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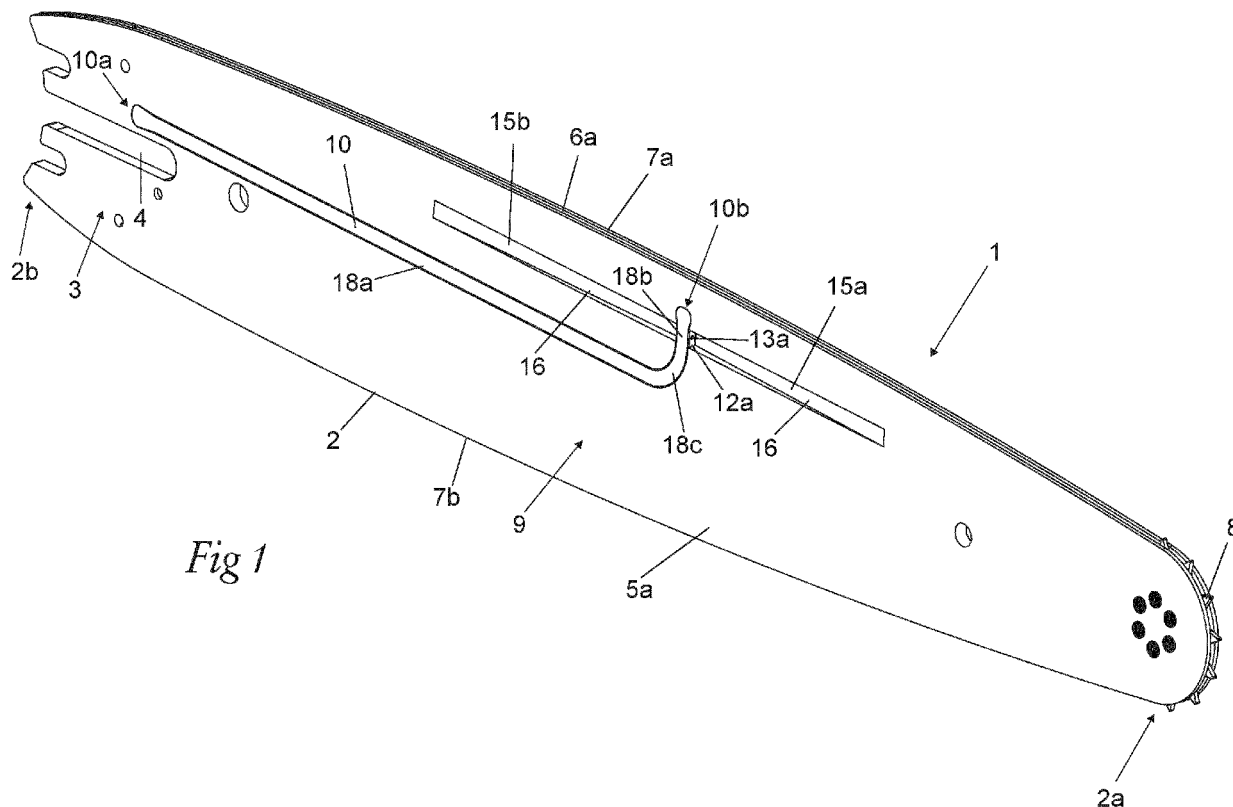
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(57) A saw chain guide bar comprising a guide bar body (2) and a liquid feed channel (10) configured to receive pressurized liquid and having an outlet (12a) with at least one first spray outlet orifice (13a), which is configured to face the nose end (2a) or the rear end (2b) of the guide bar body and emit a liquid spray in a direction towards that end of the guide bar body. The guide bar

body is provided with a spray guiding groove (15a) formed as an outwardly open elongated recess in the guide bar body, wherein said spray outlet orifice (13a) opens into this spray guiding groove, which extends from said outlet (12a) in a direction towards the end of the guide bar body to which said spray outlet orifice (13a) is facing.

*Fig 1***EP 4 385 692 A1**

Description

FIELD OF THE INVENTION AND PRIOR ART

[0001] The present invention relates to a saw chain guide bar according to the preamble of claim 1, which is configured for attachment to a chainsaw cutting device of a tree harvester and which is intended to be used for spraying a liquid onto an exposed end surface of a tree stump that remains after the felling of a tree.

[0002] A tree stump remaining after the felling of a tree may be infected by fungus spores through the air and the resulting fungus growth may cause root rot, which may be transmitted from the infected tree stump to healthy and growing trees in the surroundings via the root system. In order to prevent the development of such root rot in a tree stump, the cut surface of the tree stump may be coated with a suitable treatment liquid in connection with the felling of the tree by means of a tree harvester. The treatment liquid may for instance be a chemical fungicide, such as an urea solution, or a water suspension of spores of harmless fungi which are antagonists or competitors to the harmful fungi. It is previously known to use the saw chain guide bar of a chainsaw cutting device of a tree harvester in order to apply a treatment liquid onto the cut surface of a tree stump by spraying in connection with the felling of a tree. Such a guide bar may for instance be of the type previously known from US 6 397 452 B1 or WO 01/87050 A1 where a liquid feed channel is provided along a part of the guide bar, wherein spray outlet orifices are distributed along the length of the liquid feed channel and a source of treatment liquid is connected to the liquid feed channel in order to supply pressurized treatment liquid into the liquid feed channel and allow the treatment liquid to be emitted through the spray outlet orifices as an array of liquid sprays directed towards the cut surface of a tree stump. With such a saw chain guide bar, the pressure of the treatment liquid drops as the treatment liquid moves through the liquid feed channel and passes the different spray outlet orifices, which may cause an uneven distribution of the treatment liquid over the cut surface of the tree stump.

[0003] It is desirable that the exposed cut surface of the tree stump is covered completely and evenly with the treatment liquid. It is also desirable to avoid a spraying of the treatment liquid onto vegetation and ground in the area around the tree stump, to thereby avoid negative environmental effects and a costly waste of treatment liquid. With a saw chain guide bar of the type disclosed in US 6 397 452 B1 or WO 01/87050 A1, the distribution of the spray outlet orifices along the liquid feed channel has to be adapted to the diameter of the trees to be cut in order to achieve an appropriate spray pattern over the cut surface of the tree stumps. If a saw chain guide bar of this previously known type is adapted for cutting of large diameter trees, a considerable amount of the sprayed treatment liquid will miss the cut surface of a tree stump if the saw chain guide bar is also used for

cutting a tree of smaller diameter. If a saw chain guide bar of this previously known type is adapted for cutting of small diameter trees, the sprayed treatment liquid will not cover the entire area of the cut surface of a tree stump if the saw chain guide bar is also used for cutting a tree of larger diameter.

SUMMARY OF THE INVENTION

[0004] The object of the present invention is to achieve a further development of a saw chain guide bar of the above-mentioned type so as to provide a saw chain guide bar that is improved in at least some aspect.

[0005] According to the invention, this object is achieved by means of a saw chain guide bar having the features defined in claim 1.

[0006] The saw chain guide bar of the present invention comprises:

- an elongated guide bar body, which has a rear end and an opposite nose end, wherein the guide bar body at its rear end has an attachment section configured for attachment to a chainsaw cutting device of a tree harvester and wherein the guide bar body has a first side face extending between the rear end and the nose end and an opposite second side face extending between the rear end and the nose end; and
- a liquid feed channel extending along a part of the guide bar body from the attachment section towards the nose end, the liquid feed channel having an upstream end located at the attachment section and a downstream end located at a distance from the attachment section.

[0007] At its upstream end, the liquid feed channel has an inlet opening, through which the liquid feed channel is configured to receive pressurized liquid. At its downstream end, the liquid feed channel has an outlet with at least one spray outlet orifice facing the rear end or the nose end of the guide bar body. This outlet and its spray outlet orifice are in the following referred to as "first outlet" and "first spray outlet orifice", respectively. The first outlet is in fluid communication with the inlet opening of the liquid feed channel and configured to emit liquid received therefrom as a liquid spray through the first spray outlet orifice in a direction towards the rear end of the guide bar body if the first spray outlet orifice is configured to face the rear end of the guide bar body or in a direction towards the nose end of the guide bar body if the first spray outlet orifice is configured to face the nose end of the guide bar body.

