May 10, 1966 W. M. CAMERON ETAL 3,250,545

SKI POLE

Filed Jan. 18, 1963

FIG_1

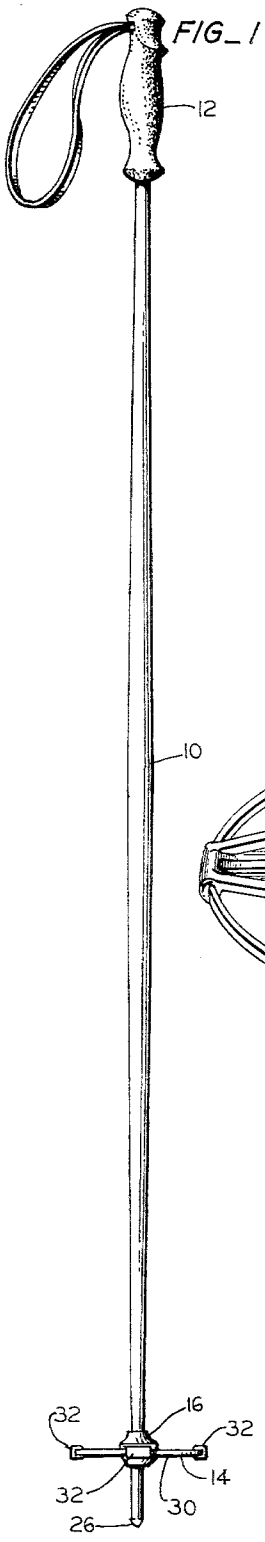


FIG_2

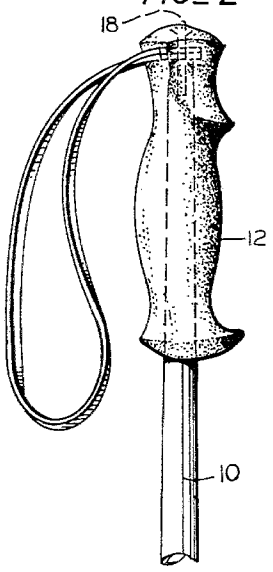


FIG_3

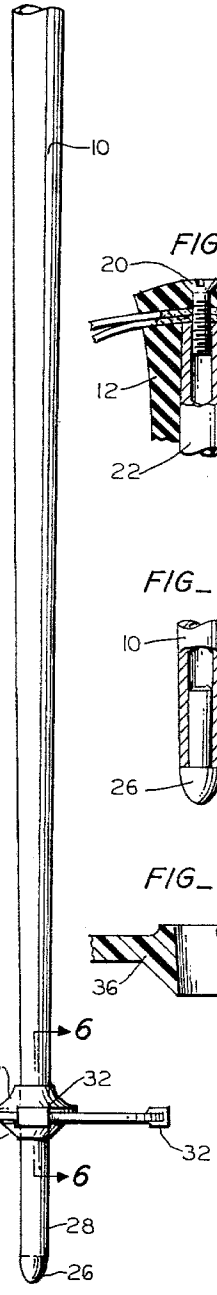
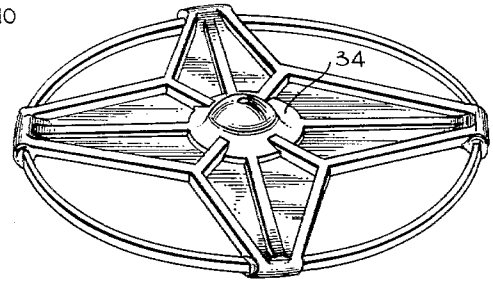


FIG_4

FIG_5

FIG_6

FIG_7



INVENTOR.
William M. Cameron
Lawrence G. Powers
BY Taylor & Neal
ATTORNEYS

United States Patent Office

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SKI POLE

William M. Cameron, Lafayette, and Lawrence G. Powers, Hayward, Calif., assignors, by mesne assignments, to Henry D. Whittlesey, doing business as Whittlesey, Powers and Cameron, Hayward, Calif.

