United States Patent [19]

Camp

[11] **3,787,868**

[45] **Jan. 22, 1974**

[54] **REMOTELY ACTUATED RELEASE APPARATUS FOR SKI BINDINGS**

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[22] Filed: **June 25, 1971**

[21] Appl. No.: **156,689**

[52] **U.S. Cl.** ..... **343/225 R,** 340/171 R

[51] **Int. Cl.** **H04b 7/00**

[58] **Field of Search** ..... 343/225 R; 340/171 R

[56] **References Cited**

UNITED STATES PATENTS

3,622,998 11/1971 Kortman ..... 343/225 X

Primary Examiner—Harold I. Pitts

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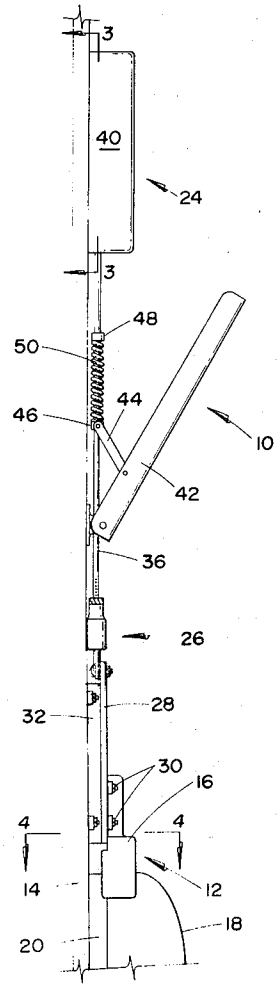
[57] **ABSTRACT**

The remotely actuated release apparatus for ski bindings comprises a signal transmitter housed in a ski pole which is actuated by the skier to transmit a signal which is intercepted by receivers supported on the skis. The receivers are operatively connected to release the bindings by shifting part of the bindings relative to the boots through a mechanical linkage. In one embodiment, a radio frequency signal is provided and in a second embodiment, an audio (sonic) signal is provided. The release apparatus gives the skier the option of releasing the bindings in addition to the usual force release function built into the bindings.

