



(43) International Publication Date
9 January 2014 (09.01.2014)

(51) International Patent Classification:
B23D 63/16 (2006.01)

(21) International Application Number:
PCT/EP2012/063165

(22) International Filing Date:
5 July 2012 (05.07.2012)

(25) Filing Language: English

(26) Publication Language: English

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(81) Designated States (unless otherwise indicated, for every
kind of national protection available): AE, AG, AL, AM,

AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ,
CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO,
DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN,
HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR,
KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME,
MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ,
OM, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SC, SD,
SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR,
TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every
kind of regional protection available): ARIPO (BW, GH,
GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ,
UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ,
TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK,
EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV,
MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM,
TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW,
ML, MR, NE, SN, TD, TG).

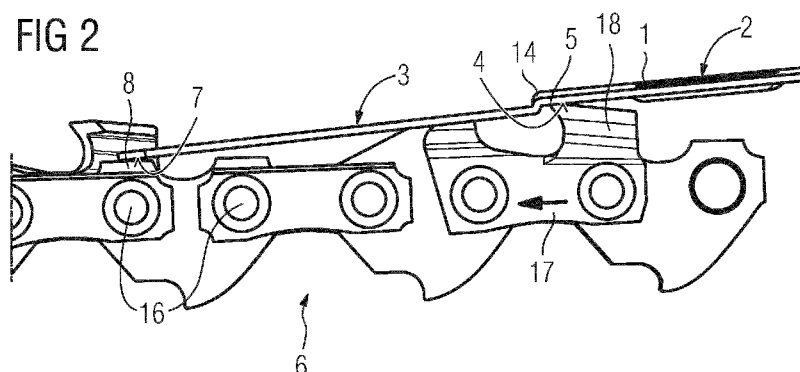
Declarations under Rule 4.17:

— of inventorship (Rule 4.17(iv))

Published:

— with international search report (Art. 21(3))

(54) Title: SAW CHAIN DEPTH GAUGE FILING TEMPLATE



(57) Abstract: The invention relates to a saw chain depth gauge filing template (1), comprising a first flat section (2) and a second flat section (3), wherein both sections (2, 3) are made from a single piece of flat metal, especially from sheet metal, wherein the first flat section (2) has a first bearing surface (4) for a cutter link edge (5) of a saw chain (6) to be filed, wherein the second flat section (3) has second bearing surfaces (7) for a drive link (8) of the saw chain (6), wherein the second surfaces (7) are established by an linear edge (9) in which at least two incisions (10, 11; 10, 11) are machined, wherein the second flat section (3) has at least one cutout (12, 13) for a part of the saw chain (6) to be sharpened by filing. Furthermore, the invention relates to a method for sharpening a saw chain by using such a saw chain depth gauge filing template. By the proposed concept filing of a saw chain becomes possible in a more precise way.

Saw chain depth gauge filing template

The invention relates to a saw chain depth gauge filing tem-
5 plate.

In Fig. 1 an example of a pre-known saw chain depth gauge filing
template is shown. Here, a saw chain 6 has a plurality of cutter
links 17 and of drive links 8, wherein the different chain parts
10 are connect by means of rivets; the rivet heads are denoted with
16. To sharpen the saw chain 6 a saw chain depth gauge filing
template 1 is placed onto the saw chain 6 as shown in the fig-
ure. That is, the gauge filing template 1 rests on the cutter
edge 5 at a rear end and on the rivet heads 16 with a front end.

15 A saw chain depth gauge filing template of this kind is know e.
g. from US 4 738 165 A. Such a depth gauge filing template can
be a part of a chain filing gauge. Other comparable solutions
are disclosed in US 5,241,882, in US 4,473,958, in US 4,412,463,
20 in US 3,365,805 and in US 2,622,338.

It is a certain problem and difficult to place and hold the
depth gauge filing template in the correct position during use,
i. e. during the filing operation to sharpen the respective
25 parts of the saw chain. Specifically, it is difficult to locate
the template at the correct angle and position on the chain so
that less than optimal filing results of the chain's depth gauge
are obtained and thus no optimal cutting performance of the saw.

30 The pre-known gauge filing templates do not compensate suffi-
ciently the angel changes, i. e. the change of the height of the
cutter link edge, during the lifetime of the saw chain, which
changes from filing event to filing event. This results in a
varied depth gauge level during the lifetime of the chain. Con-
35 sequently, an unefficient cutting performance is caused and in
most cases the chain becomes unusable when it approaches the end
of its lifetime since the depth gauge level becomes very low
(closer to the plate thickness).

