

Dec. 12, 1967

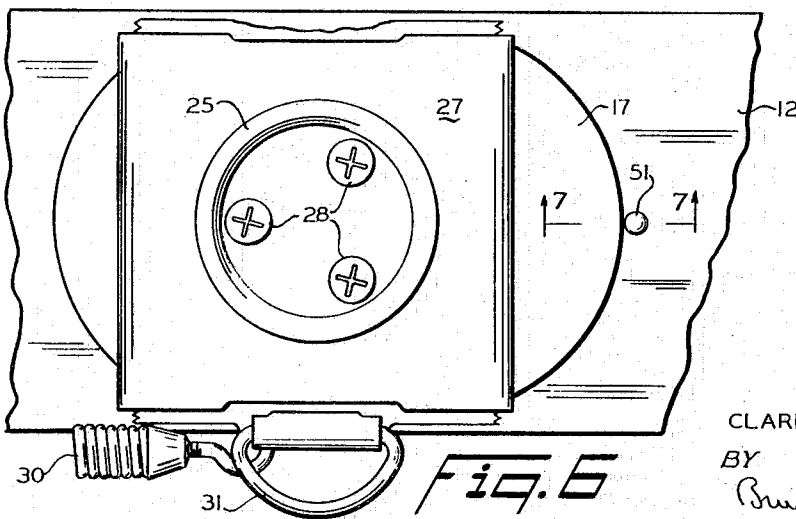
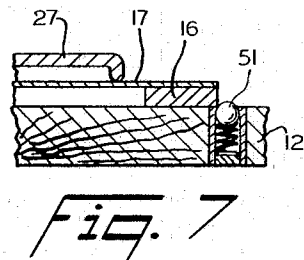
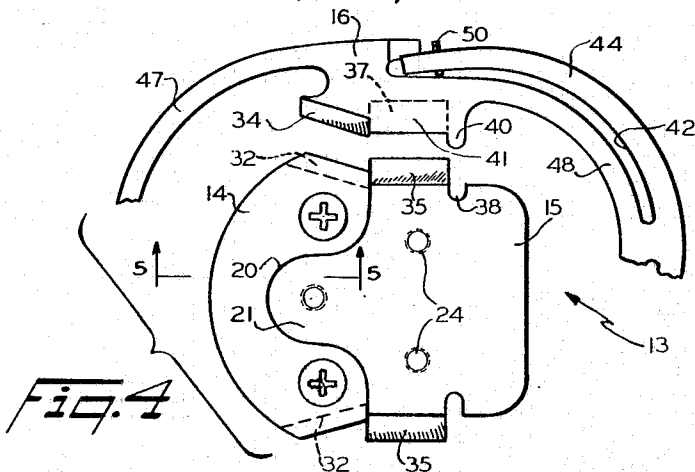
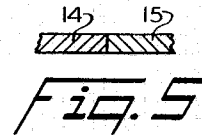
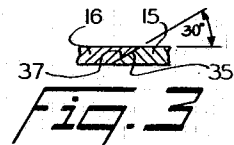
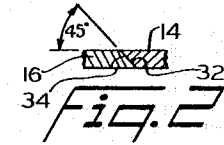
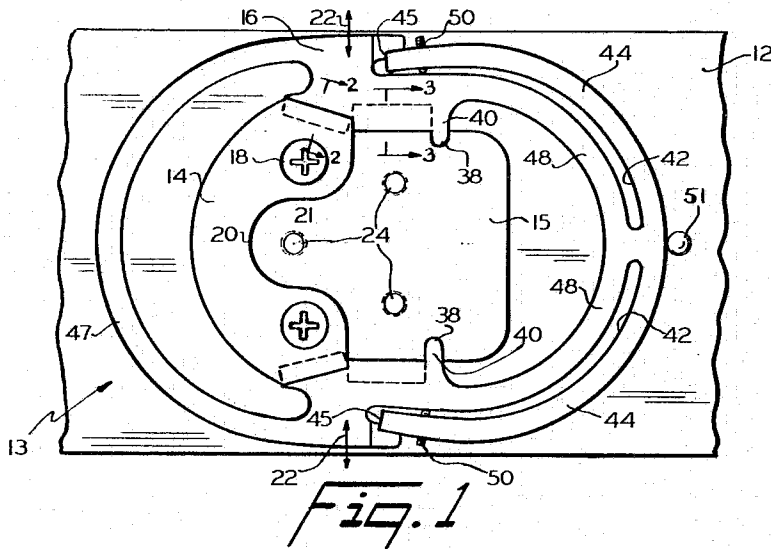
C. W. SEE, JR

