



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
01.04.2020 Bulletin 2020/14

(51) Int Cl.:
B27B 17/02 (2006.01)

(21) Application number: **19200062.8**

(22) Date of filing: **27.09.2019**

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

(72) Inventors:
• **TSUMURA, Toshihiro**
Hyogo, Hyogo 673-0435 (JP)
• **YANOO, Akihito**
Hyogo, Hyogo 673-0435 (JP)
• **KADOWAKI, Taichi**
Hyogo, Hyogo 673-0435 (JP)

(30) Priority: **28.09.2018 JP 2018185502**

(74) Representative: **Kleine, Hubertus et al**
Loesenbeck - Specht - Dantz
Patent- und Rechtsanwälte
Am Zwinger 2
33602 Bielefeld (DE)

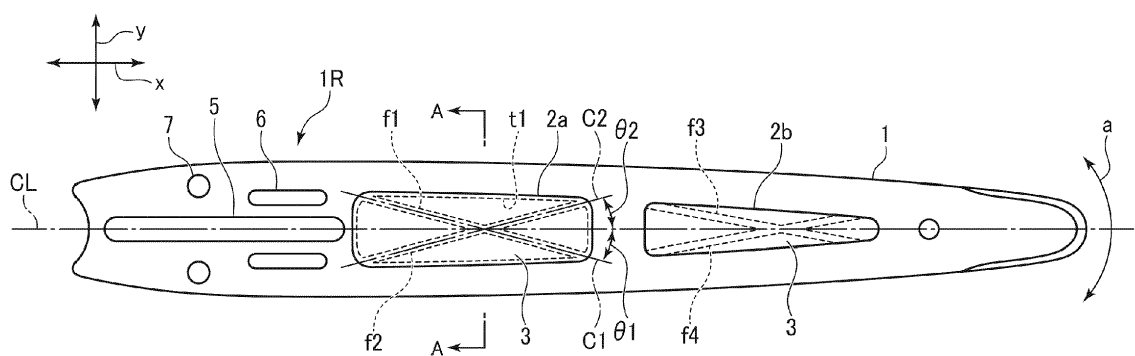
(71) Applicant: **Suehiro Seiko Kabushiki Kaisha**
Miki-shi, Hyogo 673-0435 (JP)

(54) **GUIDE BAR OF CHAIN SAW**

(57) An example of a guide bar of a chain saw of the present invention includes: an elongated plate-shaped guide bar body (1) that supports a saw chain on a peripheral edge portion thereof; holes (2a, 2b) penetrating the guide bar body (1); and a filler (3) filling the holes (2a,

2b). The guide bar body (1) has a reinforcement portion that includes a beam portion (f1, f2) (f3, f4) tilted with respect to a central axis line CL that extends in the longitudinal direction of the guide bar body (1), and connecting two parts of a side wall of the holes (2a, 2b).

FIG. 1A



Description**BACKGROUND OF THE INVENTION****(1) Field of the Invention**

[0001] The present invention relates to a guide bar of a chain saw used for felling, cutting, or the like of trees, for example.

(2) Description of Related Art

[0002] Chain saws are operated by workers and used for felling, cutting, or the like of trees, for example. Conventionally, it has been sought to reduce the weight of the guide bar of chain saws for the purpose of improving the usability of the chain saws for the workers.

[0003] Fig. 5 is a front view showing a main part of a conventional guide bar (see JP 2016-155351 A). The guide bar has an elongated plate-shaped guide bar body 51 in which a guide groove 54 for guiding a saw chain is formed along the outer periphery. The guide bar body 51 has elongated holes 52a and 52b on both sides of a central axis line CL, and an attachment member 53 made of a light-weight component such as synthetic resin is attached to each of the elongated holes 52a and 52b to reduce weight.

SUMMARY OF THE INVENTION

[0004] Further, in the configuration shown in Fig. 5, the guide bar body 51 has a beam portion f51 extending in the longitudinal direction of the guide bar body 51 and a beam portion f52 extending in the width direction of the guide bar body 51 in each of the long holes 52a and 52b to improve rigidity. However, there is room for improvement in increasing rigidity.

[0005] The present invention has been made to solve the above-described problems, and an object of the present invention is to provide a guide bar of a chain saw that can reduce weight and increase rigidity.

