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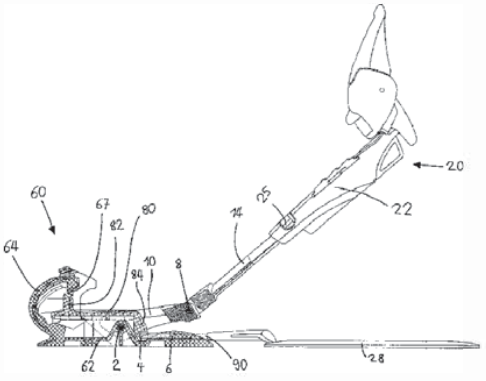
(54) FIXATION DE SKI DE TELEMARK
(54) TELEMARK SKI BINDING

(57)

[222]The invention relates to a telemark ski binding having a front jaw (60) that [2]can be fixed to the ski. A front sole holder (66) is disposed on the front jaw [2](60) in such a way that it cannot pivot in relation to the ski and configured [2]in such a way that it fixes the sole of a ski boot to the ski in the area of [2]the tip of the boot. A support (10, 14) pivotally hinged on a retaining part [2]that can be fixed to the ski in such a way that it can rotate around a pivot [2]pin (2) extending crosswise in relation to the longitudinal direction of the [2]ski and parallel to the top side of the ski is mounted at a location that is [2]staggered backwards in relation to the tip of the boot in the direction of the [2]heel of the boot. A back jaw (20) having a back sole holder (40.1, 40.2, 40.3) [2]is disposed on the support (10, 14) and is configured in such a way as to fix [2]the sole of the boot to the heel of the boot on the support (10, 14). The back [2]sole holder (40.1, 40.2, 40.3) is configured in such a way that it can swing [2]out laterally in relation to the back jaw (20) in order to ensure functioning [2]of a lateral release mechanism of a safety ski binding. Due to the fact that [2]the front sole holder (66) cannot pivot in relation to the ski, good lateral [2]ski control is guaranteed even when the heel of the boot is raised.The [2]lateral safety release mechanism mounted on the back jaw (20) reduces the risk [2]of an injury to the skier in case of a fall.[2]



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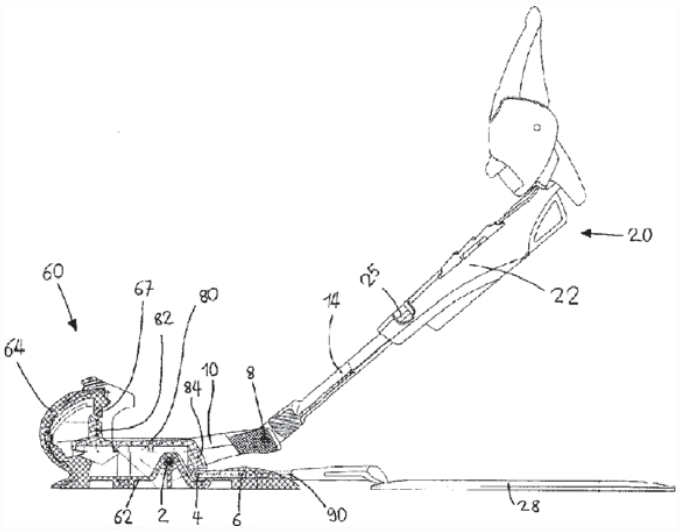


(57) Abrégé/Abstract:
The invention relates to a telemark ski binding having a front jaw (60) that can be fixed to the ski. A front sole holder (66) is disposed on the front jaw (60) in such a way that it cannot pivot in relation to the ski and configured in such a way that it fixes the sole of a ski boot to the ski in the area of the tip of the boot. A support (10, 14) pivotally hinged on a retaining part that can be fixed to the ski in such a way that it can rotate around a pivot pin (2) extending crosswise in relation to the longitudinal direction of the ski and parallel to the top side of the ski is mounted at a location that is staggered backwards in relation to the tip of the boot in the direction of the heel of the boot. A back jaw (20) having a back sole holder (40.1, 40.2, 40.3) is disposed on the support (10, 14) and is configured in such a way as to fix the sole of the boot to the heel of the boot on the support (10, 14). The back sole holder (40.1, 40.2, 40.3) is configured in such a way that it can swing out laterally in relation to the back jaw (20) in order to ensure functioning of a lateral release mechanism of a safety ski binding. Due to the fact that the front sole holder (66) cannot pivot in relation to the ski, good lateral ski control is guaranteed even when the heel of the boot is raised. The lateral safety release mechanism mounted on the back jaw (20) reduces the risk of an injury to the skier in case of a fall.

Abstract

The invention relates to a telemark ski binding having a front jaw that can be fixed to the ski. A front sole holder is disposed on the front jaw in such a way that it cannot pivot in relation to the ski and configured in such a way that it fixes the sole of a ski boot to the ski in the area of the tip of the boot. A support pivotally hinged on a retaining part that can be fixed to the ski in such a way that it can rotate around a pivot pin extending crosswise in relation to the longitudinal direction of the ski and parallel to the top side of the ski is mounted at a location that is staggered backwards in relation to the tip of the boot in the direction of the heel of the boot. A back jaw having a back sole holder is disposed on the support and is configured in such a way as to fix the sole of the boot to the heel of the boot on the support. The back sole holder is configured in such a way that it can swing out laterally in relation to the back jaw in order to ensure functioning of a lateral release mechanism of a safety ski binding. Due to the fact that the front sole holder cannot pivot in relation to the ski, good lateral ski control is guaranteed even when the heel of the boot is raised. The lateral safety release mechanism mounted on the back jaw reduces the risk of an injury to the skier in case of a fall.

Telemark ski binding

Technical field

The present invention relates to a ski binding, especially a binding suitable for telemark skiing (hereinafter referred to as a telemark ski binding).

Prior art

When skiing and/or touring in the "telemark" style skiers move not only uphill but also downhill with the heel able to be lifted away from the ski (also referred to as "free heel"). During downhill skiing, in the case of telemark skiing, cornering is undertaken by means of a side step. For this purpose, the boot heel has to be lifted away from the top of the ski on the inside of the curve. In contrast, for example, to a ski touring binding of the type described in WO-A-96/23559 (Fritschi), which is merely provided with a free heel for uphill skiing, virtually no significant steering forces being transmitted to the ski during uphill skiing, in the case of telemark ski bindings (in other words, ski bindings which are suitable for telemark skiing) the ski must still be under controlled guidance even in the position with the heel raised.

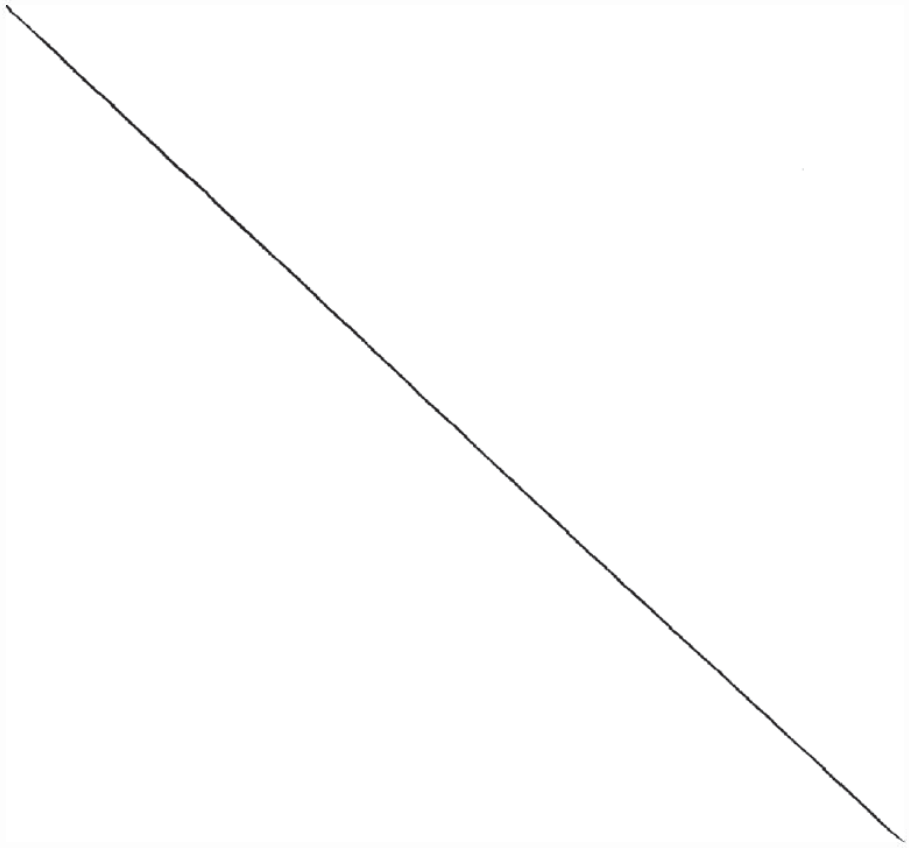
For many years, conventional telemark ski bindings have customarily comprised a front jaw fixedly attached to a ski with a front sole holder for holding the boot sole down and fixing it laterally at the boot toe and a cable pull device provided with tension springs by means of which the boot heel is fixed to be resilient substantially toward the front jaw. The heel is left free perpendicularly to the lengthwise direction of the ski in order to permit raising of the heel away from the ski. When the heel is raised, the sole of the telemark ski boot is bent in the lengthwise direction, the foremost part of the boot sole being held fixedly down on the top of the ski by the sole holder and also

fixed against lateral displacements. As a result, the skier can still steer the ski, even with the heel raised, via the telemark ski boot which is still fixedly connected to the ski at the front, steering forces being transmitted to the ski in the region of the ball of the foot and the toes. The lateral guidance of the ski boot with the heel raised is, however, relatively slight. In addition, the cable pulls in this type of telemark ski binding are relatively frequently sheared through in use because of the high stress to which they are subjected.

A telemark ski binding of the type described above provided with a cable pull is described in publication WO-A-99/02226 (Ayliffe). In order to guarantee that the boot heel is fixed, during its movement in the course of raising of the heel by the cable pull, with a predetermined spring force in the lengthwise direction of the ski toward the front jaw, a spring disposed on the ski in front of the front jaw is coupled to the cable pull via a movable deviation element. This deviation element ensures the desired characteristic of the spring force as a function of the position of the boot heel.

In Patent Specification US-A-4 887 833 (Bailey) a ski binding is described which is suitable, inter alia, for telemark skiing, in which the cable pull device is replaced by a support on which is disposed a heel holder formed to fix the ski boot heel on the support. The support is articulated in the region of the boot toe on a front jaw fixed on the ski, so as to be pivotable about a first horizontal transverse axis, and can be bent in the region of the ball of the foot about a second transverse axis parallel to the first transverse axis. As a result, the lifting-off of the

boot heel is made possible with the boot toe simultaneously fixed in the front jaw without this requiring a cable pull device in the manner of the conventional telemark bindings. To fix the boot in the binding, first, the ski boot toe is firmly pressed by means of a fixing hoop on mandrels attached to the front jaw which engage into corresponding holes drilled in the boot sole. Secondly, the ski boot is fixed on the support in the heel region by means of the heel holder and additionally by means of a securing strap surrounding the boot. As a result of these measures, the boot is fixedly connected to the binding and, in particular, any lateral displacement of the ski boot relative to the binding (and hence relative to the ski) is prevented in order to guarantee good lateral guidance of the ski even with the heel raised. The



fixed connection between the ski and the ski boot, however, proves dangerous in the event of a fall by the skier, because in that case uncontrolled forces are transmitted from the skis to the skier's legs and can result in substantial injuries to the skier.

Description of the invention

It is an object of the present invention to provide a telemark ski binding which first guarantees good ski guidance even with the boot heel raised and secondly reduces the risk of injury to the skier in the event of a fall.

The achievement of the object forms the subject of the independent patent claims.

According to the invention, a telemark ski binding has a front jaw which can be fixedly (i.e. undisplaceably and unpivotably) attached to a ski and on which a front sole holder is disposed to be incapable of pivoting relative to the ski. This is formed in such a way as to fix the sole of a ski boot to the ski in the region of the boot toe. The ski binding also has a support, which is articulated, at a point set back from the boot toe toward the boot heel, on a retaining part that can be fixedly attached to the ski, to pivot about a pivot pin extending transversely to the lengthwise direction of the ski and parallel to the top of the ski, and having a rear jaw disposed on the support with a rear sole holder. The latter is formed to fix the boot sole at the boot heel to the support. The telemark ski binding according to the invention is notable for the fact that the rear sole holder is formed to pivot laterally outward relative to the rear jaw, in order to guarantee the function of lateral release of a safety ski binding.

The front sole holder is formed so that the boot sole of a ski boot inserted into the binding is fixed relative to the ski by the front sole holder at or in the region of the boot toe. In other words, the boot sole is held down (in a manner known per se) on the ski (or on a sole rest attached to the top of the ski) by the front sole holder and at the same time prevented thereby from lateral displacements or forward displacement relative to the ski. In order to guarantee good lateral ski guidance even with the boot heel lifted, however, according to the invention, the front sole holder is disposed completely unpivotably on the front jaw, which is in contrast, for example, to the front sole holder of a conventional alpine safety binding, which can be pivoted outward sideways relative to the front jaw to guarantee a lateral release.

