

Oct. 5, 1965

E. J. KEELING ETAL

3,210,090

SAFETY SKI BINDING

Filed Feb. 28, 1963

2 Sheets-Sheet 1

Fig. 1.

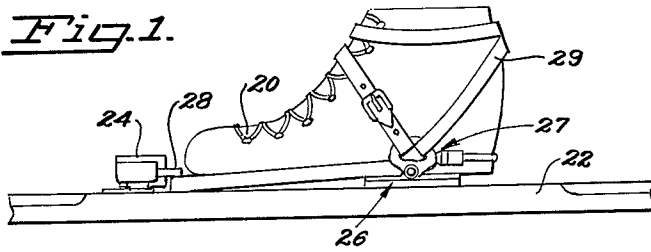


Fig. 7.

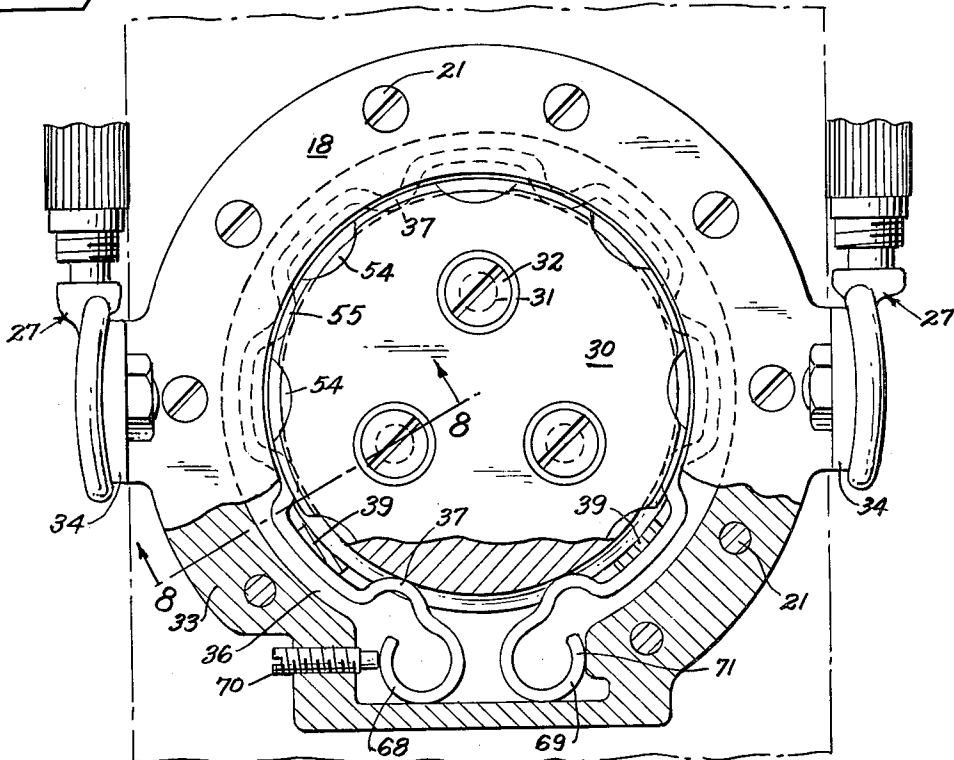
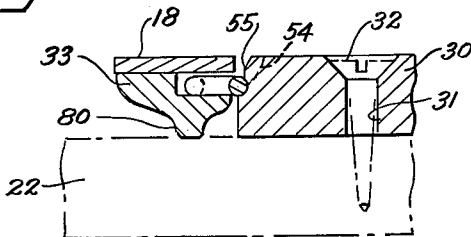


Fig. 8.



