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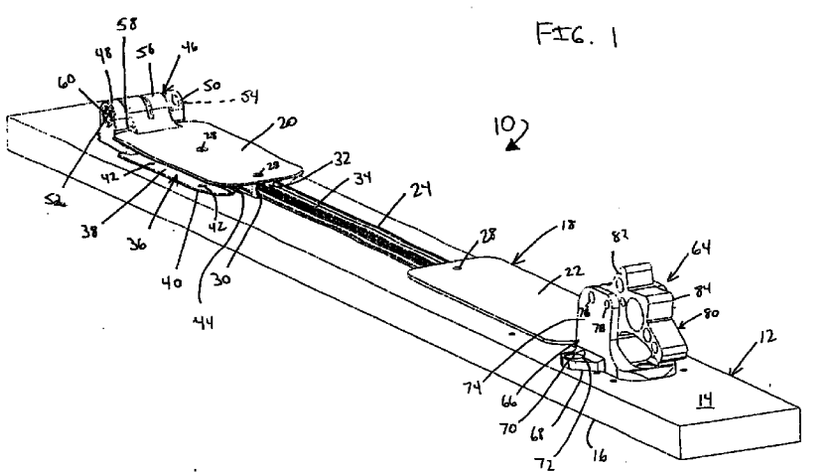
(54) Convertible downhill/cross-country snow ski binding apparatus

(57) A snow ski binding apparatus for mounting a standard downhill binding to an elongated ski is provided. The binding has a toe portion and a heel portion and the ski having a substantially planar upper mounting surface. The binding apparatus comprises a binding mechanism for releasably securing the standard downhill binding thereto with the binding means having a toe end and a heel end. The toe portion of the binding is releasably secured to the toe end of the binding means and the heel portion of the binding is releasably secured to the heel end of the binding means. A toe plate is securable to the planar upper mounting surface of the ski and pivotally securable to the toe end of the binding means allowing the heel end of the binding means to travel away from and toward the planar upper mounting surface of the ski. A securing mechanism is mounted to the planar upper mounting surface of the ski nearingly adjacent the heel end of the binding means for selectively releasably securing the heel end of the binding means in a substantial parallel relationship to the planar upper mounting surface of the ski.

FIG. 1



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Description

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0001] This invention relates generally to a convertible downhill/cross-country snow ski binding apparatus and, more particularly, it relates to a convertible downhill/cross-country snow ski binding apparatus which allows a downhill skiing binding to be mounted thereon and which allows a skier to ski in either a downhill or a cross-country manner.

2. Description of the Prior Art

[0002] In the beginning of the skiing revolution, snow ski bindings consisted of simply strapping the skier's boot to the ski with a rope or line. Over the years, snow ski bindings have evolved to more sophisticated downhill skiing bindings which automatically release the skier from the ski when the skier falls or when a certain directional force is applied to the ski. The releasable skiing bindings are often referred to as safety release bindings and tend to minimize the risk of injury to the skier. The typical release bindings of the prior art have primarily been directed toward Alpine or downhill skiing applications and have rarely addressed Nordic or cross-country skiing applications.

[0003] Notwithstanding the extreme popularity of downhill skiing, due to the advantageous health benefits associated with cross-country skiing, cross-country skiing has been rapidly increasing in popularity. For many years, the Nordic or cross-country bindings for cross-country skis have not substantially varied. In the art, most cross-country ski bindings have utilized some form of anchor for the toe of the skier's boot while leaving the heel free to lift upward as commonly occurs during normal walking motions.

[0004] The recent increase of interest in cross-country and backcountry skiing, however, has brought about a need for a binding which is readily convertible between use as a downhill skiing release binding and a cross-country ski binding. For example, Ramer, U.S. Patent No. 5,318,320, describes a snow ski binding having a boot plate releasably securable with a plurality of screws to a ski by a toe piece and a heel piece. The boot plate is pivotally connected to the toe piece to selectively pivot about a transverse axis and allow a skier to move in a cross-country motion. The heel piece is movable between a plurality of positions to selectively lock the trailing end of the boot plate to the ski to facilitate downhill skiing or can be repositioned to allow the boot plate to pivot about the toe piece while restricting the downward movement of the trailing end of the boot plate between two locations to facilitate use of the binding in a cross-country mode for climbing hills.

[0005] While providing a binding which is readily convertible between use as a downhill skiing release binding and a cross-country binding, the binding of the Ramer patent does not allow the skier to utilize a ski having an ordinary downhill binding without first removing the downhill binding. In fact, the Ramer patent's snow ski binding is secured directly to the ski by a plurality of screws. In order to utilize the binding of the Ramer patent, the downhill bindings originally on the ski must first be removed and either stored or discarded which tends to damage the original downhill bindings and leads directly to increased monetary expense for the skier and a waste of resources. Additionally, by removing the downhill binding and installing the Ramer patent's binding, the integrity of the ski is compromised since the screws of the Ramer patent's binding will not necessarily correspond to the screw holes necessary for attaching the original downhill binding.

[0006] In an attempt to overcome the shortcomings of the Ramer patent, the ALPINE TREKKER™ binding by Backcountry Access, Boulder, Colorado, was introduced. The ALPINE TREKKER™ binding allows a skier to transform a downhill binding into a cross-country binding for climbing and traversing. Once the skier is mounted in the ALPINE TREKKER™ binding, his or her heel remains free to travel in a generally upward and downward direction. Unfortunately, however, since the skier's heel remains free to travel in a generally upward and downward direction, the ALPINE TREKKER™ binding is not suitable for downhill skiing and should always be removed prior to skiing downhill, as recommended by the manufacturers of the ALPINE TREKKER™ which means that the skier must carry the binding in his or her pack when not in use.

[0007] Furthermore, using the ALPINE TREKKER™ binding is very time consuming and a hassle for the skier since he or she needs to remove the binding prior to skiing downhill. Additionally, the height of the binding is completely unstable in the hiking mode.

[0008] Accordingly, there exists a need for convertible downhill/cross-country snow ski binding which is completely convertible between a binding suitable for downhill skiing and a binding suitable for cross-country skiing. Additionally, there exists a need for a convertible downhill/cross-country snow ski binding which allows an ordinary, existing downhill ski binding to be mounted on the convertible downhill/cross-country snow ski binding. Furthermore, there exists a need for a convertible downhill/cross-country snow ski binding which allows a skier to safely downhill ski without having to remove either the convertible downhill/cross-country snow ski binding or the ordinary downhill ski binding.

SUMMARY OF THE INVENTION

[0009] The present invention is a snow ski binding apparatus for mounting a standard downhill binding to an elongated ski. The binding has a toe portion and a heel portion. The ski has a substantially planar upper

mounting surface.

[0010] The binding apparatus of the present invention comprises binding means for releasably securing the standard downhill binding thereto. The binding means have a toe end and a heel end with the toe portion of the binding being releasably secured to the toe end of the binding means and the heel portion of the binding being releasably secured to the heel end of the binding means. A toe plate is securable to the planar upper mounting surface of the ski and pivotally securable to the toe end of the binding means allowing the heel end of the binding means to travel away from and toward the planar upper mounting surface of the ski. Securing means are mounted to the planar upper mounting surface of the ski nearingly adjacent the heel end of the binding means for selectively releasably securing the heel end of the binding means in a substantial parallel relationship to the planar upper mounting surface of the ski.

[0011] In an embodiment of the present invention, the binding means comprise a first plate adjacent the toe end, a second plate adjacent the heel end, and a connecting member extending between and mounted to the first plate and the second plate with the downhill binding securable to the first plate and the second plate. Preferably, the connecting member is flexible between the toe plate and the heel plate.

[0012] In another embodiment of the present invention, the toe plate is releasably secured to the planar upper mounting surface of the ski.

[0013] In still another embodiment of the present invention, the binding apparatus further comprises biasing means associated with the toe plate for biasing the heel end of the binding plate in a direction toward the planar upper mounting surface of the ski. Preferably, the biasing means is a spring member.

