April 23, 1968 G. A. WEBSTER 3,379,447

SKI SAFETY BINDING DEVICE

Filed May 19, 1966 3 Sheets-Sheet 1

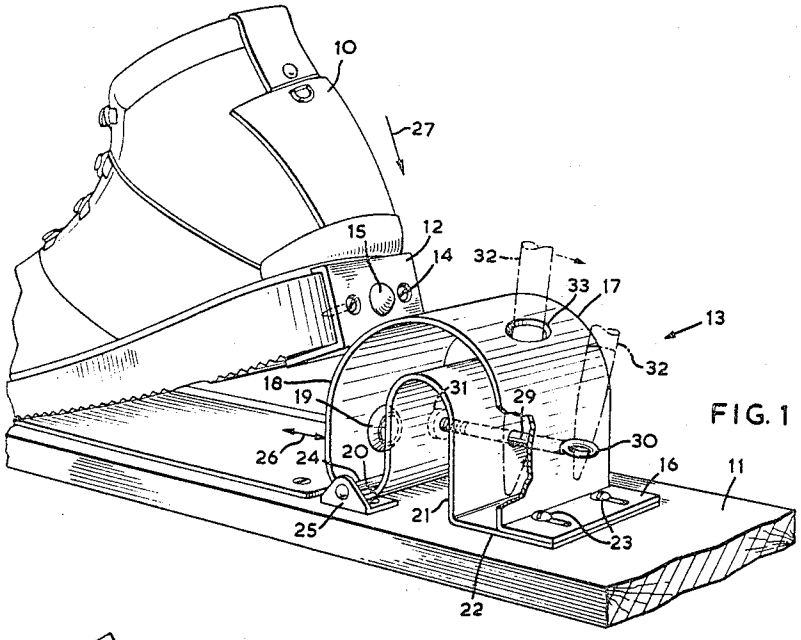


FIG. 1

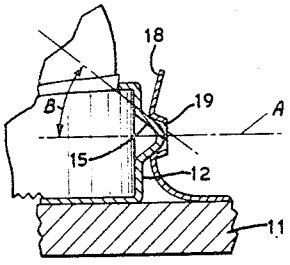


FIG. 3

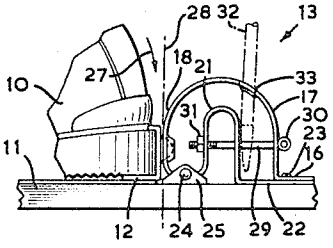


FIG. 2

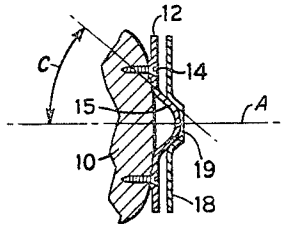


FIG. 4

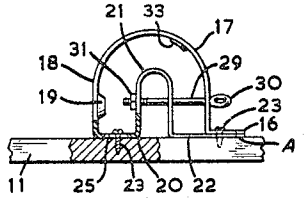


FIG. 5

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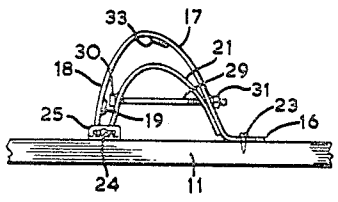