18 Claims, 13 Drawing Figures



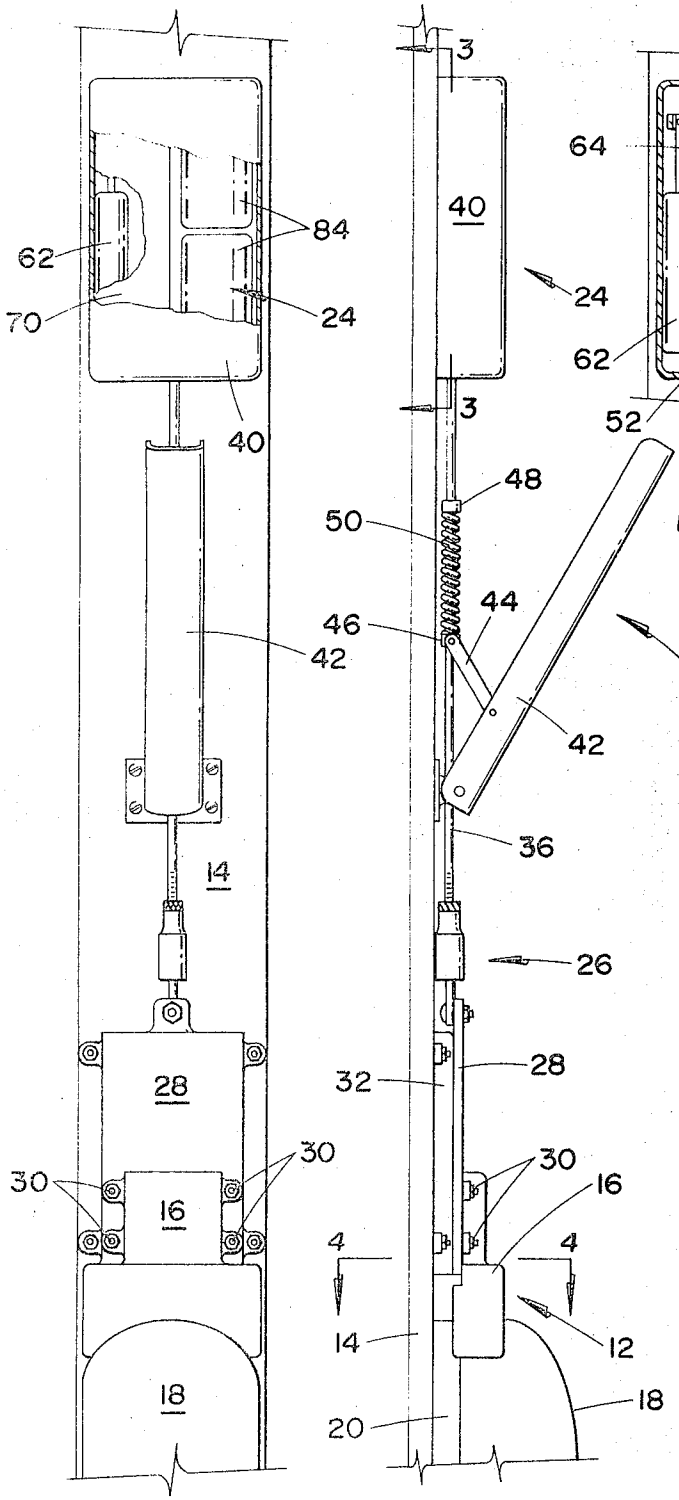


FIG. 2

FIG. 1

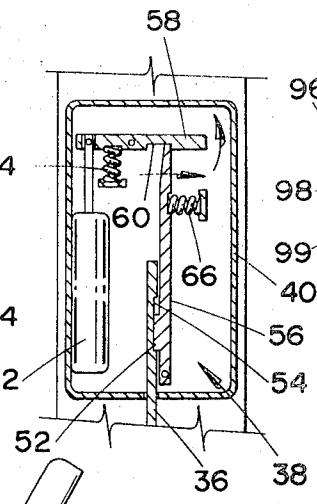


FIG. 3

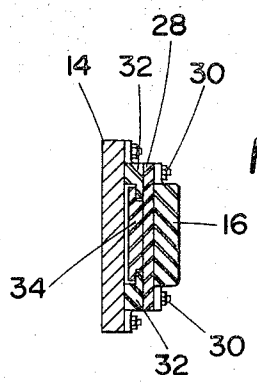


FIG. 4

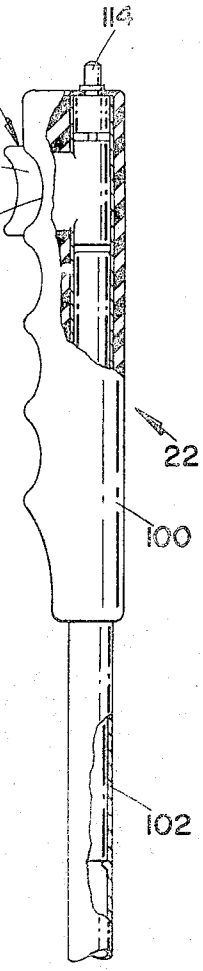


FIG. 5

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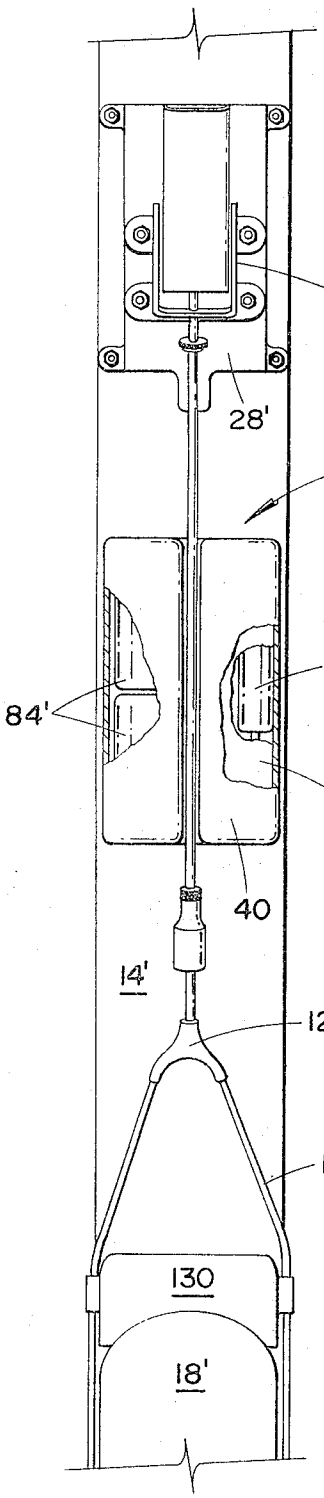