3,357,713

SAFETY SKI BINDING

Filed Sept. 28, 1965

2 Sheets-Sheet 1



INVENTOR
CLARENCE W. SEE JR.

BY
Bruns & Fenney
Attys.

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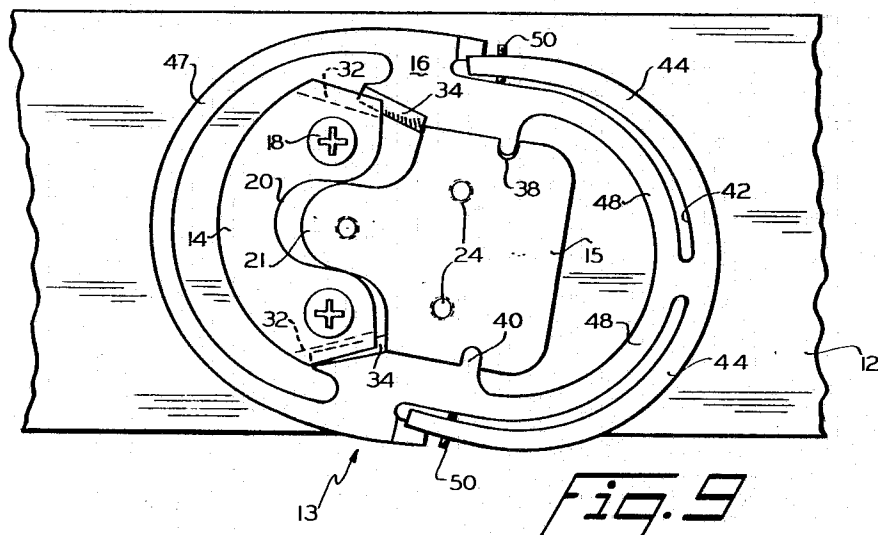
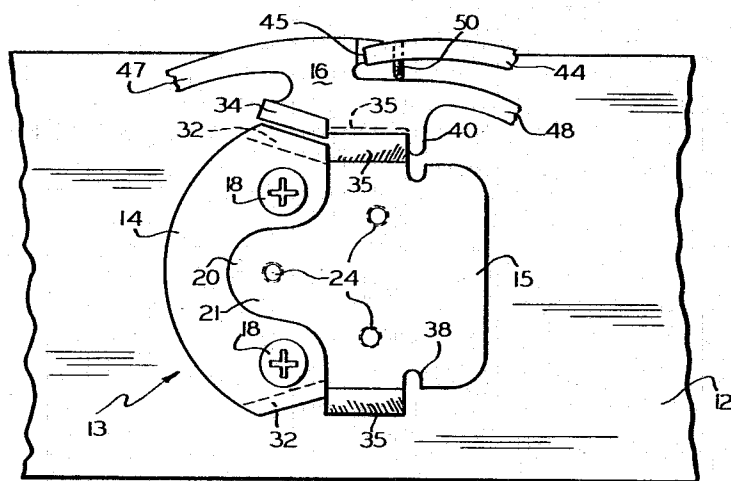
C. W. SEE, JR

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SAFETY SKI BINDING

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2 Sheets-Sheet 2



INVENTOR
CLARENCE W. SEE JR.

BY

Bruma + Jenney
Attys.

1

3,357,713

SAFETY SKI BINDING

Clarence W. See, Jr., 730 Cold Springs Road,
Baldwinsville, N.Y. 13027

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ABSTRACT OF THE DISCLOSURE

A safety ski binding for permitting the heel of a ski boot to be released from the ski when there is an excessive upward strain. The binding includes three flat, interengaging plates, one attached to the ski, one attached to the boot and one which releasably holds the first two together. The interengaging means are coacting inclined edge portions on the plates, and the third plate can be sprung laterally to disengage some of these edge portions and effect the release.

