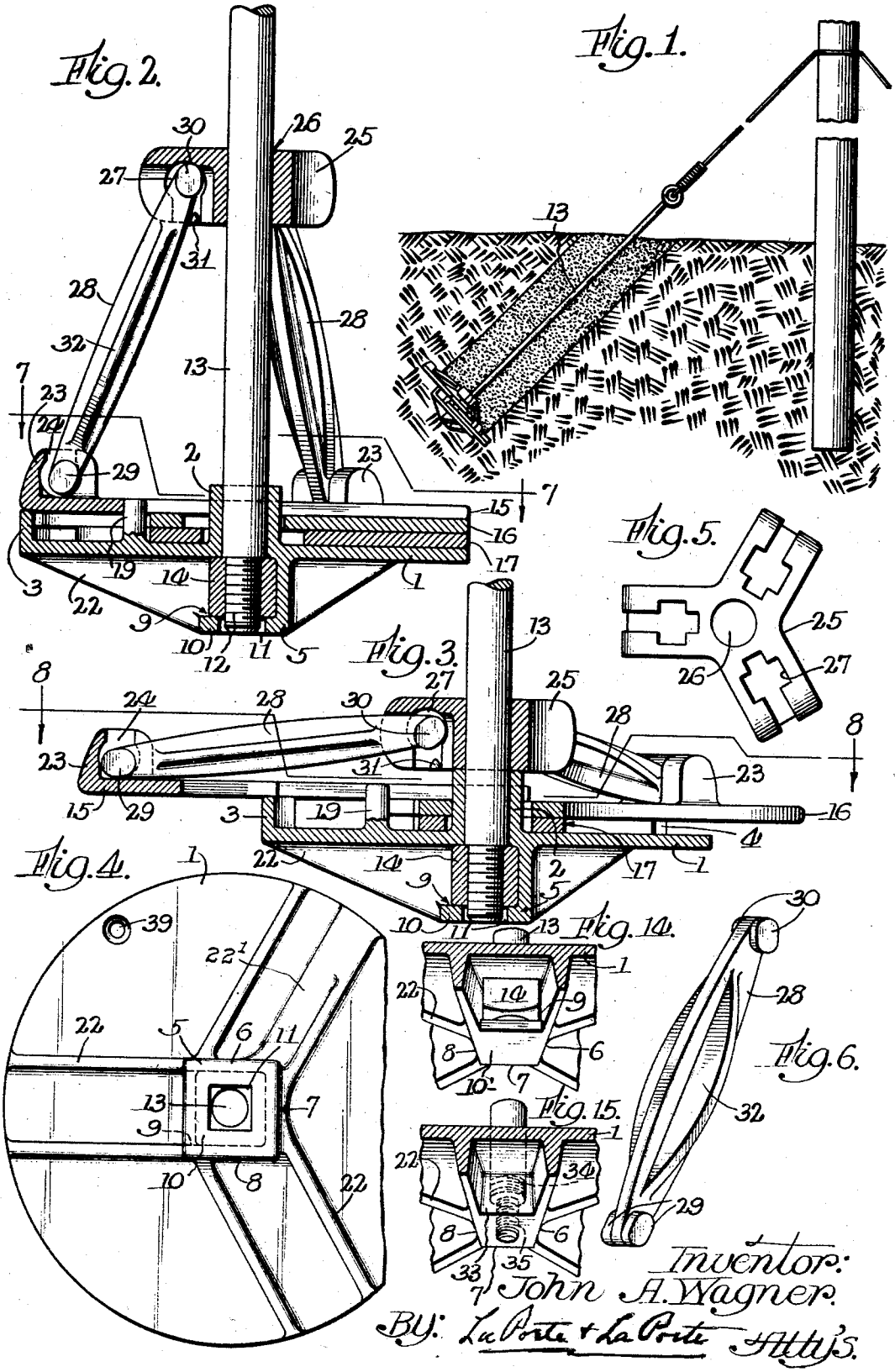
June 26, 1934. J. A. WAGNER 1,964,610

GROUND ANCHOR

Filed Sept. 30, 1932 2 Sheets-Sheet 1



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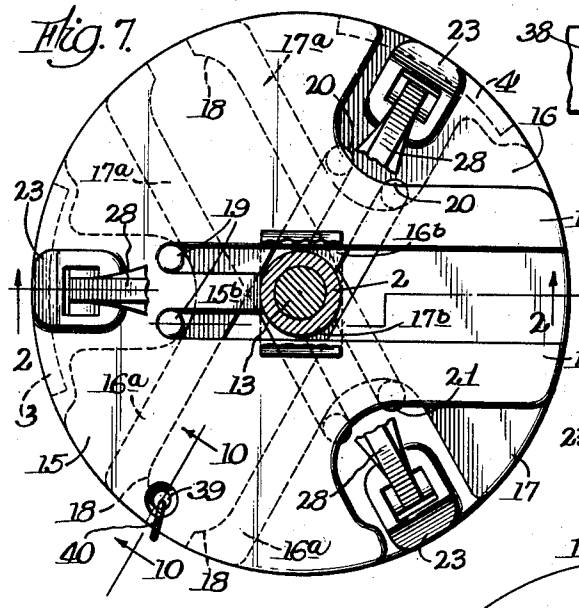

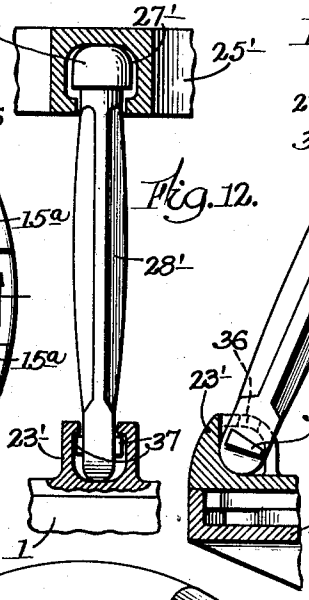

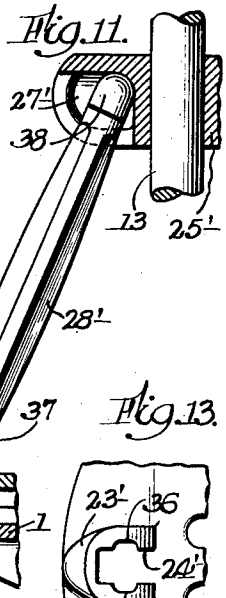

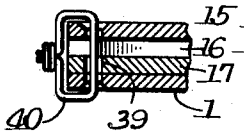

Inventor:
John A. Wagner
By: La Porte & La Porte Atty's.

Patented June 26, 1934 1,964,610

UNITED STATES PATENT OFFICE

1,964,610

GROUND ANCHOR

John A. Wagner, Decatur, Ill.

Application September 30, 1932, Serial No. 635,531

6 Claims. (Cl. 189—92)

This invention has reference to earth anchors for guy-wires and the like and is especially directed to improvements in that class of earth anchors comprising a base plate and slidably arranged flukes superimposed over said plate for movement laterally and radially of the plate and each other, which when located in the ground will firmly and effectually maintain its position in the ground for the uses intended.

The invention has for a further object to improve the construction of the base plate, including the flukes and to provide novel guiding means in said plate and flukes whereby to facilitate the operation of said flukes in relation to said plate and maintain the flukes in horizontal and lateral alignment with respect to said plate when actuated.

A further object of the invention is to provide new and novel sockets in the flukes, including the slidable spider collar whereby rods having complementary connecting elements may have a jointed connection between the sockets of said flukes and said collar whereby the flukes, collar and rods may be quickly and easily assembled and disassembled and provide equal and easy operation of the flukes in their lateral movements.

A still further object of the invention is to improve the lower side of said base plate by the provision of an improved nut socket construction for fastening the lower end of a guy rod whereby such operation may be quickly performed whether it be an assembling or disassembling operation; further, the provision of strengthening ribs radiating from said nut socket to the boundary of said base plate and preferably located in underlying relation to the movement of said flukes to provide the base plate with sufficient strength and reinforcement in usage.

The invention has for a further object to provide one or more of said strengthening ribs on the underneath side of said base plate with a fillet of metal, preferably of the same material of the base plate, whereby to compensate for any loss of shrinkage that might occur during the casting of the base plate to insure such plate being of equal strength throughout its entirety, thus avoiding possible cracking or breaking of such plate in use.

A still further object of the invention is in the provision of aligned holes or openings through the base plate and flukes whereby when the flukes are in inoperative or nested position, such assembly may be locked against dislodgment for shipping purposes and the like.

Other and further objects will more fully appear from the following description.