[0008] The guide bar body is provided with a spray guiding groove, in the following referred to as "first spray guiding groove", formed as an outwardly open elongated recess in the first side face of the guide bar body, wherein the first spray outlet orifice opens into the first spray guiding groove and the first spray guiding groove extends

from said first outlet of the liquid feed channel in a direction towards the rear end of the guide bar body if the first spray outlet orifice is configured to face the rear end of the guide bar body or in a direction towards the nose end of the guide bar body if the first spray outlet orifice is configured to face the nose end of the guide bar body.

[0009] When liquid is to be applied from the above-mentioned liquid feed channel onto a cut surface of a tree stump, the saw chain guide bar is to be moved across the tree to be felled with the above-mentioned first side face of the guide bar body facing the cut surface of the tree stump. With the saw chain guide bar of the present invention, the above-mentioned spray outlet orifice will emit a liquid spray in a direction along the guide bar body and the associated spray guiding groove will allow this liquid spray to be distributed along the guide bar body before hitting the cut surface of a tree stump. Liquid from one single liquid spray may hereby be distributed over a larger area on a cut surface of a tree stump when the saw chain guide bar is swept over the surface. It is hereby possible to dispense with an arrangement of an array of spray outlet orifices along the length of the liquid feed channel, which in its turn implies that the above-mentioned pressure drop along the liquid feed channel is avoided. With the saw chain guide bar of the present invention, it will also be possible to adjust the reach of the emitted liquid spray by adjustment of the pressure of the liquid supplied to the liquid feed channel, which in its turn makes it possible to adapt the spray pattern in a quick and simple manner in dependence on the diameter of the trees to be cut. The exposed cut surface of the tree stumps may hereby be covered completely and evenly with the sprayed liquid with a limited waste of liquid.

[0010] An embodiment of the invention is characterized in:

- that said at least one first spray outlet orifice faces the nose end of the guide bar body;
- that the liquid feed channel at its downstream end also has a second outlet with at least one second spray outlet orifice facing the rear end of the guide bar body, wherein this second outlet is in fluid communication with the inlet opening and configured to emit liquid received therefrom as a liquid spray through said at least one second spray outlet orifice in a direction towards the rear end of the guide bar body; and
- that the guide bar body is provided with a second spray guiding groove formed as an outwardly open elongated recess in the first side face of the guide bar body, wherein said at least one second spray outlet orifice opens into the second spray guiding groove and the second spray guiding groove extends from said second outlet of the liquid feed channel in a direction towards the rear end of the guide bar body.

In this case, liquid sprays will be emitted from the liquid

feed channel in two opposite directions, or at least essentially opposite directions, along the guide bar body, which will ensure an efficient distribution of liquid over a cut surface of a tree trunk.

[0011] The first outlet preferably has one single first spray outlet orifice and that the second outlet preferably has one single second spray outlet orifice. Furthermore, the first spray outlet orifice and the second spray outlet orifice are preferably aligned with each other.

[0012] According to another embodiment of the invention, the total cross-sectional area of all spray outlet orifices of the liquid feed channel is smaller than the cross-sectional area of the inlet opening of the liquid feed channel. Pressure drop in the liquid feed channel is hereby avoided, which is favourable with respect to the formation of the liquid spray or sprays. When the liquid feed channel is provided with one single first outlet orifice and one single second outlet orifice, the sum of the cross-sectional area of the first spray outlet orifice and the cross-sectional area of the second spray outlet orifice is in this case smaller than the cross-sectional area of the inlet opening.

[0013] Each spray guiding groove preferably extends in a straight line, or at least essentially straight line, along a part of the first side face of the guide bar body. Furthermore, the first and second spray guiding grooves are preferably aligned with each other.

[0014] According to another embodiment of the invention, each spray guiding groove has an inclined bottom surface, which has such an inclination that the depth of the spray guiding groove is gradually decreasing as seen in a direction from a first end of the spray guiding groove facing the associated outlet of the liquid feed channel to an opposite second end of the spray guiding groove.

[0015] According to another embodiment of the invention, the liquid feed channel comprises:

- a straight, or at least essentially straight, first part that extends from the attachment section of the guide bar body to a middle section of the guide bar body located at the middle of the guide bar body as seen in the longitudinal direction thereof, this first part being free from spray outlet orifices;
- a straight, or at least essentially straight, second part that extends at an angle of 80-100°, preferably 90°, to the first part, said spray outlet orifice or orifices being provided in this second part; and
- a curved third part that forms a connection between said first part and said second part, this third part being free from spray outlet orifices.

However, the liquid feed channel may of course also be designed in any other suitable manner.

[0016] The liquid feed channel is with advantage formed by an elongated tube, which is mounted in an elongated tube-accommodating groove in the first side face of the guide bar body. In this case, a bottom surface of the tube-accommodating groove may have:

- an inclined first ramp section at a first end of the tube-accommodating groove, wherein this first ramp section has such an inclination that the depth of the tube-accommodating groove is gradually increasing as seen in a direction from a first end of the first ramp section facing the first end of the tube-accommodating groove to an opposite second end of the first ramp section; and
- an inclined second ramp section at a second end of the tube-accommodating groove, wherein this second ramp section has such an inclination that the depth of the tube-accommodating groove is gradually increasing as seen in a direction from a first end of the second ramp section facing the second end of the tube-accommodating groove to an opposite second end of the second ramp section.

If the above-mentioned elongated tube is an open-ended tube of rather soft metal material, such as aluminium or copper, and mounted to the tube-accommodating groove in a previously known manner by being pressed into this groove with such a force that the wall of the tube is deformed into a shape essentially corresponding to the shape of the groove, the initially open ends of the tube may be sealed by clamping by being pressed against said ramp sections at the ends of the groove.

[0017] Another embodiment of the invention is characterized in:

- that the saw chain guide bar comprises an additional liquid feed channel, which extends along a part of the guide bar body from the attachment section towards the nose end, the additional liquid feed channel having an upstream end located at the attachment section and a downstream end located at a distance from the attachment section, wherein the additional liquid feed channel at its upstream end has an inlet opening, through which the additional liquid feed channel is configured to receive pressurized liquid;
- that the additional liquid feed channel at its downstream end has a first outlet with at least one first spray outlet orifice facing the nose end of the guide bar body and a second outlet with at least one second spray outlet orifice facing the rear end of the guide bar body, wherein the first outlet of the additional liquid feed channel is in fluid communication with the inlet opening of the additional liquid feed channel and configured to emit liquid received therefrom as a liquid spray through said at least one first spray outlet orifice in a direction towards the nose end of the guide bar body, and wherein the second outlet of the additional liquid feed channel is in fluid communication with the inlet opening of the additional liquid feed channel and configured to emit liquid received therefrom as a liquid spray through said at least one second spray outlet orifice in a direction towards the rear end of the guide bar body;

- that the guide bar body is provided with a third spray guiding groove formed as an outwardly open elongated recess in the second side face of the guide bar body, wherein said at least one first spray outlet orifice of the additional liquid feed channel opens into the third spray guiding groove and the third spray guiding groove extends from the first outlet of the additional liquid feed channel in a direction towards the nose end of the guide bar body; and
- that the guide bar body is provided with a fourth spray guiding groove formed as an outwardly open elongated recess in the second side face of the guide bar body, wherein said at least one second spray outlet orifice of the additional liquid feed channel opens into the fourth spray guiding groove and the fourth spray guiding groove extends from the second outlet of the additional liquid feed channel in a direction towards the rear end of the guide bar body.

In this case, the saw chain guide bar may be attached to the chainsaw cutting device of a tree harvester in a first orientation such that the saw chain guide bar is moved across a tree to be felled with one of the longitudinal edges of the guide bar body as leading edge and with the first side face of the guide bar body facing the cut surface of the tree stump, and in an inverted second orientation such that the saw chain guide bar is moved across a tree to be felled with the other longitudinal edge of the guide bar body as leading edge and with the second side face of the guide bar body facing the cut surface of the tree stump. Thus, when the initial leading edge of the guide bar body becomes worn, the bar may be inverted such that the other longitudinal edge of the guide bar body will become a new leading edge. When the saw chain guide bar is attached to the chainsaw cutting device in said second orientation, liquid may be applied from the above-mentioned additional liquid feed channel onto a cut surface of a tree stump, and when the saw chain guide bar is attached to the chainsaw cutting device in said first orientation, liquid may be applied from the other liquid feed channel onto a cut surface of a tree stump.