FIG. 6

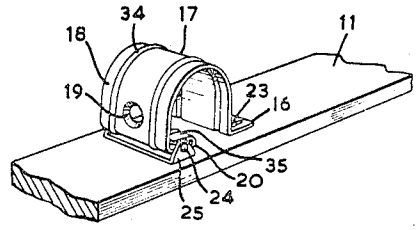


FIG. 7

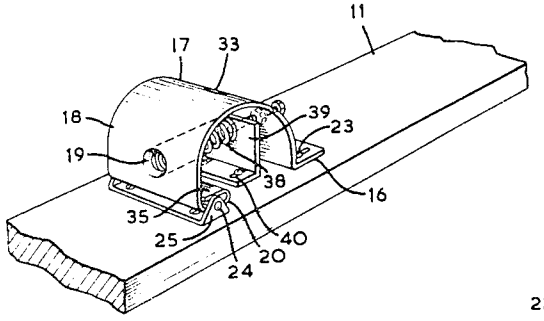


FIG. 8

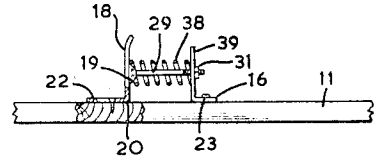


FIG. 9

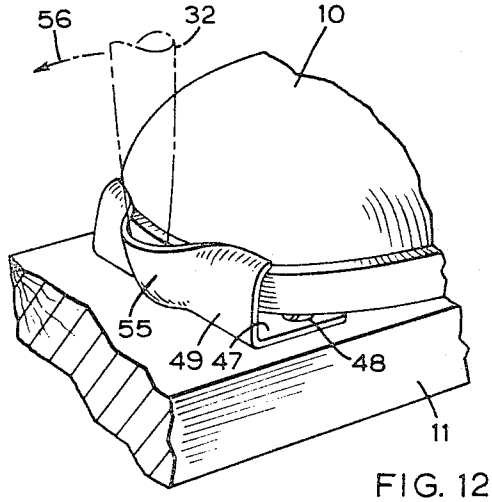


FIG. 12

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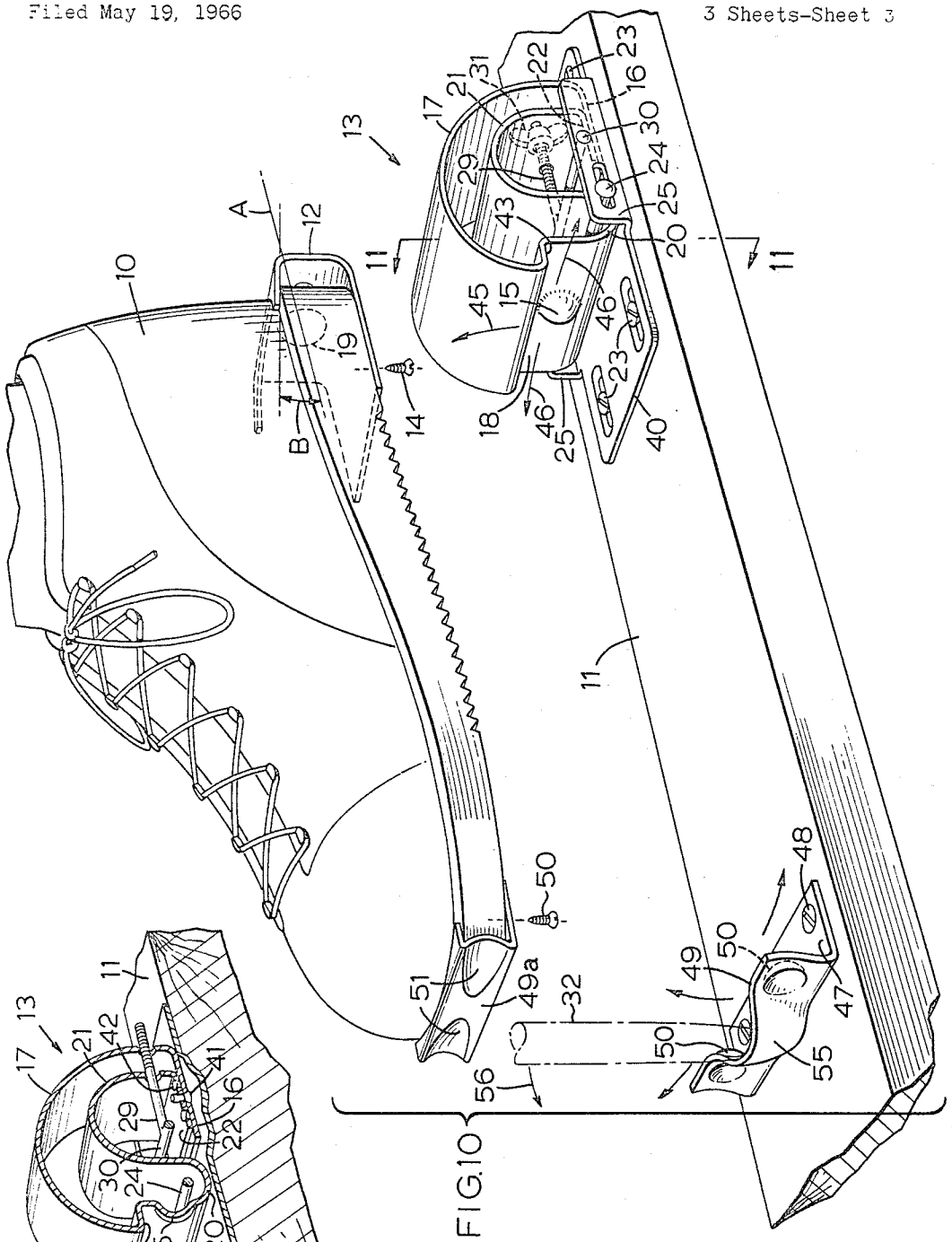


FIG. 10

FIG. 11

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PATENT AGENTS

United States Patent Office

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Patented Apr. 23, 1968

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SKI SAFETY BINDING DEVICE

Gordon Ashton Webster, 37 Brentwood Drive, Dundas, Ontario, Canada

Continuation-in-part of application Ser. No. 459,759, May 28, 1965. This application May 19, 1966, Ser. No. 551,363

30 Claims. (Cl. 280—11.35)

The present application is a continuation-in-part of my application Serial No. 459,759, which is now abandoned.

