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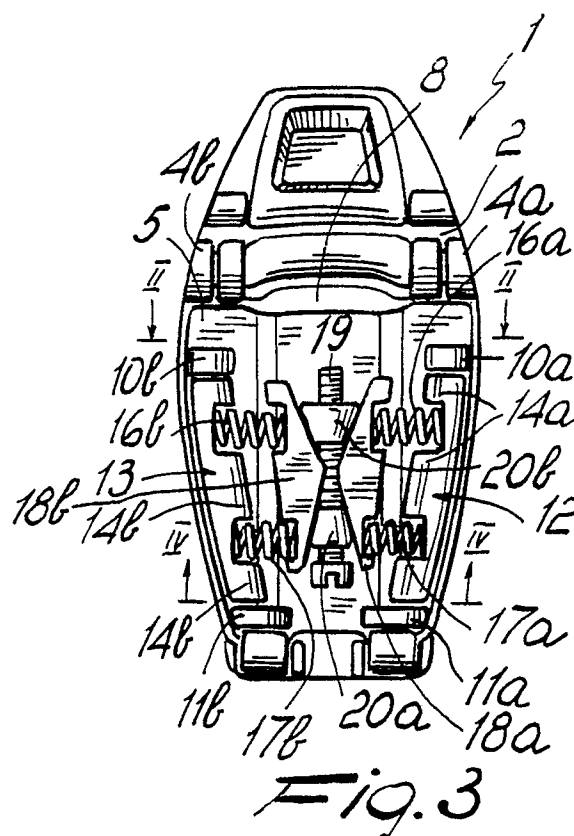
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54 Cross-country ski fastening.

(57) The fastening (1) includes a base (2) secured to a ski (4) and a plate (5) pivoted to the base; the plate has a transverse point of engagement, or first wing 8, for the sole (6) of a shoe (7) for cross-country skiing and two brackets (10a,10b,11a,11b) with two lateral jaws (12,13) for coupling with complementarily shaped grip elements defined on the sole. The fastening further includes adjustable springs (16,17) for adjusting the oscillation of the jaws (12,13) with respect to the base.



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CROSS-COUNTRY SKI FASTENING

The present invention relates to a cross-country ski fastening.

Several types of ski fastenings are currently known for the practice of cross-country skiing; the known ski fastenings generally have the essential feature of locking the tip of an adapted shoe to the ski.

Said tip is provided as an extension of the sole of the shoe and deforms elastically during the stride, and this allows to adopt the so-called alternated step technique.

These known types of fastenings for cross-country skiing have some disadvantages: the tip is in fact subjected to considerable stress which very rapidly leads to its breakage at the region of interaction with the fastening.

Another disadvantage observed in said known types of fastening consists of the fact that they do not allow a good lateral hold of the shoe, preventing the athlete from placing the ski edgewise with respect to the snow surface.

This last disadvantage is very important because of the now widespread trend to use a mixed technique which comprises the so-called side push step technique as well as the alternated step technique.

This technique in fact allows better efficiency in skiing if the ski can be placed edgewise with respect to the plane of the snow, imparting to said ski a lateral movement according to an axis which is oblique with respect to the advancement axis.

As a partial solution to these disadvantages, fastenings are known which are essentially constituted by two elements, one suitable for locking the tip of the shoe and the other adapted to lock the heel region.

Even these known types of fastening, however, have disadvantages: they in fact have high overall costs, since two separate elements must be produced, and the skier is furthermore not allowed to ski according to the traditional alternated step technique.

As a partial solution to this disadvantage, this same Applicant filed a U.S. application granted on June 6, 1989, No. 4.836.572 disclosing a device, for connecting the shoe to the ski, comprising a fastening having a base which can be associated with the ski and to which the end of a plate is freely pivoted transversely to the ski. The plate comprises means for coupling to complementarily shaped grip elements defined at the sole of a shoe.

One of said coupling means is pivoted to the plate, has means for adjusting its oscillation with respect to said plate and cooperates with locking means adapted to make it temporarily associable

with the base which can be coupled to the ski.

Though this device is undoubtedly valid, it also has a disadvantage, since it is not structurally stable, as the sole of the shoe can be subject to shifting while skiing.

The aim of the present invention is therefore to eliminate the disadvantages described above in known types by providing a cross-country ski fastening which allows the skier to adopt both the alternated step technique and the side push step technique and is at the same time structurally very stable so as to allow the optimum transmission of efforts from the shoe to the ski.

Within the scope of the above described aim, an important object is to provide a cross-country ski fastening with an easier axial and transverse locking of the shoe with respect to the ski.

Another important object is to provide a fastening which associates with the preceding characteristics that of allowing a rapid and optimum coupling and uncoupling of the shoe.

Another object is to provide a fastening which is structurally simple and does not require particular maintenance.

Not least object is to provide a fastening which associates with the preceding characteristics that of being reliable and safe in use.

