United States Patent [19]

Zubke

[11] **3,888,057**

[45] **June 10, 1975**

[54] **GROUND ANCHOR WITH PIVOTING FLUKE**

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[22] Filed: **Feb. 21, 1974**

[21] Appl. No.: **444,453**

[52] **U.S. Cl.** **52/163;** 52/166

[51] **Int. Cl.** **E02d 5/80**

[58] **Field of Search** 52/156, 160, 162, 163, 52/164, 155, 166, 165, 161, 158, 159

[56] **References Cited**

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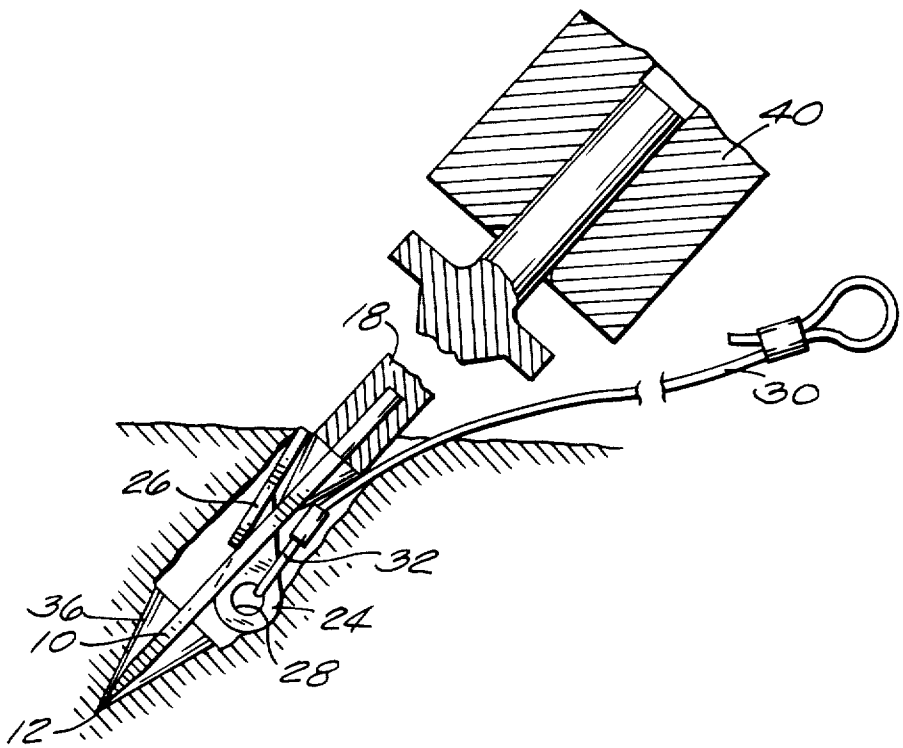
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Primary Examiner—Price C. Faw, Jr.
Attorney, Agent, or Firm—Joseph P. House, Jr.

[57] **ABSTRACT**

The shank portion of a movable fluke extends through a slot in a fixed fluke to pivotally attach the movable fluke to the fixed fluke. An eye is formed in the shank of the movable fluke and one end of a cable is secured to the eye. The movable fluke is moved by a pull on the cable from a position substantially parallel to the fixed fluke to a position transverse to fixed fluke. Abutment means on the fixed fluke limits the pivotal movement of the movable fluke in its position transverse to the fixed fluke, thereby causing the fixed fluke to rotate to a position transverse to the pull on the cable to anchor the same in the ground. The fixed fluke preferably has a stem portion that extends along the longitudinal axis of the fixed fluke and is shaped to receive a pneumatic hammer for driving the ground anchor into the ground.