The rear sole holder is so formed that the boot sole of the ski boot introduced into the binding is fixed relative to the support at or in the region of the boot heel by the rear sole holder. In other words, the boot sole is held down in a manner known per se (as is described, for example, in WO-A-96/23559) by the rear sole holder on the support (or on a sole rest attached to the support, which may be formed as part of the rear jaw) and at the same time prevented thereby from lateral displacements and displacements backward relative to the support. In order to guarantee the function of lateral release of a safety ski binding, however, according to the invention, the rear sole holder is formed to pivot laterally outward relative to the rear jaw, which is in contrast, for example, to the rear sole holder of a conventional alpine safety binding, which cannot pivot outward laterally. Because of the lateral safety release embodied in the rear jaw, when disproportionately high lateral forces arise between the ski and the ski boot, the ski boot is released from the binding, as a result of which

injuries to the skier in the event of a fall can be prevented.

Because the rear jaw with the rear sole holder is supported by the support, no cable pull to retain the boot heel is necessary for the binding according to the invention, as a result of which the disadvantages associated with the cable pulls of previous telemark ski bindings are eliminated. The support is articulated on the retaining part to pivot about a pivot pin extending transversely to the lengthwise direction of the ski and parallel to the top of the ski. As a result, the boot heel of a telemark ski boot accommodated in the binding can be lifted away from the top of the ski and pivotably moved in a plane defined by the lengthwise direction of the ski and the surface perpendicular to the top of the ski. As a result first of the articulation of the support at a point set back from the boot toe toward the boot heel, and secondly of the unpivotable arrangement of the front sole holder on the front jaw, it is guaranteed that the sole of a telemark ski boot, which is bendable in the lengthwise direction, still partially rests on the front jaw, fixedly attached to the ski, or the top of the ski in the region of the ball of the foot or the toes even with the heel raised. As a result of the contact between the boot sole in its foremost region and the front jaw or the top of the ski, the force transmission necessary from the ball of the foot and/or toe region to the ski during telemark skiing is made possible.

According to a preferred embodiment of the invention, the front sole holder is disposed completely fixedly on the front jaw and is formed as an integral part thereof. In this case, the front jaw and the front sole holder can be formed as a single, integral molding, as a result of which a particularly simple and strong design of the front jaw together with the front sole holder is permitted. It is however also possible to

dispose the front sole holder on the front jaw, optionally so as to be vertically adjustable (for example, by means of an adjusting screw) in order to provide the possibility of adaptation to different sole heights.

Preferably, the retaining part is also formed as an integral part of the front jaw, in which case it is possible for the front jaw, the front sole holder and the retaining part to be formed as a single, integral molding. The support can be articulated on the same piece of the front jaw as that on which the front sole holder is also disposed. As a result, the relative position of the support articulation point relative to the position of the sole holder can be precisely predetermined by appropriate shaping of the front jaw. As an alternative to this, the retaining part may also be formed as a separate part which is separate from the front jaw supporting the front sole holder. As a result, the relative position of the support articulation point relative to the position of the sole holder can be determined during assembly of the binding on the ski.

According to a preferred embodiment of the invention, the front jaw and the front sole holder are so configured and disposed that they form, at least in one section, a receiving space for the ski boot toe which narrows toward the front and into which the boot toe can be pushed forward in order to insert the ski boot into the binding. The receiving space is further limited by the front jaw and the front sole holder in such a way that the boot toe, when the ski boot is inserted in the binding, is capable only of being pushed out backward from the receiving space and is undisplaceably fixed in all other directions by the front jaw and/or the sole holder. As a result, the boot inserted into the binding is well connected in its toe

region to the front jaw and hence to the ski, which is a precondition for optimum ski guidance.

Preferably, the pivot pin is set back from the boot toe or from the point in the front jaw intended for the latter in the lengthwise direction of the ski by at least 4.0 cm (in connection with the present description and the patent claims, a boot toe is always to be understood as meaning the foremost part of the corresponding boot sole). As a result, the surface on which the boot sole between the boot toe and the pivot pin still rests on the top of the ski or the sole rest on the front jaw is still sufficiently large for adequate ski guidance even with the heel raised. Preferably, the pivot pin is set back by at least 5.0 cm, especially even by at least 6.0 cm, from the boot toe in order to enlarge the bearing surface of the boot sole with the heel raised and so improve the ski guidance. The further the pivot pin is set back from the boot toe, the better, first, is the ski guidance with the boot heel raised. Secondly, however, the further the pivot pin is set back from the boot toe, the more the lifting of the heel away from the top of the ski is prevented, because in this case a greater bending resistance of the boot sole has to be overcome.

According to a preferred embodiment of the invention, the support is formed as an articulated chain having a plurality of rigid (in other words, rigid for torsional and twist purposes) support parts which are connected to each other by means of pivots, each of which can be pivoted about a pivot pin extending transversely to the lengthwise direction of the ski and parallel to the top of the ski. As a result, the bending of the flexible boot sole of a telemark ski boot is assisted. A binding formed in this way has the advantage, by comparison with conventional telemark bindings with a cable pull, that it is rigid for torsional and twisting purposes against trosional [sic] and/or rotational movements

about hinge pins that do not extend parallel to the pivot axes of the pivots. As a result, the steerability of the ski with the heel raised from the top of the ski is improved.

As an alternative to the support being formed as an articulated chain, the support or at least part of the support can also be formed from a flexible material, for example from a resilient plastic sheet, in order to assist the bending of the flexible boot sole of a telemark ski boot.

In telemark skiing, the length of the boot sole changes as a consequence of the different degrees of bending of the boot sole as a function of the raising of the heel from the top of the ski. Consequently, in order to adapt the binding to these changes in boot sole length, the distance between the front and the rear sole holder must be variable. This object is achieved, according to a preferred embodiment of the invention, in a telemark ski binding, having a front jaw which can be fixedly attached to a ski and on which a front sole holder is disposed to be incapable of pivoting relative to the ski, having a support which can pivot about a pivot pin extending transversely to the lengthwise direction of the ski and parallel to the top of the ski and having a rear jaw disposed on the support with a rear sole holder, the rear jaw being disposed displaceably in the lengthwise direction of the boot on the support so that it is displaceable in the sense of increasing the distance between the front and rear jaws against the force of at least one spring, the spring or springs being dimensioned and disposed on the binding in such a way that the retention of the boot is achieved solely by the tensioning force between the front jaw and the rear jaw caused by the spring or springs and the binding is free of additional boot retention means. This aspect of the invention also proves advantageous in telemark ski bindings without lateral release. The

spring or springs are so dimensioned and disposed on the binding that the boot inserted into the binding is clamped in the binding, even in the case of a minimal boot sole length, with an adequate tensioning force generated by the spring or springs between the front jaw and the back jaw, without further boot retention means (i.e. means for fixing the boot in the binding) being necessary. It is thus possible to dispense completely with additional retention or fixing means (such as, for example, boot fixing straps, clamping devices for clamping the boot toe, mandrels engaging into holes drilled in the boot sole, etc.), it being ensured nevertheless that the boot is received in the binding without play and an adequately strong connection exists between the ski boot and the binding for sufficient ski guidance. Such additional retention or fixing means, in a ski binding according to the invention with lateral release, would seriously impair the safety function of the lateral release or even make it impossible.

As an alternative and/or in addition to disposing the rear jaw on the support to be displaceable lengthwise, the support itself may also be formed adjustably in the lengthwise direction of the support, in that, for example, two support parts are connected to one another to be displaceable lengthwise and held together by one or more springs.

Preferably, in the case of a telemark ski binding according to the embodiment with a rear jaw disposed displaceably on the support, the spring or springs are designed for lengthwise adaptation as part of a functional unit independent of the support, which functional unit further comprises an anchoring element which is optionally displaceable in the lengthwise direction along the support and can be fixed in a desired sliding position on the support, the spring or springs being disposed in a manner such that they act

between the rear jaw and the anchoring element. The anchoring element serves to set the distance between the front sole holder and the rear sole holder for different boot sizes or boot sole lengths and substantially determines the lengthwise position of the rear jaw on the support.

Two cylindrical, helical compression springs are provided for the lengthwise adaptation and are guided by spring guide means in the lengthwise direction of the support, the two helical compression springs being disposed between a rear jaw part and a part of the anchoring element in a manner such that they exert a compressive force between the rear jaw and the anchoring element. The spring guide means may comprise two guide rods extending substantially in the lengthwise direction of the support and fixedly attached at their front lengthwise ends to a part of the rear jaw, while the rear rod ends are guided in a sliding function through holes drilled in a plate-shaped part of the anchoring element disposed transversely to the guide rods, the two helical compression springs being disposed between the rear jaw part holding the rod ends and the plate-shaped part of the anchoring element, displaceable in the lengthwise direction relative to the rods, in such a way that they exert a compressive force between the rear jaw and the anchoring element.

Furthermore, the anchoring element can be provided with a toothing which can be engaged into a corresponding toothing on the support to fix the lengthwise position of the anchoring element and can be disengaged from the support toothing for the displacement of the anchoring element.

According to a preferred embodiment of the invention, a first rigid support part is articulated on the retaining part to be pivotable about the pivot pin

extending transversely to the lengthwise direction of the ski and parallel to the top of the ski, a second rigid support part being articulated on the first support part to be pivotable about a further pivot pin parallel thereto, on which second support part the rear jaw is disposed to be displaceable in the lengthwise direction of the boot. The pivot pin between the retaining part and the first support part is preferably set back from the toe toward the heel by about 1/8 of the distance between the front and the rear sole holders and the further pivot pin by about 1/3 of that distance. Preferably, the rear jaw is guided in the lengthwise direction of the boot by two parallel lengthwise supports of the second support part additionally serving as guide rails, and these two lengthwise supports are connected to one another substantially over their entire length by means of a plurality of transverse struts in order to increase the torsional and twisting rigidity of the second support part. In this case, the second support part may be formed in the manner of a latticework, with two rigid parallel supports disposed at the edges which simultaneously serve as guide rails for guiding the rear jaw, and a plurality of connecting struts and/or connecting plates disposed between the parallel supports. Preferably, the transverse struts are so formed and disposed that they can be simultaneously used as a toothing on the support side into which the toothing of the anchoring element can be engaged to fix the lengthwise position of the anchoring element according to the type of embodiment described above.

Preferably, in a telemark ski binding according to the invention having a spring or springs for the lengthwise adjustment resulting from the bending of the sole and an anchoring element, this spring or these springs and the anchoring element are disposed in a substantially closed cavity of the rear jaw. As a result, they are protected against snow and or [sic] against moisture,

so that their functioning is not imposed by icing. In this case, the support may be guided in a sliding function through an aperture, closely enclosing the support, in a wall limited [sic] the cavity of the rear jaw into the cavity, so that the rear jaw is displaceable relative to the support.

Preferably, the telemark ski binding according to the invention is provided with a ski brake which comprises a brake element and a step part connected thereto in an articulated manner. The step part may be of plate-like form. The brake element is articulated on a retaining part which can be fixedly attached to the ski, this brake element preferably being formed as an integral part of the front jaw. The step part is formed and integrated in the front jaw in such a way that, in the event of a force exerted by the ski boot in the region of the boot toe on the step part which is directed downward relative to the ski, it holds up the brake element in a non-braking position. This arrangement guarantees, first, that the ski brake is held up in the non-braking position even with the boot heel raised as long as the ski boot toe exerts a downward force on the step part, and secondly that, in the event of a separation of the ski boot from the binding, it enters into operation in order to brake the ski even when the ski boot is separated from the binding in a binding position with the boot heel raised.

In order further to improve the safety of the holding-up of the brake element in the non-braking position, the step part may be provided with a locking device which is formed and disposed on the step part in such a way that it locks the step part in the position for holding up the brake element as long as the ski boot exerts a force on the step part which is directed downward relative to the ski. The effect of this is to guarantee that the ski brake springs into its braking position only when the step part is fully released by

the ski boot. In this manner, undesired braking actions of the ski brake can be prevented.

To assist the insertion of the ski boot toe into the front jaw during introduction of the foot into the binding, the step part may be provided with one or more rollers, rotatable about horizontal transverse axes, on its upper side. Moreover, the step part may be provided with a retention edge disposed behind the ski boot toe in order to prevent undesired pushing-out of the ski boot toe from the front jaw when the boot heel is raised.

According to a further preferred alternative embodiment of the invention, the rear jaw is provided with supports projecting laterally downward which, in a binding position with the heel lowered, engage over a correspondingly formed bead attached fixedly to the top of the ski in order, in that position, to fix the rear jaw against lateral displacements relative to the ski. The steerability of the ski in a binding position with the boot heel lowered can be further improved thereby.

According to a preferred alternative embodiment of the invention, the rear sole holder is disposed on the rear jaw to be pivotable about a substantially vertical, central pivot pin fixed on the rear jaw in order to guarantee lateral release. The release apparatus for the lateral release of the rear jaw of the telemark ski binding according to the invention can, in particular, be formed in the manner of the lateral release device for a front jaw described in WO-A-96/23559. Thus, in this alternative embodiment of the invention, the rear sole holder may have two downward-projecting dog attachments, one on each side of the central pivot pin, resting on free end surfaces of a pressure piece and thereby supporting the sole holder against lateral outward pivoting, the pressure piece being mounted on the rear jaw to be displaceable in the lengthwise

direction of the binding and being loaded by a compression spring received in a cavity of the rear jaw. Preferably, the cavity receiving the compression spring is disposed in a region below the boot heel, as a result of which a very compact, weight-saving design is obtained.

