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(54) SUPPORT SYSTEM FOR FREE STANDING POLES OR POSTS

STÜTZVORRICHTUNG FÜR FREISTEHENDE MASTEN ODER PFOSTEN

SYSTEME DE SUPPORT DESTINE A DES MATS OU PIEUX NON ARRIMES

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Description

TECHNICAL FIELD

The invention relates to supports for partially embedded poles, posts, and the like, and in particular, to an installation system which will permit such structures to stand free of any stays or guy wires and their associated anchors.

BACKGROUND ART

When partially embedded poles or posts are required to withstand vertical loading as well as lateral or horizontal forces, for example from cables, conductors, ice and wind, guy wires or stays are typically used to resist these forces and to support the poles. However, the use of stays or guy wires present some serious drawbacks: supports of this type require wide areas for anchorage and thus, there is considerable loss of usable land; they are unsightly, especially in urban areas where they are in heavy use; and the numerous and large excavations required for anchor installation cause damage to the environment and to public and private property.

Also associated with the use of guy wire supports are high costs which arise from the acquisitions of public and private legal permission for their installation, the necessity of using alternate routes when guy wire anchorage of a pole is not permitted or possible in a chosen location, landscaping costs for reparations to property damaged by excavations, and costs for the numerous excavations themselves.

The use of guy wire supports also increases the possibility of the pole sustaining damage and, hence, the equipment supported by it, in the event of a collision with a guy wire. Such an event could result in power blackouts, loss of street lighting, interruption of telephone and cable television service, and the loss of other public and private services.

Other methods and apparatuses for providing support for embedded poles and posts have been devised. For example, in DE-C-231,278 and GB-A-2,216,924, a post support is provided which is required to be driven into the ground and which includes a pole or post receiving portion. Radially extendable members are then activated by insertion of the post to extend the members outwards of the support and into the surrounding ground. Another anchor system is shown and described in United States Patent No. 4,269,010. This system comprises a plurality of anchors each having a tubular main sleeve designed to engage the post. A disc member extends horizontally from a midlength position on the sleeve and upper and lower radial fin members extend from the sleeve to the outer circumference of the disc, being rigidly attached thereto.

In using the latter system, it is necessary to form a hole in the ground having a diameter similar to that of the entire anchor, which is substantially greater than the

diameter of the pole or post. For poles of a large diameter, the excavation of a substantially greater diameter hole may not be feasible. In addition, the backfill material adjacent the pole and above and below the anchors, even if compacted, may not attain the compactness of that of the surrounding earth and, therefore, may not be capable of providing the resistance necessary to withstand the forces which act on the pole.

10 DISCLOSURE OF THE INVENTION

The present invention overcomes the aforementioned drawbacks by providing a support system which will permit pole or post structures to stand free of any stays or guy wires and their associated anchors. The invention also provides a support system for poles or posts which requires only minimally more excavation than the diameter of the pole or post itself and which substantially maintains the integrity of the surrounding earth during the support installation procedure.

Accordingly and as defined in claim 1, there is provided a support installation system for the support of partially embedded poles or posts which is comprised of a support and the installation instrument therefor. The support includes one or more collar assemblies, each comprising a collar and a plurality of ground engageable blades pivotally connected thereto. The support installation system forms a unit consisting of the collar assemblies and the installation instrument, which unit is lowered into a previously formed hole of predetermined depth and diameter. The installation instrument has a means to extend the blades of the collars in a generally radial direction so that they penetrate the walls of the hole. Once the collar assemblies have been installed, the installation instrument is removed for use in subsequent installations.

According to a second aspect of the invention as defined in claim 9, there is provided a method for the installation of underground supports for poles and posts, of the type comprising one or more collar assemblies each including a collar having a plurality of ground-engageable blades pivotally connected thereto, and utilizing an installation instrument of the type comprising means to extend generally radially the blades of the collar assemblies. A hole of predetermined depth and diameter is bore into the earth. The collar assemblies are assembled on the installation instrument to form a unit which is then lowered into the hole. The blade extending means are actuated to extend the blades of each of the collar assemblies into the earth. The installation instrument is the removed for use in subsequent installations.

