March 30, 1943. J. O. KLEIN 2,315,339

LAND ANCHOR

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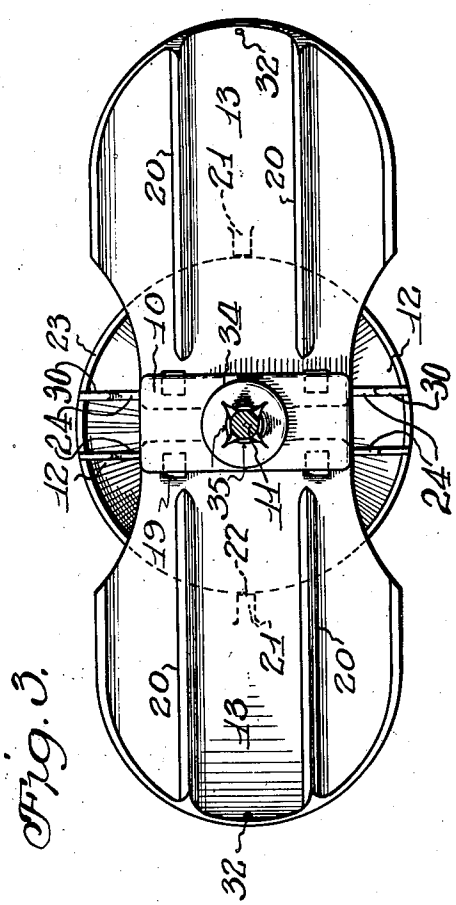

Fig. 3.

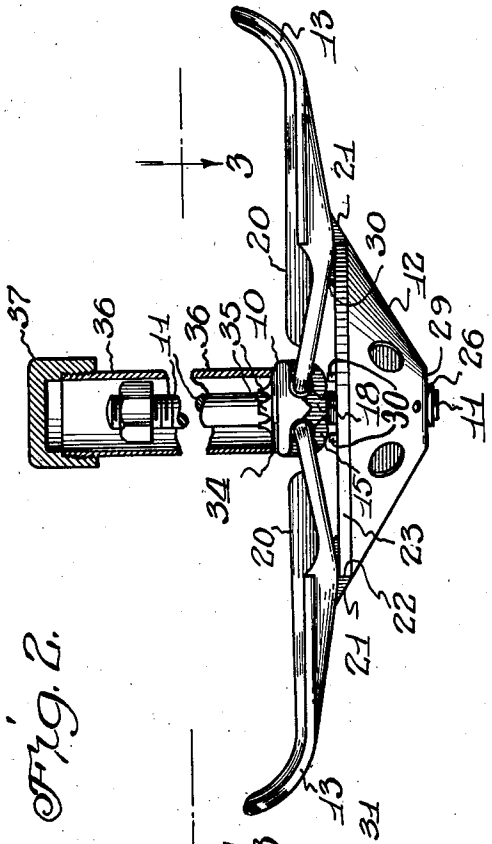

Fig. 2.

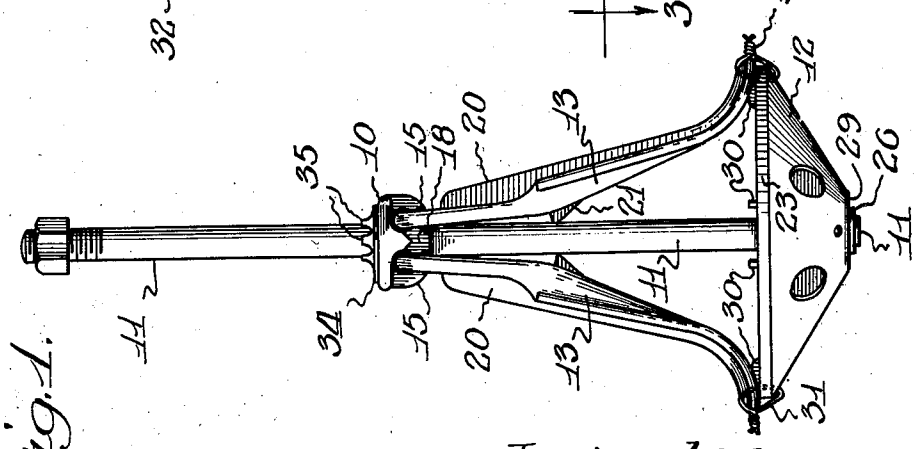

Fig. 1.