To assist the lateral release, the rear jaw may be provided with rollers disposed laterally on the sole holder and rotatable about vertical hinge pins. Furthermore, a sliding plate capable of pivoting out laterally may be provided as a rest for the boot sole in the heel region, in order to guarantee lateral release substantially independent of the friction of the boot sole.

In contrast to the previously known telemark ski bindings, in which introduction of the foot into the binding is impossible without actuating the cable pull device or the heel holder by hand, the telemark ski binding according to the invention is preferably so formed, by an appropriate configuration of the rear jaw, that what is known as a step-in function is provided, so that no parts of the binding need to be actuated by hand in order to introduce the foot into the binding. In order to provide a step-in function, the rear sole holder may, for example, be articulated on the rear jaw to be pivotable about a horizontal transverse axis in the manner of a conventional automatic heel device. The automatic heel pivot mechanism for the telemark ski binding according to the invention merely has to allow the foot to be introduced into and removed from the binding, since a safety release about the horizontal transverse axis is not necessary in a telemark ski binding with a free heel. Therefore the automatic heel device can be of much simpler design for the telemark ski binding according to the invention than, for example, the automatic heel device for a conventional alpine ski binding, which

also has to guarantee a safety release about the horizontal transverse axis.

The detailed description of the present invention that follows is intended to serve, in conjunction with the appended drawings, merely as an example to improve understanding of the invention and is not to be interpreted as restricting the scope of protection of the patent claims. The person skilled in the art will readily identify from the description that follows, in conjunction with the appended drawings and the patent claims as a whole, further advantageous types of embodiment and combinations of features, which, however, still lie within the scope of the present invention.

Brief description of the drawings

The drawings illustrate preferred types of embodiment of the present invention.

In the drawings:

Fig. 1 shows a preferred type of embodiment of the telemark ski binding according to the invention in a diagrammatic lateral view, with the ski brake in a non-braking position;

Fig. 2 shows the binding shown in Figure 1 in a diagrammatic plan view from above;

Fig. 3 shows the binding shown in Figure 1 in a partially cut-away lateral view, in a position with the heel raised away from the top of the ski;

Fig. 4 shows the binding shown in Figure 1 in a partially cut-away lateral view, with the ski brake in a braking position;

Fig. 5 shows a diagrammatic, partially cut-away partial lateral view of the rear jaw of the binding as shown in Figure 1 in its open position;

Fig. 6 shows a cross section through a support of the binding shown in Figure 1;

Fig. 7.a shows a rear jaw of the binding shown in Figure 1, in a position displaced backward relative to the support, in a partially cut-away plan view from above;

Fig. 7.b shows a rear jaw of the binding shown in Figure 1, in a position displaced forward relative to the support, in a partially cut-away plan view from above;

Fig. 8 shows a diagrammatic, partially cut-away lateral view of a detail of a step part for a telemark ski binding according to a further preferred embodiment of the invention;

Fig. 9 shows a diagrammatic lateral view of the front jaw of a telemark ski binding according to a further preferred embodiment of the invention, with the ski brake in a braking position;

Fig. 10 shows a rear jaw of a telemark ski binding according to a further preferred embodiment of the invention in the closed position in a diagrammatic, partially cut-away lateral view; and

Fig. 11 shows the rear jaw shown in Figure 10 in the open position, in a partially cut-away lateral view corresponding to Figure 10.

In principle, identical parts are provided with identical reference numerals in the figures.

Ways of embodying the invention

The telemark ski binding illustrated in Figures 1 to 7 according to a preferred type of embodiment of the invention comprises a front jaw 60, a rear jaw 20 and a support connecting the two binding jaws 20, 60 with a first support part 10 articulated on the front jaw 60 and a second support part 14, supporting the rear jaw 20, the first support part 10 being articulated about a first pivot pin 2 transverse to the lengthwise direction of the ski and parallel to the top of the ski so as to be pivotable on the front jaw 60 and the second support part 14 being articulated about a second pivot pin 8 parallel to the first so as to be pivotable on the first support part 10. The binding is formed to receive a norm 75 ski boot. The binding is further provided with a ski brake in order to brake the ski in the event of release of the telemark ski binding, designed as a safety ski binding.

Fig. 1 shows a diagrammatic lateral view of the telemark ski binding. The rear jaw 20 is in its closed position, and the ski brake is in its held-up, non-braking position. Fig. 1 also shows diagrammatically, in broken lines, the outline of a ski boot accommodated in the binding and fixed thereby on the ski, together with its boot sole. In Fig. 2, the binding shown in Fig. 1 is shown in a diagrammatic plan view from above with the same position of the rear jaw 20 and of the ski brake, and Fig. 3 shows the binding shown in Fig. 1 with the same position of the rear jaw 20 and of the ski brake in a partially cut-away lateral view in a position with the heel raised away from the top of the ski. Fig. 4 shows the binding shown in Fig. 1 in a partially cut-away lateral view. The rear jaw 20 is

once again in its closed position, while the ski brake is shown in a lowered, braking position. Fig. 5 shows the rear jaw 20 of the binding shown in Figures 1 to 7 in its open position. Fig. 6 shows a cross section through the second support part 14 of the two-part support (10, 14), which connects the rear jaw 20 with the front jaw 60, and Figures 7.a and 7.b illustrate the displaceable disposition of the rear jaw 20 on the second support part 14 for the purposes of length adjustment as a consequence of sole bending.

The integrally formed front jaw 60 has a substantially plate-shaped base portion 62, which can be fixedly attached to a ski. Molded on its front end is the upward-extending and forward-curving front wall 64. Molded on the side of this front wall facing the boot is the front sole holder 66, which has the form of a bead. The bead-shaped front sole holder 66 has an arcuate outline in a plane substantially parallel to the top of the ski which corresponds to the average outward shape of a ski boot toe. The side of the front wall 64 of the front jaw facing the boot is similarly arcuate in form, its outline corresponding to the average outward shape of the toe of a ski boot sole according to norm 75.

The base portion 62 of the front jaw 60 is provided with a first continuous drilled hole extending transversely to the lengthwise direction of the ski and parallel to the top of the ski. This is formed to receive the first pivot pin 2, on which the first support part 10 is articulated. The position of the base portion 62 with this drilled hole thus forms a retaining part, in order to retain the substantially two-part support 10, 14 described below of the ski. The first pivot pin 2 is set back from the position on the front jaw 60 provided for the foremost boot toe toward the heel by about 1/8 of the distance between the front

sole holder 66 and the rear sole holder 40.1, 40.2, 40.3.

Molded on the base portion 62 of the front jaw 60 are a further two lateral support walls 68, each of which is provided with a drilled holes [sic] for the accommodation and pivotable mounting of a brake element 90, described in detail below, for the ski brake. The two support walls 68 with the drilled holes form a brake element retaining part, in order to hold the brake element 90 firmly on the ski. The two drilled holes are disposed substantially parallel to the first pivot pin 2 and flush with one another and define a first hinge pin 6, substantially parallel to the first pivot pin 2, about which the brake element 90 is articulated pivotably on the two support walls 68. The two support walls 68 extend laterally on the base portion 62 of the front jaw 60 approximately from the position of the first pivot pin 2 toward the rear.

The first support part 10 is of substantially U-shaped form, having two branches 11, 12 and a web 13 connecting the two branches 11, 12. The two branches 11, 12 each have a drilled hole, at their branch end remote from the web 13, which holes are formed to receive the first pivot pin 2 in order to articulate the first support part 10 on the front jaw 60. At its lengthwise end on the web side, the first support part 10 is provided with a drilled hole substantially parallel to the two drilled holes in the branches 11, 12 and formed to receive a second pivot pin 8, on which the second support part 14 is articulated. The second pivot pin 8 is set back from the position on the front jaw 60 provided for the foremost boot toe toward the heel by about 1/3 of the distance between the front sole holder 66 and the rear sole holder 40.1, 40.2, 40.3.

A step part 80 for the ski brake is disposed substantially between the two branches 11, 12 of the first support part 10 and above the base portion 62 of the front jaw 60. The step part 80 of the binding shown in Figures 1 to 7 corresponds substantially to the step part 180 illustrated in Fig. 8, which latter differs from the former merely in having an additional locking lever 188. The step part 80 has an elongate outline and extends forward in the lengthwise direction beyond the position of the front sole holder 66 into the curvature formed by the front wall 64 of the front jaw. As a stop for the front edge of the ski boot sole, a wall 82 extending upward approximately at right angles to the base surface is molded on the step part 80 in the vicinity of its front edge. This wall 82 simultaneously serves to secure the step part 80, in its front region, in the curvature formed by the front wall 64 of the front jaw 60 so as to be displaceable lengthwise and pivotable about a transverse axis extending parallel to the top of the ski, engaging behind a projection 67 correspondingly molded on the front jaw wall 64.

In its lowered position shown in Figures 1 to 3, in which it holds up the brake element 90 for the ski brake in a non-braking position, the step part 80 rests on correspondingly formed supports of the base portion 62 of the front jaw 60 and then forms, together with the first support part 10, a substantially flat bearing surface for the ski boot sole in its regions corresponding to the toes and the ball of the foot.

At its lengthwise end of the base surface of the step part 80 lying in the vicinity of the web 13 of the first support part 10, a downward-angled wall-like projection 84 is molded on the latter. This projection 84 is provided at its lower end with a drilled through hole, which is formed to receive the web 91 of the substantially U-shaped braking element 90 for the ski brake. The drill hole extends substantially parallel to

the two pivot pins 2, 8 on the first support part 10 and defines a second hinge pin 4 about which the brake element is pivotably articulated on the step part 80.

The brake element 90 is manufactured from a sprung steel wire of circular cross section and has a substantially U-shaped form two branches [sic] and the web 91 connecting the latter, which, as described above, is mounted in the drilled hole in the projection 84 of the step part 80. From the connecting web 91, the two branches extend over a first section 92, 93 initially substantially at right angles to the connecting web 91 and thereafter over a second section 94, 95 approximately parallel to the connecting web 91, so that the two branches move apart, and subsequently over a third section 96, 97 again approximately parallel to the first section. Over their second section 94, 95, the two branches are each passed through one of the drilled holes described above in the two support walls 68 of the base portion 62 of the front jaw 60, in order to articulate the brake element 90 on the two support walls 68 so as to be pivotable about the first hinge pin 6. The three cut parts [sic] 96, 97 of the two branches serve as actual brake legs 96, 97 of the ski brake, which engage into the snow to brake the ski.

In Fig. 4, to clarify the movement sequence, the movement path of the second pivot 4 connecting the step part 80 to the brake element 90 is shown by a double arrow 9. The brake element 90 is pivotable about the first pivot 6, which is fixed relative to the front jaw 60. As a result, the second pivot 4 is moved on a circular path, while the step part 80, at its front lengthwise end, performs a pivot movement combined with a lengthwise displacement.

A helical spring having two branches is disposed between the step part 80 and the brake element 90 in a

manner such that, if the step part 80 is not held down by the ski boot, it brings the ski brake automatically into the braking position shown in Fig. 4. In this position, the step part 80 is raised upward from the base portion 62 and the two branches of the brake element 90 project forward beyond the bottom of the ski in order to brake the ski. As soon as the step part 80 is loaded by the ski boot, it is moved downward and forward against the spring force of the helical spring. When this occurs, the second hinge pin 4 and hence the web 91 of the brake element 90 are moved downward over the circular path shown by the double arrow 9 in Fig. 4, the projecting legs 96, 97 of the brake element 90 being simultaneously pivoted upward, by the pivot movement of the brake element 90, about the hinge pin 6 fixedly disposed on the front jaw 60. Even a relatively slight downward- and/or forward-directed force of the ski boot on the step part 80 is sufficient to hold down the step part 80 and hence to hold up the brake element 90.

The second support part 14 comprises two parallel lengthwise supports 15, 16 in the form of hollow sections 15, 16 disposed at the edges, as is apparent in the cross-sectional view shown in Fig. 6. These are connected to one another by means of a plurality of plate-shaped and strut-shaped connecting elements (19.1, 19.2, 19.3, 19.4) disposed substantially transversely and forming, as a whole, a connecting plate 17 disposed between the lengthwise supports 15, 16. Some of these transverse struts (19.1, 19.2) are so formed and disposed that they form a toothing fixed undisplaceably to the second support part 14, into which a toothing 21 of an anchoring element 21, 23 described below can be engaged to fix the lengthwise position of this anchoring element 21, 23. A fork-like front portion 18 is molded on the front lengthwise end of the second support part 14. The two fork prongs at the front end of the second support part 14 are each

provided with a drilled hole, which holes are formed to receive the second pivot pin 8, in order to articulate the second support part 14 on the first support part 10. At its lengthwise end opposite the fork-like front portion 18, the second support part 14 supports the rear jaw 20, the two lengthwise supports 15, 16 simultaneously serving as guide rails 15, 16 for guiding the rear jaw 20.