According to a yet another aspect of the invention as defined in claim 10, there is provided a method for installing poles and posts using a support installation system of the type comprising a support and an installation instrument. The support includes one or more collar assemblies, each of which comprises a collar having a plurality of ground engageable blades pivotally con-

nected thereto. The installation instrument has associated therewith, means to extend generally radially the blades of each of the collar assemblies. A hole of predetermined depth and diameter is drilled into the earth into which installation system is lowered. The blade extending means of the installation instrument is actuated to extend the blades of each of the collar assemblies into the earth. The installation instrument is then removed, leaving the support firmly embedded. The pole or post is then lowered into the hole and though the support collars. The pole is then positioned an aligned as required.

In using this support system, no excavation of the pole's location is required other than a hole slightly larger than the diameter of the pole, drilled to plant the pole or post in the ground using standard drilling methods now in use. It requires no additional capital investment for existing pole installation equipment. No specialized training is required by the workers or by engineers using this support system in pole structure design. If ever it becomes necessary to remove or relocate the pole, both the pole and the support can be easily removed and re-used in another location.

Further features and advantages of the invention will become more apparent from the following description of the preferred embodiment when taken in connection with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIGURE 1 is a plan view of a collar assembly;
FIGURE 2 is an elevation of the collar assembly shown in Figure 1 with the front collar section removed for clarity;
FIGURE 3 is an elevation partially broken away illustrating the preferred embodiment of the installation instrument;
FIGURES 4 through **7** are views which sequentially illustrate a method of installing the pole support;
FIGURES 8 and 9 are views which illustrate the installation of a pole within the support and an adjusting and positioning means therefor; and
FIGURE 10 is a side view illustrating an alternate installation instrument.

BEST MODE FOR CARRYING OUT THE INVENTION

The support system, in general, consists of one or more and preferably a pair of support collars as shown in Figures 1 and 2, and a removable installation instrument such as is shown in Figure 3 for installing the support collars within a hole in the ground.

Referring to Figures 1 and 2, a support collar assembly 10 is shown comprising a generally annular collar 11 and a pair of ground-engageable blades 12 connected pivotally thereto. The collar 11 consists of two generally semi-cylindrical halves 11a, 11b each having a pair of opposed, radially inwardly extending flanges

13. The blades 12 are rotatable about pins 14 from an installation position P1, wherein the blades are generally parallel to the longitudinal axis of the collar, to a deployed position P2 (shown in phantom), wherein the blades 12 are generally perpendicular to the longitudinal axis of the collar. The pins 14 also serve to connect the two collar halves 11a, 11b together. The pins 14 have a central section of increased diameter about which the blades 12 pivot and end sections of reduced diameter which are insertable through holes provided in flanges 13. The central section also functions to space-apart the collar halves 11a, 11b an appropriate distance. One end section of the pins 14 may be provided with a bolt head 15 while the opposite end section is threaded for receiving a nut 16 or, alternatively, both ends may be threaded and provided with nuts.

The preferred embodiment of the installation instrument 20 is shown in Figure 3. In general, the installation instrument 20 comprises a deployment shaft 21, a blade actuating device or actuator 22, lower and upper cam assemblies 23, 24, respectively, and means for causing the actuator 22 to be translated along a portion of the deployment shaft 21 between the cam assemblies 23, 24. As shown, the deployment shaft 21 is hollow and has drive shaft 25 slidable therein. The drive shaft is connected to the piston of a double-acting hydraulic cylinder 26 mounted at the top of the deployment shaft 21. The hydraulic cylinder 26 is connectable to a suitable hydraulic fluid supply device or pump (not shown) via supply ports 27. In order to assist in supporting the installation instrument 20 and lowering it into a hole in the ground, an eye 18 may be provided at the top of the hydraulic cylinder 26.

