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(54) **Ski-boot with means for actuating corresponding engaging members of ski-touring bindings**

(57) Ski-touring boot comprising a shell (10), a toe (20) provided with a hole (32) on each side for engagement with a corresponding pin (52) of ski bindings (50,51) and a sole (11), comprising means (30) for guiding and actuating said pins (52) comprising a frusto-pyramidal seat (31), the larger base of which forms the bottom part (31a) open below the sole (11) and the sides (31b,31c) of which extending in the transverse direction (Y-Y) are inclined towards the inside of the seat (31) so as to form elements for guiding the pin (52) in the vertical direction (Z-Z) and the surface (31d) of which situated inside the boot is inclined upwards and outwards so as to form the element for performing opening in the transverse direction (Y-Y) of the said pins (52).

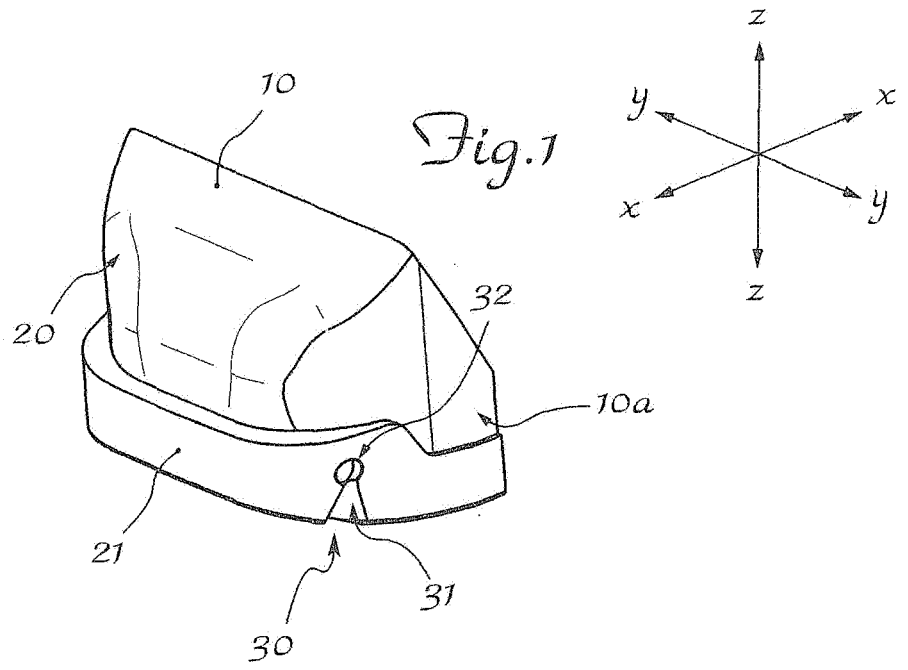

Fig.1

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Description

[0001] The present invention relates to a ski-boot with a toe having means for actuating engaging members for relative engagement with ski bindings.

[0002] It is known in the technical sector of ski-touring that there exists the need to provide safety bindings which comprise a front member, or toe-piece, able to lock in position the toe of the boot, while allowing rotation thereof about a substantially horizontal axis transverse with respect to the ski, and a rear member, or heel-piece, able to co-operate with the heel of the boot so as to allow three different modes of use, i.e.: release of the heel (walking mode); supporting with greater/lesser inclination of the boot (uphill mode); and locking of the heel (downhill mode).

[0003] It is also known, for example from WO 2007/10392 in the name of the same present Applicant, that the toe-piece of said bindings has oppositely arranged pins which engage in the transverse direction inwards and which are able to penetrate into corresponding holes on opposite sides of an associated boot which, when the binding is closed, is constrained to the toe-piece, being able to rotate only about a transverse axis consisting of said two pins so as to allow raising of the heel and the walking movement uphill or on the flat.

[0004] Although fulfilling their function, these binding/boot assemblies have, however, the drawbacks at the moment of engagement resulting in particular from the difficulty of centring correctly the opposite holes of the boot with the corresponding pin which must penetrate into the said holes so as to allow safety closing of the binding.