This invention is concerned with improvements in or relating to safety ski binding devices for releasably locking a boot on a ski.

Safety ski binding devices are now commonly employed for retaining the skier's boots on the skis, because of the relatively high possibility of a broken leg or ankle resulting from a fall. Such devices may serve to releasably retain the toe or the heel of the boot, and are preset to release the boot upon the application thereto of a sideways and/or upward force that is greater than a predetermined value.

It is an object of the present invention to provide a new safety ski binding release device.

It is another object of the present invention to provide such a device that is relatively simple and noncritical in adjustment, for skiers of different weights.

It is a further object to provide such a device that is of especially simple and inexpensive construction.

In accordance with the present invention there is provided a ski safety binding device for releasably locking a boot on a ski, the device comprising boot and ski members providing cooperating members lockably engageable with and releasably disengageable from one another upon the application between the said cooperating members of a force having a component in a plane generally transverse to the length of the ski greater than a predetermined value, the said ski member comprising a bracket portion for attaching the member to the upper face of a ski, a displaceable portion carrying the respective cooperating member and displaceable rearwardly generally parallel to the length of the ski by the said force between the boot and ski members, spring means comprising a flat non-planar spring member which is disposed with its flat surfaces extending longitudinally of the ski with part of the spring member extending in the direction generally parallel to the length of the ski and part of the spring member extending in the direction generally perpendicular to the said ski upper face, the spring means being so connected to the bracket portion and the displaceable portion that the displaceable portion is displaced rearwardly by the said force against the opposition of the spring means, and constraining means operative with the displaceable member to constrain it for generally linear rearward movement by the said force.

Also in accordance with this invention there is provided a ski safety binding device wherein the ski member comprises a bracket portion for attaching the member to a ski, a displaceable portion carrying the respective cooperating means, and spring means connected to the said bracket portion and displaceable portion so that the displaceable portion is displaceable against the opposition of the said spring means in a rearward direction generally parallel to length of the ski by the disengagement of the boot and ski members for release of the boot, the ski member cooperating means comprising a respective first cooperating means for releasing disengagement in the vertical direction and having at least two points of engagement spaced transversely of the ski for restraining the boot against rocking relative to the ski in the said plane, and a respective second cooperating means for releasing disengagement in the horizontal direction and having a single point of engagement disposed between the said at least two spaced points of engagement of the first means.

Further in accordance wtih the invention there is provided a ski safety binding device wherein the said ski member comprises a bracket portion for attaching the member to a ski, a displaceable portion carrying the respective cooperating member, and spring means connected to the said bracket portion and displaceable portion so that the said displaceable portion is displaced against the opposition of the said spring means substantially linearly in a rearward direction generally parallel to the length of the ski by its engagement with the boot member upon disengagement of the boot and ski members for releasing the boot, the spring means comprising a first spring member which provides predominantly opposing force against vertical releasing disengagement of the members, and a second spring member which provides predominantly opposing force against horizontal releasing disengagement.

Particular preferred embodiments of the invention will now be described, by way of example, with reference to the accompanying drawings wherein:

FIGURE 1 is a perspective view of a first embodiment,

FIGURE 2 is a side view of the embodiment of FIGURE 1, and drawn to a smaller scale,

FIGURES 3 and 4 are respective schematic cross-sections illustrating a detail of the construction of the cooperating projection and aperture locking means,

FIGURES 5 to 9 are respective side or perspective views of further embodiments of the invention,

FIGURE 10 is a view similar to FIGURE 1 of a still further embodiment,

FIGURE 11 is a section taken on the line **11—11** of FIGURE 10, and

FIGURE 12 is a perspective view of a detail of another toe-engaging member.

Referring now especially to FIGURES 1 and 2, the safety device illustrated therein is intended for use in releasably locking the heel of a ski boot **10** on a ski **11**. The device comprises a boot member **12** and a ski member indicated generally by **13**, the boot member being fastened to the heel by two screws **14** disposed on opposite sides of a projection **15** that protrudes generally parallel to the length of the ski, the heads of the screws **14** being countersunk in corresponding recesses punched in the member **12**. These recesses form corresponding projections on the other face of the member, and are made sufficiently long for them to accommodate the curvature of the boot heel surface they abut, and thereby assist in providing a firm and stable attachment of the member to the heel.

