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BODY HEATING APPARATUS

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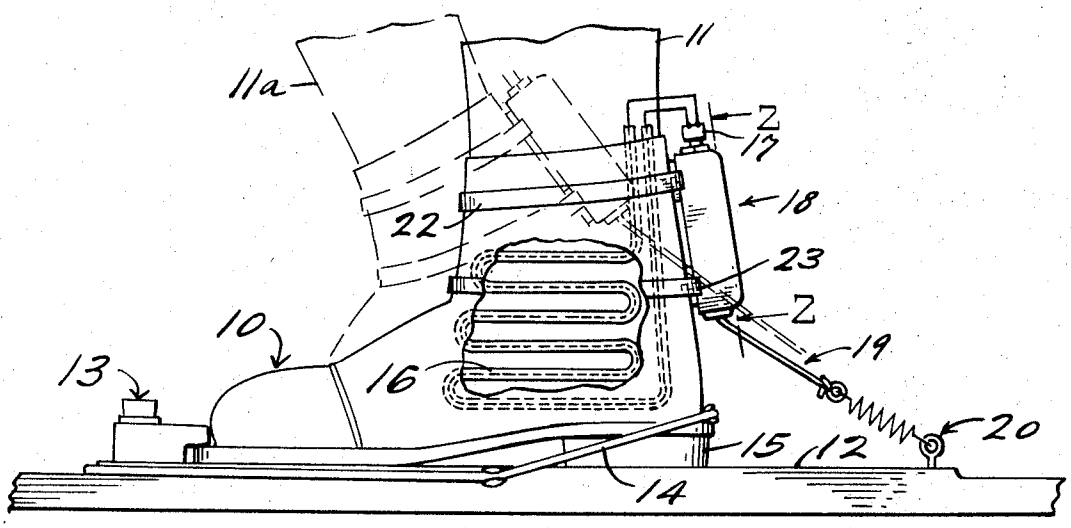


FIG-1-

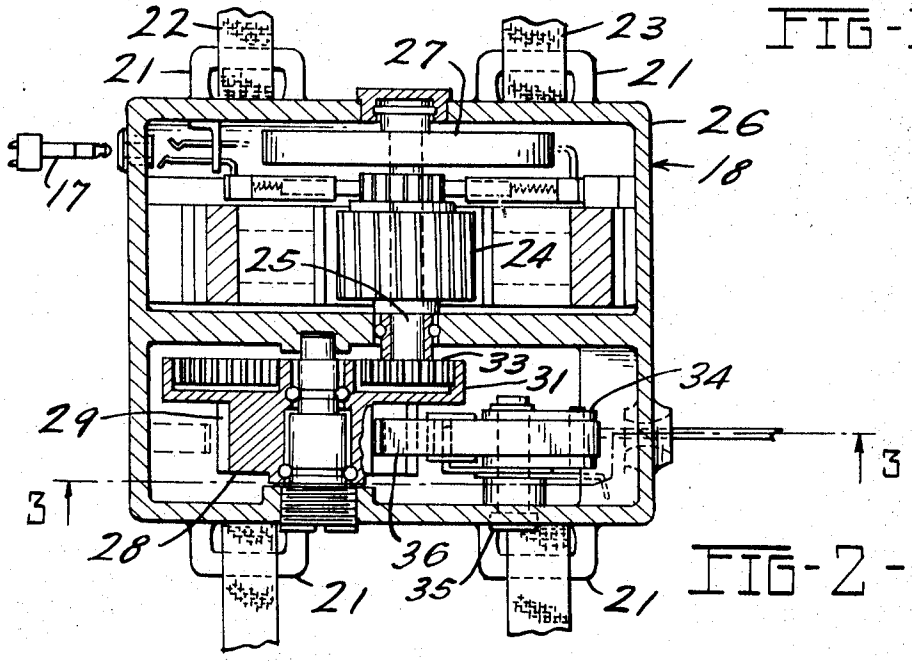


FIG-2-

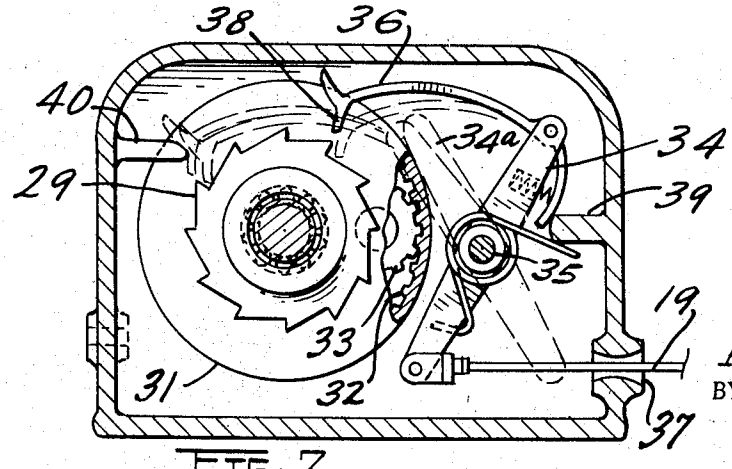


FIG-3-

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BODY HEATING APPARATUS

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U.S. Cl. 219—211 3 Claims

ABSTRACT OF THE DISCLOSURE

The invention is an apparatus for heating or warming the extremity of a skier. A resistance heater is positioned adjacent an extremity of the skier and a current generator is secured adjacent the ski boot. The generator is electrically connected to the resistance heater. A connecting member extends from the generator to a point located on the ski behind the ski boot. Relative movement between the generator and the fixed point on the ski is mechanically transmitted to the generator thereby generating current to the resistance heater.

