United States Patent [19]

Penberthy

[11] **3,735,434**

[45] **May 29, 1973**

[54] **ICE AXE**

[76] Inventor: **Harvey Larry Penberthy**, 5624 S. W. Admiral Way, Seattle, Wash.

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Related U.S. Application Data

[63] Continuation of Ser. No. 113,936, Feb. 9, 1971, abandoned.

[52] **U.S. Cl.** .....**7/8.1 R**, 30/164.8, 145/2 R, 125/43

[51] **Int. Cl.**.....**B25f 1/00**, B25c 5/16

[58] **Field of Search** .....7/8.1 R; 145/2 R; 30/164.5, 164.8; 125/40, 43

[56] **References Cited**

UNITED STATES PATENTS

1,265,276	5/1918	Stephens	145/2 R

FOREIGN PATENTS OR APPLICATIONS

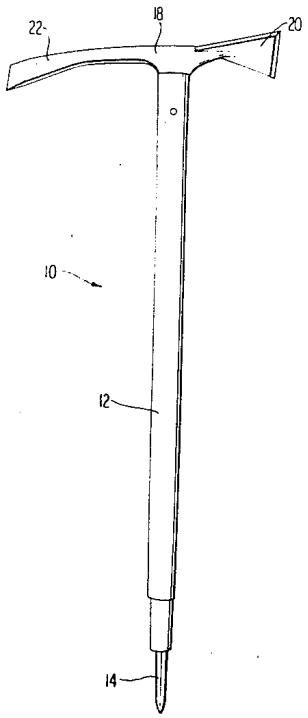
1,373,398	8/1964	France	125/43
138,284	7/1934	Austria	30/164.5
210,080	7/1960	Austria	30/164.8
1,598,872	7/1970	France	7/8.1

Primary Examiner—Robert C. Riordon
Assistant Examiner—Roscoe V. Parker
Attorney—Robert E. LeBlanc, Henry Shur and Leonard F. Stoll et al.

[57] **ABSTRACT**

Disclosed is an ice axe for use by mountaineers having improved ice chopping action and an increased bite into hard snow and ice during self-arrest. The pick portion of the axe head is provided with a hatchet-like blade having an increased maximum swinging radius. The upper and lower edges of the pick diverge so that the lower edge forms an acute angle with the axis of the shaft for improved hooking capability. The cutting edge of the blade has positive clearance.