The actuator 22 comprises a cylindrical body 28 having a pair of opposed, radially outwardly extending (in and out of the page as shown in Figure 3) members 29. Grooves 30 are provided in the upper and lower sides of the members 29 which act as bearing surfaces for the edges of the collar flanges 13 when the collars are appropriately positioned. The radial distance to which the members 29 extend is slightly less than the inner diameter of the collar 11 but sufficient so as to allow the edges of the collar flanges 13 to be received in grooves 30. The actuator 22 is attached to the drive shaft 25 by means of a cross-piece 31 which is slidable along a through slot 32 in the deployment shaft 21. The actuator 22 is fabricated in sections so as to permit easy attachment to and removal from the deployment shaft 21 and drive shaft 25.

The upper cam assembly 24 preferably comprises a hollow cylindrical body portion 33 separating an upper camming plate 34 and a collar bearing plate 35. The upper cam assembly is, in general, slidable along the deployment shaft 21 but a locking mechanism, not shown, located within the body portion 33 allows the upper cam assembly 24 to be selectively locked into position on the deployment shaft 21 at a predetermined height, preventing its translation during operation of the installation in-

strument 20. The lower cam assembly 23, which includes a connection portion 36 and a lower camming plate 37, is removably attached to the lower end of the deployment shaft 21.

While the preferred embodiment of the support will be shown and described hereinbelow comprising an upper and lower collar assembly, the invention is not necessarily limited thereto. For example, depending on the specific application, any number of collar assemblies may be employed, provided that the installation instrument and its associated components are suitably adapted. Likewise, it is not necessarily intended that the number of blades per collar be limited to two and that it will be apparent that, with suitable modification of the collar 11 and the actuator 22, any number of blades spaced at relatively equal intervals around the periphery of the collar may be employed.

The preferred method for the installation of the pole or post support is illustrated sequentially in Figures 4 through 7. A standard soil drilling instrument is utilized to bore a hole 41 of a predetermined depth and diameter into the ground using known techniques. The entire system, i.e. an upper and a lower collar assembly 10a, 10b and the installation instrument 20, is assembled at ground level into the configuration shown in Figure 4 and lowered into the hole 41. More specifically, the system is assembled such that the blades 12 of the lower collar assembly 10b are pointing downwardly and in contact with the lower camming plate 37. A strapping 42b or other suitable temporary restraining means may be used to maintain the blades 12 of the lower collar assembly 10b in their vertical position. The actuator 22 is positioned such that the grooves 30 on the lower sides of members 29 are resting on the edges of the collar flanges 13 of the lower collar assembly 10b while the upper grooves accommodate the collar flanges 13 of the upper collar assembly 10a. A similar strapping 42a might also be provided to secure the blades 12 of the upper collar assembly 10a in their installation position pointing upwardly. The upper cam assembly 24 is locked onto the deployment shaft 21 at a predetermined distance from the lower camming plate 37, which distance will be generally the same as the distance from the bottom of the hole to the eventual vertical position of the upper collar assembly 10a. Once the system has been lowered into the hole 41, the hydraulic cylinder 26 is actuated so that the actuator 22 is forced downwardly against the lower collar, thus causing the blades 12 to be cammed against the lower camming plate. This results in the breakage of the strapping 42b and the extension of the blades 12 into the walls of the hole 41 as shown in Figure 5. Due to the configuration of the blade's camming edge, which is preferably curvilinear, and the manner in which the blades are cammed, the blades, in essence, pierce the surrounding earth with minimal deleterious effect on soil integrity. When the collar contacts the bottom of the hole, the installation instrument 20 will start to rise out of the hole 41. At this stage, the blades 12 will be ex-

tended sufficiently outwardly that the lower camming plate 37 will be capable of being extracted from the lower collar assembly 10b. However, the rising of the installation instrument 20 is an indication that the installation of the lower collar assembly 10b is complete and that the action of the hydraulic cylinder 26 should be reversed to commence the installation of the upper collar assembly 10a.