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2 Sheets-Sheet 2

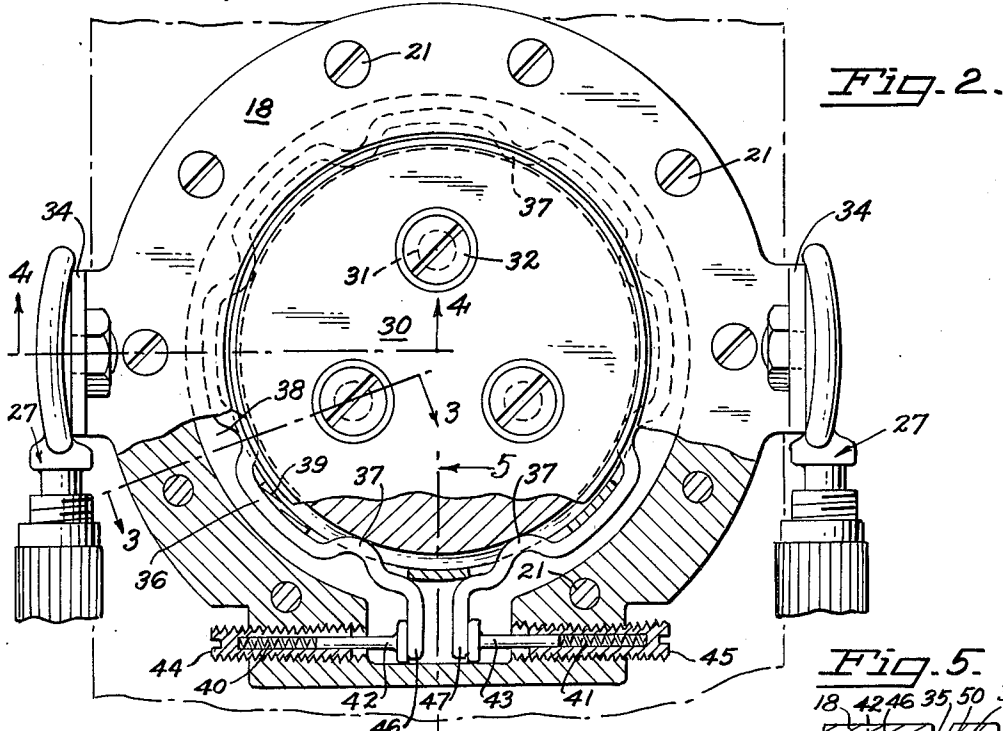


Fig. 2.

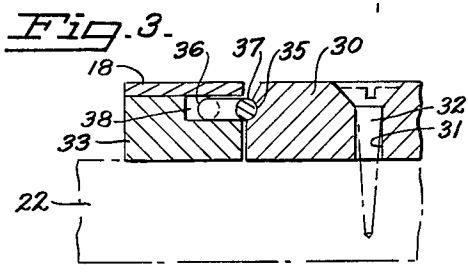


Fig. 3.

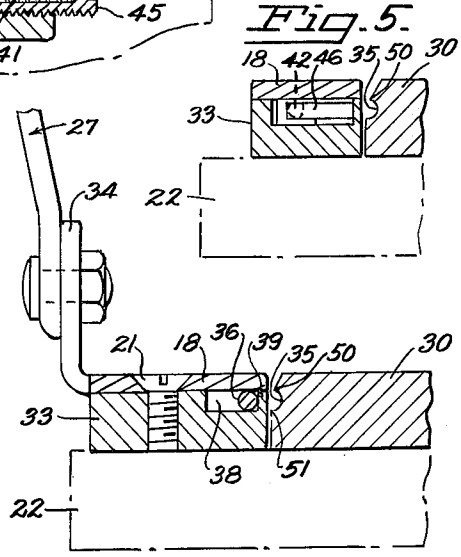


Fig. 5.

Fig. 4.

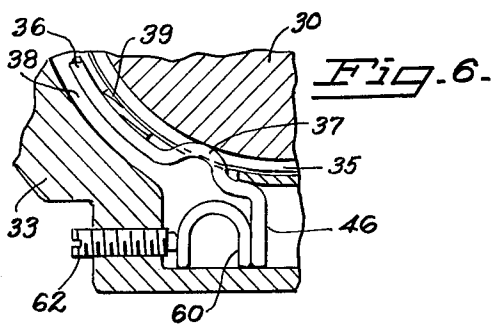


Fig. 6.

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3,210,090

SAFETY SKI BINDING

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Filed Feb. 28, 1963, Ser. No. 261,712
23 Claims. (Cl. 280—11.35)

This invention relates to ski bindings, and, more particularly, this invention relates to safety ski bindings for releasably securing a skier to a ski.