This aim, these objects and others which will become apparent hereinafter are achieved by a cross-country ski fastening, comprising a base which can be coupled to a ski, a plate being transversely and freely pivoted to one end of said base, characterized in that said plate is transversely provided with at least one point of engagement with the sole of a shoe and, specularly to the longitudinal axis, with at least two brackets to which at least two lateral jaws for coupling to complementarily shaped grip elements defined on said sole are articulated, said fastening further comprising means for adjusting the oscillation of said at least two jaws with respect to said plate.

Advantageously, said at least two jaws can be arranged on the plate along axes which are mutually parallel, divergent or convergent toward the front part of the ski.

If the jaws diverge toward the front part of the ski, said at least one point of engagement with the sole of the shoe is conveniently located approximately at the tip of said shoe, whereas if the jaws converge toward the front part of the ski said at least one engagement point is located proximate to the end of said plate which is opposite to the pivoting end of said plate to said base.

Further characteristics and advantages of the invention will become apparent from the detailed

description of a particular embodiment, illustrated only by way of non-limitative example in the accompanying drawings, wherein:

figure 1 is a schematic side view of the fastening with which the sole of the shoe is associated;

figure 2 is a sectional front view according to line II-II of figure 3;

figure 3 is a top view of the fastening;

figure 4 is a partially sectional view of the device, according to line IV-IV of figure 3, illustrating the means for adjusting the oscillation of the two jaws with respect to the plate;

figure 5 is a view, similar to that of figure 1, of a fastening according to a further aspect of the invention with a different location of the point of engagement with the sole;

figures 6, 7, 8, 9, 10, are schematic isometric views of various configurations of the jaws, according to further aspects of the invention;

figures 11 and 12 are schematic detail side views of still further embodiments of the fastening;

figure 13 is a partially sectional side view of the means for contrasting the oscillation of the plate with respect to the base, according to the invention.

With reference to the above figures, the fastening, generally indicated by the reference numeral 1, comprises a planar base 2 which can be coupled at the surface of a ski 3.

A pair of first lateral shoulders 4a and 4b, advantageously arranged specularly with respect to the longitudinal median axis of said planar base 2, protrude from said planar base 2 proximate to its end directed toward the tip of the ski 3.

A plate 5 is freely and transversely pivoted to the end of said first lateral shoulders 4a and 4b and extends in the opposite direction with respect to that of the tip of the ski 3.

Said plate has at least one point of engagement with the sole 6 of a shoe 7 for cross-country skiing; said point is advantageously constituted by a first wing 8 which protrudes perpendicular from an end of said plate; said first wing 8 advantageously has a curved configuration.

If said end of said plate is the end pivoted to said first lateral shoulders 4a and 4b, said first wing has a concavity directed toward the rear end of the ski 3 (as shown in figure 1); if said wing 108 protrudes from the opposite end, the concavity is instead directed toward the tip of said ski 103, as shown in figure 5 wherein similar elements are designated by reference numeral added by 100, with reference to figure 1.

A complementarily shaped first transverse seat 9 for the first wing 8 is naturally provided at the sole 6.

A first pair of brackets 10a and 10b and a second pair of brackets 11a and 11b protrude from said plate 5 laterally and specularly to said plate's longitudinal median axis.

The first pair of brackets is adjacent to the first lateral shoulders 4a and 4b, whereas the second pair of brackets is instead adjacent to the opposite end of the plate 5.

A first jaw 12 and a second jaw 13 which have the same configuration and are arranged approximately specularly to the longitudinal median axis of the plate 5 are articulated at the ends of each of said first and second pairs of brackets.

Said first and second jaws have a plurality of tabs, indicated by the numerals 14a and 14b, which have a substantially wedge-like shape and are directed toward the longitudinal median axis of said plate 5.

Said tabs constitute means for coupling to complementarily shaped grip elements defined on said sole 6; said grip elements are constituted by complementarily shaped seats 15a and 15b defined laterally to the sole 6.

As illustrated in figures 3 and 6, the axes of said first jaw 12 and said second jaw 13 can diverge toward the front part of the ski 3: in this case the engagement point, constituted by the first wing 8, is arranged approximately transversely to the plate 5 at said first lateral shoulders 4a and 4b.

Figure 7 illustrates a different arrangement of the axes of the first jaw 212 and of the second jaw 213, which converge toward the front part of the ski 203, not illustrated.

In this case, the engagement point constituted by the first wing 208 can be arranged at the end of the plate 205 which is directed toward the front part of the ski, optionally also including said first lateral shoulders 4a and 4b, not illustrated in the figure.

As an alternative, said engagement point can be provided, as illustrated in figure 5, at the end of the plate 105 which is adjacent to the second pair of brackets 111a and 111b.

As an alternative, the first jaw 312 and the second jaw 313 can have their axes arranged mutually parallel, as illustrated in figure 8.

The fact is stressed that the convergent or divergent arrangement of the axes of the first and second jaws facilitates the axial locking of the shoe 7, 107.

Figures 9 and 11 schematically illustrate the plate 405, in which the first jaw 412 and the second jaw 413 have their axis of rotation with respect to the first and second pair of brackets inclined with respect to the plane of arrangement of the ski 403 by an angle A which is smaller than 90 degrees, assuming as positive a counterclockwise direction of rotation starting from the front part of the ski 403.

