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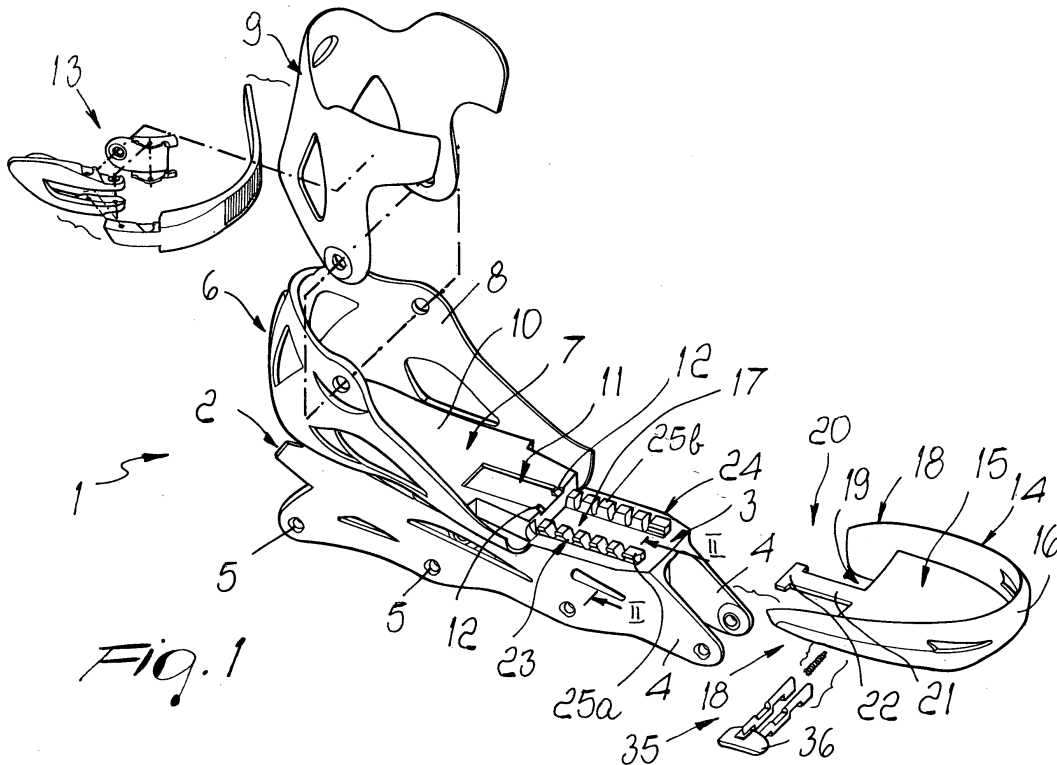
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(54) **Adjustment device, particularly for adjusting the length of a skate**

(57) An adjustment device, particularly for adjusting the length of a skate, which comprises a frame (2) provided with first connection elements (5) to two or more wheels, a shell (6) associated with the frame (2) in order to accommodate at least the heel of the user, and a toe unit (14) slidingly associated with the shell (6) and/or

frame (2) in order to accommodate the tip of the user's foot. The device comprises a slider (35) that can be actuated by the user, and is substantially transversely associated to the toe unit in contrast with an elastic element (40) and interact selectively with the frame and/or shell (2).



Description

[0001] The present invention relates to a shoe, particularly to a skate with in-line wheels that allows size adjustment.

[0002] Nowadays it is known to manufacture skates provided with a frame that supports a plurality of in-line wheels and is associated, in an upward region, with a shell of adjustable length, so as to allow the skate to be used by different people or, if the user is still growing, by the same user for a long period of time.

[0003] In this regard, EPA 00128112.0 discloses a skate provided with a frame for supporting a plurality of in-line wheels, which is associated in an upward region with a heel unit above which a cuff is in turn associated, said cuff wrapping around the lower part of the leg of the user.

[0004] A toe unit is further associated with the front part of the frame and can slide longitudinally so as to allow to vary, by way of the activation of suitable adjustment means, the size of said skate according to the size of the foot of the user.

[0005] The toe unit and the heel unit constitute a shell for containing, together with the cuff, an advantageously soft innerboot.

[0006] Said innerboot, made of non-stretch material, is provided at the toe with a suitable longitudinal elongation device, which is constituted for example by stretchable bands.

[0007] The adjustment means used in said skate comprise an actuator, which is arranged outside said frame approximately below the toe unit and can be actuated directly by the user so as to arrange said toe unit selectively with respect to the frame.

[0008] In particular, the actuator has a first position, in which said toe unit can slide freely with respect to the frame, and a second position, in which the toe unit is locked with respect to the frame.

[0009] The main drawback of this known type of skate consists of the fact that the toe unit and the heel unit, in order to perform a suitable containment of the foot, must have raised lateral edges that partially overlap each other according to a telescopic configuration.

[0010] Another drawback of the cited known type of skate relates to the fact that said telescopic arrangement of the toe unit and the heel unit requires precision manufacturing, with low tolerances, so as to avoid the possibility of jamming or the presence of excessive clearances.

[0011] Another drawback is the fact that the presence of a toe unit and of a heel unit that have a large surface causes low comfort and reduced breathability for the foot, since these components are usually made of rigid and non-breathable materials.

[0012] U.S. 4,684,140 is also known which discloses a device that is adapted to adjust the length of a skate and is arranged below the frame.

[0013] Such known type of device is constituted by a

lever that activates the movement of a pivot that is arranged at right angles and below the frame and is provided with a toothed tab that is adapted to interact with a complementarily shaped set of teeth formed below said frame.

[0014] The main drawback of such known type of adjustment device is the fact that its manual activation is particularly awkward and troublesome, since the user must act at a region that is located below the skate frame.

[0015] The aim of the present invention is therefore to solve the above noted problems, eliminating the drawbacks of the cited known art, and thus to provide a skate with adjustable size that is highly comfortable for the user, said adjustable size entailing low manufacturing costs.

[0016] Within this aim, an object of the present invention is to provide a skate that allows to perform mostly simple and rapid manufacturing operations that entail very low manufacturing costs.

[0017] Another object of the present invention is to provide a skate that has reduced weight and dimensions, said structure allowing good breathability and at the same time optimum containment of the foot and effective transmission of forces to the ground.