Heretofore, much work has been done to develop safety ski bindings to releasably secure a ski boot, and thus a skier, to a ski. The need for a safety ski binding is self-evident. However, a safety binding which couples reliability of release-operation with a high degree of skiability in the disconnectably connected position has not yet been found.

In a broad aspect, the present invention provides a safety ski binding which includes at least a first member for fixedly mounting on a ski and a second member disconnectable from said first member. The second member is provided with a means for operably securing a ski boot thereto. Groove means are formed in one of the members. Flexible means, including portions formed in a unitary manner therewith, are provided for cooperation with the groove means. Retaining means are provided in the other of the members for operably retaining the flexible means. The retaining means allows the unitarily formed portions of the flexible means to engage in and disengage from the groove means. Resilient means are provided to urge the unitarily formed portions of the flexible means into engagement with the groove means to disconnectably connect the members.

The members are disconnectably connected in the manner provided for by the present invention and one of the members is fixedly mounted on a ski. A ski boot is attached to the other member by appropriate means. The two members are disconnectably connected together in such a manner that there is little, if any, free play between the members. Therefore, the ski boot is firmly attached to the ski and a great degree of control may be exercised by the skier on the ski with no loss of motion due to wobble or free play of the binding. On the other hand, however, once a force of greater than a predetermined magnitude is exerted on the skier, whether it be a torsional force on the skier's leg caused by a twisting of the ski or a force on the skier's leg caused by a straight forward or sideward fall, the members will release and damage to the skier due to the potentially large lever arm of the ski is prevented.

It is a particular object of this invention to provide an improved means for disconnectably connecting a pair of cooperating members together to serve as means for disconnectably connecting a ski boot to a ski in a manner to provide a rigid connection to the ski until the occurrence of a force of a predetermined magnitude which causes the members to separate and which improved means allows said members to be readily reconnected in the same manner.

Further objects and advantages of this invention will become apparent from the following detailed description and the accompanying drawings which are a part of this specification and in which:

FIG. 1 is a view illustrating a ski boot disconnectably connected to a ski which is helpful in understanding the present invention;

FIG. 2 is a plan view, with parts broken away for clarity of presentation, illustrating a preferred embodiment of

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apparatus assembled in accordance with the present invention;

FIG. 3 is a sectional view taken at line 3—3 of FIG. 2;

FIG. 4 is a sectional view taken at line 4—4 of FIG. 2;

FIG. 5 is a sectional view taken at line 5—5 of FIG. 2;

FIG. 6 is a fragmentary view of a portion of apparatus similar to that illustrated in FIG. 2 with parts broken away for clarity of presentation and showing an alternative embodiment of apparatus in accordance with the present invention;

FIG. 7 is a plan view with parts broken away for clarity of presentation illustrating an alternative embodiment of apparatus assembled in accordance with the present invention;

FIG. 8 is a sectional view taken at line 8—8 of FIG. 7.

With reference to the drawings and to FIG. 1 in particular, a preferred embodiment of apparatus assembled in accordance with the present invention will be described in detail. FIG. 1 is helpful in gaining a better understanding of the present invention. A ski boot 20 is shown disconnectably connected to a ski 22 by a toe binding means represented generally by the numeral 24 and a heel binding means represented generally by the numeral 26. The toe of the boot 20 is secured by a ski boot engaging means such as lip 28 formed on the toe binding means 24. The rearward portion of boot 20 is secured to the heel binding means 26 by suitable means such as thong 29 and heel spring 27. The particular and important features of this invention will be described in detail below with regard to the heel binding means 26. In this regard, therefore, any suitable toe binding means 24 may be used. For example, a suitable toe binding means is illustrated in U.S. 2,836,428.

With reference to FIGS. 2-5, a preferred embodiment of apparatus assembled in accordance with this invention is shown. A first member 30 is provided with means such as appropriate holes 31 to fixedly mount it on a ski. Screws 32 may be used to mount the member 30. A second member 33, formed for cooperation with the first member 30, is provided with ski boot engaging means, such as for example lugs 34. The lugs 34 serve to anchor an appropriate connection to the boot, for example the heel spring means 27 and long thong 29 shown in FIG. 1. The second member 33 is provided with a top plate 18 which is connected to it by suitable bolts 21.