That the invention may be more fully understood, reference is had to the accompanying drawings illustrating a preferred embodiment of the invention, in which:

Fig. 1 is a sectional view through the ground in which my improved ground anchor is positioned and illustrating a supporting post with guy-wire, broken away, attached to my improved anchor;

Fig. 2 is a transverse sectional view in elevation taken on the line 2—2 of Fig. 7, showing the anchor and its operative parts in inoperative or nested relation;

Fig. 3 is a view similar to Fig. 2, taken on the line 3—3 of Fig. 8, except that the operative parts are shown in operative or extended position, being that position assumed when in the earth for anchoring purposes;

Fig. 4 is a plan view of the underneath side of the base plate of said anchor, a portion thereof being broken away;

Fig. 5 is a plan view of the underneath side of the spider collar showing the sockets in the arms thereof, the same being illustrated in assembled relation in Figs. 2 and 3;

Fig. 6 is a perspective view of one of the connecting rods illustrating its end connecting elements and strengthening ribs shown in assembled relation in Figs. 2 and 3;

Fig. 7 is a top plan view of my improved ground anchor as the same would appear if taken on the line 7—7, Fig. 2;

Fig. 8 is a top plan view of my improved ground anchor as the same would appear if taken on the line 8—8, Fig. 3;

Fig. 9 is a top plan view of a portion of one of the fluke plates showing the socket unoccupied;

Fig. 10 is a sectional view in elevation, when broken away, of one form of locking the base plate and nested flukes in assembled relation for shipping purposes or the like, as the same would appear if taken on the line 10—10, Fig. 7;

Fig. 11 is a side view in elevation, partly in section, of a modified form of connecting rod illustrated in assembly with spider collar and fluke;

Fig. 12 is an end view in elevation of the rod illustrated in Fig. 11;

Fig. 13 is a top plan view of a portion of one of the fluke plates showing a modified form of socket capable of receiving the complementary end portion of the type of connecting rod illustrated in Figs. 11 and 12;

Fig. 14 is a partially sectional perspective view of a modified nut socket construction other than shown in Figs. 2 and 3, and

Fig. 15 is a view similar to Fig. 14 illustrating a still further modified form of socket construction other than shown in Figs. 2, 3 and 14.

Like characters of reference denote corresponding parts throughout the figures.

Reference now being had to the drawings, 1 designates a base plate shown to be disk-like in shape having centrally and axially disposed thereof an upstanding centrally apertured post or sleeve 2 and arranged near the boundary of said plate stepped fluke supports 3 and 4.

Disposed beneath said plate and preferably integral therewith and arranged centrally thereof is a nut embracing inclosure or socket 5 comprising preferably solid side walls 6, 7 and 8 and a recess opening 9 and the bottom wall 10, said wall 10 being preferably apertured as at 11 for the clearance of the depending threaded end 12 of a guy-rod or post 13, upon which threaded end is adapted to be screwed a nut 14 which is initially located within said inclosure by passage through said side recess opening 9, the side walls 6, 7 and 8 and bottom wall 10 embracing said nut against possible rotation or displacement and further, protection against undue weather or ground contact whereby the nut and threaded end of said guy-rod or post is materially guarded against weather corrosion.

15, 16 and 17, best seen in Fig. 8, designate flukes or anchor plates adapted to be arranged on the upper side of said base plate 1 in superimposed relation and to be extended and retracted radially and laterally of said base plate and each other, the outer body portions of each of said flukes being preferably fan-like in formation and having a pair of spaced elongated extensions 15^a—15^a, 16^a—16^a and 17^a—17^a, providing a slot therebetween terminating in the body of said fan-like portion. At the end of each slot in the body portion of each fluke there is provided a tongue extension 15^b, 16^b and 17^b adapted to project from the body of said fan-like portion to a predeterminate point in the length of said slot and preferably in the plane of the body of said fluke, the inner projecting ends of said extensions being preferably arcuately shaped as at 15^c, 16^c and 17^c whereby when the flukes are in retracted inoperative and nested positions, as shown in Figs. 2 and 7, said arcuate portions 15^c, 16^c and 17^c of said tongue extensions will partially embrace the sleeve or post 2. Referring to Fig. 8, one or more of said flukes are shown having their spaced extensions having preferably curved finger-like ends or abutments 18 adapted for engagement with the sleeve or post 2 when said flukes are in their extended or projected and operative position which function to limit such projected movements of said flukes when caused to be extended radially of said base plate 1.