Thus, it is an object of the present invention to propose a saw chain depth gauge filing template of the mentioned kind which allows a more precise location on the saw chain during the filing operation, so that the filing can be carried out in such a way that an optimized filing result is obtained from filing event to filing event. Thus, the saw chain should maintain an optimal cutting ability till its end of the lifetime.

The solution of this object according to the invention is characterized in that the saw chain depth gauge filing template comprises a first flat section and a second flat section, wherein both sections are made from a single piece of flat rigid material, particularly metal, preferably sheet metal, wherein the first flat section has a first bearing surface for a cutter link edge of a saw chain to be filed, wherein the second flat section has second bearing surfaces for a drive link of the saw chain, wherein the second surfaces are established by an linear edge in which at least two incisions are machined, wherein the second flat section has at least one cutout for a part of the saw chain to be sharpened by filing.

The at least two incisions have preferably a substantial rectangular shape in a top plan view.

Side walls of the at least two incisions are preferably arranged under a first angle to a longitudinal direction of the filing template; the first angle is preferably between 2° and 10° , specifically between 3° and 5° .

The gauge filing template can have a longitudinal direction, wherein the second flat section is then preferably arranged in longitudinal direction under a second angel relatively to the first flat section; the second angle is preferably in the range between 0.5° and 2° .

The depth gauge filing template can furthermore have a transversal direction which is perpendicular to the longitudinal direc-

tion, wherein the second flat section is arranged in transversal direction under a third angel relatively to the first flat section; the third angel is in the range between 0.5° and 10° .

5 Thus, the first and the second flat sections can be inclined relative to another in two directions which allows a better and more precise filing process and thus an improved performance of the saw chain.

10 Preferably, four incisions are machined in the linear edge of the second flat section. The linear edge is preferably perpendicular to the longitudinal direction in a top plan view onto the filing template. The four incisions can be arranged parallel to another along the transversal direction.

15 Preferably, a bending edge is arranged between the first flat section and second flat section. This bending edge forms preferably a step in a direction perpendicular on the first flat section and the second flat section respectively. By this measure
20 the stability of the template is significant improved.

Two cutouts can be arranged in the second flat section.

Furthermore, a circular bore can be arranged in the first flat
25 section. This bore might be use to pivotally link the depth gauge filing template to a filing gauge as for example shown with US 5 241 882 A.

The proposed method for sharpening a saw chain by using of a saw
30 chain depth gauge filing template as described above is characterized in that the saw chain depth gauge filing template is arranged such that the first flat section contacts a cutter link edge of the saw chain with its first bearing surface and that the second flat section contacts a drive link of the saw chain
35 with its second bearing surfaces; in this position of the template parts of the cutter link which reach through the cutout in the second flat section are filed.

The proposed concept allows maintaining an even depth gauge level on the cutter links after every filing event, i. e. during the whole lifetime of the saw chain. Thus, the proposed solution increases the performance of the saw chain through its lifetime and also prolongs the lifetime by avoiding premature chain scraping due to low depth gauge results after filing.

Furthermore, the stability and the correct positioning of the depth gauge tool on the saw chain are improved. While pre-known depth gauge tools rest on the cutter link edge at the rear end of the template and on the rivet heads on the front end, the proposed concept allows that the template rests on the cutter link edge at the rear end (as pre-known) but rest at the front end on the drive link instead. The dimensions of a drive link can be more accurately controlled during its manufacturing than this is possible with the shape of the rivet head during the assembly of the saw chain. Thus by contacting of the drive link with its second bearing surface makes the positioning of the depth gauge tool more accurate.

Specifically, the combination of the following features leads to a significant improvement of a depth gauge tool (template) which is used with a chainsaw sharpener: The tool (template) is substantial planar and has two flat sections, which are arranged relatively to another in an inclined manner. A bend between the two flat sections enhances the mechanical stability substantially. The depth gauge tool rests on a drive link of the saw chain in the front in the sharpening configuration. Preferably, the depth gauge tool has four narrow slots.

The suggested shape of the depth gauge filing template and more specifically the bending edge between the two flat sections increases the strength of the template and thus improves also the quality of the filing process.

In the drawings an embodiment of the invention is depicted.