Vice versa, in figures 10 and 12 the axis of the first jaw 512 and of the second jaw 513 is inclined by an angle A comprised between 90 and 180 degrees.

Also in the embodiments illustrated in figures 9, 10, 11 and 12, the point of engagement with the sole of the shoe can be located at one of the transverse ends of the plate 405, 505.

The fastening furthermore comprises means for the adjustment of the oscillation of the first and second jaws; said means are constituted by a first pair of springs 16a and 16b and by a second pair of springs 17a and 17b.

Each of said first and second pairs of springs is arranged along transverse axes with respect to the plate 5 and are interposed, on planes which are approximately mutually parallel, between said first jaw 12 and said second jaw 13 and a facing pair of plates 18a and 18b which have a wedge-like configuration at their mutually facing surfaces.

The ends of each of said first and second pairs of springs are advantageously accommodated at adapted seats provided on the facing surfaces of said first jaw 12 and plate 18a and of said second jaw 13 and plate 18b.

The means for adjusting the oscillation of said first and second jaws with respect to the plate 5 furthermore comprises an adapted first screw 19 which is arranged approximately axially to said plate 5 and interacts with a pair of first nuts 20a and 20b. The wedge-like lateral surfaces of the nuts 20a, 20b are shaped complementarily to the facing surfaces of said pair of plates 18a and 18b and interact therewith.

The rotation imparted to the screw 19 actuates the mutual approach or spacing of said nuts 20a and 20b and thus forces a movement of the pair of plates 18a and 18b toward the first and second jaws or in the opposite direction, thus compressing the first and second pairs of springs or allowing their elongation.

The fastening furthermore includes means for contrasting the oscillation of the plate 5 with respect to the base 2; said means are constituted by a third spring 21 which is coiled at the pin 22 for pivoting the plate 5 to the first lateral shoulders 4a and 4b of the planar base 2 and has a first end, which interacts with an adapted raised portion 23 which protrudes transversely to the first wing 8 which constitutes the point of engagement with the sole of the shoe, and a second end which rests at the base 2 toward the front portion of the ski.

Said last end is perforated, and a means is provided for adjusting the contrast to the oscillation of the plate with respect to the base; said means is constituted by a second screw 24 the stem whereof is rotatably associated at a second wing 25 which protrudes from said base 2 and is associated

with a second nut 26 which is associated with said base and interacts with the surface of the end of the third spring 21 adjacent to the base 2.

In this case, a rotation imparted to the second screw 24 forces or not the lifting of the end of the third spring 21 with respect to the base 2, limiting the oscillation of the plate 5 with respect to said base 2.

It has thus been observed that the invention has achieved the intended aim and objects, a cross-country ski fastening having been provided with which the sole of a shoe is stably associable so as to allow the optimum transmission, on the part of the skier, of the efforts from the shoe to the ski and which thus allows said skier to adopt the side push step technique as well as the alternated step technique.

The point of engagement and the particular configuration given to the first and second jaws provide in fact the best axial transverse locking of the sole of the shoe.

The means adapted to adjust the oscillation of the first and second jaws furthermore allows to achieve an optimum coupling and/or release of the shoe from the fastening.

Finally, the adjustable means for contrasting the oscillation of the plate with respect to the base allow the skier to select the maximum elevation of the plate with respect to the base according to his own requirements by means of a simple and compact structure.

The materials and the dimensions which constitute the individual components of the fastening may naturally be the most pertinent according to the specific requirements.

Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly such reference signs do not have any limiting effect on the scope of each element identified by way of example by such reference signs.

Claims

1. Cross-country ski fastening, comprising a base (2,102) which can be coupled to a ski, a plate (5,105,205,305,405,505) being transversely and freely pivoted to one end of said base, characterized in that said plate is transversely provided with at least one point (8,108,208,308) of engagement with the sole (6) of a shoe (7) and, specularly to the longitudinal axis, with at least two brackets (10a,10b,11a,11b,111a) to which at least two lateral jaws (12,13,112,212,213,312,313,412,413,512,513) for coupling to complementarily shaped grip ele-

ments (15a,15b) defined on said sole (6) are articulated, said fastening further comprising means (16a,16b,17a,17b) for adjusting the oscillation of said at least two jaws with respect to said plate.

2. Fastening according to claim 1, characterized in that said at least two jaws are arranged at said plate, means (21) being provided for contrasting the oscillation of said plate (5) with respect to said base (2).

3. Fastening according to claim 1, characterized in that said at least one point (8) of engagement with said sole is advantageously located at the end of said plate (5) which is directed toward the tip of said shoe (7), said at least two jaws (12,13) being arranged at said plate, along axes which mutually diverge toward the front part of said ski.

4. Fastening according to claim 1, characterized in that said at least one point (108, 208) of engagement with said sole (106) is located at the end of said plate (105) which is directed opposite to the front part of said ski (103), said at least two jaws (112,212,213) being arranged at said plate along axes which mutually converge toward the front part of said ski.

