

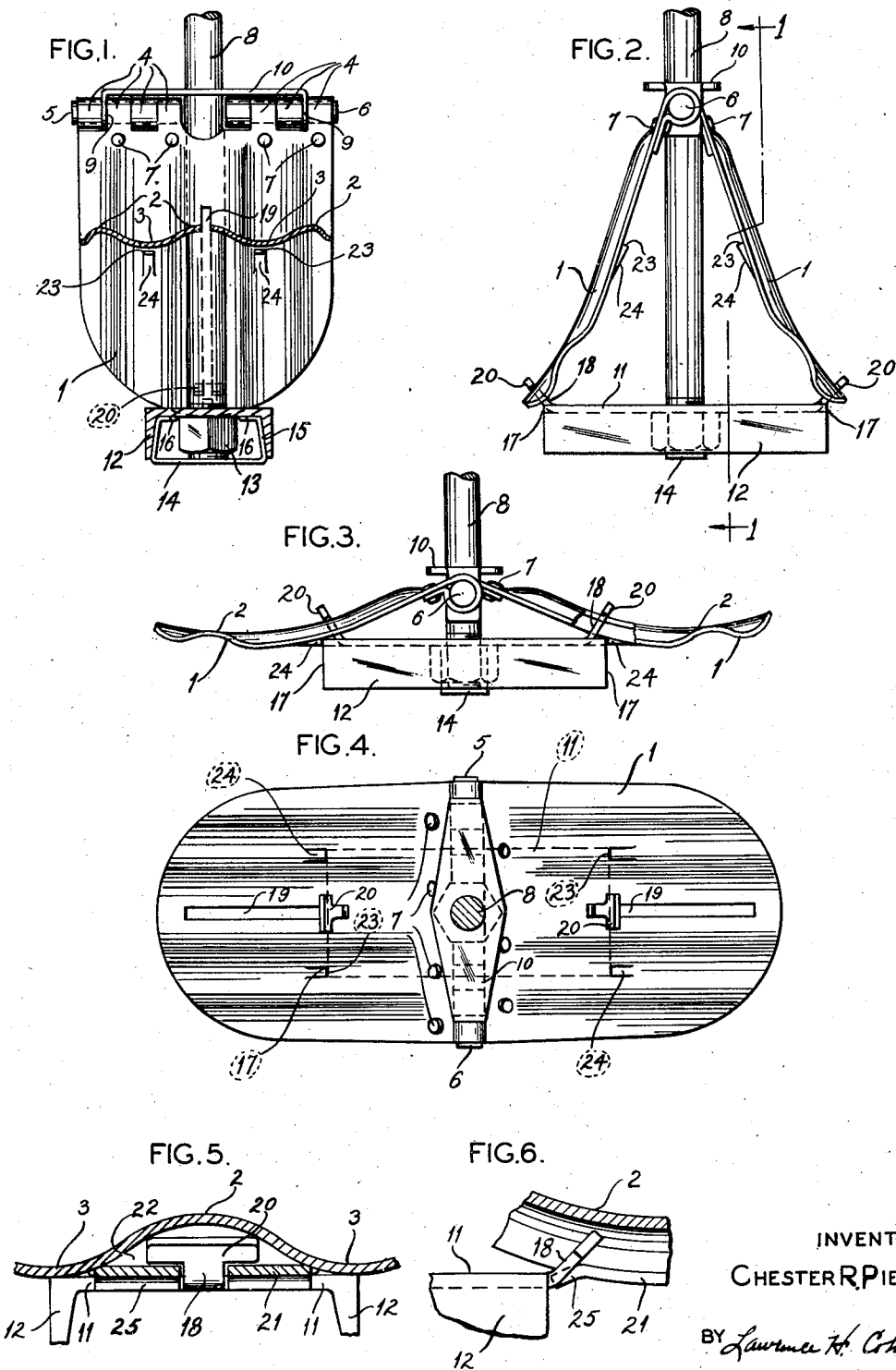
July 2, 1946.

C. R. PIEPER

2,403,150

EXPANSION EARTH ANCHOR

Filed Sept. 15, 1944



INVENTOR
CHESTER R. PIEPER

BY *Lawrence H. Cohen*
ATTORNEY

UNITED STATES PATENT OFFICE

2,403,150

EXPANSION EARTH ANCHOR

Chester R. Pieper, Warrenton, Mo.