[0014] In yet another embodiment of the present invention, the securing means is a rotatable latch mechanism with the rotating latch mechanism rotating to selectively releasably secure the heel end of the binding means in a substantial parallel relationship to the planar upper mounting surface of the ski.

[0015] In still yet another embodiment of the present invention, the binding apparatus further comprises supporting means for supporting the binding means at an angle relative to the planar upper mounting surface of the ski. Preferably, the supporting means are associated with the securing means with the securing means being releasable from the heel end of the binding means and movable into a position underlying the heel end of the binding plate. Furthermore, preferably, the supporting means have at least one supporting surface for supporting the binding means at an angle relative to the planar upper mounting surface of the ski.

[0016] The present invention further includes a snow ski binding device for mounting a standard downhill binding to an elongated ski. The binding has a toe portion and a heel portion. The ski has a substantially planar upper mounting surface.

[0017] The binding apparatus comprises binding means pivotally mounted to the planar upper mounting surface of the ski for releasably securing the standard downhill binding thereto with the binding means having a toe end and a heel end. Securing means are mounted to the planar upper mounting surface of the ski nearingly adjacent the heel end of the binding means for selectively releasably securing the heel end of the binding means in a substantial parallel relationship to the planar upper mounting surface of the ski. Supporting means are mounted to the planar upper mounting surface of the ski nearingly adjacent the heel end of the binding means for selectively releasably supporting the heel end of the binding means at an angle relative to the planar upper mounting surface of the ski.

[0018] In an embodiment of the present invention, the binding means comprise a first plate adjacent the toe end, a second plate adjacent the heel end, and a connecting member extending between and mounted to the first plate and the second plate with the downhill binding securable to the first plate and the second plate. Preferably, the connecting member is flexible between the toe plate and the heel plate.

[0019] In another embodiment of the present invention, the binding device further comprises a toe plate securable to the planar upper mounting surface of the ski with the toe end of the binding means being pivotally secured to the toe plate allowing the heel end of the binding means to travel away from and toward the planar upper mounting surface of the ski. Preferably, the binding device further comprises biasing means associated with the toe plate for biasing the heel end of the binding plate in a direction toward the planar upper mounting surface of the ski.

[0020] In still another embodiment of the present invention, the securing means are a rotatable latch mechanism. Preferably, the rotating latch mechanism rotates to selectively releasably secure the heel end of the binding means in a substantial parallel relationship to the planar upper mounting surface of the ski.

[0021] In yet another embodiment of the present invention, the supporting means are associated with the securing means. Preferably, the securing means are releasable from the heel end of the binding means and movable into a position underlying the heel end of the binding plate.

[0022] In still yet another embodiment of the present invention, the supporting means has at least one supporting surface for supporting the binding means at an angle relative to the planar upper mounting surface of the ski.

[0023] Furthermore, the present invention includes a method for mounting a binding to a ski for a skier to ski in both a downhill and cross-country manner. The method comprises providing a binding apparatus having binding means with the binding means having a toe end and a heel end, releasably securing a downhill

binding to the binding plate between the toe end and the heel end, pivotally securing the toe end of the binding means to the ski, and mounting securing means on the ski for selectively releasably maintaining the heel end of the binding plate in a substantial parallel relationship to the ski.

[0024] In an embodiment of the present invention, the method further comprises providing supporting means associated with the securing means for supporting the binding means at an angle relative to the planar upper mounting surface of the ski.

BRIEF DESCRIPTION OF THE DRAWINGS

[0025]

FIG. 1 is a perspective view illustrating a convertible downhill/cross-country snow ski binding apparatus constructed in accordance with the present invention with the binding apparatus being illustrated in the downhill skiing mode;

FIG. 2 is a perspective view of the embodiment of FIG. 1 illustrating a securing/ supporting mechanism of the convertible downhill/cross-country snow ski binding apparatus constructed in accordance with the present invention;

FIG. 3 is an elevational side view of the embodiment of FIG. 1 illustrating a toe end of the convertible downhill/cross-country snow ski binding apparatus constructed in accordance with the present invention;

FIG. 4 is an elevational side view illustrating the convertible downhill/cross-country snow ski binding apparatus constructed in accordance with the present invention with the binding apparatus being illustrated in a cross-country skiing mode with the downward pivotal movement of the binding apparatus being restricted by the securing/ supporting mechanism;

FIG. 5 is a perspective view of the embodiment of FIG. 4 illustrating the securing/ supporting mechanism of the convertible downhill/cross-country snow ski binding apparatus constructed in accordance with the present invention;

FIG. 6 is an elevational side view of the embodiment of FIG. 4 illustrating the toe end of the convertible downhill/cross-country snow ski binding apparatus constructed in accordance with the present invention;

FIG. 7 is a sectional view of the embodiment of FIG. 1 illustrating a spring mechanism of the convertible downhill/cross-country snow ski binding apparatus constructed in accordance with the present invention for biasing the binding apparatus in a generally downward direction;

FIG. 8 is an elevational side view illustrating the convertible downhill/cross-country snow ski binding apparatus constructed in accordance with the present invention with the binding apparatus being illustrated in a different cross-country skiing mode with the downward pivotal movement of the binding apparatus being restricted by the securing/supporting mechanism;

FIG. 9 is a sectional view of the securing/supporting mechanism of the convertible downhill/cross-country snow ski binding apparatus constructed in accordance with the present invention with the binding apparatus being illustrated in a cross-country skiing mode; and

FIG. 10 is a sectional view of the securing/supporting mechanism of the convertible downhill/cross-country snow ski binding apparatus constructed in accordance with the present invention with the binding apparatus being illustrated in a downhill skiing mode.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0026] As illustrated in FIG. 1, the present invention is a snow ski binding apparatus, indicated generally at 10, for releasably connecting a standard downhill snow ski binding (not shown) to an elongated ski 12. The standard downhill snow ski binding typically has a toe portion (not shown) for receiving a toe end (not shown) of a downhill snow ski boot (not shown) and a heel portion (not shown) for receiving a heel end (not shown) of the downhill snow ski boot. Furthermore, the ski bindings typically have a plurality of apertures (not shown) for receiving screws (not shown) or the like for mounting the downhill ski binding to the elongated ski 12.

[0027] To a person skilled in the art, it will be understood that the structures of the various downhill snow ski bindings with which the binding apparatus 10 of the present invention may be used form no part of the invention and are described herein so that the features and advantages of the binding apparatus 10 of the present invention can be better explained. In fact, the structure of the downhill snow ski binding described is strictly conventional and does not form a part of the present invention.

[0028] Still referring to FIG. 1, typically, the elongated ski 12 has a substantially planar upper mounting surface 14 and a bottom snow contacting surface 16 substantially opposite the planar upper mounting surface 14. Like the downhill snow ski binding described above, it will be understood that any typical elongated ski 12, including, but not limited to, elongated skis having a substantially parabolic shape, can be used with the binding apparatus 10 of the present invention.

[0029] As illustrated in FIG. 1, the binding apparatus 10 of the present invention includes a binding support device 18 mounted to the mounting surface 14 of the elongated ski 12. The binding support device 18 preferably has a first toe plate 20, a spaced second heel plate 22, and an extension member 24 extending between

the first toe plate 20 and the second heel plate 22. The extension member 24 has an extended portion 26 (See FIG. 5) extending beyond the second heel plate 22 in a direction generally away from the first toe plate 20. The first toe plate 20 and the second heel plate 22 are sized and shaped for releasably or fixedly receiving the toe portion and the heel portion, respectively, of the typical downhill snow ski binding. Mounting of the downhill ski binding to the binding support device 18 can utilize the existing apertures already present on the downhill ski binding with the screws provided with the downhill binding, if so desired.

