

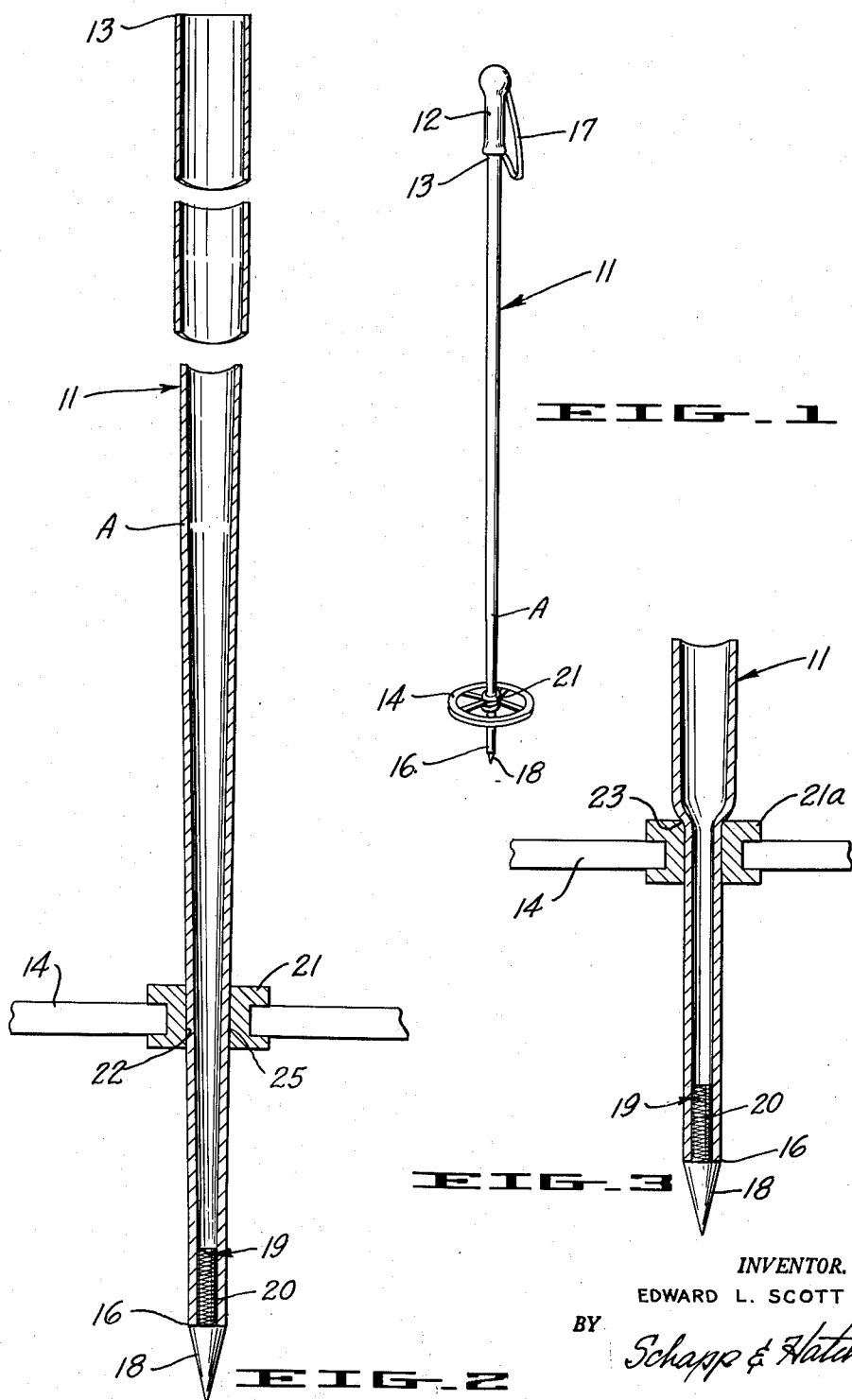
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SKI POLE CONSTRUCTION

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1

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SKI POLE CONSTRUCTION
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This invention relates to improvements in ski pole construction, and more particularly to light-weight ski poles suitable for both general use and use under extreme conditions such as racing.

It is important that a ski pole be as light in weight as possible in order to avoid tiring the arms of the skier. At the same time it is equally important that the pole be rigid and free from bending or "whip" in order to assure the precise control necessary during fast turns and other maneuvers.

The upper end of the pole is held in the hand of the skier and the lower end is moved forwardly and rearwardly or to the side, depending upon the conditions encountered and the maneuvers desired to be performed. To avoid unnecessary tiring of the skier and to permit rapid and easy movement of the lower end of the ski pole, it is important that the lower portion of the pole be as light as possible, thus reducing the inertia or "pendulum effect."

It is also important that the ski pole be of such construction that it cannot easily be dented or cut, for denting or cutting destroys the resistance to bending of a tubular shaft. Such resistance to denting and cutting is particularly necessary at the lower end of the pole, adjacent to and extending several inches above the basket ring, because this area is repeatedly struck forcibly against the skis and other hard objects.