[0005] This drawback is also made worse by the - often awkward - situation of the ski-tourer who has to perform a precise operation in critical conditions.

[0006] EP 1,559,457 also discloses a boot which, in the region of each hole for engagement with the associated engaging pin, has a recess extending vertically from the sole to the hole itself; said recess has a cross-section substantially in the form of an angled edge for forming a contact and end-of-travel shoulder in the longitudinal direction for the boot; in this way, when the latter is inserted inside the open binding with a movement in the longitudinal direction of the ski, it engages via the said contact surfaces with the respective pin of the binding against which it stops in a positive and precise manner, allowing the skier to press the boot downwards so as to close the binding and position the two opposite nibs inside the respective hole.

[0007] Said boot with transverse contact seats is however practical only for positioning the boot in the longitudinal direction and only for bindings which at the time of engagement with the boot are open with the pins splayed so as to allow the toe of the boot to be positioned in the longitudinal direction; on the other hand, the known boot does not provide any useful teaching should the binding be closed as for example in the case of the toe-piece described in the already-mentioned document W02007/10392.

[0008] The technical problem which is posed, therefore, is to provide a ski-touring boot which has a toe able to allow easy, but precise and reliable engagement with the engaging members of a corresponding ski-binding toe-piece for locking in position the toe of the boot with the rigidity normally required for such applications and with the possibility of rotating the said toe about a horizontal axis.

[0009] In addition, it also happens in practice that similar problems of rapid and reliable engagement also arise during engagement of the boot with the heel-piece of the binding, in particular if the latter is of the type with a limited amount of space.

[0010] A further technical problem which is posed, therefore, is that of providing a heel for a ski-boot which allows rapid, reliable and rigid engagement with the heel-pieces of safety bindings in accordance with that described in the co-pending patent application in the name of the same present applicant.

[0011] In connection with this problem it is also required that the boot should have a low weight and longer duration and also be easy and inexpensive to produce using normal standardized means.

[0012] These results are achieved according to the present invention by a ski-touring boot having a toe for engagement with corresponding pins of ski-touring bindings, comprising means for actuating said engaging pins according to the characteristic features of Claim 1 and/or having a heel with transverse pins according to Claim 8.

[0013] Further details may be obtained from the following description of a non-limiting example of embodiment of the subject of the present invention provided with reference to the accompanying drawings in which:

- Figure 1 shows a perspective front view of the toe of the boot according to the present invention;
- Figure 2 shows a bottom view of the boot toe according to Fig. 1;
- Figure 3 shows a side view of the boot toe according to Fig. 1
- Figure 4 shows a partial schematic view of the boot toe according to Fig. 1;
- Figure 5 shows a schematic partial cross-section along the plane indicated by V-V in Fig. 4;
- Figure 6a shows a top view of the boot according to Fig. 1 during positioning for engagement with the toe-piece of the ski binding;
- Figure 6b shows a partial schematic cross-section of the boot/toe-piece assembly according to Fig. 6a
- Figure 6c shows a partial schematic cross-section along the plane indicated by VIc-VIc in Fig. 6b;
- Figure 7a shows a top view of the boot according to Fig. 1 at the end of the positioning movement for closing the toe-piece of the ski

binding;

Figure 7b shows a partial schematic cross-section of the boot/toe-piece assembly according to Fig. 7a and

Figure 7c shows a schematic partial cross-section along the plane indicated by VIIc-VIIc in Fig. 7b.

Figure 8 shows a perspective view of the heel of the boot according to the present invention;

Figure 9a shows a schematic cross-section along the plane indicated by IX-IX in Fig. 8 of a first embodiment of the heel according to Fig. 8; and

Figure 9b shows a schematic cross-section along the plane IX-IX of Fig. 8 of a second embodiment of the heel according to Fig. 8; and

Figure 10 shows a side view of the boot with heel engaged with the heel-piece of the safety binding.