This invention relates to an apparatus for heating or warming the extremities of a snow skier or person engaged in outdoor activity. More particularly this invention relates to an apparatus particularly adapted for warming the feet or hands of a skier by utilizing the continuous movement made by such person while skiing to generate an electrical current which is used to energize an electrical resistance heating wire embedded in the clothing covering the skiers extremities.

Warming through use of electric heating elements embedded in an article of clothing, such as shoes, mittens or insulated suits, is known in the art and has been used for a number of years to keep aviators warm at high altitudes. The disadvantage of course, with most electrically heated clothing is the fact that the user must remain close to a fixed power source, such as the electrical system of an airplane, in order to take advantage of the electrical power available therefrom.

U.S. Pat. 2,692,326 discloses a battery powered, electrical heating device for use in the shoes of a wearer. This device, while completely portable and enabling the wearer to travel independently of a fixed power source, must rely upon batteries of limited energy capacity. Current development in the art of electrical generators has made possbile the use of highly efficient, compact and light-weight generating units which require a minimum of mechanical power to generate an amount of electrical power sufficient to heat a fine resistance wire which may be used to selectively warm certain portions, such as the hands or feet, of persons exposed to the elements.

It is accordingly an object of this invention to provide an apparatus which may be conveniently used by skiers and other persons exposed to the weather for relatively long periods and which, due to their activity in skiing or their means of locomotion, create sufficient force through body movement which, when converted to rotary energy, can drive a small electric generator for supplying the electric power to the heating element.

It is another object of this invention to provide an apparatus for electrically heating the feet of skiers, which apparatus is light-weight, compact, may be readily attached to the upper portion of a ski boot, and which is activated by the natural motion of a skier as he rocks back and forth in his ski boots in the ski bindings.

Other objects and advantages of this invention will be apparent to persons skilled in the art, from the following description of a preferred embodiment of the invention, reference being made to the accompanying drawings in which:

FIG. 1 is a side view in elevation showing a ski boot with a portion of the wearer's leg therein, and an embodiment of suitable electrical generator attached thereto and to a portion of a ski;

FIG. 2 is a cross-sectional view of the electrical generator shown in FIG. 1, shown on an enlarged scale and taken along the line 2—2 of FIG. 1, showing the construction details of this preferred embodiment, and;

FIG. 3 is a cross-sectional view on an enlarged scale, as it would be seen in full section from the position of line 3—3 of FIG. 2, and showing the details of the embodiment of the generator.

Referring first to FIG. 1, a single ski boot **10** with a portion of the wearer's leg **11** inserted therein is shown held on a ski **12** by means of a conventional ski harness **13** which includes a spring mounting **14**. As is well known the spring mounting **14** extends around the heel **15** of the ski boot **10** and permits the wearer to rock forward on the ball of his foot, raising the heel **15** off of the upper surface of the ski **12**, to the position shown in phantom and indicated by reference numeral **11***a*. This rocking motion is practiced by a skier to shift his weight forward and back on the skis, depending upon his speed, position and nature of the slope being traversed.

Within the ski boot **10**, as shown in the portion broken away, is a winding or filament of a fine wire resistance heating element, generally designated by reference numeral **16** which encircles the foot of the wearer or may be entirely below the wearer's foot, such as in the sole of the ski boot or stocking. In this embodiment, the wire is shown as being within the lining of the ski boot, but it is to be understood that it may be incorporated within the stocking of the wearer or, if desired, within the mittens of the wearer.

The ends of the resistance heating element **16** extend upwardly through the top of the boot and are attached to a pair of output terminals **17** which are a part of an electrical generator, generally designated by reference numeral **18**. As further seen in FIG. 1, a flexible tension member **19**, whose purpose will be subsequently explained, extends from the lowermost portion of the electrical generator **18** and is secured to an eye or other appropriate fastening **20** on the upper surface of the ski **12**, to the rear of the heel **15** of the boot **10**. The body of the electrical generator **18** has a plurality of strap loops **21**, also seen in FIG. 2, which receive a pair of straps **22** and **23** which encircle the upper portion of the ski boot **10** and securely hold the generator **18** in position. Other means of attaching the generator **18** to the upper portion of the ski boot **10** will be apparent to those skilled in the art.

