United States Patent [19]

Engel

[11] **3,908,971**

[45] **Sept. 30, 1975**

[54] **SKI BINDING**

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[22] Filed: **Aug. 2, 1974**

[21] Appl. No.: **493,869**

[52] **U.S. Cl.** ..... **280/11.35 K;** 280/11.35 Y; 280/11.35 T

[51] **Int. Cl.²** **A63C 9/08**

[58] **Field of Search** ..... 280/11.35 T, 11.35 K, 280/11.35 Y

[56] **References Cited**

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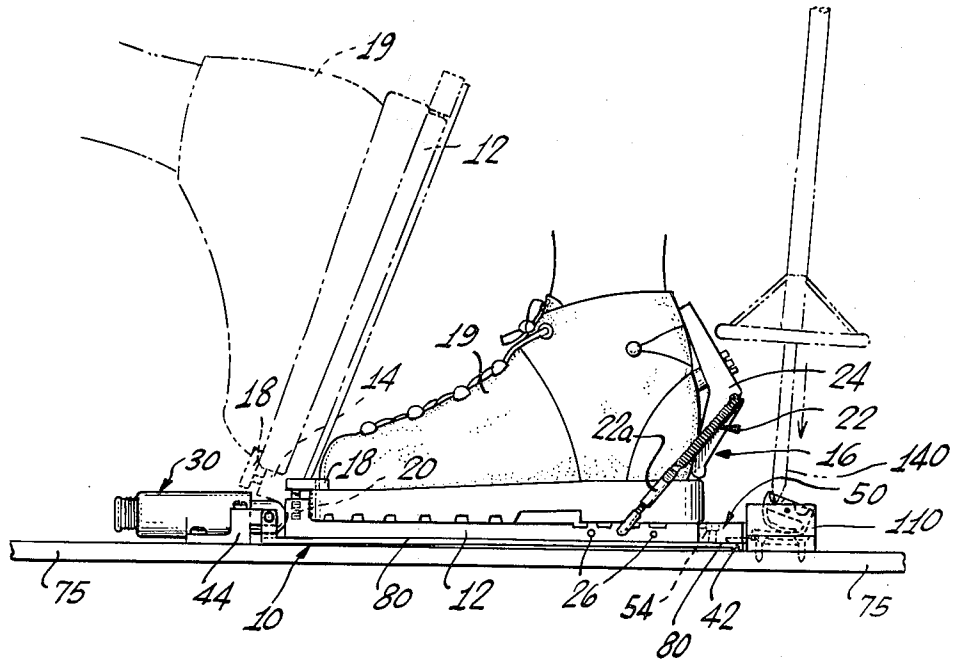
2,072,477	3/1937	Dodd	280/11.35 T
2,649,306	8/1953	Hilding	280/11.35 K
3,359,010	12/1967	Wick	280/11.35 K
3,388,918	6/1968	Hollenback	280/11.35 Y
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Primary Examiner—Robert R. Song
Attorney, Agent, or Firm—I. Morley Drucker

[57] **ABSTRACT**

The ski binding of this invention is adapted for downhill skiing, ski touring and ski mountaineering, where a walking mode is desired. The safety of a sole plate ski binding is combined with the hinged action of a ski touring binding by supporting the sole plate binding on a laterally stable hinged walking plate. The walking plate, when locked at the rear thereof, is laterally stable and permits the ski binding to perform safely and efficiently in the downhill mode. Once the rear of the walking plate is released, however, the ski binding functions in the walking mode, with great lateral stability and with minimal loss of energy.