[0014] As shown in Fig. 1 and with reference to the layouts shown by way of example in the figures, where "top" is assumed as referring to the part for putting on the boot and "bottom" as referring to the sole part thereof, and a set of three axes, i.e. longitudinal axis X-X, transverse axis Y-Y and vertical axis Z-Z, conventionally assumed solely for the sake of convenience of description, the ski-touring boot according to the invention comprises essentially:

- a shell 10, the toe 20 of which is shaped in a conventional manner in compliance with the corresponding DIN regulations;
- a reinforcing insert 30 which is integral with the toe 20 and is provided with:

- a circular hole 32 arranged on each side of the toe for insertion of a corresponding pin 52 (Fig. 6a) projecting in the transverse direction Y-Y of each arm 51, rotating about a vertical axis 51a, of the toe-piece 50 of a ski binding, only schematically shown in the figures.

[0015] The inner diameter of the hole 32 corresponds to the outer diameter of the said pin 52.

[0016] In greater detail, said seats 32 are connected to respective guiding and actuating means 30 which are shaped substantially in the manner of a pyramid frustum, the bottom part 31a of which is open underneath the sole and the top part 31c of which is connected to said hole 32.

[0017] As can be seen from the cross-section in Fig. 4, the two transverse sides 31b,31c of the seat 31 have an opposite inclination with respect to the vertical axis Z-Z towards the inside of the said seat, while (Fig. 5) the surface 31d of the seat, situated inside the boot, has an inclination upwards and towards the outside of each side 10a of the toe 10.

[0018] As can be seen from the same Fig. 5, the angle of inclination (α) of the inner side 31d is between 25° and 80° and preferably between 45° and 65°.

[0019] The top part 31c of the pyramid frustum 31 also has an inner width "L1" which is slightly smaller than the outer diameter of the pin 52, while the bottom base of the pyramid frustum has a width "L2" substantially corresponding to the relative distance between the two nibs 52 of the binding when in the closed position.

[0020] With the configuration described above the operating principle of the boot is as follows:

- the toe-piece 50 of the ski is arranged in position for engagement with the arms 51 closed;
- the toe 20 of the boot 10 is positioned opposite and above (in the vertical direction Z-Z) the pins 52 of the said arms 51;
- the sole 11 of the boot is moved downwards, so that the frusto-pyramidal seat 31 engages on top of the pin 52 (Fig. 6b);
- the continued downwards pushing of the sole (Fig. 6b,6c) causes the gradual downwards movement of the hole 32 towards the pin 52 with simultaneous guiding of the said pin in the vertical direction performed by the two transverse sides 31b,31c of the seat 31 and with simultaneous gradual pushing of the pin 52 in the transverse direction Y-Y and towards the outside of the seat 31 as a result of the inclination of the inner surface 31d of the seat 31 on which the pin rests and slides;
- this pushing force on the pin 52 causes the simultaneous opening of the arms 51 of the binding toe-piece (Fig. 7b,7c), allowing the boot to continue its movement downwards until the holes 32 are aligned with the respective pin 52 which, no longer pushed by the inclined surface 31d, is able to penetrate into the respective hole, being recalled by the resilient means (not shown) of the toe-piece which tend to bring the arms 51 back into the closed condition in the transverse direction Y-Y;
- once the pin 52 has entered into the circular seat 32 it is locked in the three directions, i.e. longitudinal direction X-X, transverse direction Y-Y and vertical direction Z-Z, remaining, however, free to rotate about the transverse axis formed by the two opposite pins 52.

[0021] It is therefore evident how, in the case of the boot provided with actuating means according to the invention, easier and more reliable engagement thereof with the engaging pins of the toe-piece is possible owing to the frusto-pyramidal shape of the said guiding means, which shape allows easy alignment of the toe of the boot with the pins in the vertical direction Z-Z and easy and reliable engagement of the said pins inside the respective circular seat even when the binding is closed.

[0022] Also evident is the advantage which is provided by easier, but precise and reliable engagement of the toe with the binding in view of the particularly difficult situation

which the ski-tourer may be in when having to perform said operation.