Fig. 1 shows a side view of a saw chain on which a saw chain

depth gauge filing template according to the state of the art is placed,

Fig. 2 shows a side view of a saw chain on which a saw chain depth gauge filing template according to the invention is placed,

Fig. 3 shows a similar depiction as Fig. 2, wherein the saw chain is in a further used state,

Fig. 4 shows a perspective view of the depth gauge filing template according to Fig. 2,

Fig. 5 shows a perspective view according to Fig. 5, seen from another position,

Fig. 6 shows a top plan view of the depth gauge filing template according to Fig. 2,

Fig. 7 shows the cross section VII-VII according to Fig. 6 and

Fig. 8 shows the cross section VIII-VIII according to Fig. 6.

In the figures 2 to 8 a saw chain depth gauge filing template 1 is shown alone and when placed on a saw chain 6.

Basically, the depth gauge filing template 1 is made from a piece of sheet metal which is hardened in a well known manner. The sheet metal forms a first flat section 2 and a second flat section 3. At the transition between the two sections 2, 3 a bending edge 14 is formed and has a form like a step. The mechanical stability of the template 1 is significantly enhanced by this measure.

The first flat section 2 forms a first bearing surface 4 at its bottom side which is designed to be located on a cutter edge 5 of the saw chain 6 (see figures 2 and 3). Likewise, the second flat section 3 forms a second bearing surface 7 at its bottom

side; this bearing surface 7 is designed to be located on a drive link 8 of the saw chain 6. Thus, during use the template 1 has no contact with the rivet heads 16 of the saw chain 6.

5 In Fig. 2 the saw chain 6 is shown in a quite new state when the sharpening of the cutting edges of the saw chain 6 takes place the first time. During the lifetime of the saw chain 6 material is removed by filing. Fig. 3 shows basically the same situation as Fig. 2, but here the saw chain 6 was already used a certain
10 part of its lifetime (thus the length of cutter 18 with cutter link 17 is significantly reduced due to repeated filing action).

The following further features of the template 1 should be mentioned:

15 The template 1 forms a linear edge 9 at a distal end of the second flat section 3. This linear edge 9 runs perpendicular to a longitudinal direction L of the template 1, i. e. in a transversal direction T.

20 In the region of the linear edge 9 of the second flat section 3 four incisions 10, 10', 11, 11' are machined (i. e. punched during the production of the template 1). Furthermore, two cutouts 12, 12' are machined (i. e. punched) into the second flat section 3. This allows to use the template 1 flexible for the filing
25 of a saw chain 6.

To easily arrange and remove the template 1 into the position as shown in Fig. 2 and Fig. 3 and away from this position the side
30 walls 13 of the incisions 10, 10', 11, 11' are provided with a slight conical shape, i. e. as can be seen from Fig. 6 a first angle α is provided between the side walls 13 and the longitudinal direction L. The first angle is presently 6°.

35 Furthermore, the first flat section 2 and the second flat section 3 are pivoted relatively to another in two planes. As can be seen from Fig. 8 a second angle β is provided between the two sections 2, 3 when seen in the cross section VIII-VIII according

to Fig. 6. Furthermore, as can be seen from Fig. 7 a third angle γ is provided between the two sections 2, 3 when seen in the cross section VII-VII according to Fig. 6. The second angle β is about 1° in the shown embodiment, the third angle γ is about 2.2°

5 Thus, to sum up the proposed saw chain depth gauge filing template 1 is used with a chainsaw sharpener. The template 1 has a first planar part 2 and a second planar part 3. A bending edge (bend) 14 is provided between the first and second planar parts
10 2, 3 for improved strength.

The second planar part 3 includes separate apertures 12, 12' for sharpening depth gauges for hard and soft cutting operations.

15 Further, the second planar part 3 includes four narrow slots 10, 11, 10', 11', two each for left (see "l" in Fig. 5) and right (see "r" in Fig. 5) cutter links.

Moreover, the second planar part 3 is inclined in two planes
20 relatively to the first planar part 2, namely, longitudinally and laterally, for improved performance.

The first planar part 2 includes a bore (hole) 15 for pivotally connecting the depth gauge template with a filing gauge.

25 In sharpening configuration, the template rests on a drive link 8 in the front instead of a rivet head 16. This design of the tool improves the accuracy and stability of the depth gauge tool significantly.