FIG. 7

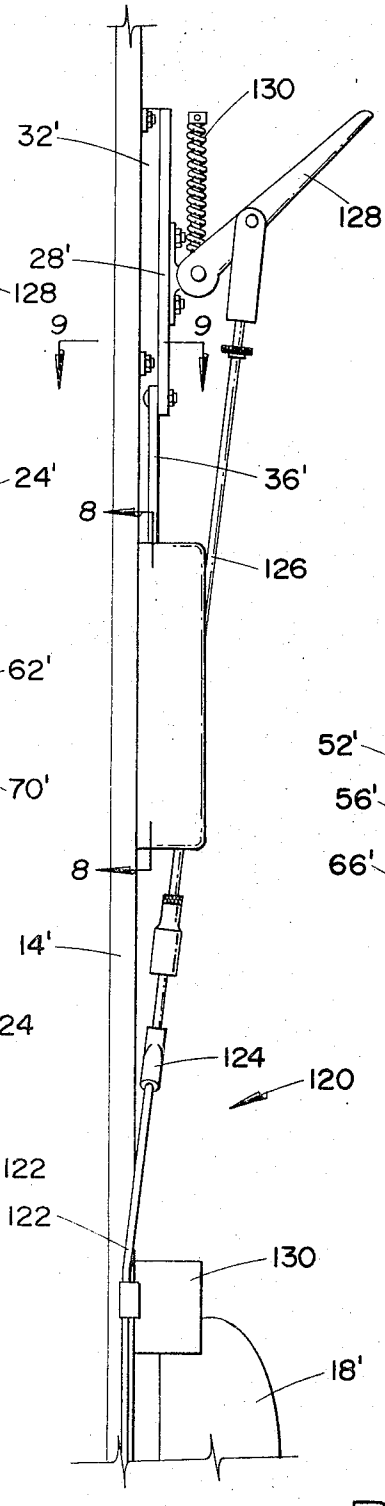

FIG. 6

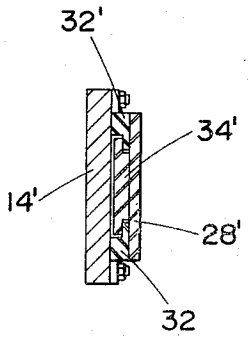

FIG. 9

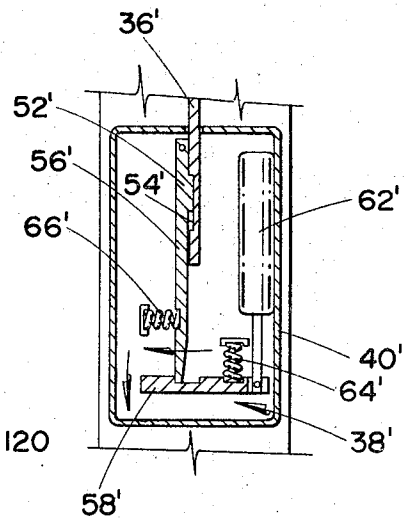

FIG. 8

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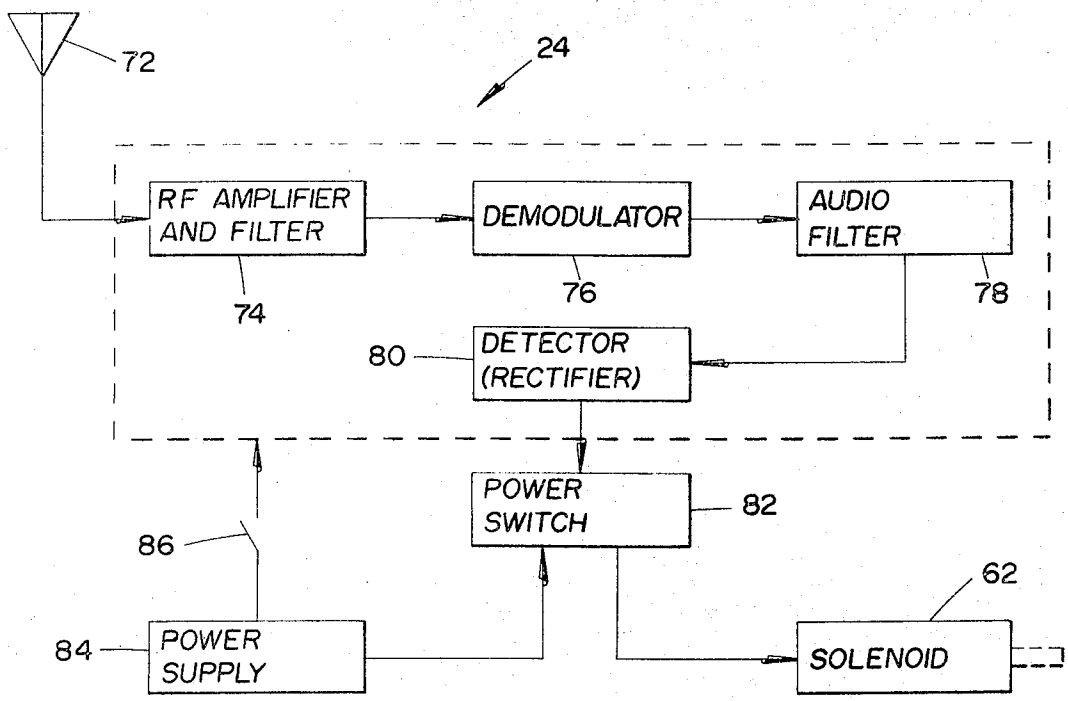