[0018] Another object of the invention is to provide a skate whose size can be modified always rapidly and effectively, without the possibility of causing jamming or other adjustment defects.

[0019] Another object of the present invention is to provide a skate that is sturdy and aesthetically pleasant.

[0020] Another object of the present invention is to provide a skate that is structurally simple and has low manufacturing costs.

[0021] This aim and these and other objects that will become better apparent hereinafter are achieved by an adjustment device, particularly for adjusting the length of a skate, said skate comprising:

- a frame provided with first means for connection to two or more wheels;
- a shell, which is associated with said frame in order to accommodate at least the heel of the user;
- a toe unit, which is slidingly associated with said shell and/or said frame in order to accommodate the tip of the user's foot;

characterized in that it comprises slider means that can be actuated by the user, are associated substantially transversely to said toe unit in contrast with elastic means, and interact selectively with said frame and/or shell.

[0022] Advantageously, in said adjustment device said slider means comprise second engagement means, which are adapted to act selectively with one or more abutment elements, which are associated with said frame and/or said shell.

[0023] Further characteristics and advantages of the

invention will become better apparent from the detailed description of a particular embodiment thereof, illustrated by way of non-limitative example in the accompanying drawings, wherein:

Figure 1 is an exploded perspective view of some components of a skate, such as a frame associated with a shell, a cuff, a toe unit and a slider;
 Figure 2 is a sectional view of a detail of Figure 1, taken along the line II-II of Figure 1;
 Figure 3 is a partial bottom perspective view of the skate with which the toe unit is associable;
 Figures 4 and 5 are two separate top perspective views of the toe unit, with which a slider is associable so that it can slide transversely;
 Figures 6 and 7 are two separate partially sectional views, taken along a longitudinal plane, of the frame associated with the toe unit, with the slider respectively in the temporary locking position and in the release position;
 Figure 8 is a sectional view of the invention, taken along the line VIII-VIII of Figure 6;
 Figure 9 is a sectional view of the invention, taken along the line IX-IX of Figure 7;
 Figures 10 and 11 are two separate top perspective views of the toe unit associated with the frame, with the slider shown respectively in the temporary locking position and in the release position.

[0024] In the examples of embodiment that follow, individual characteristics, given in relation to specific examples, may actually be interchanged with other different characteristics that exist in other examples of embodiments.

[0025] With reference to the figures, the reference numeral 1 generally designates a skate, which is shown partially and comprises a frame 2.

[0026] In the described embodiment, the frame 2 has a transverse cross-section that is preferably shaped like an inverted letter U and is therefore provided with a first flat base 3, at the ends of which two first wings, generally designated by the reference numeral 4, protrude downward and approximately at right angles.

[0027] The frame 2 is provided with first means for connection to one or more in-line wheels, not shown, which are preferably constituted by one or more pairs of through holes, which are designated by the reference numeral 5 and are formed at matching regions of the first wings 4, and by seats for pivots for the pivoting of said wheels.

[0028] Said holes 5 are provided proximate to the lower edge of each wing 4 so as to be arranged in succession with respect to each other at a preset distance from each other.

[0029] A shell 6 is associated with the frame 2 in an upward region and affects, or extends over a portion of the base 3 that corresponds to the region of the foot that goes from the heel to approximately the plantar arch.

[0030] More particularly, the shell 6 is constituted by a first flat and horizontal plate 7, which is associated or rigidly coupled above the base 3.

5 **[0031]** The first plate 7 is provided, laterally and at the rear, with a first raised edge 8 for wrapping around the heel of the foot.

[0032] A cuff 9 for wrapping around the lower part of the leg of the user is associated in an upward region with said first raised edge 8 so that it can rotate about a pivoting axis that is substantially transverse to the base 3.
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[0033] One or more fastening levers 13 for a soft innerboot, not shown, are associable with the cuff and with the shell.

15 **[0034]** At the first upper surface, designated by the reference numeral 10, of the first plate 7 there is a first slot 11 that is provided longitudinally starting from the front edge of said plate and has a substantially C-shaped profile in a transverse cross-section.

20 **[0035]** The front end of the first slot 11 is partially closed transversely because two first tabs, generally designated by the reference numeral 12, are associated or rigidly coupled thereto.

[0036] At the front of the frame 2 it is possible to associate slidingly a toe unit, designated by the reference numeral 14, which comprises a second flat base 15 that is provided laterally and at the front with a second raised edge 16 for partially wrapping around the tip of the foot.

25 **[0037]** The second base 15 can rest at least partially at the first front region, designated by the reference numeral 17, of the base 3, which is not affected by the shell 6.
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[0038] The reference numeral 18 designates the tips of the second raised edge 16 that protrude to the rear of the second base 15.
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[0039] A second flat tab 20 protrudes at right angles to the third rear edge, designated by the reference numeral 19, of the second base 15, approximately at a central axis; said tab has an approximately T-shaped plan shape and lies on the same plane as the second base 15.
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[0040] The second tab 20 is therefore provided with a stem 21, which is connected at one end at right angles to the third rear edge 19 of the second base 15 and is provided, at the opposite end, with a head 22 that is approximately as wide as the first slot 11 of the first plate 7 of the shell 6.
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[0041] It is therefore possible to insert the second tab 20 in the first slot 11 by way of a downward movement.

50 **[0042]** Said first slot therefore allows the sliding engagement of the second tab 20 until said tab abuts against the first tabs 12, so as to prevent the axial extraction of said second tab 20 from said first slot 11.

[0043] Abutment elements protrude upward and at right angles to the first front region 17 and from the base 3 of the frame 2 and are preferably constituted by a plurality of first toothed profiles 23 and by a plurality of second toothed profiles 24, each of which is arranged along
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a same longitudinal axis and is parallel to the others.

[0044] The first toothed profiles 23 are therefore constituted by a plurality of first teeth, each designated by the reference numeral 25a, which are arranged mutually in succession at a preset distance from each other.

[0045] Likewise, the second toothed profiles 24 are constituted by a plurality of second teeth, each designated by the reference numeral 25b, which are identical to the first teeth 25a, so as to allow the alignment, along an axis that is transverse to the first base 3, of each first tooth 25a with a corresponding second tooth 25b.