The rear jaw 20 has an L-shaped base portion, of which one branch 22 is disposed substantially in the lengthwise direction of the support part 14 while the other branch 24 is disposed substantially perpendicularly thereto. The branch 22 disposed in the lengthwise direction of the support has a substantially closed cavity, through which the second support part 14 passes in the lengthwise direction in a displacement guide in order to connect the rear jaw 20 with the second support part 14 so as to be displaceable in the lengthwise direction. In order, first, to provide lengthwise adjustment as a consequence of the bending of the sole and secondly to provide a way of adjusting the binding for different boot sizes or boot sole lengths, a functional unit independent of the support part 14 is disposed in this cavity to change the distance between the front sole holder 66 and the rear sole holder 40.1, 40.2, 40.3.

The functional unit for changing the distance between the front and the rear sole holders comprises an anchoring element 21, 23 which is displaceable in the lengthwise direction along the support part 14 and can be fixed in a desired sliding position on the support part 14. The anchoring element 21, 23, comprises a sprung steel plate 21 extending in the lengthwise direction of the support and provided with a toothing, and a plate-shaped portion 23 disposed transversely to the lengthwise direction of the support. The toothing of the sprung steel plate 21 can be engaged in the

toothing on the support part 14 formed from the transverse struts 19.1, 19.2, in order to fix the anchoring element 21, 23 relative to the support part 14. By means of an actuating lever 25, the sprung steel plate 21 having the toothing can be raised and the toothing of the anchoring element 21, 23 can thus be disengaged from the toothing on the support side, whereupon the anchoring element 21, 23 can be displaced in the lengthwise direction along the support path 14 and subsequently fixed again by engaging the toothings in a desired position of displacement. In this manner, the distance between the front sole holder 66 and the rear sole holder 40.1, 40.2, 40.3 can be set in order to set the binding for different boot sole lengths.

The rear jaw 320 shown in Figures 10 and 11 is provided with a functional unit, identical to that shown in Figures 1-7, to change the distance between the front and the rear sole holders, having corresponding anchoring elements 321, 323, actuating lever 325 and helical compression spring 329.1. In contrast to the illustrations in Figures 1-7, the functional unit shown in Figures 10 and 11 is shown in a position with the actuating lever 325 raised, in which position the toothing of the anchoring element 21, 23 is disengaged from the toothing on the support side.

For lengthwise adjustment of the binding as a consequence of the bending of the sole, the functional unit further comprises a spring mechanism with spring guide means in the form of two guide rods 27.1, 27.2, extending substantially in the lengthwise direction of the support and each fixedly attached at its front lengthwise ends to a portion of the horizontal branch 22 of the rear jaw 20. The rear rod ends are guided, in a sliding function, through drilled holes in the plate-shaped portion of the anchoring element 21, 23 disposed transversely to the guide rods 27.1, 27.2. A cylindrical helical compression spring 29.1, 29.2 is

disposed on each of the two guide rods 27.1, 27.2 in a manner such that it exerts a compressive force between the portion of the rear jaw branch 22 holding the guide rods and the plate-shaped portion 23 of the anchoring element. (For the sake of clarity, only the lengthwise ends of the helical compression springs 29.1, 29.2 are suggested in Figures 7.a and 7.b respectively.) In the embodiment of the invention shown in Figures 1 to 7, the rear jaw 20 is displaceable in this manner by up to 75 mm in the lengthwise direction relative to the second support part 14, in order to guarantee adjustment of the distance between the front sole holder 66 and the rear sole holder 40.1, 40.2, 40.3 to a change in boot sole length as a consequence of the bending of the boot sole.

A jaw structural part 30 is disposed on the other branch 24 of the rear jaw base portion, projecting upward from the second support part 14. The rear sole holder 40.1, 40.2, 40.3 is molded on the side of the jaw structural part 30 facing the boot. The rear sole holder 40.1, 40.2, 40.3 has the shape of a bead. In the binding position with the boot heel lowered, it has an arcuate outline in a plane substantially parallel to the top of the ski, corresponding to the average outward shape of a ski boot heel. The side of the jaw structural part 30 facing the boot is similarly of arcuate form. In the illustration shown in Figure 5, the hatched surfaces each represent a section through the lengthwise center of the rear jaw, where the arcuate shape of the rear sole holder 40.2 and of the side of the jaw structural part 30 facing the boot extends furthest backward. The outline shape of this side and of the rear sole holder 40.3 is also drawn in continuous lines at a lateral edge where they extend furthest forward because of the arcuate shape. The rear jaw 20 is also shown in a similar manner in Fig. 4.

The jaw structural part 30 is mounted on the upward-projecting branch 24 of the base portion of the rear jaw 20 to be capable of pivoting laterally outward about a central swivel 32, the jaw structural part 30 being retained by a resilient release device in its intended pivot position on the jaw base portion to fix the ski boot, in order to provide a lateral safety release of the ski binding. The release device substantially corresponds to the lateral release device on the front jaw of a touring ski binding of the type described in WO-A-96/23559 (Fritschi).

To assist the lateral release, rollers 48, each rotatable about a vertical axis of rotation, are disposed in a manner known per se on both sides of the rear jaw, below the lateral edges of the rear sole holder 40.1, 40.2, 40.3. Furthermore, again in a manner known per se, a sliding plate 46 which is pivotable outward laterally is disposed on the branch 22 of the rear jaw base portion disposed on the second support part 14 as a rest for the boot sole in the heel region, in order to guarantee a lateral release substantially independent of the friction of the boot sole.

To provide a boot guide device which guides the rear edge of the boot sole around the rear sole holder 40.1, 40.2, 40.3 when the foot is introduced into and removed from the binding, a one-piece rocker is articulated on the structural part 30 of the rear jaw 20 to be pivotable about a substantially horizontal transverse axis 52. The rocker comprises two guide arms 54, 56 disposed approximately parallel to one another and perpendicular to the transverse axis 52, and an actuating arm 58, which extends from the transverse axis 52 substantially in the opposite direction relative to the guide arms 54, 56.

The transverse axis 52 is disposed, relative to the second support part, approximately at the same height

on the structural part 30 of the rear jaw 20 as the bead-shaped rear sole holder 40.1, 40.2, 40.3. As a result, the length of the guide arms 54, 56 becomes minimal, which is necessary in order to guide the boot sole in a circular path around the rear sole holder 40.1, 40.2, 40.3.

The guide arms 54, 56 extend from the transverse axis 52 through two slit-like passages 34, 36 in the structural part 30 and in the rear sole holder 40.1, 40.2, 40.3, which are formed off-center between the center and the lateral edges in the structural part 30 and extend in the lengthwise direction. The bead-like rear sole holder 40.1, 40.2, 40.3 is divided into three parts by the two slit-like passages 34, 36. The length of the guide arms 54, 56 is dimensioned so that they project, in the vicinity of the rear sole holder 40.1, 40.2, 40.3, through the slit-like passages 34, 36 beyond the respective boot-side edge of the rear sole holder 40.1, 40.2, 40.3. As a result, when the foot is introduced into and removed from the binding, the sole projection at the heel lengthwise end of the boot is guided by the two guide arms 54, 56 substantially on a circular path, having the transverse axis 52 as the center, about the rear sole holder 40.1, 40.2, 40.3, the two guide arms 54, 56 each touching the boot sole off-center.

An angular recess 57 is formed in each of the sides of the two guide arms 54, 56 facing the boot sole, in order to receive the bottom edge of the boot sole. As a result, when the foot is introduced into and removed from the binding, at which time the guide arms 54, 56 touch the boot sole, the latter is retained on two sides of the bottom edge by the guide arms 54, 56, in order to guarantee secure guidance of the boot sole.

Above the transverse axis 52, a cylindrical helical spring 44 having two branches is disposed in each of

the two slit-like passages 34, 36. One branch of each of the two springs 44 bearing on the jaw structural part 30 and the other on a protuberance 45 which is disposed on a lateral surface of the guide arm 54, 56 extending through the slit-like passage 34, 36, the two springs 44 act between the jaw structural part 30 and the rocker. The spring branches that bear on the protuberances 45 can slide freely thereon, and the springs 44 together with the protuberances 45 are so disposed relative to the transverse axis 52 that their lines of influence extend past the transverse axis 52 on one side in a first pivot position of the rocker and on the other side in a second pivot position. As a result of this disposition, a bistable rocker switch device for the rocker is created, in order to switch the rocker back and forth in the manner of a mechanical flipflop between two stable pivot positions on the transverse axis 52. On actuation of the rocker from one of the stable pivot positions to the other, the latter is moved beyond a dead-center position in which the lines of influence of the springs 44 extend through the transverse axis 52.

The first stable pivot position of the rocker, shown in Fig. 5, defines the open position of the rear binding jaw 20 or of the binding. In the open position, the two guide arms 54, 56 are directed upward and the actuating arm 58 downward. In this position, in order to introduce the foot into the binding, the boot heel can be placed on the guide arms 54, 56 and subsequently pressed downward, no manual manipulation being necessary. This in itself provides a step-in function.

The second stable pivot position of the rocker, shown in Figures 1, 2, 3 and 4, defines the closed position of the rear binding jaw 20 or of the binding. In the closed position, the two guide arms 54, 56 are directed downward and the actuating arm 58 upward. In this position, the boot sole, secured on the second support

part 14 by the rear sole holder 40.1, 40.2, 40.3, is not touched by either of the two guide arms 54, 56. The effect of this is to guarantee that, in the closed position, the guide arms 54, 56 do not obstruct either the securing function of the rear sole holder 40.1, 40.2, 40.3 or the safety function of the lateral release device.

A wall-like, downward-projecting support 26 is molded on each of the two lengthwise sides of the branch 22 of the rear jaw base portion disposed on the second support part 14, these engaging, in a binding position with the heel lowered, over a correspondingly formed lengthwise bead 28 fixedly attached to the top of the ski. As a result, in the binding position with the heel lowered, the rear jaw 20 is fixed against lateral displacements, as a result of which the steerability of the ski in this binding position is further improved.

In Fig. 3, the binding is shown with the heel raised away from the top of the ski. From this illustration, it is clearly apparent that, with the heel raised, a rest for the ski boot sole is provided by the base portion 62 of the front jaw 60, the step part 80, the first support part 10 and the second support part 14, this rest, because of the pivotability of the two pivots 2, 8 between the first support part 10 and the front jaw 60 on the one hand and between the first support part 10 and the second support part 14 on the other hand, being of substantially arcuate form in the lengthwise direction, in order to assist the bending of the sole of a telemark ski boot in the lengthwise direction.

In order to introduce the foot into the binding, the latter is necessarily first brought into its open position, the actuating arm 58 being pressed downward either by hand or by means of a ski stick. Thereafter, the boot toe is introduced into the front jaw 60, the

sole projection on the boot toe being pushed under the front sole holder 66 on the front jaw 60. As a result, the step part 80 on the rear jaw 20 is pressed down and the ski brake thus lifted. Subsequently, the boot heel is placed on the guide arms 54, 56 on the rear jaw 20 in a manner such that the bottom edge of the ski boot is received by the two angles 57 in the guide arms 54, 56. Now the boot heel is pressed downward, being guided by the guide arms 54, 56. When the boot heel is pressed down, the rear jaw 20 is first displaced by the two guide arms 54, 56, against the force of the compression springs 29.1, 29.2, in the backward lengthwise direction, away from the shoe, until the two guide arms 54, 56 extend substantially parallel to the second support part 14. When the boot heel is further pressed down, the rear jaw 20 is again pressed forward, toward the boot, by the compression springs 29.1, 29.2 in its base portion, the rear sole holder 40.1, 40.2, 40.3 being pushed over the sole projection of the boot sole at the heel end. After the boot heel has been lowered onto the second support part 14 or the base portion of the rear jaw 20 and the boot is thus completely inserted in the binding, the rocker is moved a little further again in the insertion direction by the two helical springs 44 of the rocker switch device, until the closed position of the binding is reached, in which the boot sole is no longer touched by guide arms 54, 56.

To remove the foot from the binding, the actuating arm 58 is pressed downward, for example by means of a ski stick. As a result, first, the two guide arms 54, 56 are moved forward and upward in a manner such that the two angles 57 of the guide arms 54, 56 encompass the bottom edge of the boot sole. As a result of a further downward pressing of the actuating arm 58, the boot sole projection at the heel end is moved forward and upward in order to guide it around the rear sole holder 40.1, 40.2, 40.3. As the boot toe is undisplaceably

secured by the front jaw 60, the rear jaw 20 is simultaneously displaced by the two guide arms 54, 56, initially against the force of the compression springs 29.1, 29.2, backward in the lengthwise direction, away from the boot, until the two guide arms 54, 56 extend substantially parallel to the second support part. Subsequently, during the further raising of the heel, the two guide arms 54, 56 are pivoted further upward and the rear jaw 20 is pressed forward again toward the boot by the compression springs in its base portion until the open position of the binding is reached. In the open position, the rocker is secured by the two helical springs 44 of the rocker switch device in the pivot position with the guide arms 54, 56 directed upward, so that no manual manipulation is necessary for subsequent introduction of the foot into the binding and thus the step-in function is guaranteed. After the removal of the boot toe from the front jaw 60, the ski brake is brought automatically into its braking position by the helical spring in the ski brake.