FIG. 11

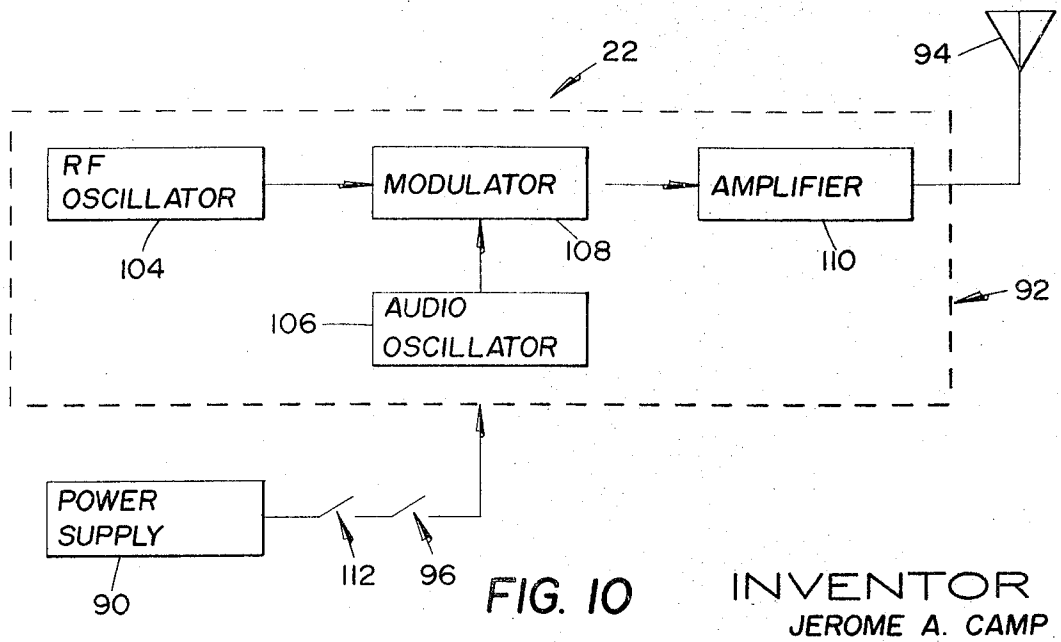

FIG. 10

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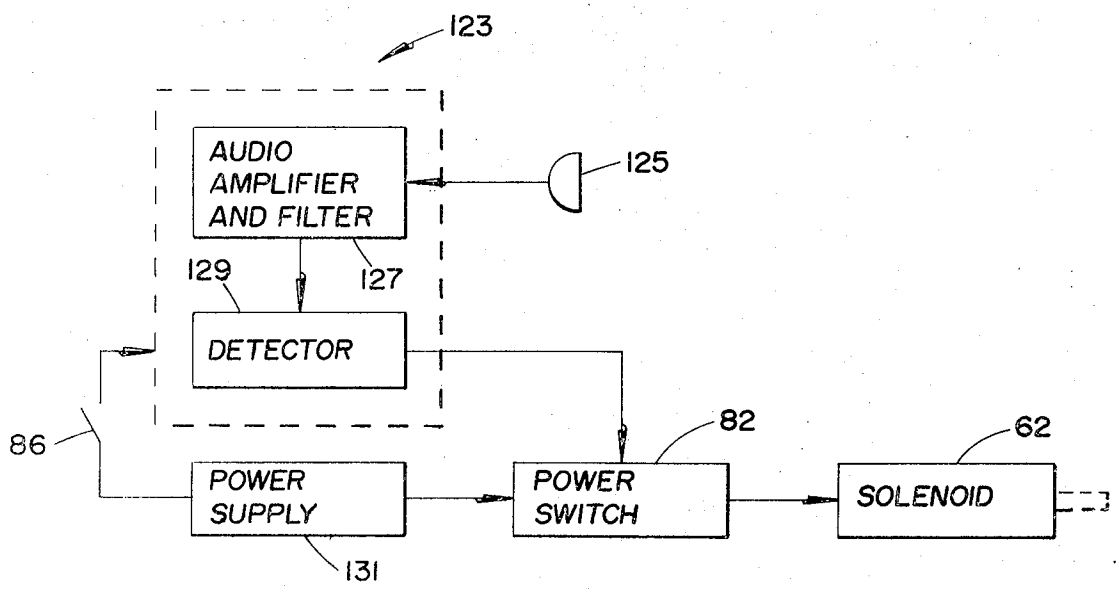

FIG. 13

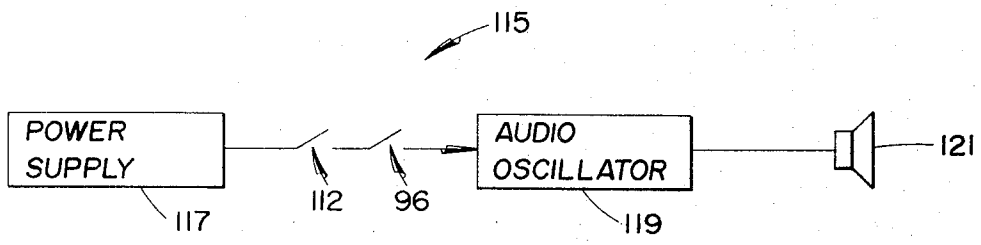

FIG. 12

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REMOTELY ACTUATED RELEASE APPARATUS FOR SKI BINDINGS

BACKGROUND OF THE INVENTION

Currently marketed ski release devices maintain the binding between a skier's ski and boot until forces applied through the ski and boot to the legs and ankles exceed safe levels. When excessive forces are encountered, the bindings release the boots from the skis to prevent injury during falls.

Attempts have been made in the design of most ski release bindings to achieve proper release behavior by constructing the bindings so that release occurs due to forces applied in either a plane parallel to the broad surface of the ski and directed perpendicularly to the length of the ski, or in a direction normal to and directed away from the upper surface of the ski. The first of these includes those forces exerted, for instance, by a twisting motion of the body with respect to the skis. The second includes those exerted by a person leaning forward on the skis. While most ski bindings fall into this category, there are some bindings which are designed to release due to forces applied in directions in addition to those just described. These forces include those due to a rolling motion of the foot with respect to the ski, an upward force at the toe, etc.