[0006] In order to achieve the above object, a guide bar of a chain saw according to an embodiment is a guide bar used for a chain saw including: an elongated plate-shaped guide bar body that supports a saw chain on a peripheral edge portion thereof; a hole penetrating the guide bar body; and a filler filling the hole. The guide bar body has a reinforcement portion that includes a beam portion tilted with respect to a central axis line that extends in a longitudinal direction of the guide bar body, and connecting two parts of a side wall of the hole.

[0007] The present invention has the above-described configuration, and has an effect of providing a guide bar of a chain saw that can reduce weight and increase rigidity.

BRIEF DESCRIPTION OF THE DRAWINGS**[0008]**

- 5 Fig. 1A is a front view showing a guide bar of a chain saw of a first configuration example of the embodiment, and Fig. 1B is an enlarged view of a cross-sectional portion taken along line A-A of Fig. 1A;
- 10 Fig. 2 is a front view showing a main part of a guide bar of a chain saw of a second configuration example of the embodiment;
- 15 Fig. 3 is a front view showing a main part of a guide bar of a chain saw of a third configuration example of the embodiment;
- 20 Fig. 4A is a front view showing a guide bar of a chain saw of a fourth configuration example of the embodiment, and Fig. 4B is a front view showing a guide bar body before filling a filler in the guide bar of Fig. 4A; and
- 25 Fig. 5 is a front view showing a main part of a conventional guide bar.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

[0009] Hereinafter, embodiments of the present disclosure will be described with reference to the accompanying drawings.

30 **[0010]** Each embodiment described below shows a specific example of the present disclosure. Numerical values, shapes, materials, components, arrangement positions and connection forms of components, and the like shown in the following embodiments are merely examples, and do not limit the present disclosure.

35 **[0011]** In addition, the same or corresponding elements are denoted by the same reference numerals throughout all the drawings, and redundant description thereof may be omitted. In addition, the drawings schematically show each component for easy understanding, and the shape, dimensional ratio, and the like may be inaccurate in some cases.

(Embodiment)

45 **[0012]** A guide bar of a chain saw of the embodiment is a guide bar used for a chain saw including: an elongated plate-shaped guide bar body that supports a saw chain on a peripheral edge portion thereof; a hole penetrating the guide bar body; and a filler filling the hole. The guide bar body has a reinforcement portion that includes a beam portion tilted with respect to a central axis line that extends in a longitudinal direction of the guide bar body, and connecting two parts of a side wall of the hole.

50 **[0013]** According to this configuration, it is possible to reduce weight by providing a hole in the guide bar body and filling the hole with a filler having a lower density than the guide bar body. Furthermore, since the beam portion placed in the hole is tilted with respect to the central axis

line extending in the longitudinal direction of the guide bar body, flexural rigidity and torsional rigidity can be improved.

[0014] In the guide bar, the reinforcement portion may have two of the beam portions tilted in opposite directions with respect to the central axis line of the guide bar body, the two beam portions intersecting each other.

[0015] In the guide bar, multiple holes may be provided, and the guide bar body may have the reinforcement portion for two or more of the holes.

[0016] In the guide bar, the periphery of the beam portion may be covered with the filler.

[0017] In the guide bar, the hole is one hole that is long in the longitudinal direction and that is provided to the guide bar body; the guide bar body may have one or more separation portions extending in a width direction of the guide bar body from a side wall of the hole to separate the hole into a plurality of regions in the longitudinal direction of the guide bar body, the reinforcement portion included in the region separated by the separation portion; and the periphery of the beam portion and the separation portion may be covered with the filler.

[0018] In the guide bar, the guide bar body may further have a projecting portion extending inward from a side wall of the hole, and the periphery of the projecting portion may be covered with the filler.

[First Configuration Example]

[0019] Fig. 1A is a front view showing a guide bar of a chain saw of a first configuration example of the embodiment, and Fig. 1B is an enlarged view of a cross-sectional portion taken along line A-A of Fig. 1A. Note that in the guide bar shown in Fig. 1A, the arrow x direction is the longitudinal direction, and the arrow y direction is the width direction. Additionally, a direction perpendicular to the arrow x and y directions (sheet depth direction of Fig. 1A) is the thickness direction.

