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(54) **Element of junction between a ski and a ski binding**

(57) An element of junction (1, 1') between a ski (30) and a ski binding (20) having a toe piece (21) and a heel piece (22); the element of junction (1) is positioned in an upper zone (31) of the ski (30) and extends, for a direction of maximum length, parallelly to a longitudinal axis (X) of the ski (30); the element of junction (1), fixed with respect

to the ski binding (20) and with respect to the ski (30), is positioned under the ski binding (20) or is embedded within it and comprises a couple of lateral guides (3a, 3b) for the unloading of forces between the ski binding (20) and the ski (30), laterally positioned with respect to a raised channel (4); the raised channel (4) is not in contact with the upper zone (31) of the ski (30).

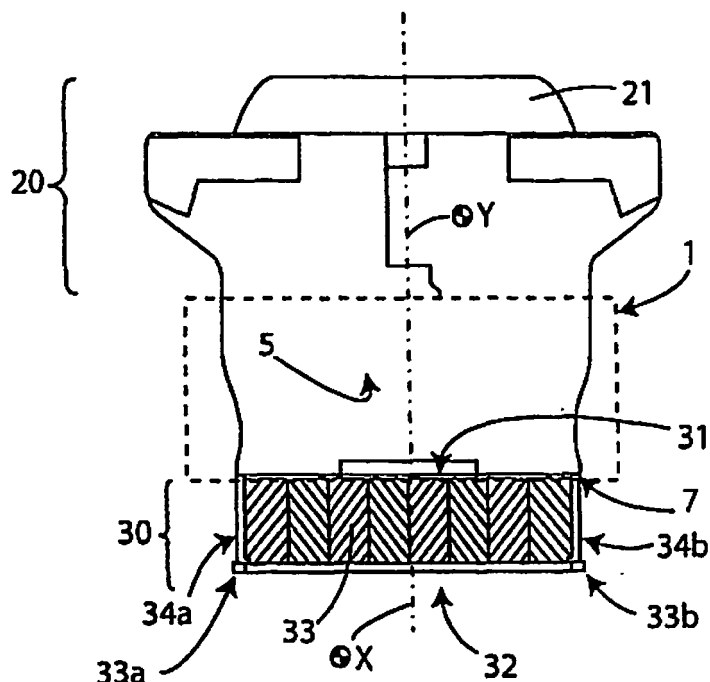


Fig. 2

Description

[0001] The present invention relates to the field of ski accessories devices and in particular relates to an element of junction between a ski and a ski binding.

[0002] It is known that the skis at present in commerce have the need of being united to bindings, typically comprising a toe piece and a heel piece, for binding a ski boot.

[0003] In detail, ski bindings of known kind are fixed to the ski in an upper zone of itself, which is opposed to a bottom plate that in use is made gliding on the snow.

[0004] Alternatively, ski bindings of known kind are fixed to a ski boot raising plate, in its turn fixed to the upper part of the ski, or are embedded directly within the structure of the ski, thus resulting immovable.

[0005] As shown in figure 1, which illustrates a section of a ski 100 with a raising plate 101 of known kind, observed by the front part of the ski and right in front of a front ending part of a toe piece 102 of a ski binding, bindings and raising plates of known kind are provided with a plane base having a lower face 103 which lies on an upper zone 100a of the ski 100 all along its width 104.

[0006] Upper zone 100a of the ski is opposite with respect to one of its bottom plate 100b, to whose sides extend, all along the length of the ski, a couple of ski edges 110c, 110d.

[0007] The raising plate 101 depending on the models can be provided with ribs and, consequently, can be not solid.

[0008] Therefore, during the use of the ski, a plurality of forces which develop among a skier and the ski, are transmitted through the boot, the binding, the raising plate (if present) and the ski up to the ski edges, which permit to keep a stable curved path even in case of great loads or high speeds.

[0009] A ski comprising a raising plate for bindings is described in document US7,344,149; in this document it is illustrated a raising plate that presents a couple of lateral guides which insert in a recess of the ski.

[0010] Bindings and raising plates of known kind are characterized by some drawbacks.

[0011] In detail, they do not allow the realization of an optimized unloading of forces towards the ski edges, and often are the cause of force dissipation on the entire structure of the ski, in particular in its central part.

[0012] In fact, skis present a not uniform core, and which features often vary from factory to factory and, furthermore, from model to model.

[0013] An optimal unloading of forces on the ski edges is essential for obtaining high performances of the skier and of the ski. During the straight descent, in fact, the entire bottom plate slides on the snow and the ski edges do not play a fundamental role; in this case, the core of the ski in its entirety supplies a force reaction to the skier. During turns, on the contrary, the ski edge of the ski is substantially the only line of contact with the snow (in particular in case of compressed or iced snows) and the force transmission towards the ski edge is essential for:

- allowing the skier not to waste the force used for curving the ski.
- allowing a better and purer reaction transmission (or feedback) of the ski to the skier, without which he would not be able to identify the behavior of the ski on the snow.

[0014] The two factors above illustrated are mostly important the more the ski can offer high performances.

[0015] In particular, with the last generation of skis for alpine skiing, the so-called "carving" skis, the conduction of the turn happens uniquely with a good stability of the ski, the ski edge becomes a driving element during the turn (due to a flexing of the ski following the application of a force for the flexure) and is equally the unique element that allows to provide to the skier - still with a transmission of forces - the indication of the passage from a conduction of the turn to a skidding.