16 Claims, 6 Drawing Figures



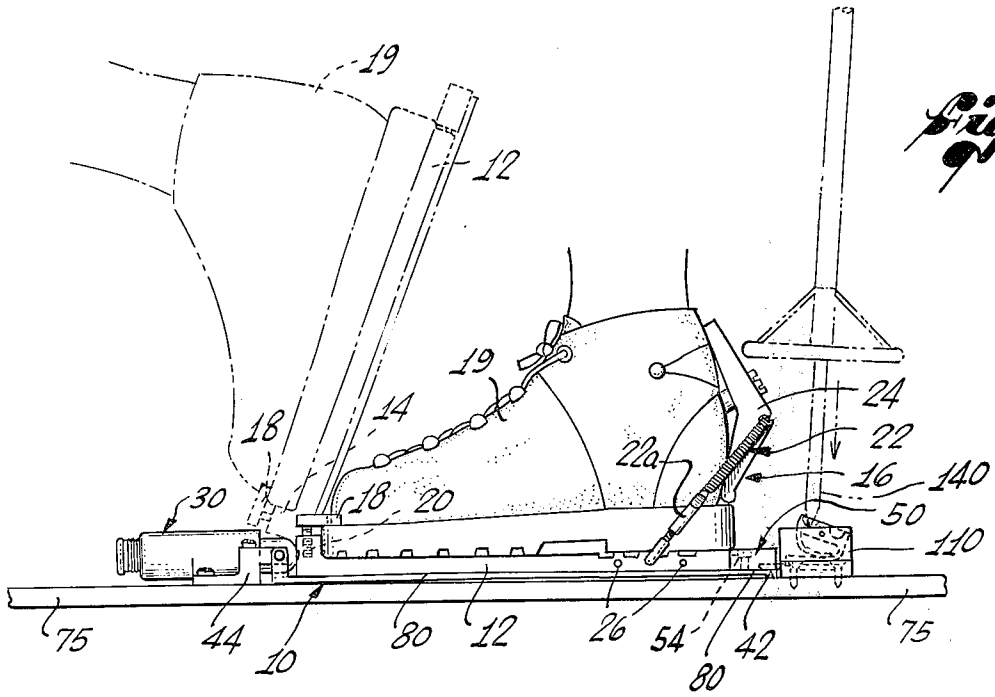


Fig. 1

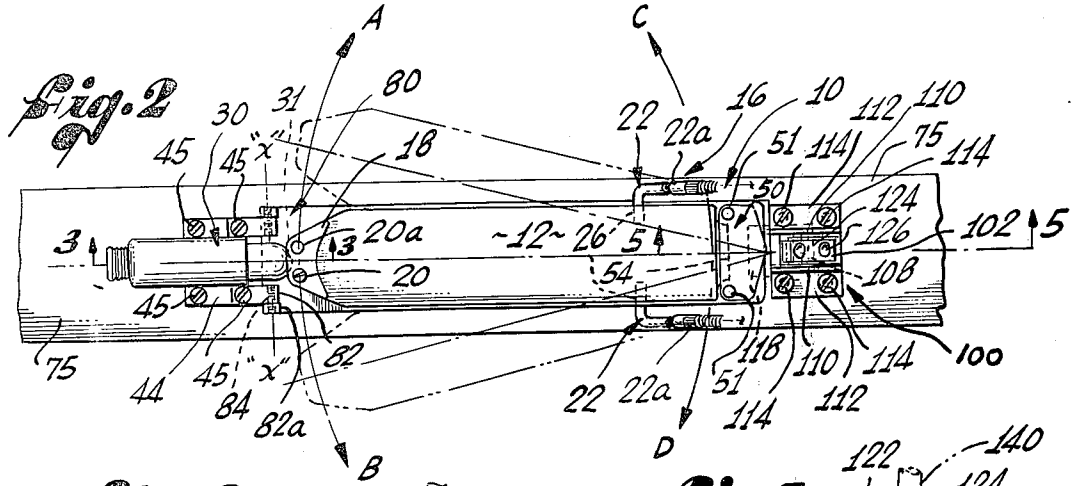


Fig. 2

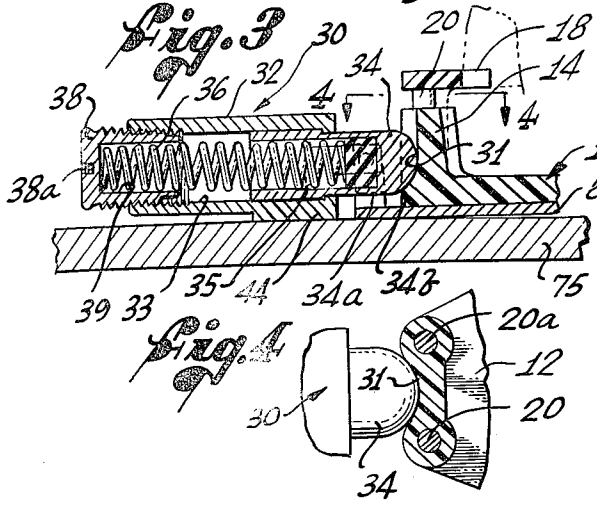


Fig. 3

Fig. 4

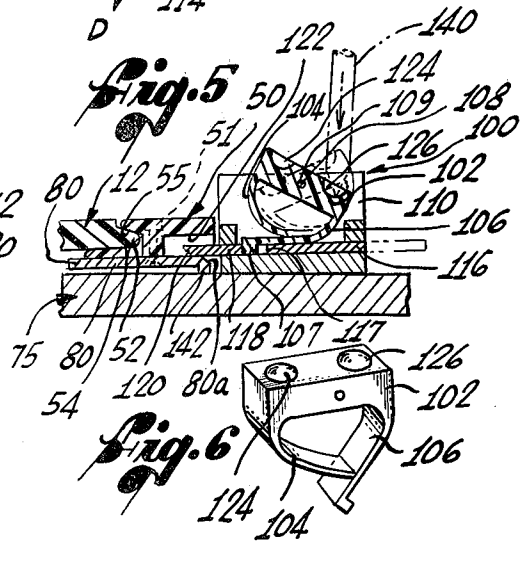


Fig. 5

Fig. 6

SKI BINDING

This invention relates to safety ski bindings and more specifically relates to a releasable ski binding adapted for both slope (or downhill) skiing and cross-country skiing (or ski touring), and ski mountaineering.

Ski bindings are known wherein the ski boot is first mounted to a sole plate having an adjustable heel and toe retaining means. The sole plate, itself, is releasably engaged at its toe end to a spring-biased detent member responsive to rearward or sideward forces to thereby release the toe end of the sole plate. At the heel end of the sole plate a releasable heel retainer for the sole plate is provided which is responsive to forward or sideward forces to release the heel end of the sole plate. In the event of any abnormal forces on the ski, the entire sole plate, together with the boot retained therein, is released from the ski.

Bindings of the foregoing described type are shown, by way of example, in the Besser Patent, U.S. Pat. No. 3,492,614, issued Jan. 27, 1970. Bindings of the type described are of advantage in that full safety release for both forward and backward falls, and sideways release at both toe and heel can be obtained. However, the binding of the type described cannot be adequately utilized for cross-country skiing (ski touring) or ski mountaineering. In these situations, a great deal of flat, or uphill terrain is encountered, and the binding of the type described restricts to a great extent, a normal free walking motion which is best utilized for ski touring, mountaineering, etc.

It is therefore a chief aim of this invention to provide a ski binding which combines the safety of a "releasable sole plate" downhill binding with the hinging action of touring and mountaineering bindings.

Additionally, it is a major object of the invention to virtually eliminate any friction or spring compression upon the foot of the user — during the time that the binding is utilized for ski touring and mountaineering while, at the same time, insuring full safety release when the binding is operatively positioned for downhill skiing.