[0023] Although described and illustrated in an integrated form which is provided at the time of manufacture of the boot, it is understood that the toe with shaped seat according to the invention may also incorporate an additional part to be fitted by means of screws to the toe of already existing boots.

[0024] As shown in Fig. 8 it is also envisaged that the boot 10 has a heel 60 provided with a pin 61 projecting from each side 60a of the said heel.

[0025] Preferably the heel also has an inset seat 60b with a depth in the transverse direction Y-Y substantially corresponding to the length of the pin 61 which in this way does not project outside the shape of the boot and has a depth in the longitudinal direction corresponding to the size of the engaging member 101 (Fig. 10) of the heel-piece 100 of a ski binding.

[0026] As shown in Figs. 9a, it is envisaged that the projecting pins 61 are independent of each other and forced into a respective transverse seat 60c of the heel 60; however it is envisaged (Fig. 9b) that the pin 161 is formed as one piece of suitable length inserted inside a through-hole 160c in the heel, thereby simplifying in this case the stages for manufacture of the finished boot.

[0027] It can therefore been seen how a boot with a heel having transverse pins as described above is particularly suitable for easy and reliable engagement with corresponding engaging members 101a of a corresponding fork element 101 of a heel-piece 100 of a ski binding.

[0028] It is also envisaged that the embodiments described by way of example may have different geometrical layouts which are all equivalent in terms of the required functional features and are included within the scope of the present patent as defined by the claims which follow, such that, for example, the cross-section of the pin may be circular or polygonal.

Claims

1. Ski-touring boot comprising a shell (10), a toe (20) provided with a hole (32) on each side for engagement with a corresponding pin (52) of ski bindings (50,51) and a sole (11), **characterized in that** it comprises means (30) for guiding and actuating said pins (52) comprising a frusto-pyramidal seat (31), the larger base of which forms the bottom part (31a) open below the sole (11) and the sides (31b,31c) of which extending in the transverse direction (Y-Y) are inclined towards the inside of the seat (31) so as to form elements for guiding the pin (52) in the vertical direction (Z-Z) and the surface (31d) of which situated inside the boot is inclined upwards and outwards so as to form the element for performing opening in the transverse direction (Y-Y) of the said pins (52).

2. Boot according to Claim 1, **characterized in that** the top part of the frusto-pyramidal seat (31) has an inner width "L1" slightly smaller than the outer diameter of the pin (52).

3. Boot according to Claim 1, **characterized in that** the bottom base of the frusto-pyramidal seat (31) has a width (L2) substantially corresponding to the distance between the two nibs (52) of the binding (50) when in the closed position.

4. Boot according to Claim 1, **characterized in that** the angle of inclination (α) of the inner side (31d) of the pyramid frustum is between 25° and 80°.

5. Boot according to Claim 4, **characterized in that** the angle of inclination (α) of the inner side (31d) of the pyramid frustum is preferably between 45° and 65°.

6. Boot according to Claim 1, **characterized in that** said actuating seats (31) are incorporated in the toe (20) of the boot.

7. Boot according to Claim 1, **characterized in that** said actuating seats (31) are formed in an external element which can be fitted to the toe of the boot.

8. Ski-touring boot, **characterized in that** it has a heel (60) provided with a pin (61;161) projecting from each side (60a) of the heel itself.

9. Boot according to Claim 8, **characterized in that** the heel (60) has on each side (60a) an inset seat (60b) from which a pin (61) protrudes.

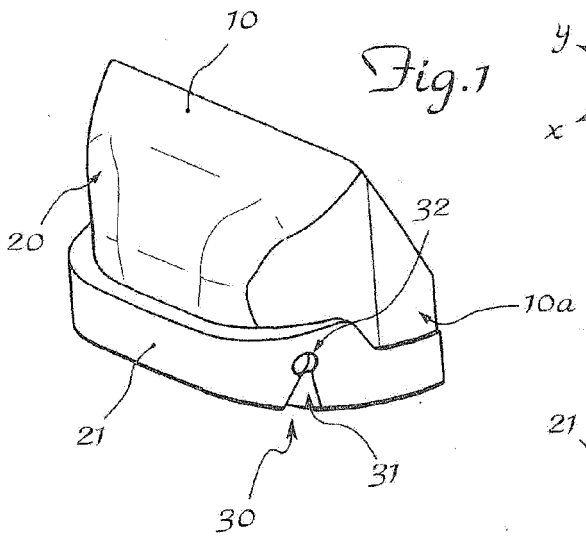
10. Boot according to Claim 9, **characterized in that** the depth, in the transverse direction Y-Y, of each inset seat (60b) substantially corresponds to the length of the pin part (61;161).