[0020] The guide bar includes an elongated plate-shaped metal guide bar body 1, multiple holes (hereinafter referred to as "filling holes") 2a and 2b penetrating the guide bar body 1 and long in the longitudinal direction of the guide bar body 1, and fillers 3 and 3 filling the filling holes 2a and 2b. Note that the filler 3 is formed of a synthetic resin having a lower density than the guide bar body 1. The filler 3 can be formed by injection molding, for example. Additionally, as in JP 2016-155351 A described above, the filler 3 may be formed by attaching the attachment member 53 (see Fig. 5) molded in advance.

[0021] A base end portion 1R of the guide bar body 1 has appropriate holes 5 to 7, for example, for engaging with a chain saw body (not shown), and can be attached to the chain saw body. Additionally, a guide groove 4 (Fig. 1B) for guiding a saw chain (not shown) is formed along the outer periphery of the guide bar body 1. That is, the saw chain is supported on a peripheral edge portion of the guide bar body 1. The guide bar body 1 does

not have a sprocket at the tip end, but may have a sprocket at the tip end.

[0022] In the guide bar body 1, the filling holes 2a and 2b are formed symmetrically with respect to the central axis line CL extending in the longitudinal direction of the guide bar body 1. Hence, there is good balance. However, the shape, number, arrangement, and the like of the filling holes can be changed as appropriate.

[0023] Additionally, the guide bar body 1 has a reinforcement portion including two beam portions f1 and f2 in one filling hole 2a. Each of the beam portions f1 and f2 extends linearly so as to connect two parts of a side wall (inner wall) of the filling hole 2a. Additionally, the two beam portions f1 and f2 are tilted in opposite directions with respect to the central axis line CL of the guide bar body 1 and intersect each other (intersection fx). Additionally, the guide bar body 1 has a projecting portion t1 extending inward from a central portion in the thickness direction of the side wall (inner wall) of the filling hole 2a. The projecting portion t1 is formed over the entire periphery of the filling hole 2a, and is partially shared with the beam portions f1 and f2. The beam portions f1 and f2 and the projecting portion t1 have the same thickness and pass through the central portion in the thickness direction of the guide bar body 1, and the periphery thereof is covered with the filler 3.

[0024] Similarly, the guide bar body 1 has a reinforcement portion including two beam portions f3 and f4 in the other filling hole 2b. Each of the beam portions f3 and f4 extends linearly so as to connect two parts of a side wall (inner wall) of the filling hole 2b. Additionally, the two beam portions f3 and f4 are tilted in opposite directions with respect to the central axis line CL of the guide bar body 1 and intersect each other. Additionally, the beam portions f3 and f4 pass through the central portion in the thickness direction of the guide bar body 1, and the periphery thereof is covered with the filler 3.

[0025] The filling hole 2b, too may have a projecting portion similar to the projecting portion t1 in the filling hole 2a. Such a projecting portion may be provided in one or both of the two filling holes 2a and 2b. Additionally, the projecting portion may be omitted from both of the filling holes 2a and 2b. Moreover, while the above-described projecting portion t1 is provided over the entire periphery of the filling holes 2a and 2b, the projecting portion t1 may be spaced apart in the circumferential direction of the filling hole and divided into multiple parts. By providing the projecting portion t1, the filler 3 is held stronger, and the effect of preventing the filler 3 from peeling off can be improved during use of the chain saw, for example.

[0026] In the guide bar body 1, through-holes are formed by laser machining or press working in regions inside the filling holes 2a and 2b and except for the beam portions f1, f2, f3, and f4, and the projecting portion t1, and then the beam portions f1, f2, f3, and f4, and the projecting portion t1 are formed by cutting, for example.

[0027] In the first configuration example, it is possible to reduce weight by providing the filling holes 2a and 2b

in the guide bar body 1 and filling each of the filling holes 2a and 2b with the filler 3 having a lower density than the guide bar body 1. Further, the beam portions f1, f2, f3, and f4 placed in the filling holes 2a and 2b are tilted with respect to the central axis line CL extending in the longitudinal direction of the guide bar body 1. As a result, it is possible to increase flexural rigidity against a force that bends a tip end portion of the guide bar body 1 fixed to the chain saw body in an arrow a direction with respect to the base end portion 1R thereof, and also increase torsional rigidity against a force that twists the tip end portion in an arrow b direction with respect to the base end portion 1R.