Referring to FIGS. 2 and 3, one preferred embodiment of the generator **18** includes a rotor **24** mounted on the shaft **25** which is journaled for rotation within the external frame **26** of the generator **18**. A flywheel **27** is also secured to the shaft **25**. A ratchet wheel **28** having external ratchet teeth **29**, as best seen in FIG. 3, is journaled for rotation on a shaft **30** which is spaced from and parallel to the rotor shaft **25**. A recessed, internal tooth ring gear **31** is integrally formed and coaxial with the ratchet wheel **28**, as best seen in FIG. 2, and is of a diameter so that the inner teeth **32**, best shown in FIG. 3, mesh with a pinion **33** secured to the adjacent end of the rotor shaft **25**.

Referring to FIG. 3, a pivot arm **34** is secured to a fixed pin **35** on the casing **26** of the generator **18** and has a ratchet pawl **36** pivoted on one end thereof. The opposite end of the pivot arm **34** is attached to the tension member **19** which extends through an opening **37**

in the lower portion of the casing **26**. The free end of the ratchet pawl **36** has a tooth engaging dog **38** which, when in the position shown in FIG. 3, is held out of engagement with the ratchet teeth **29** by a detent **39**. When the pivot arm **34** is turned counterclockwise, by a force applied on the tension member **19** in the direction of the arrow, the ratchet pawl **36** will engage a ratchet tooth **29** of the ratchet gear **28** as the pivot arm **34** moves away from the detent **39** and further force supplied from the tension member **19** will cause the pawl **36** to move to the left, thus turning or spinning the ratchet wheel **28** and connected internal ring gear **31**.

Because of the difference in diameter of the internal ring gear **31** and the pinion **33** secured to the rotor shaft **25**, a relatively large amount of rotation of the rotor **24** will be caused by a relatively small amount of rotation of the ratchet wheel **28**. When the pivot arm **34** is moved to its left-hand position, as shown in phantom in FIG. 3 and designated by reference numeral **34***a*, the face of the ratchet dog **38** strikes a second detent **40** which raises it up out of contact with the ratchet teeth **29**, thus permitting the ratchet wheel **28** and internal ring gear **31** to spin.

With the preferred embodiment of the electrical generator **18** as thus described attached to the rear of a ski boot **10**, as seen in FIG. 1, it will be apparent that the continued rocking motion of the skier in his ski boot, as previously described, will continually pivot the pivot arm **34** and thus drive the ratchet wheel **28** by means of the ratchet pawl **36**, driving the rotor **24** of the generator at a relatively continuous and steady speed, thus generating a substantial and steady amount of electrical power for use in heating the resistance element **16**.

It will be apparent that the system thus described, which uses the natural motion of a skier or other person engaged in traveling through the snow, can be used to power a heating element disposed in any part of the wearer's body, and not just the foot thereof. Furthermore, it will be apparent that other specific embodiments of the generator which converts the movement of the skier to a rotary movement for driving the generator, can be utilized by persons skilled in this art. Because the power source for these heating elements is dependent, not upon expendible batteries, but upon the continued movement of the user, the apparatus described herein has advantages over those known in the prior art in that the power generated therefrom is available so long as the person remains engaged in his out-of-doors activity.

Various other modifications of the above described preferred embodiments will be apparent to those skilled in the art and may be made without departing from the spirit or scope of the attached claims.

I claim:

1. An apparatus for heating the foot of a person wearing a ski boot with a ski attached thereto, comprising in combination, a resistance heating element disposed within said ski boot, a current generator means secured to the rear portion of said ski boot, said generator means having output terminals electrically connected to said heating element and having a magnetic field, and a rotor positioned to cut magnetic lines of force from said field and thus generate electrical current to said output terminals when rotated, a flexible member extending from said generator means and secured to a fixed point on said ski behind said ski boot, and means for converting movement of said generator means relative to said fixed point to rotary movement of said rotor whereby the movement of said generator caused by movement of the upper part of said ski boot relative to said ski by said person drives said rotor and thus generates current to heat said ski boot.

2. The apparatus of claim **1** wherein the means for converting generator movement to rotary movement includes a toothed ratchet wheel coaxially secured to said rotor and a spring biased ratchet pawl secured to said flexible member whereby tension placed on said flexible member through movement of said generator away from said fixed point causes said pawl to engage and drive said rotor and whereby the subsequent release of tension on said flexible member will cause said pawl to return to its previous position without interfering with movement of said rotor.

3. Heating apparatus for use by a skier wearing a ski boot with a ski attached thereto, said heating apparatus comprising, in combination, a resistance heating means positioned adjacent an extremity of the skier, a current generator means secured adjacent such ski boot, said current generator means having output terminals electrically connected to said resistance heating means and having a magnetic field and a rotor, wherein electric current is generated to said terminals and to said resistance heating means when said rotor is rotated, a connecting member extending from said current generator means to a fixed point located on said ski behind such ski boot, and means located adjacent said current generator means and operatively connected to both said current generator means and said connecting member for converting movement of said current generator means relative to said fixed point to rotary movement of said rotor, thereby generating current to said resistance heating means.

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36—2.6; 310—75.2