Aug. 2, 1960 L. J. BARKLEY, JR 2,947,149

PILE WITH SELF-SPREADING ANCHORS

Filed Feb. 11, 1958 2 Sheets-Sheet 1

Fig. 1

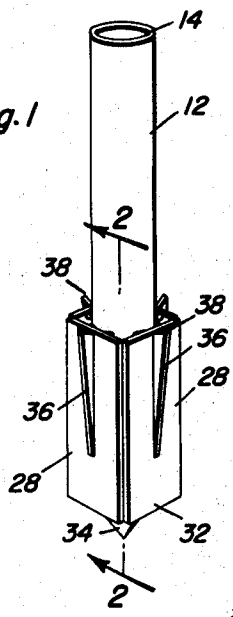


Fig. 2

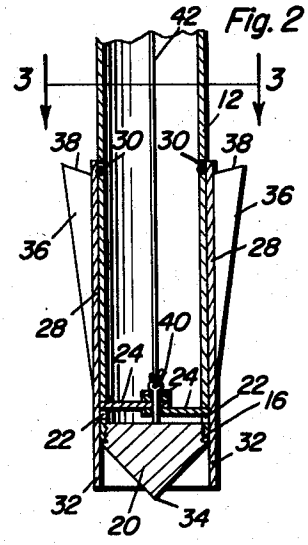


Fig. 4

Fig. 5

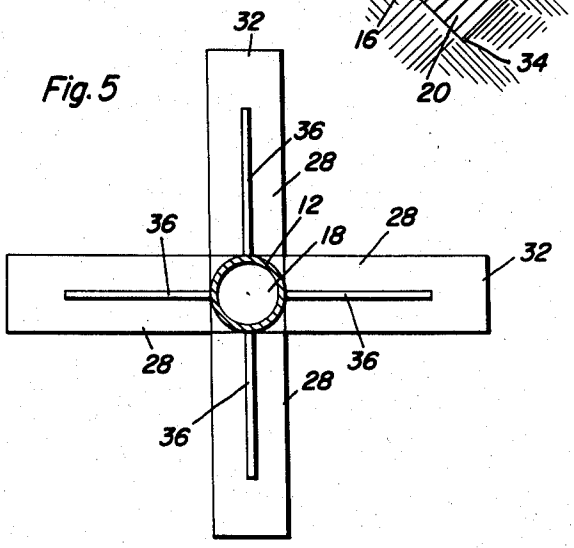
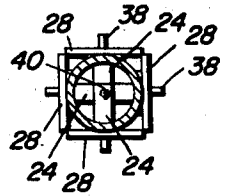


Fig. 3



Lowell J. Barkley, Jr.
INVENTOR.

BY Clarence A. O'Brien and Harvey B. Jacobson
Attorneys

Aug. 2, 1960 L. J. BARKLEY, JR 2,947,149

PILE WITH SELF-SPREADING ANCHORS

Filed Feb. 11, 1958 2 Sheets-Sheet 2

Fig. 6

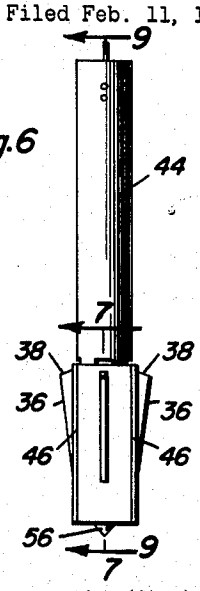


Fig. 9

Fig. 7

Fig. 10

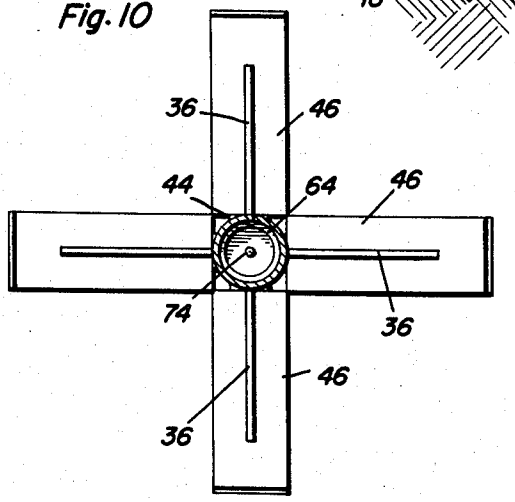
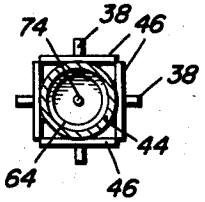


Fig. 8



Lowell J. Barkley, Jr.
INVENTOR.