The closest art, with which I am familiar, shows a releasable ski binding combined with a hinging action for ski touring and the like and is disclosed in U.S. Pat. to R. R. Hollenback, entitled "SKI BINDING" and bearing U.S. Pat. No. 3,388,918. Hollenback discloses a conventional releasable cable binding directly engaging and looped around the heel of a boot. The boot is held under compression by the cable binding. The boot itself is also mounted to a hinged supporting plate and, for downslope skiing, the supporting plate is latched at the heel.

Hollenback has several drawbacks. Aside from the inherent disadvantages of a cable binding, the degree of freedom of walking motion in Hollenback is restricted to about a 30° angle. Secondly, the foot of the user, during walking motion, is under constant compression in the Hollenback structure, due to the presence of the cable binding which is always under tension.

It is a further object of the invention to quickly and easily convert the binding of this invention from the "downhill" mode to the "walking" mode simply by means of actuation with a ski pole tip.

These and other objects of the invention will become more apparent by reference to the summary of the invention, and the detailed specification which follows.

SUMMARY OF THE INVENTION

The ski binding of this invention comprises in combination, a downhill ski binding with a binding having an effective hinging action for walking motions. The ski binding in the downhill mode, has a sole plate, a toe and heel retaining means for a ski boot mounted to said sole plate, an adjustable spring-biased detent pin mounted to a ski blade and releasably engaging a detent-receiving means on the toe retaining means of said sole plate and a releasable heel-retaining means responsive to forward and sideward forces to release the heel retaining means. The ski binding so far described has a six-way safety release, a right and left release at the toe, under rearward or sideward forces, a right and left release at the heel under forward or sideward forces, and upward releases at the toe or heel under upward forces. In all forms of release, the entire sole plate and boot is released. The boot is not part of the binding mechanism and therefore mountaineering, hiking or skiing boots can be worn.