However, no binding releases uniformly well in all directions, and even if one did, it would still not overcome the major problems associated with all currently available bindings. This problem is that the decision to release or not release is made by the ski release mechanism, and is therefore a function of many variables. Namely, these are the amounts, directions, and types of forces to which the release mechanism is subjected. Thus, the decision-making process is analog in nature since it is a function of continuous variables.

The main difficulty in the design of the force release bindings stems from not being able to accurately determine the appropriate force required to effect a release. Nearly all release mechanisms have some scheme for adjusting the tension on one or more springs which controls the force required for a release. The tension in one spring normally controls the release magnitude of forces applied in several different directions and thus the magnitude of forces cannot be selected independently. Compounding the problem is the fact that the human skeleton can withstand more force in certain directions than in others.

Thus the problem of obtaining the right balance between proper binding and protection from injury is difficult to solve successfully by merely redesigning the existing force release bindings. The solution to this dilemma appears to be a ski release device that employs a decision-making process that is digital, binary, and not a function of anything but a complete assessment of all the circumstances surrounding the immediate situation. The only practical decision-marking device that approaches satisfying this criterion is the skier himself.

The difficulty encountered in a scheme of this nature is relaying the decision to the release mechanism. The prior art has addressed itself to solving the problem in the patent to P. S. Chisholm U.S. Pat. No. 3,246,907. Chisholm proposes magnetic ski bindings which are released by the skier actuating a switch on the ski pole. However, the signal is transmitted to the bindings through electrical conductor wires which run from the ski pole through clothing and boots to the bindings. Hence the ski boots, skier and ski poles are physically connected which is undesirable from the standpoint of the cost, convenience, comfort, safety and reliability of maintaining the signal communication system operating. Moreover, since Chisholm replaces force actuated bindings with magnetic bindings, any failure in the magnet actuating system creates a potentially hazardous situation to the skier.

It is therefore an object of the present invention to provide a safer release mechanism for ski bindings which overcomes the undesirable features of the prior art and which mechanism is a simple, convenient and reliable modification of force release bindings which provides the skier with the option of releasing his bindings when desired while retaining the benefits afforded by the customary force release bindings.

Another object of the present invention is to provide a new and improved remotely actuated safety release apparatus for ski bindings which operates independent of forces imposes on the skier and with a minimum of apparatus and includes a signal link initiated by the skier to release the bindings.

A further object of the present invention is to provide a signal link for releasing ski bindings that includes an actuating switch on a ski pole to provide easy accessibility for the skier.

A still further object of the invention is to provide a remotely actuated release mechanism which includes in one embodiment a radio frequency transmitter and receiver to effect release of the mechanism and in a second embodiment, an audio (sonic) transmitter and receiver to effect release of the mechanism.

These and other objects of the invention will become apparent from the following description of a preferred embodiment of the invention.

PREFERRED EMBODIMENT OF THE INVENTION

The present invention relates to a remotely operated release mechanism and more specifically to a remotely operated safety release apparatus for ski bindings which permits the skier to release his bindings at anytime by merely actuating a conveniently located switch. The switch is part of a transmitter preferably housed in the ski pole and which transmits a signal to receivers mechanically connected to force actuated bindings. The usual force actuated binding generally classified as step-in bindings or cable bindings must be modified to permit the mechanical linkage to release the bindings upon receipt of the signal initiated by the skier. The present invention also provides means for rendering the skier-initiated release system inoperative.

Preferred embodiments of the present invention are illustrated in the accompanying drawings in conjunction with the two widely used type of safety ski bindings, i.e., step-in and cable bindings. However, it will become apparent that the invention has application to practically all types of releasable ski bindings from the following specification made in conjunction with the drawing wherein:

FIG. 1 is an elevational view of part of a toe release safety ski binding according to the present invention;

FIG. 2 is a plan view of FIG. 1;

FIG. 3 is a sectional view taken approximately line 3—3 of FIG. 1;

FIG. 4 is a sectional view taken approximately along line 4—4 of FIG. 1;

FIG. 5 is an elevational view of the upper part of a ski pole housing the transmitter according to the present invention;

FIG. 6 is an elevational view of part of a cable release safety ski binding according to the present invention;

FIG. 7 is a plan view of FIG. 6;

FIG. 8 is a sectional view taken approximately along line 8—8 of FIG. 6;

FIG. 9 is a sectional view taken approximately along line 9—9 of FIG. 6;

FIG. 10 is a schematic circuit of the radio frequency transmitter according to the present invention;

FIG. 11 is a schematic circuit of the radio frequency receiver according to the present invention;

FIG. 12 is a schematic circuit of the audio (sonic) transmitter according to the present invention; and

FIG. 13 is a schematic circuit of the audio receiver according to the present invention.

Referring to the drawings and initially to FIGS. 1–5 which discloses a remotely actuated release apparatus **10** according to the present invention embodied to release a toe release binding **12** mounted on ski **14.** Only the pertinent part of the binding and ski is illustrated in the drawings to conserve space but it should be appreciated that parts not illustrated are conventional and do not contribute to understanding the invention and that the second ski would be a duplicate of the ski illustrated.