10 Claims, 6 Drawing Figures



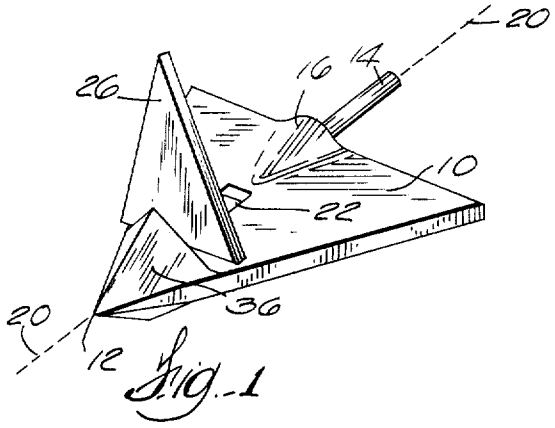


Fig. 1

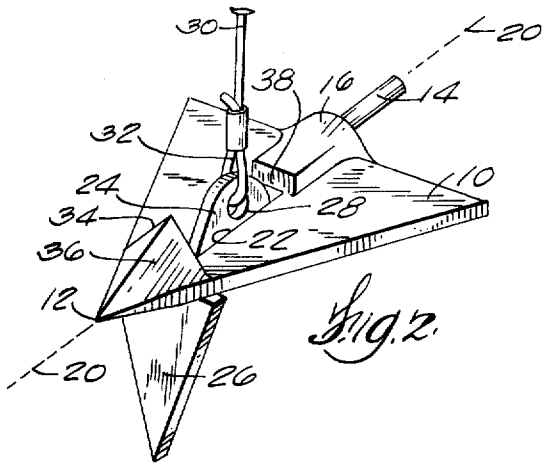


Fig. 2

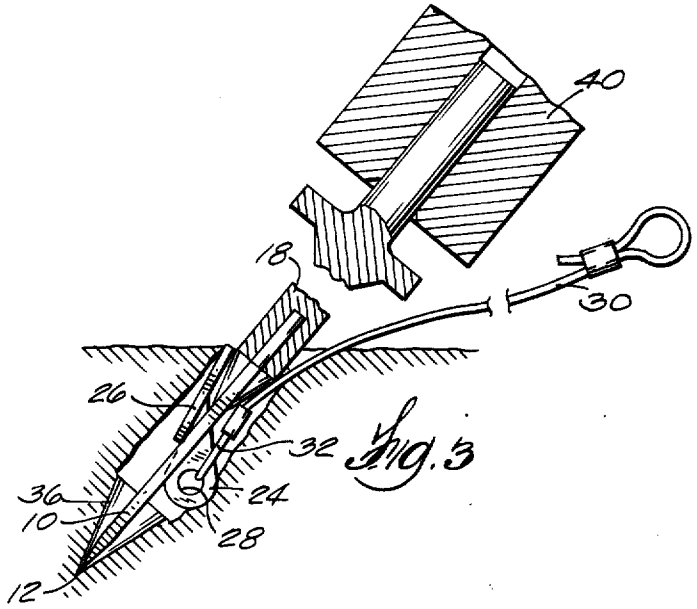


Fig. 3

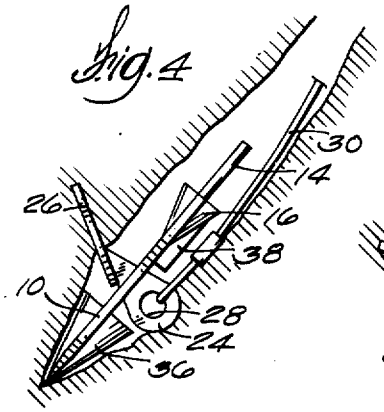


Fig. 4

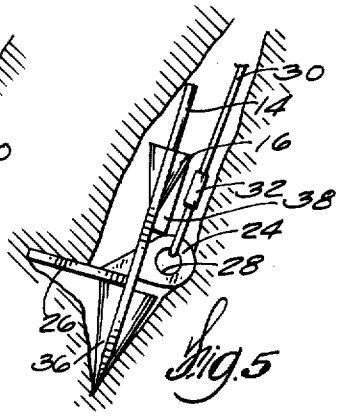


Fig. 5

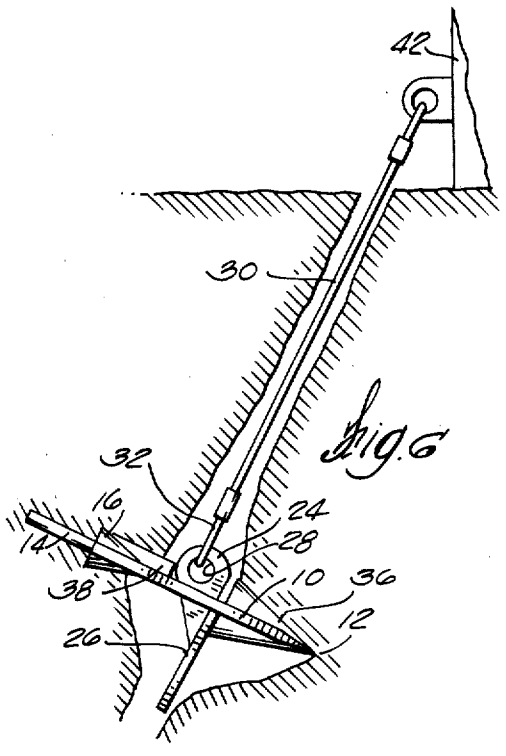


Fig. 6

GROUND ANCHOR WITH PIVOTING FLUKE

BACKGROUND OF THE INVENTION

This invention relates to ground anchors of the type used for securing guy lines to tents, campers, portable buildings, poles, or other structures that require guy lines. Typical prior art ground anchors are disclosed in the following U.S. Pat. Nos. Wilcox 972,306; 1,002,350; Woolfrey 2,058,751; Schiff 2,633,947; Cordes 2,941,636; 2,973,065; Smith 3,279,136 and Watanabe 3,601,941. The typical prior art ground anchor has a stem portion with one or more movable flukes pivotally attached to the bottom of the stem portion and means for moving the flukes outwardly after the anchor has been driven into the ground so as to set the anchor and resist withdrawal from the ground. In these anchors, the stem portion of the anchor does not move when the flukes are pivoted outwardly but rather remains aligned with the hole or shaft formed when the anchor was driven or inserted into the ground. Other prior art ground anchors are known in which a cable is attached to the central region of a fluke which is adapted to be driven into the ground. After being driven into the ground, the fluke is turned crosswise to the cable by means of a separate rod which is thrust into the anchor hole to engage the fluke and turn it crosswise.

SUMMARY OF THE INVENTION

The physical structure of the preferred embodiment of the invention is summarized in the foregoing abstract of the disclosure. The invention can be very simply installed by driving the fixed fluke into the ground with a suitable hammer. The anchor is set by then pulling on the cable to first pull the movable fluke crosswise to the cable and then, through the combined section of the movable fluke and the cable, to turn the fixed fluke crossways to the cable to anchor the same in the ground. The need to use a separate turning rod is eliminated, thus simplifying the installation and setting of the anchor.

DESCRIPTION OF THE DRAWINGS

FIG. **1** is a perspective view showing one side of the preferred embodiment.

FIG. **2** is a perspective view showing the other side of the preferred embodiment.

FIG. **3** is a side view showing the preferred method of driving the ground anchor of FIGS. **1** and **2** into the ground.

FIg. **4** is a side view of the ground anchor of FIGS. **1–3** with the movable fluke thereof pivoted partially crosswise to the cable thereof.

FIG. **5** is a side view of the ground anchor of FIGS. **1–4** with the movable fluke thereof pivoted completely crosswise to the cable thereof.

