Aug. 11, 1959 J. R. BALLEW 2,899,029

ANCHORING DEVICE

Filed Nov. 14, 1956

FIG. 1

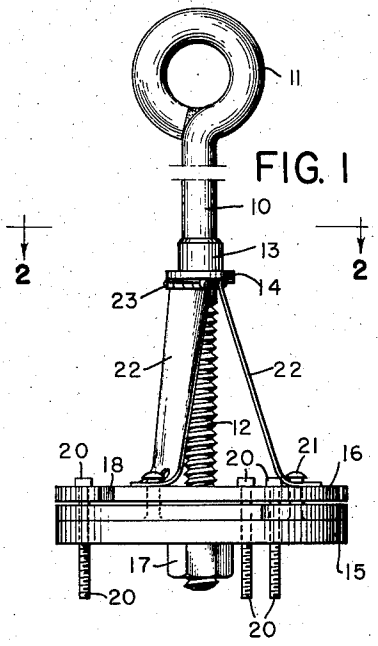


FIG. 3

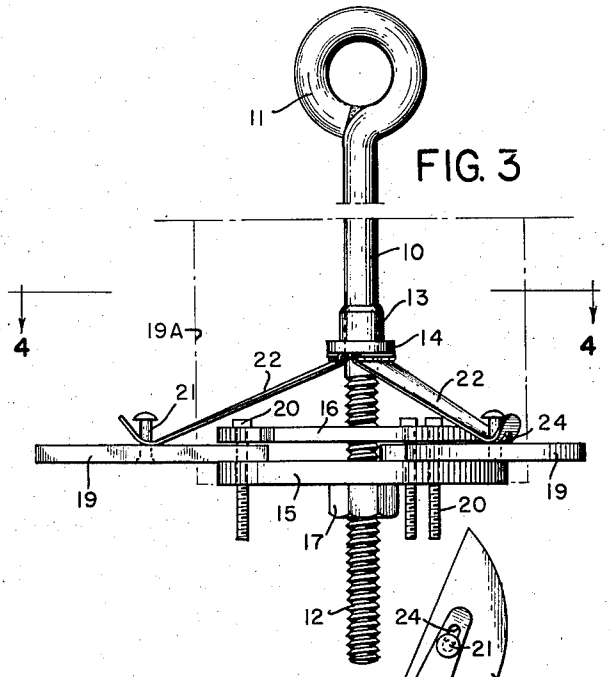


FIG. 2

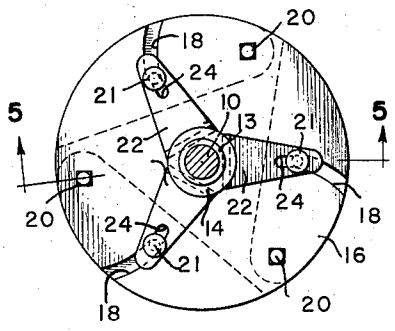


FIG. 4

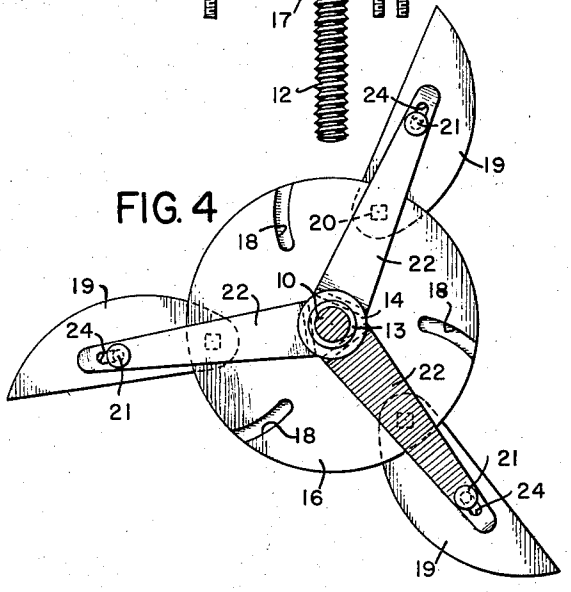
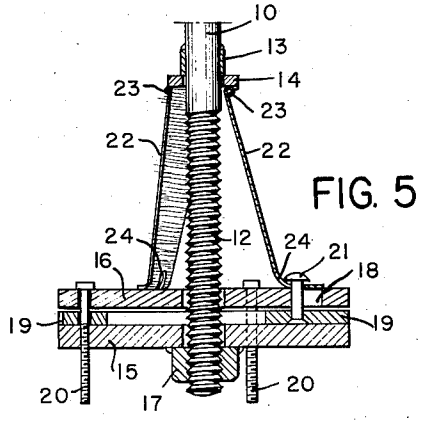


FIG. 5



INVENTOR
J. R. BALLEW

BY Agatton Donnell
ATTORNEY

United States Patent Office 2,899,029 Patented Aug. 11, 1959

2,899,029

ANCHORING DEVICE

Julius Raymond Ballew, Hobbs, N. Mex.