As shown in Figure 6, the action of the hydraulic cylinder 26 has been reversed, causing the actuator 22 to be translated upwardly, eventually forcing the blades 12 of the upper collar assembly 10a against the upper camming plate 34. This results in the breakage of the strapping 42a, if provided, and the subsequent piercing of the blades 12 into the walls of the hole 41. The purpose of the collar bearing plate 35 is to prevent the collar 11 of the upper collar assembly 10a from surpassing the point at which the blades 12 become generally perpendicular to the longitudinal axis of the collar 11, i.e., their P2 position. This purpose could be served equally as well by providing a means on the collar assembly 10b to prevent the blades 12 from rotating outwardly more than about 90° from their P1 position.

A slight translation of the actuator 22 in the downward direction disengages the collar flanges 13 from the grooves 30 of the actuator members 29. By rotating the installation instrument 20 slightly, the actuator members 29 become misaligned with the collar flanges 13 of the upper collar assembly 10a, thus permitting removal of the entire installation instrument 20 (see Figure 7). The installation instrument can therefore be utilized in subsequent applications.

When wooden pole or post structures are used, it may be necessary, depending upon load factors, to attach bearing plates 51, 52 (see Figure 8) to the pole 50 to prevent the collapse of the wood fibres at the points of contact with the upper and lower collar assemblies 10a, 10b. In such case, one bearing plate 51 may be fitted to the pole 50 at the height of the upper collar assembly 10a and another bearing plate 52 may be fitted to the foot of the pole 50 located at the lower collar assembly 10b level. These bearing plates 51, 52 are attached before the pole 50 is lowered into the hole 41. It should be noted that various methods may be used to enhance the useful load of wooden pole structures. These, however, go beyond the scope of the present invention and, therefore, will not be discussed herein.

In order to ensure a proper fit, a plurality of adjustment wedges 53 and spacer blocks 54 are attached to the foot of the pole 50 prior to being lowered, so that the hole may sit firmly inside the lower collar assembly 10b (Figures 8 and 9). Once the desired position of the pole 50 is obtained, the portion of the pole 50 at the level of the upper collar assembly 10a is locked into position using a plurality of adjustable positioning wedges 55 and spacer blocks 54. The adjustable positioning wedges 55 have extensions 56 that are fixed in place at ground level and thus remain accessible if ever it becomes neces-

sary to readjust the position of the pole 50. The hole 41 is then back-filled with any desired material, which may include the original soil, using standard filling techniques.

Figure 10 illustrates an alternate installation instrument 120 which, in general functions in a similar fashion to the installation instrument 20 shown in Figures 3 to 6, and in this regard like features will be denoted by like reference numerals incremented by 100. The alternate installation instrument 120 comprises a partially threaded deployment shaft 121 having at its lower end a lower cam assembly 123 which includes a lower camming plate 137 and a camming plate bearing assembly 136. The installation instrument 120 further includes a blade actuating device or actuator 122 and an upper cam assembly 124.

In this embodiment, the actuator 122 is comprised of a pair of opposed, radially outwardly extending members 129 attached to a cylindrical body member 128. Body member 128 is hollow and has internal threads designed to engage with the threaded portion 60 of the deployment shaft 121. The diameter of threaded portion 60 is slightly greater than the diameter of the unthreaded portion 61, allowing the actuator 122 to slide over the unthreaded portion 61 of the deployment shaft 121. Grooves 130 are provided in the upper and lower sides of the members 129 which act as bearing surfaces for the edges of the collar flanges 13 when the collars are appropriately positioned. The radial distance to which the members 129 extend is slightly less than the inner diameter of the collar 11 but sufficient so as to allow the edges of the collar flanges 13 to be received in grooves 130.

In order to remove dirt and other particulate matter which might accumulate on the threaded portion 60 of the shaft 121 and/or to prevent any such material from entering the actuator 22 and jamming the screw action, it may be necessary to provide a seal, packing or similar device (not shown) at the upper and lower ends thereof.

The upper cam assembly 124 preferably comprises a hollow cylindrical body portion 133 separating an upper camming plate 134 and a collar bearing plate 135. A locking mechanism, not shown, is located within the body portion 133, and may be of the type which permits only unidirectional downward motion of the upper cam assembly 124 on the unthreaded portion 61 of the deployment shaft 121 unless deactivated. Other suitable locking mechanisms may be used such as, for example, a spring loaded pin or ring situated in the body portion 133 which would lock into a corresponding groove in the shaft 121 when the upper cam assembly 124 is slid down its unthreaded portion 61. The locking mechanism allows the upper cam assembly 124 to be locked into position on the unthreaded portion 61 of the deployment shaft 121 at a predetermined height, preventing its translation but allowing its rotation relative to the shaft 121.

