July 12, 1955 M. L. CLEVETT, JR 2,712,864

GROUND ANCHOR

Filed Oct. 3, 1952

Fig. 1.

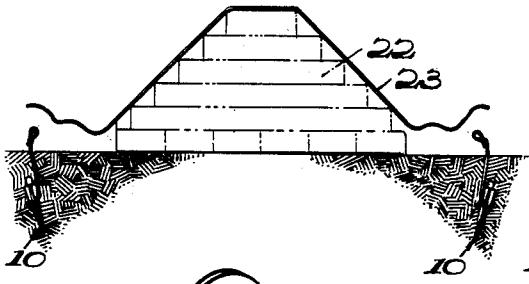


Fig. 2

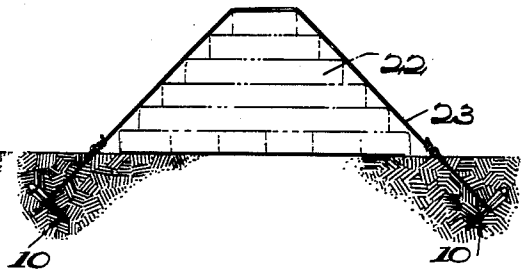


Fig. 3.

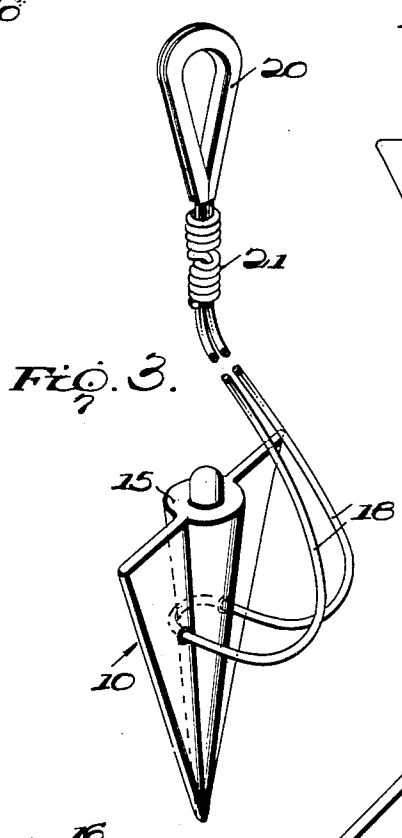
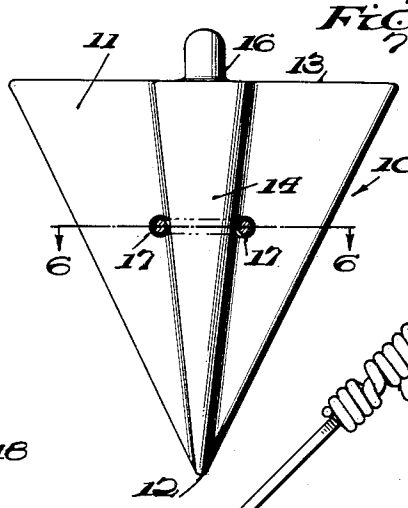


Fig. 4.



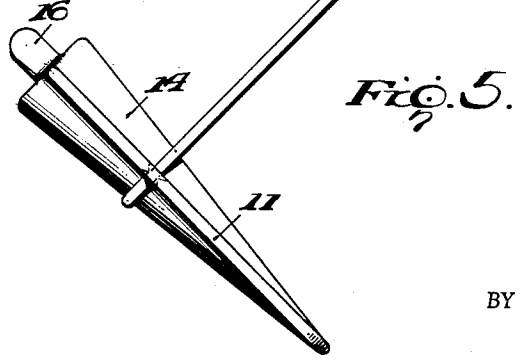


Fig. 5.

Fig. 6.

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GROUND ANCHOR

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2 Claims. (Cl. 189—90)

(Granted under Title 35, U. S. Code (1952), sec. 266)

The invention described herein, if patented, may be manufactured and used by or for the Government for governmental purposes, without the payment to me of any royalty thereon.

My invention relates to ground anchors or stays for guy lines and the like.

A primary object of the invention is to provide a highly simplified, efficient and inexpensive device for anchoring the ends of guy cables and the like to the ground, and characterized by ease of penetration into the ground and maximum resistance to extraction therefrom due to the force exerted by the guy cable.

A further object is to provide a ground anchor which is substantially unitary in construction and adapted to be manufactured in the form of a metal casting or the like, as an expendable article, if desired.

A further object is to provide a ground anchor having novel and simplified means for connecting the same with a guy line above the ground, and affording an extremely strong connection between the anchor and guy line.

