

[54] POLE OR POST MOUNTING FOR GROUND ANCHOR

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[51] Int. Cl.E02d 27/42

[58] Field of Search52/98, 160, 159, 157, 155, 52/296, 165, 156, 170, 298, 99

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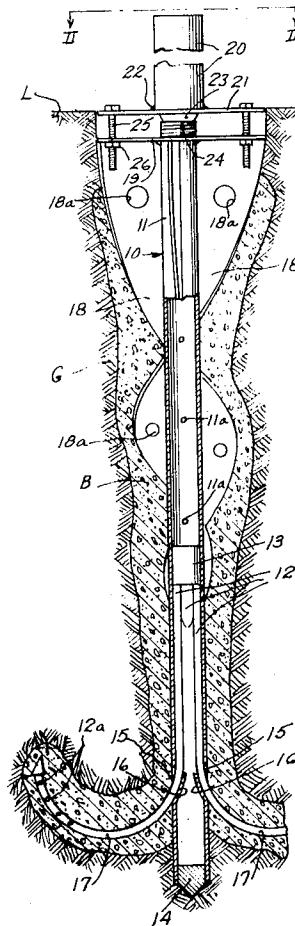
Primary Examiner—Price C. Faw, Jr.

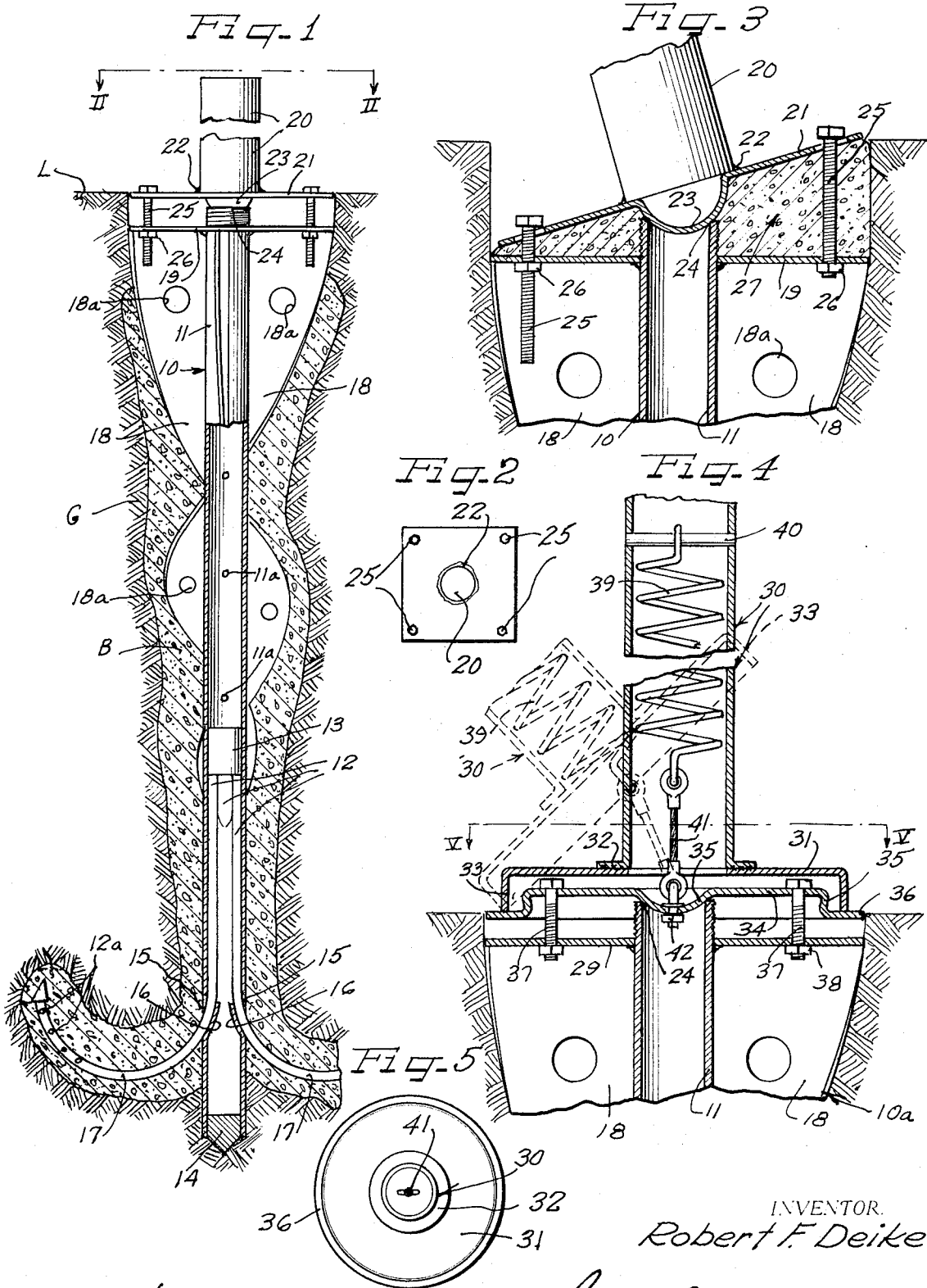
Attorney—Hill, Sherman, Meroni, Gross & Simpson