The customarily designated step-in safety release binding is represented by binding **12** and comprises a toe piece **16** which snugly engages the toe of boot **18** immediately above the protruding sole **20.** The toe of the boot **18** is normally positioned as illustrated in FIG. 1 and pressure is exerted on the heel of the boot which is positioned in a cooperating step-in releasable heel fixture (not shown) which secures the boot **18** to binding **12.** The boot **18** is released from binding **12** when a predetermined force is exerted on toe piece **16** or the heel fixture (not shown) which causes, for example, the toe piece **16** to pivot relative to the ski thereby releasing boot **18.** Of course, the heel fixture likewise releases in response to a predetermined force.

The release mechanism **10** does not interfere with this normal force release function of binding **12** but rather permits the skier to release binding **12** when he deems it appropriate. A skier will encounter circumstances where he realizes that he is in trouble, such as an inevitable fall, and should release his binding before the release forces are imposed on the binding. In such circumstances, it is advantageous for the skier to get rid of his skis as soon as possible to minimize injury. This option is provided by the present invention.

The release mechanism **10** includes means **22** (FIGS. 5 and 10) for generating and transmitting a radio frequency signal which is intercepted by receiver means **24.** Means **24** receives and processes the signal and initiates operation of a mechanical linkage means **26** that shifts or translates toe piece **16** away from the toe of boot **18** releasing the boot from binding **12.**

Linkage means **26** includes a shiftable mounting platform **28** to which toe piece **16** is secured by bolts **30.** Platform **28** slides on ways **32** (FIG. 4) bolted to the upper surface of ski **14.** The platform **28** is guided along ways **32** by a depending, inverted T-shape shoe **34** which slides against complimentary inner surfaces of ways **32.**

Platform **28** is moved along ways **32** by an adjustable rod **36** connected at one end to the forward end of platform **28** and at the other end to an unlatching means **38** (FIG. 3) located in a housing **40.** Rod **36** is shifted downward as viewed in FIG. **1** to set toe piece **16** in position to receive boot **18** by a channel-shaped lever **42** pivoted at one end to ski **14.** Lever **42** is connected to rod **36** by a pair of links **44** pivotally connected to lever **42** at one of their ends and to a spring abutment **46** slidably mounted on rod **36** at their other ends. Slidable abutment **46** is connected to spring abutment **48** fixed to rod **36** through coil spring **50** which surrounds rod **36** and is fixed at its ends to abutments **46** and **48.**

Thus pivoting lever **42,** clockwise as viewed in FIG. **1,** shifts rod **36** downward to position toe piece **16** in the position illustrated in FIG. **1.** This movement stops when rod **36** is latched by latching means **38.** Lever **42** is then pivoted counter-clockwise until it rests against the upper surface of ski **14** and covers links **44,** abutments **46** and **48,** and spring **50** to protect them from ice and snow. Such movement of lever **42** also compresses spring **50** against fixed abutment **48** which biases rod **36** to the left.

The upper end of rod **36** is disposed in housing **40** where it is latched and unlocked by a keeper **52** of latching means **38** which engages and disengages a recess **54** in the rod **36.** Keeper **52** extends from a pivoted keeper bar **56** which is held in latching engagement with rod **36** by a latch bar **58.** Latch bar **58** is pivoted intermediate its ends and has a recess **60** to receive the free end of keeper bar **56** and prevent keeper bar **56** from pivoting away from laterally fixed rod **36.**

Latch means **38** in the condition illustrated in FIG. **3** prevents rod **36** from shifting axially upwardly thereby maintaining toe piece **16** in binding engagement with boot **18.** When the skier initiates a signal to release the bindings, it is intercepted by receiver means **24** which energizes a solenoid **62** connected to latch bar **58.** Solenoid **62** pivots latch bar **58** counter-clockwise releasing the end of keeper bar **56.** Keeper bar **56** is pivoted away from rod **36** by the bias of spring **50** on rod **36** causing keeper **52** to disengage recess **54** on rod **36.** Rod **36** is then free to shift axially upwardly releasing binding **12.**

After a momentary delay, power is terminated to solenoid **62** and latching bar **58** and keeper bar **56** are biased by springs **64** and **66,** respectively, toward their latching positions. When lever **42** is pivoted clockwise as described previously the recess **54** in rod **36** moves downwardly until keeper **52** drops therein which latches the rod **36.**

The solenoid **62** is actuated by receiving means **24.** Receiving means **24** is housed in the upper portion of housing **40** as shown in FIG. **2** and is separated from the latching means **38** by platform **70.** Attention is directed to FIG. **11** for a description of the operation of receiving means **24.** Receiving means **24** includes a signal receiver means **72** which receives a signal from the transmitter **22** and directs the signal which comprises a carrier and imposed signal to a radio frequency amplifier and filter **74** which filters and amplifies the incoming signal. The carrier portion of the signal is then removed by a demodulator **76** so that only the audio portion is left. The audio portion of the signal is again filtered by filter **78** and rectified by rectifier **80** to obtain an appropriate signal to operate a power switch **82.** Power switch **82** is in a circuit between a power supply **84**

comprising batteries, and solenoid **62.** When the power switch **82** is actuated, it assumes a closed state to thereby complete a circuit between the batteries **84** and the solenoid **62.**

After a predetermined lapse of time, the power switch automatically assumes an open state thereby terminating power to the solenoid. Also included in the power circuit is a manually actuated switch **86** which can be opened to prevent actuation of the solenoid for example during non-use of the skis.