Filed Jan. 18, 1963, Ser. No. 252,405
5 Claims. (Cl. 280—11.37)

This invention relates to ski poles and more particularly to ski poles having improved structural characteristics which permit them to be made and used more advantageously than poles made heretofore.

Properly designed ski poles form a substantial asset for the competitive skier, and good skiers are coming to realize that their skiing ability may be enhanced by the use of one type of ski pole instead of another. In the selection of a good ski pole, the weight of the pole below the hand grip is an important consideration, because a pole whose free end is lighter can be swung much more easily and rapidly than a heavy pole and thereby permits the competitive skier to bring his poles to effective position more rapidly and with less effort. The part of the pole which is within or close to the skier's hand may be made fairly heavy thereby giving the skier substantial balancing weight in his hands which can help him to control his own balance, but the remainder of the pole should be as light as possible, that is have a minimum swinging weight, commensurate with the provision of sufficient strength in the pole to prevent pole failure.

It is an object of this invention to provide a ski pole which is formed to provide the best compromise between pole strength and swinging weight so that the skier may obtain the pole having both absolute minimum swinging weight and sufficient strength to prevent pole failure.

It is another object of the invention to provide such a ski pole which is efficiently designed with the safety of the skier in mind.

It is another object of the invention to provide such a ski pole which may be made as easily and economically as possible commensurate with its unique features.

Other objects and advantages of the invention will become apparent from the following description read in conjunction with the attached drawings in which:

FIG. 1 is a view in side elevation of a ski pole constructed in accordance with the principles of this invention;

FIG. 2 and FIG. 3 are enlarged views of the upper and lower portions respectively of the pole of FIG. 1;

FIG. 4 and FIG. 5 are further enlarged views of the upper and lower tips of the pole of FIG. 1;

FIG. 6 is a sectional view of the snow wheel on the pole of FIG. 1, taken on the plane indicated at **6—6** in FIG. 3 and illustrating the relaxed shape of the hub of the snow wheel prior to its placement on the pole, and

FIG. 7 is a perspective view of the snow wheel.

Referring now in detail to the drawings, the ski pole illustrated therein comprises a tubular shaft **10** described in greater detail hereinafter, a hand grip member **12** which forms the subject matter of a separate application of William M. Cameron and Lawrence G. Powers, Serial No. 252,508, filed January 18, 1963, now Patent No. 3,181,880 issued May 4, 1965, and a snow wheel **14** which is supported on the lower end of the pole in engagement with a rigid collar **16**. The tubular shaft **10** is substantially symmetrical and has identical end portions whereby

the grip member **12** and snow wheel **14** may be mounted on either end of the pole.

As illustrated in FIGS. 2 and 4, the grip member **12** has an aperture **18** in its upper end through which a self tapping screw **20** extends with the screw **20** being threadedly engaged in the upper end **22** of the pole (see FIG. 4) restraining the grip member **14** against axial movement off of the pole. A tip point member **26** is driven into the lower end **28** of the tubular shaft **10** and frictionally retained therein.

As indicated in FIG. 1, the tubular shaft **10** is formed with an area of maximum diameter at its center and with areas of equal minimum diameter at its opposite ends with the shaft being smoothly tapered between these areas of maximum and minimum diameter. The double taper shaft may be formed on known tube shaping apparatus, and it is formed with its inner and outer diameters varying with its length (axial distance from the adjacent end) in accordance with a predetermined formula so that the entire tubular shaft has substantially the characteristics of a constant strength beam which is capable of withstanding substantially equal lateral loads applied at all positions along its length. Thus, where the inner and outer diameters of the tube are represented by d and D respectively, and L is the distance from the point at which the diameters are measured to the adjacent end of the pole, the inner and outer diameters vary with the length in accordance with the following formula where K is a constant of proportionality and where the outer diameter D varies between the end points of minimum diameter and the central point of maximum diameter such that the maximum diameter is between about two and ten times the minimum diameter:

