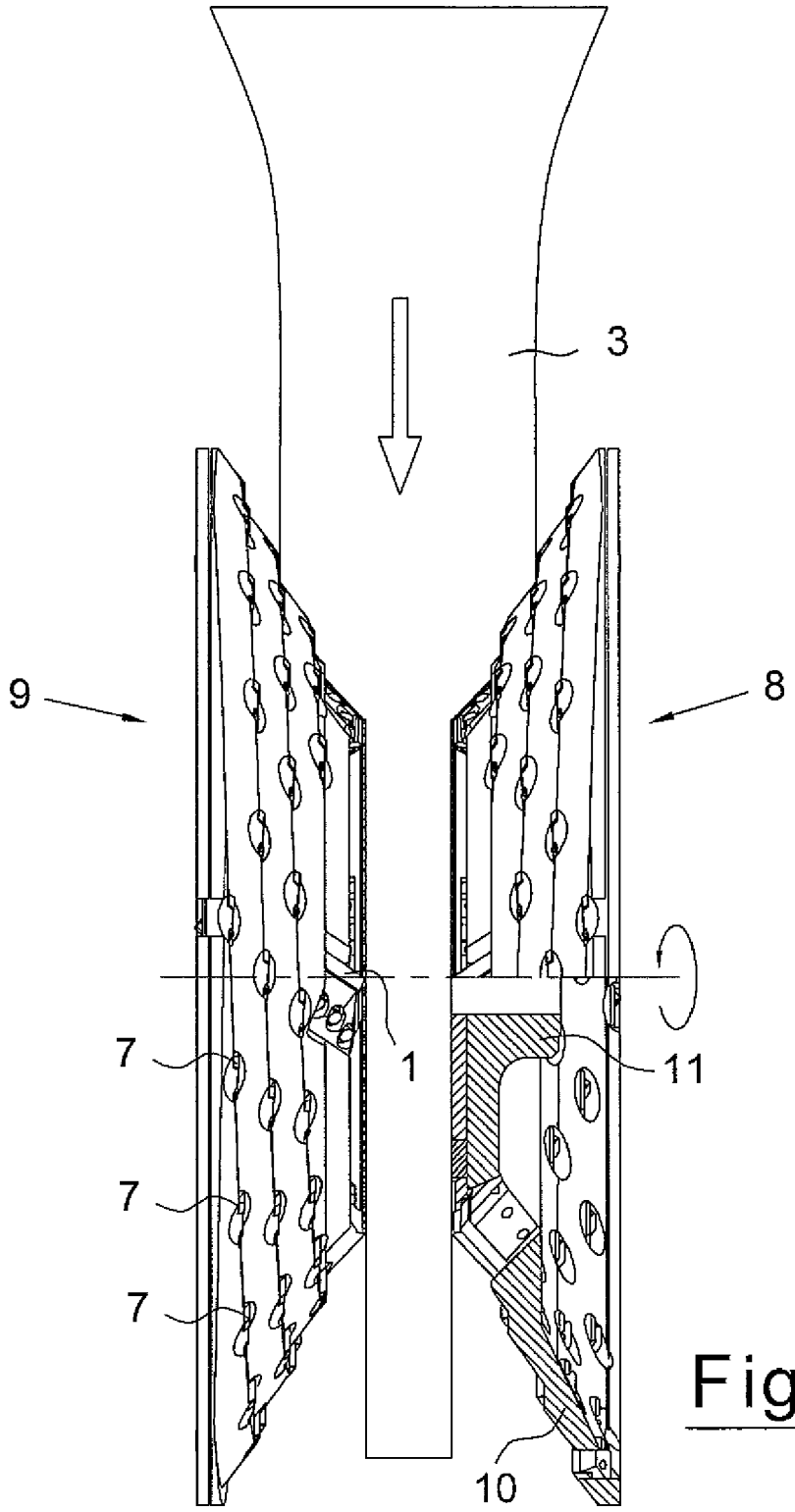

Fig. 4

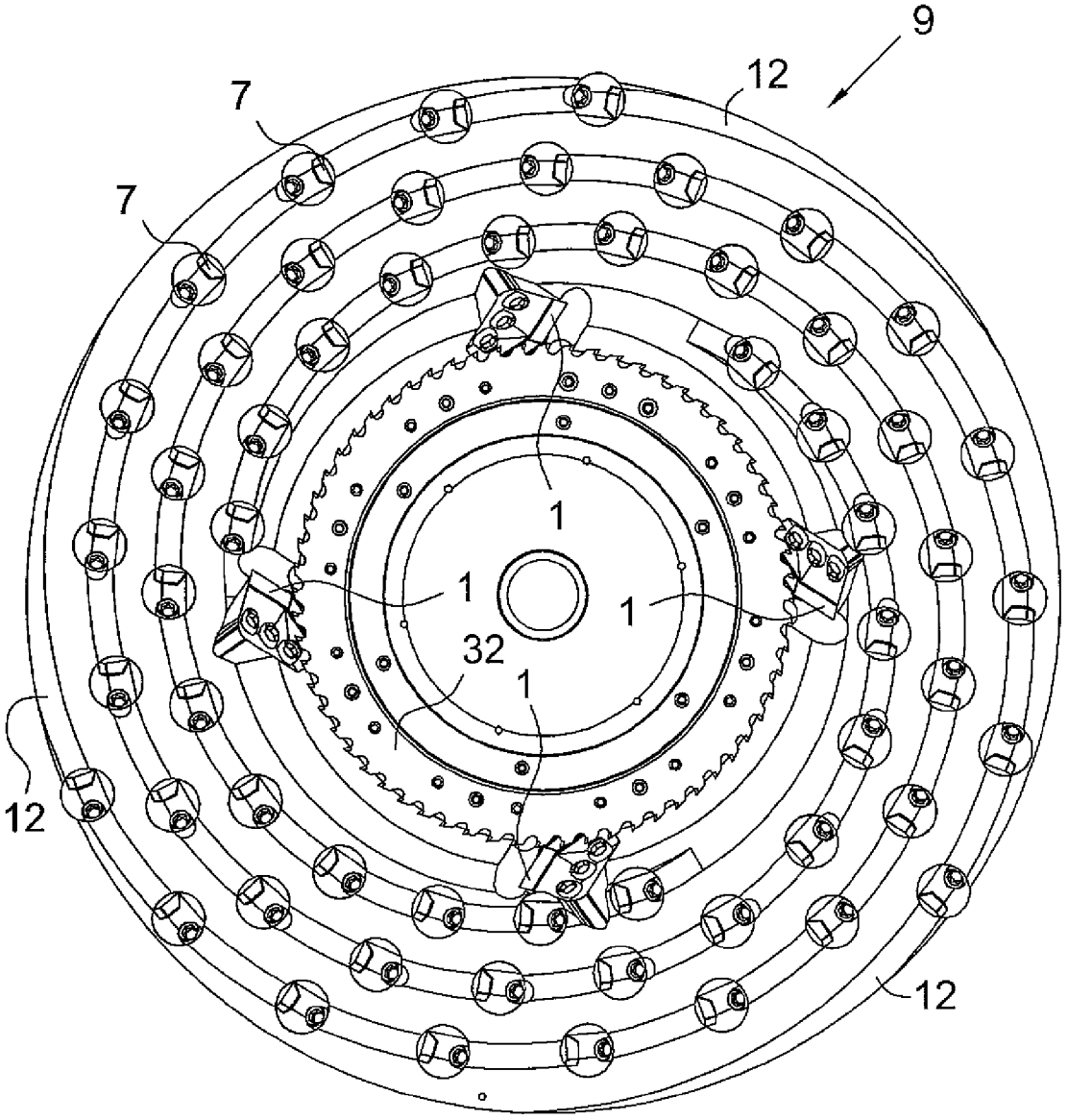

Fig. 5

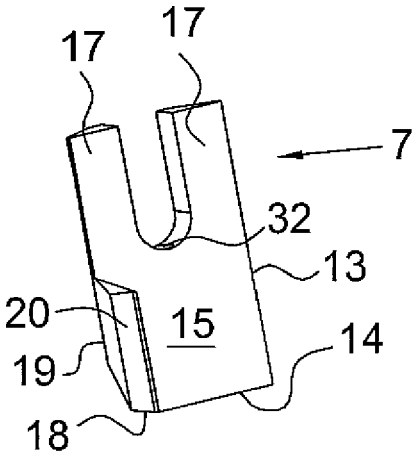

Fig. 6

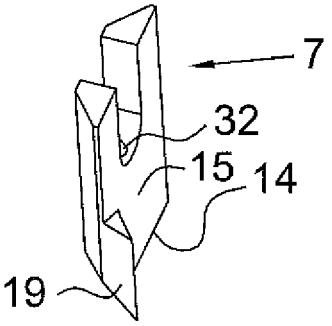

Fig. 7