5. Fastening according to claim 2, characterized in that said at least two jaws (412,413) have their axis of rotation with respect to the point of articulation to said at least two brackets inclined with respect to the plane of arrangement of said ski by an angle α smaller than ninety degrees, assuming as positive a counterclockwise direction of rotation starting from the front part of said cross-country ski.

6. Fastening according to claim 2, characterized in that said at least two jaws (512,513) have their axis of rotation with respect to the point of articulation to said at least two brackets inclined with respect to the plane of arrangement of said ski by an angle α which is comprised between ninety and one hundred and eighty degrees, assuming as positive a counterclockwise direction of rotation starting from the front part of said cross-country ski.

7. Fastening according to one or more of the preceding claims, characterized in that a pair of first lateral shoulders (4a,4b), arranged specularly with respect to the longitudinal median axis of said base (5), protrude from said base, proximate to its end directed toward the tip of said ski (3), said plate (5) being transversely and freely pivoted to the end of said first lateral shoulders and extending in the opposite direction with respect to that of the tip of said ski.

8. Fastening according to claim 7, characterized in that said plate (5) has at least one point of engagement with a complementarily shaped first seat (9) defined on said sole (6) of a shoe (7) for cross-country skiing, said point being advantageously constituted by a first wing (8) which protrudes perpendicular from said plate (5) at the end thereof,

said first wing (8) advantageously having a curved configuration.

9. Fastening according to one or more of the preceding claims, characterized in that said first wing (8) protrudes perpendicular from said plate at its end pivoted to said first lateral shoulders, said wing having a concavity directed toward the rear end of said ski (3).

10. Fastening according to one or more of the preceding claims, characterized in that said first wing (108) protrudes perpendicular from said plate (105) at its end opposite to the end for pivoting to said first lateral shoulders, said wing having a concavity directed toward the tip of said ski.

11. Fastening according to claim 7, characterized in that a first pair of brackets (10a, 10b) and a second pair of brackets (11a,11b,111a) protrude from said plate (5,105) laterally and specularly to the longitudinal median axis thereof, said first pair of brackets (10a, 10b) being adjacent to said first lateral shoulders (4a,4b,104a), said second pair of brackets (11a,11b,1a) being adjacent to the opposite end of said plate.

12. Fastening according to one or more of the preceding claims, characterized in that a first jaw (12,112) and a second jaw (13) are articulated at the ends of each of said first and second pairs of brackets, said jaws having the same configuration and being arranged approximately specularly to the longitudinal median axis of said plate, said first and second jaws having a plurality of tabs (14a,14b) having a substantially wedge-like shape and being directed toward the longitudinal median axis of said plate.

13. Fastening according to one or more of the preceding claims, characterized in that said tabs constitute means for coupling to complementarily shaped grip elements defined on said sole (6), said grip elements being constituted by complementarily shaped second seats (15a,15b) defined laterally to said sole.

14. Fastening according to one or more of the preceding claims, characterized in that said means for adjusting the oscillation of said first and second jaws are constituted by a first pair of springs (16a,16b) and by a second pair of springs (17a,17b), each of which is arranged along axes which are transverse to said plate (5), said first and second pairs of springs being interposed, on planes which are approximately mutually parallel, between said first (12) and second (13) jaws and a facing pair of plates (18a,18b) which have a wedge-like configuration at their mutually facing surfaces.

15. Fastening according to one or more of the preceding claims, characterized in that the ends of each of said first and second pairs of springs are accommodated at adapted seats defined on the facing surfaces of said first and second jaws and of

said pair of plates, said means for adjusting the oscillation of said first and second jaws with respect to said plate furthermore comprising a first screw (19) which is arranged approximately axially to said plate and interacts with a pair of first nuts (20a,20b), said nuts having lateral wedge-like surfaces which are shaped complementarily to the facing surfaces of said pair of plates and interact therewith. 5

16. Fastening according to claim 1, characterized in that said means for contrasting the oscillation of said plate with respect to said base comprises a third spring (21) which is coiled at a pivot (22) for the pivoting of said plate (5) to said base (2) and has a first end, which interacts with an adapted raised portion which protrudes transversely to a first wing which constitutes the point of engagement with said sole (6) of said shoe (7), and a second end which rests at said base toward the front part of said ski (3). 10 15 20

17. Fastening according to claim 16, characterized in that the end of said third spring (21), which rests on said base, is perforated, a means being provided for adjusting the contrast to the oscillation of said plate with respect to said base, constituted by a second screw (24) which has its stem rotatably associated at a second wing (25) which protrudes from said base (2) and associated with a second nut (26) which is associated with said base and interacts with the surface of the end of said third spring (21) which is arranged adjacent to said base. 25 30