This invention relates generally to safety bindings for attaching ski boots to skis, and has particular reference to a novel heel release structure which can be used in connection with existing boot heel engaging devices to greatly increase the safety of same.

Safety ski bindings are intended to serve a two-fold purpose, e.g., to hold the ski boots firmly attached to the skis during normal skiing activities and to permit the boots to be released from such attachment when the pressure or strain between boot and ski reaches a point at which injury to the skier is likely to result if a release is not effected. While a number of excellent safety bindings have been developed heretofore, the emphasis has generally been on swivel type binding devices which allow the boot to release laterally when there are excessive rotational strains. Unfortunately, some of the more popular swivel devices do not always release the boot under an excessive upward strain such as may be caused by a forward fall and many injuries still occur due to falls of this type.

Among the most widely accepted heel retaining devices are the turntable types which are used in conjunction with various toe retaining devices that swivel or pivot to permit a lateral release of the boot. Many skiers, particularly the more proficient, use a turntable heel retaining device together with long leather straps known as long thongs. These are wrapped securely around the boots so that the latter are clamped tightly to the turntable and thus to the ski. This gives the skier maximum control over his skis but, even through the toe retaining and turntable devices still permit a lateral release of the boot, the long thong in combination with the turntable prevents a release in the event of a forward fall.

With the foregoing and other considerations in view, it may be stated that the primary objective of the present invention is to provide a ski binding release structure which permits rigid attachment of the ski boots to the skis during normal, hard skiing but will effect a release of either boot from its ski when a severe or excessive forward strain is imposed on the boot as by a forward fall of the skier.

Another important object of the invention is to provide a ski binding release structure that can be used in conjunction with most of the well known swivel type toe and heel retaining devices and materially increases the safety thereof by permitting the ski boot to be released under excessive upward strains unaccompanied by such rotational strains as would normally cause the swivel devices to release.

Another important object is to provide a ski binding

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release structure having a relatively simple construction which in its entirety does not exceed a height of $\frac{1}{8}$ ".

Still another important object is to provide a ski binding release structure which utilizes a novel lateral springing action to effect the release.

A further important object is to provide a ski binding release structure which utilizes coacting inclined edge portions on its engaging parts to effect a novel means of operation.

Another important object is to provide a release structure of the character described having adjustment means whereby the point of release can be regulated.

Still another important object is to provide a ski binding release structure which is very strong and durable and yet can be economically manufactured.

Other objects and advantages will become apparent from the following detailed description read in conjunction with the accompanying drawings in which:

FIGURE 1 is a top plan view of an assembled release structure embodying the invention;

FIGURE 2 is a vertical sectional view taken along line 2-2 of FIGURE 1;

FIGURE 3 is a vertical sectional view taken along line 3-3 of FIGURE 1;

FIGURE 4 is a fragmentary top plan view illustrating the release structure of the invention in a partially disassembled state;

FIGURE 5 is a vertical sectional view taken along line 5-5 of FIGURE 4;

FIGURE 6 is a top plan view of a turntable type heel retaining device used in conjunction with the release structure of the invention;

FIGURE 7 is a vertical sectional view taken along line 7-7 of FIGURE 6;

FIGURE 8 is a fragmentary top plan view of the release structure showing the parts thereof at the point at which a release occurs; and

FIGURE 9 is a top plan view of the release structure showing the relative movement of the parts thereof when a purely rotational force is applied.

Referring now to the drawings, wherein like reference numbers designate the same part in each of the views, reference number 12 indicates a fragmentary portion of a ski to which the release structure of the invention is attached. The release structure, generally designated 13, is essentially comprised of a first plate member 14, a second plate member 15, a resilient member 16 and a cover plate 17 (FIG. 6). The plate 14 is fixed to the ski as by a pair of screws 18. This fixed plate is formed with an indented portion 20 which receives a projecting tongue portion 21 of the plate 15, the two plates normally being in edgewise engagement as shown in FIG. 1.