The ski pole of the present invention is constructed so that the shaft has a graduated wall thickness. The diameter of the shaft at its upper end adjacent to the handle is large as compared with previous ski poles. It is a well known principle that the stiffness of a tubular member varies approximately with the square of diameter but is directly proportional to the wall thickness. Thus, shafts of relatively large diameters may have much thinner wall thickness and less weight than shafts of smaller diameter while still retaining at least an equivalent resistance to bending.

For these reasons, the upper portion of the present tapered shaft has a much more favorable weight-to-strength ratio than previous ski poles. The main drawback to the use of large diameter, thin walled shafts of constant diameter is the low resistance of such shafts to "localized loading," resulting in denting and cutting.

This principle is taken advantage of in the present ski pole construction by making the upper or handle end of the pole of comparatively large diameter with a comparatively thin walled section. While the thin wall section of large diameter offers good resistance to bending, this resistance is dependent upon the wall being tubular in form and not flattened or dented.

This construction is practicable at the upper sections of the pole but not at the lower section because of the tendency of the lower sections to be dented or cut by contact with the skis or other objects. Therefore, the thickness of the wall is increased gradually from top to bottom. At the same time, the diameter of the pole is decreased so that increase in wall thickness will not add undesirable weight to the lower portion of the shaft.

This decrease in diameter also increases the resistance to denting. For any given wall thickness, denting will be resisted better by small diameter tubing than by tubing of larger diameter.

A further advantage of my described construction is

2

in the "feel" of the pole resulting from the tapered appearance and extremely light weight.

Another advantage accrues from the fact that the shaft is manufactured of light-weight metals such as aluminum alloys which are work-hardened during the tapering process.

Accordingly, it is a principal object of the present invention to provide a ski pole having a tapered shaft of graduated wall thickness in which the wall thickness increases toward the bottom, while the diameter decreases.

A further object of the present invention is to provide a ski pole of the character described in which the wall thickness increases toward the bottom of the pole so as to provide increased resistance to denting, flattening or buckling thereat.

Still another object of the invention is to provide a ski pole construction of the character described which is sturdy, light in weight, particularly at the lower end, and which presents a pleasing appearance to the beholder.

And finally, it is proposed to provide a ski pole construction of the character described which is inherently capable of precisely positioning the basket ring with respect to the bottom end of the pole.

Further objects and advantages of my invention will appear as the specification proceeds, and the new and useful features of the ski pole construction will be fully defined in the claims hereto attached.

The preferred forms of my invention are illustrated in the accompanying drawing, forming part of this application, in which:

FIGURE 1 is a side elevational view of a ski pole constructed in accordance with the present invention;

FIGURE 2, an enlarged vertical cross-sectional view of the pole of FIGURE 1, with portions broken away to fit the drawing to the sheet; and

FIGURE 3, a fragmentary vertical cross-sectional view of the lower end of a modified form of the ski pole of FIGURE 2.

While I have shown only the preferred forms of my invention, it should be understood that various changes or modifications may be made within the scope of the claims hereto attached, without departing from the spirit of the invention.

Referring to the drawings in detail, it will be seen that the ski pole construction of the present invention includes a hollow tapered shaft 11 of light metal alloy, having a handle 12 mounted at the larger end 13 of the shaft, and a flattened snow-engaging member 14 mounted adjacent to the smaller end 16 of the shaft. The handle 12 may be of any suitable type generally used on ski poles, and preferably includes a wrist strap 17. Likewise, the snow-engaging member 14 may be of any suitable configuration, the member here being shown as a conventional type of basket ring.

In accordance with the present invention the shaft 11 is provided with a graduated wall thickness. The thickness of the wall at the top 13 of the pole is slight but increases gradually as it nears the bottom end 16. At the same time the diameter of the shaft is tapered from a comparatively large diameter at the upper end 13 to a considerably smaller diameter at the lower end 16. The taper of the pole and the increase of wall thickness are chosen so that the shaft will have substantially the same weight per lineal inch over its entire length, while having a much greater resistance to denting or flattening in the area adjacent to the member 14.

The taper of the shaft may commence at a point somewhat below the top end of the shaft, so that the untapered top portion may be cut off at different lengths to provide different lengths of finished poles. With such

3

construction, one size of handle will fit equally well regardless of the total length of the shaft.

While other materials, such as plastic reinforced with glass fibers, steel, or other metals may be used, in order to make the pole as light in weight as possible, I prefer to use one of the light-weight aluminum alloys suitably heat-treated and cold-worked to provide maximum strength. Such alloys provide a strong, but light-weight shaft, and, at the same time the material can be made sufficiently ductile to permit its being drawn to the form described. The shaft may be drawn or formed in any suitable manner which will provide decreasing diameter and simultaneously increasing wall thickness from one end of the shaft to the other, while permitting accurate control over both diameter and wall thickness.