In operation, the ski boot is connected to the member 33 provided with means for so doing. The other member 30 is fixedly mounted on a ski. The members 30 and 33 are snapped together and are releasably maintained in this position until a fall by the skier causes a force of a predetermined magnitude to separate the members 30 and 33. Thus, the boot and the ski separate, each having one of the members 30 and 33 respectively attached thereto. Appropriate safety strap means are provided to prevent the ski running off. The skier then aligns the members 30 and 33 in a coaxial position and snaps them back together and he is again ready to ski.

The first member 30 and the second member 33 are disconnectably connected together to allow for relative rotational motion between the members when a predetermined torsional force is applied between the ski and the skier's leg and thus transferred to the members. Thus, if a force occurs which opens the safety toe means and only tends to twist the skier's leg, the members 30 and 33 will not separate, but rather they will rotate relative to one another to ease the stress on the leg.

In a particular aspect, the present invention provides an improved means for disconnectably connecting a pair of cooperating members to form a safety ski binding. For example, a groove means, such as annularly extending groove 35, is formed in one of the members. The groove

means 35 is, for example, formed in a peripheral wall of the member 30. A flexible means 36 is provided with groove engaging means formed in a unitary manner therewith, for example a plurality of unitarily formed protuberances 37. That is, the protuberances 37 are formed in the flexible means 36 in a unitary manner therewith. The protuberances 37 are formed for engagement in and disengagement from the groove means 35.

Retaining means, such as an annularly extending channel 38, the lip means 39 associated therewith, and a top cover 18, operably retain the flexible means 36 in the other of the members and allow limited movement of the flexible means 36 sufficient to permit the unitarily formed protuberances to engage and disengage the groove means 35. Resilient means, such as opposing compression springs 40 and 41, acting on pistons 42 and 43, urge the radially extending protuberances 37 into engagement with the groove means 35 to disconnectably connect the members 30 and 33. The members when thus connected are rotatable by a twisting force applied to the ski sufficient to cause the safety toe means to release. On the other hand, the members are separable when a force of a predetermined magnitude, such as a forward fall, occurs in another direction or the members are both rotatable and releasable should the need arise, and thus the skier is safe from serious injury to his legs.

Adjusting means are provided to adjust the force exerted by the resilient means 40 and 41 on the flexible means 36. For example, the resilient means 40 and 41 are contained in hollowed out bolts 44 and 45. The bolts 44 and 45 may be turned in or out to vary the force exerted by the resilient means 40 and 41 on the ends 46 and 47 of the flexible means 36. By adjusting the force exerted by the resilient means, it is possible to obtain a release setting between the members varying from very easy to very tight. However, in either an easy release position or a tight release position, the members are held together in a rigid manner until release occurs.

A further feature of the present invention includes forming the groove means 35 to include a means for cooperation with the radially extending protuberances 37 of the flexible means 36 to allow the protuberances 37 to more easily engage in the groove means 35 when the member containing the flexible means is pushed down over the member having the annular groove 35 than to disengage from the groove 35 when that member is pulled off the member having the annular groove. In other words, it is important to be able to easily disconnectably connect the members even when the resilient means 40 and 41 are adjusted to put a great force on the flexible means 36. Thus the members 30 and 33 may be relatively tightly connected together so that they do not become disconnected too easily while skiing. However, in the event of a fall which does cause the members 30 and 33 to become disconnected the members 30 and 33 may be relatively easily connected together without the application of a force of anywhere near the magnitude required to separate them.

It has been found that by forming the annularly extending groove 35 in a shape to firmly receive the protuberances 37 and then reducing the size of the flange 50 on which maximum force is exerted when the members are pulled apart, the members can be held together against a very strong force tending to separate them, but once separated they can again be disconnectably connected with much less force.

For example, in the preferred embodiment the flexible means 36 is of circular cross-section. Therefore the groove means 35 is formed with a circular cross-section of substantially the same diameter. The lip of the flange 50 which acts to retain the protuberances in the groove 35 is cut back over the entire extent of the annularly extending groove until it is smaller than the lip of the other flange 51. When the flanges are prepared in this man-

ner, the large flange 51 provides a seat to rigidly seat the flexible member and the smaller flange 50 allows the protuberances to be easily snapped into the groove. It has been found that reducing the size of the lip of the flange 50 also allows a smoother release action when the members 30 and 33 separate. In actual skiing with one member connected to the boot and the other member fixedly connected to the ski, when separation of the members 30 and 33 occurs in a fall, it has been found that the members may be reconnected simply by stepping on the ski with the members coaxially aligned and stepping down to snap the members together. The heel spring 27, as shown in FIG. 1, is loosened and the toe of the boot is then rotated under the toe binding means 24 and the heel spring 27 locked. The safety binding of the present invention is then ready to be again skied on.

