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(54) **Binding for a piece of footwear and a piece of sports equipment**

(57) A binding for a piece of footwear and a piece of sports equipment such as a ski or a skate, comprises a first member attached or attachable to the piece of footwear and a second member attached or attachable to the piece of sports equipment, the first and second members are releasably coupled or couplable with each other and in coupled condition are pivotable with respect to each other, preferably around the coupling. The binding is characterised in that the binding is provided with a manually operable member, preferably a lever adapted to provide a clamping force, for fastening the coupling.

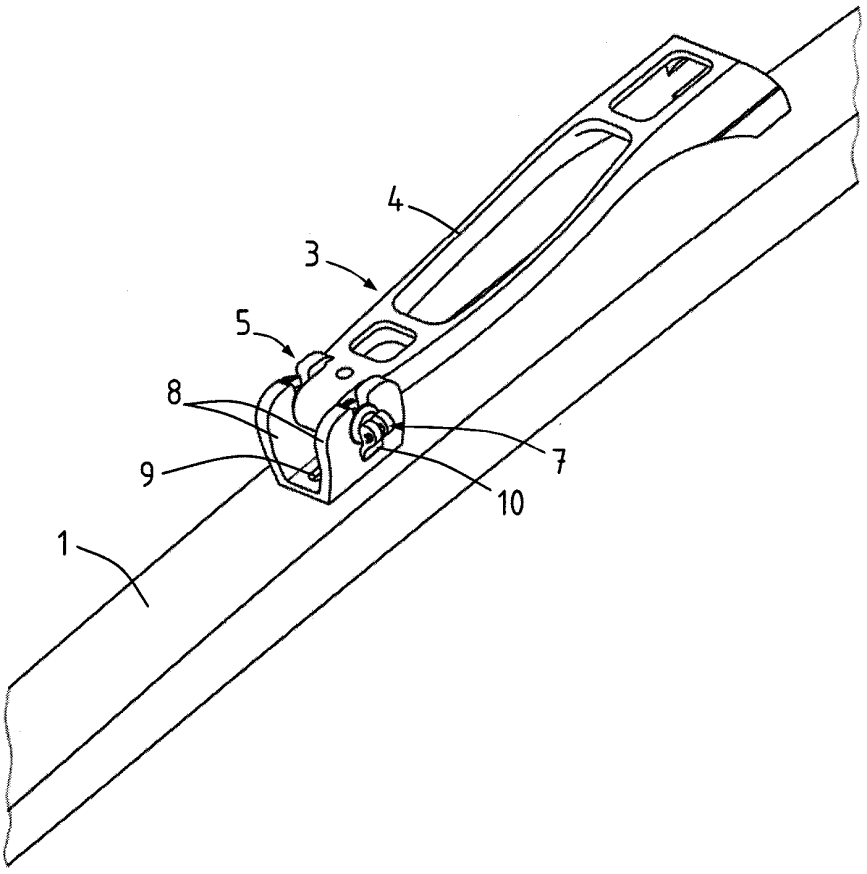

Fig.2a

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Description

[0001] The present invention pertains to a binding for a piece of footwear and a piece of sports equipment such as a ski or a skate, comprising a first member attached or attachable to the piece of footwear and a second member attached or attachable to the piece of sports equipment, wherein the first and second members are releasably coupled or couplable with each other and in coupled condition are pivotable with respect to each other, preferably around the coupling.

[0002] Such a binding is known in the art. E.g., DE 201 08 681 U discloses a cross country ski comprising a base strip to be joined to a shoe on a fixed pushing lever mounted to rotate on the strip and suitable to rotate between a stopping position and a normal horizontal resting position. The pushing lever is mounted to a fixed pivot which is adapted to hold the lever in a stable transverse direction relative to the ski.

[0003] Further, NL 1 012 630 shows a binding for a skate which in general is of the above-mentioned type.

[0004] With such bindings according to the prior art, in order to put on or to take off a ski or a skate provided with such a binding, one has to put on or take off the boot or shoe attached thereto, i.e. the entire assembly, which takes considerable time and urges the sportsperson to use spare footwear for walking without the ski or skate.

[0005] Also, in order to exchange one of the pieces of footwear or sports equipment coupled with such bindings, e.g. for repairs or for adapting the equipment to different conditions, it is necessary to disassemble the hinge which forms the coupling at least partly and/or to detach the piece of footwear or sports equipment from the binding. This also takes time and it requires the use of separate tools. This is considered a burden for recreational and professional sportsperson alike, especially in cold environments where fingers might go numb.

[0006] Thus a tour skater encountering a stretch of poor ice or an unfrozen patch which forces him/her to revert to walking is inclined to walk on his/her skates. This is generally uncomfortable and may cause damage to the equipment, even when using protective covers for the blades.

[0007] Also, a sportsperson, in particular in cross country skiing or -skating where changed or changing conditions may require particular material or differently prepared material such as differently waxed skis, might decide not to change less than optimal material in order not to lose time, especially during the period directly before the start of a tournament.