[57] ABSTRACT

A ground anchor for posts, poles and the like having a base plate assembly accommodating pitch or tilt adjustment of the pole or post relative to the anchor and adapted to yield and break away when the pole or post is subjected to a lateral impact force of a predetermined magnitude. The anchor has a pile member driven into the ground carrying tentacles which are ejected to form anchoring roots. A base plate at the upper end of the pile member compacts the underlying earth and rigid vanes underlying the base plate stiffen the assembly and may be helically shaped to provide a screw thread locking relationship with the earth. A post base plate is adjustably anchored to the pile base plate with fasteners that can yield or break when the post is struck by a vehicle. The post may be attached to the pile member by spring means permitting the post to deflect under impact and then retracting the post to an upright position.

9 Claims, 10 Drawing Figures





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Fig. 6

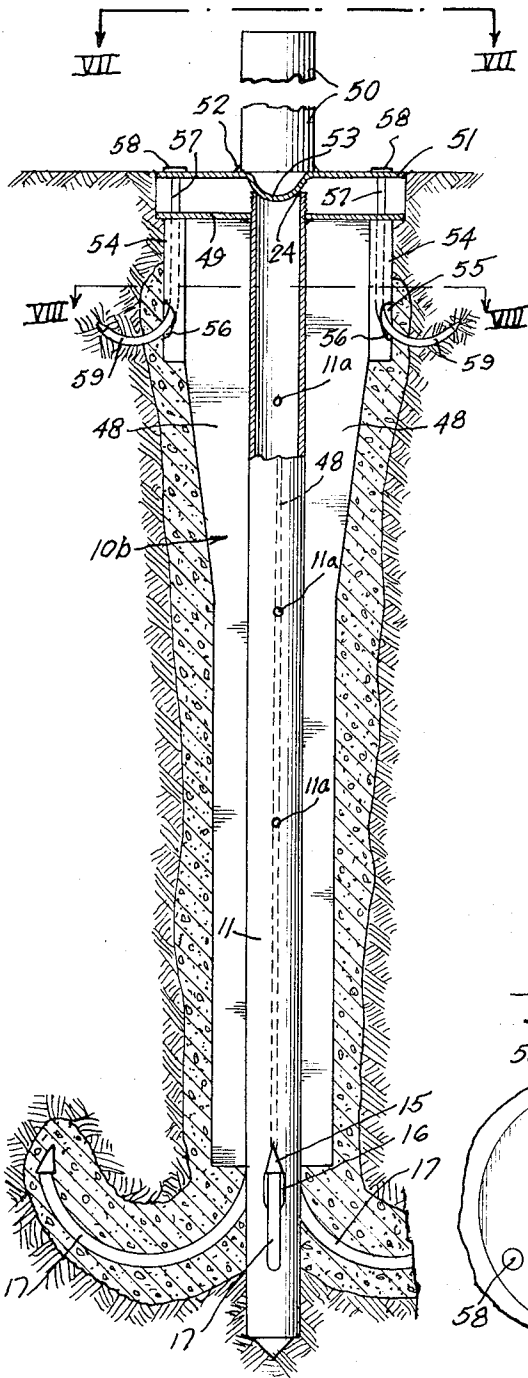


Fig. 9

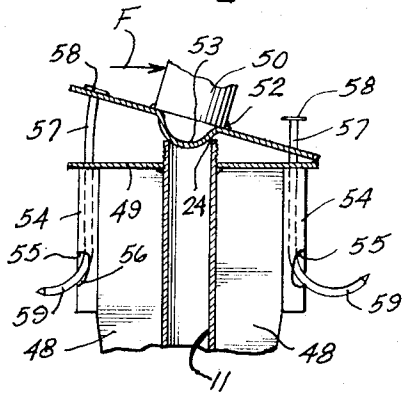


Fig. 10