Application November 14, 1956, Serial No. 622,127

4 Claims. (Cl. 189—92)

The present invention relates to an anchoring device and particularly to an anchoring device adapted to be placed in a small hole in the earth and then expanded avoiding the necessity of digging a large hole such as customarily is done in providing a "dead man" to take a tensile strain on a guy wire or the like.

Heretofore, various types of ground anchoring devices have been employed and some have been of the type placed in the ground through a small bore dug into the ground by an auger or a boring machine and the lower end expanded by some means after which the bore was filled in the usual manner. Although some of these anchoring devices were somewhat effective, the structures were complicated, and in a number of instances failures occurred due to weaknesses in the design and due to improper operation.

An object of the present invention is to provide a ground anchor to avoid these shortcomings and which is foolproof in use and can be installed with a minimum of labor.

Another object of the invention is to provide an anchoring device of general utility which can be installed by relatively unskilled personnel with assurance that the device will not fail within its rated capacity.

A further object is to provide an anchoring device which expands after being placed in the ground and positively engages the earth at the bottom of the bore and is simple and certain in its operation.

Other and further objects will be apparent as the description proceeds and upon reference to the accompanying drawing wherein;

Fig. 1 is an elevation of the anchoring device in closed condition ready for insertion in a bore in the earth;

Fig. 2, a section taken on line 2—2 of Fig. 1;

Fig. 3, an elevation of the anchoring device in position in a bore in the ground the bore being shown in the phantom outline;

Fig. 4, a section taken on line 4—4, Fig. 3 showing the blades in their expanded position; and

Fig. 5, a section taken on line 5—5, Fig. 2 and showing the connection of the links and blade.

Briefly, the present invention comprises an anchoring device including a long eye-bolt threaded at its lower end and passing through a pair of spaced plates with a nut fixed to the outer surface of one plate and a plurality of ground engaging blades pivotally connected to said plates and located in the space between said plates. The pivotal mounting of each blade is obtained by a pin or bolt passing through the plates and one end of its associated blade. A rivet is mounted on each blade spaced from the blade pivot and is adapted to move in the slot provided in the upper plate while a strut or link member extends from each rivet or stud to a centrally disposed collar surrounding the eye-bolt. A stop or fixed collar is provided on the eye-bolt to abut against the collar and upon turning of the eye-bolt, the eye-bolt moves the fixed collar toward the plates causing the fixed collar to engage the moveable collar forcing such moveable collar downward

thereby exerting force on the struts urging the struts to move outward like an umbrella in toggle fashion forcing the ground engaging blades radially outward whereby such ground engaging blades extend into the undisturbed ground.

Referring more particularly to the drawing, an elongated eye-bolt including a shank portion 10 having an eye 11 at one end and being threaded on its other end with conventional screw threads 12, the shank of such eye-bolt being provided with a fixed collar or stop 13 providing a shoulder thereon which fixed collar abuts against a ring or collar 14 slideably and rotatably embracing the shank 10.

The threaded portion 12 of the shank 10 passes through centrally disposed apertures in circular disc plates 15 and 16, the plate 15 having a nut 17 fixed thereto by welding or the like, the threaded portion 12 of the eye-bolt being screwed in the nut 17.

The upper plate 16 is provided with a plurality of slots 18 opening to the periphery thereof and between the plates 15 and 16 are a plurality of ground engaging blades 19. Such blades 19 being pivotally mounted between said plates 15 and 16 by means of pins or bolts 20 passing through both plates and fixed to the lower plate 15 by being welded or threaded into either or both plates. Fixedly mounted to each blade intermediate the ends thereof is a rivet 21, the upper end or head lying above the upper plate and the shank portion passing through the cooperating slot 18 with the heads of the rivets spaced slightly above the plate 16.

A plurality of strut members 22 are hingedly connected by suitable pins and knuckles or the like 23 to the slideable collar or ring 14 and the other end of each strut is curved and provided with a slot 24 which embraces the rivet 21 of the cooperating blade. From an inspection of the drawing, it will be apparent that rotation of the eye-bolt 10 in the direction to move the fixed collar 13 of the eye-bolt 10 toward the nut 17 results in force on the strut members 22 urging such strut members from the position shown in Figs. 1, 2 and 5 to the positions shown in Figs. 3 and 4.

It will be noted that the plates 15 and 16 will be held in fixed spaced apart relation a sufficient distance to permit the angular movement of the blades 19 and such plates 15 and 16 serve to reinforce and provide positive securement of the blades to the plates as the blades act as cantilever beams on the portions projecting outwardly from such plates. It will also be noted that the blades 19 pass into the ground with a minimum of disturbance of the ground and therefore a positive and permanent engagement with the ground is obtained and the load on each blade is substantially equal to the load on other plates. It will also be noted that the threaded portion 12 will penetrate the earth and act as an auger so the lower ends of the bolts 20 will remain in positive engagement with the earth in the bottom of the bored hole.

