July 15, 1952 F. A. DYCHE 2,603,319

GROUND ANCHOR

Filed Jan. 24, 1949

Fig. 1

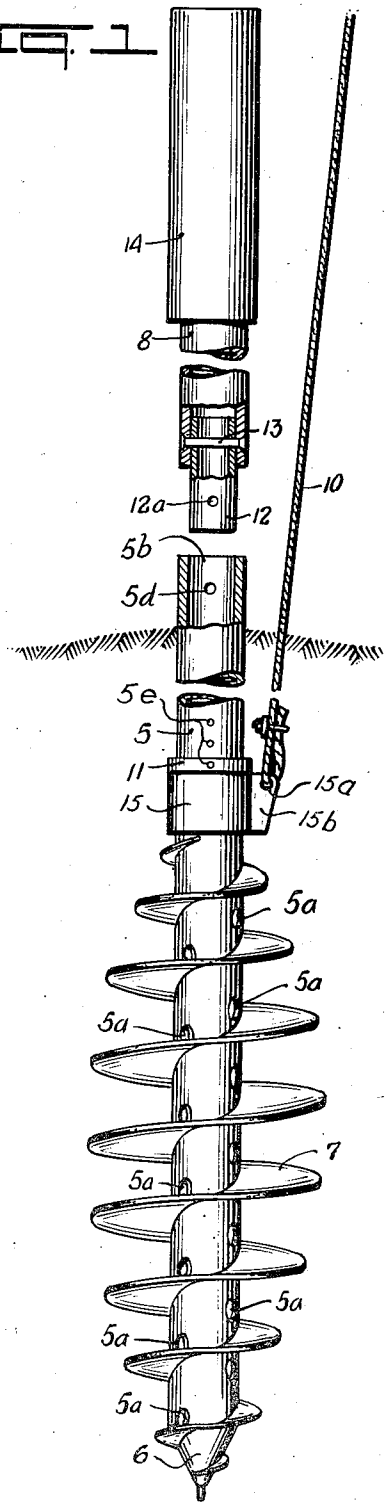


Fig. 3

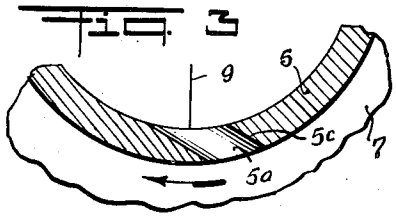
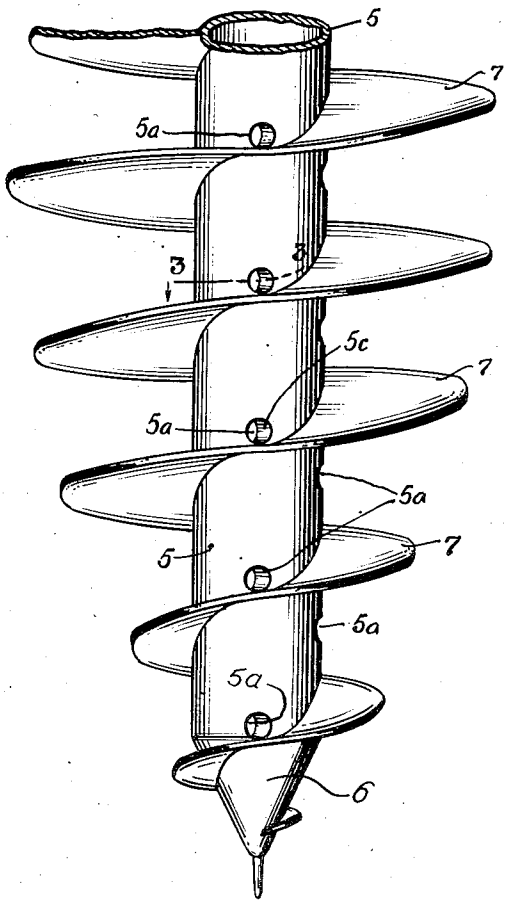


Fig. 2



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GROUND ANCHOR

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1 Claim. (Cl. 189—91)

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This invention relates to improvement in ground anchors and refers more particularly to anchors for securing deadlines of hoisting apparatus, guy wires and the like.

Ground anchors heretofore proposed have had several objectionable features. One of these is that the anchors which have satisfactorily held in place when installed have not been readily removable for reuse at different locations. In addition, in the conventional ground anchor of the auger type, no provision has been made for lubricating the auger threads during installation and removal of the anchor. This has made it very difficult to use this type of anchor in some earth conditions. Also, the anchors heretofore used have tended to be pulled into axial alignment with the line secured thereto, and when this occurs the effectiveness of the anchor is greatly reduced. Then, too, there has been no convenient way of extending the length of the shaft of the anchor where it is desirable to sink the anchor to a greater depth than the over-all length of the anchor unit.

An object of this invention is to provide a ground anchor that may be economically manufactured, easily and quickly installed and removed, and which will effectively resist up-rooting.