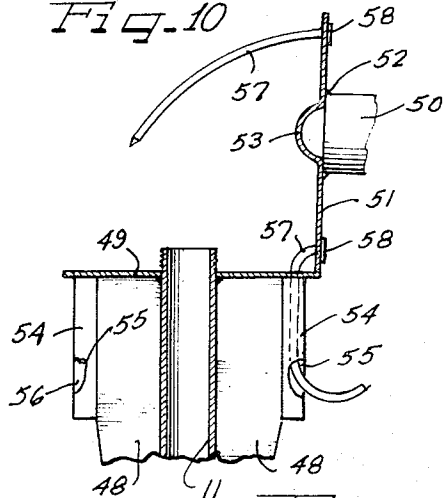


Fig. 7

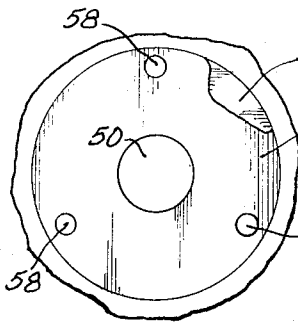
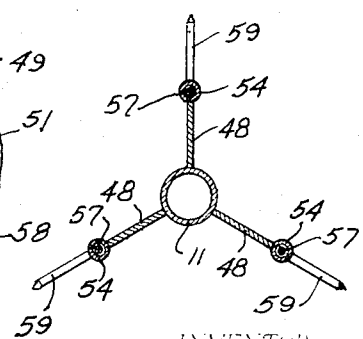


Fig. 8



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POLE OR POST MOUNTING FOR GROUND ANCHOR

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention deals with the art of anchoring posts, poles, and the like to the ground in adjustable angular breakaway relation to the ground for controlling the pitch or tilt of the post or pole and for permitting the post or pole to break away from its anchor when subjected to excessive impact, as when struck by a vehicle.

2. Description of the Prior Art

In my U.S. Pat. No. 3,526,069, granted Sept. 1, 1970, entitled "ANCHORING DEVICE," I have described and claimed a ground or earth anchor having an elongated pile member embedded in the ground, rigid tentacle members slidably supported by this pile member and rod bending orifices in the pile member to shape the rods into anchoring roots as they are driven from the pile member. The pole or post to be anchored by this device was fixedly mounted to the upper end of the pile member of the device as by means of screw threads or the like.