Fig. 8 shows, in a detail view, a step part 180 together with a locking device 188 for a telemark ski binding according to a further preferred embodiment of the invention. In order to permit a further reduction of the force necessary to hold down the step part 180 and to be exerted by the ski boot on the step part 180, in the embodiment of the invention shown in Fig. 8, a rocker-like locking lever 188 is articulated on the step part 180, specifically on the base surface of the step part 180. One arm of the locking lever 188 is formed as a locking hook, while the other arm of the rocker-like locking lever 188 serves as an actuating arm. When, in the lowered position of the step part 180, the actuating arm of the locking lever 188 is loaded by the ski boot sole, the locking hook is thereby hooked in around a cam correspondingly formed on the base portion of the front jaw. As a result, even in the event of an extremely slight force on the step

part 180 or the actuating arm of the locking lever 188, any lowering of the brake element is prevented, which lowering might result in an undesired braking of the ski.

Fig. 9 shows a front jaw 260 for a telemark ski binding according to a further preferred embodiment of the invention, which differs from the front jaw 60 shown in Figures 1-7 substantially only in that the ski brake is of different design. In the lateral view of Fig. 9, the front jaw 260 is shown with the ski brake in a lowered, braking position, and the part of the front jaw 260 supporting the sole holder has been broken away for the sake of clarity.

The ski brake of the front jaw 260 comprises a step part 280 of substantially plate-like form, which is articulated at its rear lengthwise end about a horizontal transverse axis 205 to be pivotable on a base portion 262 of the front jaw 260. At its front lengthwise end, the step part 280 is provided with a substantially horizontal transverse slit aperture, open toward the front. Accommodated in this aperture is the connecting web, displaceable in the lengthwise direction and pivotable about a horizontal transverse axis, of a substantially U-shaped brake element which, together with the connecting web, also comprises two branches 296 connected to one another by the latter and serving as actual brake legs. The brake legs 296 are articulated on the base portion 262 of the front jaw 260 to be pivotable about a horizontal transverse axis 206, the transverse axis 206, on which the brake legs 296 are articulated, being disposed in front of the transverse axis 205 on which the step part 280 is articulated.

When a ski boot is introduced into the front jaw 260, its boot toe presses the step part 280 downward. As a result, the brake element, in its front part, is

pivoted downward about the transverse axis 206, as a result of which the brake legs 296 are pivoted upward about the transverse axis 206 into a non-braking position.

To assist the insertion of the ski boot toe into the front jaw 260 while the foot is being introduced into the binding, the step part is provided with a plurality of rollers 201, 203, rotatable about horizontal transverse axes, which project at the top of the step part 280. When the ski boot is inserted into the front jaw 260, the ski boot sole rolls over these rollers 201, 203 in its foremost region, virtually without friction. The step part is further provided with a retaining edge 207 disposed behind the ski boot toe which prevents undesired pushing-out of the ski boot toe from the front jaw 260 when the boot heel is raised.

Figures 10 and 11 show, in an illustration substantially corresponding to Fig. 5, a rear jaw 320 for a telemark ski binding according to a further preferred type of embodiment of the invention, the rear jaw 320 being shown in its closed position in Fig. 10 and in its open position in Fig. 11. The rear jaw 320 shown in Figures 10 and 11 differs from the rear jaw 20 shown in Figures 1-7 substantially only in having a different embodiment of the mechanism for introducing and removing the foot.

A rear jaw intermediate part 331 is mounted on a branch 324 of the L-shaped base portion of the rear jaw 320, projecting from the second support part, so as to be pivotable about a central pivot pin 332. A rear jaw structural part 330 is articulated on the rear jaw intermediate part 331 to be pivotable about a horizontal transverse axis 352. The rear jaw structural part 330 is formed in the manner of a two-armed rocker, a rear sole holder 340 of bead-like form being molded

on the front rocker arm. Similarly to the embodiment shown in Figs. 1-7, the rear jaw 320 shown in Figures 10 and 11 is also provided with rollers 348 rotatable about vertical axes of rotation to assist the lateral release. The rear rocker arm 358 serves to actuate the rear jaw structural part 330, the rear jaw structural part 330 being pivoted by means of the actuating arm 358 about the pivot pin 352 in the manner of an automatic heel device known for alpine ski bindings for the introduction and removal of the foot.

A pressure piston is accommodated in a drilled hole in the rear jaw structural part 330 and is pressed by a compression spring onto a pressure surface formed on the rear jaw intermediate part 331. The pressure surface is so formed that, when the rear jaw structural part 330 is pivoted about the pivot pin 352, the pressure piston and hence the rear jaw structural part 330 engage into two locking positions predetermined by the pressure surface that define the closed position and the open position, respectively, of the binding.

In contrast to a conventional alpine ski binding, no step spur is necessary in the telemark ski binding shown in Figures 10 and 11, on which the boot heel has to be placed in order to introduce the foot into the binding, in order subsequently to press down the automatic heel device. In the telemark ski binding shown in Figures 10 and 11, the distance between the front sole holder and the rear sole holder 340 is set in a manner such that, after the introduction of the boot toe into the front jaw, the boot heel lies on the rollers 348. After the boot heel is placed on the rollers 348, the heel is simply pressed downward. As a result, the rear jaw structural part 330 is pivoted about the pivot pin 352, the rear jaw 320 simultaneously being displaced backward against the compression spring 329.1 of the functional unit to change the distance between the front and the rear sole

holders and thus permit introduction of the foot into the binding.

In summary, it can be said that the invention provides a telemark ski binding which not only guarantees good ski guidance even with the boot heel raised but also reduces the risk of injury to the skier in the event of a fall.

International Patent Application PCT/CH99/00522

Publication No. WO 00/43085

Fritschi AG - Swiss Bindings

List of references

2, 8	Pivot pin
4, 6, 204, 208	Hinge pin
9	Double arrow
10	First support part
11, 12	Branches of the first support part
13	Web of the first support part
14	Second support part
15, 16	Hollow profile-type lengthwise support of the second support part
17	Connecting plate of the second support part
18	Fork-shaped front part of the second support part
19.1, 19.2, 19.3, 19.4	Connecting element
20, 320	Rear jaw
21, 321	Sprung sheet steel part of the anchoring element
22, 24	Branches of the rear jaw base portion
23, 323	Plate-shaped part of the anchoring element
25, 325	Actuating lever
26	Guide support
27.1, 27.2	Guide rod
28	Guide bead
29.1, 29.2, 329.1	Helical compression spring
30, 330	Rear jaw structural part
32, 332	Pivot pin
34, 36	Slit-like passage
40.1, 40.2, 40.3, 340	Rear sole holder
44	Helical spring
45	Protuberances on the guide arm

46	Sliding plate
48, 348	Roller
52, 352	Transverse axis
54, 56	Guide arm
57	Angular recess
58, 358	Actuating arm
60, 260	Front jaw
62, 262	Front jaw base portion
64	Arcuate front wall, arching of the front jaw
66	Front sole holder
67	Projection
68	Supporting wall
80, 180, 280	Step part
82	Front wall of the step part
84	Projection of the step part
90	Braking element
91	Web of the braking element
92, 93	First branch section of the braking element
94, 95	Second branch section of the braking element
96, 97, 296	Third branch section of the braking element, brake leg
188	Locking lever
201, 203	Roller
205	Hinge pin
207	Retention edge
331	Rear jaw intermediate part
351	Pressure piston
352	Transverse axis
353	Compression spring

Patent claims

1. Telemark ski binding, having a front jaw (60, 260) which is formed to be fixedly attached to a ski and on which a front sole holder (66) is disposed to be incapable of pivoting relative to the ski and is formed to fix the sole of a ski boot to the ski in the region of the boot toe, having a support (10, 14), which is articulated, at a point set back from the boot toe, on a retaining part that is formed to be fixedly attached to the ski, to pivot about a pivot pin (2) extending transversely to the lengthwise direction of the ski and parallel to the top of the ski, and having a rear jaw (20, 320) disposed on the support (10, 14) with a rear sole holder (40.1, 40.2, 40.3, 340), which is formed to fix the boot sole at the boot heel to the support (10, 14), characterized in that the rear sole holder (40.1, 40.2, 40.3, 340) is formed to pivot laterally outward relative to the rear jaw (20, 320), in order to guarantee the function of lateral release of a safety ski binding.

2. Telemark ski binding according to Claim 1, characterized in that the front sole holder (66) is disposed completely fixedly on the front jaw (60) and is formed as an integral part thereof.

3. Telemark ski binding according to Claim 1 or 2, characterized by a configuration and arrangement of the front jaw (60, 260) and of the front sole holder (66) such that they form a receiving space for the ski boot toe which narrows toward the front and into which the boot toe can be pushed forward in order to insert the ski boot into the

binding, the boot toe, when the ski boot is inserted in the binding, being capable only of being pushed out backward from the receiving space and being undisplaceably fixed in all other directions by the front jaw (60, 260) and/or the sole holder (66).

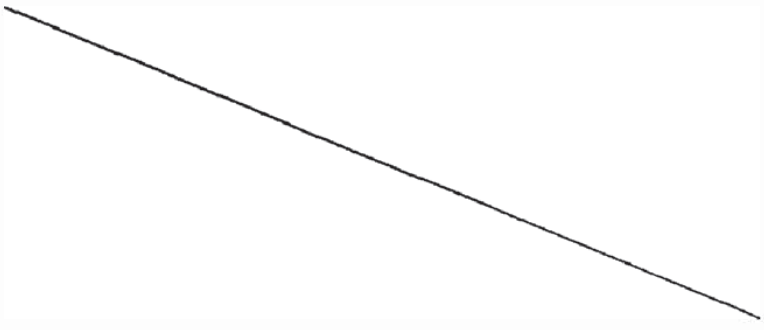
4. Telemark ski binding according to one of Claims 1 to 3, characterized in that the pivot pin (2) is set back from the boot toe in the lengthwise direction of the ski by at least 4.0 cm, preferably by at least 5.0 cm, especially by as much as at least 6.0 cm.

5. Telemark ski binding according to one of Claims 1 to 4, characterized in that the support (10, 14) is formed as an articulated chain having a plurality of rigid support parts (10, 14) which are connected to each other by means of pivots, each of which can be pivoted about a pivot pin (8) extending transversely to the lengthwise direction of the ski and parallel to the top of the ski.

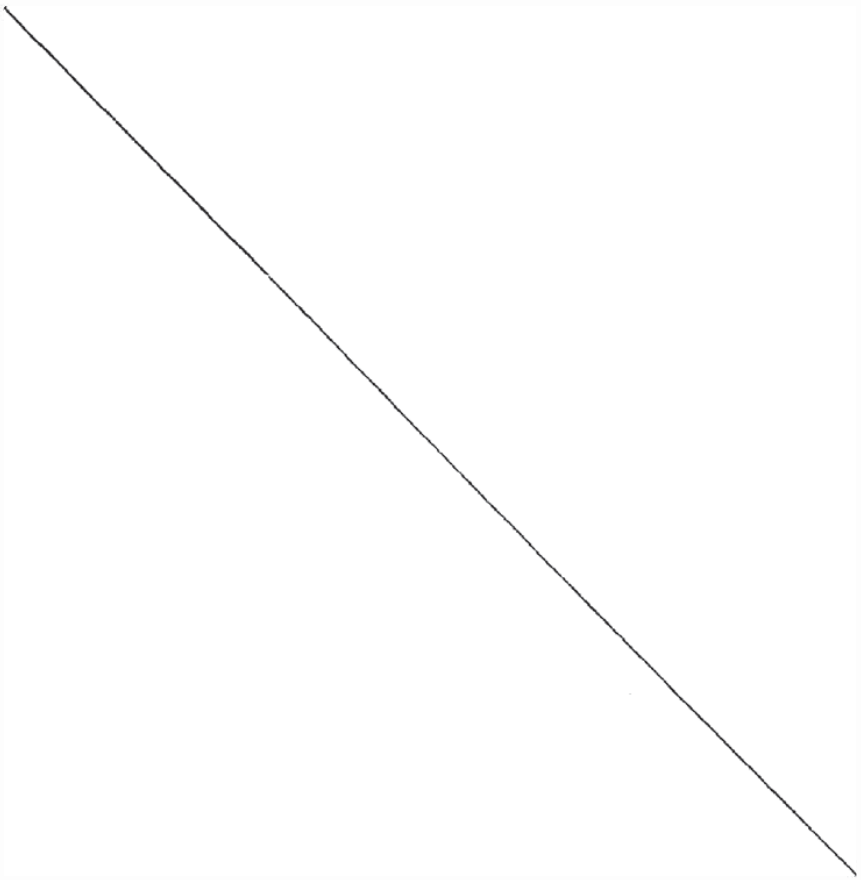
6. Telemark ski binding especially according to one of Claims 1 to 5, having a front jaw (60, 260) formed to be fixedly attached to a ski and on which a front sole holder (66) is disposed to be incapable of pivoting relative to the ski, having a support (10, 14) which can pivot about a pivot pin (2) extending transversely to the lengthwise direction of the ski and parallel to the top of the ski and having a rear jaw (20, 320) disposed on the support (10, 14) with a rear sole holder (40.1, 40.2, 40.3, 340), the rear jaw (20, 320) being disposed displaceably in the lengthwise direction of the boot on the support (10, 14) so

that it is displaceable in the sense of increasing the distance between the front (60, 260) and rear (20, 320) jaws against the force of at least one spring (29.1, 29.2; 329.1), in order to guarantee an adjustment of the distance between the front sole holder (66) and the rear sole holder (40.1, 40.2, 40.3, 340) to a change of length of boot sole as a result of the bending of the boot sole, characterized by dimensions and disposition of the spring or springs (29.1, 29.2; 329.1) such that the retention of the boot is achieved solely by the tensioning force between the front jaw (60, 260) and the rear jaw (20, 320) caused by the spring or springs and the binding is free of additional boot retention means.