[0018] Further advantageous features of the saw chain guide bar according to the present invention will appear from the description following below and the dependent claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0019] With reference to the appended drawings, a specific description of embodiments of the invention cited as examples follows below. In the drawings:

- Fig 1 is a perspective view of a saw chain guide bar according to an embodiment of the present invention,
- Fig 2 is perspective views from another direction of the saw chain guide bar of Fig 1,

- Fig 3 is a planar view from a first side of the saw chain guide bar of Fig 1,
- Fig 4 is a planar view from an opposite second side of the saw chain guide bar of Fig 1,
- Fig 5 is a cut according to the line A-A in Fig 3,
- Fig 6 is a cut according to the line B-B in Fig 3,
- Fig 7 is a perspective view of a tube that is used for forming a liquid feed channel included in the saw chain guide bar of Fig 1,
- Fig 8 is a perspective view of a guide bar body included in the saw chain guide bar of Fig 1,
- Fig 9 is a perspective view of the liquid feed channel included in the saw chain guide bar of Fig 1,
- Fig 10 is a perspective view of a saw chain guide bar according to an alternative embodiment of the invention,
- Fig 11 is a planar view from a first side of a saw chain guide bar according to another alternative embodiment of the invention,
- Fig 12 is a planar view from an opposite second side of the saw chain guide bar of Fig 11, and
- Fig 13 is a cut according to the line C-C in Fig 11.

DETAILED DESCRIPTION OF EMBODIMENTS OF THE INVENTION

[0020] A saw chain guide bar 1 according to a first embodiment of the present invention is illustrated in Figs 1-6. The saw chain guide bar 1 is to be attached to a chainsaw cutting device of a tree harvester and is intended to co-operate with a saw chain of said cutting device. The saw chain guide bar 1 comprises an plate-shaped and elongated guide bar body 2, which has a rear end 2b and an opposite nose end 2a. At its rear end 2b, the guide bar body 2 has an attachment section 3 configured for attachment of the saw chain guide bar 1 to a chainsaw cutting device of a tree harvester by clamping. The attachment section 3 is in a conventional manner provided with a centre slot 4, which is configured to receive clamping bolts of the chainsaw cutting device. The guide bar body 2 has a first side face 5a extending between the rear end 2b and the nose end 2a and an opposite second side face 5b extending between the rear end 2b and the nose end 2a. A first saw chain guide track 6a extends along a first longitudinal edge 7a of the guide bar body 2 and a second saw chain guide track 6b extends along the opposite second longitudinal edge 7b of the guide bar body 2. A sprocket wheel 8 is in a conventional man-

ner rotatably mounted to the guide bar body 2 at the nose end 2a thereof. A saw chain of the above-mentioned cutting device is to extend in a loop around the guide bar body 2 along the peripheral edge thereof while being in engagement with the sprocket wheel 8 and with the first and second saw chain guide tracks 6a, 6b. During a cutting operation, the saw chain is rotated and thereby driven along the peripheral edge of the guide bar body 2 by means of a driving motor of the cutting device.

[0021] A liquid feed channel 10 extends along a part of the guide bar body 2 from the attachment section 3 towards the nose end 2a, the liquid feed channel 10 having an upstream end 10a located at the attachment section 3 and a downstream end 10b located at a distance from the attachment section 3. At its upstream end 10a, the liquid feed channel 10 has an inlet opening 11, through which the liquid feed channel is configured to receive pressurized liquid. The liquid is for instance an urea solution or any other desired tree stump treatment liquid and may be supplied to the liquid feed channel 10 from a liquid reservoir in the tree harvester by means of a pump.

[0022] In the embodiment illustrated in Figs 1-6, the inlet of the liquid feed channel 10 comprises one single inlet opening 11, but the liquid feed channel 10 may as an alternative be provided with an inlet that comprises two or more inlet openings.

[0023] At its downstream end 10b, the liquid feed channel 10 has a first outlet 12a with a first spray outlet orifice 13a facing the nose end 2a of the guide bar body 2 and a second outlet 12b with a second spray outlet orifice 13b facing the rear end 2b of the guide bar body 2. The first and second outlets 12a, 12b are located opposite to each other on opposite sides of the liquid feed channel 10 and are both in fluid communication with the inlet opening 11 in order to receive liquid that has entered the liquid feed channel 10 through the inlet opening 11. The first spray outlet orifice 13a is configured to emit liquid from the liquid feed channel 10 as a liquid spray in a direction towards the nose end 2a of the guide bar body 2 and the second spray outlet orifice 13b is configured to emit liquid from the liquid feed channel 10 as a liquid spray in a direction towards the rear end 2b of the guide bar body 2. The first and second spray outlet orifices 13a, 13b are with advantage aligned with each other. Furthermore, the total cross-sectional area of the first and second spray outlet orifices 13a, 13b, i.e. the sum of the cross-sectional area of the first spray outlet orifice 13a and the cross-sectional area of the second spray outlet orifice 13, is preferably smaller than the cross-sectional area of the inlet opening 11.

[0024] The guide bar body 2 comprises a first spray guiding groove 15a, which is formed as an outwardly open elongated recess in the first side face 5a of the guide bar body 2 and which extends from the first outlet 12a of the liquid feed channel 10 along a part of the first side face 5a in a direction towards the nose end 2a of the guide bar body 2. The guide bar body 2 also com-

prises a second spray guiding groove 15b, which is formed as an outwardly open elongated recess in the first side face 5a of the guide bar body 2 and which extends from the second outlet 12b of the liquid feed channel 10 along a part of the first side face 5a in a direction towards the rear end 2b of the guide bar body 2. The first spray outlet orifice 13a opens into the first spray guiding groove 15a and the first spray guiding groove is configured to receive the liquid spray emitted from the first spray outlet orifice 13a and allow this liquid spray to propagate along the length of the first spray guiding groove 15a in a direction towards the nose end 2a of the guide bar body 2. The second spray outlet orifice 13b opens into the second spray guiding groove 15b and the second spray guiding groove is configured to receive the liquid spray emitted from the second spray outlet orifice 13b and allow this liquid spray to propagate along the length of the second spray guiding groove 15b in a direction towards the rear end 2b of the guide bar body 2.

[0025] In the illustrated embodiment, each spray guiding groove 15a, 15b extends in a straight line, or at least essentially straight line, along a part of the first side face 5a of the guide bar body 2, wherein the first and second spray guiding grooves 15a, 15b are aligned with each other. However, the first spray guiding groove 15a and/or the second spray guiding groove 15b may as an alternative be slightly curved as seen in the longitudinal direction of the guide bar body 2, as long as it allows the received liquid spray to propagate a certain distance in the longitudinal direction of the guide bar body 2.

[0026] Each one of the first and second spray guiding grooves 15a, 15b preferably has a length of 80-200 mm and a width of 6-10 mm.

[0027] In the illustrated embodiment, each spray guiding groove 15a, 15b has an inclined bottom surface 16 (see Figs 1 and 8), which has such an inclination that the depth d of the spray guiding groove 15a, 15b is gradually decreasing as seen in a direction from a first end 17a of the spray guiding groove 15a, 15b facing the associated outlet 12a, 12b of the liquid feed channel 10 to an opposite second end 17b of the spray guiding groove 15a, 15b. However, each spray guiding groove 15a, 15b may as an alternative have one and the same depth all along its length or a depth that varies in any other suitable manner along the length thereof.

[0028] In the illustrated embodiment, the liquid feed channel 10 comprises:

- a straight, or at least essentially straight, first part 18a that extends from the attachment section 3 of the guide bar body 2 to a middle section 9 of the guide bar body 2 located at the middle of the guide bar body 2 as seen in the longitudinal direction thereof, this first part 18 being free from spray outlet orifices;
- a straight, or at least essentially straight, second part 18b that extends at an angle of 80-100°, preferably 90°, to the first part 18a, the first and second spray

outlet orifices 13a, 13b being provided in this second part 18b; and

- a curved third part 18c that forms a connection between said first part 18a and said second part 18b, this third part 18c being free from spray outlet orifices.