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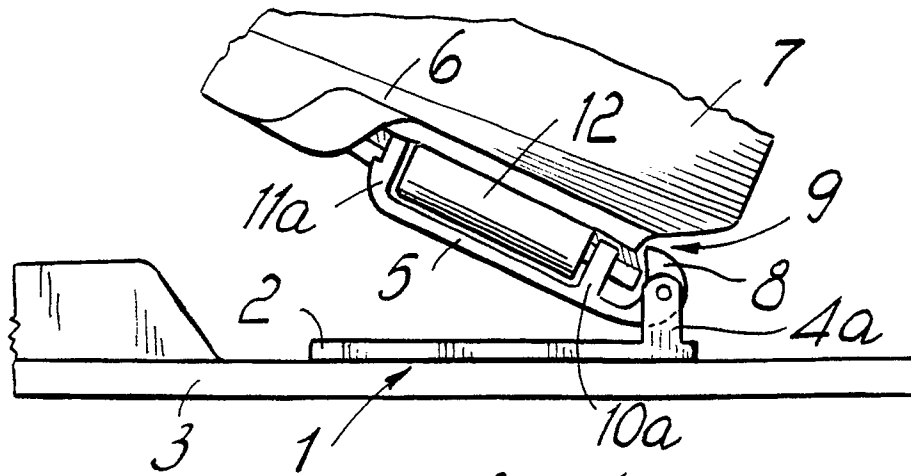