SUMMARY OF THE INVENTION

The present invention now provides adjustable breakaway post or pole mountings for the ground anchors of the type described and claimed in my aforesaid U.S. Pat. No. 3,526,069. According to the present invention, the pile member of the ground anchor has a base plate affixed to its upper end effective to compact the underlying earth when the pile member is driven to its submerged level in the earth. Vanes or fins underlie the base plate and are attached to the sides of the pile member for rigidifying both the pile member and the base plate. The pole or post to be supported by the ground anchor has a base plate affixed to its bottom end with a protruding fragmental spherical central portion adapted to partially project into the upper end of the pile member providing a tiltable pivot connection therewith. The base plate on the post and the base plate on the pile member are connected by shear bolts or the like yieldable members which tightly clamp the pile member to the spherical portion of the post plate, locking the post to the anchor. The pivot connection between the pile member and the post base plate accommodates tilting of the post relative to the anchor. In one form of the invention the fasteners connecting the two base plates are breakaway shear bolts. In another form the fasteners connecting the two base plates are nail-like tentacles projected through bending orifices of tubes depending from the base plate of the pile member. In another embodiment of the invention, the post may be connected to its base plate through a spring or other yieldable member permitting the post to deflect under impact and return to its upright position after impact.

The adjustable pole or post mounting of this invention enables the installer to adjust any member supported or anchored by the ground anchor to any degree of tilt or pitch relative to the ground anchor. A safety feature is incorporated through the use of yieldable or breakaway connecting fasteners between the ground anchor and the device carried thereby. This safety feature is especially useful for highway lighting post or fence post installations which will yield when impacted by an automotive vehicle and yet will resist all natural thrust forces such as heavy winds. The devices of this invention are also especially useful as sign post anchors, median strip divider anchors and the like.

It is then an object of this invention to provide an adjustable breakaway mounting for ground anchors of the type described and claimed in my aforesaid U.S. Pat. No. 3,526,069.

Another object of this invention is to provide an improved post or pole mounting for ground anchors which will accommodate pitch and tilt adjustment of the post or pole relative to the anchor.

A further object of the invention is to provide an adjustable breakaway mounting for attaching devices to an anchoring pile.

A still further object of the invention is to provide the pile member of an anchoring device with a laterally extending base plate for clamping the base plate of a pole or post to the pile member in adjustable relation.

A still further object of this invention is to provide a means for adjustably mounting a pole or post on a ground anchor for controlling the degree of pitch or tilt of the post or pole and for accommodating deflection of the post or pole relative to the ground anchor under application of excessive side thrust loads on the pole or post.

A further object of the invention is to provide a deflectable pole or post mounting for ground anchors which will return the post or pole to its upright position on the anchor upon release of the side thrust loads.

A specific object of the invention is to provide a breakaway post or pole mounting for ground anchors having a continuing yielding resistance under impact to prevent the post or pole from being tossed into the air at impact.

Other and further objects and features of this invention will be apparent to those skilled in this art from the following description of the annexed sheets of drawings which illustrate several preferred embodiments of the invention:

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a broken vertical cross-sectional view, with parts in elevation, of a ground anchor of this invention driven in the ground and carrying a post in upright position;

FIG. 2 is a cross-sectional view taken along the line II—II of FIG. 1;

FIG. 3 is a view similar to FIG. 1 but illustrating the post in a tilted relation relative to the anchor;

FIG. 4 is a view similar to FIG. 1 but illustrating a modified post mounting on the ground anchor;

FIG. 5 is a cross-sectional view taken along the line V—V of FIG. 4;

FIG. 6 is a view similar to FIG. 1 but illustrating a further modified post mounting on the ground anchor;

FIG. 7 is a cross-sectional view taken along the line VII—VII of FIG. 6;

FIG. 8 is a cross-sectional view taken along the line VIII—VIII of FIG. 6; and

FIGS. 9 and 10 are somewhat diagrammatic views illustrating how the post mounting of FIGS. 6-8 gradually yields under impact to accommodate separation of the post from the ground anchor without permitting the post to fly into the air.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The anchoring device 10 of FIG. 1 has a central pile member 11 in the form of a hollow metal tube or pipe receiving a plurality of tentacle rods 12 depending from a head 13 which is slidably mounted in the tube. A ground piercing point 14 is provided at the leading end of the tube 11 and orifices 15 are provided in the sides of the tube in trailing relation to the piercing point. These orifices have bending shoe walls 16 which deflect the tentacle rods 12 laterally and outwardly from the tube to form anchors or tines 17 for the pile member. As illustrated, two tentacle rods 12 are partially extended through orifices adjacent the leading end of the pile member. Additional tentacle rods can also depend from the head 13 for extrusion through other orifices at higher levels in the tube as more fully described in my aforesaid U.S. Pat. No. 3,526,069.