[0029] In the illustrated embodiment, the liquid feed channel 10 is formed by an elongated tube 19 (see Fig 7), which is mounted in an elongated tube-accommodating groove 20 (see Fig 8) in the first side face 5a of the guide bar body 2. The tube 19 is with advantage mounted to the tube-accommodating groove 20 in the manner described in US 6 397 475 B1, wherein the tube-accommodating groove 20 has undercut side walls 21, as illustrated in Fig 5. In this case, the tube 19 is made of soft and deformable metal material, such as aluminium or copper, and is originally made with a circular cross-sectional shape. The tube 19 is first bent in correspondence with the longitudinal shape of the tube-accommodating groove 20 and then positioned in this groove. After having been inserted into the tube-accommodating groove 20, the tube 19 is deformed by rolling or pressing until it fills the tube-accommodating groove 20 and conforms to the undercut side walls 21 thereof. The tube 19 is secured in the tube-accommodating groove 20 by having its cross-sectional shape deformed to conform to the undercut cross-sectional shape of the tube-accommodating groove. However, a channel-forming tube may of course also be secured to an associated tube-accommodating groove 20 in the guide bar body 2 in any other suitable manner. As a further alternative, the liquid feed channel 10 may be formed as an integrated part of the guide bar body 2, for instance by being formed as an outwardly covered recess in the guide bar body 2.

[0030] In the illustrated embodiment, the bottom surface 22 of the tube-accommodating groove 20 has:

- an inclined first ramp section 23a at a first end 20a of the tube-accommodating groove 20, wherein this first ramp section 23a has such an inclination that the depth of the tube-accommodating groove 20 is gradually increasing as seen in a direction from a first end of the first ramp section 23a facing the first end 20a of the tube-accommodating groove 20 to an opposite second end of the first ramp section 23a; and
- an inclined second ramp section 23b at a second end 20b of the tube-accommodating groove 20, wherein this second ramp section 23b has such an inclination that the depth of the tube-accommodating groove 20 is gradually increasing as seen in a direction from a first end of the second ramp section 23b facing the second end 20b of the tube-accommodating groove 20 to an opposite second end of the second ramp section 23b.

When the initially open-ended tube 19 is pressed against

the bottom surface 22 of the tube-accommodating groove 20 in connection with the mounting of the tube 19 to the guide bar body 2, the end sections 19a, 19b of the tube 19 are pressed against a respective one of the ramp sections 23a, 23b such that the end sections 19a, 19b are deformed by clamping against the ramp sections 23a, 23b and thereby sealed. Fig 9 illustrates the shape of the tube 19 when it has been deformed to conform to the shape of the tube-accommodating groove 20. As an alternative, the ends of the tube 19 may be sealed before the mounting thereof in the tube-accommodating groove 20. The inlet opening 11 and the spray outlet orifices 13a, 13b may be formed in the tube 19 before or after the mounting thereof in the tube-accommodating groove 20.

[0031] In the embodiment illustrated in Figs 1-6, the inlet opening 11 of the liquid feed channel 10 is facing the bottom surface 22 of the tube-accommodating groove 20, wherein the inlet opening 11 is aligned with and connected to a liquid supply hole 24 that extends through the guide bar body 2 between the second side face 5b and the tube-accommodating groove 20. Thus, in this case, the liquid enters the inlet opening 11 of the liquid feed channel 10 from the second side face 5b of the guide bar body 2 through the liquid supply hole 24. However, the inlet opening 11 of the liquid feed channel 10 may as an alternative be arranged on the outwardly facing side of the liquid feed channel 10, as illustrated in Fig 10. In the latter case, the liquid enters the inlet opening 11 of the liquid feed channel 10 from the first side face 5a of the guide bar body 2.

[0032] In the embodiment illustrated in Figs 1-6, the first outlet 12a of the liquid feed channel 10 comprises one single outlet orifice 13a, but the first outlet 12a may as an alternative be provided with two or more outlet orifices 13a facing the nose end 2a of the guide bar body 2. In the embodiment illustrated in Figs 1-6, also the second outlet 12b of the liquid feed channel 10 comprises one single outlet orifice 13b, but the second outlet 12b may as an alternative be provided with two or more outlet orifices 13b facing the rear end 2b of the guide bar body 2.

[0033] In the illustrated embodiment, the saw chain guide bar 1 has a liquid feed channel 10 with two opposite outlets 12a, 12b and two associated spray guiding grooves 15a, 15b. However, the saw chain guide bar 1 may as an alternative have a liquid feed channel 10 with one single outlet comprising a spray outlet orifice facing the rear end 2b or the nose end 2a of the guide bar body 2 and one single spray guiding groove. If the spray outlet orifice of this single outlet faces the rear end 2b of the guide bar body 2, it is configured to emit liquid from the liquid feed channel 10 as a liquid spray in a direction towards the rear end 2b of the guide bar body 2, wherein the associated spray guiding groove extends from the outlet in a direction towards the rear end 2b of the guide bar body 2. If the spray outlet orifice of said single outlet faces the nose end 2a of the guide bar body 2, it is configured to emit liquid from the liquid feed channel 10 as a liquid spray in a direction towards the nose end 2a of

the guide bar body 2, wherein the associated spray guiding groove extends from the outlet in a direction towards the nose end 2a of the guide bar body 2.

[0034] In the embodiment illustrated in Figs 11-13, the saw chain guide bar 1 comprises a first liquid feed channel 10 of the type described above for emitting liquid sprays on the first side face 5a of the guide bar body 2 and an additional second liquid feed channel 10' of the same type for emitting liquid sprays on the opposite second side face 5b of the guide bar body 2. In this case, first and second spray guiding grooves 15a, 15b are formed as outwardly open elongated recesses in the first side face 5a of the guide bar body 2 as described above with reference to Figs 1-6, whereas corresponding third and fourth spray guiding grooves 15c, 15d are formed as outwardly open elongated recesses in the second side face 5b of the guide bar body 2. As to the rest, the saw chain guide bar 1 illustrated in Figs 11-13 corresponds to the saw chain guide bar 1 described above with reference to Figs 1-6. In this case, the saw chain guide bar 2 preferably has 180° rotational symmetry about a longitudinal centre axis 25 of the guide bar body 2.

[0035] In the embodiment illustrated in Figs 11-13, the first and second spray guiding grooves 15a, 15b are located on the first side face 5a of the guide bar body 2 adjacent to the first longitudinal edge 7a thereof, whereas the third and fourth spray guiding grooves 15c, 15d are located on the second side face 5b of the guide bar body 2 adjacent to the second longitudinal edge 7b thereof.

[0036] In the illustrated embodiments, the guide bar body 2 has the form of a solid body. However, the guide bar body 2 may as an alternative have the form of a laminated body formed by two or more separate plates.

[0037] The invention is of course not in any way restricted to the embodiments described above. On the contrary, many possibilities to modifications thereof will be apparent to a person with ordinary skill in the art without departing from the basic idea of the invention such as defined in the appended claims.