Application September 15, 1944, Serial No. 554,274

3 Claims. (Cl. 189-92)

1

This invention relates to earth anchors used for securing guy cables and other bracing and holding means to the ground. The invention has special reference to improvements in earth anchors of the type having a plurality of pivoted blades which are adapted to be folded together to permit the anchor to be installed in a pre-formed hole of minimum diameter, in the present case approximately one-half of the expanded diameter of the anchor, and having means for expanding the blades to cause them to penetrate the solid, undisturbed earth at side of the hole. The earth anchor of the present invention employs a member secured to the lower end of the anchor rod or stem, which member engages the under surface of the pivoted blades and functions wedgingly to spread or expand them, to lock them in expanded position, and to transmit and distribute the tension forces in the anchor rod to the embedded blades. The improvements of the present invention relate particularly to this spreading member, its shape, construction, arrangement, and its combination with the other parts of the anchor.

The principal objects of the invention are to increase the strength and holding power of earth anchors of the described character, and to reduce the manufacturing cost thereof.

Subordinate objects and advantages will appear from the following description of a practical embodiment of my invention shown in the accompanying drawing, wherein

Fig. 1 is an elevational view partly in section, showing my improved anchor with the blades thereof arranged in collapsed position, the section being taken at a plane indicated by line I—I of Fig. 2;

Fig. 2 is a side view of the anchor;

Fig. 3 is a side view with the blades shown in expanded position;

Fig. 4 is a plan view of the anchor with the blades expanded;

Fig. 5 is a transverse sectional view somewhat enlarged, showing a modified form of blade construction, and

Fig. 6 is a longitudinal section showing a fractional part of the modified blade of Fig. 5.

Referring now by characters of reference to the drawing, the anchor comprises a pair of blades 1 of like shape and surface contour, these members being preferably formed of sheet steel by punch and die-press operations. The blades are curved longitudinally to approximate the curvature of the paths traversed when they are moved from collapsed to expanded positions, thus to

2

facilitate end-on penetration of the earth with minimum disturbance thereto. As best appears from the sectionalized representation in Fig. 1 the blades are corrugated in transverse aspect in order to strengthen them to withstand the bending forces normally occurring when the anchor is in service, the blade formation preferably being such as to provide longitudinal ridges 2 at the center and near the side edges, and intervening troughs 3.

The blades are pivotally connected together at their inner ends by a hinge joint consisting of interfitting knuckles or eyes 4, and aligned pivot pins 5 and 6 that extend therethrough. The hinge knuckles 4 are desirably formed by circularly bending integral finger-like extensions produced on the inner ends of the blades when the same are stamped from the sheet stock, the ends of said fingers being bent backwardly upon the under side of the blades and secured thereto by rivets 7. It will be observed that the hinge knuckles are spaced on their respective blades so as to leave an opening between the ones which, when the blades are assembled together, constitute the center-most pair, such opening accommodating the anchor rod 8. Additional spaces between paired knuckles at the sides of the blades accommodate the down-turned ends 9 of a strike plate 10 that overlies the hinge structure, the end parts 9 having suitable openings through which the pivot pins 5 and 6 extend. The strike plate 10 is provided with a central opening for the anchor rod.

Describing now improved means by which tension forces in the anchor rod are transmitted to the blades, there is provided at the lower extremity of the rod 8 a rectangular plate 11 having downwardly projecting side flanges 12 that extend the length of the plate, the flanges serving to strengthen this member to prevent it from buckling under the influence of the applied forces. The member 11 most desirably comprises a length of channel iron of mill standard proportions with regard to web and flanges, this stock being admirably suited to the present requirements. Its use results in considerable savings in manufacturing cost as compared to former types of anchor strain plates. A central opening in the member 11 receives the end of the anchor rod 8 and a nut 13 threaded on the rod end provides a bearing surface for the member.

A retainer strap 14 bridges the flanges 12 and forms a seat for the end of the anchor rod, this strap consisting of an inverted U-shaped strip having leg portions 15 which fit snugly against

the inner surfaces of the flange, to which they are secured as by spot welding. The extremities 16 of the legs 15 are bent inwardly as shown to confront opposite side faces of the unit 13 and prevent that member from turning relative to the rod when the latter is tightened in place. It will appear that the nut 13 and retainer strap 14 secure the strain plate assembly against movement longitudinally of the rod in both directions, and since the anchor blades are attached to the strain plate by means hereinafter described the entire unit is retained adjacent the lower end of the rod. This materially facilitates the placement of the anchor at the bottom of a bore in the earth which is desirably made of size only slightly greater in diameter than that of the folded anchor.