6 Claims, 5 Drawing Figures



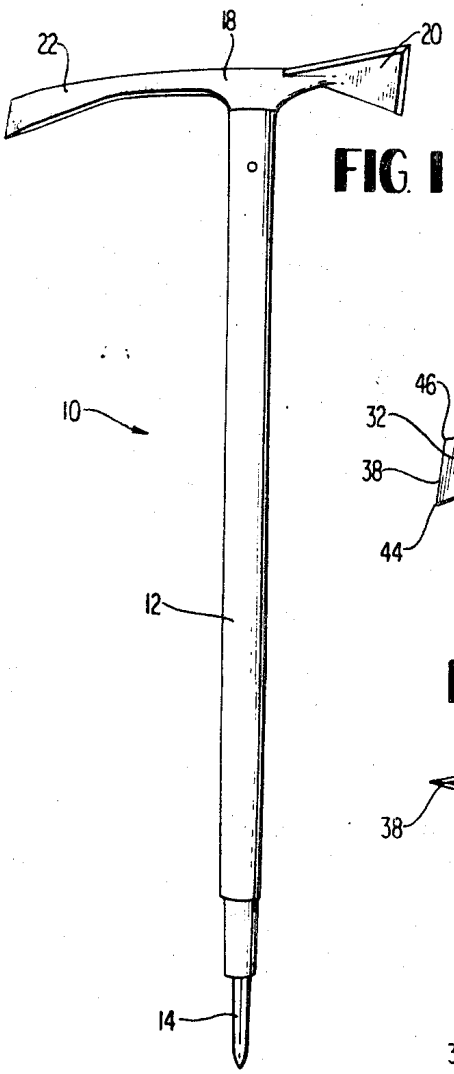


FIG. 1

FIG. 2

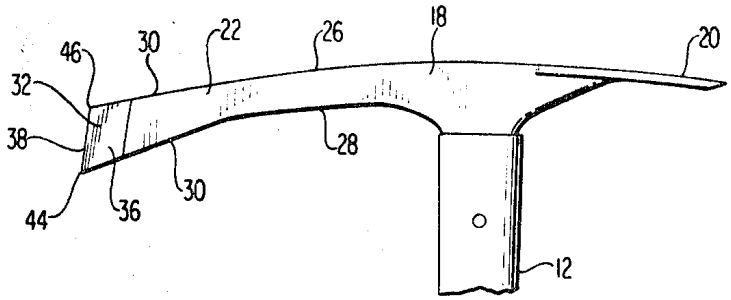
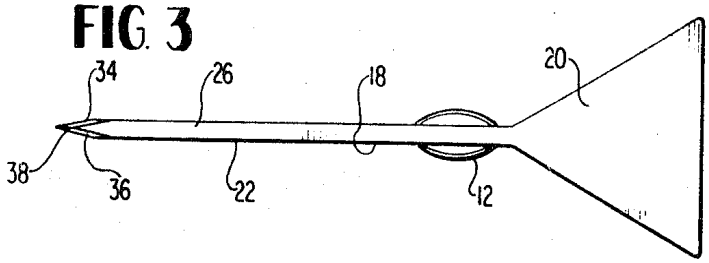


FIG. 3



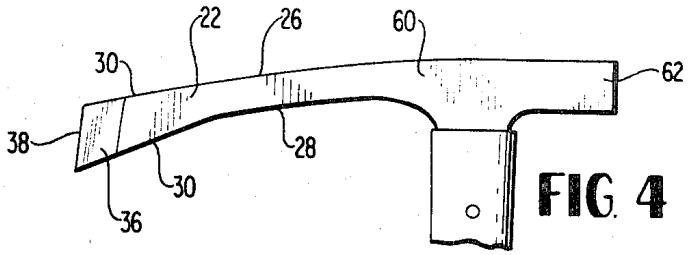
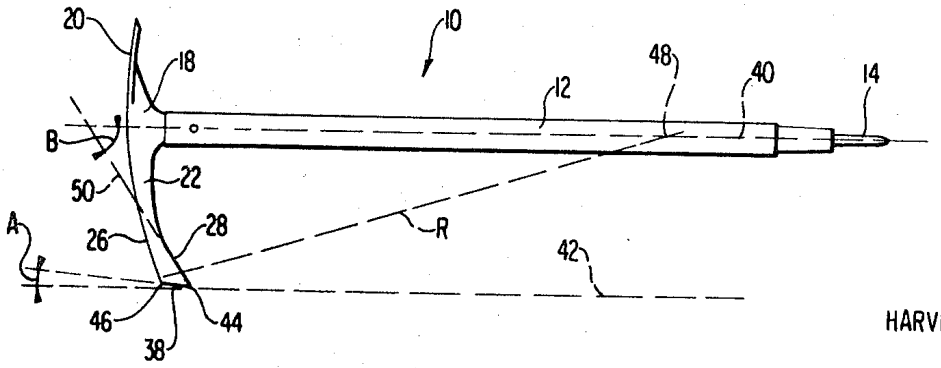


FIG. 4

FIG. 5



INVENTOR
HARVEY LARRY PENBERTHY

BY

ATTORNEYS

ICE AXE

This application is a continuation of my copending application Ser. No. 113,936 filed Feb. 9, 1971, now abandoned.

This invention relates to an ice axe as used by mountaineers and more particularly to an ice axe having an improved pick portion. The axe is constructed to provide improved action in chopping ice, particularly when chopping deep steps. In addition, the improved pick construction provides added gripping action for engaging especially hard snow as is required during self-arrest when falling or sliding down a slope.

Ice axes are well known and have been used for many years by mountaineers. The conventional ice axe generally is comprised of a shaft forming a handle and a head generally perpendicular to the shaft. One end of the shaft terminates in a point or spike, while the other end of the shaft is suitably joined to the axe head. The axe head is provided with a blade at each end. One blade, referred to as an adz, is a conventional hoe-like blade or hammer head. The other blade of the axe head is longer and narrower and is referred to as the pick. It may be curved or straight, and has upper and lower edges that usually converge to a narrow blade or point.