[0008] In addition, some types of sport, such as tour-skating, cross-country skiing and snow-shoe hiking or skating and roller skating may be performed with the same footwear. Having the option of a relatively easy and efficient interchanging of footwear and/or sports equipment would, inter alia, reduce the need for buying additional footwear, thus saving costs.

[0009] A pivotable binding which allows a rapid decoupling between a piece of footwear and a piece of sports equipment is discussed in NL 1 024 330 by the present inventor, which discloses a frame for a skate which is provided on one side with a device for accommodating a blade or a wheel set and on the opposite side are devices for fixture of a shoe. The frame is divided, and a basic part accommodates the blade or wheel set accommodation devices, together with an upper part which is releasably connected to it, which supports the shoe fixture devices The frame forms part of a folding skate with the basic part divided into an accommodation part to which the blade is fixed and a connecting part which on the front side is pivotably connected to the accommodation part. The connecting part accommodates the upper part to which the shoe is fixed.

[0010] Such a binding functions very satisfyingly. However, it requires a main binding member attached to the skate comprising a hinging arrangement, as well as a coupling arrangement to (de)couple a footwear-member to (from) the main binding member. Thus, the construction is inherently more complex and therefore heavier and more vulnerable relative to a binding with fewer parts as discussed above.

[0011] It is therefore an object of the present invention to provide an improved pivotable binding with which a piece of footwear and a piece of sports equipment may be (de)coupled relatively easily and quickly.

[0012] To that end, the binding is provided with a manually operable member, preferably a lever adapted to provide a clamping force, for fastening the coupling. Thus, the members of the binding may be easily (de)coupled and the coupling efficiently secured or released without having to use one or more tools. Thus the binding is generally easier and faster in operation.

[0013] In a preferred embodiment, at least one of the first and second members comprises at least one hook or fork for receiving a coupling member therein. Herein, the words "hook" or "fork" are used to generally denote a piece of material having an open hole whose perimeter is open to the outside of the material otherwise surrounding the hole, e.g. an open slot or a channel in a flange. The coupling member may be a part of the first or second member of the binding or a separate part for realising a coupling between the first and second members.

[0014] In this manner, the coupling member or a fastening device which secures the coupling member and the coupled members to another, need not be removed or disassembled altogether. Instead, the coupling arrangement need only be released partially, i.e. just so far that the coupling member may be slid out of (the opening of) the hook or fork. Thus, the time required to decouple a binding according to the present invention is considerably less than that needed to fully unscrew a bolt and/or a nut and to disassemble a binding according to the prior art. Further, as there is no need to completely take a, possibly relatively delicate, member apart, there is less risk of soiling, damaging or even losing parts.

[0015] It is preferred that the coupling comprises a cou-

pling member having a pivot which is rotatably mounted with respect to a housing and that one of the first and second members is attached or attachable to the pivot or to the housing and that the other one of the first and second members is fastened or fastenable, e.g. by clamping, to the housing or to the pivot, respectively. In this way the first and second members may be releasably fastened to each other in a relatively easy and quick manner, while providing a hinge for obtaining a smoothly pivoting coupling between the members.

[0016] When using a clamped connection, the clamping force is preferably substantially along or parallel to the pivoting axis. Thus, the coupling member and one or more hooks or forks wherein it is received are clamped together so that play of the members of the binding with respect to each other may be reduced efficiently.

[0017] The invention will now be explained in more detail with reference to the Figures, which show preferred embodiments of the invention.

[0018] Fig. 1 shows an elevated view of a cross country ski provided with a binding according to the present invention and a ski boot attached thereto.

[0019] Figs. 2A and 2B show perspective views in close-up of the ski of Fig. 1 but without the ski boot.

[0020] Figs. 3A and 3B show top and side views, respectively, of the binding of Figs. 1 and 2.

[0021] Fig. 4 shows a partial cross section of the binding along the line AA of Fig 3B.

[0022] Figs. 5A and 5B show a perspective view and a top view, respectively, of a clap-skate provided with a binding according to the present invention.

[0023] Fig. 1 shows a cross country ski 1 and a ski boot 2 mounted thereto with a binding 3 according to the present invention. The binding 3 comprises a footwear supporting member or bridge 4 and a base member or bracket 5 mounted to the ski 1. The binding 3 further comprises a stopper 6 mounted to the ski 1. The bridge 4 and the bracket 5 are coupled by means of a coupling member 7. The bridge 4 and the base 5 can pivot with respect to each other around the coupling member 7, in the general vertical plane, i.e. in the same direction as the natural bending of a knee joint of a user wearing the assembly of ski 1, boot 2 and binding 3.

[0024] The boot or shoe 2 is attached or attachable to the bridge 4 as shown in Fig. 1 in any known or inventive manner. E.g. the boot 2 may be screwed to the bridge 4 through holes provided in the bridge 4, which holes are preferably slotted holes so that the position and/or angle of the boot 2 with respect to the bridge 4, and thus to the pivoting axis of the binding, is adjustable.