In use of the device a hole is drilled in the ground of a diameter to easily receive the plates 15 and 16 with the blades contracted as shown in Figs. 1, 2 and 5 and the anchor device is set firmly in the bottom so that the studs 20 engage the bottom preventing rotation of the plate discs and nut 17 of the anchoring device and thereafter the eye-bolt 10 is turned causing the eye-bolt to be screwed down in the nut 17 drawing the collar or stop 13 downwardly against the ring 14 forcing the lower ends of the strut members 22 outwardly and thereby forcing the blades 19 outwardly penetrating the wall 19A of the bore forcing the blades into the undisturbed earth until the maximum radial extension of the blades is reached which maximum position can be observed from the surface of the ground. Thereafter, the bore is filled with earth that

was removed from the bore during the drilling and the anchor device is ready for use.

One size which has proven satisfactory is designed with plates or disk **15** and **16** approximately 9" in diameter and the blades in their extended position extending to a diameter of 21". The resulting anchor is superior to conventional "dead men" in that the anchoring blades extend into undisturbed earth and the labor involved in digging the small bore is reduced to a minimum with power machines. It will be noted that the blades **19** work on vertical pivots provided by the pivot pins **20** thereby disturbing a minimum of earth in the process of penetration.

It will be obvious to those skilled in the art that various changes may be made in the invention without departing from the spirit and scope thereof and therefore the invention is not limited by that which is illustrated in the drawing and described in the specification, but only as indicated in the accompanying claims.

What is claimed is:

1. An anchor device for securement at a depth in the ground through a small bore in the earth, said device comprising a first plate having a nut fixed to one surface thereof, a slotted plate arranged in spaced relation to said first plate, a plurality of ground-engaging blades received within the space between said plates, pin means pivotally mounting each blade at one of its ends adjacent the periphery of said plates, an elongated eye-bolt threadedly recieved in said nut and passing through said plates adjacent the center thereof, a collar slidably mounted on said bolt, a plurality of links pivotally mounted at one end to said collar, the other end of each link being pivotally and slidably connected to a corresponding blade by a connection passing through a slot in said slotted plate, a fixed stop mounted on said bolt for abutting said collar to urge said collar towards said plates when said bolt is rotated in said nut, the pivot pins of said blades projecting downwardly a sufficient distance below said first plate to engage the ground for preventing rotation of said plates as said eye-bolt is rotated to cause said collar to move toward said plates and to cause said links to straighten out in the manner of a toggle whereby the blades are forced outwardly in a single plane by said links into undisturbed earth for obtaining effective, positive, and permanent engagement with the undisturbed earth at the bottom of said bore.

2. An anchor device comprising a plate for positioning in the bottom of a hole in the earth, said plate having an aperture therethrough, threaded means associated with said plate and aperture, a threaded shaft extending through said aperture in said plate and into said threaded means whereby rotation of said shaft causes longitudinal movement thereof, a plurality of elongated blades pivotally mounted in spaced relation on the upper surface of said plate adjacent the periphery thereof, a collar rotatably mounted on said shaft, a strut extending from each blade to said collar, means pivotally mounting each strut to said collar so that relative rotation of said collar and said struts about said shaft will be prevented while each strut may pivot about an axis transverse to said shaft, means pivotally connecting the other end of each of said struts to the associated blade at a location spaced from the pivotal mounting of the associated blade and said plate, means on said plate for engagement with the bottom of the hole in the earth to take the reaction caused by rotation of said shaft relative to said plate, a fixed collar mounted on said shaft for rotatable engagement with said rotatable collar whereby the rotation of said shaft will positively move said collars toward said plate and move said blades outwardly, a cover plate connected to and overlying said plate in spaced relation, said blades being movable intermediate said plates, said cover plate having arcuate slots concentric with the pivot of the associated blade, said slots being open at the periphery of the plates whereby the struts can assume positions substantially parallel to said plates.

3. The invention according to claim 2 in which the means on the first said plate for engagement with the bottom of the hole is an extension of the pivotal mounting of each blade to said first mentioned plate.

4. An anchoring device comprising an elongated bolt having connecting means at one end and threaded means at its other end, radially extending support means threadedly mounted on the bolt at its threaded end and comprising upper and lower spaced members, pins connecting said upper and lower members and spaced substantially from the bolt and from each other around the bolt, a blade pivotally mounted on each of said pins for swinging movement from a position between said upper and lower members to a position projecting outwardly therefrom, a collar rotatably mounted on the bolt at a position above the support means, means interengaging the collar and bolt and preventing axial movement of the collar toward the end of the bolt having the connecting means, a plurality of struts, each strut having one end pivotally attached to said collar on an axis transverse to that of the shaft and having its other end pivotally connected to one of the blades for motion about axes both transverse and parallel to the plane of the blades, said upper member having openings through which said struts and blades are connected and permitting movement thereof as said support means is moved along said bolt.

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