The elements of the receiver circuit means **24** such as elements **74, 76, 78, 80** and **82** are well-known along with solid state power switch **82** and are commercially available. Hence, no further description of their construction or operation is deemed necessary.

The radio frequency signal initiated by the skier to effect release of the binding is generated by transmitter means **22** which is partially shown mounted in one ski pole in FIG. **5** and the electrical functional circuit is shown in FIG. **10** to which attention is directed. Receiver means **22** includes a power supply **90** comprising batteries connected to a signal generator and transmission circuit means **92** which generates and directs the signal to a transmitter **94.** A manually actuated switch **96** initiates generation and transmission of the signal.

Switch **96** includes a switch actuator portion **98** (FIG. **5**) which protrudes from one of the finger grips **99** of grip **100** of ski pole **102.** When switch actuator portion **98** is protruding from the grip **99** as shown in FIG. **5,** switch **96** is in its closed position. Hence, when the skier is skiing and grips grip **100** and specifically has his forefinger gripping finger grip **99,** the switch actuator **98** is moved and held inward of the FIG. **5** position which functions to maintain the switch **96** open as shown in FIG. **10.** When the skier desires to release his binding, he merely releases his finger from finger grip **99** and spring biased switch actuator portion **98** moves out to the position shown in FIG. **5** which closes switch **96** thereby completing a circuit to the signal generation and transmission circuit means **92.**

When power is directed to circuit means **92,** a radio frequency carrier is first generated by the oscillator **104.** The carrier signal is then modulated by an audio signal generated by the audio oscillator **106** at modulator **108.** The audio and carrier signal is then amplified by amplifier **110** and directed to transmitting means or antenna **94** which transmits the signal which is picked up by signal receiving means **72.**

At various times such as at the end of a run or during non-use, the skier may want to render the transmitter **22** inoperative and this is accomplished by a latching switch **112.** Latching switch **112** is manually actuated and can be moved into an open or closed position by the skier depressing a latching switch actuator **114** (FIG. **5**) which is located in one of the ski poles. When the skier is ready to commence a run, he merely moves the switch actuator **114** to close latching switch **112** which arms the receiver for operation when actuator **98** is released by the skier. The switch actuator **114** may have associated herewith a light or other means to indicate to the skier the position of the latching switch **112.**

Transmitter means **22** like receiver means **24** is made up of standard commercially available components that need no further explanation.

To minimize the possibility of one skier's transmitter releasing another skier's binding where both skiers are using the present invention, the radio frequency transmitter is designed to transmit a very short distance, such as a few feet, to thereby provide a spatial separation between skiers. In addition, the transmitter and receiver can be designed to transmit and receive a particular, specific frequency and numerous frequencies would be employed for different mechanisms. Further, the transmitter and receiver can also be designed to employ different modulating frequencies. Thus, it would be difficult with this combination for one skier's signal to release another skier's binding.

The specification has thus far described the remote actuator as incorporating a radio link, however, it should be apparent to those skilled in the art that other types of wireless, remote actuators are within the purview of the present invention. For example, an audio link or actuator can be employed to issue an audio signal in the sonic range to effect release of the bindings. Such a system would be physically incorporated into the equipment just like the radio link and a function circuit diagram therefor is disclosed in FIGS. **12** and **13** to which attention is directed.

In FIG. **12,** an audio transmitter **115** is disclosed which would be physically incorporated into the ski pole **102.** The audio transmitter includes a power supply **117** comprising appropriate size batteries in circuit with an audio oscillator **119** and speaker **121.** The skier initiates generation of an audio signal by first arming the circuit by closing latching switch **112** so that release of the actuator portion **98** causes switch **96** to close thereby directing power to the audio oscillator **119.** The audio signal is generated by the audio oscillator **119** and is transmitted by the speaker **121.** A generated audio (sonic) signal is picked up by the audio receiver **123** located on the skis **14** in the same physical arrangement as receiver **24** for the radio link. The audio receiver **123** includes a microphone **125** which picks up the audio signal from speaker **121** and directs the signal to audio amplifier and filter **127.** The audio amplifier and filter **127** amplifies the audio signal and filters out all unwanted frequencies and directs the desired frequencies to a detector **129.** The signal is rectified by detector **129** to obtain an appropriate signal to operate a power switch **82.** When power switch **82** assumes a closes position as a result of receiving a signal from detector **129,** a circuit is completed from power supply **131** which includes appropriate batteries to solenoid **62.** Power supply **131** also supplies operating power for the amplifier **127** and detector **129.** Actuation of solenoid **62** causes the bindings to open in the same manner as described in combination with the radio signal frequency system just previously described.

The specification thus far describes the application of the present invention to the modern step-in release bindings. However the invention has application by slight modification to release other types of bindings such as the older cable binding which is still in use. This application to the cable bindings is illustrated in FIGS. **6** through **9** of the drawings. In describing the cable release binding application, the same reference numerals will be applied to the parts common to the step-in toe and heel release binding description previously made, but with the addition of a prime (').