[0046] A gap, designated by the reference numeral 50, is formed between each one of said first teeth 25a and between each one of said second teeth 25b.

[0047] The first teeth 25a and the second teeth 25b also have, in a cross-section taken transversely to the base 3, a shape that is approximately like an inverted letter L, and are therefore provided with a first wing 26, which at one end is connected at right angles to the base 3 and at the opposite end is connected to a first protrusion 27, which protrudes laterally thereto and is directed toward the outer edges of the base 3.

[0048] A second slot 29 and a third slot 30 are formed longitudinally at the second lower surface, designated by the reference numeral 28, of the second base 15 of the toe unit 14; said slots are parallel to each other at a distance equal to the distance between the first toothed profiles 23 and the second toothed profiles 24, so as to slidingly accommodate them.

[0049] Said second slot 29 and said third slot 30 have, in a transverse cross-section, a shape that is advantageously complementary to the shape of the first teeth 25a and of the second teeth 25b, so as to allow, by way of a front insertion of the toe unit 14, to slidingly position said first and second teeth at said second and third slots, respectively.

[0050] The toe unit 14 is therefore allowed to slide substantially longitudinally with respect to the base 3; furthermore, if said toe unit 14 is pulled upward, the interaction of the first protrusions 27 with the respective surfaces of said second slot 29 and said third slot 30 prevents any vertical extraction of said toe unit 14 with respect to the first base 3.

[0051] A fourth slot 31 and a fifth slot 32 are also formed transversely to the second lower surface 28 of the second base 15, preferably at a region that is adjacent to the second tab 20, affect or extend over the entire width of said second lower surface 28 and are arranged at right angles to said second slot 29 and said third slot 30, so as to intersect them.

[0052] Said fourth slot 31 and said fifth slot 32 are deeper than said second slot 29 and said third slot 30 and are arranged at a mutual distance that is equivalent to the center distance between said first and second teeth.

[0053] The fourth slot 31 and the fifth slot 32 are also at least as wide as the gap 50 between two first consecutive teeth 25a and therefore between two consecutive

second teeth 25b.

[0054] A recess or hollow 33 is formed on one side of the second raised edge 16 of the toe unit 14, starting from the second lower surface 28, and is connected to the fourth and fifth slots 31 and 32 at a wall 34 formed in a downward region by said recess or hollow 33 at right angles to said second lower surface 28.

[0055] Once the arrangement of the first toothed profiles 23 and of the second toothed profiles 24 has been determined, at the respective second slot 29 and third slot 30 of the toe unit 14 the longitudinal sliding of said toe unit with respect to the first base 3 can be set in a selected arrangement and locked temporarily by using an adjustment device, which preferably comprises a slider means designated by the reference numeral 35.

[0056] Said slider means comprises a cheek 36, whose plan shape is approximately complementary to the shape of the recess or hollow 33 and from which a first arm 37a and a second arm 37b protrude, said arms being arranged parallel to each other at a mutual distance equal to the distance between the fourth slot 31 and the fifth slot 32.

[0057] The first arm 37a and the second arm 37b are each shaped approximately like a face-down letter F and have a maximum height and an overall length and width that are approximately equal to, or at the most slightly smaller than, the corresponding dimensions of said fourth slot 31 and said fifth slot 32.

[0058] The first arm 37a and the second arm 37b are therefore each constituted by a straight bar 38, whose height is slightly less than the gap 50 between the upper ends of the first and second teeth 25a, 25b and the lower surface 28 of the second base 15; second engagement means protrude below the straight bar 38 and at right angles thereto and are preferably constituted by a third tooth 39a and a fourth tooth 39b, which are adapted to be arranged temporarily in the gap 50 between said first teeth 25a and between second teeth 25b.

[0059] More particularly, the third tooth 39a and the fourth tooth 39b are approximately as high as, or at the most slightly higher than, said first teeth 25a and second teeth 25b.

[0060] The third tooth 39a is slightly shorter than the distance between the first toothed profiles 23 and the second toothed profiles 24, while the fourth tooth 39b is approximately as long as said second teeth 25b are wide.

[0061] Furthermore, the third tooth 39a and the fourth tooth 39b have such dimensions that they affect together either the gap 50, provided between two contiguous first teeth 25a and two contiguous second teeth 25b, or arrange themselves laterally thereto so as to allow the axial movement of the toe unit 14 with respect to the first base 3.

[0062] Once a chosen first tooth 25a and the corresponding second tooth 25b have been interposed between the fourth and fifth slots 31 and 32, it is then possible to push manually the cheek 36 of the slider 35 to-

ward the hollow or recess 33 of the toe unit 14, so as to produce the gradual insertion of the first arm 37a and of the second arm 37b in the respective fourth slot 31 and fifth slot 32.

[0063] An elastically compressible element is arranged between the wall 34 of the recess or hollow 33 and the cheek 36 of the slider 35 and is preferably constituted by a spring 40, which pulls said slider 35 toward the outside of the toe unit 14 and of the first base 3 of the frame 2.

[0064] A depression 41 is formed transversely on the upper surface of the straight bar 38 of said first arm 37a and said second arm 37b at a region located above the third tooth 39a, and has a chosen length that is approximately equal to the length of said third tooth 39a or fourth tooth 39b.

[0065] A second protrusion 42 protrudes in a downward region at right angles to the upper surface of said fourth slot 31 and said fifth slot 32, can be arranged at the depression 41, and abuts against the step-like surfaces formed at the ends of the depression 41 when the relative position of the slider 35 and of said fourth and fifth slots varies.

[0066] With reference to Figures 8 and 10, arranging the third tooth 39a between two adjacent first teeth 25a arranges the fourth tooth 39b between two adjacent second teeth 25b and arranges the second protrusion 42 in abutment against the step-like surface of the depression 41 that lies closest to the fourth tooth 39b.

[0067] This accordingly prevents the extraction of the slider 35 of the toe unit 14 due to the traction applied by the spring 40, consequently keeping said slider 35 in the position for temporarily blocking the longitudinal sliding of the toe unit 14 with respect to the base 3 of the frame 2.