At the upper end of the deployment shaft 121, a

drive means 62 is provided by which the shaft 121 may be rotated manually or with power assistance. In this embodiment, rotation of the shaft causes the necessary translation of the actuator, and it will be appreciated that the aforementioned method of installation of the collar assemblies may be carried out with this installation instrument 120 merely by substituting the steps of actuating the hydraulic cylinder 26 with corresponding rotations of the deployment shaft 121.

Use of this installation instrument 121 does, however give rise to an alternate method of installing the collar assemblies in which, instead of assembling the collar assemblies and installation instrument 120 at ground level and lowering the unit into the hole, the components are deployed individually.

The deployment shaft 121, with the lower camming plate 137 and the camming plate bearing assembly 136, is lowered as a unit into the hole 41 where it comes to rest on the bottom. A lower collar assembly 10b is lowered into the hole 41 with the blades 12 pointing downwardly and aligned in the direction specified by the work plan. Again, a strapping or other suitable temporary restraining means may be used to maintain the blades 12 in their installation position P1. The collar assembly 10b comes to rest at or near the bottom of the hole 41 when the blades 12 contact the lower camming plate 137. The actuator 122 is then slid down the unthreaded portion 61 of the deployment shaft 121. The shaft 121 is rotated in a first direction by a detachable rotation means, causing the internal threads of the actuator 122 to engage with the threaded portion 60 of the deployment shaft 121. It may be necessary at this point to restrain the actuator 122 from rotating with the shaft 121 in order to permit its axial translation downward towards the first collar assembly 10b until the grooves 130 of the actuator members 129 engage the collar flanges 13 of the collar 11. The subsequent combination of the screw action on the actuator 122 and the camming provided by the lower camming plate 137, results in the breakage of the strapping, if provided, and the extension of the blades 12 into the walls of the hole 41.

An upper collar assembly 10a is lowered into the hole 41 with the blades 12 pointing upwardly and aligned in the direction specified by the work plan. Again, a strapping may be used to maintain the blades 12 in their installation position P1. The collar assembly 10a is positioned such that the collar flanges 13 come to rest in the upper grooves 130 of the actuator 122. The upper cam assembly 124 is slid down the deployment shaft 121 and is locked into position at a predetermined height. The shaft 121 is rotated in an opposite direction by detachable rotation means. It is possible that, depending upon the height at which the upper cam assembly 124 is locked, there may exist a distance between the initial point of contact of blades 12 and the upper camming plate 134. If this is the case, then the rotation of the shaft 121 in the opposite direction will result in the actuator 122 moving upwards from its lowermost posi-

tion, bringing with it upper collar assembly 10a, until the blades 12 contact the upper camming plate 134. The subsequent combination of screw action on the blade actuator 122 and the camming provided by the upper camming plate 134, results in the breakage of the strap-
 5 ping, if provided, and the extension of the blades 12 into their deployed position P2. As before, the collar bearing plate 135 prevents the collar from being pulled from the hole.

A slight counter-rotation of the shaft 121, i.e. in the first rotation direction, disengages the collar flanges 13 from the grooves. Further rotation of the shaft 21 in this direction causes the finger actuator members 129 to be-
 10 come misaligned with the collar flanges 13 of the upper collar assembly 10a, thus permitting removal of the entire installation tool 120.

Although the support system has been shown and described herein with the arrangement the blades 12 of the upper collar assembly 10a being deployed in sub-
 20 stantially the same directions relative to the blades 12 of the lower collar assembly 10b, it is not intended that the blade deployment be so restricted. In most applications, it will be desired to deploy the blades of the upper and lower collar assemblies 10a,10b offset relative to one another. It will be appreciated that various modifi-
 25 cations to the apparatus, and in particular the actuator, may be effected in order to achieve this result. One such modification envisioned is to provide separate actuator members for the upper and lower collar assemblies. The amount of offset between the members would then cor-
 30 respond to the amount of offset between the blades of the upper and lower collar assemblies 10a,10b when deployed.