In this embodiment the ski member is formed from a length of flat strip spring material bent to form a first bracket portion **16**, a first outside arcuate spring portion **17**, a planar displaceable portion **18** provided with an aperture or recess **19** cooperating with the projection **15**, a junction portion **20**, a second inside arcuate spring portion **21**, and a second bracket portion **22**. Each arcuate spring portion constitutes an individual non-planar spring member having a part thereof extending in the direction generally parallel to the length of the ski and part thereof extending in the direction generally perpendicular to the ski top face. In a particular embodiment a suitable material that was used was high carbon steel S.A.E. 1074 strip of thickness 0.040 inch and width 2 inches. The ski member is fastened to the top face of the ski **11**, e.g. by screws **23**, that pass through registering slots punched in

the overlapping parts of the bracket portions **16** and **22**, the slots permitting a limited movement of the device longitudinally of the ski for adjustment of its position thereon, and also permitting coarse differential adjustment of the two spring portions relative to one another. The displaceable portion **18** is constrained against displacement thereof perpendicular to the length of the ski by constraining means comprising a bar **24** carried by brackets **25** (only one shown), the brackets being fastened to the ski top face. The bar **24** constrains the junction portion **20**, the displaceable portion, and the corresponding ends of the spring portions **17** and **21**, against any substantial movement perpendicular to the ski top face, but permits a limited rearward movement parallel to the length of the ski in the direction of the arrows **26**, and against the spring bias provided by the arcuate spring portions **17** and **21**. The brackets **25** constrain the junction portion **20** etc. against any substantial movement transverse to the length of the ski. It will be noted that the constraining means does not prevent linear rearward movement produced by twisting of the displaceable portion **18**, such as is caused by one edge thereof moving rearward to a greater extent than a corresponding edge.

In operation of the device, the skier engages the toe of the boot with a fixed toe member (not illustrated for this embodiment) and then stamps or presses the boot heel down in the direction of the arrow **27**. At some point of the downward movement the projection **15** engages the displaceable portion **18** and further downward movement can only take place upon rearward displacement of the portions **18** and **20** against the above-mentioned spring bias provided by the arcuate spring portions **17** and **21**. An engaging camming action takes place between the projection and the face of the portion **18** to displace the latter until the projection engages in the aperture **19**, whereupon the portion **18** snaps forward and the heel is securely locked on the ski by the locking engagement of the projection and the aperture in the plane **28** indicated in FIGURE 2.

If at any time a force is applied to the boot that has a sideways or upwards component in the plane **28** greater than a predetermined value, a disengaging camming action takes place between the projection and the edge of the aperture against the spring biasing force, producing sufficient displacement of the portion **18** for the two to disengage and release the boot from the ski in the desired manner. It will be apparent that the releasing and engaging forces are both dependent directly upon the said spring biasing force. The engaging force is exerted directly by the skier's leg muscles in stamping or pressing the boots into position, so that this force can be felt directly, and immediate assurance is obtained that each device has been adjusted for a suitable releasing force, or the skier is immediately warned that the required releasing force is too high or too low for safety. By suitable design of the shape of the projection **15**, and/or of the shape of the edge of the aperture **19**, and/or of the part of the portion **18** above the aperture **19** and providing the cooperating cam face, it is possible to arrange that the engaging and releasing forces are at least approximately equal, or are in a predetermined ratio to one another, so that the skier obtains a direct, immediate and accurate indication of the required releasing force.

In this particular embodiment the slope naturally acquired by the upper part of the displaceable portion **18**, as it joins the immediately connected arcuate spring portion **17**, is about 45° and provides the desired camming action between itself and the projection, but in other embodiments this upper part may require to be shaped to a particular contour for the desired action. Moreover, it is also contemplated that this upper part of the displaceable portion may be provided with a vertical groove leading to the aperture **19** (which groove may taper in width toward the aperture) so that the projection is positively guided toward the aperture.

Referring now especially to FIGURES 3 and 4, it will be seen that in this embodiment the projection **15** is a little too large to be fully inserted into the aperture or recess **19**, and the slope of the aperture relative to an axis of symmetry A of both the recess and the projection is less than that of the projection, so that they engage one another with an edge contact, or even a point contact. Under these condtions the releasing force is determined principally by the biasing force and by the inclination relative to the said axis A of the part of the projection that contacts the edge of the recess **19**.

FIGURE 3 illustrates the inclination angle B that predetermines the force required for releasing disengagement in the vertical direction, such as is required when the skier falls forward, and preferably this angle is from 10° to 45°, more preferably about 30°. FIGURE 4 illustrates the corresponding inclination angle C that predetermines the force required for releasing disengagement in the horizontal direction, such as is required for a sideways fall or sudden twist, and preferably this angle is from 30° to 60°, more preferably about 45°. In preferred embodiments the amount by which the projection **15** extends into the recess for locking engagement thereof is at least ⅛ inch, and more preferably is ¼ inch.