The tube or pile member 11 has helical vanes or fins 18 secured thereon along a portion of the length thereof and tapering from wide upper ends underlying a square base plate 19 secured to the upper portion of the pile member. The vanes 18 rigidify the pile member and base plate and assist in anchoring the pile member in the ground. The pile member is driven into the ground G to a depth positioning the base plate 19 below the ground level L. This compacts the ground underlying the base plate and seals off an area of the ground surrounding the pile member. When the pile member is driven to its desired depth, an impact rod is inserted therein to act on

the head 13, thereby driving the tentacle rods 12 to their anchoring positions. These rods 12 can be in the form of hollow tubes with orifices 12a at their leading ends and the tube 11 may be perforated along its length as at 11a so that concrete may be forced through the pile member and hollow tubes to form an anchoring bed B in the ground around the pile member and vanes, also as more fully described in my aforesaid U.S. Pat. No. 3,526,069. Holes 18a are provided in the vanes permitting concrete to flow through the vanes and form locking plugs.

A post 20 is mounted on the ground anchor 10 according to this invention through a post base plate 21 rigidly affixed to the bottom end of the post as by welding 22 or the like. This post base plate 21 overlies the base plate 19 of the pile member and has a central fragmental spherical protuberance 23 seating in the open top mouth 24 of the pile member which projects above the base plate 19.

As shown in FIG. 2, four fastening bolts 25 project through the corner portions of the post base plate 21, and as shown in FIG. 1, these bolts 25 extend through the pile base plate 19 and are threaded through nuts 26 welded to the underface of this plate 19. The bolts are tightened to clamp the two plates 19 and 21 in fixed relation and to lock the protuberance 23 in the mouth 24 of the pile member. This provides a firm, fixed connection or mounting between the pile member 11 and the post 20.

The fasteners 25 have predetermined shear strengths and may be provided with notches or other weakened portions so that they will break when subjected to impact loads in excess of predetermined loads. Thus, when the post 20 is struck sideways as by a vehicle, the bolts 25 will shear permitting separation of the post from the ground anchor without pulling the ground anchor out of the ground.

FIG. 3 illustrates the manner in which the post 20 can be tilted relative to the ground anchor 10. As therein illustrated, the fastener bolts 25 on the left side of the assembly are threaded substantially through the nuts 26, while on the right side of the assembly the bolts barely enter the nuts 26. This tilts the base plate 21 relative to the base plate 19 and the post 20 projects from the anchor 10 in angular relation. Adjustment of the bolts 25 can thus position the post at any desired angle relative to the anchor.

To firm up the connection between the post 20 and the ground anchor 10, the space between the two plates 19 and 21 may be filled with grouting 27, thus providing a cement foundation for the post plate 21. This grouting will not interfere with the breakaway capacity of the mounting.

In the embodiment illustrated in FIGS. 4 and 5, a ground anchor 10a substantially identical with the anchor 10 of FIGS. 1-3 has the same central pile or tube 11, vanes 18 and the like structure of the anchor 10 and it will be understood that the anchor 10a is driven into the ground and anchored thereto by tentacles in the same manner as described in connection with FIG. 1. The base plate 29 of the anchor 10a is circular instead of square as in the FIG. 1 embodiment, and the post 30 is hollow and has a circular base plate 31 welded thereto as at 32. This circular plate 31 has a depending peripheral skirt or rim 33. An intermediate circular mounting plate 34 is positioned between the plates 29 and 31 and it has a rounded projection 35 seated in the mouth 24 of the pile member 11. A skirt 35 is provided on the plate 34 and has an out-turned flange 36 receiving the skirt 33 of the plate 31.