The resilient member 16 is, like members 14 and 15, a flat plate, the member having a substantially oval shape and an open interior. This member is essentially a spring which is deformable laterally as is indicated by the arrows 22 in FIG. 1. The resilient member is preferably formed of a suitable spring steel and plate members 14 and 15 are also preferably formed of metal. As shown in the drawings, member 16 substantially encircles plates 14 and 15 and normally holds them in engagement with one another, as will be more fully described hereinafter.

Plate member 15 is not fixed to the ski but is provided with means, in the form of three tapped holes 24, for connecting it to a ski boot (not shown). This is accomplished by securing the plate member to a heel retaining device such as that shown fragmentarily in FIG. 6, the cover plate 17 being positioned between the plate member and device as best shown in FIG. 7. The heel retaining device shown in FIG. 6 is a known type of turntable or swivel heel device as disclosed in U.S. Patent Nos.

2,836,428; 3,009,710 and 3,100,119 to H. Marker. These devices per se play no part of this invention.

The turntable of FIG. 6 comprises a round center portion 25 fixed to plate member 15 and an outer boot engaging portion 27 which can turn relative to the center portion 25 and plate 15. The central portion is secured to plate 15 as by screws 28 which are threaded into the tapped holes 24, the screws passing through corresponding holes (not shown) in the cover plate 17. The outer portion 27 of the turntable is provided with a substantially conventional boot heel engaging mechanism or tightening device comprising a pair of tension springs, one of which is shown at 30, and a toggle type locking lever (not shown) that operates in a well known manner. In addition to the boot heel engaging mechanism just referred to, many skiers use the previously mentioned long leather straps, or long thongs (not shown), which are passed through loops 31 on each side of the turntable and wrapped securely around the boot.

From the foregoing it will be understood that the plate member 14 is fixed to the ski, the plate member 15 is connected to the skier's boot, and the resilient spring member 16 normally engages both plate members to hold them together and thereby cause the boot to be attached to the ski. Plate member 14 and resilient member 16 engage along inclined edge portions, the inclined edges 32 of plate 14 coacting with oppositely inclined matching edges 34 of member 16, see FIGS. 1, 2, and 4. In a similar manner, plate member 15 and resilient member 16 engage along inclined edge portions comprising the inclined edges 35 of plate 15 and the oppositely inclined matching edges 37 of member 16, see FIGS. 1, 3, and 4. In addition, plate 15 is formed forwardly of its inclined edges 35 with small indentations or keyways 38 which receive fingers 40 on the resilient member to positively locate the members in respect to one another.

With further reference to the matching and coacting inclined edges just described, it will be noted that the inclined edges 32 of plate member 14 are the inverse of the inclined edges 35 of plate member 15, the latter facing upwardly in the plan view (FIG. 4) while the former face downwardly and thus are hidden in the plan view. Where the plate members 14 and 15 are in edge-wise engagement with one another, their meeting edges are substantially vertical as indicated in FIGS. 4 and 5.

The release structure and turntable are assembled by engaging plate member 15 and resilient member 16—apart from the ski and plate member 14 fixed thereon—and then attaching the turntable to the plate member by means of the screws 28 with the cover plate 17 being positioned therebetween, FIGS. 6 and 7. The cover plate provides an unbroken foot pad area for the turntable and also serves to keep snow, ice and dirt out of the release structure below it. With the turntable and plate 15 secured together by the screws, the resilient member will necessarily be held in engagement with these parts because the edge portions 41 of the member, which overlie its inclined edges 37, are locked between the inclined edges 35 of the plate 15 and the overlying cover plate 17.

In discussing the operation of the release structure of the invention it should be first pointed out that in the illustrated embodiment the angle of inclination of the coacting edges 32 and 34 on members 14 and 16 is 45°, FIG. 2, while the angle of inclination of the coacting edges 35 and 37 on members 15 and 16 is 30°, FIG. 3. Assuming now that the skier has a straight forward fall which would cause the boot heel to be lifted off the ski if not prevented from doing so by the binding, an upward force is transmitted through the boot and turntable to the plate member 15. The vertical upward force acting on plate 15 will cause its inclined edges 35 to exert an upward force on the inclined edges 37 of the resilient spring member 16 causing a lateral deformation or outward flexing of the latter.