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Fig. 4.

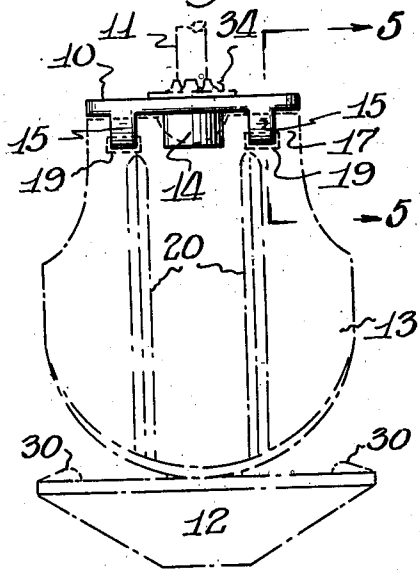


Fig. 5.

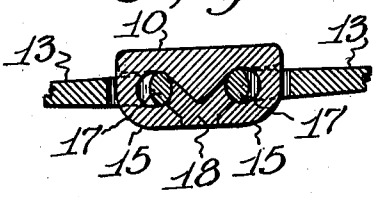


Fig. 6.

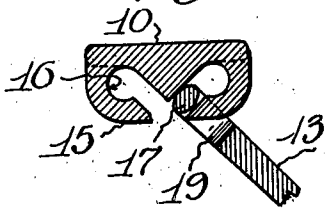


Fig. 7.

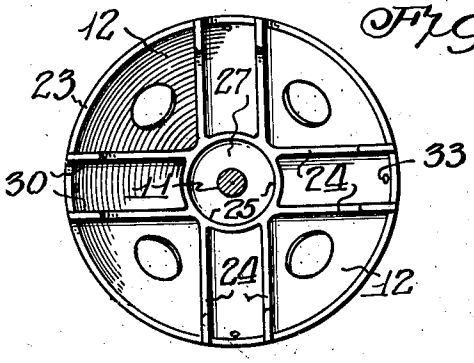


Fig. 9.

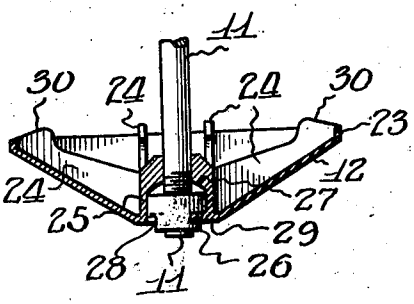
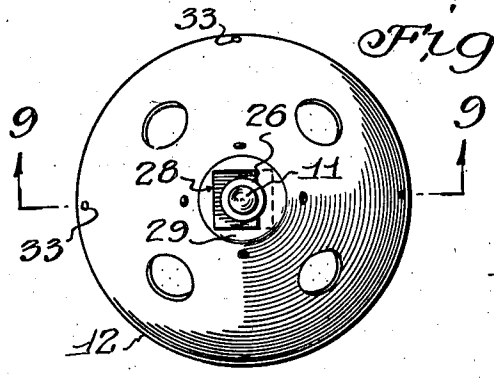


Fig. 8.



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Patented Mar. 30, 1943

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UNITED STATES PATENT OFFICE

2,315,339

LAND ANCHOR

John O. Klein, Lufkin, Tex., assignor to Texas Foundries, Inc., Lufkin, Tex., a corporation of Texas

Application October 23, 1940, Serial No. 362,427

4 Claims. (Cl. 189—92)

My invention relates to land anchors, or earth anchors, as are commonly used in securing the ends of guy wires to the ground when employed in supporting derricks, telephone poles, guard rails and fences, and particularly to that class of anchors known as the expanding type, wherein the unit is adapted to be inserted into a hole made in the ground for that purpose, and then expanded by force such as produced by a tamping tool, and when expanded, to anchor into the undisturbed earth with a substantial anchoring spread in area much greater than the area of the hole necessary to accommodate the closed or unexpanded anchor. And more specifically, my invention relates to a simple and novel means for assembling the movable parts of the anchor; the effective reinforcing of the various members of the anchor against both the impact set up when tamping the unit in place and the pull or tension created by the guy wire when operating under load, and has for its objects;