BY Clarence A. O'Brien and Harvey B. Jacobson
Attorneys

United States Patent Office

2,947,149

Patented Aug. 2, 1960

2,947,149

PILE WITH SELF-SPREADING ANCHORS

Lowell J. Barkley, Jr., Box 127, Matador, Tex.

Filed Feb. 11, 1958, Ser. No. 714,528

3 Claims. (Cl. 61—53)

The present invention relates to certain new and useful improvements in structural devices which may be broadly referred to as a pile. However, and in the instant disclosure, two embodiments of the over-all concept are revealed and for convenience in distinction one embodiment has to do with a so-called footing of a self-spreading type, while the other embodiment is differentiated as a self-locking anchor.

Stated otherwise the invention in one of its aspects has to do with a novel footing characterized by self-spreading arms functioning as stabilizers and anchors. The construction is such that the cooperating components work on a forced principle affording the user maximum load bearing properties in any and all types of earth and equivalent formations and foundations. The improvements are such that the construction is possessed of advantages over conventional types of footings in that (1) no preliminary drilling is necessary to determine the type of formation to give bearing, and (2) the cost of the pile is appreciably reduced.

Briefly summarized and generically construed, both forms or embodiments of the invention are characterized by an elongated outer tubular member adapted to be driven into the ground, a conical ground penetrating point removably plugged into the leading end of said member and adapted to be forcibly driven into the ground with the aid of a conventional pile driver, at least one pair of broad-surfaced stabilizing and anchoring arms arranged on diametrically opposite sides of said member and having upper ends hingedly joined to said member, and lower ends normally depending and projecting below the lower end of the tubular member but terminating in a plane just short of the apex of said point so that pressurized earth crowding and wedging itself between the tapering surfaces of the point and said depending lower ends will force and spread the arms radially, outwardly, and upwardly to assume an expanded stabilizing and anchoring position relative to said member, retaining means carried by the tubular member and arms, respectively, and serving to maintain the arms in contracted position alongside the intervening tubular member, whereby when said means is released at a predetermined time the arms are allowed to spread and assume their desired expanded stabilizing and anchoring position.

Novelty is predicated on the utilization of arms which are provided with lengthwise rigidifying ribs. When the arms are collapsed or folded alongside the hub-like tubular member the upper ends of the ribs are normally at right angles to the member. These upper ends serve as abutments which, when they come to rest against the tubular member provides stop and limit the upward swing of the expanding arms.

More specifically, novelty in addition is predicated on a construction revealed wherein the retaining means embodies a keeper pin. This pin is remote controlled by a pull cable which is connected at its lower end to the upper end of the pin. The penetrating point which as before stated is removable is employed to permit access to be had to the pin and to make sure that the pin is locked before the device is driven into the ground.

In the aforementioned embodiment identified as the self-locking anchor a weighted cup-like slide or inner tubular member is mounted in the bore of the outer tubular member. This cooperates with special detents on the hinged ends of the expansible and contractible anchor-arms and when it drops down to its intended locking position the arms are held substantially immovably in their outstanding anchoring positions.

Other objects, features and advantages will become more readily apparent from the following description and the accompanying illustrative drawings.

In the drawings, wherein like numerals are employed to designate like parts throughout the views:

Fig. 1 is a perspective view showing the aforementioned self-spreading footing with the stabilizing and anchoring elements or arms in their folded ready-for-use position.

Fig. 2 is a view in section and elevation taken on the plane of the line 2—2 of Fig. 1, looking in the direction of the arrows.

Fig. 3 is a cross-section on a smaller scale taken on the horizontal line 3—3 of Fig. 2.

Fig. 4 is a view on the approximate scale of Fig. 2 showing the cooperation and relationship of parts when the device has been embedded for anchorage in a foundation, the ground, for example.

Fig. 5 is a top plan view of the construction seen in Fig. 4 out of the ground and on a smaller scale.