INDUSTRIAL APPLICABILITY

The present invention provides an economical and practical alternative to support systems for poles and posts which are typical candidates for support by means of stays or guy wires.

While a preferred embodiment has been shown and described having an upper and lower collar assembly, the invention is not necessarily limited thereto and obvious modifications and substitutions may be made without departing from the spirit and scope of the inven-
 45 tion as defined in the appended claims.

Claims

1. A support installation system for the subterranean support of poles or posts comprising one or more support collar assemblies and an installation instru-
 50 ment for installing the collar assemblies in the ground, each of the collar assemblies (10a,10b) comprising a generally annular collar (11) having a plurality of ground engageable blades (12) pivotally connected thereto, characterised in that the support

installation system forms a unit consisting of the one or more support collar assemblies and the installa-
 5 tion instrument, which unit is lowered into a previously formed hole of predetermined depth and diameter, and that the installation instrument (20,120) which is positioned through the collar assemblies comprises a deployment shaft (21,121) and means associated with the deployment shaft for extending the blades (12) of the collar assemblies (10a,10b) generally radially outwardly so as to penetrate the walls of the hole (41), and wherein the installation instrument (20,120) is removable once the one or more support collar assemblies have been in-
 10 stalled.

2. The support installation system of claim 1 characterised in that the means for extending the blades of the collar assemblies comprises cam means (24,124,23,123) carried by the deployment shaft (21,121), an actuator (22,122) engageable with at least a portion of each of the collar assemblies, and means for causing the actuator (22,122) to be se-
 20 lectively translated axially along a portion of the deployment shaft (21,121) so as to force the blades (12) of each of the collar assemblies (10a,10b) against the cam means thereby extending the blades (12) radially outwardly.

3. The support installation system of claim 2 characterised in that the deployment shaft (21) is substan-
 30 tially hollow and that the means for causing the actuator to be selectively translated comprises a hydraulic cylinder (26) connected to a source of fluid under pressure, a drive shaft (25) slidable within the deployment shaft (21) and being actuated by the hydraulic cylinder (26), and cross-piece means (31) for connecting the actuator (22) to the drive shaft (25) through slots (32) in the deployment shaft (21).

4. The support installation system of claim 2 or claim 3 characterised in that the deployment shaft (121) has an externally threaded portion (60) and an un-
 40 threaded portion (61), the actuator (122) is internally matingly threaded, and that the means for causing the actuator (122) to be selectively translated comprises rotational drive means for selectively rotating the deployment shaft (121).

5. The support installation system of any preceding claim characterised in that the annular collars (11) each comprise a pair of generally semi-cylindrical halves (11a,11b) each having opposed, radially in-
 50 wardly extending flanges (13) connected and spaced-apart by pin means (14) and that the blades (12) are pivotally supported on the pin means (14) and between the flanges (13).

6. The support installation system of claim 2 charac-

terised in that the cam means (24,124) includes a collar bearing plate (34,134) for preventing over extension of the blades (12) of the collar assembly (10a).

7. The support installation system of claim 6 characterised in that the cam means (24,124) further includes means for locking the position thereof with respect to the deployment shaft (21,121)

8. The support installation system of any preceding claim characterised in that the edges of the blades (12) which are cammed have a curvilinear configuration so that the blades, when extending, generally pierce the walls of the hole (41).

9. A method for the installation of underground supports for poles and posts, of the type comprising one or more collar assemblies (10a,10b) each including a collar (11) having a plurality of ground-engageable blades pivotally connected thereto, and utilizing an installation instrument (20, 120) of the type comprising means to extend generally radially the blades of the collar assemblies, characterised by the steps of:

boring a hole (41) of predetermined depth and diameter into the earth;
assembling on said installation instrument (20, 120) said one or more collar assemblies (10a, 10b) to form a unit;
lowering said unit into said hole (41);
actuating said blade extending means to extend the blades (12) of each of said collar assemblies (10a,10b) into the earth; and
removing the installation instrument.