7. Telemark ski binding according to Claim 6, characterized in that the spring or springs (29.1, 29.2; 329.1) are designed for lengthwise adaptation as part of a functional unit independent of the support (10, 14), which functional unit further comprises an anchoring element (21, 23; 321, 323) which is optionally displaceable in the lengthwise direction along the support (10, 14) and can be fixed in a desired sliding position on the support (10, 14), the spring or springs (29.1, 29.2; 329.1) being disposed in a manner such that they act between the rear jaw (20, 320) and the anchoring element (21, 23; 321, 323).



8. Telemark ski binding according to Claim 7, characterized in that two cylindrical, helical compression springs (29.1, 29.2; 329.1) are provided for the lengthwise adaptation and are guided by spring guide means (27.1, 27.2) in the lengthwise direction of the support, the two helical compression springs (29.1, 29.2; 329.1) being disposed between a rear jaw part and a part (23; 323) of the anchoring element (21, 23; 321, 323) in a manner such that they exert a compressive force between the rear jaw (20, 320) and the anchoring element (21, 23; 321, 323).



9. Telemark ski binding according to Claim 7 or 8, characterized in that the anchoring element (21, 23; 321, 323) is provided with a toothing which can be engaged into a corresponding toothing on the support (10, 14) to fix the lengthwise position of the anchoring element (21, 23; 321, 323) and can be disengaged from the support toothing for the displacement of the anchoring element (21, 23; 321, 323).

10. Telemark ski binding according to one of Claims 6 to 9, characterized in that a first rigid support part (10) is articulated on the retaining part to be pivotable about the pivot pin (2), a second rigid support part (14) being articulated on the first support part (10) to be pivotable about a further pivot pin (8) parallel thereto, on which second support part the rear jaw (20, 320) is disposed to be displaceable in the lengthwise direction of the boot, the rear jaw (20, 320) being guided in the lengthwise direction of the boot by two parallel lengthwise supports (15, 16) of the second support part (14) additionally serving as guide rails, and these two lengthwise supports (15, 16) being connected to one another substantially over their entire length by means of a plurality of transverse struts (19.1, 19.2, 19.3, 19.4) in order to increase the torsional and twisting rigidity of the second support part (14).

11. Telemark ski binding according to Claim 10, characterized by a disposition and form of the transverse struts (19.1, 19.2) such that they can be simultaneously used as a toothing on the support side into which the toothing of the anchoring element (21, 23; 321, 323) can be engaged to fix the lengthwise position of the anchoring element (21, 23; 321, 323).

12. Telemark ski binding according to one of Claims 7 to 11, characterized in that the spring or springs (29.1, 29.2, 329.1) for the lengthwise adaptation as a result of the bending of the sole and the anchoring element (21, 23; 321, 323) are disposed in a substantially closed cavity of the rear jaw (20, 320).

13. Telemark ski binding according to one of Claims 1 to 12, characterized by a ski brake having a brake element (90) which is articulated on a retaining part (68) that can be fixedly attached to the ski and having a step part (80; 180, 280) connected in an articulated manner to the brake element (90), the step part (80; 180, 280) being formed and integrated in the front jaw (60, 260) in such a way that, in the event of a force exerted by the ski boot in the region of the boot toe on the step part (80; 180, 280) which is directed downward relative to the ski, it holds up the brake element (90) in a non-braking position.

14. Telemark ski binding according to Claim 13, characterized in that the step part (180) is provided with a locking device (188) which is formed and disposed on the step part (180) in such a way that it locks the step part (180) in the position for holding up the brake element (90) as long as the ski boot exerts a force on the step part (180) which is directed downward relative to the ski.

15. Telemark ski binding according to Claim 13 or 14, characterized in that the step part (280) is provided on its upper side with at least one roller (201, 203) rotatable about a horizontal transverse axis in order to assist the pushing of the ski boot toe into the front jaw (260) when inserting the foot into the binding, and in that

the step part (280) is provided with a retaining edge (207) disposed behind the ski boot toe in order to prevent an undesired pushing of the ski boot toe out of the front jaw (260) when the boot heel is lifted.

16. Telemark ski binding according to one of Claims 1 to 15, characterized in that the rear jaw (20, 320) is provided with supports (26) projecting laterally downward which, in a binding position with the heel lowered, engage over a correspondingly formed bead (28) attached fixedly to the top of the ski in order, in that position, to fix the rear jaw (20, 320) against lateral displacements.

17. Telemark ski binding according to one of Claims 1 to 15, characterized in that the rear sole holder (40.1, 40.2, 40.3, 340) is disposed on the rear jaw (20, 320) to be pivotable about a substantially vertical, central pivot pin (32, 332) fixed on the rear jaw (20, 320) in order to guarantee lateral release.

18. Telemark ski binding according to one of Claims 1 to 17, characterized by a formation and disposition of the rear jaw (20, 320) and of the rear sole holder (40.1, 40.2, 40.3, 340) such that a step-in function is provided.