[0016] The central area of the core of the ski, in the turns in particular, exerts a function of waste of energy which is the cause of a worsening of the performances obtainable by the skier.

[0017] Moreover, the ski disclosed in US 7,344,149, has the disadvantage of permitting a certain degree of movement between the raising plate in function of the forces of charge which develop on the ski.

[0018] This is a disadvantage because this same movement is a source of a friction energy dispersion and, depending on the thermal conditions of use of the ski, can result in a reciprocal temporary locking of the plate with respect to the ski in a non optimal position, causing temporary incoherencies of response of the ski itself.

[0019] Moreover, the ski described in US 7,344,149, is not free from plays which can create between the raising plate and the body of the ski; therefore, this ski cannot be used in competitive, semi-competitive disciplines or in all of those uses wherein the ski is subjected to repeated extreme loads, wherein the long-term acquired plays cannot be tolerated.

[0020] A scope of the present invention is to describe an element of junction between a ski and a ski binding which is free from the inconvenients above described.

[0021] According to the present invention is thus realized an element of junction between a ski and a ski binding as claimed in the first claim.

[0022] The invention will be now described with reference to the attached drawings, which illustrate a nonlimiting example of embodiment, wherein:

- figure 1 illustrates a detail of a section of a ski with a raising plate and a ski binding of known kind;
- figure 2 illustrates a front section of a first embodiment of an element of junction between a ski and a ski binding according to the present invention;
- figure 3 illustrates a perspective view of the first embodiment of the element of junction of figure 1;
- figure 4 illustrates a perspective view of part of the element of junction of figure 2;

- figure 5 illustrates a detail of part of the element of junction of figure 2;
- figures 6 and 7 illustrate respectively a second embodiment of the element of junction according to the present invention;
- figures 8, 9, 10 illustrate respectively a perspective view from the bottom of a third, fourth and fifth embodiment of the element of junction according to the present invention; and
- figure 11 illustrates a sectional view of a sixth embodiment of the element of junction according to the present invention; and
- figure 12 illustrates a further variant of the element of junction illustrated by the previous figures.

[0023] With reference to figures 2, 3, 4 an element of junction between a ski binding 20, having a toe piece and a heel piece and a ski 30 is generally designated with 1.

[0024] In figure 2, in detail, it can be observed a section of the element of junction 1 when correctly installed between ski 30 and binding 20, of which it is visible part of toe piece 21, whereas in figure 3, it can be observed a three-dimensional view of element of junction 1 seen from the bottom, that is from the side in use which faces on the upper part of ski 30.

[0025] Ski 30, that extends along an own longitudinal axis X comprises:

- an upper zone 31, upon which it is fixed element of junction 1;
- a bottom plate 32, opposite with respect to the upper zone and having plane shape, which in use glides over the snow; and
- a core 33, which is laterally delimited by a couple of lateral walls 34a, 34b, upperly by upper zone 31 and below by bottom plate 32;
- a couple of ski edges 33a, 33b, positioned respectively along all the longitudinal extension of the ski upon its left and right side, on the borders of said bottom plate.

[0026] Element of junction 1 is positioned over said upper zone 31 of ski 30, and it is fixed to it through a plurality of screws or equivalent blocking means; it is also mounted in such a way as to extend for a direction of maximum length parallelly to longitudinal axis X of ski 30; element of junction 1 also presents a symmetrical section with respect to a vertical axis Y, orthogonal to longitudinal axis X.

[0027] Element of junction 1 has a body which comprises an upper face 2, plane, upon which it is fixed ski binding 20; element of junction 1 extends in only one piece under binding 20 and over ski 30.

[0028] The height along vertical axis Y can be of the required measure, in such a way as to adapt element of junction 1 to the different kinds of ski and, equally, to provide for a raising of ski binding 20 - and consequently of the ski boot - enough for permitting a wide angle of

inclination of the ski on the snow without the boot or the binding entering in contact with it.

[0029] Underneath upper face 2 of the element of junction 1 extend a couple of lateral guides 3a, 3b, parallel among them, which are interposed to a raised channel 4 and which extend for all the length of element of junction 1.

[0030] Lateral guides 3a, 3b are united by a part of the body of element of junction 1 which superimposes them and which is upperly delimited by upper face 2; in this way they are never separated among them, but - on the contrary - result reciprocally engaged.

[0031] In detail, even raised channel 4, of substantially rectangular section, extends parallelly with respect to lateral guides 3a, 3b for all the direction of the maximum extension of the element of junction and is projected in such a way as, once element of junction 1 has been installed on ski 30, to result symmetrical with respect to vertical axis Y.

[0032] Lateral guides 3a, 3ba are each one provided with a planar and solid lower face 5, which is in contact with upper zone 31 of the ski and, also, present a sufficient width for unloading the forces which a skier (even an agonistic one) typically exerts on one ski without flexing or modifying its shape.

[0033] On the other hand, element of junction 1 is laterally delimited by a couple of lateral walls 6a, 6b, respectively left and right, which are not planar.

[0034] In detail, as illustrated in figure 2 and in figure 4, lateral walls 6a, 6b are positioned at a distance equal to the width of ski 30 and present an arched shape, each one with a convexity directed toward the interior of device 1 and, precisely, in direction of the opposed wall.

[0035] This convexity is kept for all the length of lateral walls 6a, 6b and permits an optimization of the distribution of the forces exerted by the skier on ski edges 33a, 33b of the ski, together with raised channel 4, that prevents that part of the force impressed by the skier is dispersed in the central part of core 33 of the ski.