Fig. 1

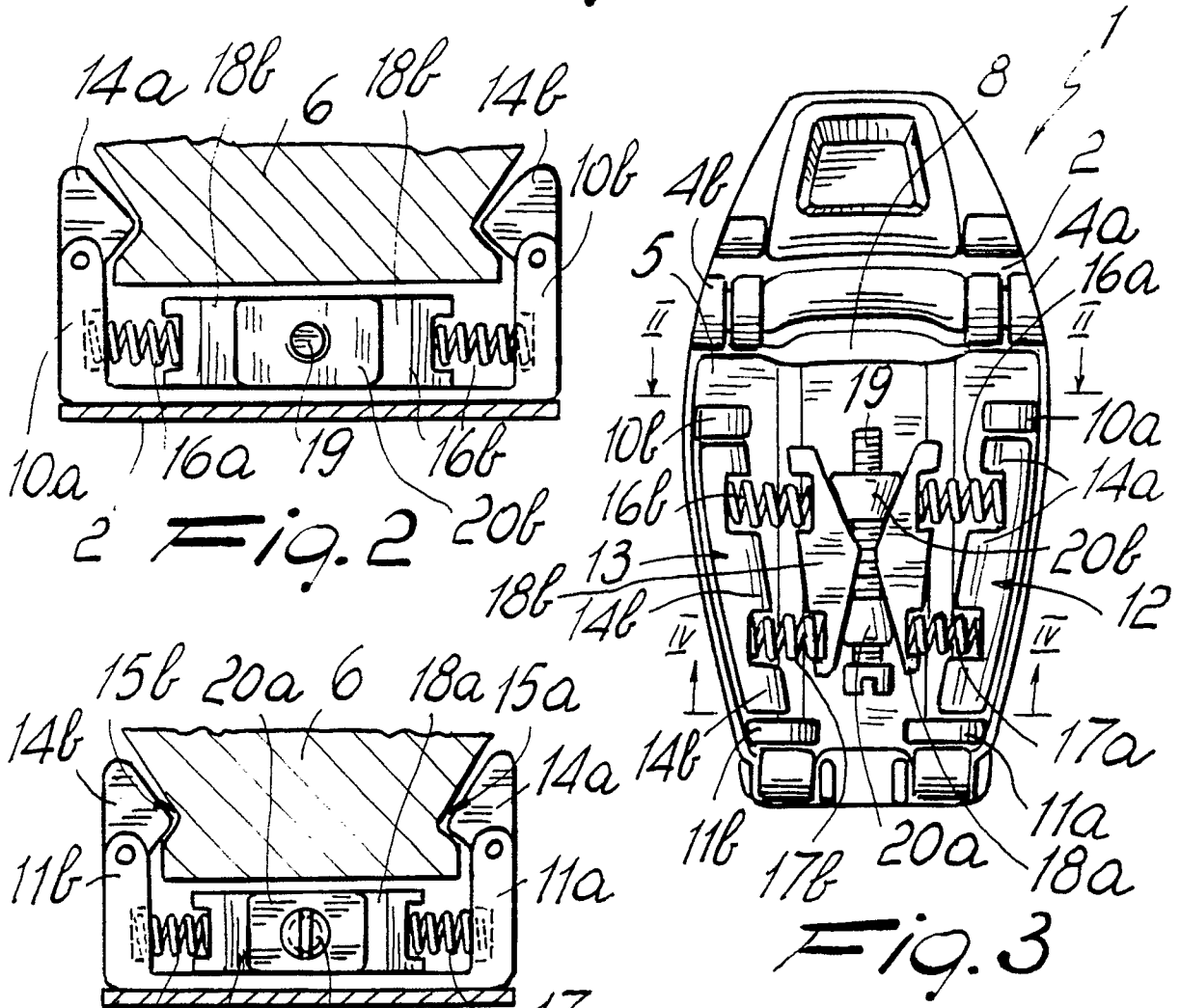


Fig. 2

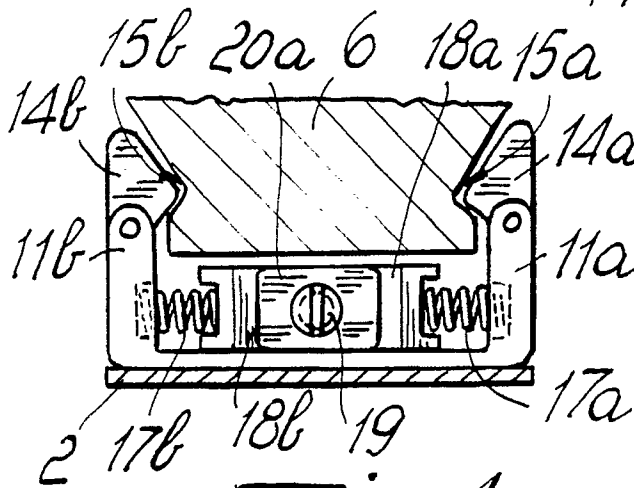


Fig. 4

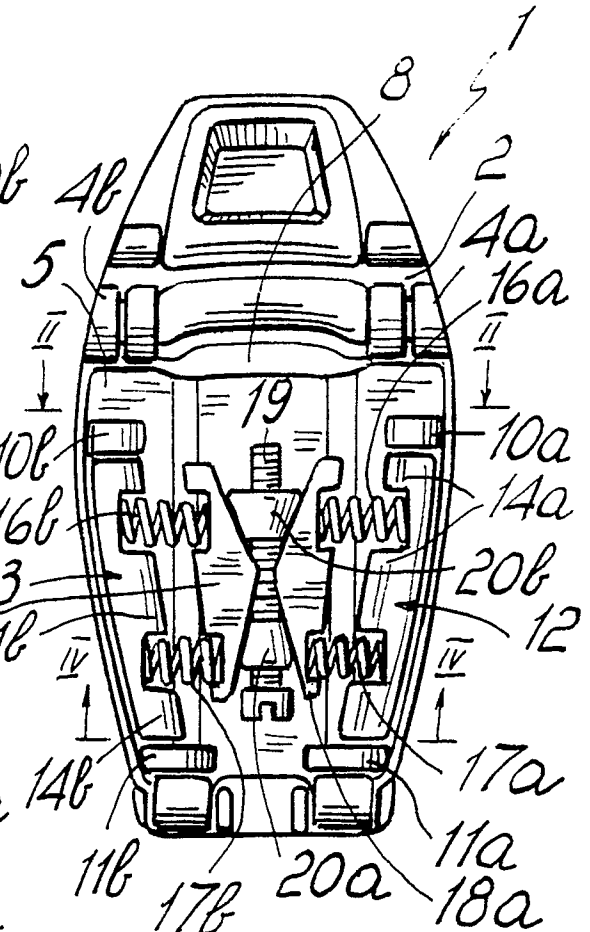


Fig. 3

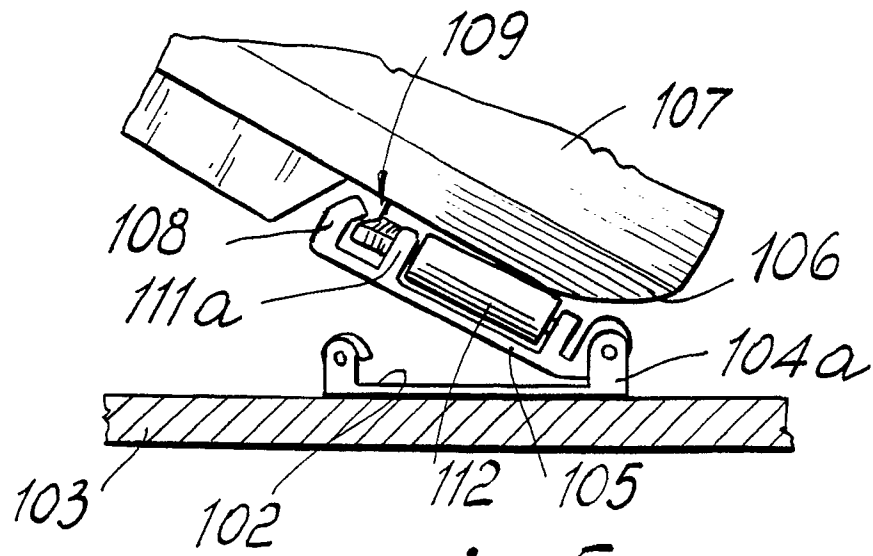


Fig. 5

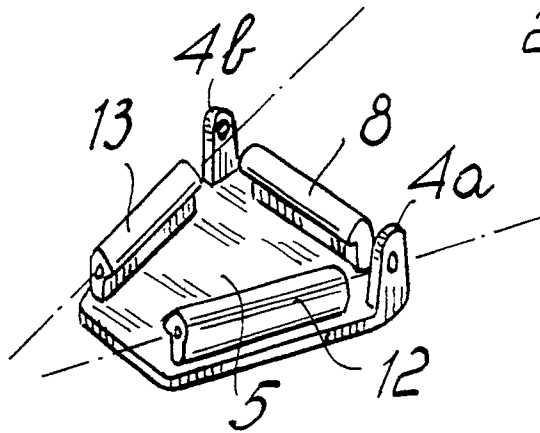


Fig. 6