The upward force that is exerted on the inclined edges 37 by the edges 35 is transmitted through the member 16 to its inclined edges 34 which coact with the edges 32 of plate member 14 to assist in the lateral deformation of the resilient member. If the upward force that is applied to the plate 15 is excessive, or sufficiently severe to in all probability cause injury to the skier, the force will also be sufficient to cause the resilient member to be sprung outwardly enough so that its inclined edges 34 are no longer in engagement with edges 32 of plate 14 as is indicated in FIG. 8. As soon as edges 34 are clear of edges 32, the plate 15 is no longer held in engagement with plate 14 and the boot is released from the ski, carrying with it the turntable, plate 15 and the resilient member 16.

In arriving at the above described point of release it will be noted that, because of the 30° angle of inclination of the edges 35 and 37, slightly more deformation or travel is required by the member 16 to cause these edges to become disengaged from each other than is required to cause disengagement of the 45° edges 32 and 34. Accordingly, and as is shown in an exaggerated manner at the upper part of FIG. 8, the edges 35 and 37 will still have a tiny overlap at the exact moment edges 32 and 34 clear. Since the resilient member will spring inwardly back into its normal, undeformed state the moment edges 32 and 34 clear one another, this will cause the member to remain in engagement with the plate 15 thereby causing it to stay with the boot when the latter is released from the ski. If, however, the release structure were modified so that the edges 32, 34 were the 30° edges and edges 35, 37 were the 45° ones, the plate members would clear first at the latter and the resilient member would remain in engagement with plate 14 and the ski during a release. While the 30° and 45° angles of inclination result in a completely satisfactory embodiment of the invention, it will be understood that these angles can be varied within reasonable limits without affecting the operation of the release structure.

The release structure is provided with adjustment means so that the amount of force needed to cause a release can be regulated. Thus, the point at which a release should occur depends on such factors as the skier's ability, his weight and the snow conditions. A heavy but very proficient and hard skier would require a considerably greater release force than would be safe for a novice child, for example. Referring to FIG. 1, it will be seen that the right side of the resilient member 16 is formed with a pair of arcuate slots 42 and that the narrow portions 44 of the member which form the outside walls of the slots are cut as at 45. The left hand narrow portions 47 and the inside portions 48 on the right thus form the principal spring areas of the member 16 and the portions 44 with their free ends at 45 serve as helper springs. To this end, the helper springs are provided with horizontal tapped holes adjacent their free ends and Allen screws 50 are threaded therein. These screws, which are accessible from the sides of the ski, can be backed off so that the helper springs are in a rest position and exert no force on the inside spring portions 48, as shown in FIGS. 1 and 4, or they can be turned inwardly so that the helper springs are forced outwardly and exert an added spring force as shown in FIG. 8. In this manner, the resistance of the resilient member 16 to lateral deformation can be decreased or increased as required.

As already described, the plate 15, resilient member 16 and turntable are all connected together. This assembly engages the fixed plate 14 along the inclined edges 32, 34 and engagement is maintained when the boot is mounted in the binding by a rearward force acting on plate 15 and member 16 which forces the latter into a firm wedging engagement with the fixed plate 14. The rearward force which operates in this manner is caused by the engagement of the boot toe with the toe retaining device of the binding (not shown) while at the same time closing the

spring tensioned toggle locking lever around the heel of the boot. Since the boot is prevented from moving forward by the toe device, the closing of the locking lever results in the application of a rearward force on the turntable to which the lever is attached, and thus to the plate 15 and member 16.

To maintain the parts of the release structure in engagement when the boot is not mounted in the binding, the structure includes a small ball detent 51, FIGS. 6 and 7, mounted in the ski. This detent abuts against the forward edge of the resilient spring member 16 when the latter is engaged with the fixed plate 14 and prevents accidental forward movement of the resilient member such as would cause an inadvertent separation of the parts. The detent 51 can, on the other hand, be easily depressed to permit re-engagement of the parts of the release structure after a release has occurred.