Extending upwardly and preferably integrally from the upper surface of said base plate 1, are a series of spaced sets of fluke guiding pins or members 19, 20 and 21 disposed intermediate the edge of said base plate and the vertical axis thereof, said pins adapted to have guiding engagement with the spaced elongated extensions 15^a—15^a, 16^a—16^a and 17^a—17^a, respectively, as shown in Fig. 8, when said flukes are caused to assume their extended and operative positions. In the retracted, inoperative and nested positions of the flukes, best illustrated in Figs. 2 and 7, the sets of guiding pins 19, 20 and 21 are caused to enter spaced slots adjacent the tongue extensions 15^b, 16^b and 17^b, said pins, slots and tongue extensions functioning to initially guide the flukes in their outward movement from retracted or nested positions, whereby said flukes when operated under working conditions will enter the ground without deviation in such radial and lateral movements of said base plate.

On the underneath side of said base plate 1, I have elected to provide strengthening and reinforcing ribs 22 preferably integral with said base plate and located in spaced relation thereon in underlying relation to the radial and lateral movements of said flukes on the upper side of said plate, said ribs preferably connecting and centralizing with said socket 5 and extending radially thereof to the boundary of said plate, whereby to strengthen and reinforce those portions of the base plate subject to the stress and travel of the flukes thereon. One of these strengthening ribs is provided with a fillet of metal 22', see Figure 4, preferably of the same material of the base plate, whereby to compensate for any loss of shrinkage that might occur during the casting of the base plate to insure such plate being of equal strength throughout its entirety, thus avoiding possible cracking or breaking of such plate in use.

Located adjacent the outer edge of each fluke and preferably in spaced relation to the tongue extensions, is provided an upstanding boss 23 having a recessed socket 24 opening out of its upper and inner side faces, see Fig. 9, the interior of said socket being preferably spherical in shape, see Figs. 2 and 3, whereby to provide a swivel-like connection with an end of a connecting rod to be described.

25 designates a collar being apertured centrally thereof at 26 adapted for slidable relation with the guy-rod or post 13 when in assembled relation as shown in Figs. 2 and 3, the lower face of said collar provided with a series of recessed sockets 27 constructed in a manner similar to the sockets 24 on the flukes. The sockets 24 and 27 are connected by means of operating rods 28, each of which is provided at each of its opposite ends with substantially elongated cam-like lugs 29 and 30, the longitudinal axes of which are divergent to a line extending longitudinally and medially of the length of said rods, see Fig. 6. In assembly of the connecting rods 28 with the sockets of the flukes and collar, the lugs 29 of the rod 28 are slipped down in the recessed socket 24 of the boss 23 requiring that the rod 28 be held in substantially a vertical position in order that the lugs 29 will enter and be received in said recess whereupon the rod is inclined to the position substantially as shown in Fig. 2, in which inclined position the collar 25 may be lowered, permitting the lugs 30 of said rod to enter the recessed opening 27 within said collar. In order to prevent the dislodgment of said lugs 30 from the recesses 27 of the collar, I have elected to provide a locking means, such for instance, as peening the opening edge of said recessed openings 27 as at 31, see Fig. 2. A locking means is not required for the lugs 29 in the socket 24 since after the lugs 30 are received and locked within the recesses 27, the lugs 29 have been canted or swiveled sufficiently to prevent their removal and can only be dislodged by first removing the lugs 30 from the recesses of the collar and the assembling operation being reversed, as will be understood. Reinforcing ribs 32 are provided preferably in the length of said rods 28 to give them added strength and reinforcement.

In assembled relation, as illustrated in Fig. 2, showing my improved anchor in inoperative and

nested position, the flukes are disposed in superimposed relation over the base plate 1, the flukes 15 and 16 having their outer body end portions supported by the fluke supports 3 and 4, respectively. The fluke 17 being the lower fluke requires no support since it has a supporting and sliding relation when operated with the upper surface of the base plate 1. As shown in Figs. 3 and 8, the fluke supports 3 and 4 function to maintain the flukes 15 and 16 in horizontal alignment in their outward extended movements whereby to facilitate their entrance into the ground.

In the operation of my improved anchor, a hole is dug in the ground of a diameter slightly in excess of the diameter of the base plate 1, whereupon the completely assembled device is introduced into said hole with the parts thereof in the position shown in Fig. 2.

In order to extend or expand the flukes into anchoring position, a tamping instrument is employed against the upper face of the collar 25 and by reason of the connection between the collar and flukes, each fluke is extended radially and laterally outwardly and forced in the earth surrounding the hole until the downward movement of the collar 25 is limited by contact with the upstanding sleeve or post 2, as seen in Fig. 3, whereupon the hole above the device is filled in as shown in Fig. 1 and the protruding end of the guy-rod is secured for the purposes intended.