[0030] The first toe plate 20 and the second heel plate 22 of the binding support device 18 are secured to the extension member by a plurality of screws 28 or the like. As previously mentioned, the extended portion 26 of the extension member 24 preferably extends a short distance beyond the second heel plate 22 for allowing the binding support device 18 to be releasably retained nearingly adjacent the mounting surface 14 of the elongated ski 12 (a downhill skiing mode) as illustrated in FIG. 1 or releasably supported at an angle relative to the mounting surface 14 of the elongated ski 12 (a cross-country skiing mode) as illustrated in FIGS. 4 and 8. Releasably retaining and releasably supporting the binding support device 18 at an angle relative to the mounting surface 14 of the elongated ski 12 will be discussed in further detail below.

[0031] The first toe plate 20 and the second heel plate 22 of the binding support device 18 further have a longitudinal groove 30 for receiving a portion of the extension member 26. Additionally, both the first toe plate 20 and the second heel plate 22 have a protruding portion 32 extending in a generally downward direction toward the mounting surface 14 of the elongated ski 12 and are receivable by a corresponding longitudinal groove 34 in the extension member 24. The longitudinal groove 30 of the first toe plate 20 and the second heel plate 22 together with the mating of the protruding portion 32 of the first toe plate 20 and the second heel 22 with the longitudinal groove 34 of the extension member 24 inhibit lateral movement of the first toe plate 20 and the second heel plate 22 relative to the extension member 24 during use of the binding support device 18 of the binding apparatus 10 during use by the user.

[0032] While the first toe plate 20, the second heel plate 22, and the extension member 26 have been described heretofore as being constructed from three separate pieces, it is within the scope of the present invention to have the first toe plate 20, the second heel plate 22, and the extension member 26 be a single piece constructed from a unitary piece of material.

[0033] Preferably, the first toe plate 20, the second heel plate 22, and the extension member 24 are constructed from an aluminum material. It should be noted, however, that it is within the scope of the present invention to construct the first toe plate 20, the second heel plate 22, and the extension member 26 from other materials, including, but not limited to, other metals, fiberglass, ceramic, plastic, etc.

[0034] Regardless of the embodiment of the binding support device 18 of the binding apparatus 10 of the present invention, the binding support device 18, especially the extension member 24, is constructed to provide a certain amount of flexing of the binding support device 18 between the first toe plate 20 and the second heel plate 22 during use of the binding apparatus 10 regardless of whether the binding support device 18 is releasably maintained substantially parallel to the elongated ski 12 in the downhill skiing mode or the binding support device 18 is supported at an angle relative to the elongated ski 12 in the cross-country skiing mode. The flexibility of the binding support device 18 provides the skier with additional control over the elongated ski 12 during use by the skier in all skiing terrain and conditions. Actual use and operation of the binding apparatus 10 will be discussed in further detail below.

[0035] The binding apparatus 10 further includes a support plate 36 secured to the mounting surface 14 of the elongated ski 12 and the first toe plate 20 of the binding support device 18 substantially between the mounting surface 14 and the first toe plate 20. Preferably, the support plate 36 is constructed from the same material as the binding support device 18, however, it is within the scope of the present invention to construct the support plate 36 from materials different than the binding support device 18, including, but not limited to, other metals, fiberglass, ceramic, plastic, etc.

[0036] The support plate 36 of the binding apparatus 10 has a first top surface 38 and a second mounting surface 40 substantially opposite the first top surface 38 of the support plate 36. The second mounting surface 40 of the support plate 36 is releasably or fixedly secured against the mounting surface 14 of the elongated ski 12 by a plurality of screws 42, adhesives, or the like. It should be noted that it is within, the scope of the present invention to either releasably secure or fixedly secure the support plate 36 to the planar upper mounting surface 14 of the elongated ski 12 by a variety of methods and means.

[0037] The support plate 36 of the binding apparatus 10 further includes a generally central groove 44 formed therein. The groove 44 of the support plate 36 is designed for receiving a portion of the extension member 24 of the binding support device 18 to inhibit lateral and rotational movement of the binding support device 18 of the binding apparatus 10 of the present invention relative to the support plate 36 during use by the skier in either the downhill mode or the cross-country mode.

[0038] As illustrated in FIGS. 3 and 6, the binding apparatus 10 of the present invention also includes a pivoting mechanism 46 or hinge connected between the first toe plate 20 of the binding support device 18 and the support plate 36 for pivotally securing the first toe plate 20 of the binding support device 18 to the support plate 36. The pivoting mechanism 46 allows the second

heel plate 22 of the binding support device 18 to freely travel in a direction generally away from and toward the planar upper mounting surface 14 of the elongated ski 12 to position the binding support device 18 in either the downhill skiing mode or the cross-country mode.

[0039] In an embodiment of the binding apparatus 10, the pivoting mechanism 46 includes a first ear portion 48 and a second spaced ear portion 50 formed in the support plate 36. The first ear portion 48 has a first aperture 52 formed therethrough and the second ear portion 50 has a second aperture 54 formed therethrough with the first aperture 52 being substantially aligned with the second aperture 54.

[0040] The pivoting mechanism 46 further includes a mounting piece 56 formed in the first toe plate 20 of the binding support device 18. The mounting piece 56 is receivable between the first ear portion 48 and the second ear portion 50 of the support plate 36. The mounting piece 56 also includes an aperture 58 (best illustrated in FIG. 7) formed therethrough with the mounting piece aperture 56 being alignable with the first aperture 52 and the second aperture 54 when the mounting piece 56 is positioned between the first ear portion 48 and the second ear portion 50 of the support plate 36. A rod 60 or the like is inserted into and frictionally or otherwise held within the first aperture 52 of the first ear portion 48, the aperture 58 of the mounting piece 56, and the second aperture 54 of the second ear portion 50 thereby allowing the binding support device 18 to pivot relative to the support plate 36 about the rod 60 into and out of the cross-country skiing mode. It should be noted that other pivoting mechanisms 46 including, but not limited to, having more than two ear portions and more than one mounting piece, is within the scope of the present invention.

[0041] As illustrated in FIG. 7, the binding apparatus 10 of the present invention further includes a biasing mechanism 62 for biasing the binding support device 18 in a direction generally toward the planar upper mounting surface 14 of the elongated ski 12. The biasing mechanism 62 is preferably mounted between the support plate 36 and the first toe plate 20 of the binding support device 18. Preferably, the biasing mechanism 62 is a coil spring, however, it is within the scope of the present invention to have the biasing mechanism 62 include, but not be limited to, other types of springs (i.e., a leaf spring) or biasing mechanisms.

[0042] As illustrated in FIG. 1, furthermore, the binding apparatus 10 of the present invention includes a securing/supporting mechanism 64 mounted to the planar upper mounting surface 14 of the elongated ski 12. The securing/supporting mechanism 64 selectively releasably maintains the second heel plate 22 of the binding support device 18 nearingly adjacent the mounting surface 14 of the elongated ski 12 in a substantial parallel relationship to the mounting surface 14 of the elongated ski 12 in the downhill skiing mode and further supports the second heel plate 22 of the binding support device 18 distant from the mounting surface 14 of the elongated ski 12 at an angle relative to the mounting surface 14 of the elongated ski 12 in the cross-country skiing mode. It is also within the scope of the present invention to have the securing/supporting mechanism 64 be rotated away from the second heel plate 22 to having the second heel plate 22 travel freely without impedance from the securing/supporting mechanism 64.

[0043] The securing/supporting mechanism 64 includes a base portion 66 having a mounting face 68 positioned against the mounting surface 14 of the elongated ski 12. Preferably, the securing/supporting mechanism 64 is releasably secured to the elongated ski 12 by a plurality of screws 70 or the like through a plurality of base portion apertures 72. While being described as being releasably secured to the elongated ski 12, it should be noted, however, that it is within the scope of the present invention to either fixedly or releasably secure the base portion 66 of the securing/ supporting mechanism 64 to the elongated ski 12 by means including, but not limited to, adhesive, bolts, etc.