30

Reference Numerals

1	Saw chain depth gauge filing template
2	First flat section
3	Second flat section
4	First bearing surface
5	Cutter edge
6	Saw chain
7	Second bearing surface
8	Drive link of the saw chain
9	Linear edge
10	Incision
10'	Incision
11	Incision
11'	Incision
12	Cutout
12'	Cutout
13	Side wall
14	Bending edge
15	Bore
16	Rivet head
17	Cutter link
18	Cutter
α	First angle
β	Second angle
γ	Third angle
L	Longitudinal direction
T	Transversal direction

Patent Claims

1. Saw chain depth gauge filing template (1), comprising a first flat section (2) and a second flat section (3), wherein both sections (2, 3) are made from a single piece of flat rigid material, preferably metal, wherein the first flat section (2) has a first bearing surface (4) for a cutter edge (5) of a saw chain (6) to be filed, wherein the second flat section (3) has at least one cutout (12, 12') for a part of the saw chain (6) to be sharpened by filing, wherein the second flat section (3) has second bearing surfaces (7) for a drive link (8) of the saw chain (6), wherein the second surfaces (7) are established by an linear edge (9) in which at least two incisions (10, 11; 10', 11') are machined.
2. Saw chain depth gauge filing template according claim 1, characterized in that the at least two incisions (10, 11; 10', 11') have a substantial rectangular shape in a top plan view.
3. Saw chain depth gauge filing template according claim 1 or 2, characterized in that side walls (13) of the at least two incisions (10, 11; 10', 11') are arranged under a first angle (α) to a longitudinal direction (L) of the filing template (1).
4. Saw chain depth gauge filing template according claim 3, characterized in that the first angle (α) is between 2° and 10°, preferably between 3° and 5°.
5. Saw chain depth gauge filing template according to one of claims 1 to 4, characterized in that it has a longitudinal direction (L) and that the second flat section (3) is arranged in longitudinal direction (L) under a second angel (β) relatively to the first flat section (2).

6. Saw chain depth gauge filing template according claim 5, characterized in the second angel (β) is in a range between 0.5° and 2° , preferably 1° .

5

7. Saw chain depth gauge filing template according to one of claims 1 to 6, characterized in that it has a transversal direction (T) which is perpendicular to the longitudinal direction (L) and that the second flat section (3) is arranged in transversal direction (T) under a third angel (γ) relatively to the first flat section (2).

10

8. Saw chain depth gauge filing template according claim 7, characterized in the third angel (γ) is in a range between 0.5° and 10° , preferably $2,2^\circ$.

15

9. Saw chain depth gauge filing template according to one of claims 1 to 8, characterized in that four incisions (10, 11; 10', 11') are machined in the linear edge (9) of the second flat section (3), wherein the linear edge (9) is preferably perpendicular to the longitudinal direction (L) in a top plan view onto the filing template (1).

20

10. Saw chain depth gauge filing template according to claim 9, characterized in that the four incisions (10, 11; 10', 11') are arranged parallel to another along the transversal direction (T).

25

11. Saw chain depth gauge filing template according to one of claims 1 to 10, characterized in that a bending edge (14) is arranged between the first flat section (2) and second flat section (3).

30

12. Saw chain depth gauge filing template according to claim 11, characterized in that the bending edge (14) forms a step in a direction perpendicular on the first flat section (2) and the second flat section (3) respectively.

35

13. Saw chain depth gauge filing template according to one of claims 1 to 12, characterized in that two cutouts (12, 12') are arranged in the second flat section (3).

5

14. Saw chain depth gauge filing template according to one of claims 1 to 13, characterized in that a circular bore (15) is arranged in the first flat section (2).

10 15. Method for sharpening a saw chain (6) by using of a saw chain depth gauge filing template (1) according to one of claims 1 to 14,

characterized in that

15 the saw chain depth gauge filing template (1) is arranged such that the first flat section (2) contacts a cutter edge (5) of the saw chain (6) with its first bearing surface (4) and that the second flat section (3) contacts a drive link (8) of the saw chain (6) with its second bearing surfaces (7) and filing part of the saw chain (6) reaching through the
20 cutout (12, 12') in the second flat section (3).