Another object is to provide an anchor of the auger type wherein the auger thread has a novel contour which facilitates removal of the anchor when its usefulness in a given location ceases.

A further object is to provide an anchor of the auger type which may be lubricated during installation and removal where ground conditions make this desirable.

Still another object is to provide an anchor having a novel means for securing a line thereto which reduces the likelihood of the anchor's shifting its position in use to a position in substantial axial alignment with the line which is secured thereto.

Other and further objects of the invention will appear from the description.

In the accompanying drawings which form a part of the instant specification and are to be read in conjunction therewith, and wherein like reference numerals are used to indicate like parts in the various views:

Fig. 1 is a partially exploded and partially sectional elevational view illustrating an anchor embodying this invention;

Fig. 2 is a fragmentary elevational view upon an enlarged scale illustrating the lower end of the anchor shown in Fig. 1, and

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Fig. 3 is a view upon a still larger scale, taken along the line 3—3 in Fig. 2 in the direction of the arrows.

Referring to the drawings, numeral 5 designates the body member of an auger type anchor and is preferably a hollow shaft having a pointed end 6 which is substantially closed. Shaft 5 carries adjacent its pointed end a flight of auger thread 7 which is permanently secured thereto. The number of convolutions of the auger thread may vary dependent upon the requirements of the particular anchoring job. However, a plurality of such convolutions should be employed. The auger thread convolutions adjacent the pointed end are in somewhat conventional form commencing with a slight taper and gradually increasing in degree of radial extension as the thread spirals upwardly. At about the midpoint, or the central convolution, the radial extension of the thread reaches its maximum. At this point the remainder of the convolutions depart radically from present day conventional practice, in that the radial extension of the auger thread commences to diminish and tapers down to a point at its extreme end in much the same fashion as the thread commences at the lower or pointed end of the anchor.

The auger thread preferably is fabricated from sheet metal or the like having substantially uniform thickness throughout its length. This strip or ribbon may be welded to shaft 5 and no fillets are provided at the joinder of the blade to the shaft other than that inherently present due to the weld material. Thus the auger blade will extend from the shaft as though the blade surfaces were formed by extending an infinite number of spirally arranged radii of the shaft. This is of advantage over the type of auger blade, which is somewhat V-shaped in cross-section, for the latter provides a wedge action to force the dirt from between the adjacent convolutions increasing the likelihood of accidental withdrawal of the anchor.

In order that the auger blades may be lubricated during installation and removal of the device, shaft 5 may be provided with a plurality of ports 5*a* spaced along the length of the shaft for distributing a lubricant liquid to the blades thereof. Preferably each port lies closely adjacent the upper surface of a portion of the auger thread and the perforations should also be provided near the lower end of the device. Water or other suitable liquid may be introduced into the upper end of the device through its open end 5*b* or through

the open end of the uppermost extension 8 of the shaft.

In order to reduce the likelihood of ports 5a becoming clogged or filled with earth in use, the ports are preferably formed along axes which form obtuse angles with the radii of the shaft 5 that they intersect. This is illustrated in Fig. 3 where it will be seen that the axis of the port 5a, shown therein, forms an obtuse angle with the radius shown at 9 and that this obtuse angle resides on the trailing side of the radius as the shaft is rotated in a driving direction, which is indicated by the arrow. With this arrangement the inclined innersurface indicated at 5c of the port will tend to push any dirt or debris entering the port 5a outside the port as the auger is driven. Of course, this action will be aided by the pressure of the water or other liquid within the shaft.

In Fig. 1, the anchor is shown secured to a deadline 10 and it will be assumed for the purpose of the discussion that the extension 8 is not to be secured to the anchor but that the device will not be driven below the position shown in the figure. It will be seen that the deadline 10 will be secured about the shaft 5 at an intermediate point of its length. The end of the line is secured to shaft 5 in such manner to provide a swivel connection and yet which will prevent axial movement of the line on the shaft which would withdraw the line from the end of the shaft. To accomplish this, a collar 11 may be secured to shaft 5 in a selected position by a dowel pin placed in a selected perforation 5e. This collar 11 provides a downturned shoulder which will abut the upper edge of sleeve or member 15, which has an eye 15a in which the deadline may be secured, to prevent upward movement of the sleeve upon the shaft. Sleeve 15 carries a radially extending guide vane 15b, in which the eye may be formed, that engages the earth about the shaft to retard rotation of the sleeve with the shaft in operation.

With this connection of the line to the shaft, the tendency of the shaft to be pulled into axial alignment with the line secured thereto is reduced. The shaft may be considered, in effect, as pivoted on the deadline and a force exerted against the shaft, in the direction of the line 10 will set up substantially counterbalancing forces between the earth and the shaft on each side of the pivot, and this reduces the likelihood of the shaft shifting its position into substantially axial alignment with line 10.