Underlying the sole plate there is provided a separate, preferably metal, supporting or walking plate. The walking plate is held to the ski blade at its rearward end during downhill skiing by means of a toggle-actuated latching mechanism.

The walking plate is pivotally mounted to the ski blade, at its forward end, by virtue of hinged mountings. The pivotal axis of the walking plate is transverse to the ski blade. The pivot axis is positioned slightly forward of the area of engaagement of the spring-biased detent with the detent receiving means on the sole plate, and along a line which provides minimal resistance to the spring-biased detent pin, during walking.

When the toggle actuated latching mechanism is actuated to release the latching mechanism, the walking plate is free to rotate about its pivotal axis — and, at the same time, the spring-biased detent and detent receiving means stably hold the sole plate (and boot) from sideways movement during the walking motion — with virtually no friction or spring compression during the walking motion. In excess of 70° of angular motion of the walking plate is possible with the structure of this invention, more angular motion than is usually required.

The toggle latching mechanism is engaged and disengaged simply by a ski pole. Bending down by the user is therefore not required.

The latch plate, which forms part of the toggle actuated mechanism, is beveled at its latching edge so that even if there is some snow under the walking plate, the beveled latch plate can engage and lock the top surface of the walking plate. Further, the latch plate is held under pressure, by the toggle mechanism, so that the latch plate prevents any play in the walking plate even if there be varying amounts of snow accumulation under the walking plate.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a view in side elevation, of the ski binding of my invention, shown mounted on a fragmentary portion of a ski blade;

FIG. 2 is a top plan view of the ski binding of my invention;

FIG. 3 is an enlarged cross-sectional view, taken along the line 3—3 of FIG. 2;

FIG. 4 is a top plan view, taken partially in cross-section along the line 4—4 of FIG. 3;

FIG. 5 is an enlarged cross-sectional view, taken along the line 5—5 of FIG. 2; and

FIG. 6 is a perspective view of a portion of the toggle actuated latching mechanism shown in FIG. 5.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to FIG. 1, the ski binding **10** of this invention comprises, in combination, a sole plate **12**, having a preferably integral, upstanding forward or toe end or flange **14** and a heel retaining clamp affixed near the rear end of said sole plate, and designated generally by the numeral **16.**

A toe retaining means, in the form of a toe bracket **18** is mounted to the toe end **14** of the sole plate. The toe bracket is upwardly and downwardly adjustable to clamp the toe ends of various types of boots whether they be skiing, hiking, or mountaineering boots. This vertical adjustment with respect to a boot, e.g., boot **19** is accomplished by a single adjusting screw **20** passing through the toe bracket **18** and into upstanding toe end **14.** A telescoping, locating pin **20***a* is also provided which pin **20***a* permanently attaches toe bracket **18** to flange **14.**

The heel retaining clamp **16** is conventional in nature, and comprises an adjustable cable portion **22** pivotally mounted to a heel clamp **24.** The lower ends of the cable **22** interfit within one of a series of pairs of apertures **26** formed in the edges of the sole plate **12** and are thereby held to the sole plate. Adjustment to the heel of the boot **19** can then be made by tightening the cable **22** by a conventional adjusting ring **22**a mounted on the cable **22.**

The boot **19** is thus snugly held to the sole plate **12** by both adjustable toe retaining means **14, 18** and **20** and by heel retaining means **16.**

The sole plate **12** is releasably fastened to the ski blade **75,** at its forward end, by a spring-biased detent means **30,** which is engageable with the outer, somewhat concave, surface or socket **31** of the upstanding flange **14.**

The spring-biased detent means **30** comprises a detent housing **32,** a detent pin **34** movable within the bore **33** of housing **32** along an axis generally parallel to the ski blade **75** and a strong coil spring **36** mounted within a bore **35** of the detent pin **34** and biased so as to urge the detent pin **34** into engagement with the surface **31** of the upstanding flange **14** of sole plate **12.** The pressure of spring **36** within the detent housing **32** can be increased or decreased by means of an externally threaded adjustment member **38** having an adjusting slot **38***a* formed therein. Adjustment member **38** has a bore **39** formed therein for the purpose of retaining the forward end of spring **36.** The housing **32** is internally threaded at its forward end, and the adjustment member **38** is therefore adjustable, with respect to the housing **32,** to compress or decompress the spring **36** as the adjustment member **38** is moved to the right of left respectively as viewed in the drawings. Thus, the releasing pressure exerted on the forward portions of the sole plate is adjustable.