25

FIG 1 (STATE OF THE ART)

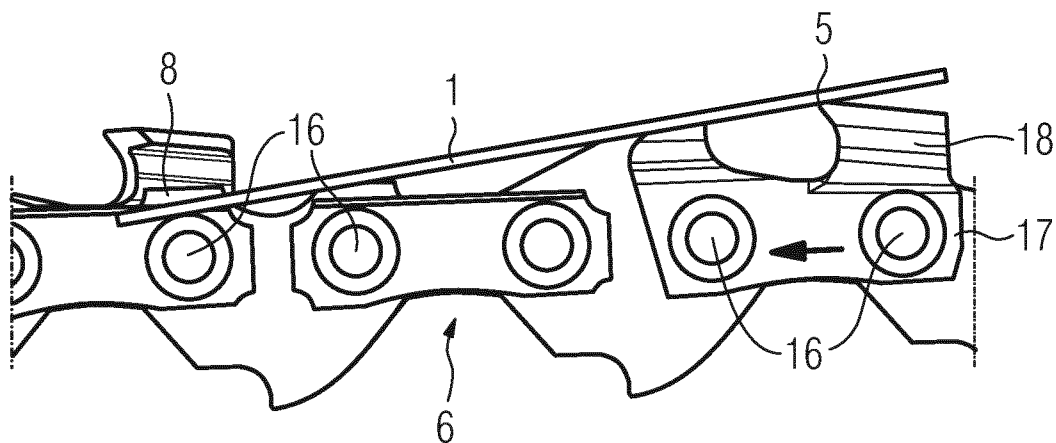


FIG 2