Referring briefly now to FIGS. 7 and 8, an alternative means formed in said groove means is illustrated for cooperation with the protuberances 37 of the flexible means 36 to allow the members to be easily disconnectably connected together. In this alternative embodiment, the lip of the flange 55 of the groove 35 which first engages the protuberances 37 when the members are being disconnectably connected is provided with spaced apart portions 54 of its lip which are greatly reduced in size. The reduced sized portions 54 are alignable with the protuberances 37, but are out of alignment with the protuberances 37 when the members have been connected and rotated to skiing position as is shown in FIG. 7 and FIG. 8. This alternative is not preferred for use when it is contemplated to use the apparatus of the invention in a binding that is fixedly secured to the ski boot as is the case with the thong and heel spring arrangement of the releasable turntable as described in the preferred embodiment, but rather it is used when the members must be reconnected by hand as is the case when only a heel spring is used in connecting the boot to the turntable or when the flexible means 37 and the groove means 35 are used in a toe release binding.

The flexible means 36 is provided with a plurality of radially extending protuberances 37 formed in a unitary manner therewith. The protuberances 37 are engageable with the groove means 35 formed in one of the members. A flexible means 36 having unitarily formed protuberances has many advantages. For example, the flexible means is readily and surely operably retained in one of the members because there are no critical capture tolerances required. Rather, only a plurality of lip means 39 are required to hold the flexible member in an annularly extending channel. It is also obvious that a disconnectably connectable safety binding utilizing a flexible means having unitarily formed protuberances can be made quite thin. This is important, especially when the flexible means is to be used in a safety binding located under the sole of the ski boot. The unitarily formed protuberances slide in the annularly extending groove and allow relative rotational motion between the members even at a tight release setting.

A set of safety turntables similar to that illustrated in FIG. 2 were constructed in accordance with the present invention. These turntables functioned extremely well in trial ski runs at such locations as Squaw Valley, California and Heavenly Valley, California. Some of the dimensions of the tested safety binding, not by way of limitation but only as a guide, are included. The flexible means was formed in a generally circular shape of about 2½ inches in diameter. Eight radially extending protuberances, each having a radius of about ¼-inch, were spaced apart on the flexible means. The material used as the flexible means was ⅜-inch piano wire suitably annealed for forming and afterwards tempered to a desired hardness to form a wire-like flexible means. The protuberances were formed by hammering out the wire. The annularly extending groove means was formed in

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the member adapted to be mounted on a ski. The groove was circular in crosssection and had a radius of approximately $\frac{3}{32}$ of an inch to insure a snug fit. The upper lip was reduced slightly to allow the protuberances to be easily snapped into the groove. The diameter of the upper flange was about 2.225 inches as compared to a diameter of 2.250 inches for the lower flange.

The wire-like flexible member was operably retained in the member having means for securing a ski boot. An annularly extending channel having raised lip portions was used to retain the wire-like flexible member to allow the unitarily formed protuberances to move in and out of the groove. Resilient means formed of compression springs and means for adjusting the force exerted by the resilient means were provided to urge the protuberances into the annularly extending groove to disconnectably connect the members. A combination of thong and heel spring was used to connect each ski boot to this member.

With reference to FIG. 6, an alternative arrangement of resilient means is shown for use in urging the flexible means into engagement with the annularly extending groove 35. Both sides of the apparatus are similar and therefore only the left side is illustrated in FIG. 6. A pair of C-shaped leaf springs 60 provide force in opposing positions abutting against the ends 46 of the flexible member 36. The force exerted by the C-springs 60 is adjusted by running in or running out adjusting means 62 in the threads provided in the member 33.