It is also important that the vertical and horizontal releasing forces be at least approximately in a predetermined ratio to one another, and generally it is preferred that the vertical force is approximately twice the horizontal force. It will be seen that the effect of the upper spring portion **17** predominates in biasing the displaceable portion **18** against the vertical releasing disengagement, while the effect of the lower spring portion **21** is predominant in biasing the portion **18** against horizontal releasing disengagement. The possibility therefore exists of ready adjustment of the ratio by suitable initial design and subsequent adjustment of the difference between the effects of the two springs, a change in the effect of the spring **17** on vertical releasing causing comparatively little change in the horizontal releasing, and vice versa.

I have found that the device can in practice readily be set for a desired releasing force in either direction, and the setting is surprisingly non-critical, so that it can readily be done by comparatively inexperienced skiers, and can readily be changed as required. Moreover, the device is surprisingly stable in its setting and does not appear to be unduly affected by the presence of amounts of ice etc. on the skis that in some types of device may prevent satisfactory releasing.

The initial determination of the spring biasing forces is by suitable choice of its dimensions, and the dimensions and modulus of the material from which it is made. Subsequent coarse adjustments can be made on the ski by the above-described use of the screws **23** in the bracket portions **16** and **22**, and finer adjustments made by means of a screw-threaded bolt **29** which extends between the spring portions **17** and **21**, chordwise with respect thereto. The bolt has a head **30** engaging the rear face of the rear part of the outer portion **17**, and is engaged in a nut **31** abutting the front face of the front part of the second inner portion **21**. As the nut is tightened on the bolt the biasing force provided by the spring portions is increased. The head **30** may be in the form of a loop that will receive the end of a ski pole, indicated by **32**, so that the pole can be used as a lever extension for rotating the bolt against the locking action of the spring bias force. The spring bias force also locks the nut **31** against rotation in normal use.

The boot may be released at any time by pulling or jerking on the heel with sufficient force, usually upwards, but preferably it is released while the end of the pole **32** is inserted (as shown in FIGURE 1) in an aperture **33** in the outer spring portion, to one side of the bolt **29**, the pole then being rotated backwards against the rear part of the inner spring portion **21** as a reaction member,

to cause releasing displacement of the portion 18, so that the minimum strain is applied to the boot.

In the embodiment of FIGURE 5 the junction portion 20 is constrained against sideways and vertically upwards movement, but it is permitted the desired limited horizontal forward and rearward movement, by means of a pair of transversely spaced screws 24 (only one can be seen) which pass freely through slots 25 in the junction portion, the slots being elongated in directions parallel to the length of the skis, and the screws being screwed directly into the ski top surface. The screws 24 and slots 25 therefore replace the rod 24 and the brackets 25 of the first embodiment. The slots 25 are of sufficient transverse width for the shafts of the screws to pass therethrough, but too narrow for the screw heads to do so. The slots are provided in known manner with a local transverse enlargement through which the screw heads can pass to enable the portion 20 to be engaged beneath the screw heads.

In the embodiment of FIGURE 6 the junction portion 20 is relatively sharply pointed and the rod 24 has little longitudinal freedom of movement therein, the rod 24 moving freely through elongated slots in the brackets 25 to permit the required displacement of the portion 18. The second bracket portion 33 is omitted and the corresponding end of the arcuate spring portion 21 abuts directly against the rear face of the portion 17, and may be fastened thereto. In a modification of this embodiment the said elongated slots are inclined up toward the back of the ski to permit corresponding movement of the junction portion 20 with a vertical component and improved the cam action obtained on both engagement and disengagement; the angle of this inclination preferably is about 15–20°.

The embodiments of FIGURES 7 to 9 employ a single arcuate spring member 17 to apply the required spring biasing force to the planar portion 18, and in the particular embodiment of FIGURE 4 this single spring member is provided with longitudinal corrugations, such as 34, to increase its rigidity and give the required resilience/displacement characteristic. The portion 20 is restrained in the desired constrained longitudinal motion by bending the terminal portion 35 until it is parallel to the portion 20, and thereby forming an elongated cylinder around the rod and which can move freely longitudinally of the ski.

The embodiment of FIGURE 8 is substantially similar to that of FIGURE 7 in its employment of a single arcuate spring and the means for constraining the forward end thereof for the desired movement. The biasing action of the spring 17 is reinforced by a helical spring 38 engaged between the rear face of the portion 18, adjacent to the aperture 19, and the vertical arm of an L-shaped bracket 39. The horizontal arm of the bracket 39 is screwed to the ski top face, the screws passing through elongated slots 40 therein for coarse adjustment of the position of the bracket 39 and thereby of the force applied by the spring 38.