FIG. 9 illustrates what happens to the release structure when a purely rotational force is applied to it through the boot heel retaining device (and in the absence of any substantial upward force of the type discussed above). Thus, it will be seen that the parts are dimensioned and shaped so that plate member 15 and resilient member 16 can be pivotally moved with respect to the fixed plate 14 to permit a rotational release. This characteristic of the release structure can be utilized to supplement the swiveling action of a turntable, or it can be utilized to take the place of such action when used in conjunction with non-swiveling types of heel retaining devices.

The release structure that has been described herein is relatively simple being comprised of only four parts (plates 14, 15 and 17 and resilient member 16). The upper surfaces of plates 14 and 15 and resilient member 16 all lie in a common plane when the parts are assembled, and the entire structure does not exceed $\frac{1}{8}$ " in height. Since the resilient spring member 16 is actually sprung outwardly in effecting a release, friction losses are at a minimum, the only frictional resistance being at the engaging inclined edges which preferably are of hardened steel. So that these inclined edge portions will not be required to bear the full load when the skier edges his skis, the meeting edges of plates 14 and 15 are vertical in the area of the indentation 20 and tongue 21 whereby these portions of the structure bear most of this shear type load.

From the foregoing description, it will be apparent that the invention disclosed herein provides a novel and very desirable safety release structure. As will be understood by those familiar with the art, the invention may be embodied in other specific forms without departing from the spirit or essential characteristics thereof. The embodiment disclosed is, therefore, to be considered in all respects as illustrative rather than restrictive, the scope of the invention being indicated by the appended claims.

What is claimed is:

1. In a safety binding for releasably attaching a ski boot to a ski, a first plate member adapted to be permanently secured to the ski, a second plate member engageable with said first plate member and having means for connecting it to the boot, and a substantially flat resilient member adapted to simultaneously engage said plate members and hold them in engagement with one another, said plate members each having inclined edge portions engageable with oppositely inclined matching portions on said resilient member, said inclined portions when in engagement with one another being operable to cause said resilient member to be sprung outwardly upon the application of an excessive upward force to said second plate member, said outward springing of the resilient

member permitting disengagement of said first and second plate members whereby a boot connected to the latter can be released from the ski.

2. Structure as defined in claim 1 wherein the upper surfaces of said first and second plate members and said resilient member lie in a common plane when the resilient member is holding the plate members in engagement with one another.

3. Structure as defined in claim 1 wherein the inclined edge portions of said first plate member are the inverse of the inclined edge portions of said second plate member.

4. Structure as defined in claim 1 wherein the angle of inclination of the edge portions of one of said plate members is less than the angle of inclination of the edge portions of the other plate member.

5. Structure as defined in claim 1 wherein said resilient member includes adjustment means whereby the amount of force required to spring the member outwardly can be varied.

6. A safety binding for releasably attaching a ski boot to a ski, a first flat plate member adapted to be permanently secured to the ski, a second flat plate member adapted to have edgewise engagement with said first plate member and having means for connecting it to the boot, and a flat, substantially oval-shaped resilient member the interior of which is open, said resilient member being adapted to substantially encircle said two plate members and hold them in engagement with one another, the upper surfaces of said plate members and resilient member lying in a common plane during such engagement, said plate members each having inclined edge portions engageable with oppositely inclined matching portions on said resilient member, said inclined portions when in engagement with one another being operable to cause said resilient member to be sprung outwardly upon the application of the predetermined force to said second plate member, said outward springing of the resilient member permitting disengagement of said first and second plate members whereby a boot connected to the latter can be released from the ski.

7. A binding as defined in claim 6 wherein the inclined edge portions of said first plate member are the inverse of the inclined edge portions of said second plate member.

8. A binding as defined in claim 6 wherein the angle of inclination of the edge portions of one of said plate members is less than the angle of inclination of the edge portions of the other plate member.

9. A binding as defined in claim 6 wherein said first plate member is formed at one side with an indented portion and said second plate member is formed with a projecting tongue portion which is received in said indented portion when said first and second plate members are in edgewise engagement with one another.

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BENJAMIN HERSH, *Primary Examiner.*

MILTON L. SMITH, *Assistant Examiner.*