[0036] Each of the two lateral walls 6a, 6b of element of junction 1 ends at the bottom on a border 7 which joins with the junction among upper zone 31 of ski 30 and its lateral walls 34a, 34b. In detail, in figure 2 it is illustrated a straight sidewall ski, where the junction among upper zone 31 of ski 30 and the lateral walls create a corner; however, the installation upon one straight sidewall ski has not to be considered as limiting, because element of junction 1 can equivalently be installed on skis having curved or beveled lateral walls in the junction with upper zone 31.

[0037] Element of junction 1 also comprises passing holes 9, which extend from upper face 2, in such a way as to be fixed through screws or equivalent blocking means to ski 30.

[0038] In detail, passing holes 9 can be equivalently positioned in correspondence with lateral guides 3a, 3b, into raised channel 4 or among them.

[0039] As illustrated figure 5, the convexity of lateral

walls 6a, 6b does not end in correspondence of the lower faces of lateral guides 3a, 3b; on the contrary, this convexity ends at a height slightly higher with respect to lateral guides 3a, 3b, leaving therefore another linear-profiled zone before the junction (border 7) among lateral walls 6a, 6b and the external corner of lateral guides 3a, 3b. This linear-profiled zone is 3-4 mm high, and is particularly advantageous when the element of junction object of the present invention is coupled to a straight side-wall ski.

[0040] As it is illustrated in figure 5, after the application of a force by the skier on the binding or after a reaction force exerted by the ski on the skier, these forces (schematically illustrated with an arrow a in figure) distribute upon a limited section of core 33 of ski 30, in a lateral zone 11 up to unloading upon ski edge 33b, illustrated in contact with snow 100. Therefore, substantially, the central part of core 33 is in resting state and is not loaded by forces caused by the presence of raised channel 4, which does not lie on the upper zone of ski 30.

[0041] A second embodiment of element of junction 1' is illustrated in figures 6 and 7.

[0042] The second embodiment of the element of junction differs from the one previously illustrated for two features; first of all, a first difference derives from the fact that element of junction 1' has two separate parts; secondly, a second difference derives from the fact that these parts are integrated or embedded respectively in a toe piece 21 and in a heel piece 22 of ski binding 20. In this case, therefore, screws for fastening the element of junction 1 to ski binding 20 itself are not necessary.

[0043] Each of the two parts of element of junction 1' keeps the same features previously described if not for what relates to the upper plane face. In fact, in the second embodiment of element of junction 1', it can be replaced by grooves or recesses for improving the integration between toe piece 21 and heel piece 22.

[0044] Finally, both the embodiments of the present invention can be adapted also to skis whose section is not rectangular as the one illustrated in the attached figures but which, on the contrary, presents raised channels ("rails") upon which lie lateral guides 3a, 3b of element of junction 1, 1'.

[0045] A third, fourth and fifth embodiment of element of junction 1", 1"', 1'''' are finally illustrated by figures 8-10.

[0046] The third, fourth and fifth embodiment of element of junction 1"-1'''' differentiate from the first embodiment for the fact that lateral guides 3a, 3b are no more parallel to each other but, with respect to a symmetrical longitudinal axis Z of element of junction 1"-1''', which finds the direction of the maximum extension of itself, respectively present:

- a reciprocal concavity for which, by observing element of junction 1" in plain-view from the bottom, lateral guides 3a, 3b are directed the one towards the other, and reciprocally approach while moving from one of the two endings towards half length of

element of junction 1";

- a reciprocal convexity for which, by observing element of junction 1" in plain-view from the bottom, lateral guides 3a, 3b are directed toward opposed directions, with a concavity directed toward the concavity of the opposed guide, and reciprocally move away while moving from one of the two endings toward half length of element of junction 1"; and
- a first half wherein by observing element of junction 1" in plain-view from the bottom, lateral guides 3a, 3b are directed the one towards the other, and reciprocally approach while moving from one of the two endings toward half length of element of junction 1'' and a second half for which, by observing element of junction 1" in plain-view from the bottom, lateral guides 3a, 3b are directed toward opposed directions, with a concavity directed toward the concavity of the opposed guide and reciprocally move away while moving from one of the two endings toward half length of the element of junction 1''''.

[0047] A further sixth embodiment differentiates from the previous ones because element of junction 1'''' is within raised channel 4 and among lateral guides 3a, 3b there is an anti-vibration element 50 for example in plastic, rubber or metallic material.

[0048] Anti-vibration element 50 is fixed to the element of junction object of the present invention through screwing, gluing or locked through one or more metallic nails which in any case have not contact the ski, not even during its flexion while in use.

[0049] In detail, anti-vibration element 50 has a shape which recalls the one of the cavity created between raised channel 4 and ski 30, but has such a size as not to result compressed between the element of junction and the ski itself, in such a way as to carry out anyhow an action of absorption of the vibrations.

[0050] Finally, as it is illustrated in figure 12, lateral guides 3a, 3b are provided each one with a plane and solid lower face under which it is positioned at least an element of absorption of vibrations comprising a layer of anti-vibration material 51 adapted to absorb the vibrations of the ski and therefore to insulate the skier from the vibrations induced by the use of said ski 30.

[0051] In detail, this layer of anti-vibration material 51, having such a rectangular section and size as not to present a width equal to the one of the lateral guides themselves, can be realized in rubber or plastic material and is fixed through gluing or fusion upon the lower face of each of the two lateral guides 3a, 3b.