11. Boot according to Claim 9, **characterized in that** the depth, in the longitudinal direction, of the said inset seats (60b) substantially corresponds to the longitudinal dimension of the engaging member (101a) of a heel piece (100) of a ski binding.

12. Boot according to Claim 8, **characterized in that** said projecting pins (61) are independent of each other and forced into a respective transverse seat (60c) of the heel (60).

13. Boot according to Claim 8, **characterized in that** said projecting pins (161) are formed as one piece of suitable length inserted inside a through-hole (160c) in the heel.

Fig.1



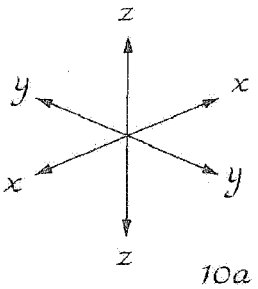


Fig.2

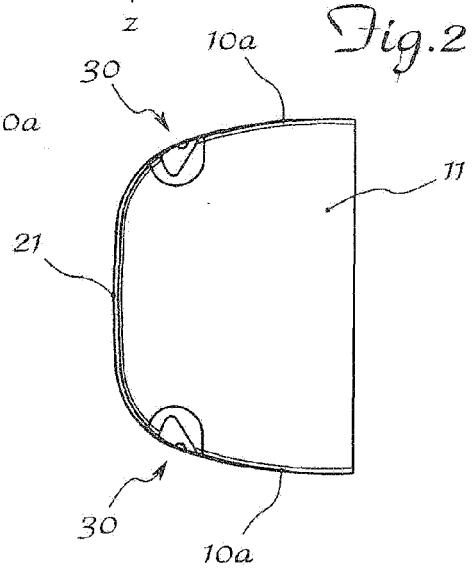


Fig.3

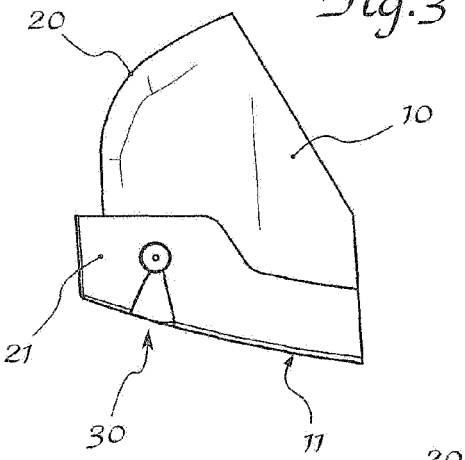
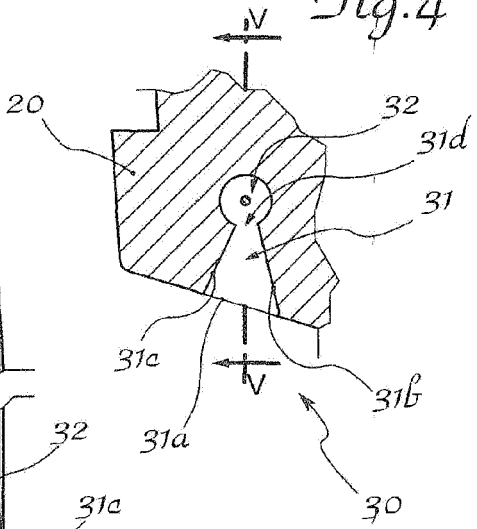