The fabrication of an anchor preferably from iron or malleable iron castings with especial significance attached to the problems encountered in foundry practice; and

The provision of a metallic key for separably securing the anchor blades to the blade spreader, or that portion of the device which is subjected to abuse and hard wear during installation, and in a simple but durable manner so that the blades will not bind of become locked or misplaced during installation; and

The design of an anchor blade which has structural strength in both directions to alternately withstand greater pull and the greater shock of driving; and

The reinforcement of the connection between the tamping block and the anchor blades to effectively absorb and distribute the lateral thrust encountered when the driving has become oblique due to obstructions such as roots or rocks; and

The locking of the driving plate to the anchor rod against relative longitudinal and upward movement but permitting the relative rotation thereof, so that the anchor can be driven into and expanded within the hole without danger of the driving plate riding up the rod, which is particularly adaptable to locking the blades at any point between closed and open position to meet field conditions when complete spreading of the anchors is found impractical; and

The mounting of the anchor blades in such a manner that they may partially rotate to avert minor obstructions during installation; and

The provision of anchor blades, so shaped that when in collapsed position, the unit will be of minimum diameter to freely enter a relatively small hole, but when expanded, the blades will have a maximum effective working area for anchoring purposes; and

My present invention has these and other objects, all of which are explained in detail and may be more readily understood when read in conjunction with the accompanying drawings (two sheets) which illustrate a preferred embodiment of my invention, it being manifest that changes and modifications may be resorted to without departure from the spirit of the claims forming a part hereof. And whereas I have so described my invention, it is to be understood that the words I use are words of description and not of limitation. Similar reference characters refer to similar parts throughout the several views of the drawings, and wherein:

Fig. 1 is an elevational view of my anchor shown in its collapsed or closed position prior to installation; and

Fig. 2 is a like view of the anchor shown fully expanded or in its operative position after installation, the anchor rod is broken and shortened and a driving pipe is shown in its relative position; and

Fig. 3 is a plan view of Fig. 2 taken on line 3—3; and

Fig. 4 is an elevation taken at ninety degrees to that shown at Fig. 1, the driving plate being shown in full lines and the associated parts in broken lines; and

Fig. 5 is an enlarged fragmentary section on line 5—5 of Fig. 4 taken through the assembled driving plate and the related end portions of the anchor blades; and

Fig. 6 is a view similar to Fig. 5 showing the key removed and one anchor blade partially inserted, to better illustrate the mode of assembly; and

Fig. 7 is a top plan of the blade spreader; and

Fig. 8 is a bottom plan of the blade spreader; and

Fig. 9 is a vertical section of the spreader taken on line 9—9 of Fig. 8.

The structure illustrated comprises in general the assembly of a driving plate 10, slidably mounted on an anchor rod or shaft 11, the lower portion of which engages a blade spreader 12. A pair of pendulant anchor blades 13—13 are pivoted to the plate 10, their lower ends riding and taking bearing upon the spreader plate 12.

The driving plate is preferably a single rectangular casting having a flat top portion substantially reinforced on its under side with an

integral depending hub 14, through which the shaft passes, to thus reinforce the block at a critical point and against abuse due to the impact set up in tamping as will hereafter be more clearly explained. Likewise depending from the under side of the block 10 are two pairs of spaced rigid hook-shaped lugs 15—15, each pair being located adjacent the opposite ends of the block; the lugs comprising each pair are spaced apart, relatively reversed, that is, they face each other with an opening there-between. Each lug constitutes a part of a bearing having a truly cylindrical bore 16, adapted to receive the trunnion portion 17 of the anchor blades 13, and which are held in place by means of a key 18. The key 18 is Y-shaped, and each arm of the Y enters and closes the opening of its related hook-shaped lug 15 to complete the bearing. The stem of the Y ends flush with the outer edge of the lugs as shown.