FIG. **6** is a side view of the ground anchor of FIGS. **1–5** with the fixed fluke thereof pivoted completely crosswise to the cable thereof.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Although the disclosure hereof is detailed and exact to enable those skilled in the art to practice the invention, the physical embodiments herein disclosed merely exemplify the invention which may be embodied in other specific structure. The scope of the invention is defined in the claims appended hereto.

Referring to FIGS. **1** and **2**, the ground anchor of this invention includes a fixed fluke **10** which is preferably pointed at its lower end **12** for easy penetration when the anchor is driven into the ground. A stem or shank **14** is welded to the top of fixed fluke **10** and a substantially conical, flat-topped shoulder **16** is formed around the bottom of shank **14** to adapt fluke **10** to be driven into the ground by a hollow drive rod **18** (FIG. **3**) that receives shank **14** and bears against the top of shoulder **16.** The shank **14** and point **12** define a longitudinal driving axis **20** for fixed fluke **10.** A central slot **22** is formed in the central portion of fixed fluke **10** along longitudinal axis **20.** Slot **22** receives the shank portion **24** of a movable fluke **26** to pivotally attach movable fluke **26** to fixed fluke **10.** Shank portion **24** has an eye **28** to which one end of a steel cable **30** is attached.

The flat surfaces of movable fluke **26** and its shank portion **24** are perpendicular to each other as best shown in FIGS. **2** and **4.** Slot **22** is wide enough to receive shank portion **24** loosely but yet is narrow enough so that the loop **32** of cable **30** cannot pass therethrough. Thus the shank portion **24** is loosely pivoted within slot **22** and is rotatable relative to fixed fluke **10,** as shown in FIGS. **3, 4** and **5,** from a position in which movable fluke **26** is substantially parallel to the longitudinal axis **20** of fixed fluke **10** (FIG. **3**) to a position in which movable fluke **26** is completely transverse or crosswise to the longitudinal axis **20** of fixed fluke **10** (FIG. **5**). When movable fluke **26** reaches the completely crosswise position shown in FIG. **5,** further rotation of movable fluke **26** is blocked by an abutment **34** (FIG. **5**) which is formed by a substantially pyramid-shaped shoulder **36** that leads to the pointed end **12.** At the same time that movable fluke **26** contacts abutment **34,** shank portion **24** contacts another abutment **38** (FIGS. **1** and **4**) which is formed on one side of conical shoulder **16.**

Abutments **34** and **38** are formed on opposite sides of fixed fluke **10,** and therefore when movable fluke **26** contacts abutment **34** and shank portion **24** contacts abutment **38,** a counterclockwise turning moment or torque is applied to fixed fluke **10** as cable **30** is pulled as shown in FIGS. **5** and **6,** causing the anchor to rotate counterclockwise from its position shown in FIG. **6.** This counterclockwise moment is caused by both the pulling force applied to cable **30** and by the resisting force due to earth pressure against movable fluke **26,** and the torque resulting from the forces.