[0025] A 'bare' binding 3, i.e. one without a ski boot 2, on a ski 1 is shown in more detail in Figs. 2A-3B.

[0026] In the shown embodiment the bracket 5 is generally U-shaped transversal to the ski 1, having two flanges 8 pointing away from the ski 1, and is screwed to the ski 1 though a slotted hole 9 in its base. The slotted hole 9 allows to adjust the position of the bracket 5, and thus of the binding 3 as a whole, with respect to the ski 1.

[0027] The flanges 8 of the bracket 5 are each formed as a fork for receiving the coupling member 7 therein. The flanges 8 and the forks therein extend parallel to the plane of the pivoting of the binding 3, i.e. in a plane generally parallel to the longitudinal direction of the ski 1 and/or of boot 2 and therewith of the foot of a user.

[0028] In the embodiment shown in Figs. 1-3, the coupling member 7 is provided with a manually operable lever 10 and a nut 11.

[0029] This coupling member 7, which is illustrated in more detail in Fig. 4, is integrated in the bridge 4 and is of the quick-release skewer-type, i.e. a cam operated lever system provided with a hollow axle; the coupling member 7 comprises the lever 10, the nut 11 and a central traction rod 12, pivotably connected to the lever 10 at the position indicated with the letter "P" on the one side and screwed to the nut 11 on the other side. The coupling member further comprises, arranged around the traction rod 12, a washer 13, and a bush 14 which comprises sleeves 15 and 16 having collars 15A and 16A, respectively. The bush 14 is rotatably mounted to a housing, here being integrated in the bridge 4, by means of bearings 17 and 18, respectively. Thus the bush 14 forms a hollow axle around which the housing, and thus the bridge 4, may rotate.

[0030] The manually operable lever 10 is pivotable about the axis through P perpendicular to the longitudinal axis of the traction rod 12. The head 10A of the lever 10 forms an eccentric cam with respect to the pivoting axis of the lever 10 through P, resulting, dependent on the orientation of the lever 10 to the traction rod 12, in an "open" and a "closed" arrangement of the coupling member. In the "closed" position the widest part of the head 10A, i.e. the cam, faces the nut 11, as shown in Fig. 4. In the "open" position the lever 10 is substantially inverted, so that the narrowest part of the head 10A faces the nut 11.

[0031] The effective length of the traction rod 12, i.e. the distance along the traction rod 12 between the pivoting axis of the lever 10 through P and the facing surface of the nut 11, is adjustable by screwing the nut 11 further onto or off the traction rod 12.

[0032] At the appropriate effective length of the traction rod 12, the eccentric head 10A of the lever 10 allows the nut 11 and the washer 13 to be separable so far in the "open" position that the coupling member 7 can be inserted in and pulled out of the forks in the flanges 8, whereas in the "closed" position the parts between the head 10A and the nut 11, i.e. the washer 13, the flanges 8 and the bush 14, are clamped tightly together. Thus, the bridge 4 and the bracket 5 can be (de-)coupled, effectively (dis-)assembling the binding 3, and the coupling releasably fastened by operating the clamping lever 10.

[0033] It should be noted here, that the clamping force of (the lever 10 of) the coupling member 7 acts on the bush 14 and not on the bridge 4. This fixes the bush 14 to the bracket 5 and thus prevents play therebetween, yet it leaves the bridge 4 essentially free to rotate about

the bush 14 with respect to the bracket 5.

[0034] To assist in the proper positioning of the members of the binding 3 relative to each other, the coupling member 7 and/or the flanges 8 etc. may be provided with profiled parts, such as ridges and/or recesses, e.g. for receiving the nut 11, the washer 13 and/or (the collars 15A,16A of) the bush 14 therein. These ridges and/or recesses can serve as guidance for a user assembling the binding 3, and also for receiving and absorbing shearing forces between the bridge 4 and/or the coupling member 7 and the bracket 5, resulting in additional fixing of the position of the coupling member 7 relative to the bracket 5. Thus, a lower fixing force may be allowed, which improves the user-friendliness of the binding 3.

[0035] The pivoting axis of the shown binding is arranged at or near the front, i.e. the toe, of the boot. The exact position of the axis, e.g. underneath the ball of the foot or in front of the toes can be arranged as desired. During use of an assembly of a ski 1, a boot 2 and a binding 3 according to the present invention, the sportsperson pivots his/her foot, and thus the boot 2, with respect to the ski 1 about the pivoting axis. When moving the heel of the boot 2 towards the ski 1, i.e. returning the bridge 4 to the parallel starting position shown in Figs. 1-3, the bridge 4 contacts the stopper 6.