Claims

1. A saw chain guide bar comprising:

- an elongated guide bar body (2), which has a rear end (2b) and an opposite nose end (2a), wherein the guide bar body (2) at its rear end (2b) has an attachment section (3) configured for attachment to a chainsaw cutting device of a tree harvester and wherein the guide bar body (2) has a first side face (5a) extending between the rear end (2b) and the nose end (2a) and an opposite second side face (5b) extending between the rear end (2b) and the nose end (2a); and
- a liquid feed channel (10) extending along a part of the guide bar body (2) from the attach-

ment section (3) towards the nose end (2a), the liquid feed channel (10) having an upstream end (10a) located at the attachment section (3) and a downstream end (10b) located at a distance from the attachment section (3), wherein the liquid feed channel (10) at its upstream end (10a) has an inlet opening (11), through which the liquid feed channel (10) is configured to receive pressurized liquid, **characterized in:**

- **that** the liquid feed channel (10) at its downstream end (10b) has a first outlet (12a) with at least one first spray outlet orifice (13a) facing the nose end (2a) or the rear end (2b) of the guide bar body (2), wherein this first outlet (12a) is in fluid communication with the inlet opening (11) and configured to emit liquid received therefrom as a liquid spray through said at least one first spray outlet orifice (13a) in a direction towards the nose end (2a) of the guide bar body (2) if said at least one first spray outlet orifice (13a) faces the nose end (2a) or in a direction towards the rear end (2b) of the guide bar body (2) if said at least one first spray outlet orifice (13a) faces the rear end (2b); and
 - **that** the guide bar body (2) is provided with a first spray guiding groove (15a) formed as an outwardly open elongated recess in the first side face (5a) of the guide bar body (2), wherein said at least one first spray outlet orifice (13a) opens into the first spray guiding groove (15a) and the first spray guiding groove (15a) extends from said first outlet (12a) of the liquid feed channel (10) in a direction towards the nose end (2a) of the guide bar body (2) if said at least one first spray outlet orifice (13a) faces the nose end (2a) or in a direction towards the rear end (2b) of the guide bar body (2) if said at least one first spray outlet orifice (13a) faces the rear end (2b).
2. A saw chain guide bar according to claim 1, **characterized in:**
- **that** said at least one first spray outlet orifice (13a) faces the nose end (2a) of the guide bar body (2);
 - **that** the liquid feed channel (10) at its downstream end (10b) also has a second outlet (12b) with at least one second spray outlet orifice (13b) facing the rear end (2b) of the guide bar body (2), wherein this second outlet (12b) is in fluid communication with the inlet opening (11) and configured to emit liquid received therefrom as a liquid spray through said at least one second

spray outlet orifice (13b) in a direction towards the rear end (2b) of the guide bar body (2); and

- **that** the guide bar body (2) is provided with a second spray guiding groove (15b) formed as an outwardly open elongated recess in the first side face (5a) of the guide bar body (2), wherein said at least one second spray outlet orifice (13b) opens into the second spray guiding groove (15b) and the second spray guiding groove (15b) extends from said second outlet (12b) of the liquid feed channel (10) in a direction towards the rear end (2b) of the guide bar body (2).

3. A saw chain guide bar according to claim 2, **characterized in that** the first and second outlets (12a, 12b) are located opposite to each other on opposite sides of the liquid feed channel (10).
4. A saw chain guide bar according to claim 2 or 3, **characterized in that** the first outlet (12a) has one single first spray outlet orifice (13a) and that the second outlet (12b) has one single second spray outlet orifice (13b).
5. A saw chain guide bar according to claim 4, **characterized in that** the first spray outlet orifice (13a) and the second spray outlet orifice (13b) are aligned with each other.
6. A saw chain guide bar according to any of claims 2-5, **characterized in that** each one of the first and second spray guiding grooves (15a, 15b) has a length of 80-200 mm and a width of 6-10 mm.
7. A saw chain guide bar according to any of claims 1-6, **characterized in that** the total cross-sectional area of all spray outlet orifices (13a, 13b) of the liquid feed channel (10) is smaller than the cross-sectional area of the inlet opening (11) of the liquid feed channel (10).
8. A saw chain guide bar according to any of claims 1-7, **characterized in that** each spray guiding groove (15a, 15b) extends in a straight line, or at least essentially straight line, along a part of the first side face (5a) of the guide bar body (2).
9. A saw chain guide bar according to claim 8 in combination with any of claims 2-6, **characterized in that** the first and second spray guiding grooves (15a, 15b) are aligned with each other.
10. A saw chain guide bar according to any of claims 1-9, **characterized in that** each spray guiding groove (15a, 15b) has an inclined bottom surface (16), which has such an inclination that the depth (d) of the spray guiding groove (15a, 15b) is gradually

decreasing as seen in a direction from a first end (17a) of the spray guiding groove (15a, 15b) facing the associated outlet (12a, 12b) of the liquid feed channel (10) to an opposite second end (17b) of the spray guiding groove (15a, 15b).

11. A saw chain guide bar according to any of claims 1-10, **characterized in that** the liquid feed channel (10) comprises:

- a straight, or at least essentially straight, first part (18a) that extends from the attachment section (3) of the guide bar body (2) to a middle section (19) of the guide bar body (2) located at the middle of the guide bar body (2) as seen in the longitudinal direction thereof, this first part (18a) being free from spray outlet orifices;
- a straight, or at least essentially straight, second part (18b) that extends at an angle of 80-100°, preferably 90°, to the first part (18a), said spray outlet orifice or orifices (13a, 13b) being provided in this second part (18b); and
- a curved third part (18c) that forms a connection between said first part (18a) and said second part (18b), this third part (18c) being free from spray outlet orifices.

12. A saw chain guide bar according to any of claims 1-11, **characterized in that** the liquid feed channel (10) is formed by an elongated tube (19), which is mounted in an elongated tube-accommodating groove (20) in the first side face (5a) of the guide bar body (2).

13. A saw chain guide bar according to claim 12, **characterized in that** a bottom surface (22) of the tube-accommodating groove (20) has:

- an inclined first ramp section (23a) at a first end (22a) of the tube-accommodating groove (20), wherein this first ramp section (23a) has such an inclination that the depth of the tube-accommodating groove (20) is gradually increasing as seen in a direction from a first end of the first ramp section (23a) facing the first end (22a) of the tube-accommodating groove (20) to an opposite second end of the first ramp section (23a); and
- an inclined second ramp section (23b) at a second end (22b) of the tube-accommodating groove (20), wherein this second ramp section (23b) has such an inclination that the depth of the tube-accommodating groove (20) is gradually increasing as seen in a direction from a first end of the second ramp section (23b) facing the second end (22b) of the tube-accommodating groove (20) to an opposite second end of the second ramp section (23b).

14. A saw chain guide bar according to any of claims 1-13, **characterized in:**

- **that** the saw chain guide bar (1) comprises an additional liquid feed channel (10'), which extends along a part of the guide bar body (2) from the attachment section (3) towards the nose end (2a), the additional liquid feed channel (10') having an upstream end (10a) located at the attachment section (3) and a downstream end (10b) located at a distance from the attachment section (3), wherein the additional liquid feed channel (10') at its upstream end (10a) has an inlet opening (11), through which the additional liquid feed channel (10') is configured to receive pressurized liquid;
- **that** the additional liquid feed channel (10') at its downstream end (10b) has a first outlet (12a) with at least one first spray outlet orifice (13a) facing the nose end (2a) of the guide bar body (2) and a second outlet (12b) with at least one second spray outlet orifice (13b) facing the rear end (2b) of the guide bar body (2), wherein the first outlet (12a) of the additional liquid feed channel (10') is in fluid communication with the inlet opening (11) of the additional liquid feed channel (10') and configured to emit liquid received therefrom as a liquid spray through said at least one first spray outlet orifice (13a) in a direction towards the nose end (2a) of the guide bar body (2), and wherein the second outlet (12b) of the additional liquid feed channel (10') is in fluid communication with the inlet opening (11) of the additional liquid feed channel (10') and configured to emit liquid received therefrom as a liquid spray through said at least one second spray outlet orifice (13b) in a direction towards the rear end (2b) of the guide bar body (2);
- **that** the guide bar body (2) is provided with a third spray guiding groove (15c) formed as an outwardly open elongated recess in the second side face (5b) of the guide bar body (2), wherein said at least one first spray outlet orifice (13a) of the additional liquid feed channel (10') opens into the third spray guiding groove (15c) and the third spray guiding groove (15c) extends from the first outlet (12a) of the additional liquid feed channel (10') in a direction towards the nose end (2a) of the guide bar body (2); and
- **that** the guide bar body (2) is provided with a fourth spray guiding groove (15d) formed as an outwardly open elongated recess in the second side face (5b) of the guide bar body (2), wherein said at least one second spray outlet orifice (13b) of the additional liquid feed channel (10') opens into the fourth spray guiding groove (15d) and the fourth spray guiding groove (15d) extends from the second outlet (12b) of the addi-

tional liquid feed channel (10') in a direction towards the rear end (2b) of the guide bar body (2).

15. A saw chain guide bar according to any of claims 1-14, **characterized in that** the saw chain guide bar (1) has 180° rotational symmetry about a longitudinal centre axis (25) of the guide bar body (2).