$$\frac{D^4-d^4}{D}=KL$$

As indicated above, the preceding formula is followed in fabrication of the tubular shaft **10** to impart to the shaft substantially the characteristics of a constant strength beam; however, the characteristics of a purely constant strength beam are departed from in the central area of the tubular shaft where it has its point of maximum diameter so that the shaft is weaker in this area by about five to ten percent than a constant strength beam would be. Viewed in reverse, the wall thickness of the pole is increased in the areas of minimum diameter by a sufficient amount to make the pole five to ten percent stronger in these areas than a constant strength beam would be. This predetermined weakening of the shaft in its center is desirable for a number of reasons. It is desirable to provide maximum strength in the tubular shaft in the area immediately above the snow wheel **14** since this area of the pole is subjected to damage by contact with the metal edges of the skier's skis. While maximum strength is desirable in this area care must be taken that increasing of the strength in this area does not place the weakest point in the shaft near the hand grip member **12** since pole failure immediately below the hand grip member **12** would leave the pole as a sharp and elongated projection on which a skier could be seriously injured. With the pole weakened at its central area of maximum diameter, as explained above, pole failure, if it occurs, will occur substantially at the middle of the pole thereby reducing the danger of injury to the skier to a minimum; as the pole starts to fail, it will first start to bend at the central weakened point thereby tending to bend the lower half of the pole over to a position parallel to the ground

before the pole fractures at its center. The bent over lower portion of the pole is then not in a position to injure the skier, and the upper portion of the pole which the skier holds in his hand after the pole fractures does not present the problem of serious injury which would be presented by a fractured portion of the pole standing upright in the ground.

The construction of the tubular shaft **10** of the pole in this manner provides the ideal balance between pole strength and swinging weight of the pole with the weight of the pole being reduced to a minimum while providing maximum strength in the pole and controlled breakage of the pole if the pole is subjected to unusually large loads. Additionally, the snow wheel **14** is constructed to provide no sacrifice in pole strength in the area around the snow wheel **14**, and is also constructed to provide a minimum weight on the lower end of the pole thereby keeping the swinging weight of the pole at an absolute minimum. The snow wheel is constructed from a metal ring **30** to which is bonded at **32** a rubber web **34** (see FIG. 7) which carries at its center a resiliently deformable rubber hub **36**. As indicated in FIG. 6, the rubber hub has a central aperture **38** which is frusto-conical in shape with an apex angle which is greater than the angle of taper of the tubular shaft **10** in the area adjacent to the snow wheel. The provision of this apex angle for the frusto-conical shape of the aperture **38** permits the hub **36** to expand resiliently as it is forced onto the lower end of the pole and to thereafter grip the pole with a greater force at the lower edge of the aperture than at the upper edge. The lower side of the hub **36** is provided with a second frusto-conical surface **40** which is coaxial with the frusto-conical aperture **38** and which has an apex angle which is greater than the apex angle of the conical aperture **38**. With the lower part of the hub shaped in this manner, the hub may be fabricated of a minimum quantity and hence weight of material while providing the most efficient locking of the hub onto the pole. The hub will expand resiliently as it is forced onto the pole until the hub comes in contact with the rigid collar **16**, but when the snow wheel is pushed downwardly to pull it off the lower end of the pole, the hub **36** turns inside out so that the hub grips the pole with the lower outer conical surface **40** and with a force substantially exceeding the force opposing sliding movement of the hub onto the pole.

While one specific embodiment of our invention has been illustrated and described in detail herein, it is obvious that many modifications thereof may be made without departing from the spirit and scope of the invention.