In the embodiment of FIGURE 9 the major part of the biasing force applied to the displaceable portion 18 is by means of the spring 38 applied between the portion 18 and the separate bracket 39, the member comprising the portion 18 being constrained and guided for the required movement by the screws 24 and slots 25, as with the embodiment of FIGURE 5. The remainder of the biasing force is provided by the resilience of the material from which the portions 18, 20 and 22 are formed, as the portion 18 is displaced about the junction portion 20 relative to the bracket portion 22.

Referring now particularly to FIGURES 10 and 11, in this embodiment the projection 15 is provided on the ski member 13, while the recess 19 is provided on the boot member 12. The brackets 25 of the constraining means are formed by bending from a plate member 40 that is fastened to the ski by the screws 23, the screws passing through slots for lengthwise adjustment of the ski member. The bracket portions 16 and 22 are not fastened directly to the ski face, but fit between extensions of the brackets 25, being held against lengthwise movement in one direction by the bar 24 and in the other direction by the bolt 29 and its nut 31.

It will be seen that the bolt 29 has a T-head 30 that is held at each end in the brackets 25, while the nut 31 bears against the outer face of the outer spring member 17, so that the bolt controls directly only the effort of the spring 17. It is contemplated that in other embodiments the head of the bolt may engage in a member struck up from the bottom of the plate 40, so that a straight conventional bolt can be used. Differential adjustment of the two springs 17 and 21 is obtained by use of a pin 41 which can be engaged selectively in longitudinally spaced apertures 42.

In this embodiment the displaceable portion 18 is shaped to provide a horizontally-forwardly extending, downwardly-facing ridge means 43, disposed above the projection 15, and engageable with a corresponding upwardly-facing surface 44 provided on the boot member. The ridge means 43 and surface 44 together constitute cooperating engaging means having at least two points of engagement spaced transversely of the ski and adapted to restrain the boot against rocking relative to the ski in the releasing plane. Although a continuous ridge 43 is illustrated, the same technical effect could be achieved by two spaced projections, one at each side of the projection 15.

Also in this embodiment separate cooperating members are provided for vertical and horizontal releasing, the ridge means 43 and surface 44 (which is inclined at the above-described angle B) comprising first members for releasing disengagement in the vertical direction (arrow 45), while the projection 15 and recess 19 comprise second members for releasing disengagement in the horizontal direction (arrows 46). By the use of separate releasing means even more flexible and simple control of the vertical/sideways release force ratio is possible. It will be seen that the vertical releasing is still more predominantly controlled by the spring 17, while the horizontal releasing is controlled more predominantly by the spring 21. Another effect of this separation of function is that it is no longer necessary to rely only on cam-engaging action of the two members for determination of the releasing force. For example, the force/displacement characteristic of the spring system is substantially linear for the displacements encountered of the member 18, so that the required ratio of releasing force can readily be achieved by providing approximately the same camming angle, and arranging that the horizontal extent of the ridge member 43 is in the required ratio to that of the projection 15.

Since the release of the boot heel is accomplished by substantially linear backwards movement of the spring system, it is also possible with a device in accordance with the invention to obtain an effective toe release, and suitable toe release members are illustrated in FIGURES 10 and 12. A ski member 47 is fastened to the ski by screws 48 and has an upstanding part 49 provided with two transversely spaced projections 50. The corresponding boot member 49*a* is fastened to the boot by means of screws 52 and is provided with two transversely spaced recesses 53 which cooperate respectively with the projections 50. Because of the longer leverage involved the forces required for toe releasing are substantially smaller than for heel releasing, usually of the order of 3:1, and the cooperating recesses and projections are arranged accordingly both as to cam angle and the extent to which they project into one another. A simpler form of toe-engaging member is illustrated in FIGURE 12, comprising a ski member with specially shaped edges 54 that engage directly on the welt of the boot 10, the shaping of

the edges **54** being such that the desired camming action is obtained for releasing.

Release of the boot from the ski with this embodiment preferably is accomplished by the arrangement illustrated in FIGURES 10 and 12, wherein the ski pole **32** is inserted in a recess formed by a suitably shaped part **55** of the ski member, and then rotated in the direction of the arrow **56** to lever the boot backwards until the toe can be disengaged from the device.

It will be apparent that all of the embodiments I have described herein as illustrating the invention will give the desired immediate indication that they will release with the application of the desired releasing force, and yet are simple and inexpensive to manufacture. Various changes and modifications to the particular embodiments described, and further embodiments, wil be apparent to those skilled in the art within the scope of the appended claims.