Reference being had to Figs. 14 and 15, there are illustrated therein modified forms of guy-rod socket construction. In Fig. 14 the bottom wall 10^1 is solid as are the solid side walls 6, 7 and 8, as distinguished from the bottom wall 10 illustrated in the preferred form, see Figs. 2, 3 and 4, having the aperture 11 therein. The solid bottom wall 10^1 provides an imperforate supporting shelf for the nut 14 and prevents earth and moisture from direct contact therewith. Fig. 15 illustrates a further modified form of socket construction wherein a nut such as 14 is eliminated by providing the space occupied by the nut 14 in Figs. 2, 3, 4 and 14 with a solid integral core 33 with said side walls 6, 7 and 8, said core being provided with threaded openings of different diameter designated 34 and 35 wherein may be threaded the screw ends of a guy-rod having a large or small diameter, whatever the case may be. As illustrated in Fig. 15, a guy-rod of large diameter has been screw threaded into the large threaded opening 34.

Reference being had to Figs. 11, 12 and 13, there are illustrated therein a modified form of fluke and collar recesses for the reception and securement of a complementary modified form of ends of a connecting rod. In Fig. 13 the boss 23^1 is provided with a recessed socket 24^1 opening out of its upper and inner side face similar to the opening 24 as shown in Fig. 9, except the upper face opening is cut away on opposite sides of said opening as at 36 to provide a channel for the passage into and out of said recess opening of the lug end of a connecting rod of the type shown in Figs. 11 and 12. The lug end of said connecting rod, see Figs. 11 and 12, comprises oppositely disposed wedge-shaped lugs 37 arranged transversely the length of said rod and near the end thereof and preferably integrally therewith, the end of said rod adjacent said lugs being rounded whereby to conform to the recess opening 24^1 to facilitate the swivel movement of such parts when connected.

Referring to the recessed socket 27^1 illustrated in Figs. 11 and 12 of the modified form of collar 25^1, said socket and recess is similar to the socket 27 except for being larger whereby to accomodate the entrance and swivel connection of the knob-like end 38 of the connecting rod opposite the lug end 37. In assembly of the parts illustrated in Figs. 11, 12 and 13, the lug end of the rod 28^1 is connected to its complementary fluke socket by placing the rod in a horizontal position in relation to said fluke plate, in which position the lug end 37 may be lowered through the openings 36 of the boss 23^1 and into said recess opening 24^1 whereupon the rod is elevated to substantially the position shown in Fig. 11, in which position the lug end 37 is prevented from dislodgment with the boss 23^1 and the rod is ready for attachment by its opposite knob-like end 38 to the recess opening 27^1 of the collar 25^1. Such attachment of this modified form of rod to the collar is preferably accomplished before the guy-rod 13 is inserted through said collar and attached to said base plate whereby the collar may be disposed in the correct angular position to receive the knob-like end 38 within the recess 27^1 and upon the collar being turned to its normal horizontal position to lock such knob-like end in said recess. To disassemble the parts just referred to the operation is reversed, as is believed will be understood.

For purposes of shipping my improved earth anchor in retracted and nested condition and in order to prevent the flukes and connecting rods and collar from being actuated to extend the flukes, I provide holes 39 arranged in axial alignment in said base plate and flukes for the reception of a securement means, such for instance as a wire 40 having twisted ends.

Quite frequently in the use of ground anchors of the type herein disclosed, occasion requires their abandonment and disuse and it is to these circumstances that I have improved the securement construction on the lower side of said base plate to which the lower end of the guy-rod is fastened. Heretofore in the event of abandonment of a ground anchor in the ground, it has been necessary to abandon the entire assembly and cutting off the protruding upper end of the guy-rod above the ground at or near the surface of the ground, thereby making little or no salvage by reason of such abandonment which increases the cost of such maneuvers. With the base plate socket construction herein disclosed and described, I greatly reduce such cost of abandonment by permitting the salvage of the entire guy-rod by reason of such improved securing means and additionally making such removal operation an easy one, whereby when the threaded end of the guy-rod is detached from said securement means, said rod may be withdrawn upwardly through the collar and out of the ground to be used again, if desired, with another ground anchor.

While I have shown and described my improved earth anchor as having three flukes, I do not wish to be understood as limiting myself to the employment of three flukes only, as it is obvious that the anchor may be constructed with more or less without departing from the spirit of my invention.