[0068] Vice versa, with reference to Figures 9 and 11, pushing manually on the cheek 36 so as to arrange it in contact with the recess or hollow 33 places the third tooth 39a at the region of the first base 3 that is interposed between the first toothed profiles 23 and the second toothed profiles 24 and arranges the fourth tooth 39b in the region of said first base 3 that is interposed between the second profiles 24 and the adjacent end of the respective fourth slot 31 and fifth slot 32, so as to allow the longitudinal sliding of the toe unit 14 with respect to the first base 3.

[0069] It has thus been found that the skate according to the present invention has achieved the intended aim and objects, an adjustment device having been provided which allows to vary easily and quickly the length of said skate thanks to the arrangement and lateral activation of the slider with respect to the toe unit.

[0070] The invention is of course susceptible of numerous modifications and variations, all of which are within the scope of the appended claims.

[0071] Thus, for example, it is possible to provide toothed profiles and slots that have different configurations and arrangements with respect to the one de-

scribed.

[0072] One might also provide, for example, a slider that has a configuration that is different from the one described and has a different number of arms.

[0073] The materials used, as well as the dimensions that constitute the individual components of the invention, may of course be more pertinent according to requirements.

[0074] The various means for performing certain different functions need not certainly coexist only in the illustrated embodiment but can be present per se in many embodiments, including ones that are not illustrated.

[0075] The disclosures in Italian Patent Application No. TV2002A000135 from which this application claims priority are incorporated herein by reference.

[0076] 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 interpretation of each element identified by way of example by such reference signs.

Claims

1. An adjustment device, particularly for adjusting the length of an in-line skate, said skate comprising:
 - a frame (2) provided with first means (5) for connection to two or more wheels;
 - a shell (6), which is associated with said frame (2) in order to accommodate at least the heel of the user;
 - a toe unit (14), which is slidingly associated with said shell (6) and/or said frame (2) in order to accommodate the tip of the user's foot;

characterized in that it comprises slider means (35) that can be actuated by the user, are associated substantially transversely to said toe unit (14) in contrast with elastic means (40), and interact selectively with said frame (2) and/or shell (6).
2. The adjustment device according to claim 1, **characterized in that** said slider means (35) comprise second engagement means (39a,39b), which are adapted to act selectively with one or more abutment elements (23,24) that are associated with said frame (2) and/or said shell (6).
3. The device according to claims 1 and 2, **characterized in that** said shell (6) comprises a first plate (7) that is flat and substantially horizontal and is associated with, or rigidly coupled to, a first base (3) in an upward region, said base (3) being part of said frame (2) and being also flat and substantially hor-

- horizontal, said first plate (7) being provided, laterally and to the rear, with a first raised edge (8) and extending along a portion of said first base that corresponds to the region of the foot that goes from the heel to approximately the plantar arch, said abutment elements (23,24) protruding at right angles and in an upward region with respect to said first base (3) at a first front region (17) thereof that is not affected by said first plate (7) of said shell (6).
- 5
4. The device according to claims 1, 2 and 3, **characterized in that** a first slot (11) is formed longitudinally at the first upper surface of said first plate of said shell, starting from the front edge of said first plate (7), said first slot (11) having a substantially C-shaped transverse sectional profile, its front end being closed partially and transversely by two first tabs (12) that are associated or rigidly coupled thereat.
- 10
5. The device according to claims 1, 2 and 4, **characterized in that** said toe unit (14) has a second flat base (15) that is provided laterally and at the front with a second raised edge (16), said flat base (15) being allowed to rest at least partially so that it can slide at said first front region (17) of said first base (3) of said frame (2).
- 15
6. The device according to claims 1, 2 and 5, **characterized in that** a second flat tab (20) protrudes substantially horizontally to the rear (19) of said second base (15), preferably at a central axis thereof, said tab (20) having a substantially T-shaped plan shape with a stem (21) at one end of which a head (22) protrudes at right angles, said head (22) being approximately as wide as said first slot (11), so as to allow the insertion, by way of a downward movement, of said second tab (20) in said first slot (11).
- 20
7. The device according to claims 5 and 6, **characterized in that** said first slot (11) of said first plate (7) allows the sliding engagement of said second tab (20) until it abuts against said first tabs (12), so as to prevent the axial extraction of said second tab (20) from said first slot (11).
- 25
8. The device according to claims 1, 2 and 7, **characterized in that** said abutment elements (23,24), which protrude in an upward region and at right angles to said first front region of said first base (3), are preferably constituted by a plurality of first toothed profiles (23) and by a plurality of second toothed profiles (24), each of which is arranged along a same longitudinal axis and parallel to the others.
- 30
9. The device according to the preceding claims, **characterized in that** a second slot (29) and a third slot (30) are formed longitudinally at the second lower surface (28) of said second base (15) of said toe unit (14) and are arranged parallel to each other at a distance equal to the distance between said first toothed profiles (23) and said second toothed profiles (24), so that both toothed profiles can be accommodated slidingly.
- 35
10. The device according to claims 1, 2 and 9, **characterized in that** said second and third slots (29,30) have a transverse sectional shape that is advantageously complementary to the shape of said first and second toothed profiles (23,24), so as to allow, by way of a front insertion of said toe unit (14), the sliding arrangement of said first and second toothed profiles (23,24) respectively at said second and third slots (29,30).
- 40
11. The device according to one or more of the preceding claims, **characterized in that** a fourth slot (31) and a fifth slot (32) are formed transversely to said second lower surface (28) of said second base (15) of said toe unit (14), preferably at a region that is adjacent to said second tab (20), affect the entire width of said second lower surface (28) and are arranged at right angles to said second and third slots (29,30) so as to intersect them.
- 45
12. The device according to the preceding claims, **characterized in that** said slider means (35) comprises a cheek (36), whose plan shape is approximately complementary to the shape of a recess or hollow (33) of said second raised edge (16) and from which a first arm (37a) and a second arm (37b) protrude, said arms (37a,37b) being parallel to each other at a mutual distance equal to the distance between said fourth and fifth slots (31,32).
- 50
13. The device according to claims 1, 2 and 13, **characterized in that** said first and second arms (37a, 37b) are each substantially shaped like a face-down letter F and have a maximum height, an overall length and a width that are approximately equal to, or at the most slightly smaller than, the corresponding dimensions of said fourth and fifth slots (31,32).
- 55
14. The device according to claims 1, 2 and 13, **characterized in that** each one of said first and second arms (37a,37b) comprises a straight bar (38) whose height is slightly less than the gap between the upper ends of said first (25a) and second teeth (25b) of said toothed profiles (23,24) and said second lower surface (28) of said second base (15).
15. The device according to claims 1, 2 and 14, **characterized in that** said second engagement means (39a,39b) protrude in a downward region and at right angles to said straight bar (38) and are prefer-

ably constituted by a third tooth (39a) and a fourth tooth (39b), which are adapted to be arranged temporarily in said gap (50) between two consecutive said first teeth (25a,25b) and between two consecutive second teeth of said first and second toothed profiles (23,24) respectively. 5