In using this embodiment of the invention, the ground anchor is preferably driven into the ground by a pneumatic hammer **40** (FIG. **3**) which terminates in a drive rod **18** that has a central opening large enough to admit shank **14** and long enough to allow the bottom of drive rod **18** to bear against the flat top of shoulder **16.** Alternately, the drive rod **18** may be driven in manually with a suitable hammer. After the ground anchor has been driven into the ground a suitable distance, e.g. two or three feet for tent anchors, the cable **30** is pulled to first rotate movable fluke **26** until it is crosswise of cable **30,** as shown in FIG. **5,** and then to rotate fixed fluke **10** and shank **14** until they are crosswise of cable **30** as shown in FIG. **6.** Then the upper end of cable **30** can be attached to the structure that is to be guyed as indicated at **42** in FIG. **6.** The earth anchor will then strongly resist pulls on cable **30.**

I claim:

1. In a ground anchor having a fixed fluke adapted to be driven into the ground along a longitudinal axis, a driving tool having a releasable connection with the fixed fluke to leave the fixed fluke free to turn laterally to said axis when the driving tool is withdrawn, a movable fluke pivotally attached to said fixed fluke and movable between a first position in which said movable fluke is substantially parallel to said longitudinal axis and a second position in which said movable fluke is transverse to said longitudinal axis, a cable coupled to said movable fluke and operable to move said movable fluke from said first position thereof toward said second position thereof in response to a pull on said cable, abutment means on said fixed fluke engageable with said movable fluke to limit its movement in said second position thereof, means including said cable and said abutment means for exerting turning torque between the movable fluke and the fixed fluke when said movable fluke is in its second position and turn said fixed fluke transverse to said axis to set the anchor in the ground.

2. A ground anchor as defined in claim 1 wherein said fixed fluke has a slot formed therein and wherein said movable fluke has a shank portion which extends through said slot.

3. A ground anchor as defined in claim 2 wherein said cable is attached to the shank portion of said movable fluke.

4. A ground anchor as defined in claim 2 wherein an eye is formed in the shank portion of said movable fluke and said cable passes through said eye and prevents the shank portion of said movable fluke from falling out of the slot in said fixed fluke.

5. In a ground anchor having a fixed fluke adapted to be driven into the ground along a longitudinal axis, the improvement comprising a movable fluke pivotally attached to said fixed fluke and movable between a first position in which said movable fluke is substantially parallel to said longitudinal axis and a second position in which said movable fluke is transverse to said longitudinal axis, a cable coupled to said movable fluke and operable to move said movable fluke from said first position thereof toward said second position thereof in response to a pull on said cable, and abutment means on said fixed fluke engageable with said movable fluke to limit its movement in said second position thereof, whereby pressure applied to said cable when said movable fluke is in its second position tends to turn said fixed fluke transverse to the pull on said cable to set the anchor in the ground, said fixed fluke having a slot formed therein, said movable fluke having a shank portion which extends through said slot, an eye formed in the shank portion of said movable fluke, said cable passing through said eye to prevent the shank portion of said movable fluke from falling out of the slot in said fixed fluke, the shank portion of said movable fluke being approximately perpendicular to the fluke portion thereof.

6. A ground anchor as defined in claim 1 wherein said fixed fluke has a shank portion aligned with said longitudinal axis and projecting from the upper end of said fixed fluke.

7. A ground anchor as defined in claim 6 and further comprising a shoulder on the top of said fixed fluke near the base of said shank portion thereof, the top of said shoulder being flattened to receive blows from a hammering tool for driving said anchor into the ground.

8. In a ground anchor having a fixed fluke adapted to be driven into the ground along a longitudinal axis, the improvement comprising a movable fluke pivotally attached to said fixed fluke and movable between a first position in which said movable fluke is substantially parallel to said longitudinal axis any a second position in which said movable fluke is transverse to said longitudinal axis, a cable coupled to said movable fluke and operable to move said movable fluke from said first position thereof toward said second position thereof in response to a pull on said cable, and abutment means on said fixed fluke engageable with said movable fluke to limit its movement in said second position thereof, whereby pressure applied to said cable when said movable fluke is in its second position tends to turn said fixed fluke transverse to the pull on said cable to set the anchor in the ground, said abutment means comprising a first abutment on the bottom portion of said fixed fluke for limiting the downward movement of said movabble fluke and a second abutment on the top portion of said fixed fluke for limiting the upward movement of the shank portion of said movable fluke.

9. A ground anchor as defined in claim 8 wherein said first and second abutments are on opposite sides of said fixed fluke, whereby a pull on said cable when said movable fluke is against said abutments produces a turning moment on said fixed fluke tending to rotate the fixed fluke crosswise to said cable.

10. A ground anchor as defined in claim 1 wherein said fixed fluke and said movable fluke are both triangular in shape.

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