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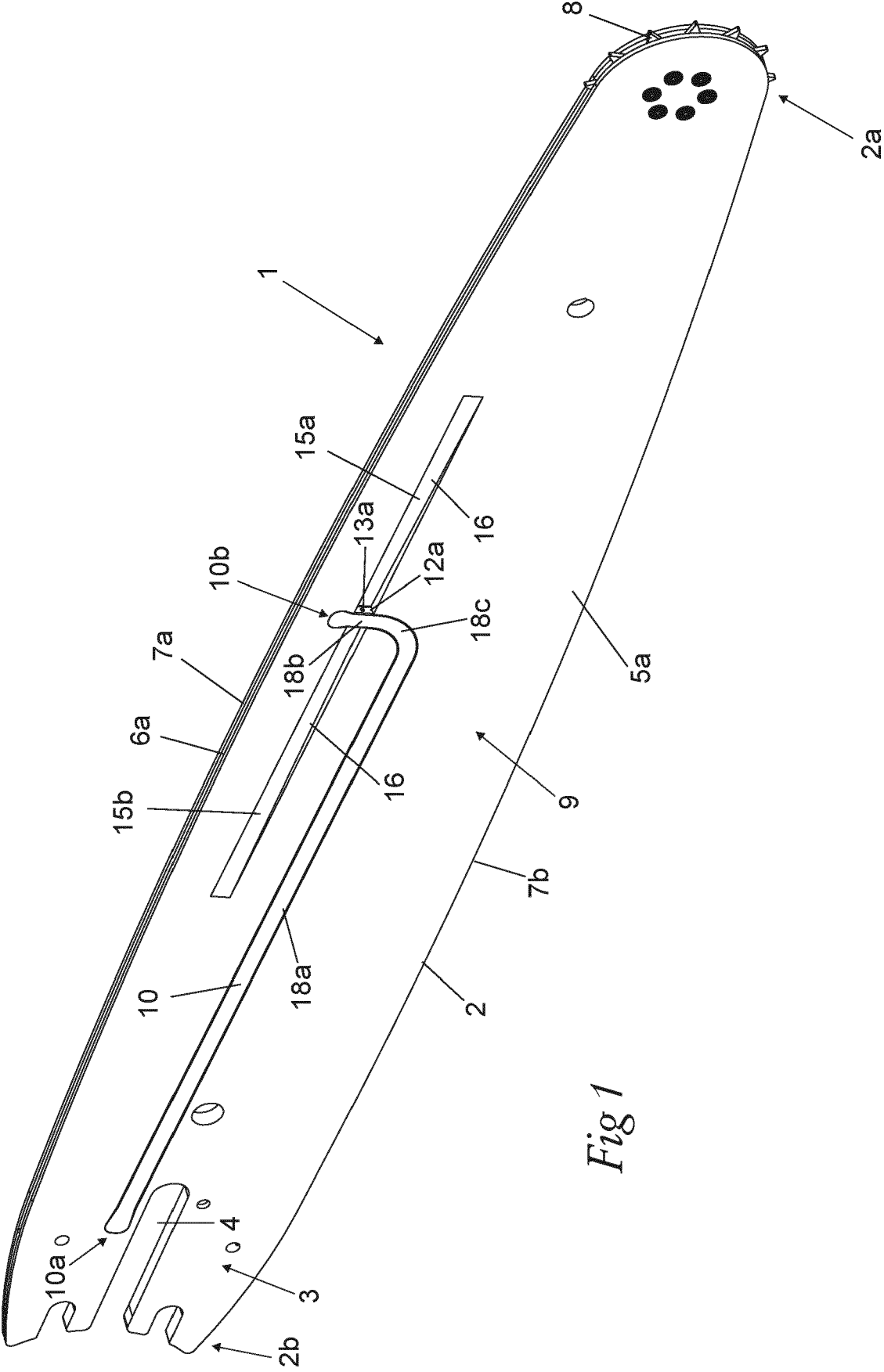
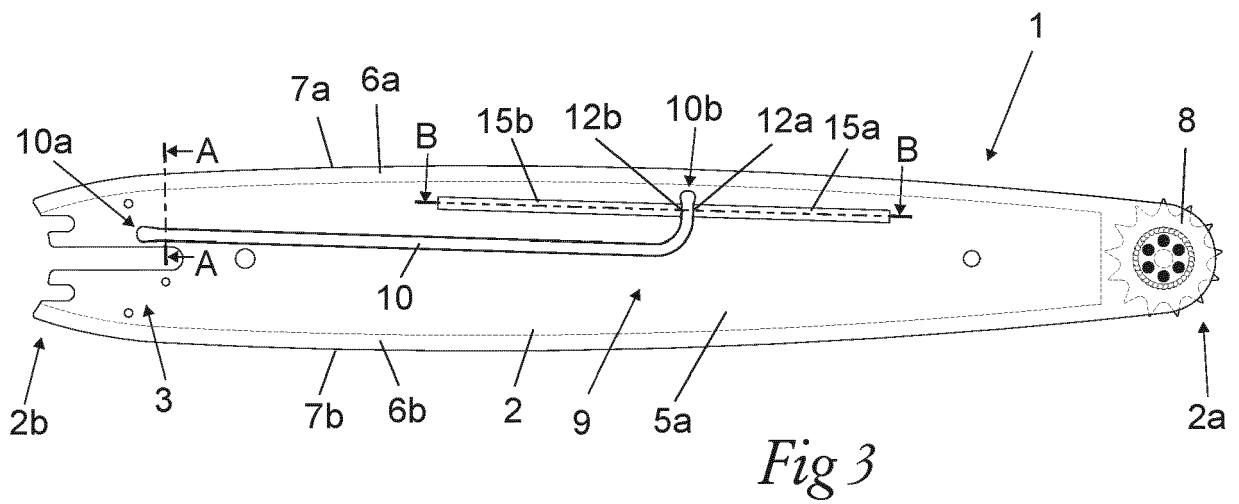
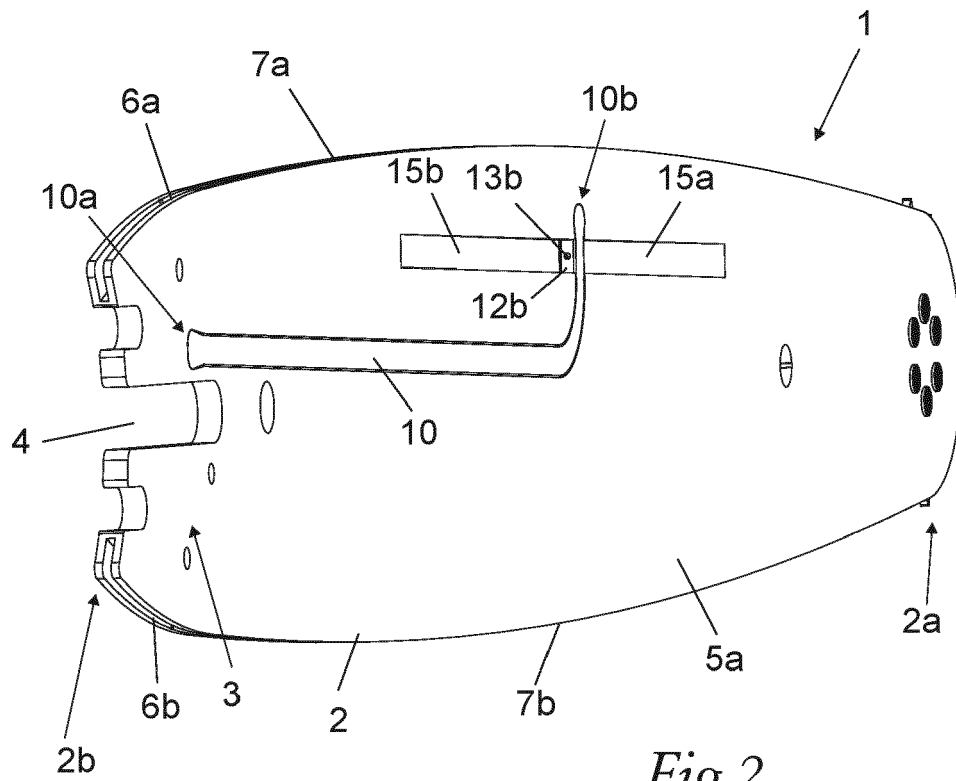