In accordance with conventional practice, a sharpened point 18 is secured to and projects from the bottom end 16 of the shaft for penetrating engagement with the snow and ice over which the skier travels. As here shown, the point 18 is provided with a pin 19, the shank 20 of which is swaged to the lower end 16 of the shaft 11.

As an example of a ski pole constructed in accordance with the present invention, the shaft 11 is formed of aluminum alloy and is approximately 54 inches long. The upper end 13 has an outside diameter of three-quarters of an inch over the top 11 inches, tapering down to an outside diameter of nine-sixteenths of an inch at a location designated "A" in the drawing and which, in the example, is approximately eight and three-quarters inches above the lower end 16.

In accordance with the present invention, means is provided for positioning the snow-engaging member 14 accurately with respect to the lower end 16 of the shaft. As shown in FIGURE 2, this means includes a hub member 21 for the member 14, the hub 21 having a tapered central opening 22 formed to seat firmly and precisely in a predetermined location on a correspondingly tapered lower end portion 25 of the shaft 11.

The taper of lower end portion 25 is steep enough to insure that the normal variations in manufacturing tolerances will not seriously alter the location of the hub 21 on the shaft 11, and is such that the hub will remain firmly in place. I have found that a suitable taper for shaft portion 25, and opening 22 in hub 21, is approximately one-quarter of an inch per foot.

The purpose of this double taper is to maintain a reasonably large diameter over the major portion of the shaft length and then to change to a steeper taper which provides for accurate location of the hub 21, and which at the same time affords a very small diameter at the lower end 16 permitting the use of a small light-weight pin 19. The wall thickens gradually from approximately 0.035 inch at the shaft upper end 13 to approximately 0.070 at lower end 16.

A modified means for positioning member 14 is illustrated in FIGURE 3 of the drawing, wherein the hub 21a is formed to fit snugly on the shaft 11, the hub 21a being precisely positioned relative to the shaft end 16 by a shoulder 23 provided on the shaft.

The shoulder 23 is here conveniently provided by suddenly reducing the diameter of the shaft 11 at the proper location so as to provide a constriction and adjacent shoulder against which the hub member 21a may be engaged.

From the foregoing it will be seen that I have provided a novel ski pole construction of extreme stiffness coupled with extreme light weight and of a form which is easily manipulated by the skier, the ski pole being tapered inwardly from top to bottom and having an increasing wall thickness from top to bottom, which makes

4

it possible to maintain light weight construction of the pole, while at the same time protecting the lower end against denting and buckling.

I claim:

1. A ski pole, comprising an elongated hollow shaft, a handle mounted at one end of said shaft, a sharpened point secured in the opposite end of said shaft, said shaft having a gradual inward taper extending from an area adjacent to said handle over a major portion of the length of the shaft and terminating at a location short of said point, the shaft being formed with a steeper taper between said location and said point, and a flattened snow-engaging member having a hub formed with a taper complementary to said steeper taper precisely positioned on said member in encircling relation thereto in a fixed spaced relation to said point.

2. A ski pole, comprising an elongated hollow shaft, a handle mounted at one end of said shaft, a sharpened point having a shank projecting into and secured within the hollow portion at the opposite end of said shaft, the wall of said shaft being relatively thin at said handle and becoming progressively thicker toward said point, said shaft having a gradual inward taper extending from an area adjacent to said handle over a major portion of the length of the shaft and terminating at a location short of said point, the shaft being formed with a steeper taper between said location and said point, and a flattened snow-engaging member having a hub formed with a taper complementary to said steeper taper precisely positioned on said member in encircling relation thereto in a fixed spaced relation to said point.

3. A ski pole as defined in claim 2 and wherein said shaft is formed from aluminum alloy tubing.

4. A double tapered shaft for ski poles, comprising an elongated tubular member having a handle end and an opposite snow-engaging end, said shaft being formed with a gradual inward taper extending from an area adjacent to said handle end over a major portion of the length of the shaft and terminating at a location short of said snow-engaging end, the shaft being formed with a steeper taper between said location and said snow-engaging end, and a snow-engaging member having a complementarily tapered hub precisely positioned in a tight encircling relation on the steeper tapered portion of the shaft in a fixed spaced relation to said snow-engaging end.

5. The double tapered shaft for ski poles defined in claim 4, in which the outside diameter of the shaft at said handle area is untapered and approximately $\frac{3}{4}$ of an inch in diameter with the shaft tapering down to an outside diameter of approximately $\frac{1}{16}$ of an inch from the area adjacent to the handle end to said location, and in which the shaft tapers inwardly from said location towards said snow engaging end at a rate of approximately $\frac{1}{4}$ inch per foot, the walls of said shaft being formed with a wall thickness of approximately 0.035 inch at said handle and increasing to approximately 0.070 inch at said snow engaging end.

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