[0052] The anti-vibration material of layer 51 permits therefore to damper and absorb the vibrations which there are during the common use of ski, in particular in conditions of high speed and skiing upon compressed or scaled snows.

[0053] The advantages of the element of junction between a ski and a ski binding are known in the light of the previous description. In particular, it permits the trans-

mission of the forces which develop between a skier and a ski during its use uniquely in a lateral zone 35 of the ski itself. In this way, the transmission of these forces takes place in the most possible direct way, without the dispersion of them within the central zone of core 33 of ski 30. After a lower force dispersion, therefore, through element of junction 1-1''', object of the present invention, an improvement of the performances of the skier is obtained during the skiing, because for the same force that he exerts on the ski boot (and therefore, passing through ski binding 20, upon ski 30), it is obtained a higher force applied to ski 30, because there is a lower dispersion of it.

[0054] In the same way, with element of junction 1-1''', object of the present invention, it enables the skier to better perceive the feedback provided by the sky because, especially in turns and in all those situations where the point of contact and of engagement with the snow is substantially ski edge 33a or 33b of the ski, the forces which originate from it are more directly transmitted to the skier, without the dispersion in the inner part of core 33 of the ski.

[0055] The integration of element of junction 1-1''' with-in the ski binding or anyhow its screwing upon ski 30 and upon ski binding 20 permits to avoid the creation of plays among the various elements and makes it impossible the reciprocal sliding among the ski, element of junction and ski binding 20; in this way, friction forces for which energy dispersions can be present during the use of the ski cannot develop among the above elements and, at the same time, the risk of acquiring reciprocal plays is avoided. Hence, the element of junction object of the present invention can be applied also to ski designed for competitive activity, subjected to extreme stresses for a long time.

[0056] Thanks to the possibility of constructing the element of junction 1-1''' with different heights, it is then possible to avoid the installation on the ski of the common raising plate of the ski boot, anyhow obtaining a raising of it. For this reason, the element of junction 1-1''' object of the present invention can anyhow be applied in competitive and/or Olympic disciplines where there are regulations for limiting the maximum height at which the ski boot can be elevated with respect to bottom plate 32.

[0057] If element of junction 1-1''' has two separate parts, respectively mounted under toe piece 21 and heel piece 20 of the ski binding, also permits the adaptability to all those skis that, in their central zone, present protuberances or elements of various nature which would make it difficult to install an element of junction formed by a sole piece which extends from the toe piece to the heel piece uninterruptedly.

[0058] Having an element of junction 1, 1''-1''' in a sole piece (respectively first, third, fourth and fifth embodiment), instead of having it in two separate parts (second embodiment) permits also to have (second embodiment) a lower stiffening of ski 30 along longitudinal axis X, with respect to what happens with the installation of element of junction 1 in a sole piece.

[0059] Furthermore, if lateral guides 3a, 3b of element of junction 1''-1''' are not parallel, there is a better adaptation to particular geometries of the ski, such as for example (and not limiting to them) skis characterized by strong sidecuts such as for example slalom skis.

[0060] Finally, if the element of junction, object of the present invention, is provided with an anti-vibration element 50 and/or with the layer of anti-vibration material 51, these elements will contribute also to reduce the vibrations of the ski induced for example by snows not perfectly homogeneous, iced, upon which the skier skis at high speed.

[0061] It is finally clear that the thickness of the element of junction object of the present invention can be defined at choice, both in phase of production and before the mounting through a rectified filing of lateral guides 3a, 3b; for this reason the element of junction object of the present invention can be adapted also to race skis, for which the "International Ski Federation" (FIS) determines precise numerical values for the maximum distance between the bottom plate of the boot and the ski.

[0062] To the device up to here described, some variants, improvements and additions obvious for an expert of the field can be applied, without exiting from the scope of protection provided by the annexed claims.

[0063] In particular, the raised channel between the two lateral guides can differ by shape with respect to what illustrated in the attached figures and, instead of having rectangular section, have for example an arched or triangular section.

[0064] Furthermore, the lateral walls of the element of junction can also be not arched (and therefore plane) or have a profile with concavity, for example trapezoidal, directed toward the opposed wall.

Claims

1. Element of junction (1-1''') between a ski (30) and a ski binding (20) having a toe piece (21) and a heel piece (22); the element of junction (1-1''') is positioned in an upper zone (31) of said ski (30) and extends, for a direction of maximum length, parallelly to a longitudinal axis (X) of said ski (30); the element of junction (1-1'''), fixed with respect to said ski binding (20) and with respect to said ski (30), is **characterized in that:**

- is positioned under said ski binding (20) or is embedded within it; and
- it comprises a couple of lateral guides (3a, 3b) for the unloading of forces between said ski binding (20) and said ski (30), laterally positioned with respect to a raised channel (4); said raised channel (4) is not in contact with said upper zone (31) of said ski (30).

2. Element of junction (1-1''') according to claim 1,

wherein said lateral guides (3a, 3b) are **characterized by** a respective continuous lower face (5); said lower face (5) being in contact with said upper zone (31) of said ski (30).