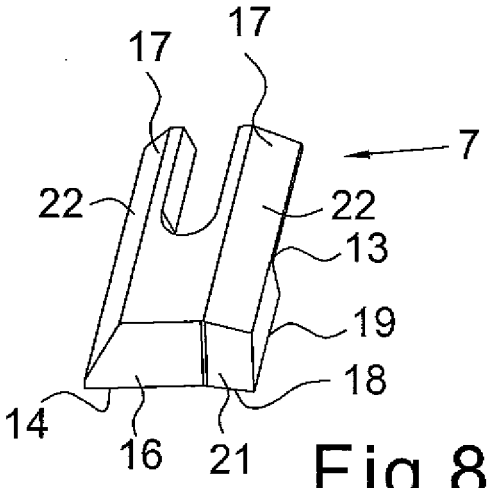

Fig. 8

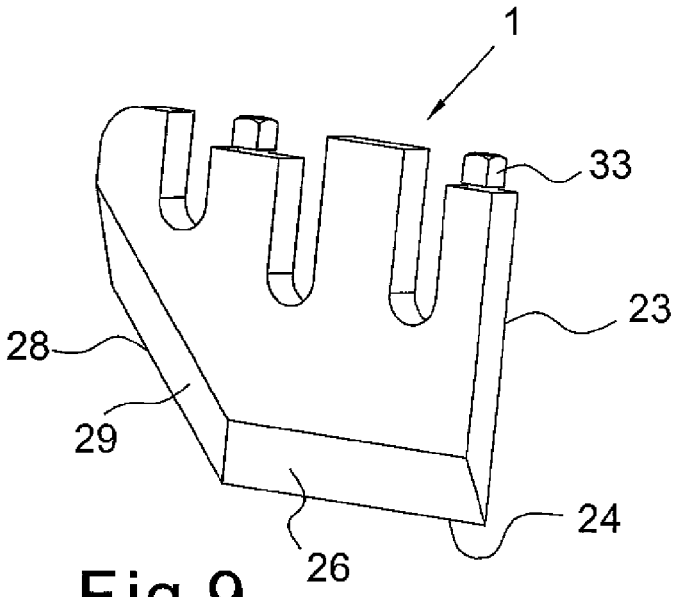

Fig. 9

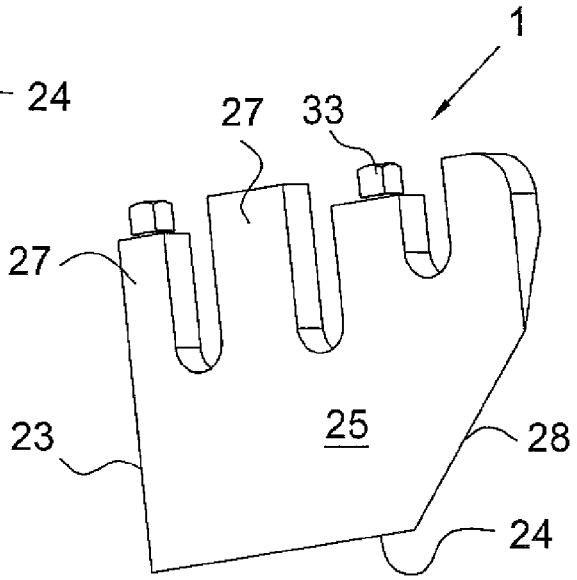

Fig. 10

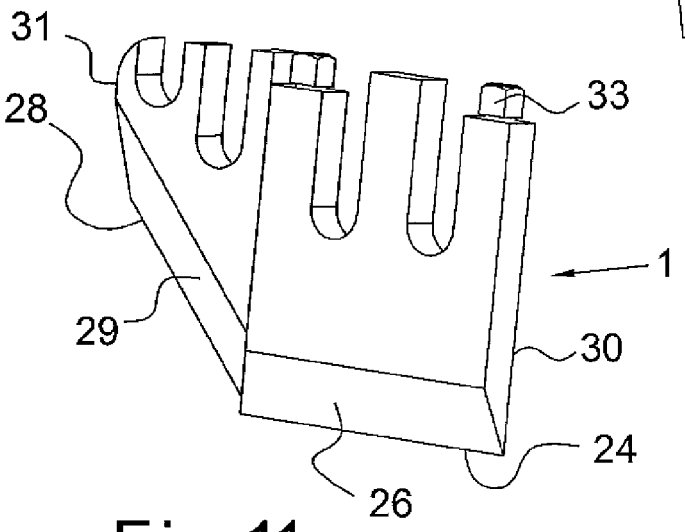

Fig. 11

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 08 15 1214

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	24 June 2008	Hamel, Pascal

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