Another object is to provide a ground anchor of the above-mentioned character which may be hand driven into substantially any type of soil by means of a simple pipe and hammer.

Still another object of the invention is to provide a ground anchor for guy lines which tends to orient itself within the ground to a plane substantially at right angles to the guy line, after the guy line is tightened and placed under tension, the anchor then offering a maximum resistance to extraction from the ground due to the tension in the guy line.

Other objects and advantages of the invention will be apparent during the course of the following description.

In the accompanying drawings, forming a part of this application, and in which like numerals are employed to designate like parts throughout the same,

Figure 1 is a side elevation, partly diagrammatic, of supplies to be lashed to the ground by a guy line and showing a pair of the ground anchors embodying the invention driven into the ground prior to having their intermediate connecting wires fastened to the ends of the guy line,

Figure 2 is a similar view of the supplies lashed to the ground by the guy line with the ends of the guy line secured to the intermediate connecting wires of the ground anchors, and the anchors disposed in planes substantially at right angles to the guy line,

Figure 3 is a perspective view of the ground anchor and its intermediate connecting wire,

Figure 4 is a side elevation on an enlarged scale of the ground anchor with the intermediate connecting wire shown in cross section,

Figure 5 is an edge elevation of the ground anchor and intermediate connecting wire showing typical relative positions of the same when the connecting wire is under tension, and,

Figure 6 is a horizontal cross section on line 6—6 of Figure 4.

In the drawings, where for the purpose of illustration is shown a preferred embodiment of the invention, the numeral 10 designates generally my ground anchor which may take the form of a casting of aluminum, iron or the like. The anchor comprises a body portion or plate 11 which is flat and has substantially the shape of an equilateral triangle with the apex 12 of the triangle adapted to be directed downwardly for penetration into the ground. The plate 11 may be approximately ⅛ of an inch thick, and the altitude or height of the triangular plate as well as its width at the base 13 may be of the order of four inches, although these dimensions may be varied as desired, and it is not intended to restrict the invention to any particular dimensions.

The body portion or plate 11 is provided at the center of the base 13 and along the line through the apex 12 which bisects the base with an integral enlargement or rib 14 which is preferably cone shaped and tapers substantially to a point at the apex 12, where the rib has substantially the same thickness as the plate 11. The end 15 of the conical rib 14 remote from the apex 12 is flat and flush with the adjacent edge or base 13 of the triangular plate 11. At this end, the rib 14 is substantially wider than the thickness of the plate 11 as shown. The conical rib 14 extends continuously throughout the entire altitude or height of the triangular plate 11.

A reduced short cylindrical extension or lug 16 is integrally formed centrally upon the upper end 15 of the conical rib 14, and preferably has its upper end rounded as shown. The lug 16 is adapted to enter the bore of a driving tube or pipe which may be used to drive the anchor 10 downwardly into the ground, the end of the pipe contacting the enlarged end 15 of the rib 14.

The cone-shaped rib 14 projects equidistantly laterally of the opposite faces of the triangular plate 11, and the opposite side portions of the plate 11, Figure 4, extend equidistantly radially beyond the rib 14 from diametrically opposite points upon the same.

The plate 11 is provided upon opposite sides of the rib 14, near the centroid of the plate 11 and close to the rib 14 with a pair of apertures 17, receiving an intermediate connecting wire 18 which is looped about one side of the conical rib 14 and bears against the same as best shown in Figure 6. This arrangement forms a very strong connection between the anchor 10 and connecting wire 18, and the circular cross sectional shape of the rib 14, Figure 6, prevents the connecting wire 18 from being bent too sharply at its loop 19, which if allowed to happen might cause the wire to fail under tension. It is thus seen that the connecting wire 18 is connected with the anchor 10 near the centroid or center of the triangular plate 11, and this arrangement permits the ground anchor to automatically orient itself at substantially right angles to the line of pull upon the guy line, as will be further described hereinafter. The intermediate connecting wire 18 carries a suitable guy line attaching eye 20, permanently secured thereto and the ends of the wire 18 may be coiled about the two strands of the wire and suitably tied near the attaching eye 20, as shown at 21. The intermediate connecting wire 18 may be of any preferred length between the anchor 10 and eye 20, such as two or three feet.