3. Element of junction (1-1''') according to claim 1, comprising also a couple of lateral walls (6a, 6b) having an arched shape with convexity respectively directed toward the opposed lateral wall. 5
4. Element of junction (1, 1', 1''') according to claim 3, wherein said lateral walls (6a, 6b) have a reciprocal distance substantially equal to a width of said ski (30). 10
5. Element of junction according to claim 3, wherein each of the two lateral walls (6a, 6b) has a lower border (7); each lower border (7) connecting to a junction between the upper zone (31) of said ski (30) and a respective lateral wall (34a, 34b) of said ski (30). 15
6. Element of junction (1, 1') according to claim 1, wherein said lateral guides (3a, 3b) are parallel to each other and are parallel also to said raised channel (4). 20
7. Element of junction (1') according to claim 1, comprising a first portion installed on said toe piece (21) of said ski binding (20) and a second portion installed on said heel piece (22); said first and said second portions of said element of junction (1') being different the one with respect to the other. 25
8. Element of junction (1, 1''-1''') according to claim 1, extending in a unique piece under the binding (20) and over the ski (30). 30
9. Element of junction (1-1''') according to claim 1, wherein said raised channel (4) has a rectangular, arched or triangular shape. 35
10. Element of junction (1-1''') according to claim 1, comprising also a couple of plane lateral walls (6a, 6b). 40
11. Element of junction (1'') according to claim 1, wherein said lateral guides (3a, 3b) are not parallel to each other; said lateral guides (3a, 3b) being directed the one towards the other and reciprocally approaching while moving from one of the two endings toward half length of the element of junction (1'') along a longitudinal axis (Z) of said element of junction. 45
12. Element of junction (1''') according to claim 1, said lateral guides (3a, 3b) are not parallel to each other; said lateral guides (3a, 3b) being **characterized by** a convexity directed towards a direction opposed to 50

the one of the convexity of the opposed lateral guide; said lateral guides (3a, 3b) reciprocally moving away while moving from one of the two endings toward half length of the element of junction (1'') along a longitudinal axis (Z) of said element of junction. 55

13. Element of junction (1''') according to claim 1, wherein said lateral guides (3a, 3b) are not parallel to each other; said lateral guides (3a, 3b) have:
 - a first tract wherein they are directed the one toward the other and reciprocally approach while moving from one of the two endings toward half length of the element of junction (1'') along a longitudinal axis (Z) of said element of junction;
 - a second tract wherein said lateral guides (3a, 3b) are **characterized by** a convexity directed towards a direction opposed to the one of the convexity of the opposed lateral guide; said lateral guides (3a, 3b) reciprocally moving away while moving from one of the two endings toward half length of the element of junction (1'') along a longitudinal axis (Z) of said element of junction.
14. Element of junction according to anyone of the preceding claims, comprising also an anti-vibration element (50); said anti-vibration element being inserted within said raised channel (4). 55
15. Element of junction according to anyone of the preceding claims, comprising also a layer of anti-vibration material (51) fixed in correspondence of said lateral guides (3a, 3b) and extending all along their length; said layer of anti-vibration material (51) being realized in rubber and/or plastic material. 60