What I claim is:

1. A ski safety binding device for releasably locking a boot on a ski, the device comprising boot and ski members providing cooperating members lockably engageable with and releasably disengageable from one another upon the application between the said cooperating members of a force having a component in a plane generally transverse to the length of the ski greater than a predetermined value, the said ski member comprising a bracket portion for attaching the member to the upper face of a ski, a displaceable portion carrying the respective cooperating member and displaceable rearwardly generally parallel to the length of the ski by the said force between the boot and ski members, spring means comprising a flat non-planar spring member which is disposed with its flat surfaces extending generally longitudinally of the ski with part of the spring member extending in the direction generally parallel to the length of the ski and part of the spring member extending in the direction generally perpendicular to the said ski upper face, the spring means being so connected to the bracket portion and to the displaceable portion that the displaceable portion is displaced rearwardly by the said force against the opposition of the spring means, and constraining means operative with the displaceable member to constrain it for generally linear movement by the said force.

2. A device as claimed in claim **1**, wherein the said spring means comprise the said flat spring member which provides predominantly opposing force against vertical releasing disengagement of the members, and a second spring member which provides predominantly opposing force against horizontal releasing disengagement.

3. A device as claimed in claim **2**, and comprising means for adjusting differentially the said opposing forces provided by the two springs.

4. A device as claimed in claim **1**, wherein the said displaceable portion comprises a respective first cooperating member for releasing disengagement in said vertical direction and a respective second cooperating member for releasing disengagement in said horizontal direction.

5. A device as claimed in claim **4**, wherein the said respective second cooperating member comprises one of a knob and a cooperating recess disposed centrally on the displaceable portion transversely of the portion, and the said respective first cooperating member comprise generally horizontally extending ridge means, the ridge means also comprising cooperating engaging means having at least two points of engagement spaced transversely of the ski and adapted to restrain the boot against rocking relative to the ski in the said plane.

6. A ski safety binding device for releasably locking a boot on a ski, the device comprising boot and ski members providing cooperating means lockably engageable with and releasably disengageable from one another upon the application between the cooperating means of a force having a component in a plane generally parallel to the length of the ski greater than a predetermined value, the ski member comprising a bracket portion for attaching the member to a ski, a displaceable portion carrying the respective cooperating means, and spring means connected to the said bracket portion and displaceable portion so that the displaceable portion is displaceable against the opposition of the said spring means in a rearward direction generally parallel to the length of the ski by the disengagement of the boot and ski members for release of the boot, the ski member cooperating means comprising a respective first cooperating means for releasing disengagement in the vertical direction and having at least two points of engagement spaced transversely of the ski for restraining the boot against rocking relative to the ski in the said plane, and a respective second cooperating means for releasing disengagement in the horizontal direction and having a single point of engagement disposed between the said at least two spaced points of engagement of the first means.

7. A device as claimed in claim **6**, wherein the said respective second cooperating member comprises one of a knob and a recess disposed centrally on the displaceable portion transversely of the portion, and the said respective first cooperating members comprises generally horizontally extending ridge means.

8. A device as claimed in claim **7**, wherein the said spring means comprise a first spring member operative with the said first cooperating members to provide predominantly opposing force against vertical releasing disengagement of the members, and a second spring member operative with the said second cooperating members to provide predominantly opposing force against horizontal releasing disengagement.

9. A device as claimed in claim **8**, wherein the said first and second spring members are both flat spring members, each formed from flat spring metal strip and of arcuate form with its flat faces disposed to extend generally longitudinally of the ski top face and with its concave face toward the ski top face, and each connected at a corresponding end to the said displaceable portion.

10. A device as claimed in claim **6**, wherein the rearward movement of the said displaceable portion for releasing disengagement of the second cooperating members is approximately half the rearward movement of the displaceable portion for releasing disengagement of the first cooperating members.

11. A device as claimed in claim **1**, wherein the said flat spring member and the displaceable portion of the ski member are both formed from flat spring metal strip and are connected with one another.

12. A device as claimed in claim **11**, wherein the said metal strip flat spring member is of arcuate form with its flat faces disposed to extend generally coextensively with the ski top face and with its concave face toward the ski top face.

13. A device as claimed in claim **11**, wherein the said displaceable portion, the flat spring member and the said bracket portion are formed integral with one another from a single length of said flat spring metal strip.

14. A device as claimed in claim **2**, wherein the said first and second spring members are both flat spring members, each formed from flat spring metal strip and of arcuate form with its flat faces disposed to extend generally longitudinally of the ski top face and with its concave face toward the ski top face, and each connected at a corresponding end to the said displaceable portion.

15. A device as claimed in claim **10**, and comprising means for adjusting differentially the forces provided by the first and second spring members, comprising first and second bracket portions attached respectively to the first and second spring members and extending coextensively with one another, and means for securing the said bracket portions in different positions relative to one another longitudinally of the ski.

16. A device as claimed in claim 15, wherein the said first and second metal strip flat spring members, the displaceable portion and the first and second bracket portions are formed integral with one another from a single length of the said flat spring metal strip.