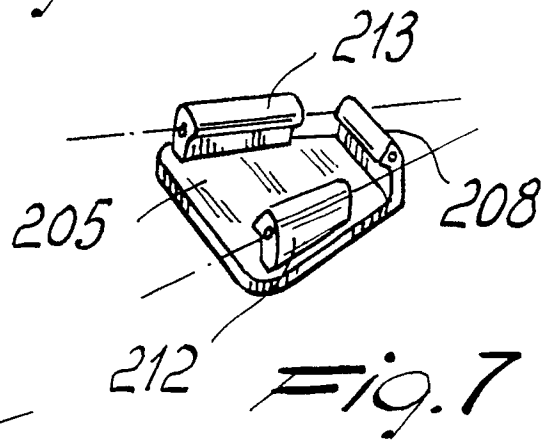


Fig. 7

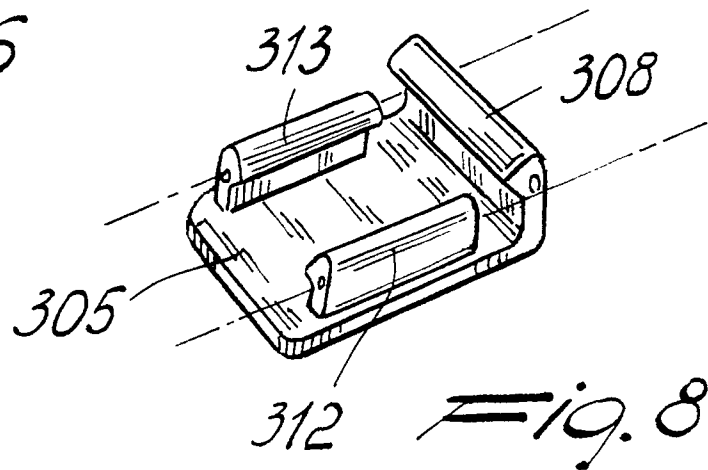
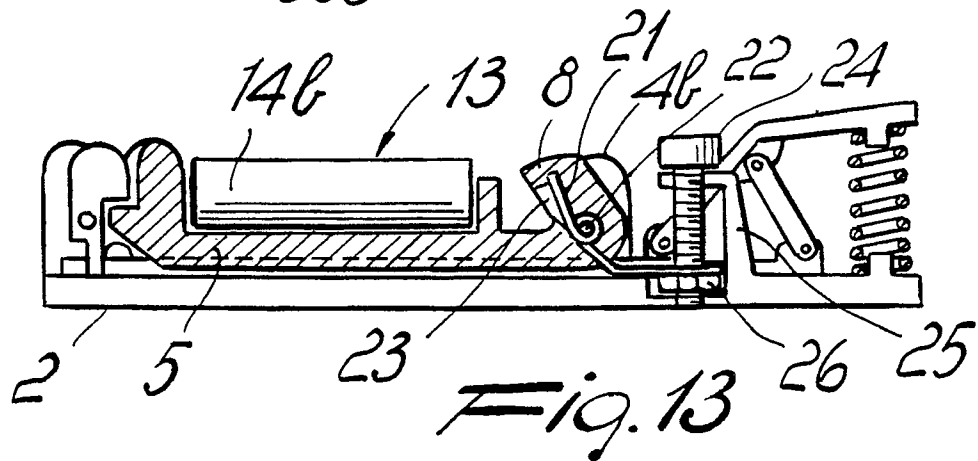
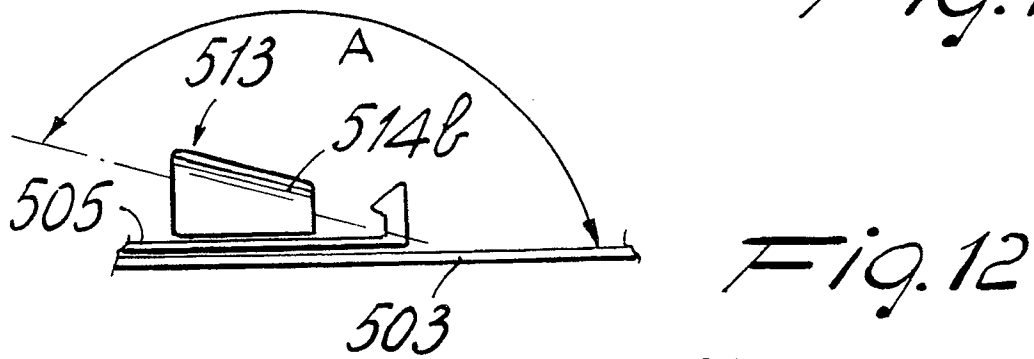
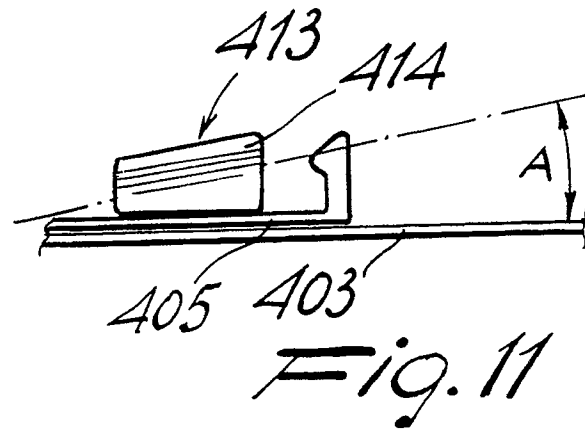
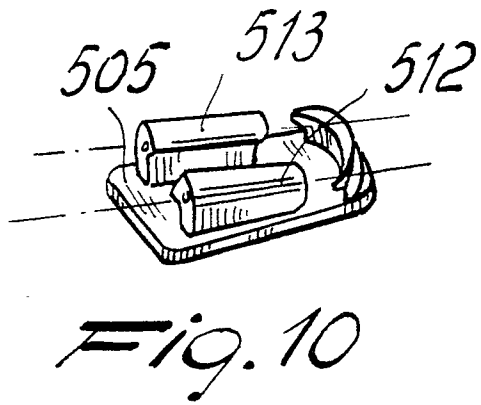
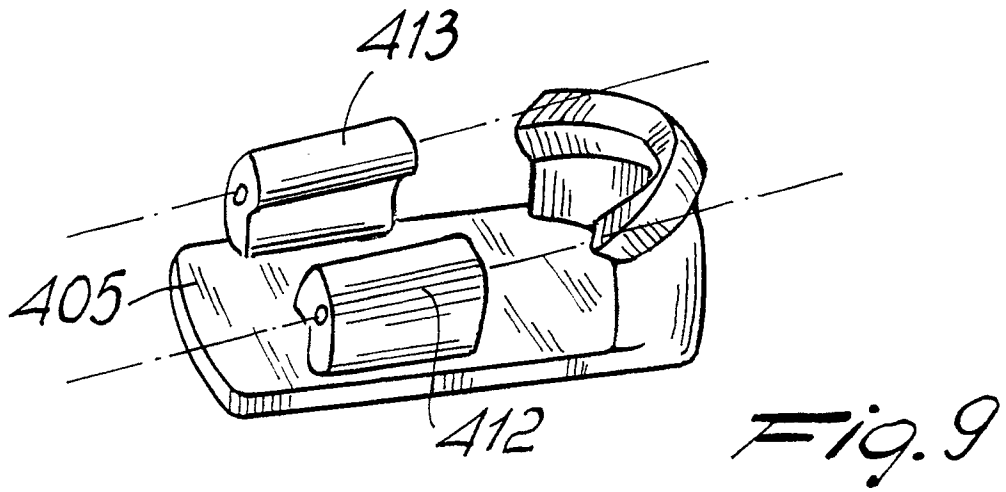