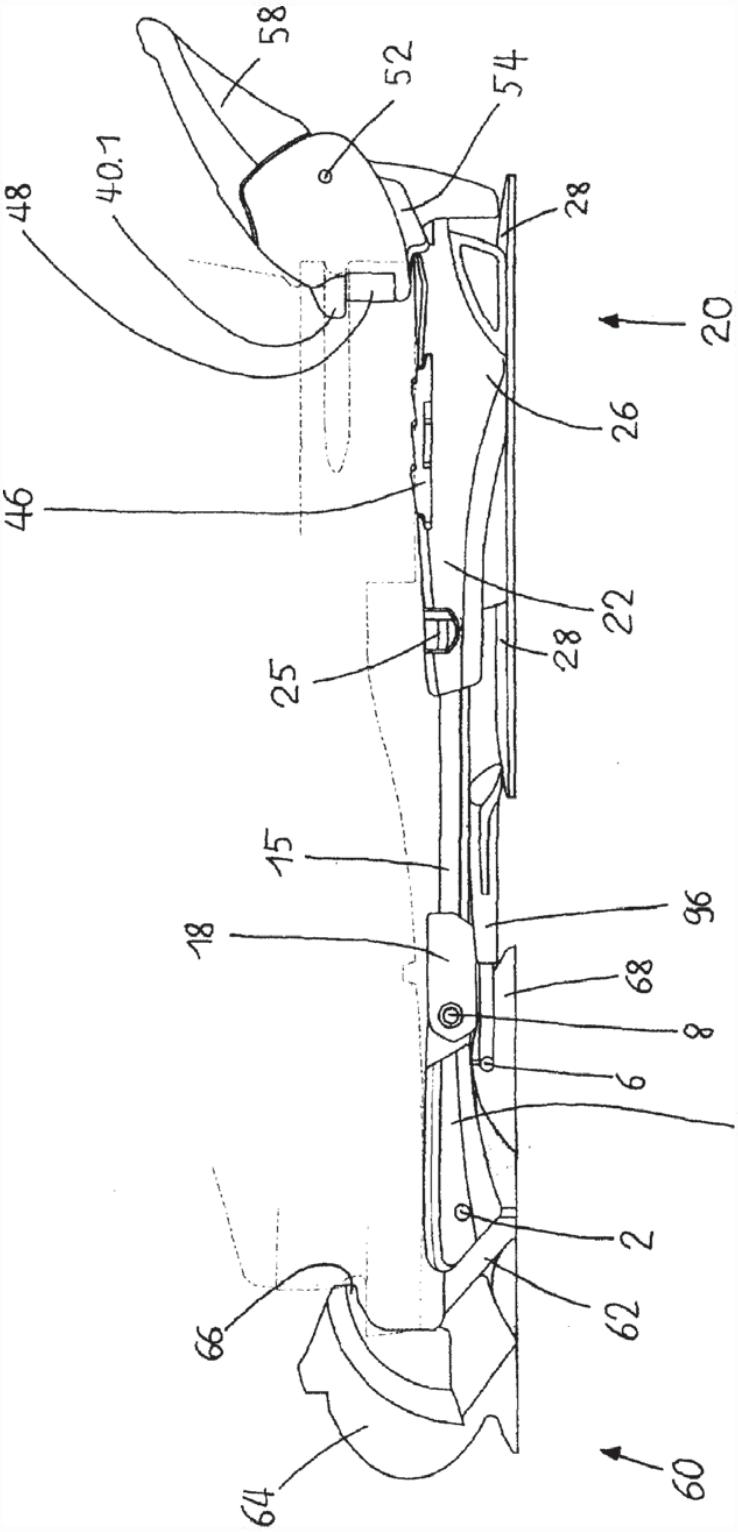


Fig.1

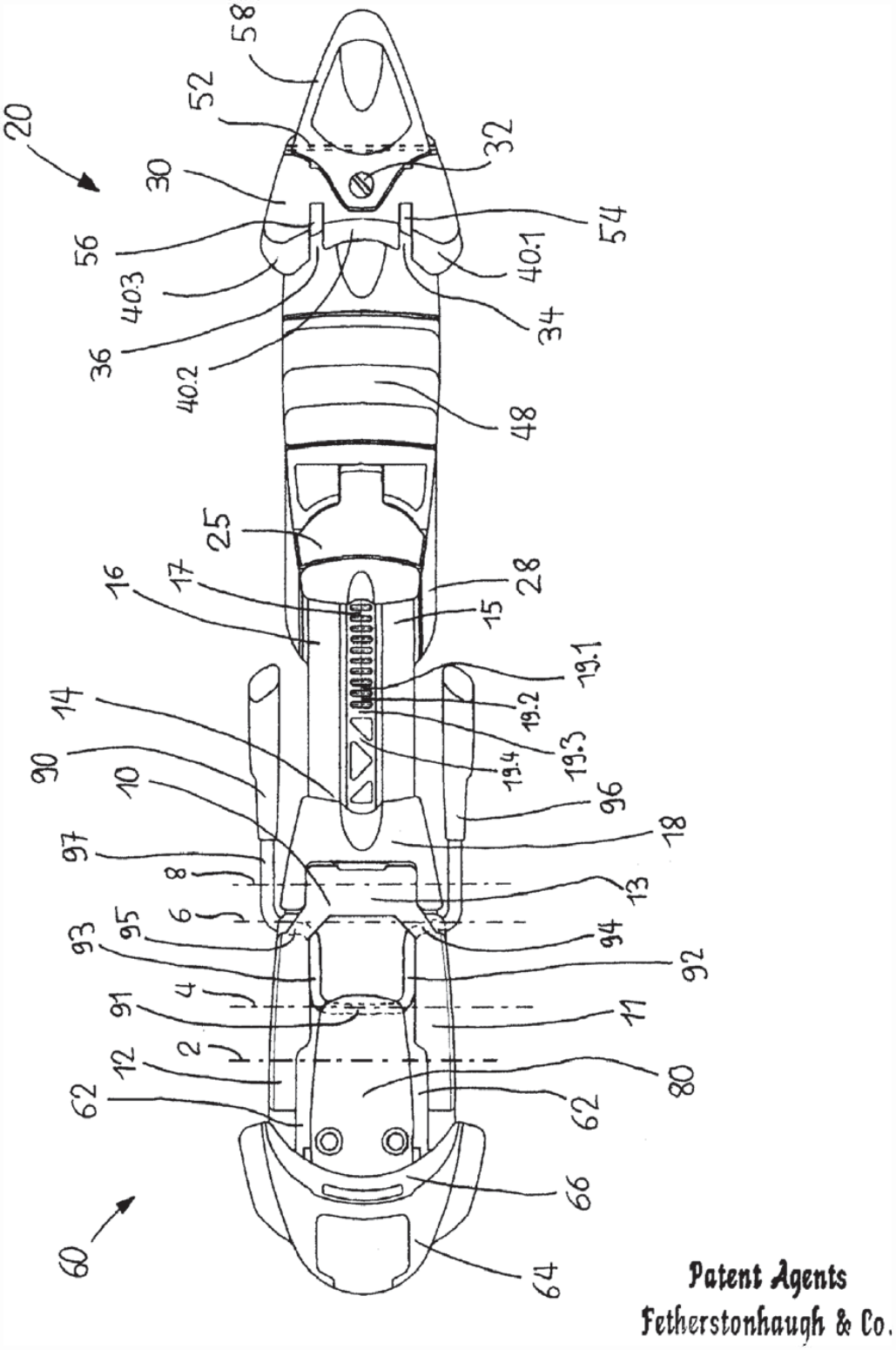


Fig.2

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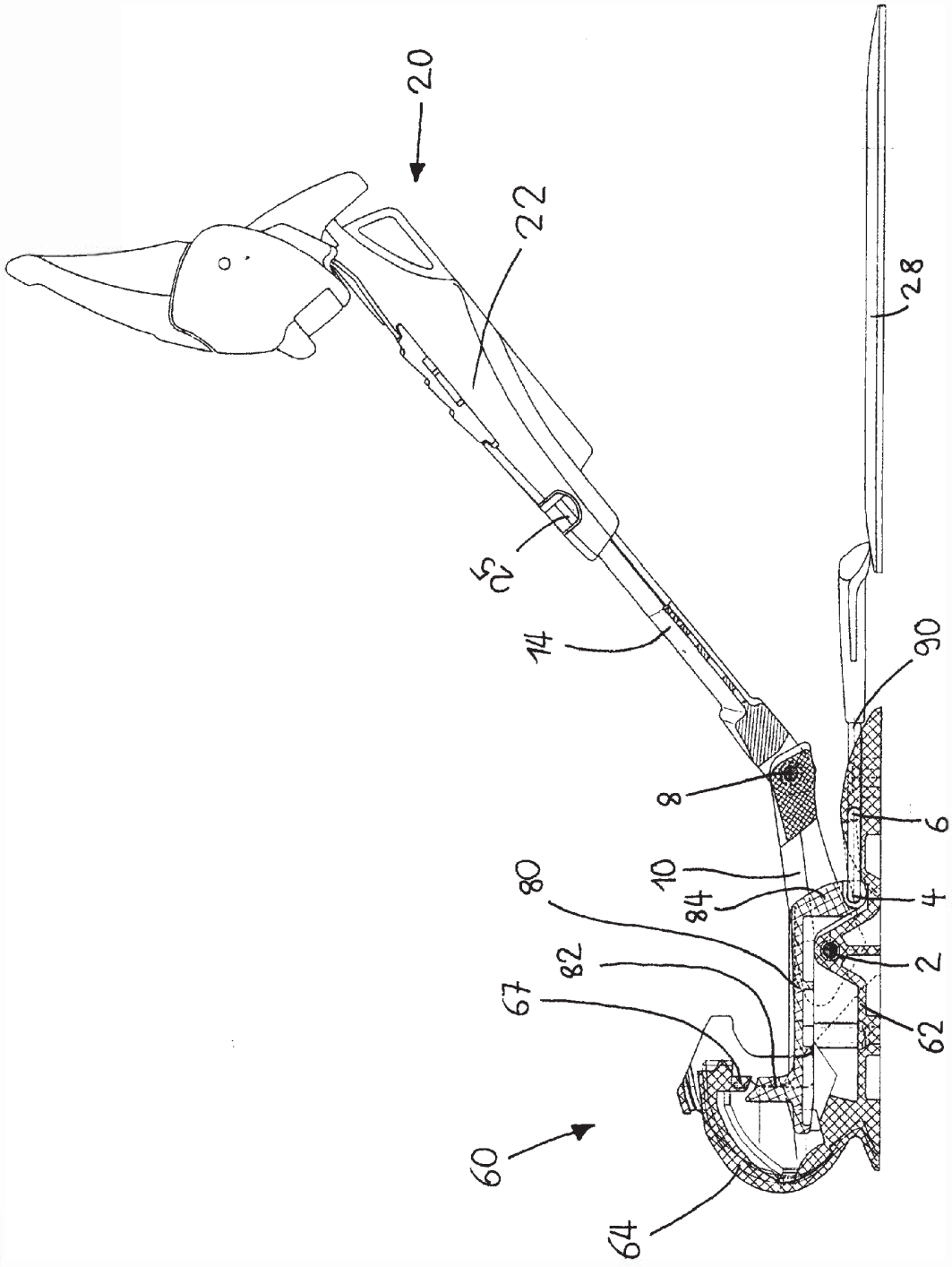

Fig.3

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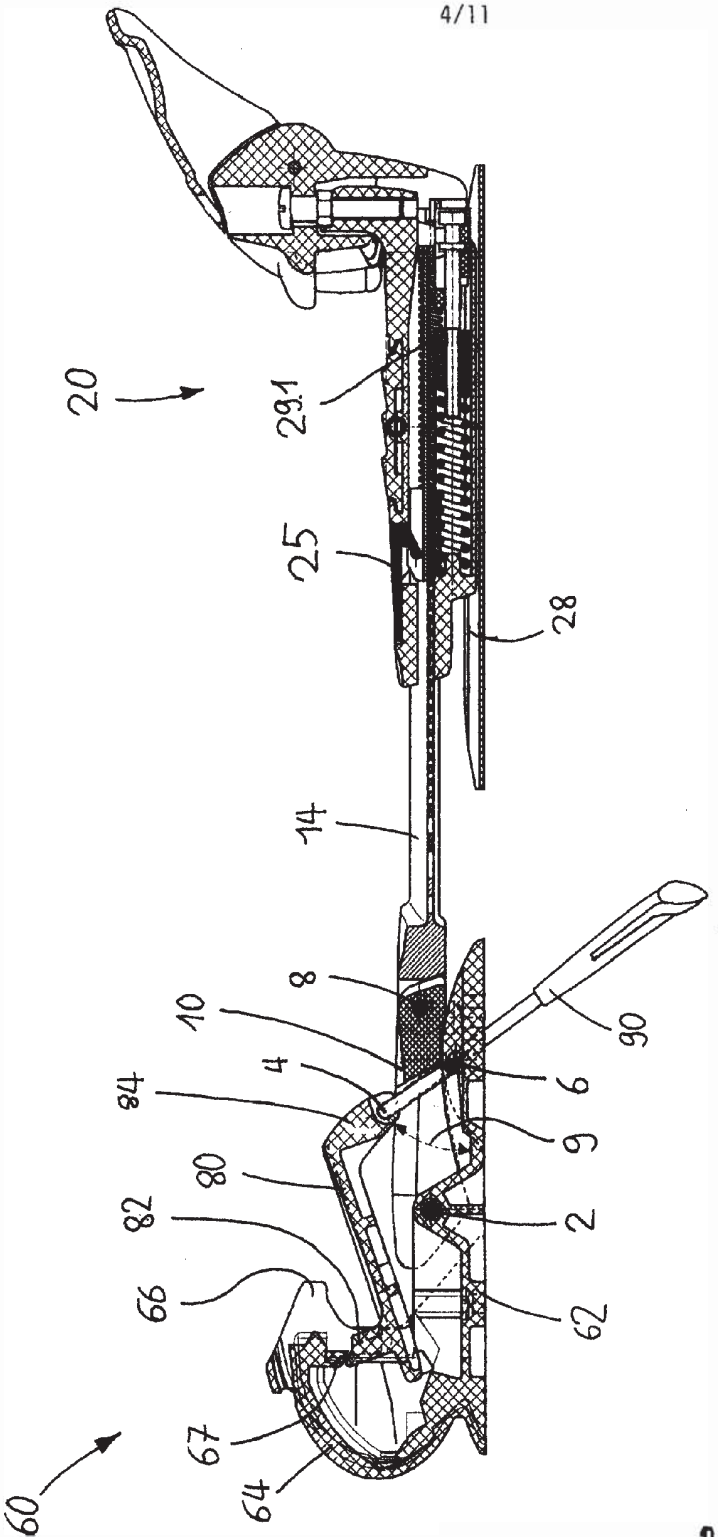

Fig.4

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Fig. 5

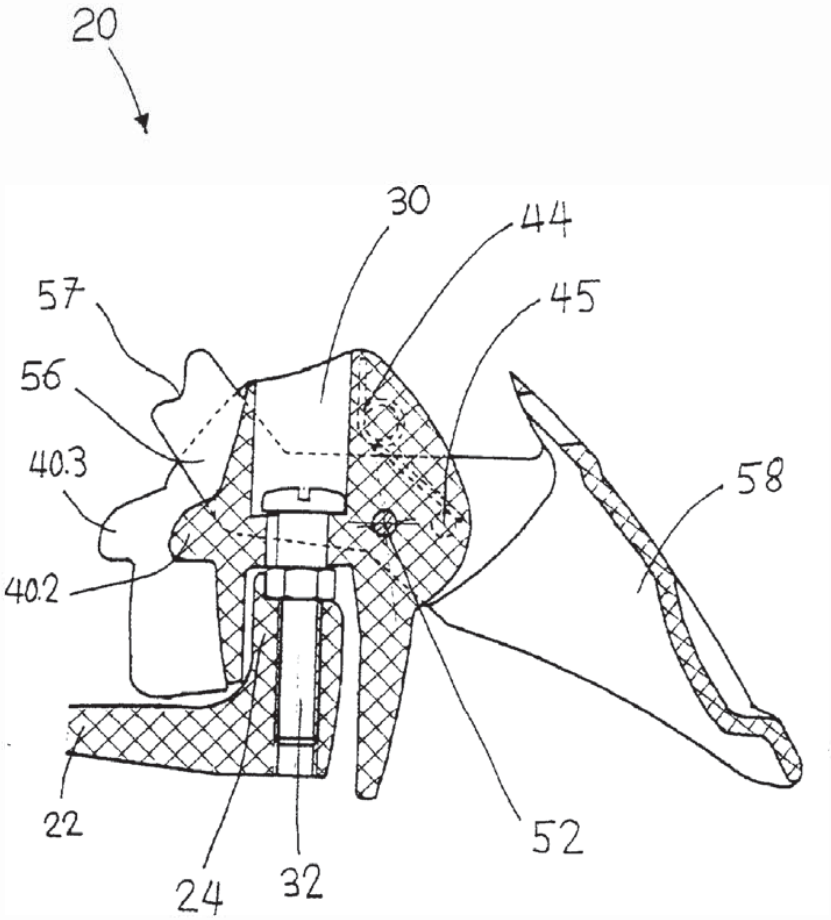

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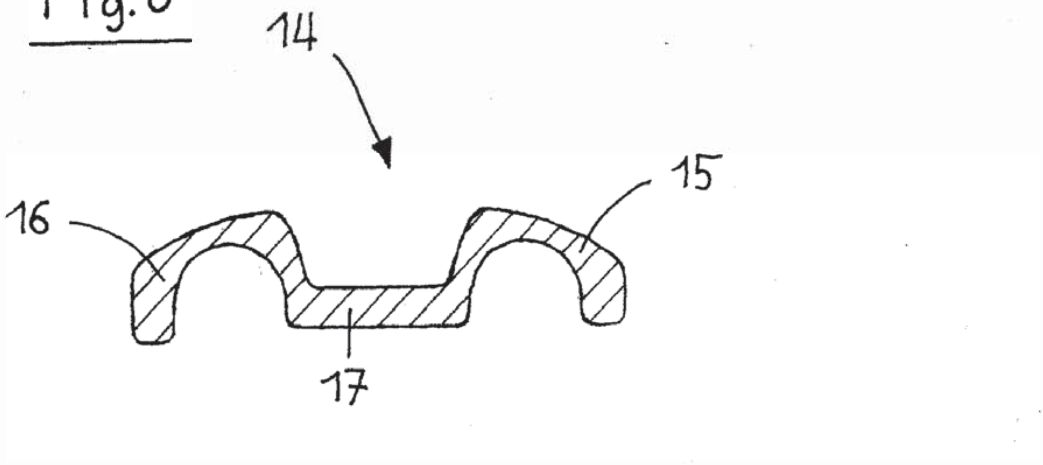
Fig.6



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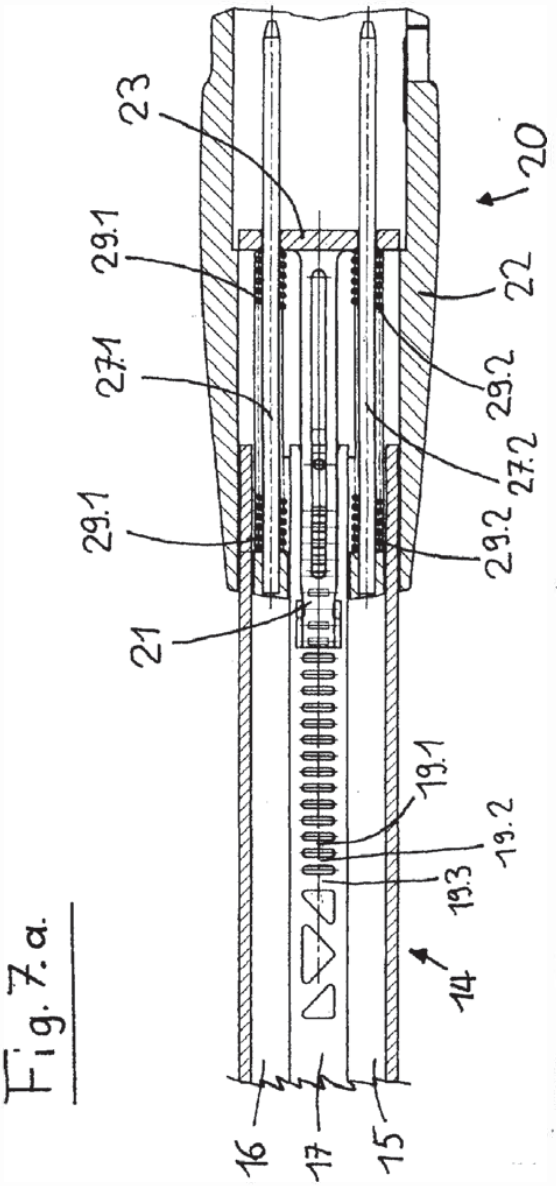
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Fig. 7.a.