[0044] The securing/supporting mechanism 64 further includes a pair of spaced support members 74 extending from the base portion 66 in a direction generally away from the mounting surface 14 of the elongated ski 12. The support members 74 each have a pair of first aligned mounting apertures 76 formed through each support member 74. Furthermore, each of the support members 74 has a pair of second aligned adjustment apertures 78 spaced from the first aligned mounting apertures 76 for maintaining the binding support device 18 in the downhill skiing mode or the cross-country skiing mode, as will be described in further detail below.

[0045] As illustrated in FIG. 2, the securing/supporting mechanism 64 also includes a rotatable actuating member 80 having a first side 82 and a second side 84. A first mounting aperture 86 and a second spaced mounting aperture 88 are formed through the actuating member 80 from the first side 82 to the second side 84. The first mounting aperture 86 is alignable with the first aligned mounting aperture 76 of each of the support members 74. The actuating member 80 is rotatably mounted between the support members 74 by a mounting pin 90 or the like extending through the first mounting aperture 86 of the actuating member 80 and the pair of first aligned mounting apertures 76 of the support members 74. The actuating member 80 is freely rotatable between the spaced support members 74 about the mounting pin 90 to maintain the binding support device 18 in the downhill skiing mode or the cross-country skiing mode.

[0046] The actuating member 80 further comprises a plurality of selectively spaced corresponding adjustment openings 92 formed in first side 82 and the second side 84 of the actuating member 80. The adjustment openings 92 are alignable with the second aligned adjustment apertures 78 of the support members 74 as

the actuating member 80 is rotated about the mounting pin 90 between the support members 74. A biased pin 94 is mounted in each of the adjustment openings 92 of the actuating member 80 and receivable by the second adjustment aperture 84 of the support members 74 as the actuating member 80 is rotated between the support members 74. The actuating member 80 is rotatable to support and maintain the binding support device 18 at a variety of different angles, including, but not limited to six (6°) degrees, eight (8°) degrees, and ten (10°) degrees, relative to the mounting surface 14 of the elongated ski 12.

[0047] Rather than having adjustment openings 92 formed in the first side 82 and the second side 84 of the actuating member 80, it is within the scope of the present invention to have the adjustment openings 92 formed completely through the first side 82 of the actuating member 80 to the second side 84 of the actuating member 80. A securing pin 96 or the like is inserted through a selected adjustment opening 92 of the actuating member 80 and the second adjustment apertures 78 of the support members 74 to maintain the actuating member 80 in a predetermined desired position between the support members 74 and to inhibit rotation of the actuating member 80 relative to the base portion 66.

[0048] As illustrated in FIGS. 9 and 10, the actuating member 80 also includes at least one, preferably three (3), binding support device supporting surfaces 98 for supporting the second heel plate 22 of the binding support device 18 at an angle relative to the mounting surface 14 of the elongated ski 12. The extended portion 26 of the extension member 24 is movable to rest against each of the supporting surfaces 98 at a predetermined angle depending on the desires of the user. Upon rotation of the actuating member 80, the user can position the desired supporting surface 98 beneath the extended portion 26 of the extension member 24 upon which a selected adjustment opening 92 of the actuating member 80 will be aligned with the pair of adjustment apertures 78 of the support members 74. The biased pins 94 of the actuating member 80 will then bias in a general direction through the pair of adjustment apertures 78 of the support member 74 and maintain the actuating member 80 in the desired position.

[0049] The securing/supporting mechanism 64 further includes a holding member 100 rotatably mounted to the actuating member 80 for maintaining the second heel plate 22 of the binding support device 18 nearingly adjacent the mounting surface 14 of the elongated ski 12. The holding member 100 includes a base portion 102 and a pair of support members 104 extending from the base portion 102 in a direction generally away from the mounting surface 14 of the elongated ski 12. The support members 104 of the holding member 100 have a pair of aligned mounting apertures 106 and extend on each side 82, 84 of the actuating member 80. The aligned mounting apertures 106 of the support members 104 of the holding member 100 are aligned with the second mounting aperture 88 extending through the actuating member 80. Another mounting pin 108 or the like is inserted through the aligned mounting apertures 106 of the support members 104 of the holding member 100 and the second mounting aperture 88 of the actuating member 80 allowing the holding member 100 to rotate relative to the actuating member 80. It should be noted that it is within the scope of the present invention to integrally form the actuating member 80 and the holding member 100 from a singe piece of material.

[0050] The base portion 102 of the holding member 100 further includes a protruding portion 110 extending in a direction generally toward the mounting surface 14 of the elongated ski 12. The base portion 102 is movable against the extended portion 26 of the extension member 14 to maintain the binding support device 18 in the downhill skiing mode nearingly adjacent the mounting surface 14 of the elongated ski 12.

[0051] The construction and operation of the binding apparatus 10 of the present invention will now be discussed. To construct the binding apparatus 10, the support plate 36 and the securing/supporting mechanism 64 are mounted to the mounting surface 14 of the elongated ski 12. The binding support device 18 is pivotally mounted to the support plate 36 through the pivoting mechanism 46. The ski binding is then mounted to the binding support device 18 as described above thereby allowing the boot of the user to be releasably secured therein.

[0052] In operation of the binding apparatus 10 of the present invention, in the downhill skiing mode, the actuating member 80 of the securing/supporting member 64 is rotated such that the holding member 100 is positioned against the extended portion 26 of the extension member 24 of the binding support device 18. The biased pins 94 of the actuating member 80 are received and maintained in the second adjustment apertures 78 of the support members 74 maintaining the binding support device 18 in the downhill mode until released by the user.

[0053] To convert to the cross-country skiing mode, the biased pins 94 are released from the second adjustment apertures 78 of the support members 74. The actuating member 80 is then rotated until the desired angle is reached and the extended portion 26 of the extension member 24 of the binding support device 18 is supported by one of the supporting surfaces 98. The biased pins 94 in the adjustment openings 92 of the actuating member 80 are then received by the second adjustment apertures 78 in the support members 74 to maintain the binding support device 18 in the cross-country skiing mode. The user can adjust the angle of the binding support device 18 relative to the mounting surface 14 of the elongated ski 12 by releasing the biased pins 94 from the second adjustment apertures 78 of the support members 74 and rotating the actuating member 80 to a desired location until a different sup-

porting surface 98 supports the extended portion 26 of the extension member 24 of the binding support device 18.

[0054] The binding apparatus 10 of the present invention is designed to allow a skier to easily and efficiently convert between the downhill skiing mode and the cross-country skiing mode. As will be evident to a person skilled in the art, the binding apparatus 10 of the present invention is a novel solution to the shortcomings of the prior art.

[0055] The binding apparatus 10 of the present invention allows the ski to flex similar to the flexing of a ski with ordinary downhill binding mounted thereon. Edge control of the ski is not compromised by using the binding apparatus 10. A skier does not have to get out of the binding apparatus 10 when changing from a cross-country to a downhill mode and vice versa which results in the skier spending less time manipulating the bindings and more time enjoying the skiing activity. Finally, the binding apparatus 10 mounts to ordinary skis without any need for special skis.

[0056] The foregoing exemplary descriptions and the illustrative preferred embodiments of the present invention have been explained in the drawings and described in detail, with varying modifications and alternative embodiments being taught. While the invention has been so shown$_1$ described and illustrated, it should be understood by those skilled in the art that equivalent changes in form and detail may be made therein without departing from the true spirit and scope of the invention, and that the scope of the present invention is to be limited only to the claims except as precluded by the prior art. Moreover, the invention as disclosed herein, may be suitably practiced in the absence of the specific elements which are disclosed herein.