16. The device according to the preceding claims, **characterized in that** said elastical means comprises a spring (40) that is arranged between the wall (34) of said recess or hollow (33) and said cheek (36) of said slider means (35), so as to pull it toward the outside of said first base (3) and said toe unit (14). 10

17. The device according to one or more of the preceding claims, **characterized in that** a depression (41) is formed transversely on the upper surface of said straight bar (38) of said first and second arms (37a, 37b) at a region that lies above said third tooth (39a), said depression (41) having a selected length that is approximately equal to the length of said third tooth (39a) or of said fourth tooth (39b). 15 20

18. The device according to claims 16 and 17, **characterized in that** a second protrusion (42) protrudes in a downward region and at right angles to the upper surface of said fourth (31) and fifth (32) slots and can be arranged at said depression (41). 25

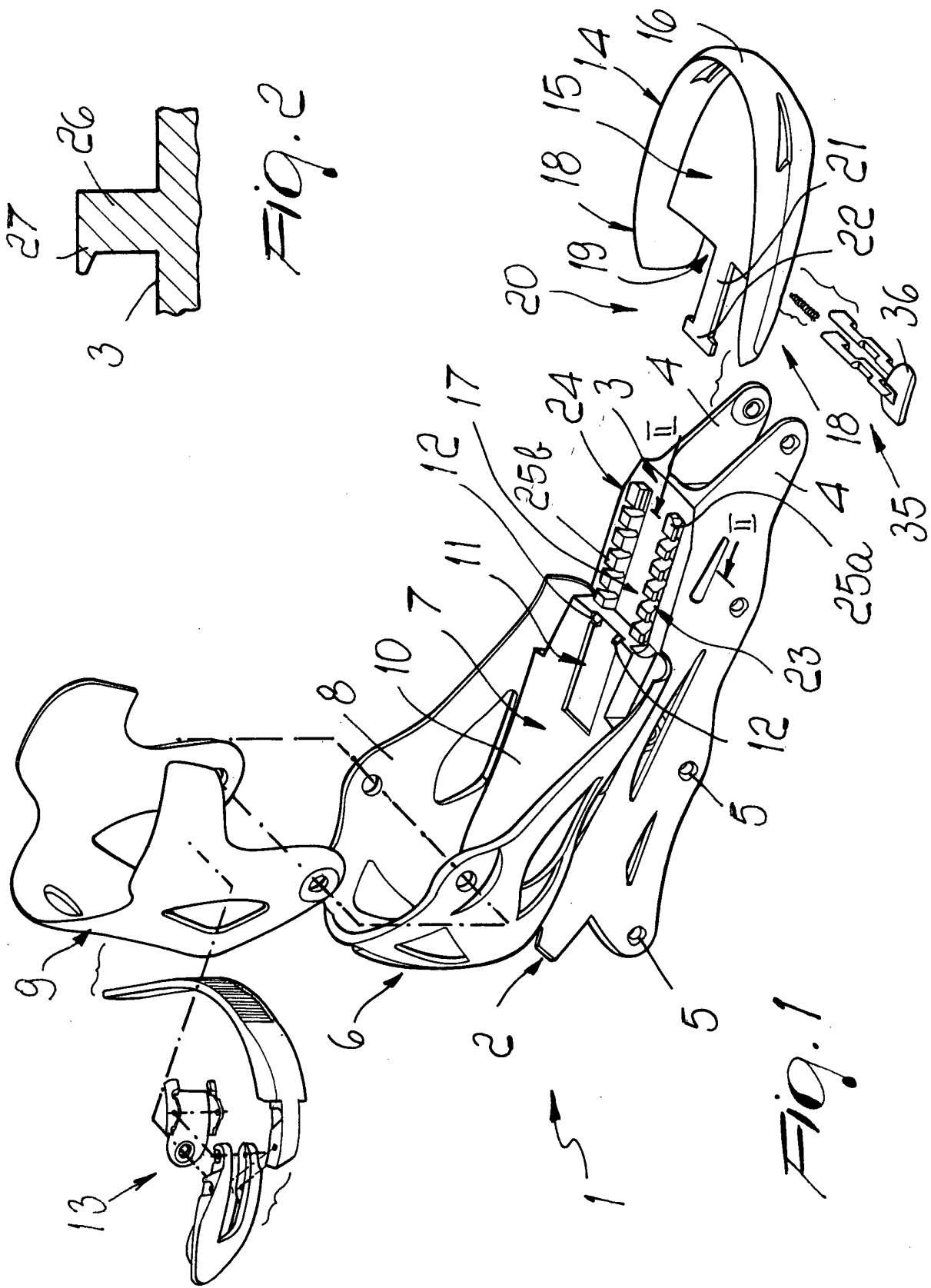
19. The device according to claims 1, 2, 17 and 18, **characterized in that** said protrusion (42) is placed in abutment against step-like surfaces formed at the ends of said depression (41) when the mutual position of said slider means (35) and said fourth and fifth slots (31,32) varies. 30 35