Bolts 37 extend through the plate 34 inwardly of the skirt 35 and are threaded through nuts 38 welded on the bottom face of the base plate 29. These bolts may also be shear bolts as described in connection with FIG. 1. In this manner, the plate 34 is secured to the plate 29 and clamps the projection 35 in the mouth 24 of the pile member 11. The bolts may be adjusted to tilt the plate 34 relative to the plate 29, as described in FIG. 3.

A helical coil spring 39 is provided in the post 30 and is anchored at one end to a cross-pin 40 extending diametrically through the post. The other end of the spring is connected to a

cable 41 which in turn is secured to the projection 35 of the plate 34 by means of an eye bolt or the like 42. In this manner, the base plate 31 of the post 30 is spring biased to bottom on the plate 34 with the end of the skirt 33 engaging the flange 36.

As illustrated in dotted lines, the post 30 can be laterally deflected with its base plate 31 tilted off of the plate 34. The coil spring 39 will stretch to accommodate this deflection, but as soon as the deflecting force is released the spring will draw the post back to its upright position with the base plate 31 seated on the plate 34.

From the description of FIGS. 4 and 5, it will thus be understood that the post mounting has a resilient deflection feature not present in the mounting of FIGS. 1-3.

In the embodiment of FIGS. 6-10 the ground anchor 10b has constituent parts the same as those of the anchors 10 and 10a identified by the same reference numerals. The fins 48 surrounding the pile member 11 are not helical like the fins 18, but radiate radially along the length of the pile member and, like the fins 18, diminish in width from the top to the bottom ends thereof. The base plate 49 of the anchor 10b is circular and is supported by the upper ends of the fins 48 and, of course, welded to the upper portion of the pile member 11. It will also be understood that the anchor 10b is driven into the ground, has the tentacle rods extruded therefrom and functions in the same manner as the anchor 10, with the exception that the vanes 48 do not rotate the pile member as it is driven into the ground.

The post 50 has a circular base plate 51 welded thereto as at 52 and, like the plates 21 and 34, is provided with a spherical nose or projection 53 at the center thereof seating in the mouth 24 of the tubular pile member 11.

Three tubes 54 depend from the base plate 49 in equally spaced circumferential relation near the periphery of the base plate and are each welded to the plate and also to the fins 48 along the length thereof as illustrated in FIG. 8. These tubes 54 each have a side orifice 55 with a bending wall 56 similar to the orifice 15 and the bending wall 16 of the anchor 10.

Fasteners in the form of elongated headed rods or nails 57 depend from the post plate 51 having heads 58 bottomed on the plate 51 and shanks extending into the tubes 54 with pointed leading ends extending through the orifices 55.

The base plate 51 of the post 50 is anchored to the base plate 49 of the anchor 10b by driving the nail-like tentacle members 57 through the orifices 55 to form the anchoring roots or tines 59 extending laterally of the pile member 11. The bent nails or tines will firmly clamp the rounded nose or projection 53 of the post plate 51 in the mouth 24 of the pile member 11. The post 50 is thus fixedly secured to the anchor 10b and the tilt or pitch of the post relative to the anchor can be selected as desired by driving the nail-like tentacles 57 into their respective receiving tubes 54 at desired distances.

The tentacle rod connections between the post base plate and the anchor base plate provide for the breakaway of the post from the anchor as described in connection with the shear bolt fasteners of FIGS. 1-3, but provide a further safety feature in preventing immediate release of the post relative to the anchor under impact. Thus, as shown in FIG. 9, when an impact force F engages the post 50 it will tilt the post to the right, drawing the fastener tentacle 57 to the left of the post, out of its socket tube 54. This withdrawing action will be resisted because the bent tine end of the fastener must be straightened out as it passes backwardly through the orifice 55. A resistance similar to the pulling of a nail out of a piece of wood is thereby created and the post 50 will not fly into the air upon receiving a sharp impact blow, as from an automobile.