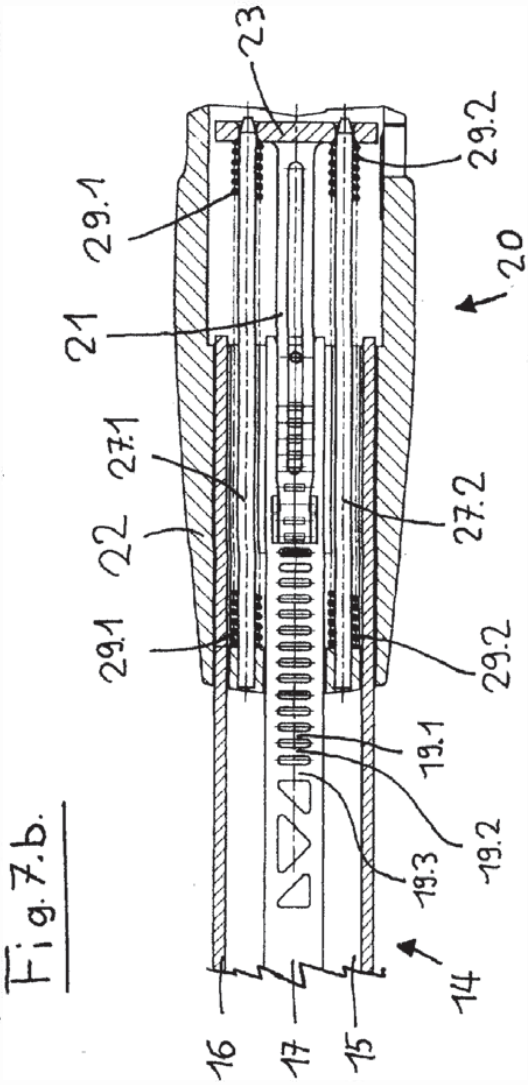
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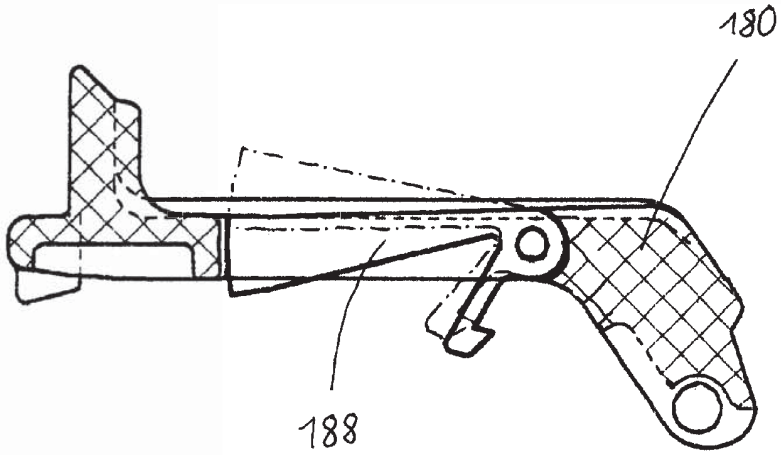
Fig. 7.b.

Fig. 8



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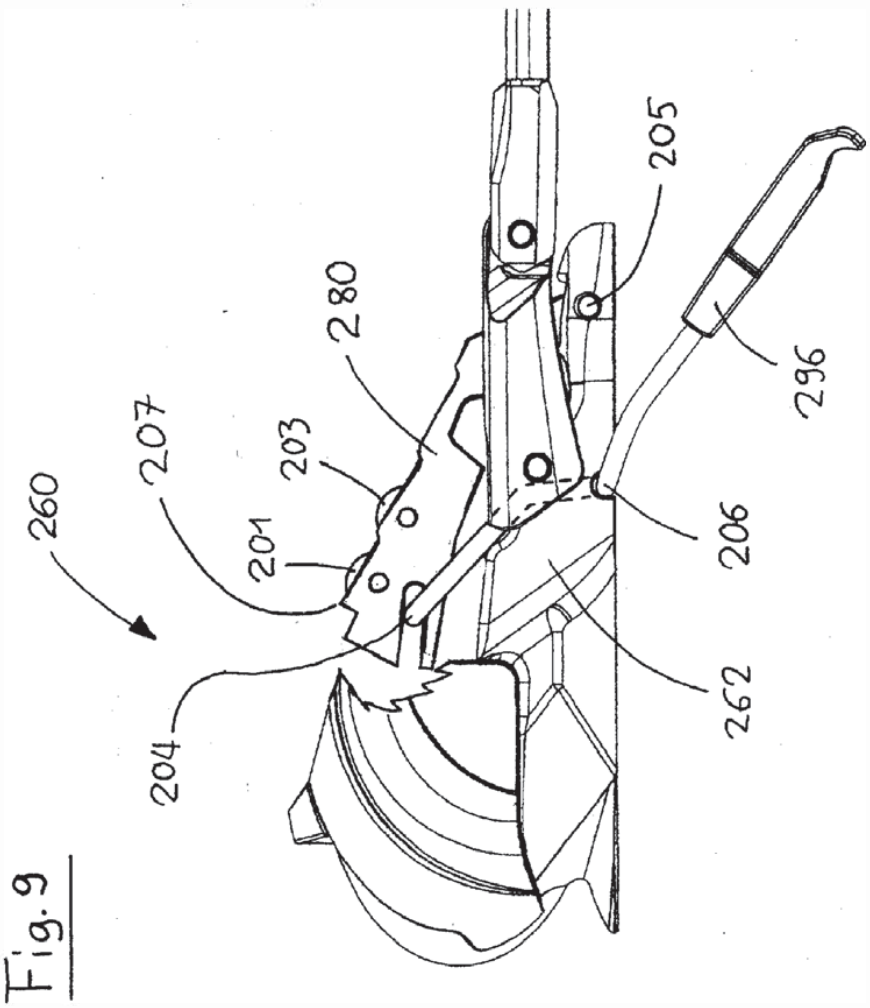

Fig. 9

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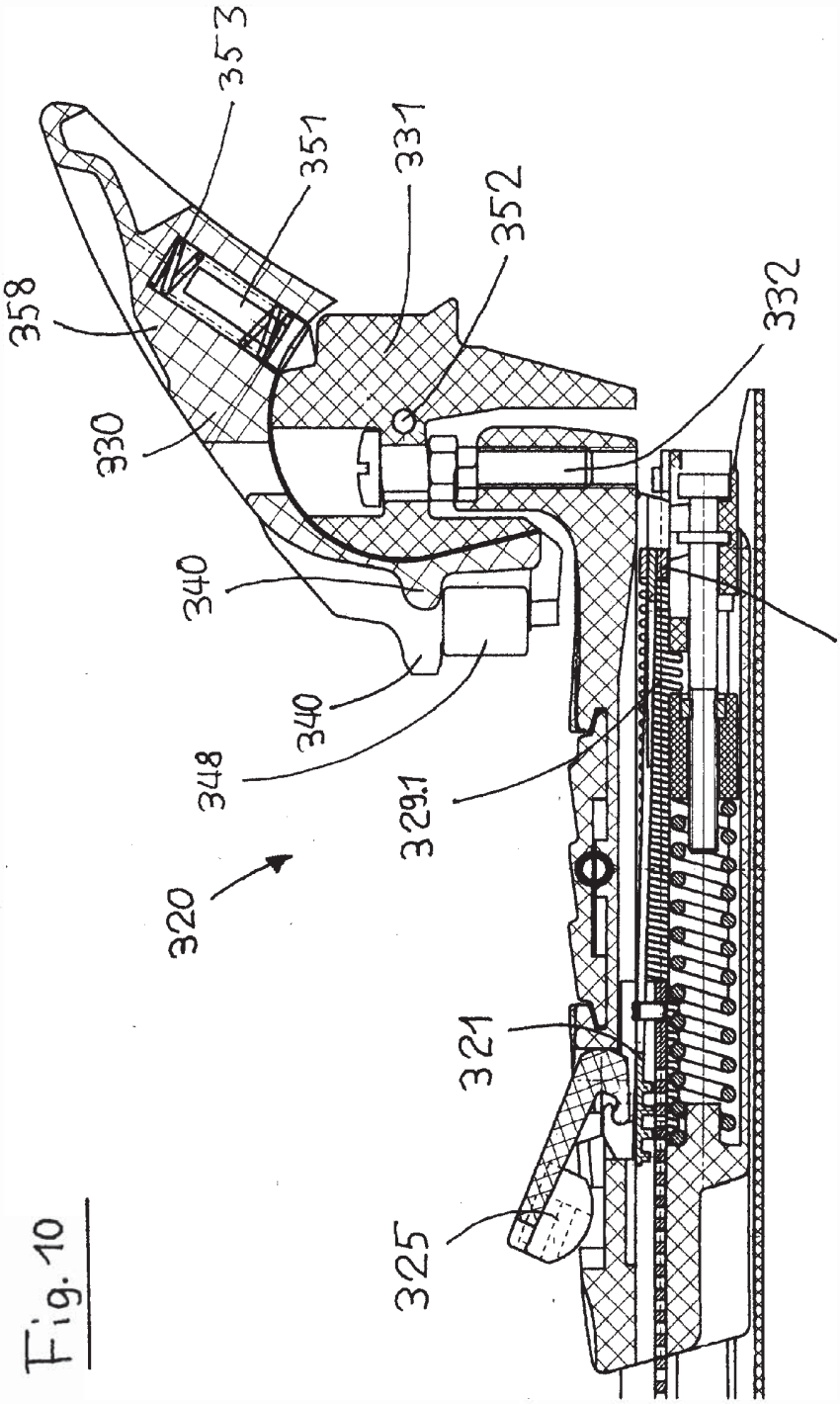

Fig. 10

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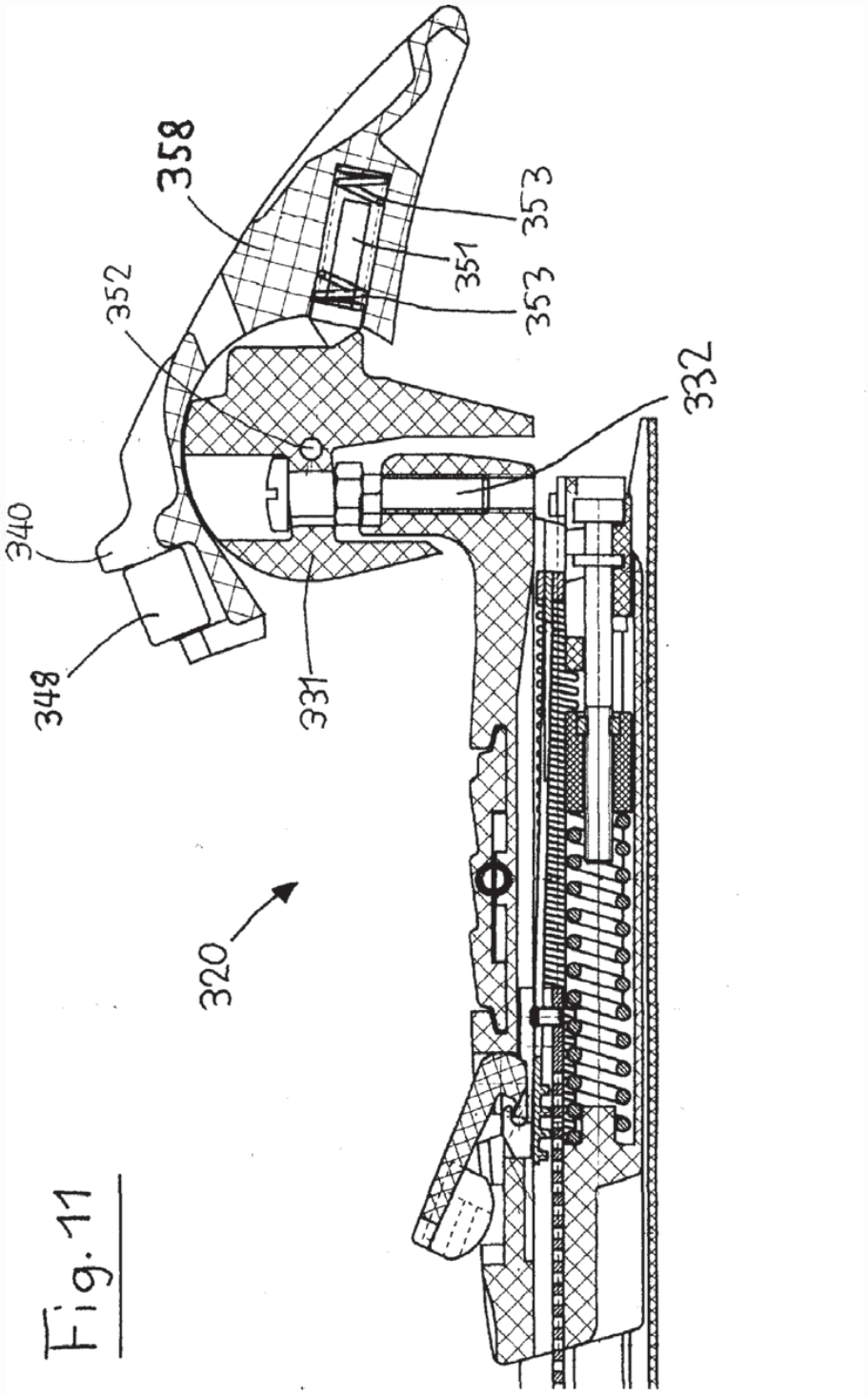

Fig. 11

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