Fig.4



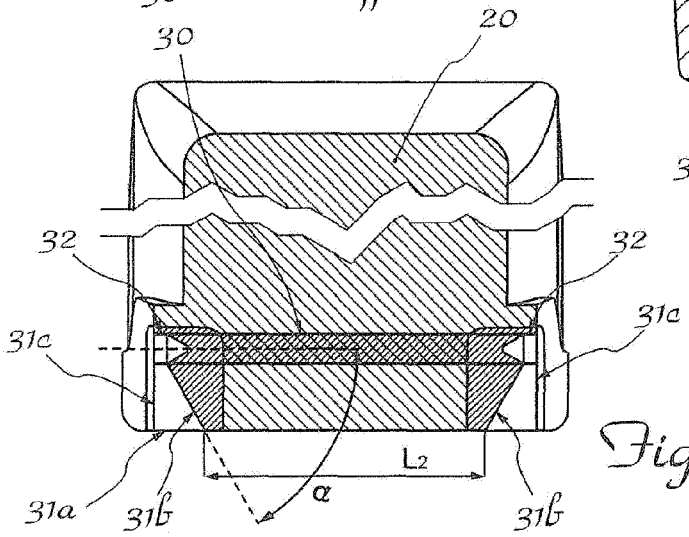


Fig.5

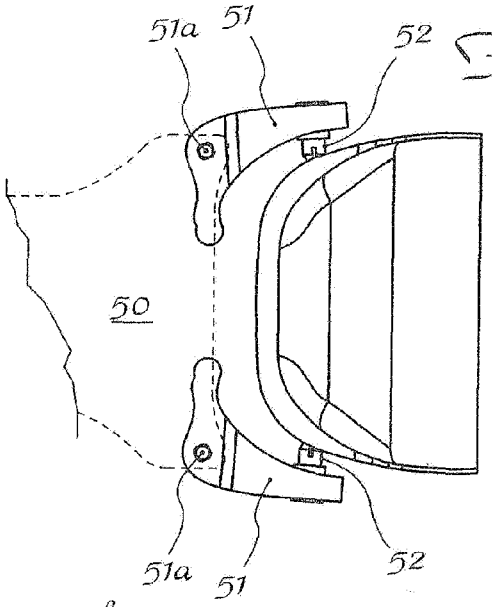
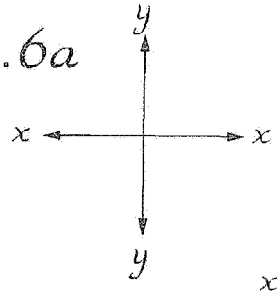


Fig.6a



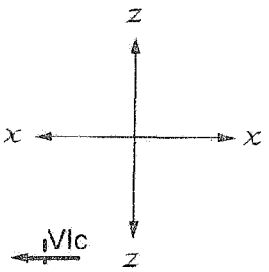
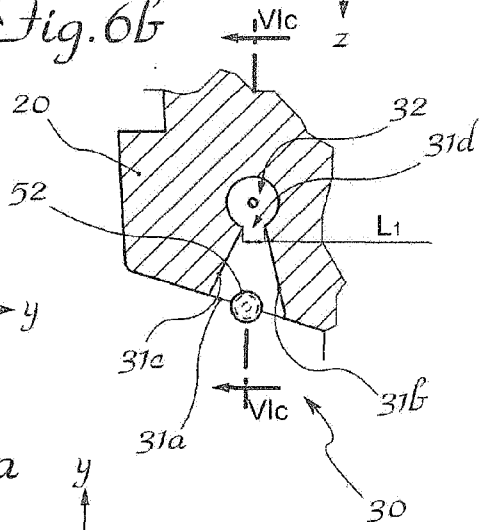