The standard cable release bindings **120** illustrated include a cable loop **122** which extends around the heel of the boot **18'** and is connected to yoke **124** where a single cable **126** extends to a pivoting latching lever

128. The cable binding is actuated by moving the foot until the toe abuts a fixed abutment 130 and the cable loop 122 is positioned about the heel of boot 18'. Latch lever 128 is then pivoted counter-clockwise as viewed in FIG. 6 to draw the cable tightly around the heel of boot 18' thereby securing the boot 18' to the ski 14'.

Associated with latch lever 128 is a spring device 130 which in this embodiment performs the function of maintaining a predetermined tension on cable 126 and exerts pressure on rod 36' in the same manner as does spring 50 of the FIG. 1 embodiment. The biased rod 36 is latched by latch mechanism 38' which operates in the same manner as latch means 38 to secure the platform 28' against movement until the skier initiates the signal through transmitter means 24.

When the skier initiates generation and transmission of a radio frequency or audio signal the solenoid 62' is actuated to release rod 36' which shifts platform 28' downward as viewed in FIG. 6 which slackens cable 122 and thereby permits the boot 18' to be released from ski 14'.

It should be apparent that applicant has disclosed an operable and practical safety ski binding release apparatus which modifies force release bindings to permit a skier to release the bindings at will while retaining the force release capabilities of present bindings.

Having described my invention, I claim:

1. A remotely actuated release apparatus for ski bindings comprising first means operatively connected to a ski binding for effecting release of the binding including signal receiving means for receiving a signal which initiates release of the binding and second means disposed for actuation by a skier for generating and broadcasting said signal to said receiving means.

2. The release apparatus as defined in claim 1, wherein said first means includes linkage means mechanically connected to shift a ski boot engaging portion of the ski binding upon receipt of said signal.

3. The release apparatus as defined in claim 2, wherein said linkage means includes a moveable support for a toe release binding.

4. The release apparatus as defined in claim 2, wherein said linkage means includes a moveable support for a cable control lever of cable bindings.

5. The release apparatus as defined in claim 2, wherein said linkage means further includes a power actuated latching bar pivoted for movement to release for movement a spring bias rod operatively connected to the ski boot engaging portion of the ski binding.

6. The release apparatus as defined in claim 5, wherein said linkage means further includes a solenoid operatively connected to said latching bar and said first means further includes receiver circuit means for actuating said solenoid including said signal receiver means, signal processings means for processing said signal from said receiver means, a power supply, and switching means operable upon receipt of said signal from said processing means to electrically connected said power supply to said solenoid.

7. The release apparatus as defined in claim 6, wherein said receiver circuit means further includes a manually actuated switch operable when open to break the circuit between said power supply and said solenoid.

8. The release apparatus as defined in claim 1, wherein said second means is disposed in a ski pole and includes a first manually actuated switch located for convenient actuation by the skier and operable when actuated to initiate generation and broadcasting of said signal.

9. The release apparatus as defined in claim 8, wherein said first manually actuated switch includes an actuator portion that is spring protruded from the grip of the pole so that the skier when gripping the grip moves said actuator portion into the pole opening said switch.

10. The release apparatus as defined in claim 1, wherein said second means includes a power supply, transmitting circuit means for generating, processing and transmitting said signal and manually actuated switch means for electrically connecting said power supply with said transmitting circuit means.

11. The release apparatus as defined in claim 10, wherein said manually actuated switch means includes a first manually actuated switch having an actuator portion spring protruded from a grip on a ski pole so that the act of a skier's hand gripping the grip moves the actuator portion into the pole thus opening said first manually actuated switch and release of the grip permits the actuator portion to protrude thus closing said first manually actuated switch.

12. The release apparatus as defined in claim 11, wherein said manually actuated switch means further includes a second manually actuated switch having an activator portion protruding from another part of the ski pole less convenient to the skier's hand than said first manually actuated switch and moveable from a closed position in which said second manually actuated switch is closed thus arming said transmitting circuit means for operation when said first manually actuated switch is closed to an open position which prevents operation of said transmitting circuit means.

13. The release apparatus as defined in claim 1, wherein said signal receiving means includes means for receiving a radio frequency signal and said second means includes means for generating and transmitting a radio frequency signal.

14. The release apparatus as defined in claim 1, wherein said signal receiving means includes means for receiving an audio signal and said second means includes means for generating and transmitting an audio signal.

15. A release apparatus for safety ski bindings comprising in combination with a force release safety ski bindings first means operatively connected to portions of said bindings and operable to shift said portions relative to the skis, and second means actuatable by a skier to effect operation of said first means independent of the force release operation of said bindings including means for remotely transmitting and receiving a signal.

16. A release apparatus as defined in claim 15, wherein said second means includes means for transmitting and receiving a radio frequency signal.

17. A release apparatus as defined in claim 15, wherein said second means includes means for transmitting and receiving an audio signal.

18. A release apparatus as defined in claim 15, wherein said means for remotely actuating transmitting and receiving a signal includes a switch actuator on a ski pole.

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