10. A method for installing poles and posts using a support installation system of the type comprising a support and an installation instrument, the support including one or more collar assemblies (10a,10b) each having a plurality of ground engageable blades (12) pivotally connected thereto, and the installation instrument having means to extend generally radially the blades of the collar assemblies, characterised by the steps of:

boring a hole (41) of predetermined depth and diameter into the earth;
assembling on said installation instrument (20,120) said one or more collar assemblies (10a,10b) to form a unit;
lowering said unit into said hole (41);
actuating said blade extending means of the installation instrument to extend the blades (12) of each of said collar assemblies (10a,10b) into the earth;
removing the installation instrument;

lowering said pole or post (50) into the hole (41) and through the one or more support collars (11);

adjusting and positioning the pole or post (50) using pole positioning and adjusting means (53,54,55,56) which are provided as part of the support; and
back-filling the remaining portion of the hole.

Patentansprüche

1. Stützeninstallationsvorrichtung oder -system zur unterirdischen Abstützung bzw. Halterung von Masten oder Pfeilern bzw. Pfosten, welche eine oder mehrere Stützmannschetteneinheiten und eine Installationsvorrichtung zum Einsetzen bzw. Installieren der Mannschetteneinheiten in den Erdboden umfaßt, wobei jede der Mannschetteneinheiten (10a, 10b) eine im allgemeinen ringförmige Mannschette (11) umfaßt, die eine Anzahl von Schaufeln (12) aufweist, die in den Boden eingreifen können und schwenkbar mit dieser verbunden sind, **dadurch gekennzeichnet**, daß die Stützeninstallationsvorrichtung eine Einheit bildet, die aus der einen oder den mehreren Stützmannschetteneinheiten und der Installationsvorrichtung besteht, welche Einheit in ein zuvor gebildetes Loch mit vorbestimmter Tiefe und Durchmesser abgesenkt wird, und daß die Installationsvorrichtung (20, 120), welche durch die Mannschetteneinheiten hindurch positioniert wird, einen Einsetzschaf (21, 121) und eine Einrichtung umfaßt, welche dem Einsetzschaf zugeordnet ist, um die Schaufeln (12) der Mannschetteneinheiten (10a, 10b) im allgemeinen radial nach außen auszufahren bzw. zu schwenken, so daß diese in die Wände des Loches (41) eindringen, und wobei die Installationsvorrichtung (20, 120) entfernt bzw. abgenommen werden kann, sobald die eine oder die mehreren Stützmannschetteneinheiten installiert bzw. eingesetzt worden sind.

2. Stützeninstallationsvorrichtung nach Anspruch 1, dadurch gekennzeichnet, daß die Einrichtung zum Ausfahren der Schaufeln der Mannschetteneinheiten Nocken (24, 124, 23, 123) umfaßt, welche von dem Einsetzschaf (21, 121) getragen werden, ein Stellorgan (22, 122), welches mit mindestens einem Abschnitt von jeder der Mannschetteneinheiten in Eingriff gebracht werden kann, und eine Einrichtung um zu bewirken, daß das Stellorgan (22, 122) selektiv axial entlang eines Abschnittes des Einsetzschafes (21, 121) verschoben werden kann, um so die Schaufeln (12) von jeder der Mannschetteneinheiten (10a, 10b) gegen die Nocken zu drücken und dadurch die Schaufeln (12) radial nach außen auszufahren.