As illustrated in FIG. 10, continued application of the impact force F on the post 50 will eventually pull some of the nail-like tentacles out of the base plate 49 so that the post can fall to the ground, but the damper action provided by withdrawal of the tentacle rods 57 from their tube sockets will prevent the post from flying into the path of another vehicle and causing an additional hazard.

From the above descriptions it should, therefore, be understood that this invention provides an adjustable and breakaway mounting for posts, poles and the like on ground anchors. The mounting devices of this invention permit the ground anchor to remain intact in the ground even when the post or pole is subjected to side impacts of sufficient magnitude to break away from the anchor. The anchor is thus readily available for mounting a replacement post or pole.

I claim as my invention:

1. A ground anchor for posts and the like which comprises a pile member adapted to be driven in the ground, a base plate secured on the pile member adjacent the upper end thereof and extending laterally therefrom, tentacle rods deflectable from said pile member below the base plate to form anchoring roots for the pile member, a post, a post mounting plate secured to the bottom of the post and extending laterally therefrom, said mounting plate overlying the base plate of the pile member and tiltably supported on the upper end of the pile member, tubes depending from the base plate of the pile member having bending orifices, and rods extending from said post mounting plate through said tubes adapted to be deformed by said bending orifices to provide adjustable fasteners locking the post mounting plate to the base plate on the pile member thereby controlling the tilt or pitch of the post on the post plate.

2. The ground anchor of claim 1 wherein the rods have heads engageable with the post mounting plate and nail-like tentacles extending through the tubes depending from the base plate of the pile member.

3. An adjustable break-away mounting for ground anchors having a pile member driven into the ground and a radial base plate secured on the upper end of the pile member which comprises a post having attached to the bottom thereof a radial post plate overlying the base plate of the pile member in spaced relation, said post plate having a rounded projection tiltably engaging the upper end of the pile member, a plurality of adjustable fasteners surrounding the post radially outward from the post and pile member connecting the post plate with the base plate to control the tilt of the post plate relative to the ground anchor, and said fasteners having a predetermined limited load carrying capacity permitting the post plate to break away from the base plate upon application of excessive side impact loads.

4 The breakaway mounting of claim 3 wherein the post is attached to the post plate by a spring permitting the post to tilt relative to the pile member under excessive impact loads and retracting the post upon release of said load.

5 5. The anchor of claim 4 wherein the post is hollow and the spring is inside the hollow post.

6. The mounting of claim 3 wherein a spring connects the post plate to the post and a plate affixed to the post rests on the post plate.

10 7. An adjustable breakaway mounting for ground anchors of the type having a pile member for driving in the ground and a base plate radiating from the upper portion of the pile member adapted to compact earth surrounding the pile member, a post supported on the pile member, a radial post plate secured to the bottom of the post, said post plate overlying said base plate in spaced relation, nail-like fasteners extending from the post plate through the base plate in spaced relation from the pile member and from each other, and means on the base plate deforming said fasteners to unite the post plate with the base plate at the desired angular relationship to control the post position and adapted to be straightened out to accommodate separation of the post from the pile member while resisting said separation to prevent the post from flying into the air upon receiving an impact blow.

20 8. A ground anchor for posts and the like which comprises a tube adapted to be driven into the ground and having an open top mouth, a base plate surrounding and secured to the tube and extending laterally therefrom to compact the earth underlying the plate around the tube when the tube is driven into the ground, a post plate having a rounded projection on the central portion thereof seated in the open mouth of the anchor tube and supporting the plate from the tube in spaced relation from the base plate, fasteners extending between the base plate and post plate in spaced relation from the tube and from each other for clamping the rounded projection of the post plate in the mouth of the tube, and means for adjusting the fasteners to vary the spacing of portions of the post plate relative to the base plate to thereby control the inclination of the post plate and a post mounted thereon relative to the tube.

30 9. The anchor of claim 8 wherein the rounded projection on the post plate and the open top mouth of the tube provide cooperating ball and socket components with the ball on the post plate tiltably seated in the socket of the tube.

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