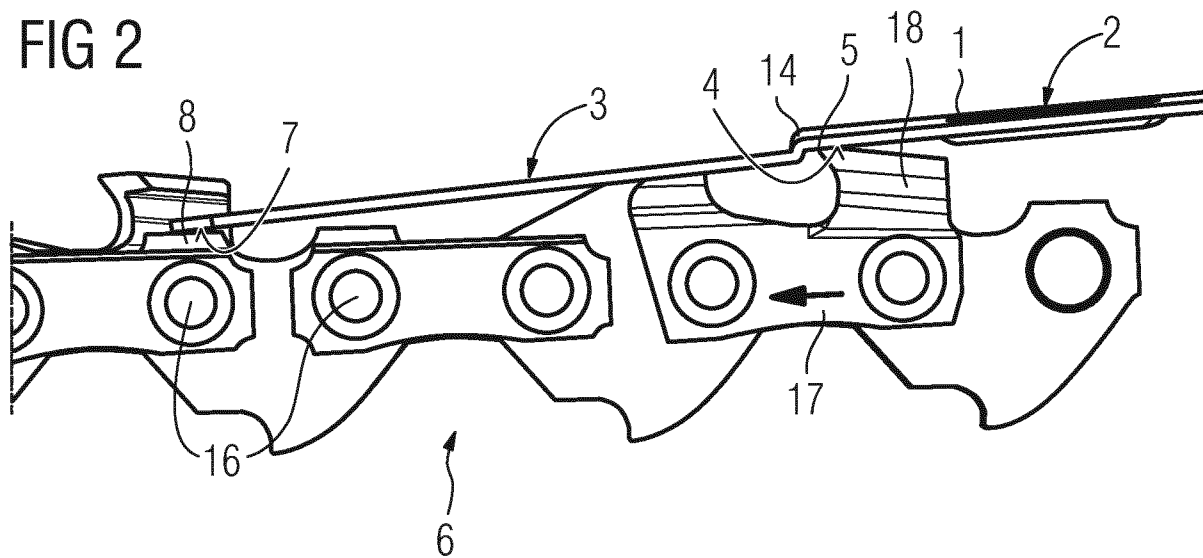


FIG 3

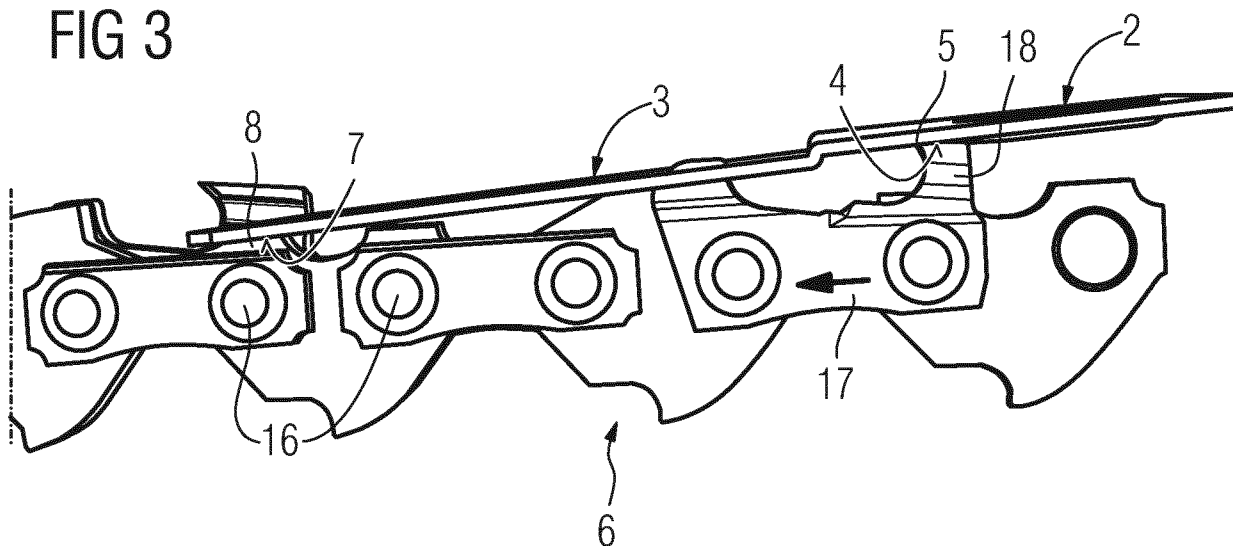