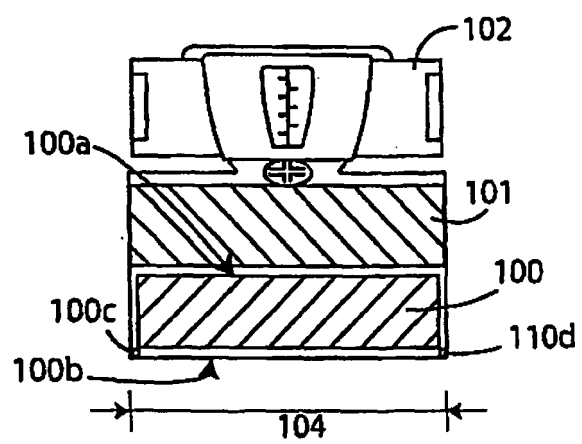


Fig. 1

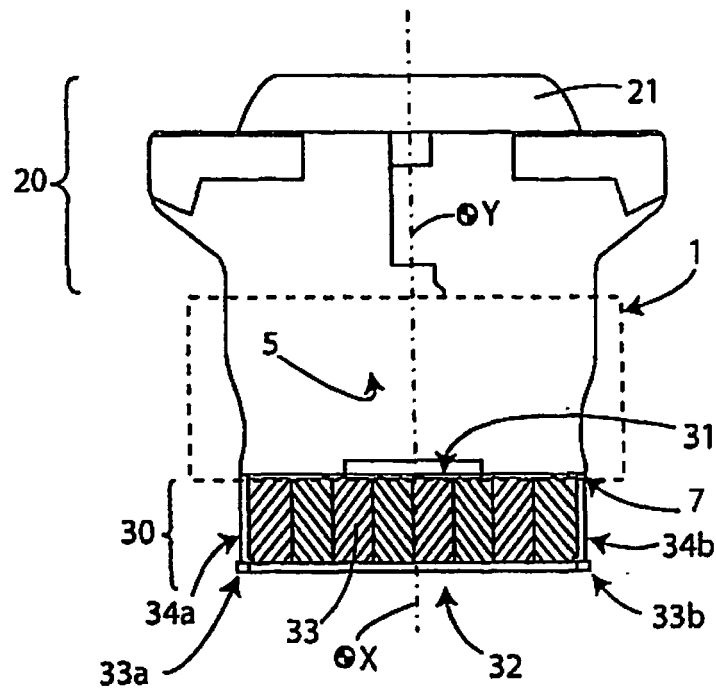


Fig. 2

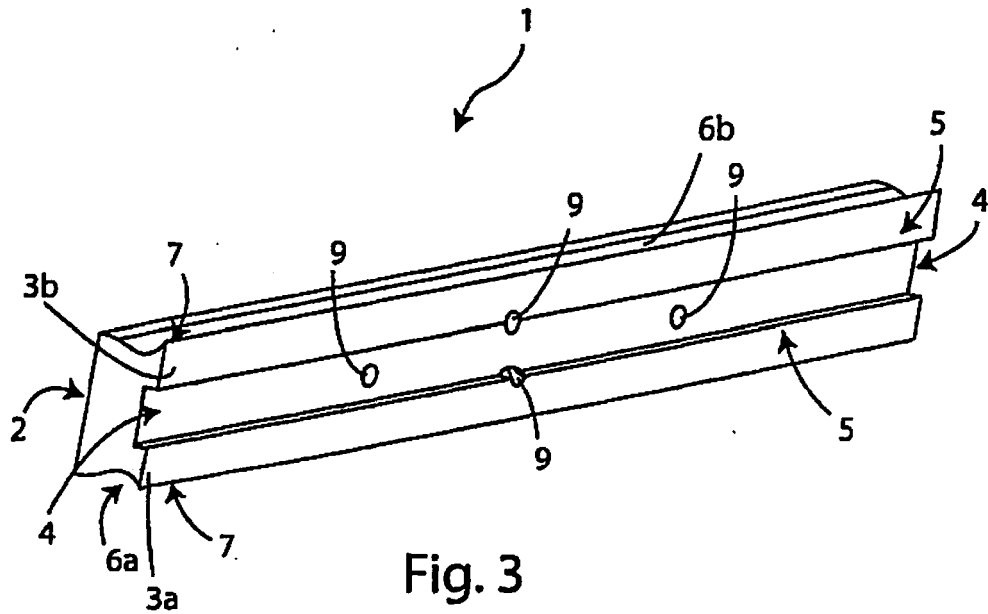


Fig. 3

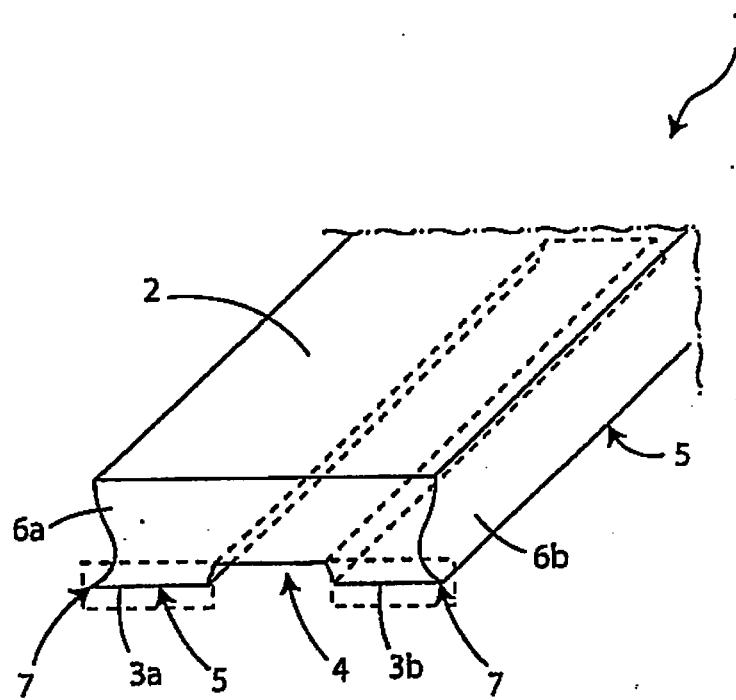


Fig. 4

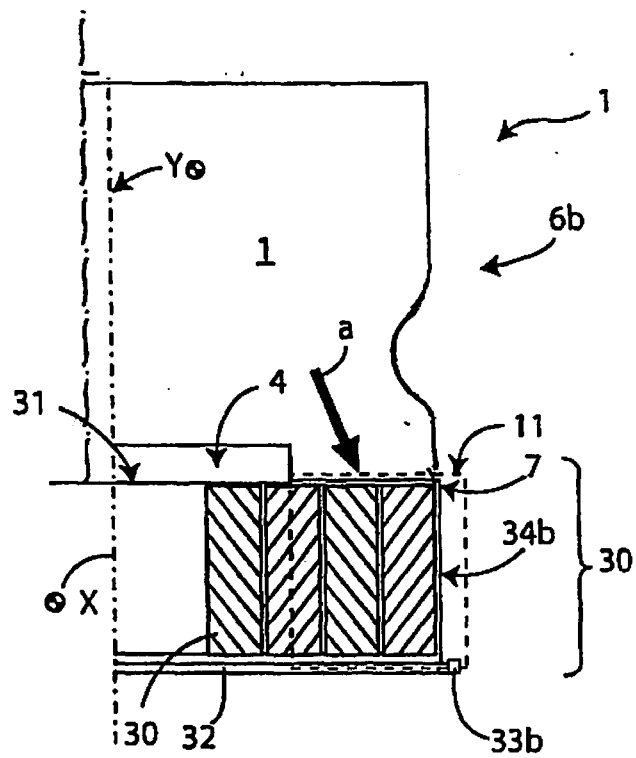


Fig. 5

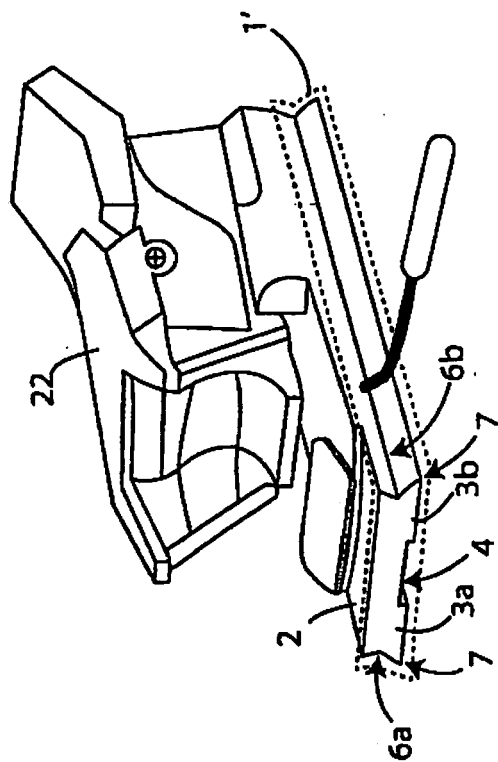


Fig. 7