[0036] The stopper 6 is preferably made of or covered with a somewhat resilient material, e.g. synthetic rubber, to cushion the contact between the bridge 4 and the stopper 6 and/or ski 1. The side faces of the stopper 6 and the corresponding contact surfaces of the bridge 4 are preferably sloping for providing a self-centering effect. The stopper 6 thus cooperates with the bridge 4 for realigning the bridge 4 and the ski 1 to each other, when necessary, and for absorbing tangential forces when skiing in curves and/or when braking, reducing the torque and shearing forces on the coupling member 7 with respect to the bracket 5.

[0037] Thus, apart from those force components resulting in the pivoting of the members of the binding 3 with respect to each other, essentially all force components exerted on the boot 2 or on the ski 1 are transferred by the binding 3, allowing a high degree of feeling and control by a user of (the behaviour of) the sports equipment.

[0038] Figs. 5A and 5B show another preferred embodiment of a binding for a piece of footwear and a piece of sports according to the present invention, viz. a clap-skate 20. In Figs. 5A and 5B, parts which are essentially equivalent to those in Figs. 1-4 are indicated with the same reference numeral.

[0039] The clap-skate 20 comprises a skate 21 and a binding 3. The binding 3 comprises a bridge 4, a bracket 5 and a coupling member 7.

[0040] The skate 21 comprises a blade 22 mounted to a tube 23. The bracket 5 is attached to the tube 23.

[0041] The tube 23 has a tapered upper side. The bridge 4 is provided with a forked rear part, provided with a resilient lining 24. The material and shapes of the tube 23 and the lining 24 provide a combined self-centering and cushioning effect, similar to that of the stopper 6 and the bridge 4 of the embodiment discussed previously.

[0042] The construction and operation of the coupling member 7 is essentially equal to those of the embodiment discussed previously. In this embodiment the lever 10 is longer, which allows to increase the ratio between the clamping force provided by the lever 10 and the necessary manual force for its operation. Thus, the user-friendliness and reliability of the binding 3 and therefore of the assembly 20 are increased.

[0043] The bridge 4 and skate 21 may be provided with an arrangement for a spring for pulling the bridge 4 and the skate 21 together to the initial, substantially parallel state, e.g. during the part of a skating stroke where the skate is lifted from the ice.

[0044] In another embodiment, the binding may be realized in substantially opposite fashion to the shown embodiments. The bridge then comprises a fork, and the bracket is provided with a coupling member.

[0045] A benefit of an embodiment with the coupling member not being attached to the piece of footwear is that it allows to attach relatively simple means with forks or hooks to the piece of footwear or to integrate the two. This allows a user to walk on the shoe or boot without risking to damage or soil a coupling member attached to the shoe. For this, the bridge may be provided with rubber protrusions to act as a sole for walking. Also, a separate sole attachable to the footwear-member of the binding may be provided for allowing a user to walk thereon.

[0046] The materials of the bridge and the bracket are preferably relatively strong, stiff and light. As the preferred uses for the inventive binding are outdoor and winter sports, the materials are preferably relatively insensitive to temperature fluctuations between the outside, where they binding may be used, and the indoors, where they may be donned, i.e. between ca. plus and minus 25 °C. Suitable materials are therefore metals such as aluminium, carbon-reinforced epoxy resins and/or plastics.

[0047] The invention is not restricted to the above described embodiments which can be varied in a number of ways within the scope of the claims. For instance, the binding may be realized with the members for the pieces of footwear and sports equipment and the coupling member formed as three or more separate, releasably attachable, parts.

[0048] The binding may also comprise only one fork for receiving the coupling member therein, e.g. by an asymmetrically formed bracket having a single forked flange.

[0049] The binding may further be realised with a manually operable screwed connection using e.g. a wing nut or a knurled knob. The fastening arrangement may be mounted on or integrated with the coupling member as well as on one of the first and second members and the coupling may be fastened by a force perpendicular to the pivoting axis, whereby the relevant part of the coupling member is fixed against the first or second member.

[0050] An especially robust coupling member may be realised with a simple fixed pivot, e.g. fixed protrusions, which, especially when received in a plastic-lined fork, e.g. lined with poly-tetrafluorethylene (PTFE, Teflon®), may allow sufficiently smooth rotation of the binding. Securing of the coupling may then be arranged by suitably closing off the exit of the fork, e.g. with a manually operable, possibly springloaded, lock-bolt. Such an embodiment may e.g. be used with snow shoes or walking soles, for which the smoothness of the pivoting action is less important than for skating or cross country skiing.

[0051] The binding, especially when used for a ski, may further be provided with means, e.g. a strap, a clamp or a hook, for fixing the relative positions of the binding members, preferably in a substantially parallel or closed position, e.g. for walking or for downhill skiing.

[0052] In the shown embodiments the fork openings are formed substantially straight and pointing away from the ski, skate and/or shoe to which they are attached, but different orientations and other shapes are also possible, e.g. a smoothly curved or rather L-shaped channel, or one having a varying width along its length and/or a slot which opens towards the front or rear of the ski.

[0053] The orientation of the pivoting axis of the inventive binding may be mounted at an angle to the longitudinal axis of the piece of sports equipment, should this be preferred.