When chopping deep steps in ice with the pick end of an ice axe, it has been found that the geometry of the upper edge of the pick near the tip with respect to the axis of the shaft is of great importance. If a line perpendicular to the upper edge of the pick near the tip is extended toward the shaft, the length of this line to the point where it intersects the longitudinal axis of the shaft will be hereafter called the maximum swinging radius. If the hand of the user grips the shaft closer to the head than this intersection and the swing is centered in the wrist, the tip of the pick penetrates the ice properly. However, if the true center of swing is further away from the head, as by swinging from the elbow or shoulder or by gripping the axe further from the head, the result is that the axe is kicked away from the ice in a direction roughly parallel to the shaft and there is some difficulty in cutting a deep hole. This longitudinal "kick" is sometimes called by mountain climbers "vibration." While the maximum swinging radius varies between ice axes, in general the maximum swinging radius for the most popular axes is in the neighborhood of from about 13 to 25 inches.

In addition to chopping ice, self-arrest is a common use of an ice axe by a mountaineer. When a climber slips on a steep snow or ice slope, he is taught to flip his body into a prone position and simultaneously hold the ice axe in front of him diagonally with the head of the axe near and to the rightside of his head with the shaft extending down toward the upper left hip. One hand grasps the head of the axe to orient the pick into the snow and the other hand grasps the shaft near its lower end. An illustration of self-arrest appears on page 254 of the publication MOUNTAINEERING—Freedom of the Hills, published by The Mountaineers, Inc., Seattle, Washington, 1967.

Geometry of the pick is not so important in soft or medium snow but on hard snow or ice, prior ice axes do not dig in very well. Climbers have been known to have accidents, at least partly due to failure of the pick to dig into the hard snow or ice.

The present invention is directed to an improved ice axe which overcomes these and other difficulties. The pick portion of the axe is provided with a hatchet-type blade for improved ice cutting and the upper edge of the blade is constructed to provide an increased maximum swinging radius for improved action in chopping deep steps. In addition, the upper and lower edges of the pick taper outwardly at the tip and the extreme outer edge of the hatchet-type blade is provided with positive clearance to improve the gripping action of the pick in the snow as is desirable during a self-arrest.

It is therefore an object of the present invention to provide an ice axe which makes it easier to chop deep steps in the ice while at the same time having increased gripping action in hard snow.

This and further objects and advantages of the invention will be more apparent upon reference to the following specification, claims, and appended drawings, wherein:

FIG. 1 is a perspective view of an ice axe for use by mountaineers constructed in accordance with the present invention;

FIG. 2 is an enlarged view of the head of the axe illustrated in FIG. 1;

FIG. 3 is a top view of the axe of FIGS. 1 and 2;

FIG. 4 shows a modified embodiment of an axe head constructed in accordance with this invention having a hatchet-like blade at one end and a hammer at the other end; and

FIG. 5 is a diagrammatic view of the axe of FIG. 1 illustrating features of its improved construction.

Referring to the drawings, the novel ice axe of the present invention is generally indicated at **10** in FIG. **1.** The axe comprises a conventional shaft **12** forming a handle by means of which the axe may be grasped in the hand of a mountaineer. The shaft terminates at its lower end in a conventional metal point or so-called spike **14.**

Connected to the upper end of shaft **12** is a metal head **18** having an adz **20** and a pick **22.** Adz **20** is preferably of a conventional hoe-like shape, as best seen in FIG. **3.**

FIG. **2** is an enlarged view showing the head **18** of the axe **10** of FIG. **1.** In addition to the adz **20,** the head is provided with the pick portion **22** comprising an upper edge **26** and a lower edge **28** which diverge outwardly as at **30** toward a tip **32** in the form of a hatchet-like blade, as shown in FIGS. **2** and **3.** The hatchet blade is formed by a pair of bevels **34** and **36** which meet in a relatively sharp cutting edge **38** at the extreme outer tip of the blade.

FIG. **4** shows a modified construction in which the pick **22** is the same but the axe head **60** has a hammer **62** at its other end in place of the adz.