With reference now to FIG. 7, another alternative arrangement of the resilient means is shown. In this embodiment, the ends 68 and 69 of the flexible member 36 are formed in a shape to provide spring action. This arrangement provides a unitary flexible means and resilient means. The adjustment is provided by bolt 70 abutting against the end 68 of the flexible member. The other end 69 of the flexible member is abutted against an appropriate stationary means, such as shoulder 71. In this manner, adjustment is accomplished by turning only one bolt.

As shown clearly in FIG. 8, it is desirable to provide a running surface 80 to seat the portion of the member engaging the ski boot on the ski 22. This is desirable so that the member is easily connected to the fixedly mounted member even in the event that snow or dirt become accumulated on the surface of the ski adjacent the fixedly mounted member. It has been found that dirt or snow will accumulate on the surface of the ski and make reconnecting the members somewhat difficult if the removable member has an entirely flat surface for seating on the ski. Forming an annularly extending running surface 80 overcomes this difficulty.

It is apparent that modifications other than those described herein may be made to the apparatus of this invention without departing from the inventive concept. It is intended that the invention embrace all equivalents within the scope of the appended claims.

We claim:

1. In a ski binding of the type having at least a first member for fixedly mounting on a ski and a second member disconnectable from said first member, said second member having means for operably securing a ski boot thereto, the improvement comprising groove means formed in one of the members, flexible means operably secured in the other of the members for limited movement, said flexible means having a groove engaging means formed in a unitary manner therewith for engagement with said groove means to disconnectably connect the members and to allow relative angular movement in a predetermined plane between the disconnectably connected members while the members are disconnectably connected, and resilient means for urging the said groove engaging means of said flexible means into engagement with said groove means.

2. In a safety ski binding of the type having one mem-

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ber adapted to be fixedly mounted on a ski and a second member disconnectably connectable with said first member, said second member having means to operably hold a ski boot, the improvement comprising groove means in one of the members, flexible means having a plurality of spaced apart radially extending protuberances formed in a unitary manner therewith and for cooperation with said groove means, retaining means in the other of the members for operably retaining said flexible means, said retaining means allowing said protuberances to engage and disengage said groove means to disconnectably connect the members together and resilient means for urging said protuberances into said groove means.

3. The apparatus of claim 2 characterized by adjusting means for adjusting the force with which the resilient means urges the flexible means into said groove means.

4. The apparatus of claim 3 further characterized by means formed in said groove means for cooperation with said protuberances to allow said members to be relatively easily disconnectably connected together.

5. In a safety ski binding of the type having a first member for fixedly mounting on a ski and a second member separable from said first member, said second member having ski boot engaging means thereon for operably securing a ski boot, the improvement comprising an annularly extending groove formed in a peripheral wall of said first member, a generally circular flexible means formed for cooperation with said groove, retaining means in said second member operably holding said flexible means to allow said flexible means to be selectively engaged in and disengaged from said groove to disconnectably connect said first member and said second member while allowing relative rotational movement between said members, resilient means for urging said flexible means into engagement with said groove and adjusting means for adjusting the force exerted by said resilient means on said flexible means.

6. Apparatus for use in connecting a ski boot to a ski comprising a first member adapted to be fixedly mounted on a ski, a second member, ski boot securing means on said second member, groove means in one of the members, a generally circular flexible means formed for cooperation with said groove, a plurality of groove engaging means formed in a unitary manner with said flexible means, retaining means operably holding said flexible means in the other of said members and allowing limited movement of said flexible means, resilient means for urging said plurality of groove engaging means of said flexible member into engagement with said groove means, and adjusting means for adjusting the force exerted by said resilient means.

7. Apparatus for use in connecting a ski boot to a ski comprising a first member for fixedly mounting on a ski, a second member for cooperation with said first member for relative rotational movement between the members, ski boot securing means on said second member, an annularly extending groove in said first member, flexible means having a plurality of spaced apart radially extending protuberances formed in a unitary manner therewith, retaining means in said second member operably retaining said flexible means in said second member and allowing said protuberances to engage and disengage said annularly extending groove, and resilient means in said second member for urging the protuberances of said flexible means into said groove whereby said members are disconnectably connected.

8. The apparatus of claim 7 and adjusting means for adjusting the force exerted by said resilient means on said protuberances.

