This invention relates to an anchor for securing an object to firmly packed earth, gravel, or the like.

The anchor of this invention is particularly useful for securing to the ground pipes of various sizes which are fixed permanently in a position above the ground, as for instance heating pipes over and around which a concrete slab floor resting directly on the earth is to be poured. Such pipes are widely used for so-called perimeter heating of concrete slab floors.

Pipes used for this purpose may be formed of galvanized iron or of lighter materials. Whatever the material, unless the pipes are firmly anchored in place before the wet concrete is poured under and around them they will have a tendency to float on the concrete and rise vertically, or else to shift laterally under the pressure of the wet concrete. Obviously it is then necessary to suspend the pouring of the concrete and to take time to try to anchor the pipe more securely to the ground.

Various methods have been used in the past in an attempt to secure perimeter heating pipes securely to the ground before the pouring of the concrete. Iron rods are sometimes driven into the ground to provide an anchor for wires which are passed around the pipes. However, such rods pull out relatively easily as they do not tend to cling to the earth with any great force. Wooden stakes of wide cross-sectional dimensions have been driven into the ground for the same purpose, but in hard ground these frequently split or are impossible to drive to the desired depth.

The anchor of this invention avoids these disadvantages altogether. It provides a means by which objects may be quickly and firmly secured to the ground. Within very wide limits, the harder the force pulling up on the anchor the firmer is the grip with which the anchor holds to the surrounding earth.

Because of the firm and reliable connection provided for anchoring objects (for example, perimeter heating pipes), this invention has great practical value in saving the time of workmen who might otherwise have to interrupt their work in connection with such objects (in the example given, pouring concrete) in order to re-anchor a floating or shifting pipe. It also provides a firm and permanent anchor for any object, such as a wire fence, which is to be permanently affixed to the ground without further work being done in connection therewith.

The invention will be described in relation to the embodiments shown in the drawings.

In the drawings:

Fig. 1 is a perspective view, partly in section, of the anchor of this invention in place in the earth with a perimeter heating pipe securely attached thereto;

Fig. 2 is a sectional view showing how the anchor is driven into the earth to be placed in its operative position;

Fig. 3 is a perspective view of one embodiment of the anchor of this invention;

Fig. 4 is a plan view of an intermediate stage of fabrication of one embodiment of the anchor of this invention.

In Fig. 1, anchor 10 is shown after it has been installed in the earth 11 in its desired position. To reach the position shown in Fig. 1, the anchor was driven into the earth in the manner described below in connection with Fig. 2, with apex 12 being forced downward ahead of the rest of the anchor, and then the whole device had sufficient upward pulling force exerted upon it to cause it to take a securely anchored position in the earth.

Opposing arms 13 of anchor 10 curve outward slightly away from the apex of the anchor. The degree of curvature may be varied from what is shown in Figs. 1, 2 and 3, depending upon the material of which the anchor is made, the material into which it is to be driven to be installed, the amount of upward force to be exerted on the installed anchor, and other relevant factors.

The anchor is made of strong spring steel. Thus arms 13 are adapted to be pressed towards each other when urged by the surrounding earth as the anchor is driven into the ground, but tend to spring back away from each other at the same time. This latter tendency is reinforced by any upward pull on anchor 10, since the outward bend in arms 13 causes them to dig into the adjacent earth when the anchor is pulled upward.

After anchor 10 has been driven to about the desired depth and then pulled upward a short distance, opposing arms 13 will have returned to their normal position. If any further upward pull is exerted on anchor 10, further spread of arms 13 will be opposed by the natural springiness of the steel anchor.

Although it is preferable to have both arms 13 adapted to function as just described, it should be noted that the anchor of this invention will also operate satisfactorily if one opposing arm is more rigid than the other and so its freedom of motion is more limited.

Attachment of object to anchor

In Fig. 1 steel strapping 14 (of a type used for wrapping bales and the like) passes through slot 15 near apex 12 of anchor 10. Steel strapping 16 passes through slot 17 in the opposing arm of the anchor. The bottom ends of both strapping 14 and 16 are bent back upward along the outside face of the respective arms 13, as seen in Fig. 1 for strapping 16.

The two pieces of steel strapping pass out of the ground and over perimeter heating pipe 18, where they are securely connected by buckle or linking device 19 of a type widely used for such purpose.

Elevating support 20 provides a means of positioning pipe 18 at the desired level above the ground. It also makes certain that when the wet concrete is poured it will pass freely under the perimeter pipe.

To avoid any rise of moisture from the ground and consequent rusting out of the perimeter pipes, some insulating material such as felt should be laid under the pipes for a distance on either side. At the point where straps 14 and 16 come out of the ground and pass through the insulating material, it may be necessary to provide a seal with tar, asphalt or other suitable sealing compound.