17. A device as claimed in claim 1, wherein the said spring means comprise the said flat spring member as a first member, a second spring member, an intermediate member connecting the first and second spring members, and a bracket portion for attaching the member to a ski, each said spring member being formed from flat spring metal strip, and disposed with its flat faces extending generally longitudinally of the ski top face, the first spring member being connected at a corresponding end to the said displaceable portion further from the ski top face and at the other end to the bracket portion, the said intermediate member being connected to the said displaceable portion nearer to the ski top face, the second spring member being connected at a corresponding end to the intermediate member and at the other end to the bracket portion, and the said constraining means engaging the intermediate member to constrain the displaceable member against the said displacement thereof.

18. A device as claimed in claim 17, wherein the said first and second spring members, the intermediate member, the displaceable portion and the bracket portion are formed integral with one another from a single length of the said flat spring metal strip.

19. A device as claimed in claim 1, wherein the said spring means comprise the said flat spring member which is of arcuate form with its concave face toward the ski top face, formed from flat spring metal strip and connected with the said displaceable portion, and a second spring member comprising a helical compresssion spring interposed between the said displaceable portion and the said bracket portion.

20. A device as claimed in claim 1, wherein the said flat spring member is of arcuate form formed from flat spring metal strip with its concave face toward the ski top face, and means for adjusting the spring bias of the arcuate spring member comprises an adjustable length member extending chordwise between the spring member and another member which is adapted to be fixed to the ski.

21. A device as claimed in claim 1, wherein the constraining means comprise bracket means adapted when the device is in position on the ski to be upstanding from the ski top face on either side of the displaceable member to restrain movement thereof transverse to the length of the ski, and rod means extending between the bracket means with a cooperating portion of the ski member extending between the rod means and the ski top face to restrain movement thereof perpendicular to the ski top face.

22. A device as claimed in claim 1, wherein the said constraining means comprise at least two spaced parallel slots in the ski member adapted when the device is in position on the ski to be disposed longitudinally of the ski, and corresponding headed attachment means having respective shafts passing freely through the said slots for restraining movement transverse to the length of the ski, and having the heads of the attachment means restraining movement perpendicular to the ski top face.

23. A device as claimed in claim 1, wherein the said spring means flat spring member is of arcuate form formed from flat spring metal strip and is provided with longitudinal corrugations increasing the force/deflection characteristic of the spring.

24. A ski safety binding device for releasably locking a boot on a ski, the device comprising boot and ski members providing cooperating members lockably engageable with and releasably disengageable from one another upon the application between the members of a force having a component in a plane generally transverse to the length of the ski greater than a predetermined value, the said ski member comprising, a bracket portion for attaching the member to a ski, a displaceable portion carrying the respective cooperating member, and spring means connected to the said bracket portion and displaceable portions so that the said displaceable portion is displaced against the opposition of the said spring means substantially linearly in a rearward direction generally parallel to the length of the ski by its engagement with the boot member upon the disengagement of the boot and ski members for release of the boot, the spring means comprising a first spring member which provides predominantly opposing force against vertical releasing disengagement of the members, and a second spring member which provides predominantly opposing force against horizontal releasing disengagement.

25. A device as claimed in claim 1, wherein the cooperating members are releasably disengageable from one another upon a cam action between them against the opposition of the spring means, and the angle of said cam action, relative to an axis substantially parallel to the length of the ski, is $30°\pm10°$ for the vertical releasing disengagement, and $45°\pm10°$ for the horizontal releasing disengagement.

26. A device as claimed in claim 24, wherein the said first and second spring members are both flat spring members, each formed from flat spring metal strip and or arcuate form with its flat faces disposed to extend generally longitudinally of the ski top face and with its concave face toward the ski top face, and each connected at a corresponding end to the said displaceable portion.

27. A device as claimed in claim 26, wherein the device comprises means for adjusting differentially the forces provided by the first and second spring members, comprising first and second bracket portions attached respectively to the first and second spring members and extending generally parallel to one another, and means for securing the said bracket portions in different positions relative to one another longitudinally of the ski.

28. A device as claimed in claim 27, wherein the said first and second metal strip flat spring members, the displaceable portion and the first and second bracket portions are formed integral with one another from a single length of the said flat spring metal strip.

29. A device as claimed in claim 26, wherein means for adjusting the spring bias of the spring member comprises an adjustable length member extending chordwise between the arcuate first spring member and another member which is adapted to be fixed to the ski.

30. A device as claimed in claim 26, wherein the said first spring member is an arcuate outer member having one end connected to the said bracket portion and the other end connected to a part of said displaceable portion further from the ski top face than the respective cooperating member, and said second spring member is an inner arcuate member disposed within and generally parallel to the said first spring member and having one end connected to the said bracket portion and the other end connected to a part of the said displaceable portion nearer than the respective cooperating member to the ski top face.

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