The spring-biased detent means **30** is affixed to a mounting plate **44,** by any suitable means, or may be made integral therewith. The mounting plate, in turn, is affixed to the ski blade **75,** as by a series of screws **45.**

The spring-biased detent means **30,** when properly adjusted by means of adjusting member **38,** urges the rear end of sole plate **12** against a rear sole plate retainer means **50.** In this connection, referring to FIGS. **1** and **2** and **5,** in particular, the rear sole plate retainer means **50** is affixed by screws **51,** or the like, to an underlying support or walking plate **80,** which walking plate underlies both the sole plate **12** and the sole plate retainer means. The detailed purpose of the walking plate will be later described.

The rear retainer means **50** has a forward recess **52** formed therein within which interfits the rear edge **54** of the sole plate **12.** The rear edge **54** is preferably beveled at its upper surface **55** for easy release from recess **52** if abnormally great forwardly directed forces are encountered by the skier.

To this point, a downhill safety ski binding has been described which is generally termed in the art as a **6**-way release. Four of the six directions are shown by the arrows A, B, C, D in FIG. **2.** The two releases not shown on the drawings are the upwardly directed releases at the toe end and the heel end respectively.

The safety of the downhill ski binding heretofore described, is combined with the hinged action of a ski touring binding, by releasably securing the sole plate **12** (and its associated boot retaining means) to the walking plate **80** which is hingedly mounted to the ski blade **75** just slightly forward of the area of engagement of the detent pin **34** with the detent-receiving socket **31.**

The walking plate **80** is hingedly mounted to the ski blade **75** by any suitable means. It is presently preferred, however, to have the hinging means formed by upturned ears **82, 82***a* integrally formed with mounting plate **44** and walking plate **80,** respectively, the ears **82** having internally threaded bores therein to accept externally threaded hinge pins **84,** While the bores of ears **82***a* are formed with smooth internal walls.

The pivotal axis, or axis of rotation, of the hinged walking plate **80,** lies transverse to the longitudinal axis of ski blade **75.** The pivotal axis is chosen so that the socket **31** of the sole plate will be stably held, against sideways and upward movement, during walking, by the spring-biased detent pin **34,** with virtually no friction or spring-compression during the walking motion.

In the construction shown in the drawings, the optimal pivotal axis is found to be along the line "X—X", the "X—X" line lying in the plane of juncture between the cylindrical portion of the detent pin **34***a* and the hemispherical portion thereof **34***b.* While the line X—X is the optimal pivotal axis, this axis can be varied somewhat e.g., ⅛ inch forwardly or rearwardly, without effecting the operation of the binding in its walking mode, in any material manner.

The degree of rotation of the walking plate **80,** with respect to the top surface of the ski blade **75,** is in excess of 70°; more than is normally required for proper walking motion. The amount of rotation is limited only by the abutment of the toe bracket **18** with the detent housing **30,** as shown in phantom in FIG. **1.**

The walking plate **80** is usually formed with an integral transversely extending bead **142,** affixed to the underside of the walking plate, and at the rear end thereof. See FIG. **5.** The walking plate **80** is normally flat. The bead **142** is normally necessary to accommodate the camber of the ski (i.e., the longitudinal curva-

ture of the ski) and to prevent any play of the walking plate **80** in the locked position.

It is also preferred to coat the underside of the walking plate **80** with a low-friction, non-stick coating, e.g., Teflon (manufactured by E. I. duPont de Nemours) to prevent snow from sticking to the underside during use of the binding of this invention in the walking mode.