Driving stake

Fig. 2 shows how anchor 10 may be driven into the ground. Driving stake 21 is a high carbon case-hardened steel stake which forces apex 12 of the anchor into the earth, gravel, or other firmly packed material in which the anchor is to be installed.

Opposing arms 13 are pressed towards each other during the downward movement of the anchor. At the same time, the lower ends 22 and 23 of steel strapping 14 and 16 are pressed against the respective arms with which they are associated.

When the portion of driving stake 21 which is left ex-
posed indicates that anchor 10 has been driven far enough into the ground, the stake is removed. Upward force is then exerted on steel strapping 14 and 16 to pull the anchor up into its final secure position shown in Fig. 1.

The anchor

Fig. 3 shows the same embodiment of the anchor of this invention in an enlarged perspective view. Apex 12 of opposing arms 13, as well as slots 15 and 17 adapted to receive the ends of steel strapping 14 and 16, are seen in this view.

Method of fabrication

Fig. 4 shows a length of spring steel 24 from which another embodiment of the anchor of this invention may be fabricated. The spring steel is cut to the desired length. Holes are then cut in the strap at the desired distance on both sides of the center of the piece. These holes should be cut near the part of the length of steel which will become the apex of the anchor as finally formed. This will in turn position near the apex the means for attaching wire, steel strapping or other means used to connect the object to the ground.

In the embodiment shown in Fig. 4, two small holes 25 are provided for each opposing arm 13 so that a wire may be passed down through one hole and back up through the other. This provides two lengths of wire on either side of the perimeter pipe for anchoring the pipe.

Holes 25 (or slots 15 and 17 in the embodiment of Fig. 3) should be placed near enough to apex 12 of the anchor that they do not tend to force bent spring arms 13 towards each other appreciably when upward force is exerted on the anchor in place. Obviously if these slots or holes were placed near the top ends of opposing arms 13 sufficient upward force would tend to pull these ends together and permit the anchor to be loosened from its installed position in the ground.

After the required holes or slots have been cut, steel strap 24 is then bent into the desired shape, of which the embodiment shown in Fig. 3 is an example. After forming, the spring steel anchor is hardened. Of course, the anchors may be made of cold rolled prehardened spring steel, if desired, so that hardening is not required after forming.

The steel strapping 14 and 16 used with the embodiment of Figure 3 and the appropriate lengths of wire used with the embodiment of Figure 4 comprise tie members that secure the pipe 18 or the like to the anchor.

The term "earth" as used in the appended claims is intended to mean soil, clay, gravel, and the like generally associated with the matter forming the surface of the earth.

The above detailed description of this invention is given for clearness of understanding only. No unnecessary limitations should be understood therefrom, as modifications will be obvious to those skilled in the art.

I claim:

1. In an earth anchor, an elongated, one-piece strap of flexibly resilient material having a generally V-shaped longitudinal cross-sectional configuration with the portions of said strap at opposite ends thereof normally curving outwardly and adapted for resilient relative opening or closing flexible swinging movement, and tie member means in the form of a pair of elongated flexible strap-like portions secured at the lower ends thereof to said anchor strap at points on opposed faces thereof remote from the curving ends thereof, said strap-like portions being adapted to extend from said anchor strap for external connection, the apex of said strap being adapted to receive one end of a removable driving rod for driving said strap into the earth apex-first, with said arms being adapted to undergo said relative closing flexible swinging movement upon said strap's being driven into earth and thereafter being adapted to undergo relative opening flexible swinging movement upon tensioning said tie member means.

2. An arrangement for earth-anchoring a pipe external of the earth against lateral or upward movement and comprising a driving rod, an elongated, one-piece strap of flexibly resilient material having a generally V-shaped longitudinal cross-sectional configuration with the portions of said strap at opposite ends thereof normally curving outwardly and adapted for resilient relative opening or closing flexible swinging movement, and tie member means in the form of a pair of elongated flexible strap-like portions secured at the lower ends thereof to said anchor strap at points on opposed faces thereof remote from the curving ends thereof, said strap-like portions being adapted to extend from the earth for direct engagement around said pipe, the apex of said pocket loosely receiving the lower end of said rod for earthing said strap apex-first and for accommodating removal of said rod after earthing of said strap, with said arms undergoing relative closing flexible swinging movement during such earthing and thereafter undergoing relative opening flexible swinging movement upon tensioning said tie member means.

References Cited in the file of this patent

UNITED STATES PATENTS
725,029 Braddock Apr. 14, 1903
753,394 Hector Mar. 1, 1904
1,178,382 Wilcox Apr. 4, 1916
1,244,133 Saunders Oct. 23, 1917
1,334,812 Snow Mar. 23, 1920
2,243,886 Scott June 3, 1941
2,658,590 Hollander Nov. 10, 1953

FOREIGN PATENTS
17,783 Great Britain 1890