FIG 4

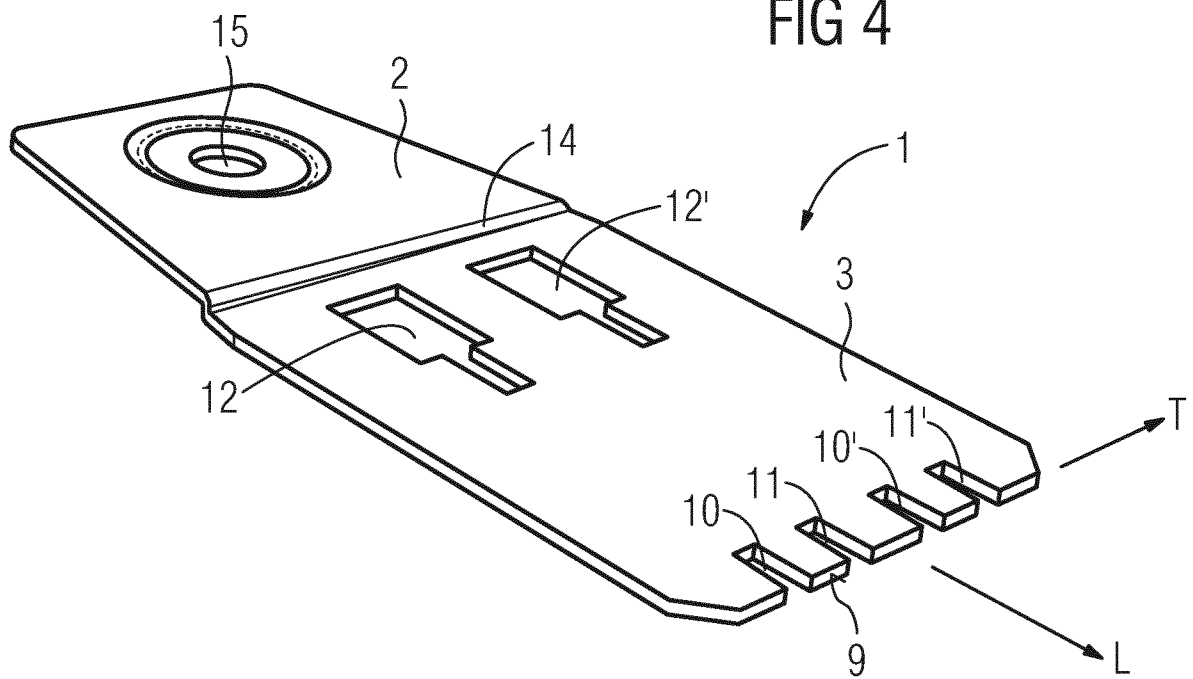
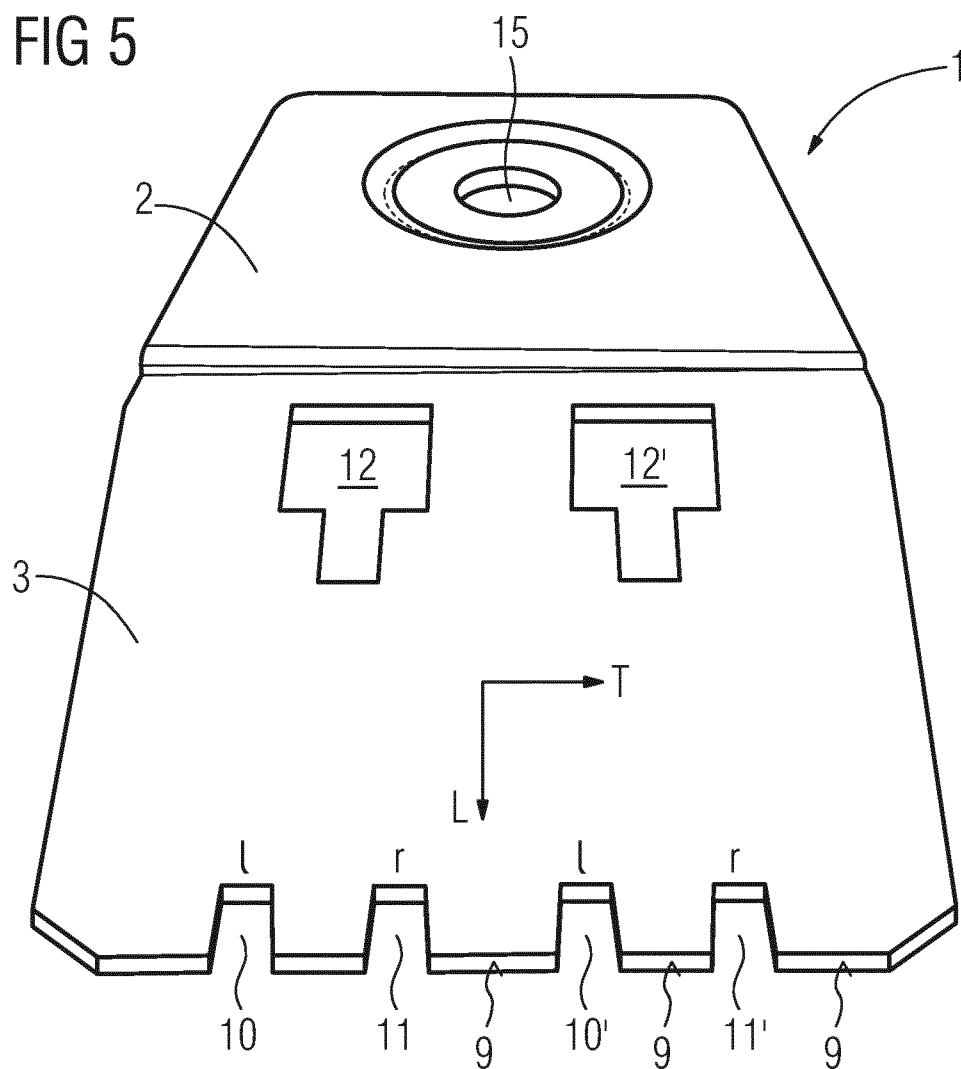