A toggle-actuated latching means **100** is mounted onto the ski blade **75** just to the rear of the rear end of the walking plate **80.** The latching means **100** includes a toggle block **102** having a pair of arcuate leaf springs **104, 106** depending therefrom. The toggle block **102** is mounted for pivotal movement by means of a hinge or pivot pin **108** passing through bore **109** in the toggle block **102.** The pivot pin **108** is held at its ends in mounting ears **110.** The mounting ears **110** are preferably integrally formed with a mounting plate **112** which is affixed to the ski blade **75** by suitable means such as screws **114.**

The latching means **100** includes also a latching plate **116,** preferably formed of metal and riding upon the mounting plate **112** and guided thereby in a direction that is coaxial with that of the ski blade **75.**

The pivotally mounted toggle block **102** and integral, depending, arcuate leaf spring portions **104, 106** are preferably formed of a plastic material.

The free end **107** of spring portion **106** is slightly enlarged and the enlarged free end fits within a slot **117** formed in latching plate **116.** The depending spring portion **104** has a forward bias and contacts spring portion **106,** thus exerting both a forward and downward pressure on free end **107** of spring portin **106.** The lower surface of spring portion **106** contacts the upper surface of latching plate **116.** In this way, the spring portion **106,** together with spring portion **104** exerts a constant downward and forwardly directed pressure on latching plate **116,** and the free end **107** of spring portion **106** is stably held within slot **117.**

The latching plate **116** has a latching tongue portion **118,** which in locking position shown in FIG. **5,** abuts the upper surface of the rear end of walking plate **80,** as best shown in FIG. **5.** The latching tongue has a bevelled forward end **120,** so that it can readily ride over the bevelled rear end **80***a* of walking plate **80,** if there is any snow on the ski blade.

In the locking position of the latching plate **116,** the latch tongue **118** is placed within a rear recess **122** formed in rear sole plate retainer means **50.**

The latching tongue **118** is disengaged, from the locking position of FIG. **5,** by inserting a ski pole end **140** in a conforming cavity **124** formed in the toggle block **102,** and exerting a downward force. The force causes toggle block **102** to pivot in a counterclockwise direction about the axis of pivot pin **108** which, in turn, causes rearward movement of latching plate **118** and disengagement of latching tongue **118** from the walking plate **80** and from recess **122.**

Upon disengagement of the latching plate **116,** the walking plate is freed for the aforedescribed hinging action about pivot axis X—X.

When the walking plate **80** is to be locked, the ski pole end **40** is placed in a second conforming ski pole cavity **126,** formed in toggle block **102.** The toggle block **102** is pivoted in a clockwise direction, causing free end **107** of spring portion **106** to move forwardly, which in turn, causes the latch plate to slide forwardly to engage the walking plate **80.**

The latch plate **116,** in the locking position shown in FIG. **5,** is thus placed under both a downward and forwardly biased pressure by means of the spring portions **104, 106.** The walking plate is thus stably held to the ski blade **75** when the latch plate **116** is in the lock position. Further, the constant pressure exerted upon walking plate **80** by the spring portions **104,** quickly melts any snow accumulation under the walking plate.

Modifications of this invention can be made by those skilled in the art. For example, other latching mechanisms for the walking plate may be devised and other front and rear releasable fastening means for the sole plate may be devised. Therefore, I wish to be bound only by the claims which follow.

I claim:

1. A ski binding, adapted to be mounted on a ski blade and utilized for slope skiing, for ski touring and for ski mountaineering, with said ski blade, which comprises, in combination:

a sole plate;

boot retaining means affixed to said sole plate at the front and rear of said sole plate;

a walking plate, underlying said sole plate, and having frontal end and rearward end;

means for releasably fastening said sole plate to said walking plate;

a manually movable latching means for locking said rearward end of said walking plate to said ski blade, in a first locking position, and for disengaging said rearward end of said walking plate in a second release position; and

hinging means, mounted to the frontal end of said walking plate, for pivotally connecting said walking plate to said ski blade, whereby when said latching means is moved to said second release position, said walking plate is pivotally movable upwardly with respect to said ski blade, together with said sole plate and boot retainer means, about an axis transverse to said ski blade.

2. The ski binding of claim **1** wherein said ski boot retaining means, affixed to said sole plate, has adjustment means thereon for different sized boots.

3. The ski binding of claim **1** wherein said means for releasably fastening said sole plate to said walking plate includes an adjustable spring-biased detent, adapted to be affixed to said ski blade, and a detentreceiving means affixed to said sole plate, said adjustable spring-biased detent being engageable with said detent-receiving means.