[Second Configuration Example]

[0028] Fig. 2 is a front view showing a main part of a guide bar of a chain saw of a second configuration example of the embodiment.

[0029] The guide bar of the second configuration example is different from the guide bar of the first configuration example in that in a guide bar body 1, one filling hole 2a omits the projecting portion t1, but has a beam portion f5 extending in the longitudinal direction of the guide bar body 1 and a beam portion f6 extending in the width direction thereof. Hence, rigidity can be improved even more. Note that other configurations are similar to those of the first configuration example.

[Third Configuration Example]

[0030] Fig. 3 is a front view showing a main part of a guide bar of a chain saw of a third configuration example of the embodiment.

[0031] The guide bar of the third configuration example is different from the guide bar of the first configuration example in that two filling holes 2c and 2d formed symmetrically with respect to a central axis line CL of a guide bar body 1 are provided instead of one filling hole 2a. Then, the guide bar body 1 has a beam portion f7 as a reinforcement portion in the filling hole 2c, and a beam portion f8 as a reinforcement portion in the filling hole 2d. Other configurations are similar to those of the first configuration example.

[0032] The beam portions f7 and f8 extend linearly so as to connect two parts of a side wall (inner wall) of the filling holes 2c and 2d. Additionally, the beam portions f7 and f8 are tilted with respect to the central axis line CL of the guide bar body 1. As a result, flexural rigidity can be increased and torsional rigidity can also be increased as in the case of the beam portions f1 to f4 and the like of the first configuration example.

[0033] In the first to third configuration examples, the guide bar body 1 has the reinforcement portion including the beam portion tilted with respect to the central axis line CL of the guide bar body 1 in each of the multiple filling holes. However, by providing the beam portion tilted with respect to the central axis line CL in at least one

filling hole, flexural rigidity can be increased and torsional rigidity can also be increased. For example, a configuration may be adopted in which the guide bar body 1 has only one filling hole, and the filling hole has only one beam portion (reinforcement portion) tilted with respect to the central axis line CL. Moreover, in addition to the filling hole having such a reinforcement portion, a filling hole having no reinforcement portion may be provided from the viewpoint of weight reduction. The shape, number, arrangement, and the like of the filling holes can be changed as appropriate.

[0034] Also, by providing a projecting portion such as the projecting portion t1 of the first configuration example in each filling hole (2a to 2d) in the second and third configuration examples, the effect of preventing the filler 3 from peeling off can be improved during use of the chain saw, for example.

[Fourth Configuration Example]

[0035] Fig. 4A is a front view showing a guide bar of a chain saw of a fourth configuration example of the embodiment, and Fig. 4B is a front view showing a guide bar body before filling a filler in the guide bar of Fig. 4A.

[0036] As shown in Fig. 4A, the guide bar of the fourth configuration example includes, as a hole for filling a filler 3, only one filling hole 2 that is long in the longitudinal direction of a guide bar body 1. Of the filling hole 2, a part on the side close to a base end portion 1R of the guide bar body 1 is separated in the width direction of the guide bar body 1 by a central separation portion 1a of the guide bar body 1.

[0037] As shown in Fig. 4B, as in the case of the projecting portion t1 of the first configuration example, the guide bar body 1 has a projecting portion t2 extending inward from a central portion in the thickness direction of a side wall of the filling hole 2. The projecting portion t2 is formed over the entire periphery of the filling hole 2, and is partially shared with beam portions f11 to f16 and separation portions f21 to f23 described later.

[0038] Further, the guide bar body 1 has the separation portions f21 to f23 extending in the width direction of the guide bar body 1 from the central portion in the thickness direction of the side wall of the filling hole 2. The filling hole 2 is separated into multiple regions r1 to r5 in the longitudinal direction of the guide bar body 1 by the separation portions f21 to f23. Then, the regions r1 to r5 separated by the separation portions f21 to f23 include therein the linearly extending beam portions f11 to f16 as reinforcement portions, respectively.