Fig. 6 is a view in elevation similar to Fig. 1 and showing the modification to be known as the self-locking anchor.

Fig. 7 is a view on a slightly larger scale and similar to Fig. 2 and taken on the line 7—7 of Fig. 6.

Fig. 8 is a horizontal section on a smaller scale on the line 8—8 of Fig. 7.

Fig. 9 is a view similar to Fig. 4 and showing the self-locking anchor in use.

Fig. 10 is a top plan view on a smaller scale with the anchor removed from the ground.

Reference is made first to the form of the pile called the self-spreading footing in Figs. 1 to 5 inclusive. With refernce in particular to Fig. 4 the outer tubular member, a length of tubing of prerequisite dimensions, is denoted by the numeral 12 and is open at the upper end 14 and open at the lower end but internally screw-threaded here as at 16 to accommodate the screw-threaded end of the plug portion 18 of the penetrating point 20. This is a solid conical member which plugs removably into and closes the lower end of the tubular member. Just above the plug portion and the lower screw-threaded end the tubular member is provided with circumferentially spaced equidistant openings or holes 22 for accommodation and clearance of cooperating lugs 24 having keeper holes 26. Each lug is fixed to a median portion of its companion anchoring arm 28. There are four of these arms and they are circumferentially spaced and each is a flat rectangular plate-like form and the upper end is hingedly connected at 30 to the intended spot on the tubular member. The hinge point in comparison to the length of the arm is such that the lower end portion 32 depends or projects below the plug portion 18 but terminates short of the penetrating apex 34 as best shown in the collapsed or folded arrangement seen in Fig. 2. On the other exterior or upper side of each arm there is a lengthwise rigidifying rib 36. The upper end of the rib 38 is normally at right angles to the plate and consequently the tubular member when the arm is collapsed or folded. This upper end provides an abutment which in turn functions as a stop as seen in Fig. 4 when it comes to rest against the tubular member. This is the posi-

tion assumed when the anchor arms have been swung radially outward and upwardly to their stabilizing and anchoring positions.

When the arms are folded or collapsed and alongside the tubular member they then cause the lugs 24 to be projected through the clearance holes 22. The lugs are then overlapped and the keeper holes are in alignment with each other.

As seen in Fig. 2 the retainer or locking pin 40 is carried on the lower end of a remote controlled pull cable 42. The pin descends through the registering keeper holes and in this manner locks the four arms 28 in their folded ready-to-descend position.

In the placement of the footing described one uses the standard pile driver and the standard pile driving procedure with the exception that it is not necessary to drill a hole in order to drive the footing into the ground. To place the footing, all that is necessary to set the penetrating point on the desired place and start the driving operation. Obviously, when the footing is driven to a predetermined point of penetration the operator attaches a tag line to the cable and to rig. The lift or pull on the cable 42 withdraws the locking or retaining pin 40 and the lugs 24 are then free to release the arms 28 for action. By continuing the driving operation the arms are spread radially out and move outwardly and upwardly. As the driving operation is continued the arms spread until the shoulders or abutments 38 come into contact with the tubular member 12 thus retaining the arms in an open or spread position and thus giving a desired refusal load bearing.

As before mentioned the penetrating point 20 functions also as a closing plug on the lower end of the tubular member permitting access to be had to the lugs 24 and keeper pin 40 to assist in setting the pin and insuring that the arms are properly locked before the driving operation takes place.

With reference to Figs. 1 to 10 inclusive and the self-locking anchor it will be seen that the principal parts of the same are already shown and described. Briefly, the tubular member 44 has anchoring and stabilizing arms (four) as before described. These arms are here denoted by the numeral 46 and the upper end is hinged in place at 48. The lugs 50 with their keeper holes 52 operate through the clearance holes 54 just above the screwed-in closing plug and penetrating point 56. It will be noticed that at the hinge points vertical slots 58 are provided to accommodate the projectible and retractable segmental flanges 60. These flanges constitute detents that operate back and forth through the slots as will be evident by comparing Figs. 7 and 9 with each other. The aforementioned weighted cup-like slide or inner tubular member is denoted at 64 and it is normally held in an elevated position by the retracted detents in the manner seen in Fig. 7. When the arms swing out and up to anchoring positions and the detents 60 are withdrawn from the slots 58 this cup-like member drops down on the stop pins 66 and covers the slots 58 thus locking the anchoring arms in the spread position shown. The arched or U-shaped bar 68 (Fig. 9) has its end portions riveted in place at 70 and has a central opening upwardly and through which the pull cable 72 operates. The cable also operates through an opening 74 in the bottom of the cup or member 64 where it has the keeper pin 76 attached thereto so that the pin may be operated in the manner already described and again shown in Fig. 7.

The foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly all suitable modifications and equivalents may be resorted to, falling within the scope of the invention as claimed.

What is claimed as new is as follows:

1. A pile comprising an elongated tubular member adapted to be driven into the ground, a conical ground penetrating point removably plugged into the leading end of said member and adapted to be forcibly driven into the ground with the aid of a conventional pile driver, at least one pair of broad-surfaced stabilizing and anchoring arms arranged on diametrically opposite sides of said member and having upper ends hingedly joined to said member, and lower ends normally depending and projecting below the lower end of the tubular member but terminating in a plane just short of the apex of said point so that pressurized earth crowding and wedging itself between the tapering surfaces of the point and said depending lower ends will force and spread the arms radially, outwardly, and upwardly to assume an expanded stabilizing and anchoring position relative to said member, said member being provided just above the lower end thereof with a plurality of openings, each arm having a lug fixed thereon at right angles thereto and projecting into the bore of the tubular member by way of one of said openings, the inner projecting end of each lug having a vertical keeper hole, the adjacent ends of said lugs overlapping one another and the keeper holes being vertically alined with each other, a keeper pin passing downwardly and releasably through said keeper holes, and a remote controlled pull cable connected at a lower end thereof to said pin so that the pin may be withdrawn from the keeper holes at the proper time, said penetrating point being removable to allow access to be had to said lugs and pin.

2. The structure defined in claim 1, and wherein said arms are provided with lengthwise rigidifying ribs having upper end portions normally at right angles to said member, said upper ends serving as abutments which, when they come to rest against the tubular member, provide stops and limit the upward swing of the arms.

3. A footing with self-spreading anchoring means comprising a vertically elongated tubular member adapted to be driven by a pile driver into a foundation, the ground for example, said tubular member being open at its upper and lower ends, the lower end being internally screw-threaded, a closure for the lower end comprising a screw plug screwed into said screw-threaded lower end and depending therefrom, the portion of the plug depending below the lower end of said tubular member being conical and pointed and constituting a ground penetrating point, said tubular member above said screw-threaded lower end being provided with a plurality of circumferentially spaced equidistant openings, a plurality of circumferentially spaced, vertical stabilizing and anchoring arms hingedly secured at their upper ends to the tubular member above the openings and folded alongside of said tubular member in their normal descending relationship, said arms extending beyond the lower end of said tubular member to be opened by the earth displaced by said plug, the lower end portion of each arm being provided with a lateral lug and said lug projecting through one of said openings into the bore of the tubular member, each lug having a keeper hole therein, the several lugs being overlapped and the keeper holes being in vertical alignment with each other, a keeper pin passing downwardly and releasably through the aligned keeper holes, a remote control cable connected at its lower end to said pin and extending upwardly through the tubular member for ready and controlled operation, said tubular member being provided adjacent the arm hinges with vertical slots, the hinged end of each arm having an integrally laterally disposed segmental shaped flange constituting a detent operable through one of the slots, said detents when projecting into the bore of the tubular member providing shoulders, a weighted inner tubular member slidable in said bore and normally resting atop said detents and adapted to pass downwardly through the bore to a position wherein it covers the slots and locks the detents in arm-retaining position, said inner tubular member includ-

ing a centrally apertured closed end slidably accommodating the control cable, and stop pins carried by said tubular member and projecting into said bore in a position between the openings and slots, said pins serving to support said sleeve in its descended locking position.

References Cited in the file of this patent

UNITED STATES PATENTS

1,497,629	Baker	June 10, 1924
1,936,541	Mechlin	Nov. 21, 1933
2,204,924	Cappel	June 18, 1940
2,588,712	Ferris	Mar. 11, 1952

FOREIGN PATENTS

388,242	Great Britain	Feb. 23, 1933
896,328	Germany	Nov. 12, 1953