4. The ski binding of claim **1** wherein said latching means includes a pivotally movable toggle and a latch plate operatively engageable with said toggle to move from said first locking position to said second release position.

5. The ski binding of claim **1** wherein said means for releasably fastening said sole plate to said walking plate includes an adjustable spring-biased detent engageable with a detent-receiving means affixed to said sole plate, and said transverse axis of pivotal movement of said walking plate is slightly forward of the area of engagement of said spring-biased detent with said detent-receiving means.

6. The ski binding of claim **5** wherein said walking plate is pivotally movably upwardly an angular distance in excess of 70° measured from the plane of the top surface of said ski blade upon movement of said latching means to said second release position.

7. The ski binding of claim 4 wherein said pivotally movable toggle has affixed thereto leaf spring means exerting forwardly directed and downwardly directed forces onto said latch plate whereby said latching means exerts said force onto said walking plate.

8. The ski binding of claim 1 wherein said means for releasably fastening said sole plate to said walking plate includes an adjustable spring-biased detent engageable with a detent-receiving means affixed to said sole plate, and said transverse axis of pivotal movement of said walking plate is placed along a plane of low resistance to the force exerted by said spring biased detent.

9. The ski binding of claim 4 wherein said pivotally movable toggle is provided with cavity means, accommodating a ski pole tip, whereby said toggle is pivotally movable when said ski pole tip is forcibly inserted in said cavity means.

10. A ski binding, adapted to be mounted on a ski blade, and utilized for slope skiing, for ski touring and ski mountaineering, which comprises, in combination:

a sole plate;

adjustable ski boot retaining means affixed to said sole plate at the frontal end and rearward end of said sole plate;

a walking plate, underlying said sole plate, and having a frontal end extending forward of said sole plate and having its rearward end extending beyond the rear of said sole plate;

means for releasably fastening said sole plate to said walking plate including an adjustable spring-biased detent adapted to be affixed to said ski blade forward of the frontal end of said sole plate, and a detent receiving means affixed to the frontal end of said sole plate, said adjustable spring-biased detent being engageable with said detent receiving means, and including also, at the rearward end of said sole plate, a releasable sole plate clamping means for releasably securing the rearward end of said sole plate to a rearward portion of said walking plate;

a manually movable latching means for locking said rearward end of said walking plate to said ski blade in a first locking position, and for disengaging said rearward end of said walking plate in a second release position; and

hinging means affixed to the frontal end of said walking plate, for pivotally connecting said walking plate to said ski blade, whereby when said latching means is moved to a second release position, said walking plate is pivotally movable upwardly with respect to said ski blade, together with said sole plate and adjustable ski boot retainer means, about an axis transverse to said ski blade.

11. The ski binding of claim 10 wherein said latching means includes a pivotally movable toggle and a latch plate operatively engageable with said toggle to move from said first locking position to said second release position.

12. The ski binding of claim 10 wherein said transverse axis of pivotal movement of said walking plate is slightly forward of the point of engagement of said spring-biased detent with said detent-receiving means whereby to allow pivotal movement of said walking plate an angular distance of at least 70°.

13. The ski binding of claim 10 wherein said transverse axis of pivotal movement of said walking plate is placed along a plane of low resistance to the force exerted by said spring-biased detent.

14. The ski binding of claim 10 wherein said latching means includes a pivotally movable toggle, a latch plate and a leaf spring means affixed to said toggle and exerting forwardly and downwardly directed forces on said latch plate when said latch plate is in a first locking position.

15. The ski binding of claim 11 wherein said pivotally movable toggle is provided with cavity means, accommodating a ski pole tip, whereby said toggle is pivotally movable when said ski pole tip is forcibly inserted in said cavity means.

16. The ski binding of claim 10 wherein the underside of said walking plate is coated with a low-friction coating.

* * * * *

UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

PATENT NO. : 3,908,971

DATED : September 30, 1975

INVENTOR(S) : ENGEL, STEVEN F.

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 6, line 24, after "ing" insert --a--;
line 46, delete "detentreceiving" and insert --detent-receiving--;
line 64, delete "movably" and insert --movable--.

Signed and Sealed this

thirtieth Day of December 1975

[SEAL]

Attest:

RUTH C. MASON
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents and Trademarks