Claims

1. A snow ski binding apparatus for mounting a standard downhill binding to an elongated ski, the binding having a toe portion and a heel portion, the ski having a substantially planar upper mounting surface, the binding apparatus comprising:

   binding means for releasably securing the standard downhill binding thereto, the binding means having a toe end and a heel end, the toe portion of the binding being releasably secured to the toe end of the binding means, the heel portion of the binding being releasably secured to the heel end of the binding means;

   a toe plate securable to the planar upper mounting surface of the ski and pivotally securable to the toe end of the binding means allowing the heel end of the binding means to travel away from and toward the planar upper mounting surface of the ski; and

   securing means mounted to the planar upper mounting surface of the ski nearingly adjacent the heel end of the binding means for selectively releasably securing the heel end of the binding means in a substantial parallel relationship to the planar upper mounting surface of the ski.

2. The binding apparatus of claim 1 wherein the binding means comprise a first plate adjacent the toe end, a second plate adjacent the heel end, and a connecting member extending between and mounted to the first plate and the second plate, the downhill binding securable to the first plate and the second plate.

3. The binding apparatus of claim 2 wherein the first plate, the second plate and the connecting member are at least one piece.

4. The binding apparatus of claim 2 wherein the connecting member is flexible between the toe plate and the heel plate.

5. The binding apparatus of claim 1 wherein the toe plate is releasably secured to the planar upper mounting surface of the ski.

6. The binding apparatus of claim 1 and further comprising biasing means associated with the toe plate for biasing the heel end of the binding plate in a direction toward the planar upper mounting surface of the ski.

7. The binding apparatus of claim 1 wherein upon mounting of the binding means, the toe plate, and the securing means, the elongated ski remains flexible.

8. The binding apparatus of claim 1 wherein the securing means is a rotatable latch mechanism, the rotating latch mechanism rotating to selectively releasably secure the heel end of the binding means in a substantial parallel relationship to the planar upper mounting surface of the ski.

9. The binding apparatus of claim 1 and further comprising supporting means for supporting the binding means at an angle relative to the planar upper mounting surface of the ski.

10. The binding apparatus of claim 9 wherein the supporting means are associated with the securing means, the securing means being releasable from the heel end of the binding means and movable into a position underlying the heel end of the binding plate.

11. The binding apparatus of claim 10 wherein the sup-

porting means have at least one supporting surface for supporting the binding means at an angle relative to the planar upper mounting surface of the ski.

12. A snow ski binding device for mounting a standard downhill binding to an elongated ski, the binding having a toe portion and a heel portion, the ski having a substantially planar upper mounting surface, the binding apparatus comprising:

binding means pivotally mounted to the planar upper mounting surface of the ski for releasably securing the standard downhill binding thereto, the binding means having a toe end and a heel end;
securing means mounted to the planar upper mounting surface of the ski nearingly adjacent the heel end of the binding means for selectively releasably securing the heel end of the binding means in a substantial parallel relationship to the planar upper mounting surface of the ski; and
supporting means mounted to the planar upper mounting surface of the ski nearingly adjacent the heel end of the binding means for selectively releasably supporting the heel end of the binding means at an angle relative to the planar upper mounting surface of the ski.

13. The binding device of claim 12 wherein the binding means comprise a first plate adjacent the toe end, a second plate adjacent the heel end, and a connecting member extending between and mounted to the first plate and the second plate, the downhill binding securable to the first plate and the second plate.

14. The binding device of claim 12 wherein the first plate, the second plate and the connecting member are at least one piece.

15. The binding device of claim 13 wherein the connecting member is flexible between the toe plate and the heel plate.

16. The binding device of claim 12 and further comprising a toe plate securable to the planar upper mounting surface of the ski, the toe end of the binding means being pivotally secured to the toe plate allowing the heel end of the binding means to travel away from and toward the planar upper mounting surface of the ski.

17. The binding device of claim 16 and further comprising biasing means associated with the toe plate for biasing the heel end of the binding plate in a direction toward the planar upper mounting surface of the ski.

18. The binding device of claim 12 wherein the securing means is a rotatable latch mechanism, the rotating latch mechanism rotating to selectively releasably secure the heel end of the binding means in a substantial parallel relationship to the planar upper mounting surface of the ski.

19. The binding device of claim 12 wherein the supporting means is associated with the securing means, the securing means being releasable from the heel end of the binding means and movable into a position underlying the heel end of the binding plate.

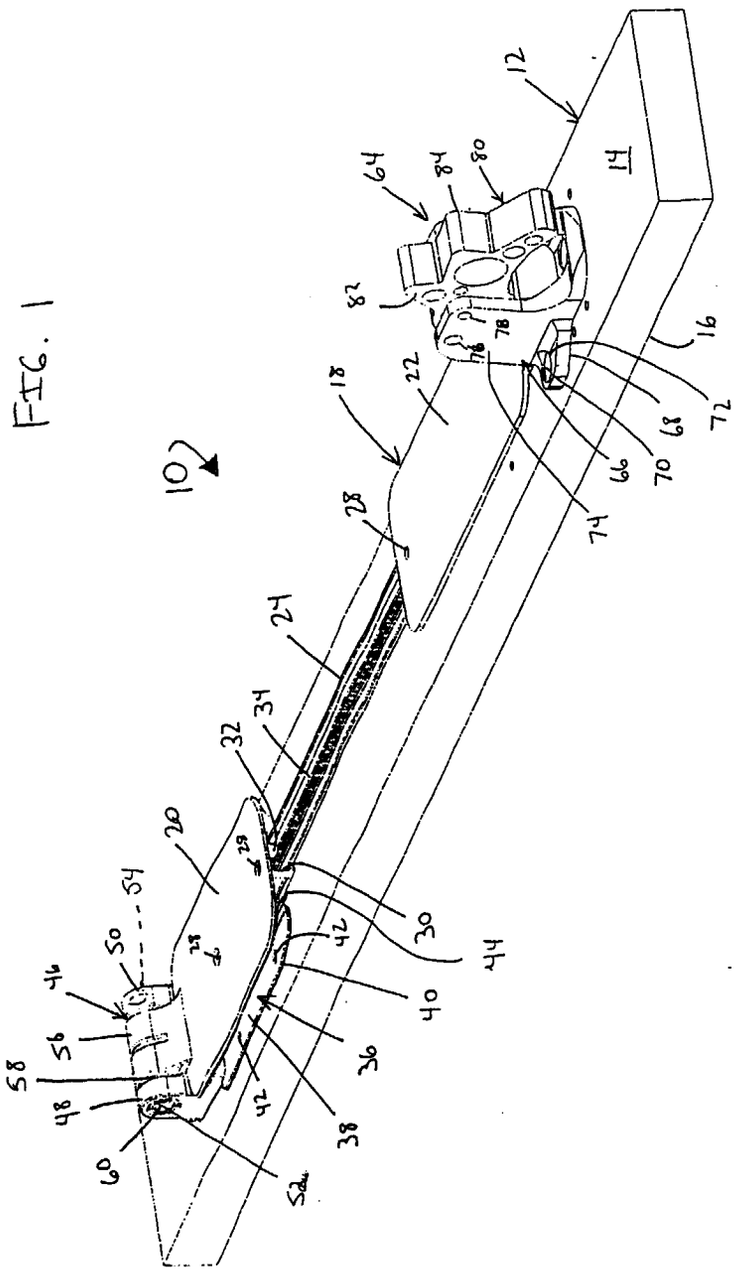
20. The binding device of claim 12 wherein the supporting means has at least one supporting surface for supporting the binding means at an angle relative to the planar upper mounting surface of the ski.

21. A method for mounting a binding to a ski for a skier to ski in both a downhill and cross-country manner, the method comprising:

providing a binding apparatus having binding means, the binding means having a toe end and a heel end;
releasably securing a downhill binding to the binding plate between the toe end and the heel end;
pivotally securing the toe end of the binding means to the ski; and
mounting securing means on the ski for selectively releasably maintaining the heel end of the binding plate in a substantial parallel relationship to the ski.

22. The method of claim 21 and further comprising providing supporting means associated with the securing means for supporting the binding means at an angle relative to the planar upper mounting surface of the ski.