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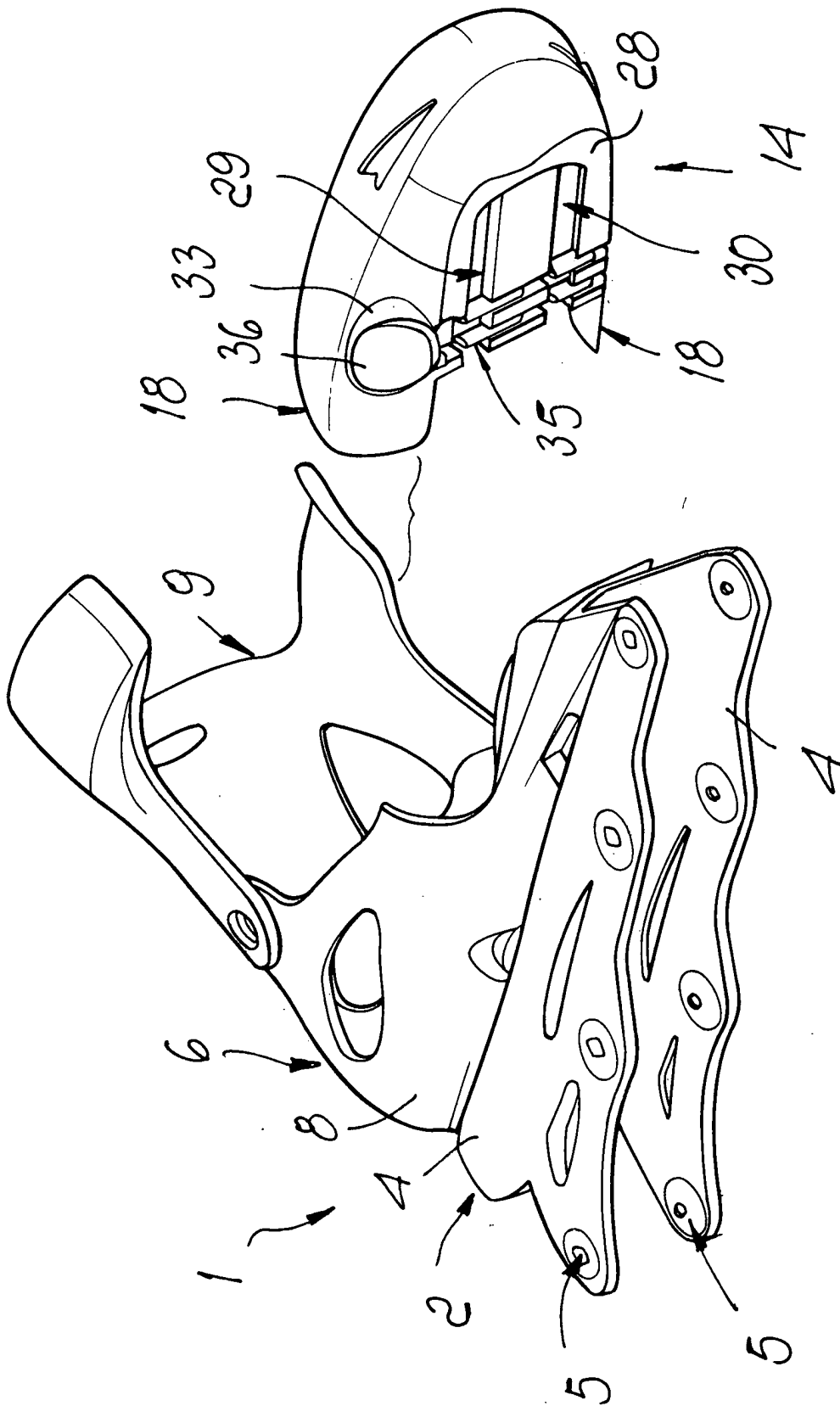