The strain plate 11 is prevented from turning about the anchor rod relative to the blades and said plate is arranged so that its end edges 17 are at all times approximately at right angles to the longitudinal axes of the blades. In the present example means for this purpose consist of tongues or lugs 18 that project from the ends of the strain plate through longitudinal slots 19 formed in the blades. The lugs 18 may be produced by displacing them from the metal of the plate 11, as shown in Fig. 3, or they may consist of separate elements secured to the blades as by spot welding. They are desirably provided with enlarged head portions 20 to prevent their dislocation out of the blade slots.

In the larger anchor sizes or where required by reason of strength considerations, the slot 19 may be omitted from the blade proper, and in lieu thereof a guide member, in the present example consisting of a slotted plate 21, is welded or otherwise secured to the under side of the blade so as to bridge the cavity 22 formed by the central corrugation 2, as shown in Fig. 5. In this instance the tongues 18 will extend through the slots of the auxiliary plates 21 and their heads 20 will be accommodated by the cavity 22.

As a means for locking the blades in expanded position they are provided on their under surface with locking shoulders 23, constituted in the present example by the end surfaces of depressed tongues 24 which are struck from the blade metal. These shoulders face toward the hinged ends of the blades and conveniently project from the troughs of side corrugations 3, by which location and arrangement they are adapted to ride over the end edges of the strain plate 11 during blade expansion and thereafter about the end surfaces 17 when a tensional force is applied to the anchor rod. Where the alternate blade construction of Figs. 5 and 6 is employed blade locking shoulders are desirably produced by bending downwardly the inner ends of the auxiliary plates 21 so that the inner end portion 25 thereof will be presented for abutment against the ends of the strain plate 11.

The operation and manner of installing the anchor of the present invention will be understood by those familiar with this class of equipment, but for purposes of completeness may be described as follows. A hole of suitable depth and inclination is made in the earth, the diameter of the hole, as heretofore mentioned, being only slightly

greater than the collapsed diameters of the anchor. With the anchor blades temporarily held in collapsed positions as by means of a relatively weak cord or wire, the anchor is lowered to the bottom of the hole. Thereafter the strike plate 10 is subjected to blows from a suitable tamping tool to force the inner ends of the blades downwardly along and relative to the rod, causing the blade assembly to expand, the blade ends entering the earth at the sides of the hole. When completely depressed the blades become locked by the engagement of the shoulders formed by tongues 24 or 25 with the ends of the strain plate 11. Finally, earth is filled in and tamped about the rod.

Having described my invention, what I claim and desire to secure by Letters Patent is:

1. An expansion anchor comprising opposed blades having adjacent end portions pivotally connected together, a rod extending slidably through an opening at the connected ends of said blades, a generally rectangular, channel shaped strain plate secured to the lower end of said rod, locking lugs projecting from the under surface of said blades engageable with the ends of said strain plate to secure the blades in expanded position, a slotted member secured to the under surface of at least one of said blades, and a projection on said strain plate, extending into and slidable along the slot in said member, whereby to maintain said blades in fixed angular relation to said strain plate, about said rod.

2. An expansion anchor comprising a set of blades having adjacent end portions pivotally connected together, each of said blades being formed to provide a longitudinally extending groove in the lower side thereof, a guide plate extending along said groove and forming therewith an elongated pocket, a rod extending slidably through an opening at the connected ends of said blades, a rectangular, channel-shaped member secured to the lower end of said rod, depending lugs on said blades, engageable with said member to secure the blades in expanded position and tongues projecting from said member into said blade pockets, said tongues being slidable along said guide plate and being adapted to prevent angular relative displacement of said blades and member about said rod.

3. An expansion earth anchor comprising paired blades, means pivotally connecting together adjacent end portions of said blades, each of said blades being formed to provide a longitudinally extending groove in the lower side thereof, slotted plates secured to said blades in bridging relation to said grooves, a rod extending slidably through an opening at the connected ends of said blades, a rectangular channel-shaped member secured to the lower end of said rod, said slotted plates having down turned portions engageable with the ends of said member to lock the blades in expanded position, tongues projecting upwardly from said member, through said slotted plates and into said blade grooves, said tongues having lateral projections confined between said blade and plate, said tongues being adapted to maintain the blades in fixed angular relation to said member, about said rod.

CHESTER R. PIEPER.