[0039] As in the case of the beam portions f1 and f2 and the projecting portion t1 of the first configuration example, the beam portions f11 to f16, the separation portions f21 to f23, and the projecting portion t2 have the same thickness and pass through the central portion in the thickness direction of the guide bar body 1, and the periphery thereof is covered with the filler 3.

[0040] In the fourth configuration example, since the

beam portions f11 to f16 as reinforcement portions are provided, flexural rigidity can be increased and torsional rigidity can also be increased, as in the case of the first to third configuration examples.

[0041] Additionally, since only one filling hole 2 is provided, when filling the filler 3 by resin injection molding, for example, the resin can be filled from one injection port of an injection molding machine. Hence, compared with a case of filling multiple filling holes from multiple injection ports, uniform filling without variation can be performed.

[0042] Although the projecting portion t2 can be omitted from the fourth configuration example, by providing the projecting portion t2, the filler 3 is held stronger, and the effect of preventing the filler 3 from peeling off can be improved during use of the chain saw, for example. Note that the projecting portion t2 may be spaced apart in the circumferential direction of the filling hole 2 and divided into multiple parts.

[0043] In the embodiment, the beam portions (f1 to f4, f7, f8, and f11 to f16) forming the reinforcement portion are tilted with respect to the central axis line CL of the guide bar body 1, unlike the beam portion such as the beam portion f51 of Fig. 5 having a center line parallel to or coinciding with the central axis line CL of the guide bar body 51, or the beam portion such as the beam portion f52 of Fig. 5 having a center line intersecting with the central axis line CL. Hence, an even greater effect can be obtained in increasing rigidity.

[0044] The above-mentioned beam portion forming the reinforcement portion being tilted with respect to the central axis line CL of the guide bar body 1 means that the center line of the same beam portion (straight line extending in extending direction of same beam portion) and the central axis line CL of the guide bar body 1 intersect at an oblique angle (intersect at angle other than right angle). For example, in the case of the beam portions f1 and f2 in Fig. 1, an angle θ_1 formed by a center line C1 of the beam portion f1 and the central axis line CL is $0^\circ < \theta_1 < 90^\circ$, and similarly, an angle θ_2 formed by a center line C2 of the beam portion f2 and the central axis line CL is $0^\circ < \theta_2 < 90^\circ$. The same applies to the beam portions (f3, f4, f7, f8, and f11 to f16) forming the other reinforcement portions.

[0045] Additionally, one end or both ends of a beam portion forming a reinforcement portion may be in the middle of the filling hole in which the beam portion is formed, instead of both ends in the longitudinal direction of the guide bar body 1. For example, a configuration may be adopted in which multiple pairs of beam portions in the form of a cross shape formed of the beam portion f1 and the beam portion f2 shown in Fig. 1A are provided side by side in one filling hole. The multiple pairs of beam portions may be arranged along the longitudinal direction or the width direction of the guide bar body 1.

[0046] Note that while the filling holes 2 and 2a to 2d of the embodiment are long in the longitudinal direction of the guide bar body 1, the shape of the filling hole is not limited to this. The shape of the filling hole may be a

square, a circle, or a triangle, for example.

[0047] From the foregoing description, many modifications and other embodiments of the present invention are obvious to one skilled in the art. Accordingly, the foregoing description should be construed as illustrative only and is provided for the purpose of teaching those skilled in the art the best mode of carrying out the invention. Details of the structure and/or function of the invention can be substantially changed without departing from the spirit of the invention.

[0048] The present invention is useful as a guide bar of a chain saw, for example, that can reduce weight and increase rigidity.

Claims

1. A guide bar used for a chain saw comprising:

an elongated plate-shaped guide bar body that supports a saw chain on a peripheral edge portion thereof;
a hole penetrating the guide bar body; and
a filler filling the hole,
wherein the guide bar body has a reinforcement portion that includes a beam portion tilted with respect to a central axis line that extends in a longitudinal direction of the guide bar body, and connecting two parts of a side wall of the hole.

2. The guide bar of a chain saw according to claim 1, wherein the reinforcement portion has two of the beam portions tilted in opposite directions with respect to the central axis line of the guide bar body, the two beam portions intersecting each other.

3. The guide bar of a chain saw according to claim 1 or 2, wherein
a plurality of the holes are provided, and
the guide bar body has the reinforcement portion for two or more of the holes.