Fig 1



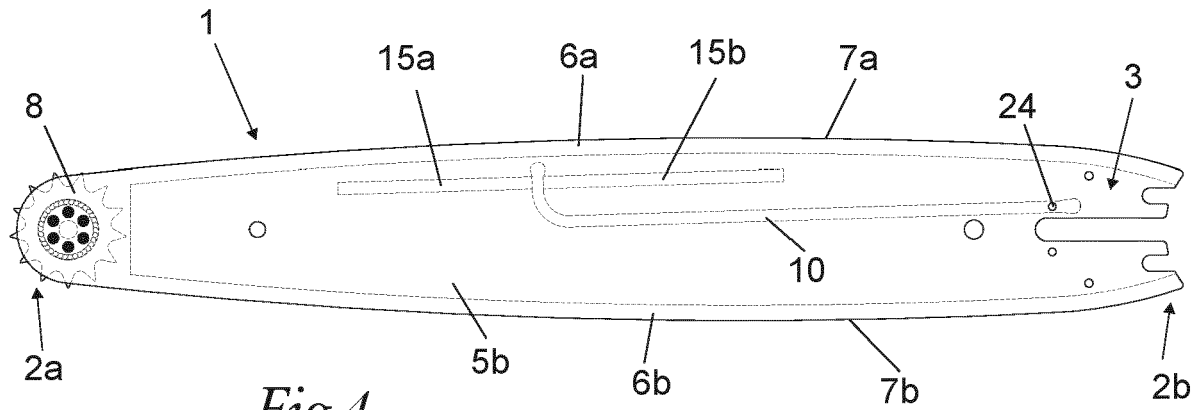


Fig 4

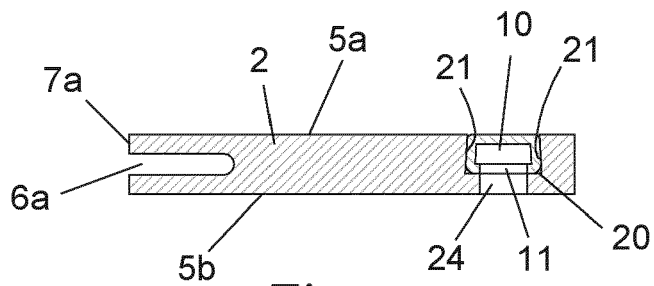


Fig 5

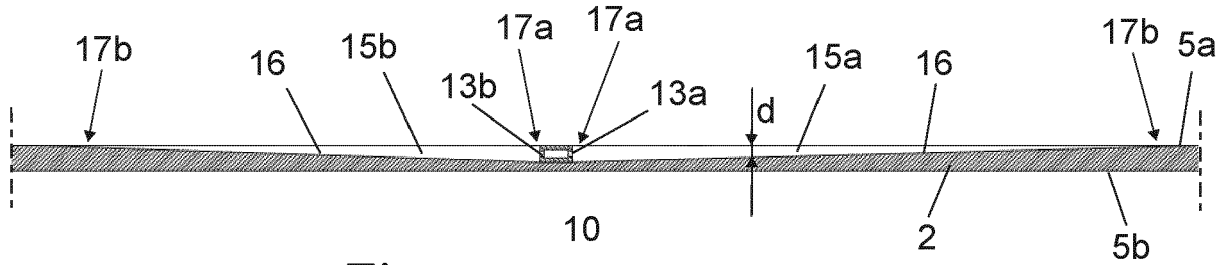


Fig 6

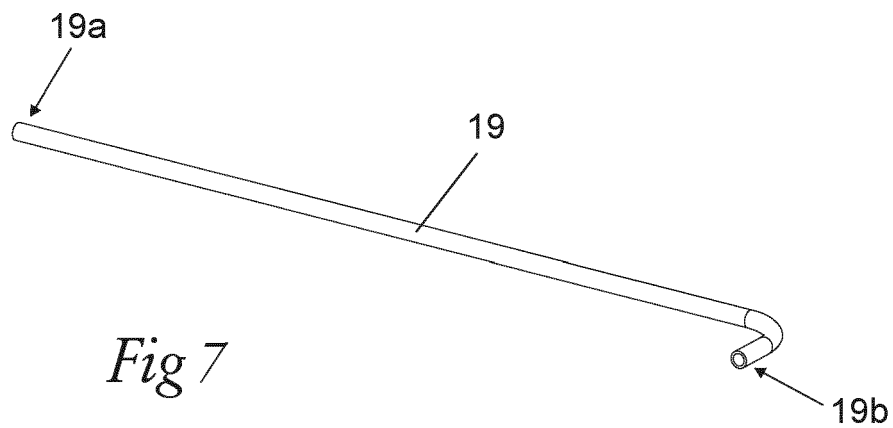
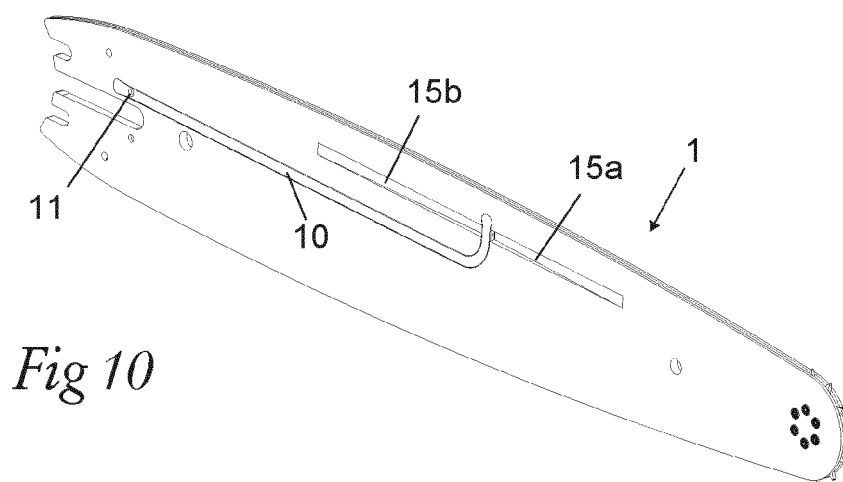
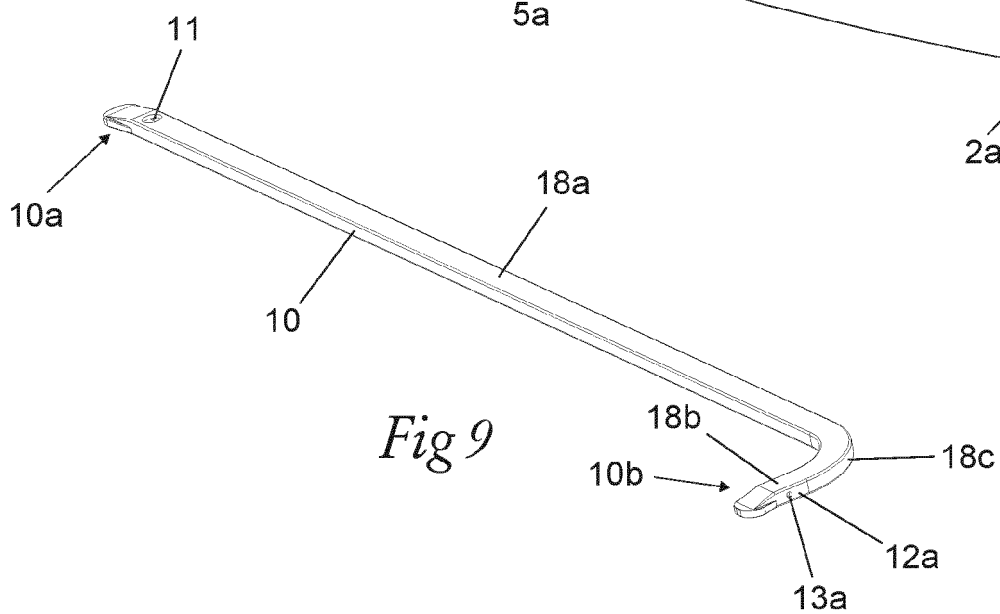
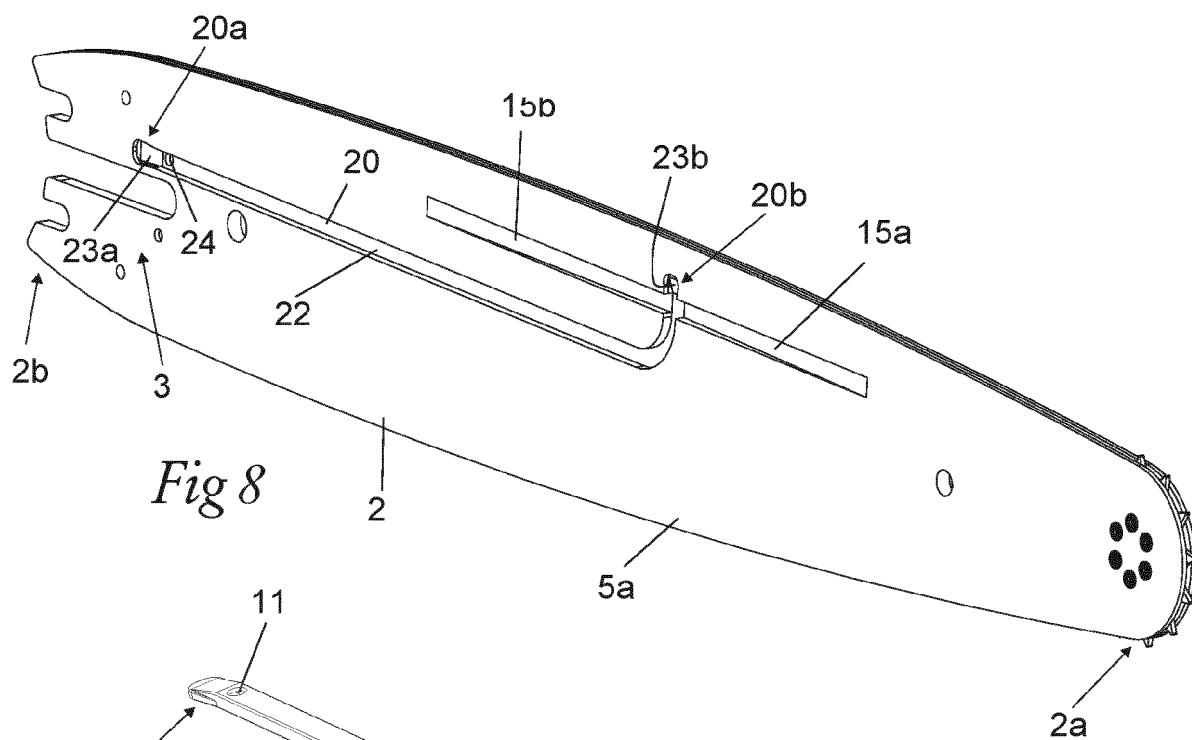
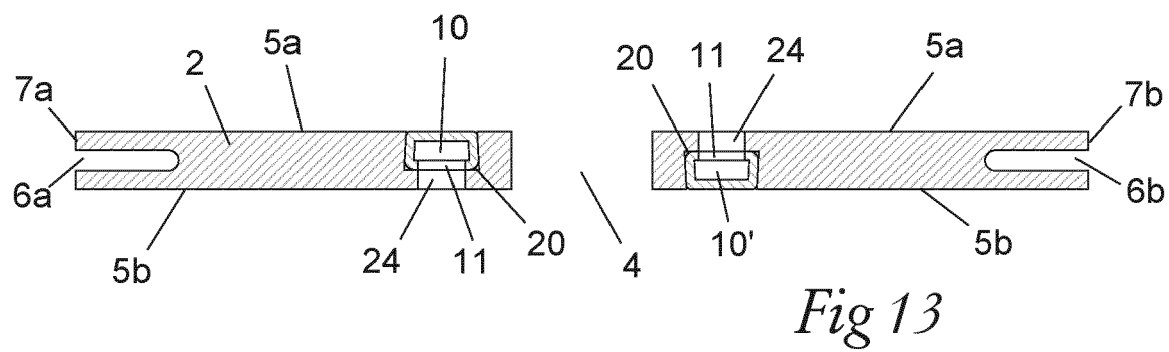
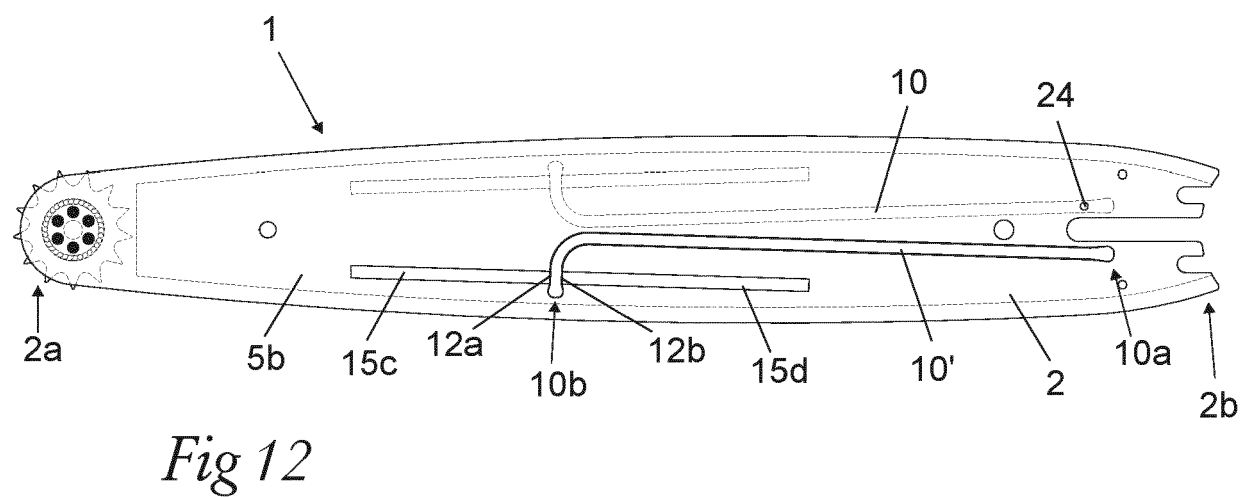