FIG. 1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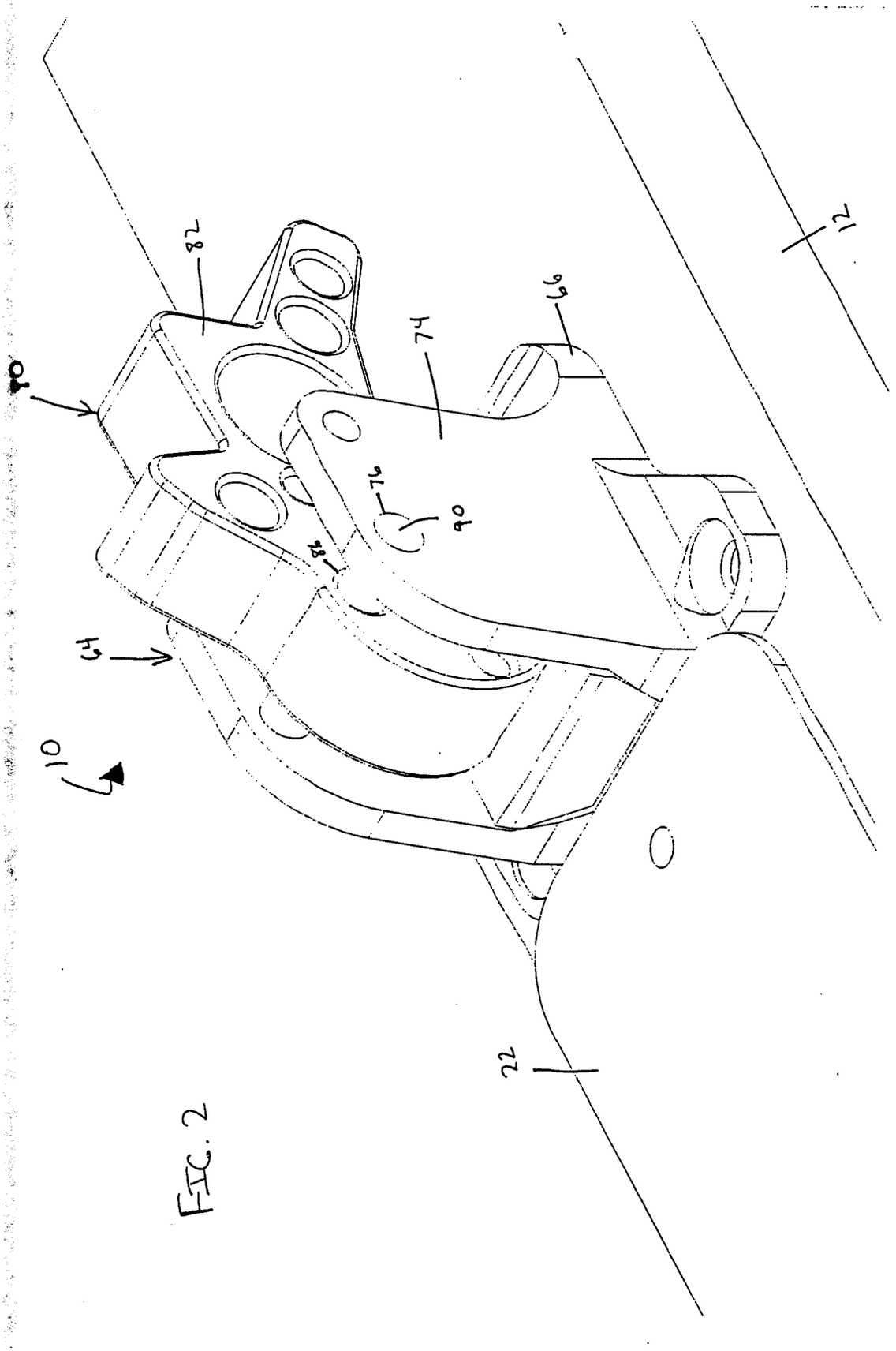