4. The guide bar of a chain saw according to any one of claims 1 to 3, wherein a periphery of the beam portion is covered with the filler.

5. The guide bar of a chain saw according to claim 1 or 2, wherein
the hole is one hole that is long in the longitudinal direction and that is provided to the guide bar body, the guide bar body has one or more separation portions extending in a width direction of the guide bar body from a side wall of the hole to separate the hole into a plurality of regions in the longitudinal direction of the guide bar body, the reinforcement portion included in the region separated by the separation portion, and
the periphery of the beam portion and the separation

portion is covered with the filler.

6. The guide bar of a chain saw according to any one of claims 1 to 5, wherein the guide bar body further has a projecting portion extending inward from a side wall of the hole, and a periphery of the projecting portion is covered with the filler.

10

15

20

25

30

35

40

45

50

55

FIG. 1A

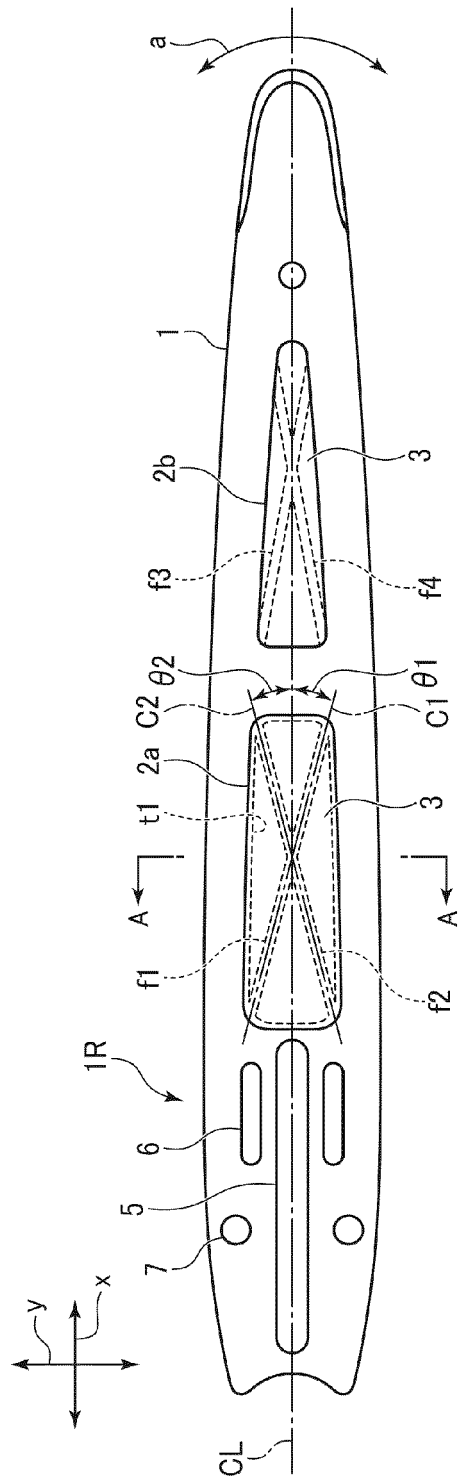


FIG. 1B

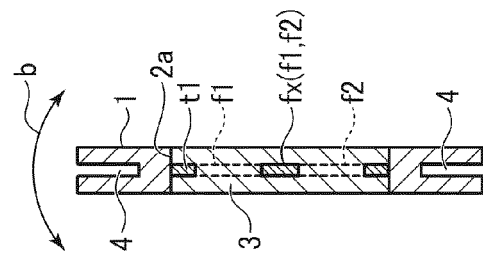


FIG. 2

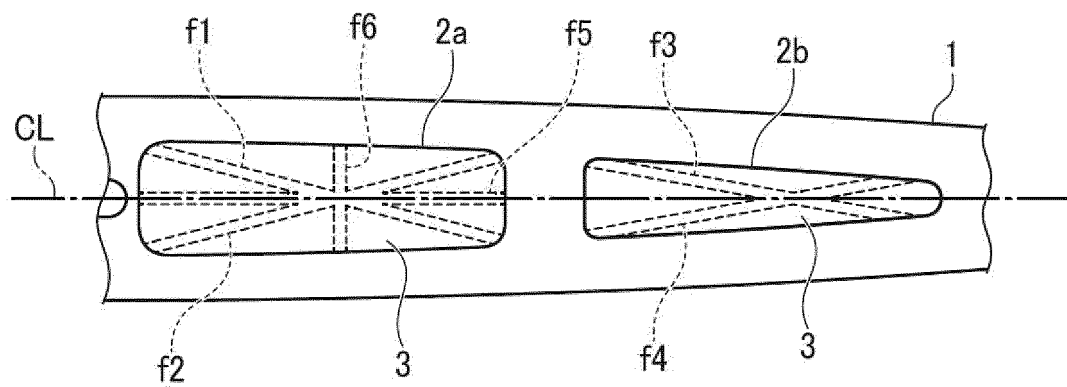


FIG. 3

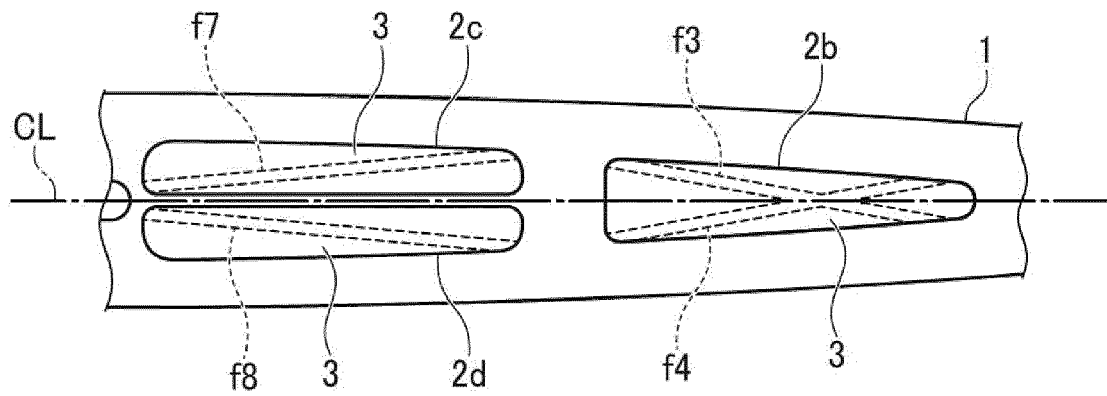


FIG. 4A

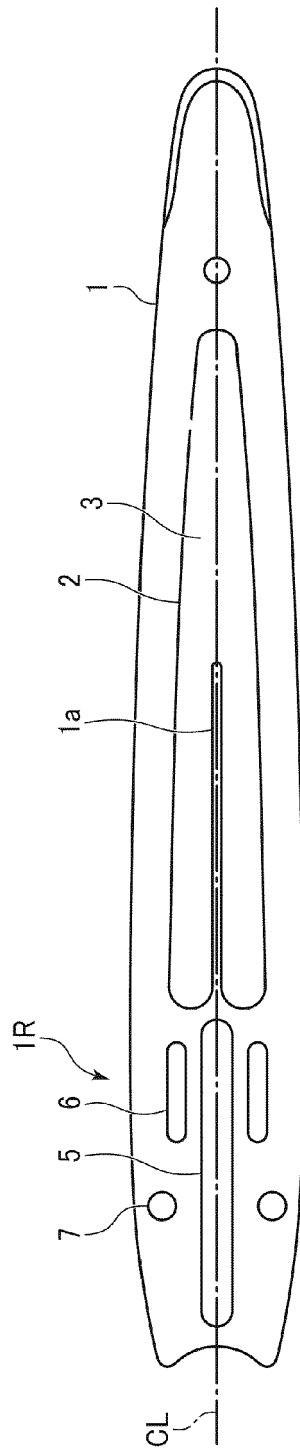


FIG. 4B

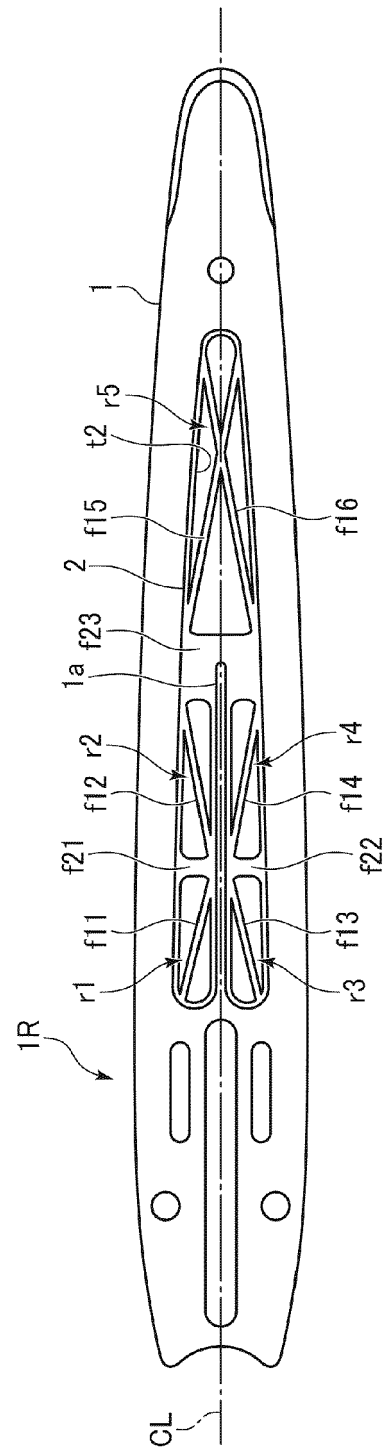
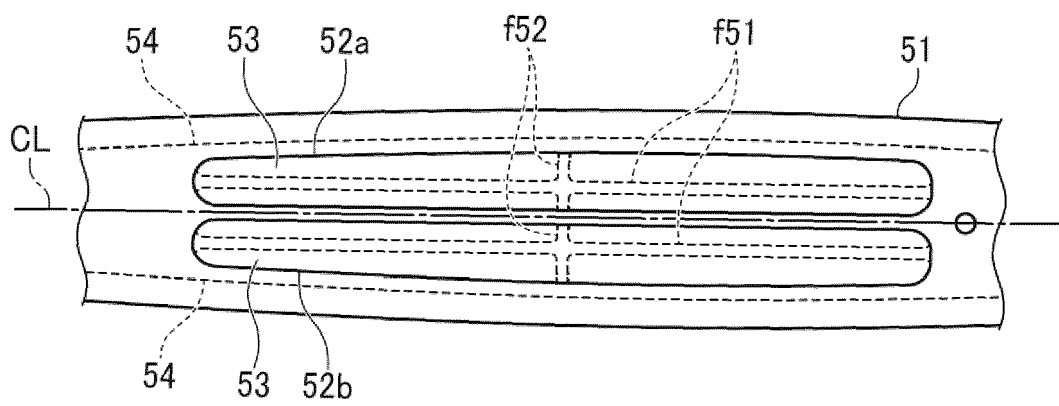


FIG. 5





EUROPEAN SEARCH REPORT

Application Number
EP 19 20 0062

5

10

15

20

25

30

35

40

45

50

55

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 5 249 363 A (MITREGA DAVID [DE] ET AL) 5 October 1993 (1993-10-05) * column 4, line 22 - line 32 * * column 5, line 46 - column 6, line 6 * * figures 9-12 *	1-6	INV. B27B17/02
X	DE 728 639 C (STIHL ANDREAS) 1 December 1942 (1942-12-01) * the whole document * * in particular: * * page 2, line 45 - line 71 * * figure 4 *	1-6	
X	CA 657 445 A (HAMILTON LEWIS J) 12 February 1963 (1963-02-12) * page 5, line 4 - page 8, line 17 * * figures 1,3,7 *	1,3-6	
A		2	
			TECHNICAL FIELDS SEARCHED (IPC)
			B27B B23D
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 11 February 2020	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			

EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 19 20 0062

5

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

11-02-2020

10

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5249363 A	05-10-1993	DE 4118664 A1	10-12-1992
		FR 2678204 A1	31-12-1992
		JP 2759018 B2	28-05-1998
		JP H05147001 A	15-06-1993
		US 5249363 A	05-10-1993

DE 728639 C	01-12-1942	NONE	

CA 657445 A	12-02-1963	NONE	

15

20

25

30

35

40

45

50

55

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- JP 2016155351 A [0003] [0020]