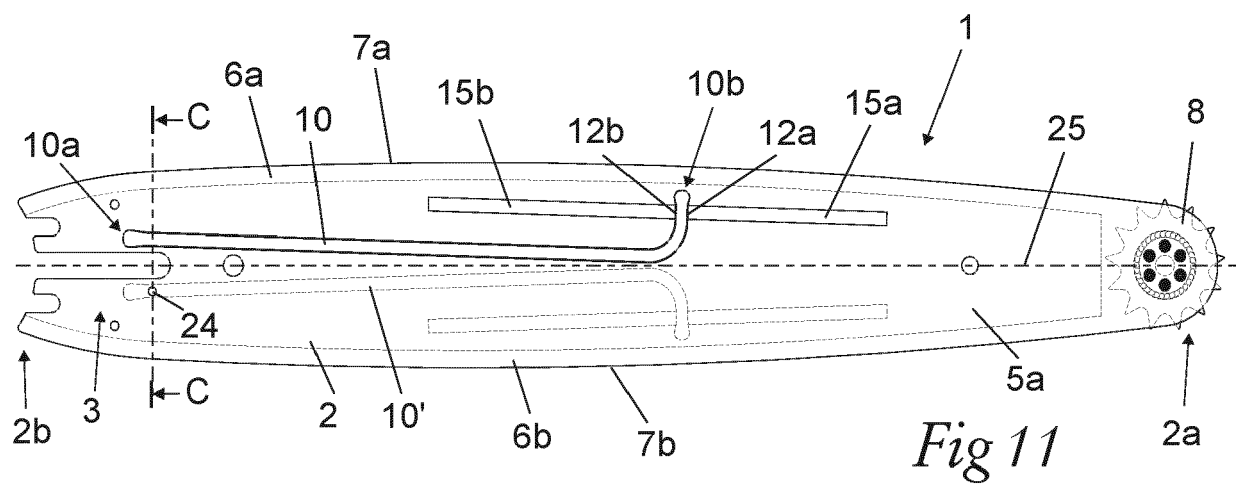


Fig 7







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Application Number

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			B27B
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 16 May 2023	Examiner Rijks, Mark
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

**ANNEX TO THE EUROPEAN SEARCH REPORT
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