Fig. 3

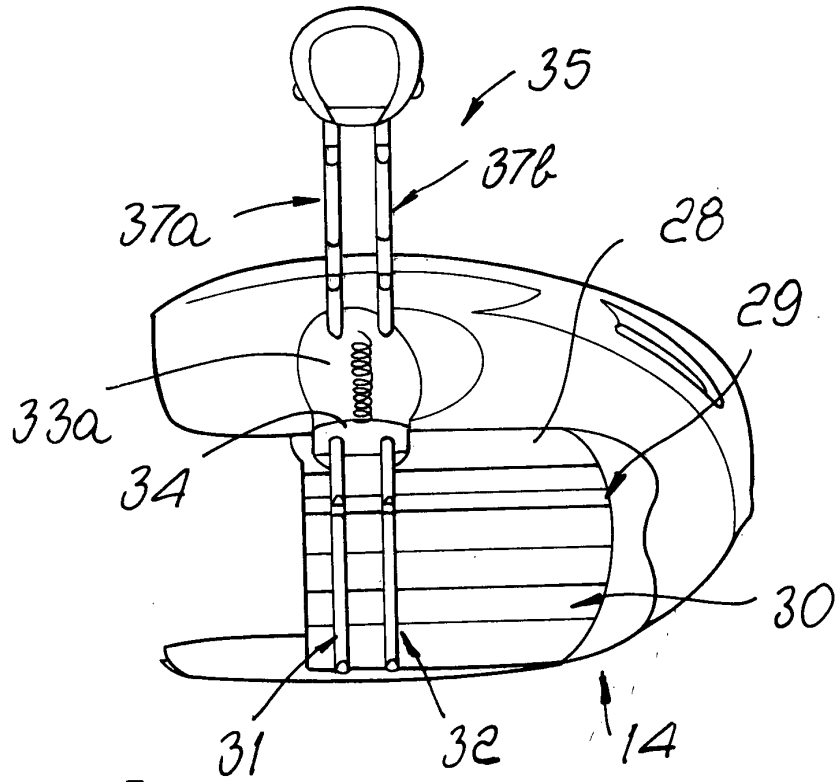


Fig. 5

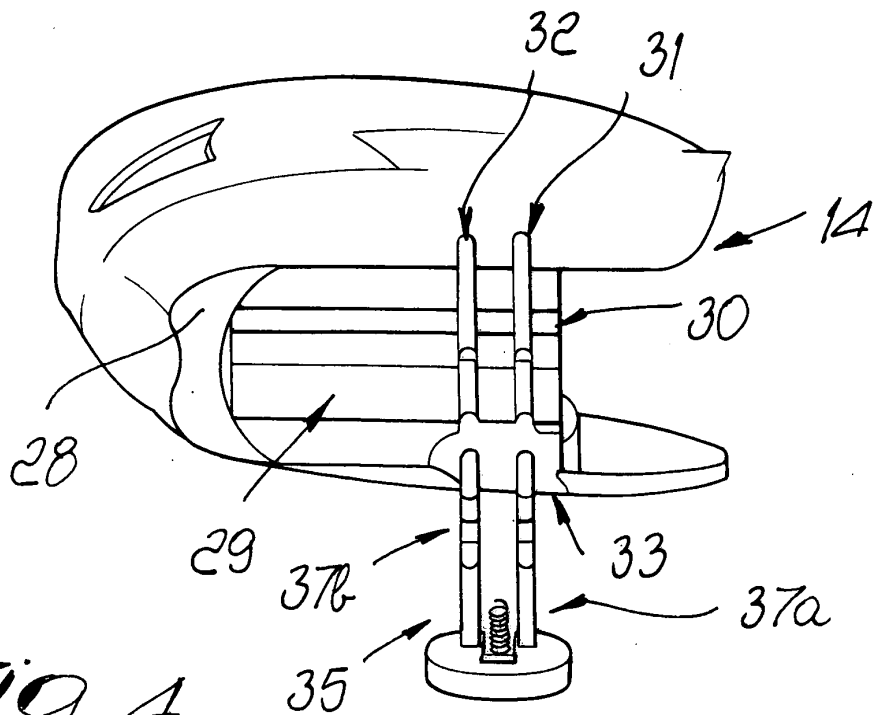


Fig. 4

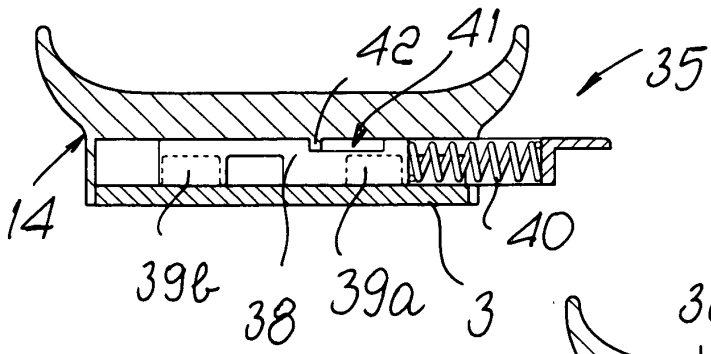


Fig. 8

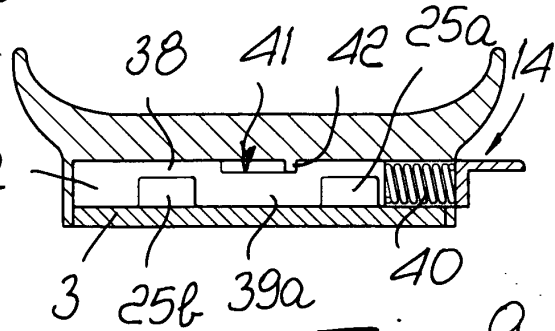


Fig. 9

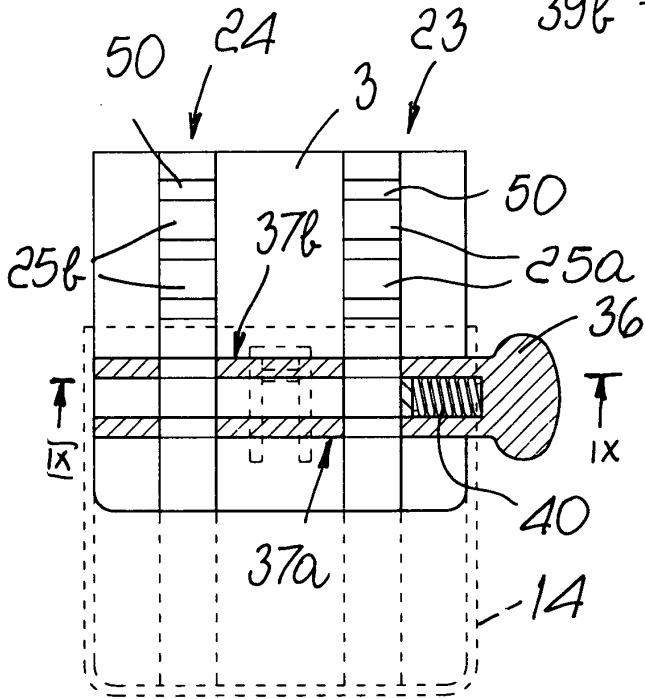


Fig. 7

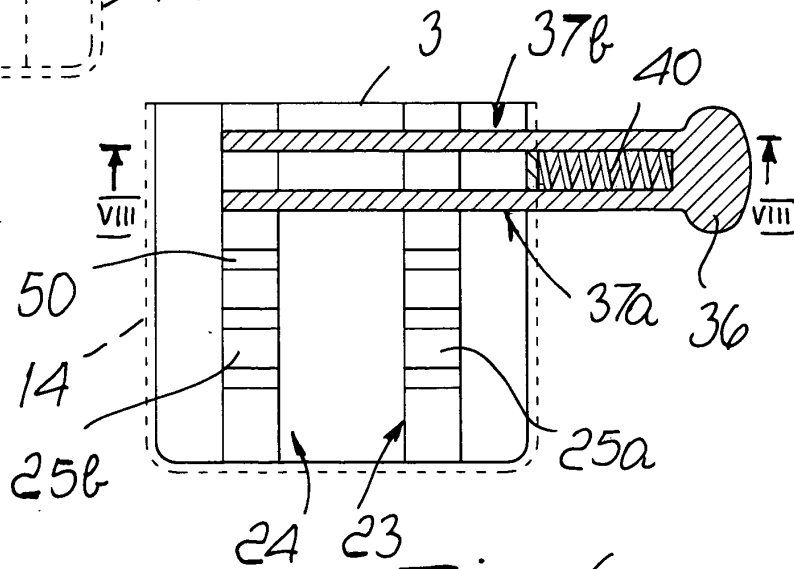


Fig. 6