What I claim is:

1. In a ground anchor, a base plate having an axially disposed upstanding sleeve and a depending socket arranged centrally of the plate, reinforcing ribs on the under side of the plate connecting the plate and the socket, a series of sets

of fluke guiding members extending upwardly from the upper surface of the plate disposed in spaced relation to each other and intermediate the edge of the plate and the axis thereof, one set of members for each fluke, and a plurality of superimposed flukes arranged for radial movement of the plate and in longitudinal alignment with ribs beneath the plate, each fluke having a radially disposed slotted opening therethrough for guiding engagement with a set of said members and said sleeve, each member of each set having a bearing relation with a wall of each opening.

2. In a ground anchor, a base plate having an axially disposed upstanding sleeve and a depending socket arranged centrally of the plate, reinforcing ribs on the under side of the plate connecting the plate and the socket, one of said ribs including a shrinkage fillet, a series of sets of fluke guiding members extending upwardly from the upper surface of the plate disposed in spaced relation to each other and intermediate the edge of the plate and the axis thereof, and a plurality of superimposed flukes arranged for radial movement of the plate and in longitudinal alignment with ribs beneath the plate, each fluke having slotted portions for guiding engagement with certain of said members and said sleeve and each fluke having a tongue extending inwardly toward the axis of the plate and adapted during a predetermined movement of the fluke to have movement between a set of guiding members for initially guiding the outward movement of the fluke, the inner ends of the tongues being arcuately shaped to partially embrace said sleeve when the flukes are in retracted and nested relation.

3. In a ground anchor, in combination, a base plate comprising a disk-like member, said disk-like member provided with an axially disposed upstanding sleeve, and with a plurality of stepped fluke supports in spaced relation arranged near the boundary of the disk and with a series of sets of upstanding fluke guiding members arranged in spaced relation and intermediate the boundary of the disk and said sleeve, a plurality of superimposed flukes carried by the disk and arranged for radial movement thereof, each fluke having slotted portions the side walls of which have guiding relation with a pair of guiding members and also with the sleeve of the disk and the side walls of one or more of said flukes having abutments at their ends for engagement with the sleeve in their projected positions, each fluke having a tongue projecting toward the axis of the disk and disposed within the slot and adapted for cooperative relation between a set of guiding members whereby to initially guide the fluke in its outward movement, a guy-rod connected with said disk, a collar slidable on said rod and operating connections between said collar and each of said flukes, the connection of said operating connections with said flukes being near the boundary thereof and in longitudinal alignment with the slots in said flukes.

4. A fluke for a ground anchor comprising a plate, the major portion of which is substantially fan-like in shape and having a pair of spaced elongated extensions providing a slot therebetween terminating in the body of said fan-like portion, and a tongue extension projecting from the body of said fan-like portion to a predeterminate point in the length of said slot and in the plane of the body of said fluke.

5. In a ground anchor, in combination, a base plate, a plurality of flukes arranged in superimposed relation thereon and adapted for extended and retracted movements radially of said plate, a guy-rod detachably connected with said plate, a collar slidable on said rod and having a plurality of recessed sockets opening out of the lower face of said collar, each fluke being provided with an upstanding boss adjacent its outer edge and having a recessed socket opening out of its upper and inner side faces, an operating connecting rod between said collar and each of said fluke bosses arranged for detachable connection therewith, each rod at its opposite ends being provided on opposite sides with substantially elongated cam-like lugs, the longitudinal axes of which are divergent to a line extending longitudinally and medially of the length of said rods, whereby to provide a swivel connection at one end of the rods with recessed slots in the collar and with recessed slots in the bosses on the flukes and when in such operative assembly to prevent the dislodgment of the rods from the bosses on the flukes, and locking means on the collar to prevent disconnection of said rods from said collar.

6. In a ground anchor, a base plate having an axially disposed upstanding sleeve and a depending socket arranged centrally of the plate, reinforcing ribs on the under side of the plate connecting the plate and the socket, one of said ribs including a shrinkage fillet, a series of sets of fluke guiding members extending upwardly from the upper surface of the plate disposed in spaced relation to each other and intermediate the edge of the plate and the axis thereof, one set of members for each fluke, and a plurality of superimposed flukes arranged for radial movement of the plate, each fluke having a radially disposed slotted opening therethrough for guiding engagement with a set of said members and said sleeve, each member of each set having a bearing relation with a wall of each opening.

JOHN A. WAGNER.