Fig.6b



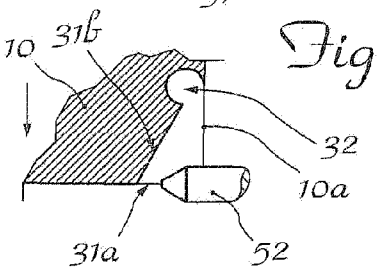


Fig.6c

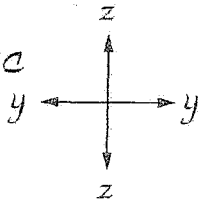
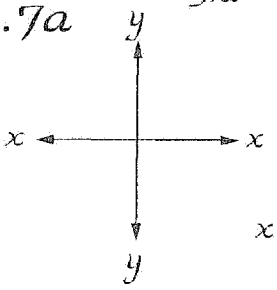


Fig.7a



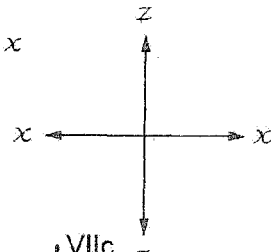
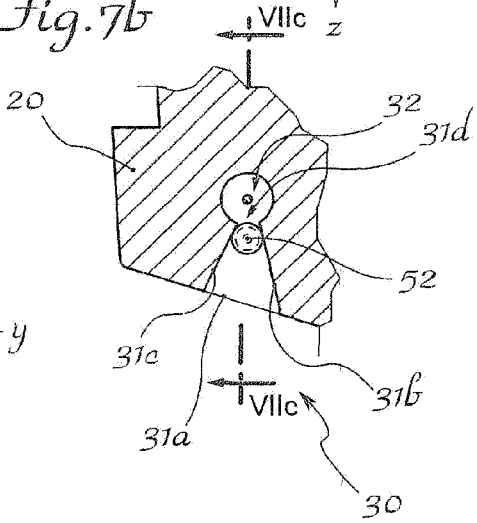


Fig.7b



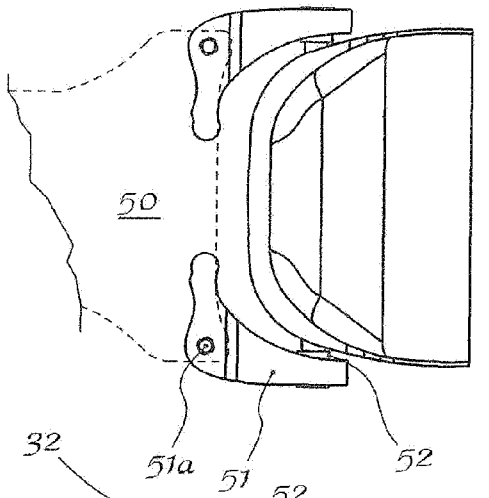
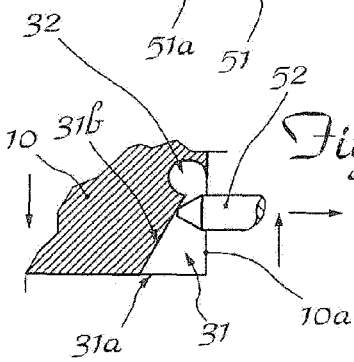