The pair of relatively aligned and pendulant anchor arms or blades 13 are hingedly secured, one on each side, to the tamping block as described. These blades are each relatively shovel-shaped, the outer ends being slightly dished upwardly and of a width slightly greater than the length of the driving plate, tapering down to a neck portion which is coextensive with the plate 10 to which they are pivoted. At each side of the neck portion of each blade is the trunnion 17, which is formed out of the material of the blade and has its major axis at right angles to the major axis of the blade. Each trunnion is substantially elliptical in cross-section, that is, one transverse axis is greater in length than the other as illustrated, and a slot or opening 19 is cored in the casting directly adjacent the trunnion and through which the related lug 15 is adapted to pass upon assembly. The anchor arms or blades 13—13, besides being dished, are further reinforced by means of a pair of substantially parallelly disposed spaced apart ribs 20—20, extending upwardly and outwardly from the top face of the blade, one on each side of the center and running parallel with the major axis of the blade. A third rib 21, is formed on the bottom of each blade and extends downwardly from the under side thereof and terminates in a vertical shoulder or stop 22.

The member 12, or blade spreader, consists of a relatively hollow cone-shaped shell, open at the top and closed at the bottom or apex of the cone. The top edge is substantially reinforced with an integral peripheral flange 23, and four pair of parallelly disposed and substantially radial spaced webs or ribs 24 connect the flange 23 to a central portion or housing 25, which is cored out to receive the end of the rod 11 and its associated nut 26. The outer ends of each web 24 are carried up and above the top surface of the peripheral flange 23 and curved to provide a guide or rail 30, against which the underside of the blades 13 take bearing and are guided in their line of travel. The housing 25 which is formed at the intersection of the ribs 24—24 is provided with a transverse shoulder or wall 27 spaced above the bottom of the cone 12 so as to create a pocket between the bottom of the cone and the wall 27, and against which wall 27 the top surface of the nut 26 is adapted to seat and thus restrict the relative longitudinal movement of the spreader member upon the shaft or anchor rod 11. The nut or locking member may be threaded onto the end of the rod 11 as shown or otherwise fixedly secured thereto, but I find it expedient to make the nut substantially rectangular with a depending and slotted reinforcing hub adapted to protrude below the bottom face of the cone. The bottom of the cone is cored or cut out to leave an opening 28 in the bottom wall 29, slightly wider than the width of the nut 26, and slightly longer than one half of the length of the nut and having a recessed or curved edge to permit easy clearance for the rod 11 to pass therethrough so that upon installation the nut 26 may be inserted from the bottom through the opening 28 vertically and on its side and then turned transversely to its entrance position so that a portion of the nut 26 extends between the bottom wall 29 of the cone and the shoulder or wall 27, which arrangement definitely secures the cone portion or blade spreader to the bottom end of the anchor rod 11.

During installation, the anchor is collapsed as indicated at Fig. 1 of the drawings, the ends of each blade are tied to the cone by means of wires 31—31, which pass respectively through the holes 32 and 33 in the blade and cone, and then the anchor is inserted in a hole made in the ground just large enough to permit the assembly to be lowered to the bottom, whereupon the tamping block or driving plate 10 is subjected to the repeated blows of a tamping tool or sledge, which forces the block 10 downwardly upon the shaft 11, and as the shaft is relatively fixed due to its bearing in the spreading member 12 which seats in the bottom of the hole, the anchor blades 13—13 are forced outwardly, shearing the tie wires 31—31 and passing into the undisturbed earth, sliding on the rails 30—30 of the spreader, until they reach the position indicated at Fig. 2, where the under-side of the tamping block approaches a position adjacent to the central housing portion of the spreading member, and the shoulder 22 formed by the rib 21 on the under-side of each anchor blade, seats and locks against the flange 23 of the spreader member, whereupon the installation is completed. It is obvious that the blades 13—13 cannot lift off of the rails 30—30 since their curved ends by engagement in the earth constantly urge the blades downwardly against these rails.