In the use of my ground anchor for lashing down a stack of supplies 22, for example, a pair of the anchors 10 may be driven into the ground near opposite sides of the stack 22, as shown in Figure 1. A suitable section of pipe is engaged over the upstanding lug 16 of each anchor, and the anchor is driven downwardly into the ground in a generally vertical fashion as shown in Figure 1 or at any chosen angle to the ground. The anchor may be driven to any desired depth below the surface of the ground, depending upon the relative hardness of

the soil, and the length of pipe employed as the driving tool. In any event, it is intended that the anchor **10** be entirely embedded beneath the surface of the ground and preferably a considerable distance below the ground surface. Due to the thickness of the triangular plate **10**, and the taper of the conical rib **14**, the anchor will penetrate even very hard soil with ease, and it should always be possible to drive the anchors into the ground by hand with a hammer or the like.

When the anchors **10**, Figure 1, have been driven to the desired depth, the upper end of the connecting wire **18** and the eye **20** will extend above the surface of the ground as shown for connection with the ends of a lashing cable or guy line **23**. The ends of the line **23** are connected with the eye **20** and tightened in any preferred manner until the line or cable **23** has the desired degree of tension. When the cable **23** and connecting wires **18** are thus placed under tension as illustrated in Figure 2, the anchors **10** will automatically change their positions in the ground and orient themselves in planes substantially at right angles to the lines of pull of the cable **23**. This will occur because the intermediate connecting wire **18** is fastened to each anchor **10** at substantially the centroid or center of the triangular plate **11**. As the tension in the cable **23** and wires **18** gradually increases, the anchors **10** will shift from the nearly vertical positions shown in Figure 1, to the inclined positions of Figure 2, wherein the anchors are shown at right angles to the ends of the cable **23**. In these positions, the anchors **10** offer maximum holding power or resistance to extraction from the ground, since the entire triangular areas of the flat plates **11** are now resisting extraction from the ground due to the pull on the cable **23**. It has been determined by experimentation that one of the triangular ground anchors having a height and width of approximately four inches will successfully resist an extracting force in excess of 1500 pounds.

I wish to emphasize as a particularly important point contributing a great deal to the holding ability of the anchor, the fact that the thinness of the anchor prevents it from displacing and disturbing any great amount of soil as the anchor penetrates the soil. This results in the soil around the anchor remaining firmly packed and undisturbed so that the embedded anchor will be firmly held in the embedded position and capable of offering maximum resistance to extraction.

Although only one use of my anchor has been shown on the drawing, for the purpose of illustration, I wish to mention that the anchor is adaptable to a wide variety of uses such as the anchoring of guy lines and cables connected with structural towers, poles and walls. In fact, the anchor is well suited for substantially any application wherein it is desired to firmly secure an object to the ground.

While I have shown and described the body portion **11** of the anchor as triangular, I wish to point out that the same may have other shapes, such as semicircular, trapezoidal and the like.

It should be understood that the form of the invention herewith shown and described is to be taken as a preferred example of the same, and that various changes in the shape, size and arrangement of parts may be resorted to, without departing from the spirit of the invention or scope of the subjoined claims.

Having thus described my invention I claim:

1. A device of the character described comprising a relatively thin and generally flat triangular plate, a relatively thick conically tapered rib formed integral with the triangular plate and extending from one corner of the same to the longitudinal center of the opposite edge of the plate, the rib tapering toward said corner and having its larger end arranged adjacent to said opposite edge of the plate, the rib projecting beyond the opposite sides of the triangular plate near the center of its area for substantial distances and being rounded outwardly of said opposite sides of the plate, the plate being provided centrally with a pair of transversely arranged openings extending therethrough normal to the plate on opposite sides of said rib and substantially tangent to the rib, and a flexible connecting element engaging through said openings and looped about a curved side of said rib transversely of the rib and held thereby against abrupt bending, said flexible element extending beyond the opposite side of the plate for attachment to a member to be anchored.

2. A device of the character described comprising a relatively thin rigid triangular plate, a conically tapered rib formed integral with the plate and extending from one corner thereof to the opposite marginal edge of the plate and tapering toward said corner, the rib projecting beyond the opposite faces of the plate for substantial distances at substantially the center of said plate, the larger end of the tapered rib terminating substantially flush with said opposite marginal edge at substantially the longitudinal center thereof for defining a relatively wide flat shoulder, a reduced extension formed centrally upon said larger end of the rib and extending axially thereof to serve as a guide for a pipe or the like used to drive the device into the ground, said plate being provided centrally with a pair of transversely arranged openings extending therethrough normal to the plate and substantially tangent to diametrically opposite sides of the rib, and a wire looped about one side of the rib transversely of the rib and extending through said openings and prevented by the rib from bending sharply, the wire extending beyond the opposite side of the device for a substantial distance and adapted to be attached to a member which it is desired to anchor.

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