FIG. 2

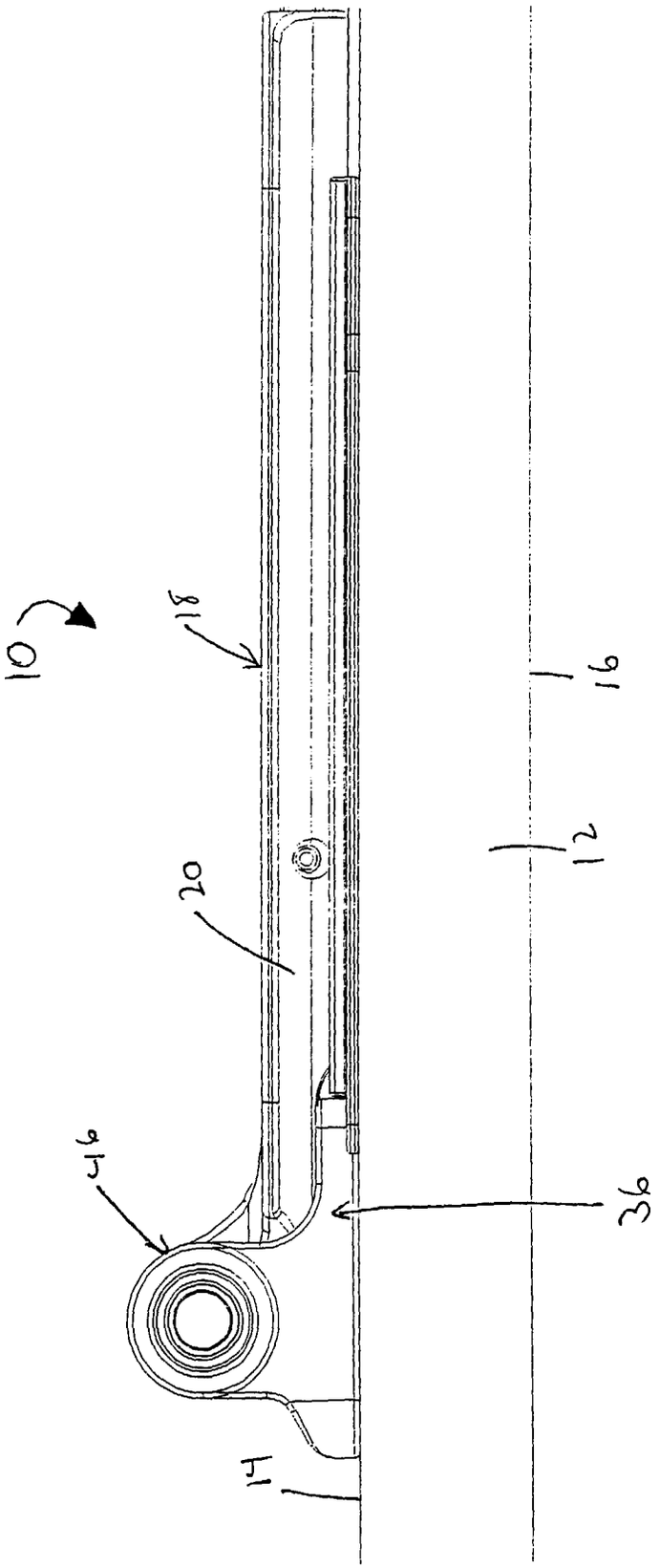

FIG. 3

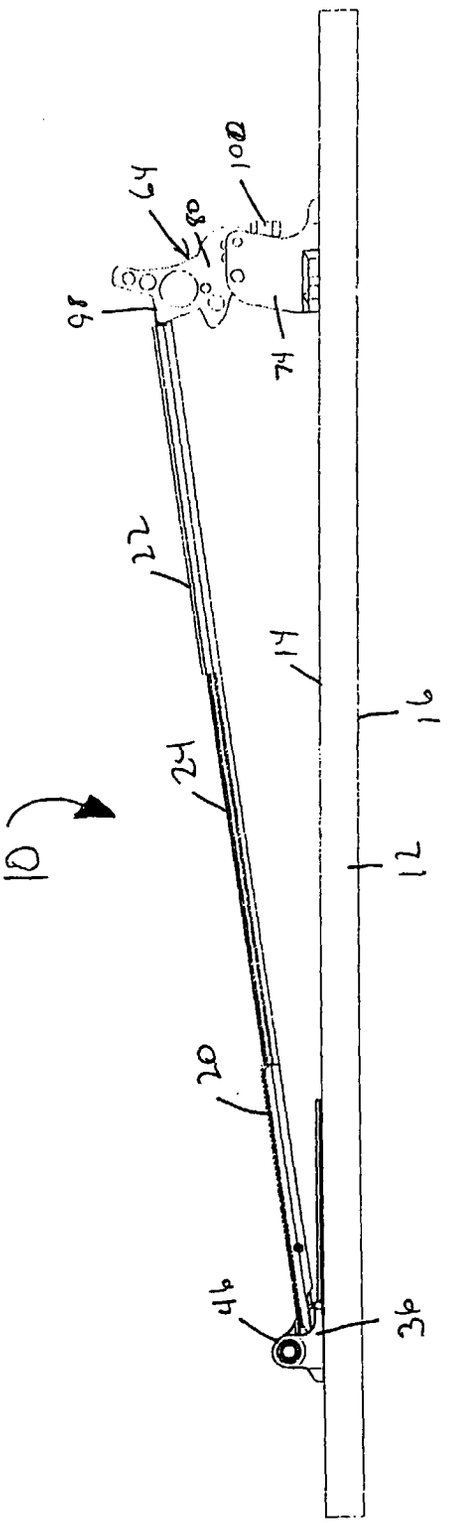
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FIG. 4