Referring to the extension of shaft 5, the upper end of the shaft has oppositely disposed perforations 5a adapted to receive a dowel pin or stud which may also pass through perforations 12a in coupling element 12. The coupling element may be a sleeve secured by pin 13 to the lower end of extension 8 and is adapted to fit within the opening 5b of shaft 5. When thus secured to the shaft the extension 8 becomes a rigid part thereof, and a plurality of such extensions may be thus made up in an elongate shaft in this or any suitable, similar manner. The shaft may be sunk to a considerable depth by using a plurality of such extensions, adjacent ones of which may be secured together in the same manner that the shaft 5 is secured to the first extension.

It is believed that the operation of the anchor of this invention is apparent from the foregoing description. The pointed end of the anchor may be jabbed into the ground and upon rotation of the anchor in one direction the auger

threads lead into the ground, pulling the anchor or shaft 5 after it. For purposes of rotating the shaft, pipe tongs or the like, may be employed and the operators may place a downward force upon the shaft in addition to a torque.

In the embodiment shown in the drawings, the driving rotational sense is clockwise as viewed in top plan and the withdrawal rotational sense is counterclockwise. However, it is to be understood that the auger threads could be mounted with a reversed spiral from that shown, in which case the driving and withdrawal rotational senses would be reversed.

When the ground into which the anchor is to be sunk or from which it is to be withdrawn, is dry, is sticky such as wet gumbo, or otherwise offers excessive resistance to movement of the auger, the shaft 5 may be filled with water or other suitable lubricant liquid which will drain from ports 5a onto the auger blades to facilitate installation or removal of the anchor.

When the device has been lowered to the extent that the desired location of collar 11 on the shaft is about to enter the ground, sleeve 15 and collar 11 are placed and line 10 is secured to the sleeve, and then the sinking of the anchor may be continued. The line 10 and sleeve 15 will swivel upon the shaft but the line will cut its way to the inclined position shown in the drawing. In many instances, the usual turnbuckle may be dispensed with, the anchor being sunk to a sufficient depth to tighten the line.

As the device is driven into the ground, the device does not act as a drill forcing the dirt upwardly and leaving a hole, but rather the dirt is compacted and compressed about the shaft and between the convolutions of the auger thread and this very effectively secures the auger against accidental release. The tapering off of the radial extension of the auger thread adjacent both ends, facilitates both the driving and the removal of the device, but does not materially reduce its effectiveness as an anchor.

As indicated above, the provision of means intermediate the ends of the anchor for securing a line thereto reduces the tendency of the anchor to become aligned axially with the line during use and thus adds to the efficiency of the anchor, for the aligned anchors are much more readily uprooted from the ground.

When the anchor has been sunk to the limits of its length, extension 8 may be rigidly secured to shaft 5 by inserting coupling element 12 in opening 5b of the shaft and placing a dowel pin, stud or the like through openings 5d and 12a. Where desirable, extension 8 may be equipped with a wear sleeve 14 to be gripped by the pipe tongs or the like.

The anchors of this invention are easily and readily removed when their usefulness in a particular location has been served by imparting a rotation to the shaft. In this operation, the tapered upper convolutions of the auger thread 7 served to lead the device from anchoring position, and it has been found that the devices may be removed from the ground with substantially the same forces as employed for driving them. Where desirable, a lubricant such as water, may be used for facilitating this operation.

It is contemplated that devices of this invention, of large dimensions, may be employed as structural supports for permanent and semi-permanent structures, performing the function of and replacing the usual driven piles. For instance, they may be used in providing a founda-

tion for beach homes, bridges, wharves, buildings and oil well derricks in off-shore wells. In the latter case, adjacent devices may be braced by cross arms and the like, and where desirable, the hollow shaft may be filled with reenforced concrete for additional strength.

From the foregoing it will be seen that this invention is one well adapted to attain all of the ends and objects hereinabove set forth together with other advantages which are obvious and which are inherent to the structure.

It will be understood that certain features and subcombinations are of utility and may be employed without reference to other features and subcombinations. This is contemplated by and is within the scope of the claim.

As many possible embodiments may be made of the invention without departing from the scope thereof, it is to be understod that all matter herein set forth or shown in the accompanying drawings is to be interpreted as illustrative and not in a limiting sense.

The invention having been described, what is claimed is:

A ground anchor comprising a central cylindrical shaft having a pointed end, a single spirally arranged sheet metal auger thread with at least three convolutions carried by said shaft with one end of the thread being joined to said

pointed end and the remainder of the thread extending along the cylindrical portion of the shaft, the convolution at about the mid-point of the length of said thread being situated on the cylindrical portion of said shaft and having a greater radial extension from said shaft than the convolutions on either side of the mid-point convolution, said convolutions on either side continuously and gradually diminishing in radial extension toward the end extremities of the thread and terminating in a tapered point so that as the pointed end of the anchor is driven through the ground to displace earth outwardly therefrom, the displaced earth is substantially prevented from moving upwardly from its original position by the convolutions of said thread.

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