Fig. 8





DOCUMENTS CONSIDERED TO BE RELEVANT			EP 90116462.4												
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)												
X	<u>EP - A2 - 0 243 847</u> (NORDICA) * Fig. 11-15 * --	1, 2, 4, 8, 13, 14, 15	A 63 C 9/20												
A	<u>EP - A1 - 0 163 054</u> (TESSARO) * Fig. 1, 6 * --	1													
A	<u>WO - A1 - 87/07 845</u> (TMC CORPORATION) -----														
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)												
			A 63 C 9/00												
The present search report has been drawn up for all claims															
Place of search VIENNA		Date of completion of the search 16-10-1990	Examiner LEBZELTERN												
<table border="0"><tr><td>CATEGORY OF CITED DOCUMENTS</td><td>T : theory or principle underlying the invention</td></tr><tr><td>X : particularly relevant if taken alone</td><td>E : earlier patent document, but published on, or after the filing date</td></tr><tr><td>Y : particularly relevant if combined with another document of the same category</td><td>D : document cited in the application</td></tr><tr><td>A : technological background</td><td>L : document cited for other reasons</td></tr><tr><td>O : non-written disclosure</td><td>& : member of the same patent family, corresponding document</td></tr><tr><td>P : intermediate document</td><td></td></tr></table>				CATEGORY OF CITED DOCUMENTS	T : theory or principle underlying the invention	X : particularly relevant if taken alone	E : earlier patent document, but published on, or after the filing date	Y : particularly relevant if combined with another document of the same category	D : document cited in the application	A : technological background	L : document cited for other reasons	O : non-written disclosure	& : member of the same patent family, corresponding document	P : intermediate document	
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A : technological background	L : document cited for other reasons														
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