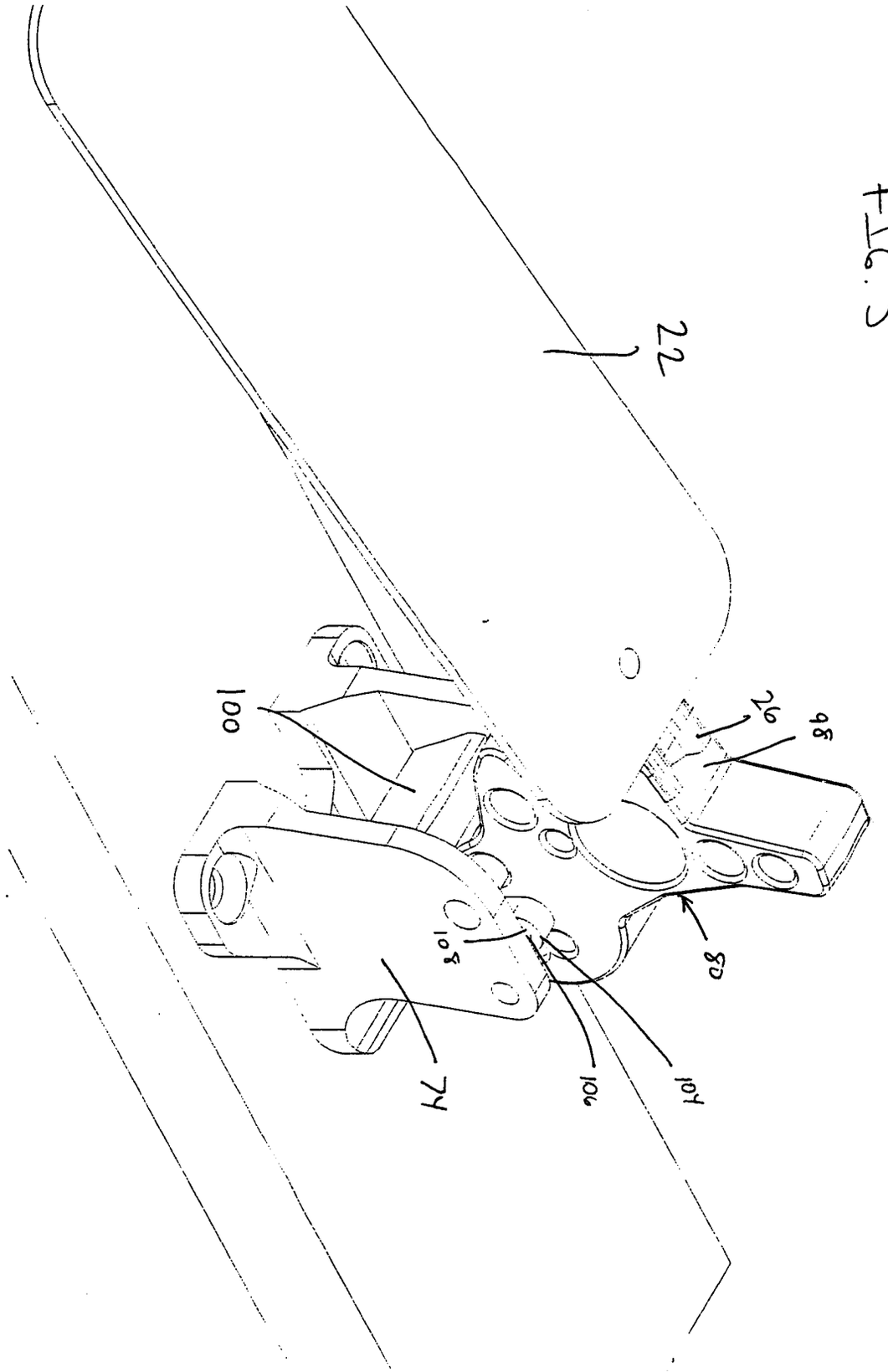

Fig. 5

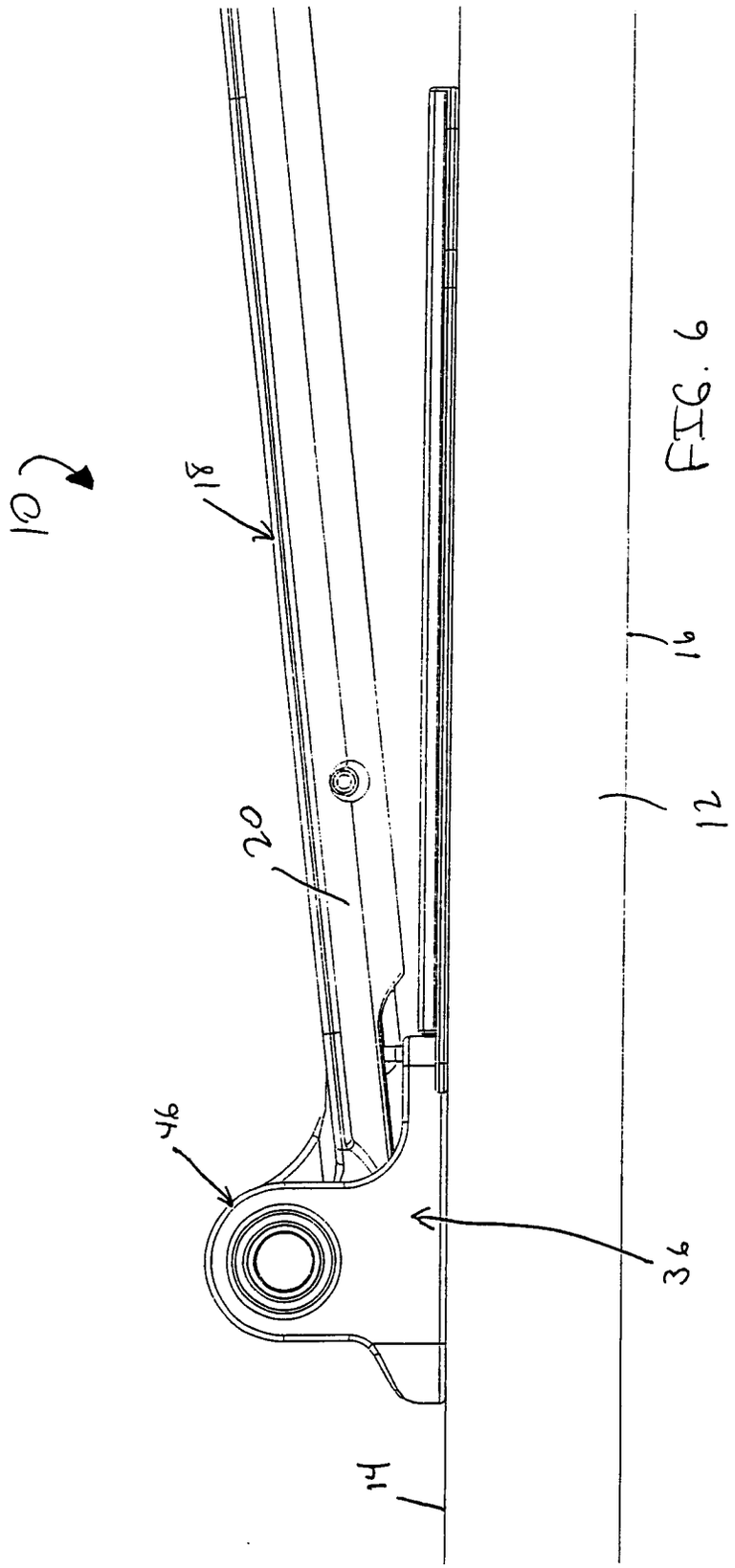

FIG. 6

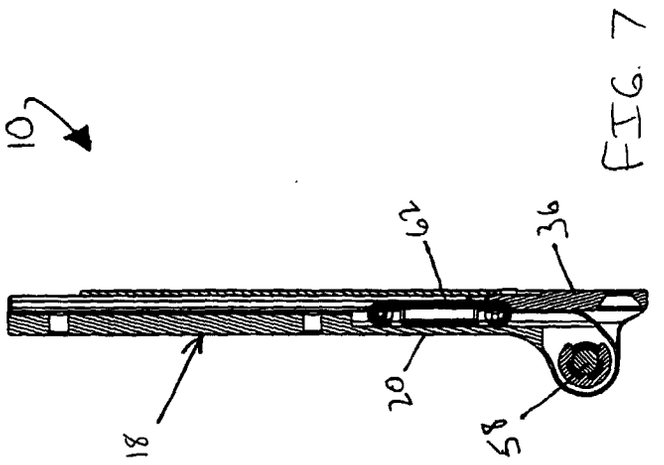

FIG. 7

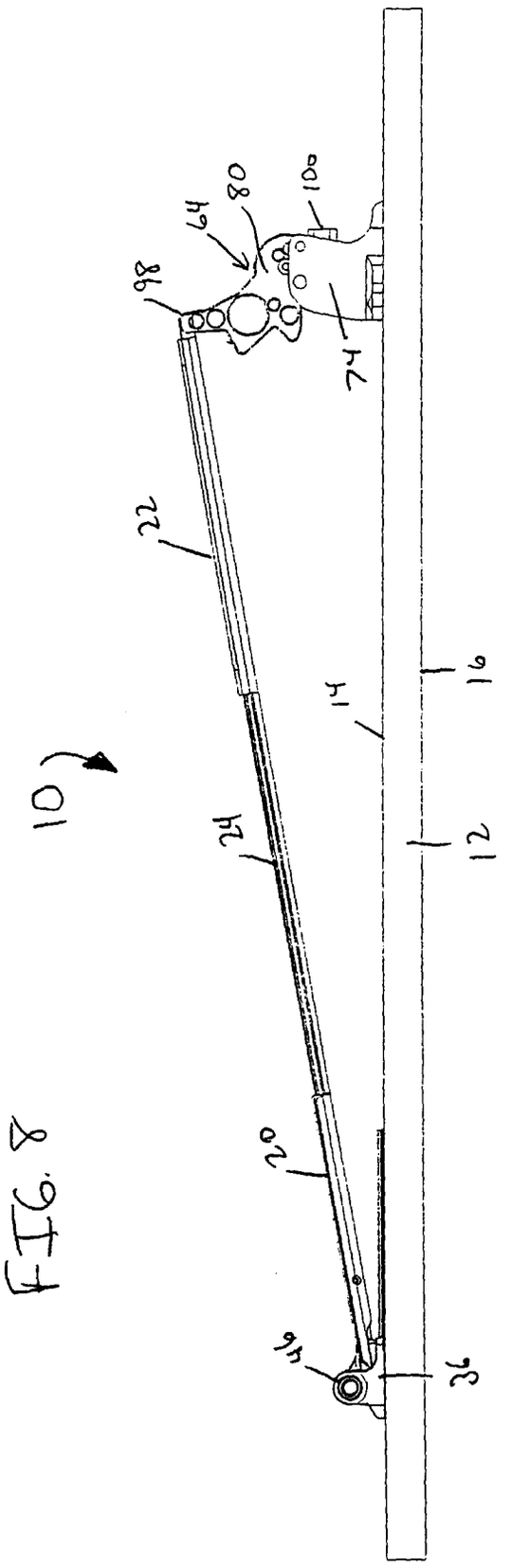

FIG 8

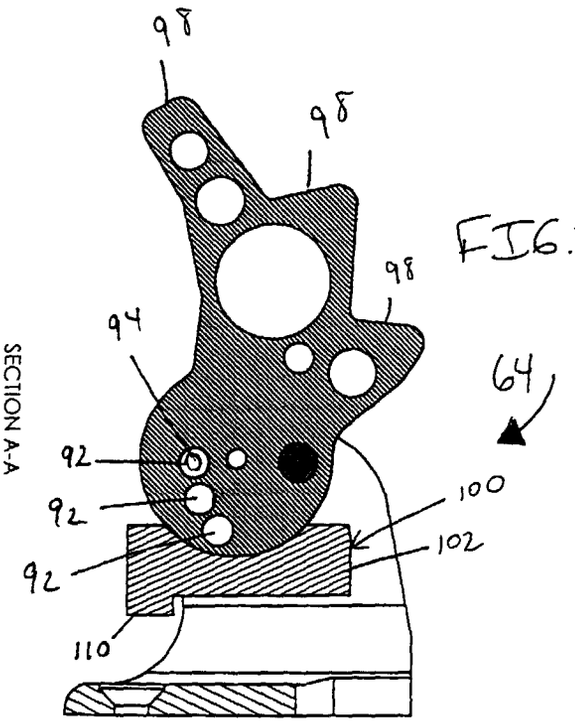

FIG. 9

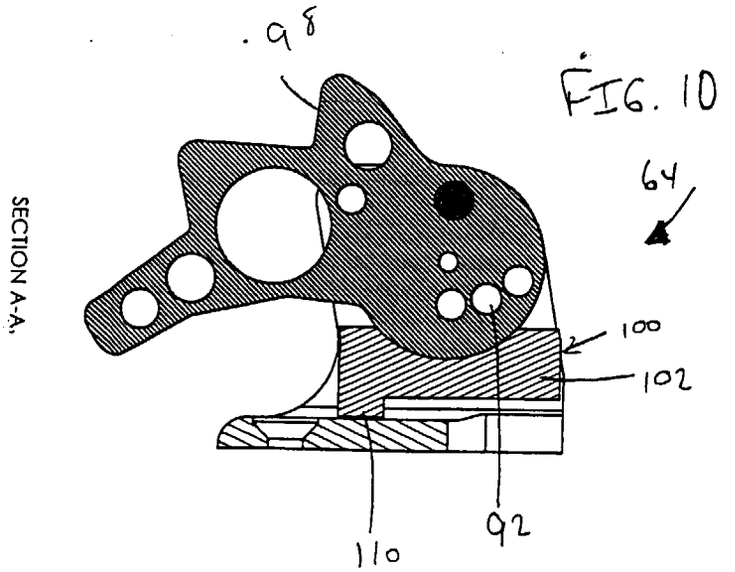

FIG. 10

SECTION A-A.