9. The apparatus of claim 7 further characterized by means formed with said annularly extending groove for cooperation with said protuberances to allow said protuberances to be more easily engaged in said groove than disengaged from said groove.

10. The apparatus of claim 7 characterized by a re-

resilient means formed in a unitary manner with the flexible means.

11. Apparatus for attaching a ski boot to a ski comprising a first member having a generally circularly formed peripheral wall, said first member adapted to be fixedly mounted on a ski, a second member for cooperation with said first member for relative rotational motion with said first member, said second member having means to secure a ski boot thereto, an annularly extending groove in the peripheral wall of said first member, flexible means having a plurality of spaced apart unitarily formed protuberances, retaining means in said second member operably securing said flexible means and allowing the protuberances of said flexible means to engage in and disengage from said annularly extending groove, resilient means operably connected to said flexible means for urging said protuberances into said groove and adjusting means for adjusting the force of said resilient means.

12. The apparatus of claim 11 characterized in that the annularly extending groove is formed to include a means to allow the protuberances to be more easily engaged into said groove than to be disengaged from said groove.

13. A safety ski binding comprising a pair of separable cooperating members, one of said members being adapted for mounting on a ski and the other of said members having means for operably engaging a ski boot, an annularly extending groove in one of said members, said groove having a radially extending flange, a wire-like flexible means having a plurality of protuberances formed in a unitary manner therewith, means for retaining said wire-like flexible means in the other of said members to allow said protuberances to engage and disengage said annularly extending groove in abutment with said flange, a plurality of spaced apart portions in said flange where the lip of the flange has been diminished in size to more easily pass said protuberances into said groove, said portions being alignable with said protuberances, resilient means normally urging the protuberances of said wire-like flexible means into said groove, and adjusting means for adjusting the force exerted by said resilient means.

14. A safety ski binding for disconnectably connecting the heel portion of a ski boot to a ski and for use with a toe mounting means comprising a first member for fixedly mounting on a ski, an annularly extending groove in said first member, a second member for cooperation with said first member for relative rotational movement therewith, means on said second member to operably secure a ski boot, a wire-like flexible means, groove engaging means formed in a unitary manner with said wire-like member for engaging in and disengaging from said annularly extending groove, resilient means in said second member and operably connected to said wire-like flexible means to urge said groove engaging means into said annularly extending groove and adjusting means for adjusting the force exerted on said groove engaging means by said resilient means.

15. The ski binding of claim 14 further characterized by means formed in said annularly extending groove to allow the groove engaging means to be easily engaged in said groove when the members are being disconnectably connected together.

16. The ski binding of claim 14 further characterized

by an annularly extending running surface on the bottom of said second member.

17. A safety ski binding for disconnectably connecting the heel portion of a ski boot to a ski, and for use with a toe binding means, comprising a first member for fixedly mounting on a ski, a second member for cooperation with said first member for relative rotational movement therewith, an annularly extending groove in said first member, an annularly extending channel in said second member, said channel having spaced apart openings adjacent said groove, a flexible wire-like means in said channel, said flexible wire-like means having a plurality of spaced apart radially extending unitarily formed protuberances for engaging said groove, resilient means operably connected with said flexible wire-like means to urge said protuberances into said groove, and adjusting means for adjusting the force exerted by said resilient means on said protuberances.

18. In a ski binding of the type having at least a first member for fixedly mounting on a ski and a second member disconnectable from said first member, said second member having means for operably affixing a ski boot thereto, the improvement comprising groove means formed in one of the members, flexible means operably secured in the other of the members and engageable with said groove means to disconnectably connect the members and to permit relative angular movement in a predetermined plane between the disconnectably connected members while the members are disconnectably connected, and resilient means for urging the said flexible means into engagement with said groove means to disconnectably connect the members.

19. The apparatus of claim 18 further characterized in that the groove means are annularly extending and that the flexible means are substantially circularly extending.

20. The apparatus of claim 18 further characterized by adjusting means for adjusting the force exerted on said flexible means by said resilient means.

21. The apparatus of claim 18 further characterized in that the members are mountable on top of a ski generally under the heel of a ski boot.

22. The apparatus of claim 18 further characterized in that the flexible means is a thin, flexible wire-like band.

23. The apparatus of claim 18 further characterized in that the flexible means is snugly engageable with said groove means.

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