Fig.7c



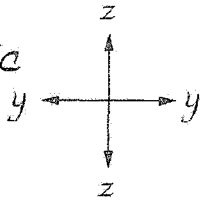


Fig.8

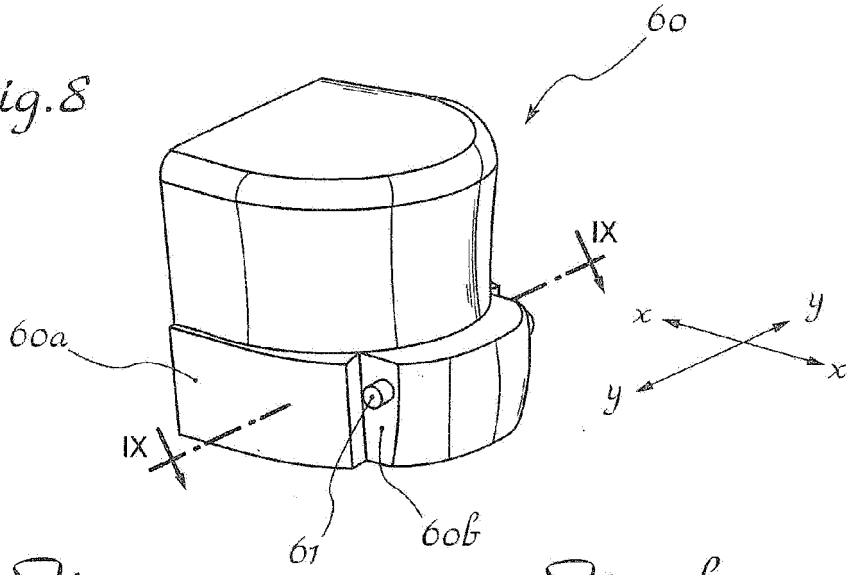


Fig.9a

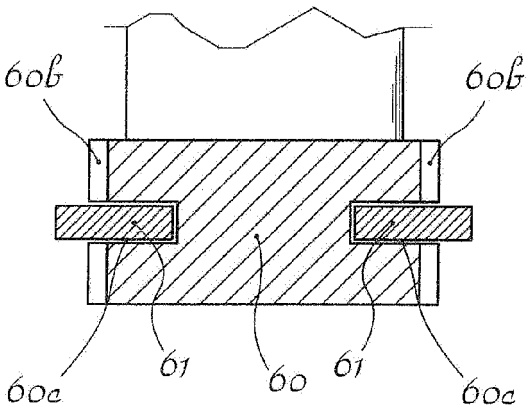


Fig.9b

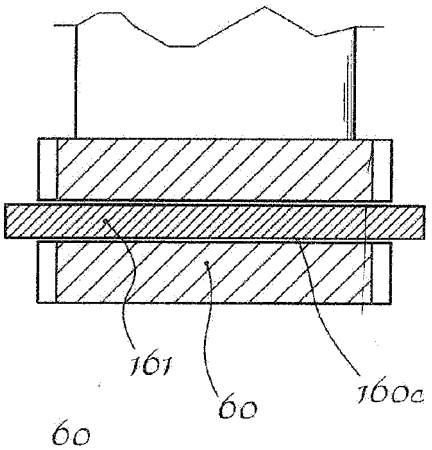
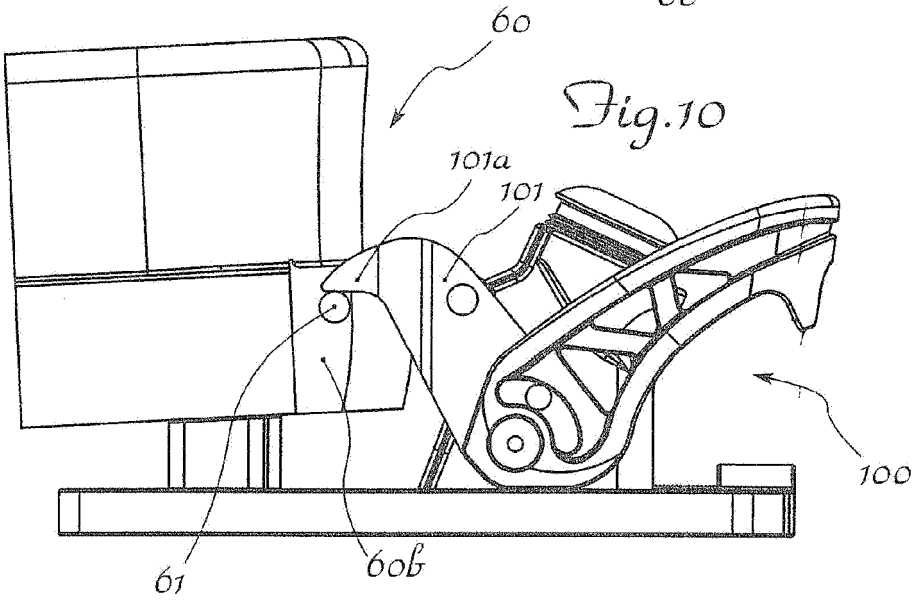


Fig.10



REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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- EP 1559457 A **[0006]**