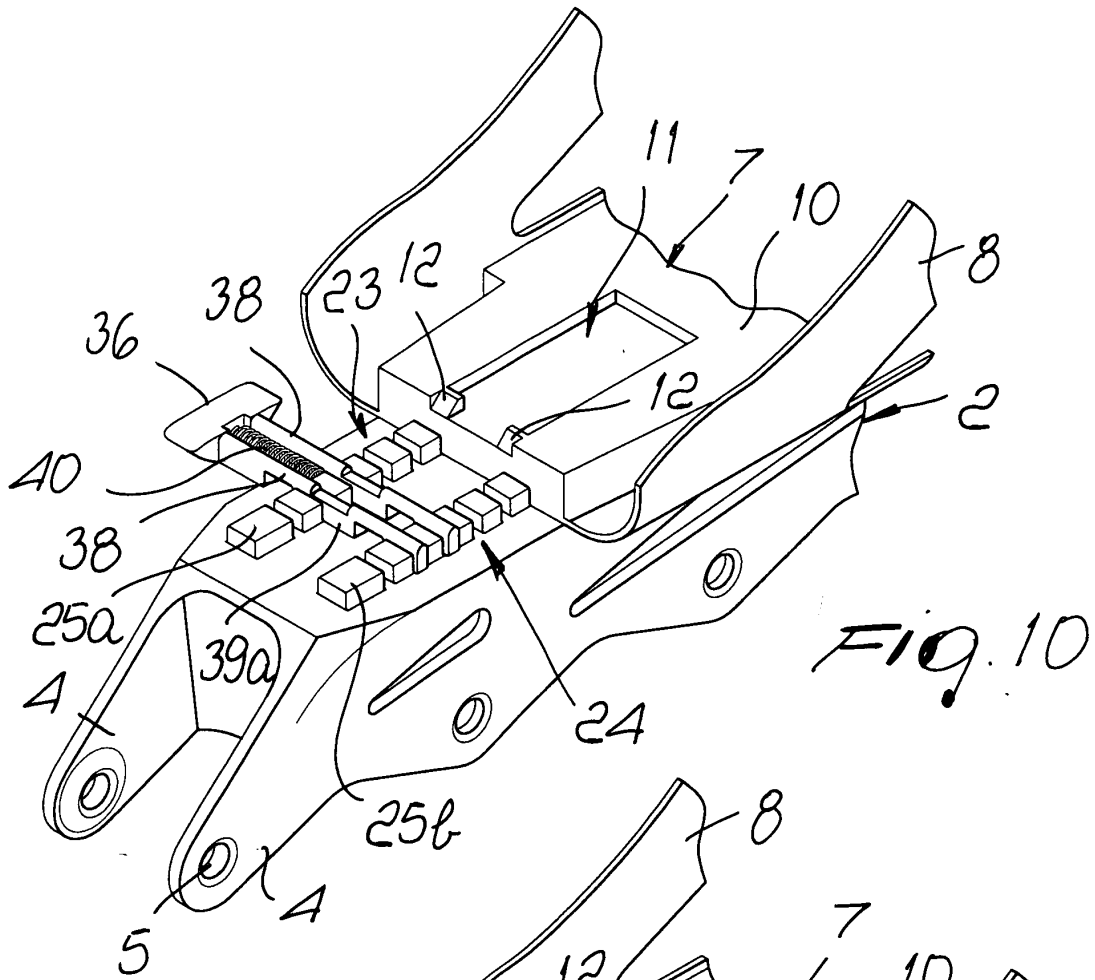


FIG. 10

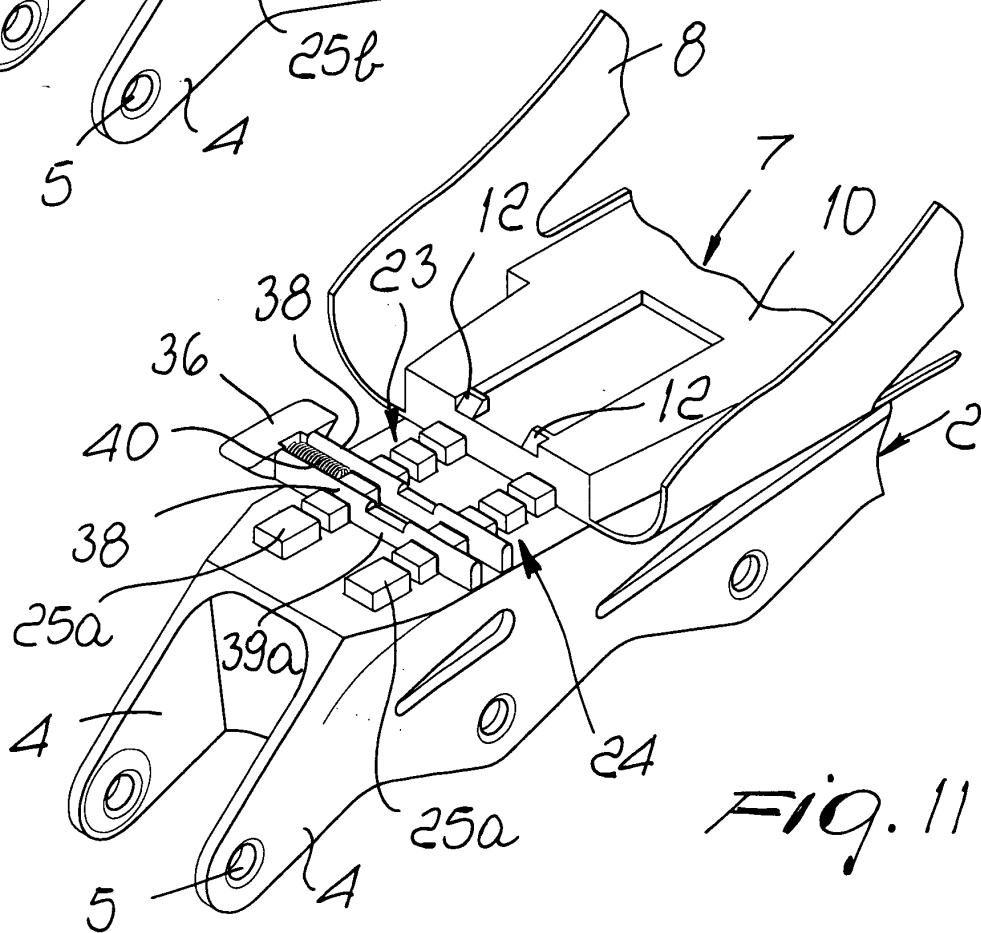


FIG. 11



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EUROPEAN SEARCH REPORT

Application Number
EP 03 02 5465

DOCUMENTS CONSIDERED TO BE RELEVANT			
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