Often times rocks or tree roots so obstruct the movement of the anchors into the surrounding earth that it is impractical to fully expand the anchors, and then it is common practice to leave the blades expanded as far as possible and to lock them in this position. Various means have been employed to effect this purpose such as providing a plurality of spaced teeth having like shoulders 22 on the under-side of each blade for engagement with the rim of the blade spreader at predetermined intervals. Such a method is not entirely satisfactory, however, because the blades must then of necessity be driven to a predetermined or fixed point before they will lock. To overcome this weakness, I have provided a hardened steel washer or plate 34 provided with a central opening so that it can be slidably mounted on the anchor shaft 11 and rest directly against the top face of the driving plate 10. The washer 34 has a number of spring teeth 35 formed upwardly from the material of the plate and adapted to bear against and firmly grip the shaft 11. As shown particularly at Fig. 2 of the drawings, a drive pipe 36 capped at 37 may be employed for installation purposes. The lock washer 34 is first slid onto the shaft, the pipe slipped over the end of the shaft so as to bear against the top of the washer, then as the oper-

ator forces the driving plate downwardly upon the shaft by repeated blows upon the cap **37**, the lock washer **34** is likewise carried down and in tight engagement with both the shaft and the top surface of the driving plate, so that when the anchor blades meet with an obstruction, the lock washer will grip and bite into the material of the shaft and thus effectively prevent the upward movement of the driving plate and positively lock the anchor blades in that particular position.

In expanding anchors of this type, it is also most desirable that the tamping block or driving plate be substantially reinforced against abuse, and that the connection of the blades to the block be made in such a manner as to completely eliminate any possibility of breakage during installation and to avoid any probability of the blades binding in their bearings due to unequalities or obstructions in the earth surrounding the installation, such as tree roots or rocks. Therefore, the bearing supporting the blades must of necessity be carefully determined as it is found to be the cardinal feature in devices of this type—the difference between a successful anchor and a failure. And the specific bearing just above described has been found to most effectively meet these requirements, and to further permit of a most simple assembly of the parts prior to installation.

What I claim is:

1. In an expansible land anchor including the combination of an anchor rod having a tamping block slidably mounted thereon, a plurality of anchor blades hingedly connected to the tamping block, and a blade spreader adapted to have sliding engagement with a portion of each anchor blade, means for connecting the tamping block with each anchor blade, said connecting means comprising spaced bearings rigid with said tamping block, each bearing consisting of a pair of opposed members, and a removable key positioned between said opposed bearing members, a trunnion formed on each of said anchor blades, and complemental faces formed on said opposed bearing members and said removable key adapted to provide a bearing surface for each trunnion respectively.

2. The expansible land anchor of claim 1 characterized by having the bearing surface formed by the assembly of said key to the opposed bearing members comprises a substantially cylindrical bore, and wherein the associated trunnion has its major axis at right angles to the major axis of the blade and in which said trunnion is substantially elliptical in cross-section with one transverse axis greater in length than the other.

3. In association with an expansible land anchor including the combination of an anchor rod, a tamping block slidably mounted thereon, and anchor blades carried by said block, the combination of a blade spreader carried by said rod, said blade spreader comprising a substantially cone-shaped member with the apex of the cone facing downwardly and constituting a housing for partially enclosing the related end portion of the associated anchor rod, an integral flange reinforcing and providing an upper peripheral edge on said cone-shaped member, a plurality of ribs connecting said flange to the housing portion of said blade spreader, and wherein a portion of at least one of said ribs extends above said upper edge of said peripheral flange and forms a guide rail for directing the movement of one of the associated anchor blades, a disk slidably mounted on said anchor rod above said tamping block and having upstanding spring fingers engaging said rod, and a driving tube surrounding said rod and having its lower end engaging the disk.

4. In an expansible earth anchor, an anchor rod, a tamping block of elongated rectangular form mounted slidably on said rod, said block having a pair of depending and transversely extending parallel ribs, each of said ribs having a pair of openings therethrough and having downwardly converging passages leading from said openings and meeting at the center of the rib to open in common through the bottom of the rib, a V-shaped key for each rib removably fitting in said passages, and a pair of blades each having a pair of spaced openings therethrough adjacent one edge, the material between said openings and said edge being of such size and so spaced on each blade as to pass up a passage of each rib and into the respective rib opening for pivotal engagement with the block.

JOHN O. KLEIN.