Claims

1. Binding (3,23) for a piece of footwear (2,22) and a piece of sports equipment such as a ski (1) or a skate (21) comprising a first member (4,24) attached or attachable to the piece of footwear (2,22) and a second member (5,25) attached or attachable to the piece of sports equipment (1,21), wherein the first and second members (4,24;5,25) are releasably coupled or couplable with each other and in coupled condition are pivotable with respect to each other, preferably around the coupling, **characterised in that** the binding (2,23) is provided with a manually operable member, preferably a lever (10,30) adapted to provide a clamping force, for fastening the coupling.

2. Binding according to claim 1 wherein at least one of the first and second members (4,24;5,25) comprises at least one hook or fork for receiving a coupling member (7,27) therein.

3. Binding (3,23) according to claim 1 or 2, wherein the coupling comprises a coupling member (7,27) having a pivot which is rotatably mounted with respect to a housing and wherein one of the first and second members (4,24;5,25) is attached or attachable to the pivot or to the housing and wherein the other one of the first and second members (4,24;5,25) is fastened or fastenable, e.g. by clamping, to the housing or to the pivot, respectively.

4. Binding (3,23) according to any of the preceding claims, wherein the fastening is by means of a clamping force substantially along the pivoting axis of the first and second members (4,24;5,25).

5. Binding (3,23) according to any of the preceding claims, wherein the coupling member (7,27) comprises a hollow axle.

6. Binding (3,23)according to any of the preceding claims, wherein the coupling member (7,27) comprises a quick-release skewer.

7. Binding (3,23) according to any one of the preceding claims, wherein at least one of the members (4,24; 5,25;7,27) is provided with profiled parts, e.g. ridges and/or recesses, for receiving and/or absorbing shearing forces between the members (4,24;5,25; 7,27).

8. Binding (3,23) according to any of the preceding claims, wherein the pivoting axis is arranged at or near the front, i.e. the toe, of the footwear (2,22).

9. Binding (3,23) according to any of the preceding claims, provided with a, preferably releasable, resilient member for urging the first and second members (4,24;5,25) in a predetermined position, preferably with the piece of sports equipment (1,21) substantially parallel to the piece of footwear (2,22).

10. Binding (3,23) according to any of the preceding claims, wherein the first and/or the second member (4,24;5,25) is (are) provided with adjustment features, such as slotted holes (9), for adjusting the relative position of the piece of footwear (2,22) and/or of the piece of sports equipment (1,21) to the member (4,24;5,25).

11. Member (4,24;5,25), comprising all the features of a first or a second member (4,24;5,25) according to any one of the preceding claims and evidently intended for use in a binding (3,23) according to any one of the preceding claims.

12. Piece or pair of pieces of footwear (2,22) or of sports equipment (1,21), such as skis (1), skates (21) or roller skates, comprising a binding (3,23) according to any one of the preceding claims or a member (4,24;5,25) according to claim 11.