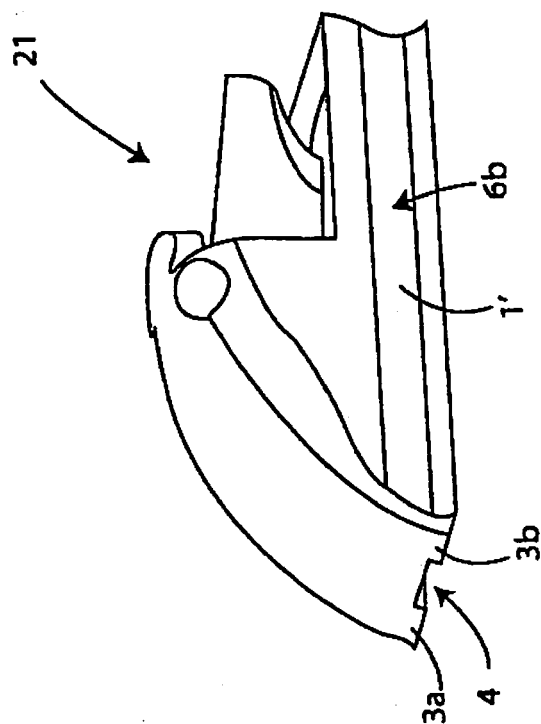


Fig. 6

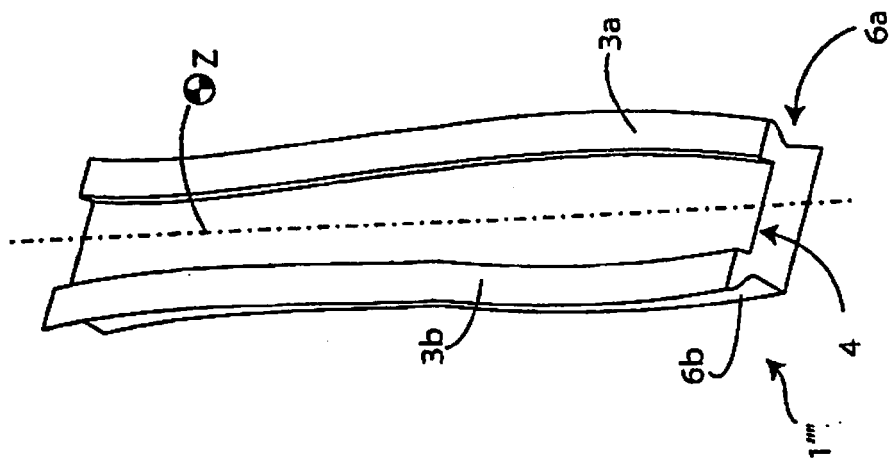


Fig. 10

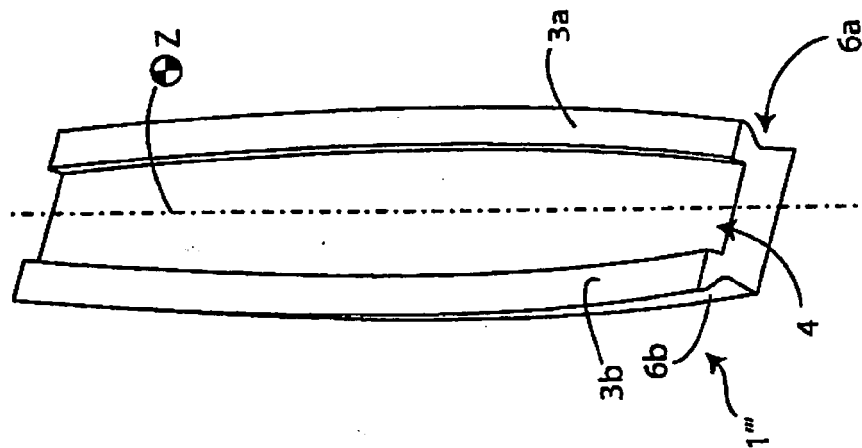


Fig. 9

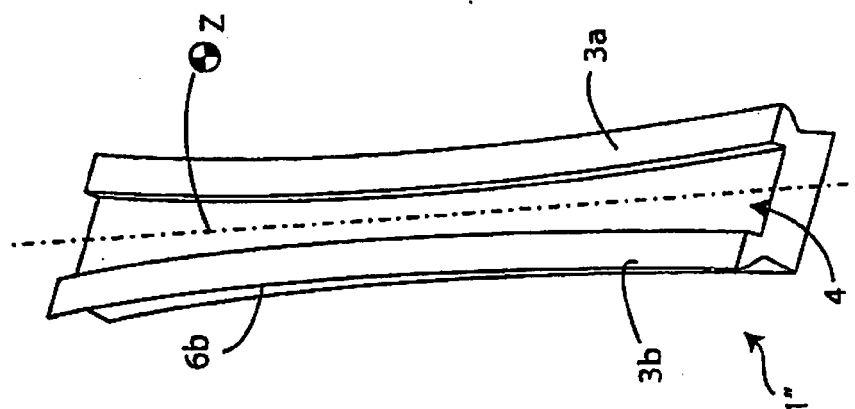


Fig. 8

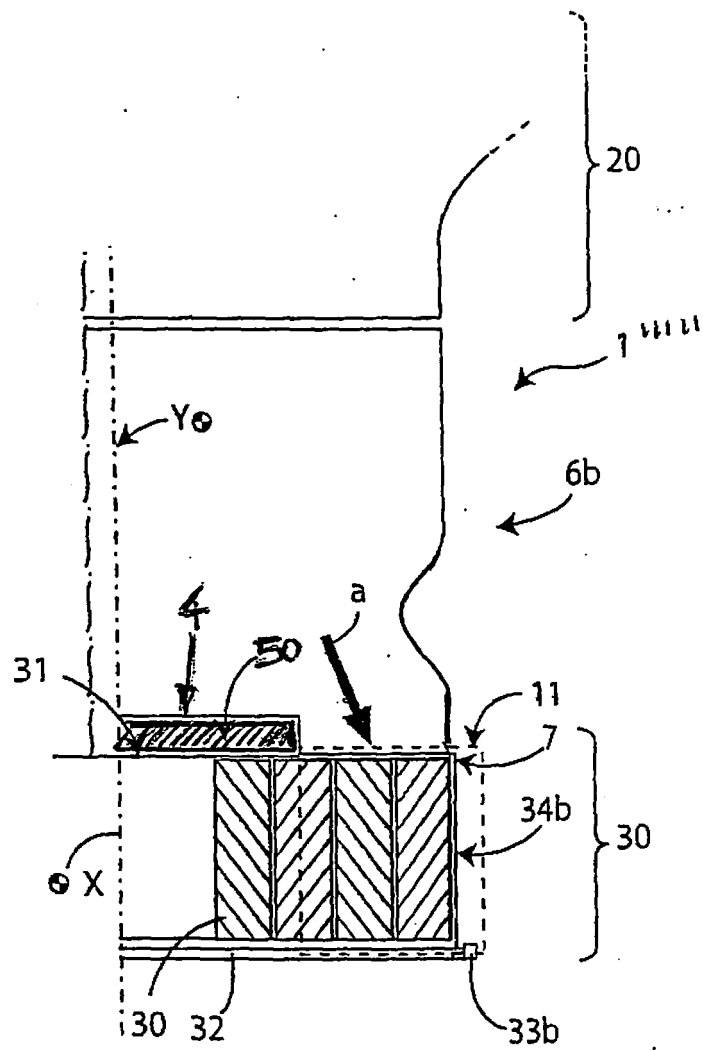


Fig. 11

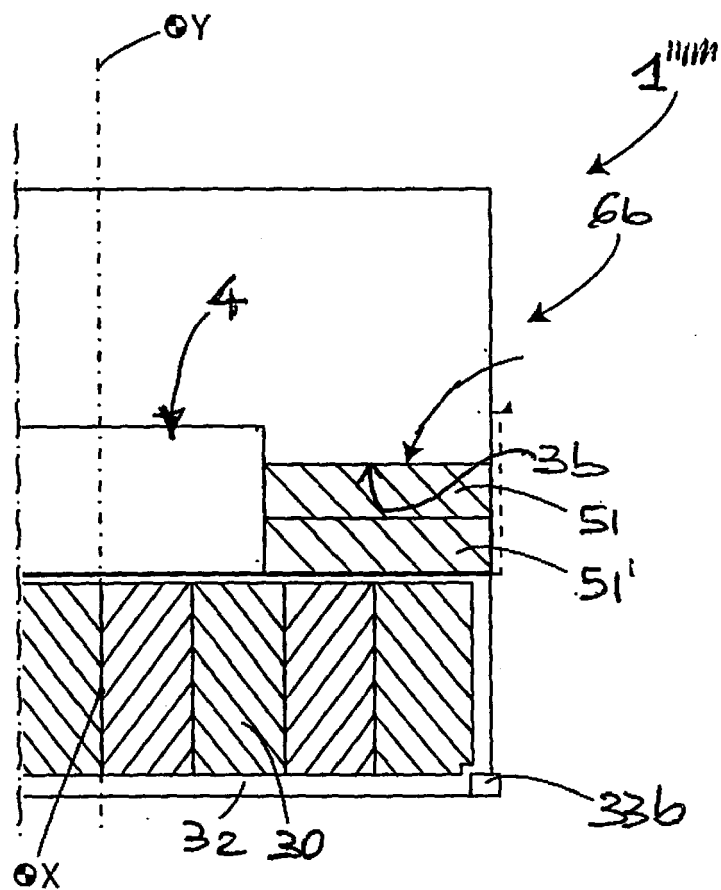


Fig. 12



EUROPEAN SEARCH REPORT

Application Number
EP 10 16 4807

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	EP 1 656 974 A1 (ROSSIGNOL SA [FR]) 17 May 2006 (2006-05-17) * column 1 - column 7; figures 1,4 * -----	1-15	INV. A63C5/00 A63C9/00 A63C5/07
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