FIG 5



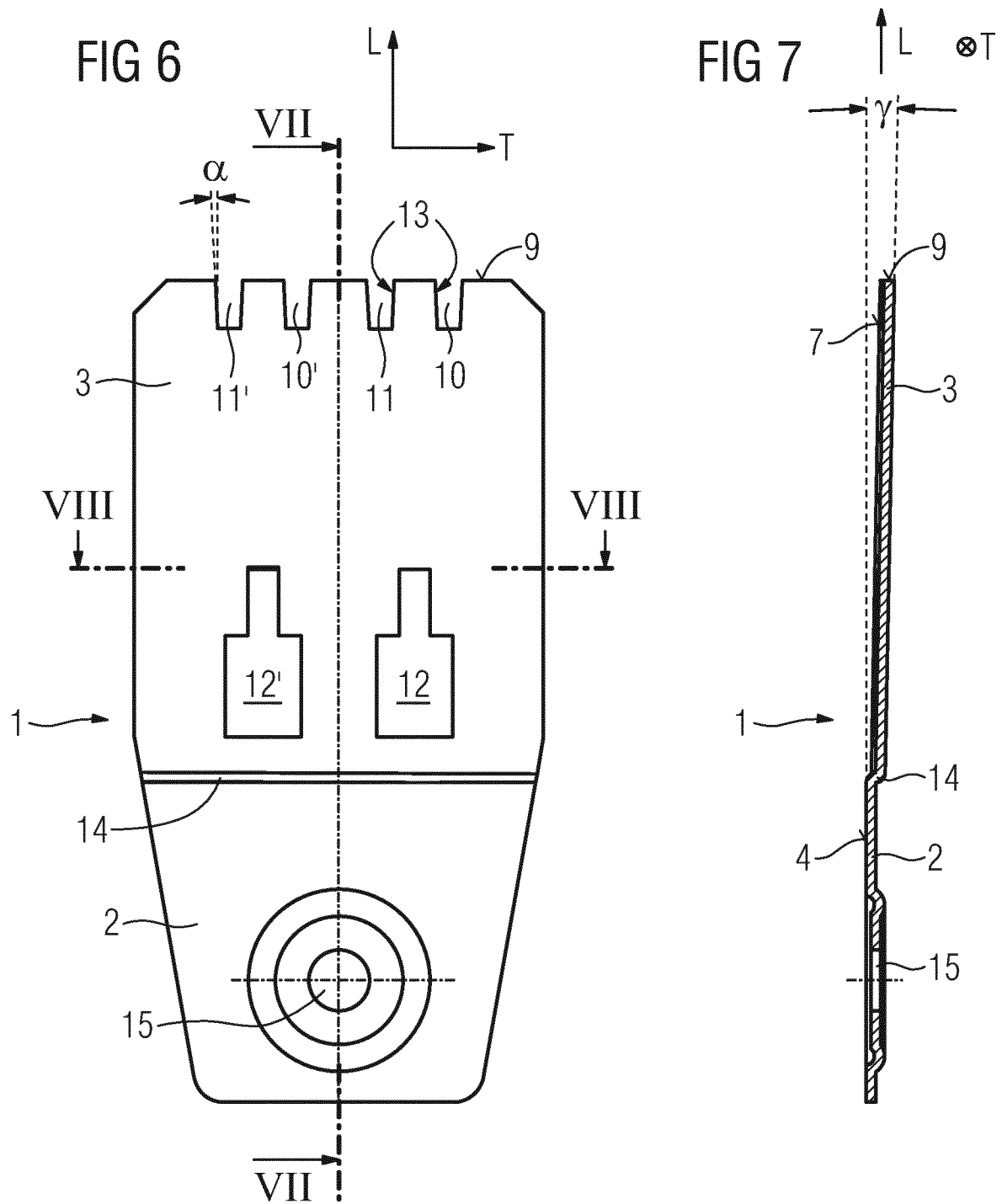
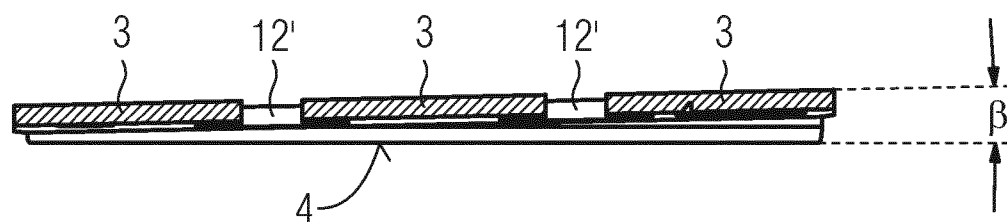


FIG 8



INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2012/063165

A. CLASSIFICATION OF SUBJECT MATTER
INV. B23D63/16
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
B23D B24B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X A	US 5 241 882 A (ERIKSSON LARS O [SE]) 7 September 1993 (1993-09-07) cited in the application column 3, line 9 - column 4, line 2 figures -----	1-4,9, 10,13-15 5-8,11, 12



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents :

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"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

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"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

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Date of the actual completion of the international search

25 February 2013

Date of mailing of the international search report

05/03/2013

Name and mailing address of the ISA/

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/EP2012/063165

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5241882	A	07-09-1993	CA 2076042 A1 21-08-1991
			DE 4190357 C2 27-05-1999
			DE 4190357 T 28-01-1993
			SE 464564 B 13-05-1991
			SE 9000601 A 13-05-1991
			US 5241882 A 07-09-1993
			WO 9112916 A1 05-09-1991