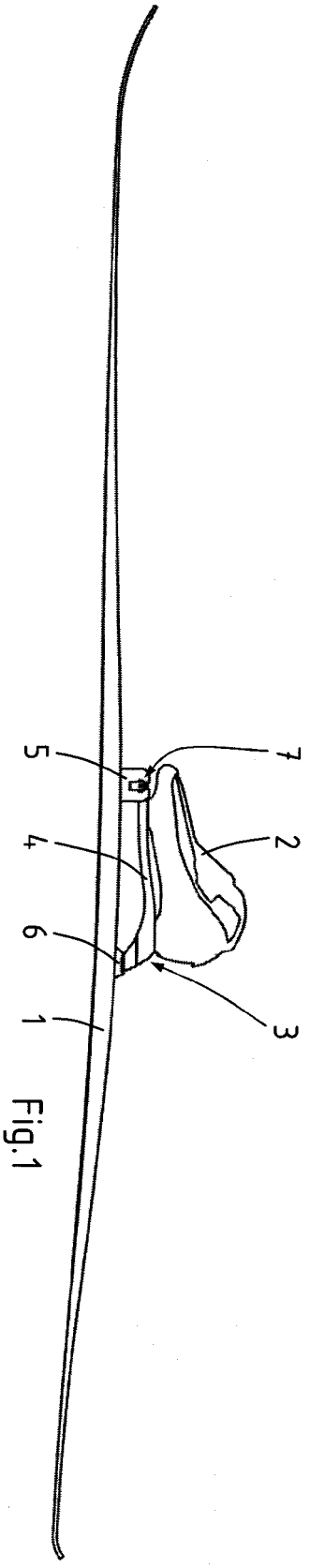

Fig.1

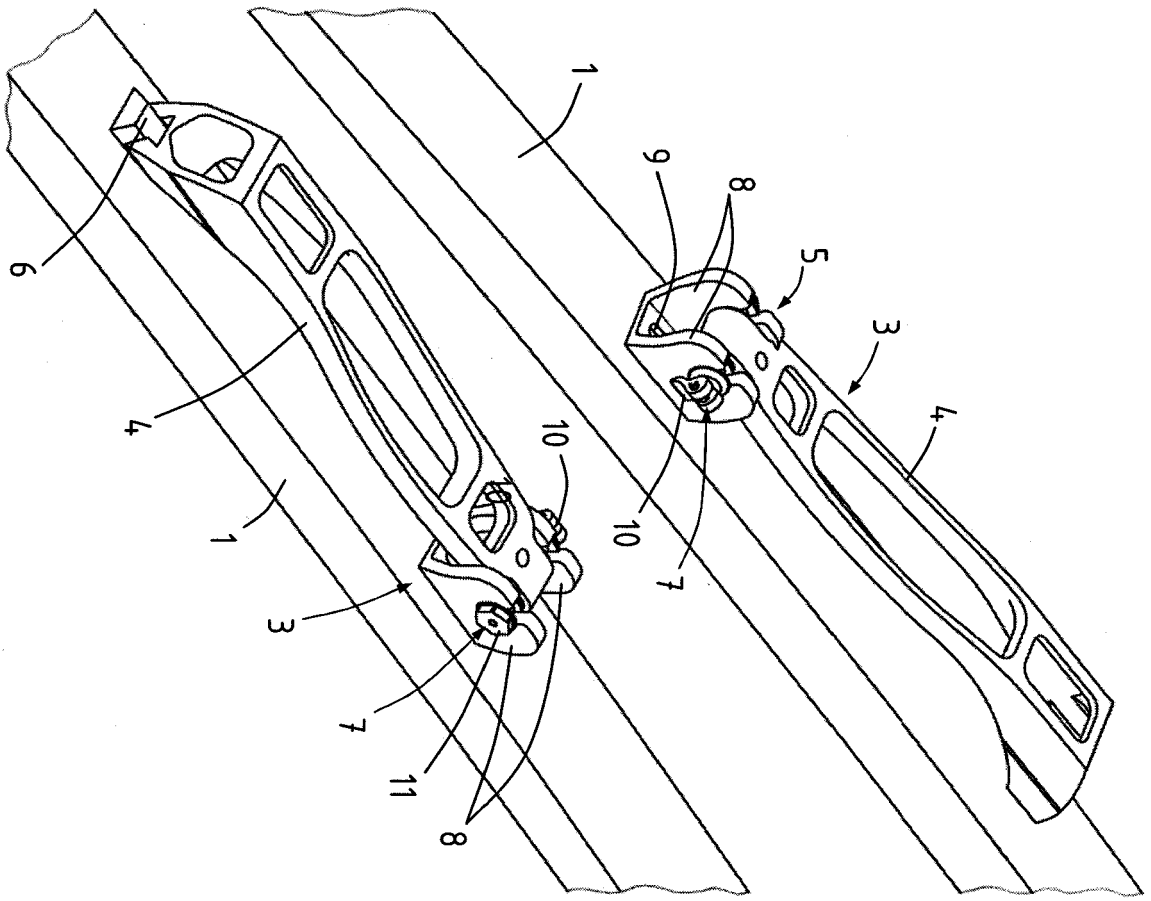

Fig.2B

Fig.2a

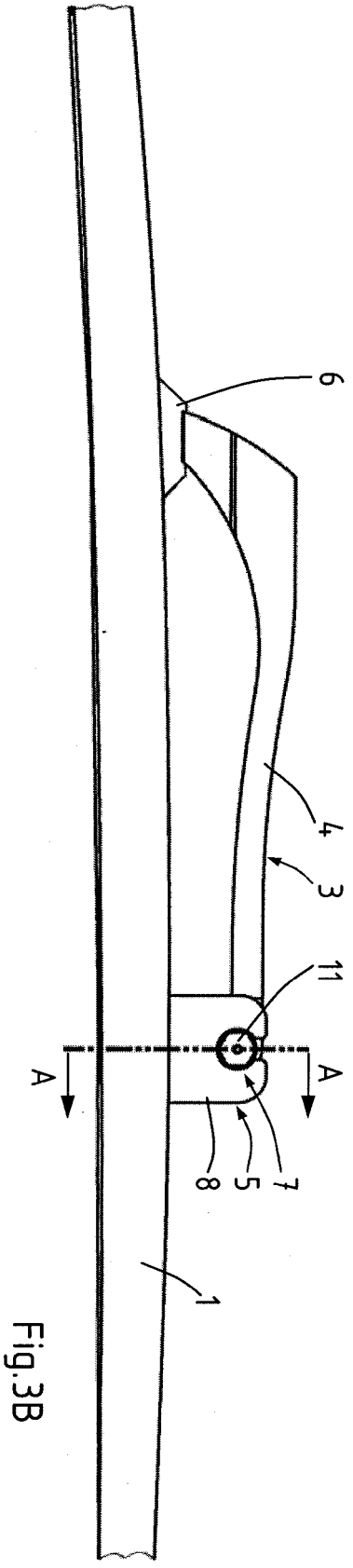

Fig.3B

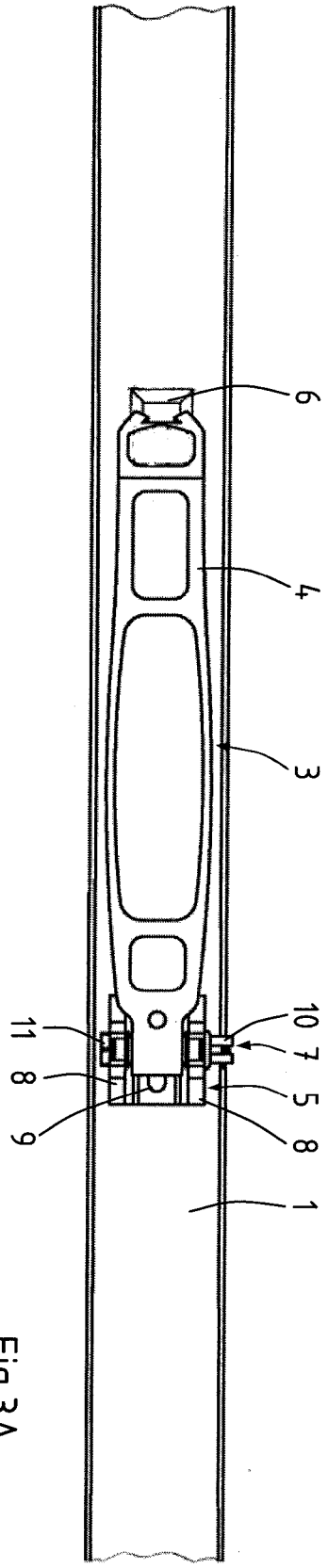

Fig.3A

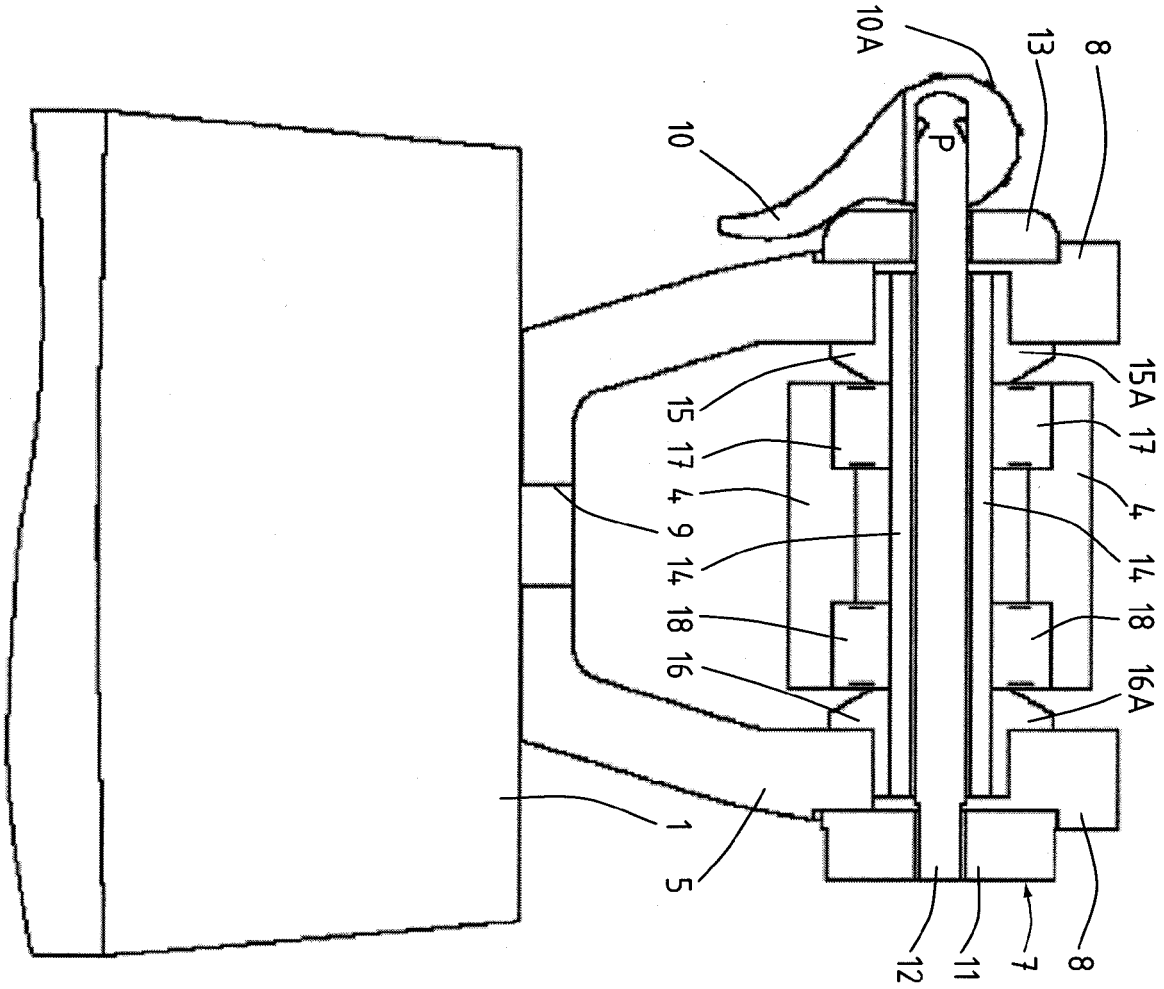

Fig.4

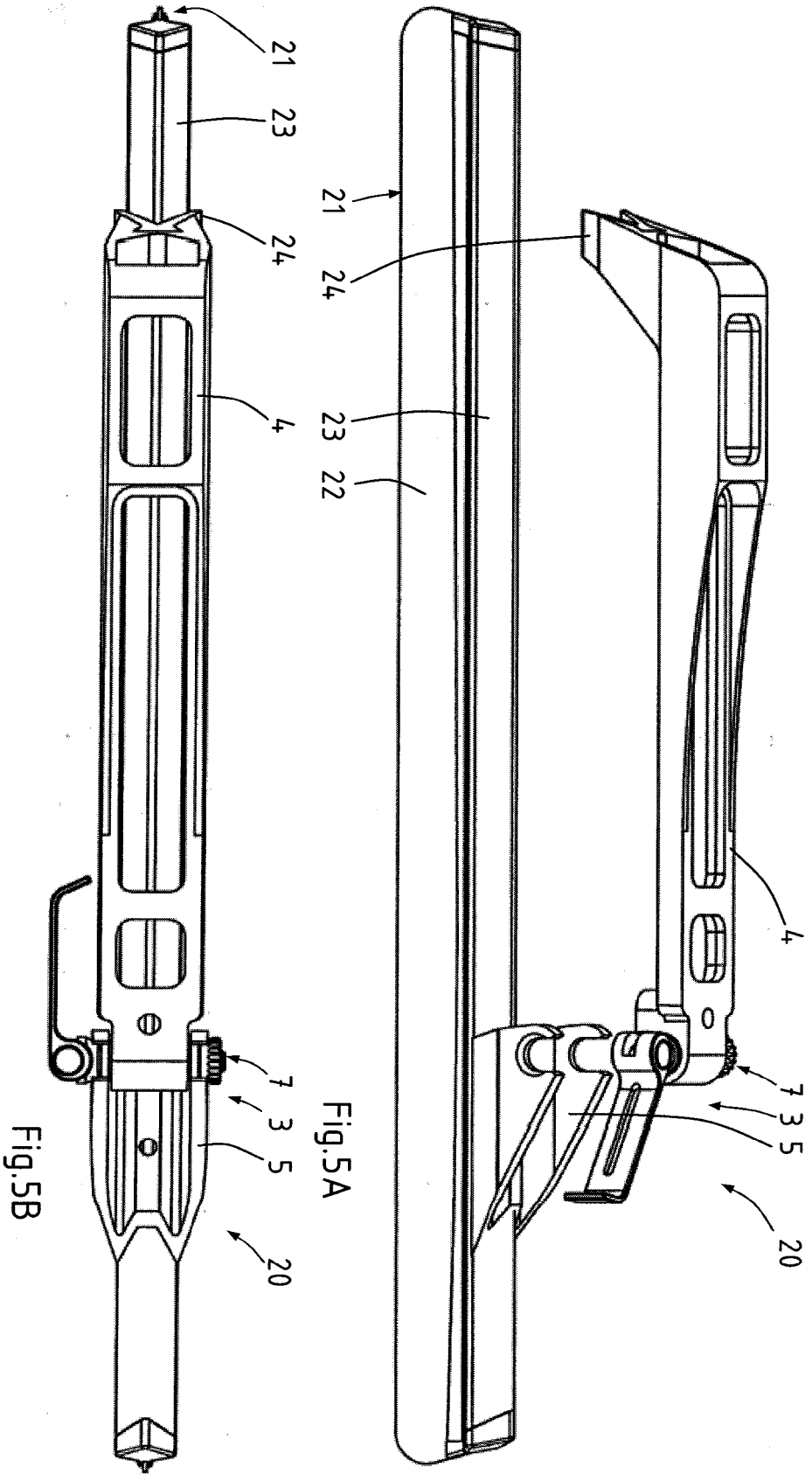
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Fig.5B
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Fig.5A

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EUROPEAN SEARCH REPORT

Application Number
EP 06 12 4112

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TECHNICAL FIELDS SEARCHED (IPC)

A63C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	6 July 2007	Brunie, Franck

CATEGORY OF CITED DOCUMENTS

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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 06 12 4112

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