FIG. **5** is a diagrammatic view of the ice axe **10** of FIGS. **1** and **3** illustrating important features of the axe. The longitudinal centerline or longitudinal axis of the axe shaft **12** is illustrated by the dashed line **40** as passing through head **18.** Also shown in FIG. **5** by dashed line **42** is a straight edge or line which extends parallel to longitudinal axis **40** and which straight edge **42** contains or passes through the extreme pointed tip **44** of cutting edge **38.** The upper end of cutting edge **38,** which can be a straight or curved line, is shown as forming a second tip **46** where it intersects with the upper edge **26** of axe head **18.**

Improved ice cutting action is obtained by forming the pick portion of the axe head with a hatchet-like blade and by increasing the maximum swinging radius. The maximum swinging radius is illustrated in FIG. **5** by

the dashed line R and is herein defined as the length of this line extending perpendicular to upper edge **26** from a point at or near upper tip **46** to its point of intersection **48** with the longitudinal axis **40** of shaft **12.** In the preferred embodiment, the distance of radius R is 28 inches. While larger radii may be employed, it has been found that the radius R in FIG. **5** should be no less than about 26 inches to avoid the vibration discussed above and to enhance the cutting action of the axe, particularly when cutting deep steps in ice.

In order to provide improved penetrating and gripping action in hard snow and ice for use during self-arrest, the geometry of the hatchet blade type pick portion **22** of the axe is important. There are two aspects of this. One is that if the lower edge makes too large an angle with the shaft axis, there is little "digging in" action. It has been found that the cutting edge **38** of FIG. **5** should form an angle B with the shaft axis in FIG. **5** no greater than about 80°. Angle B is here defined as the angle formed by the intersection of the longitudinal axis **40** of shaft **12** with a dashed line **50** coextensive with lower edge **38** at or near the lower tip **44** in FIG. **5.** In the preferred embodiment illustrated, angle B is approximately 68° to provide an improved biting action, particularly into hard snow and ice for use in self-arrest.

A second feature of the ice axe of the present invention enhancing its action during self-arrest involves providing the cutting edge with positive clearance. This positive clearance is illustrated by the angle A in FIG. **5** defined by the intersection of line **42** extending parallel with axis **12** through lower tip **44** of the cutting edge and dashed line **52** which is an extension of a line containing or coextensive with the straight cutting edge **38.** With positive clearance defined by a positive angle A in FIG. **5,** there is no tendency for the axe blade to "plane" or ride over the hard snow or ice during self-arrest, but instead the general hook shape of the pick portion **22** causes the tip **44** in FIG. **5** to have an increased biting-in action. In the preferred embodiment, angle A has a value of approximately +6°.

Various changes and modifications can be made in the pick construction depending upon the overall size of the axe and the particular shape desired. The maximum swinging radius R in FIG. **5** should be no less that about 26 inches when the head includes an adz although the maximum swinging radius may be smaller when a hammer head is used. In either case, edges **26** and **28** should not converge toward the cutting edge **38** but should be constructed so that an extension of the lower edge at or near tip **44** would form an angle B with the longitudinal axis **40** of the shaft no greater than approximately 80°, and the cutting edge **38** should have a positive clearance angle A with respect to a line **42** parallel with the longitudinal shaft axis **40** and intersecting the lower tip **44** of the cutting edge **38.** The remainder of the ice axe may be of more or less conventional construction including a wood or metal shaft **12** of either solid or hollow construction. The axe may include a metal spike **14** at the end of the shaft opposite from head **18,** and a hoe-like adz **20** or hammer **62** on the other end of the metal axe head.

What is claimed and desired to be secured by United States Letters Patent is:

1. In an ice axe for mountaineering, an axe head, a shaft secured to said axe head, said axe head having a pick portion with a hatchet-like cutting blade including side faces converging to form a cutting edge, said pick portion including upper and lower edges which diverge toward said cutting blade, said cutting edge having a positive clearance relative to a line parallel to the longitudinal axis of the axe shaft and intersecting the lower tip of said cutting edge, whereby the portion of said cutting edge beyond said lower tip has clearance from said line.

2. An axe head according to claim **1** which includes a hoe-like adz.

3. A device according to claim **2** wherein the end of said shaft remote from said axe head terminating in a metal spike.

4. An axe head according to claim **1** which includes a hammer head.

5. A device according to claim **4** wherein the end of said shaft remote from said axe head terminates in a metal spike.

6. An axe head according to claim **1** wherein the upper edge of said pick portion has a maximum swinging radius no less than about 26 inches, a line coextensive with the lower edge of said pick portion adjacent said cutting edge intersecting the longitudinal axis of the axe shaft at an angle no greater than about 80°.

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