We claim:

1. A ski pole comprising

(A) an elongated symmetrical tube made of metal and having

(1) a central area of maximum outer diameter,

(2) substantially identical end areas of substantially equal minimum outer diameters with said minimum diameters being between one-tenth and about one-half of said maximum diameter, and

(3) inner and outer wall diameters, d and D respectively, which vary along the length, L, of said tube, measured from the adjacent end of the tube, substantially in accordance with the formula

$$\frac{D^4-d^4}{D}=KL$$

where K is a constant of proportionability, to give said tube substantially the characteristics of a constant strength beam,

(B) a hand grip member removably mounted on one end of said tube,

(C) securing means extending into the interior of said one end of said tube and restraining said grip member against axial movement off of said tube, and

(D) a tip member extending into the interior of the other end of said tube and closing said other end of said tube.

2. The ski pole of claim **1** characterized further in that said inner and outer diameters depart from said formula in said central area to weaken the strength of said tube in said central area below the strength of a purely constant strength beam, whereby failure of said pole resulting from the application thereto of excessive bending moments will occur at said central area.

3. A ski pole comprising an elongated symmetrical hollow tube with its surface smoothly tapered from a central area of maximum diameter to substantially identical areas of substantially equal minimum diameter with said maximum diameter being between about two and ten times said minimum diameter and with said tube having substantially the characteristics of a constant strength beam, a hand grip member mounted on one end of said tube, securing means extending into the hollow interior of said one end of said tube and restraining said grip member against axial movement off of said tube, and a tip portion closing said other end of said tube, the wall thickness of said tube being controlled along the length of said tube to weaken the strength of said tube in said central area below the strength of a purely constant strength beam in said area, whereby failure of said pole resulting from the application thereto of excessive bending moments will occur at said central area.

4. A ski pole comprising an elongated symmetrical hollow tube with its surface smoothly tapered from a central area of maximum diameter to substantially identical areas of substantially equal minimum diameter with said maximum diameter being between about two and ten times said minimum diameter and with tube having substantially the characteristics of a constant strength beam, a hand grip member mounted on one end of said tube, securing means extending into the hollow interior of said one end of said tube and restraining said grip member against axial movement off of said tube, and a tip portion closing said other end of said tube, a rigid collar mounted on said pole adjacent to said other end thereof inwardly of said pole from said end and peripherally engaging said pole, and a snow wheel mounted on said pole between said collar and said other end and having a resilient hub portion resiliently embracing said pole, said snow wheel resilient hub portion having an upper side contacting said collar, a lower side facing toward said other end of said pole, and a generally frusto-conical aperture extending between said sides with said aperture when undeformed having an apex angle below said lower surface which is greater than the angle of taper of said tube adjacent thereto, and with said lower side having a generally frusto-conical surface which is coaxial with said frusto-conical aperture and has an apex angle below said lower surface which is greater than said apex angle of said aperture whereby said hub may be slid onto said pole into engagement with said collar while said hub portion deforms resiliently and said hub portion may be pushed downwardly on said pole away from said collar while said hub portion inverts to grip said pole with said frusto-conical lower surface.

5. A snow wheel for a tapered ski pole which comprises a central resilient hub portion with a wheel portion surrounding said hub portion, said hub portion consisting of a body of resiliently deformable material having upper and lower sides adapted to face the top and bottom of a ski pole on which said wheel is mounted and a generally frusto-conical aperture extending between said sides with said aperture when undeformed having an apex angle below said lower surface which is greater than the angle of taper of said pole, and with said lower side having a generally frusto-conical surface which is coaxial with said frusto-conical aperture and has an apex angle below said lower surface which is greater than said apex angle of said aperture whereby said hub may be slid onto said pole

while said hub portion deforms resiliently and said hub portion may be pushed downwardly on said pole while said hub portion inverts to grip said pole with said frusto-conical lower surface.

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BENJAMIN HERSH, *Primary Examiner.*

A. HARRY LEVY, *Examiner.*

M. L. SMITH, *Assistant Examiner.*