3. Stützeninstallationsvorrichtung nach Anspruch 2, dadurch gekennzeichnet, daß der Einsetzschaft (21) im wesentlichen hohl ist, und daß die Einrichtung, die bewirkt, daß das Stellorgan selektiv verschoben wird, einen hydraulischen Zylinder (26) umfaßt, der mit einer unter Druck befindlichen Flüssigkeitsquelle verbunden ist, eine Antriebswelle (25), welche innerhalb des Einsetzschaftes (21) gleiten kann und von dem Hydraulikzylinder (26) bewegt wird, und ein Querträger (31), um das Stellorgan (22) mit der Antriebswelle (25) über die Schlitz (32) in dem Einsetzschaft (21) zu verbinden.
4. Stützeninstallationsvorrichtung nach Anspruch 2 oder 3, dadurch gekennzeichnet, daß der Einsetzschaft (121) einen mit einem Außengewinde versehenen Abschnitt (60) und einen nicht mit einem Gewinde versehenen Abschnitt (61) aufweist, wobei das Stellorgan (122) auf der Innenseite mit einem passenden Gewinde versehen ist, und daß die Einrichtung, die bewirkt, daß das Stellorgan (122) selektiv verschoben wird, eine Drehantriebsvorrichtung umfaßt, um den Einsetzschaft (121) selektiv zu drehen.
5. Stützeninstallationsvorrichtung nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß die ringförmigen Manschetten (11) jeweils ein Paar von im allgemeinen halbzylindrischen Hälften (11a, 11b) umfassen, welche jeweils sich gegenüberliegende, sich radial einwärts erstreckende Flansche (13) aufweisen und welche über Bolzenteile (14) miteinander und abständig verbunden sind, und daß die Schaufeln (12) schwenkbar an den Bolzenteilen (14) und zwischen den Flanschen (13) gehalten werden.
6. Stützeninstallationsvorrichtung nach Anspruch 2, dadurch gekennzeichnet, daß die Nocke (24, 124) eine Manschettenführungsscheibe bzw. Manschettenauflage (34, 134) einschließt, um ein zu starkes Ausfahren der Schaufeln (12) der Manschetteneinheit (10a) zu verhindern.
7. Stützeninstallationsvorrichtung nach Anspruch 6, dadurch gekennzeichnet, daß die Nocke (24, 124) außerdem eine Einrichtung zum Verriegeln ihrer Position bezüglich des Einsetzschaftes (21, 121) einschließt.
8. Stützeninstallationsvorrichtung nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß die Kanten der Schaufeln (12), welche in Eingriff gebracht bzw. gedrückt werden, eine krummlinige Gestalt besitzen, so daß die Schaufeln, wenn sie ausgefahren werden, im allgemeinen die Wände des Loches (41) durchstechen.
9. Verfahren zum Einsetzen von unterirdischen Stützen für Masten und Pfeiler bzw. Pfosten, von der Art, welche eine oder mehrere Manschetteneinheiten (10a, 10b) umfassen, die jeweils eine Manschette (11) enthalten, die eine Anzahl von Schaufeln aufweist, die in den Erdboden eingreifen können und mit dieser schwenkbar verbunden sind, und das eine Installationsvorrichtung (20, 120) von der Art verwendet, welche eine Einrichtung umfaßt, um die Schaufeln der Manschetteneinheiten im allgemeinen radial auszufahren, **gekennzeichnet durch** die Schritte:
- ein Loch (41) mit vorbestimmter Tiefe und Durchmesser wird in den Erdboden gebohrt;
 - auf die Installationsvorrichtung (20, 120) wird die eine oder werden die mehreren Manschetteneinheiten (10a, 10b) aufgesetzt, um eine Einheit zu bilden;
 - die Einheit wird in das Loch (41) abgesenkt;
 - die Schaufelausfahreinrichtung wird betätigt bzw. verstellt, um die Schaufeln (12) von jeder der Manschetteneinheiten (10a, 10b) in den Erdboden auszufahren; und
 - die Installationsvorrichtung wird entfernt bzw. abgehoben.
10. Verfahren zum Einsetzen von Masten und Pfeilern bzw. Pfosten, welches eine Stützeninstallationsvorrichtung von der Art verwendet, welche eine Stütze und eine Installationsvorrichtung umfaßt, wobei die Stütze eine oder mehrere Manschetteneinheiten (10a, 10b) einschließt, welche jeweils eine Anzahl von Schaufeln (12) aufweist, die in den Erdboden eingreifen können und schwenkbar mit dieser verbunden sind, und wobei die Installationsvorrichtung eine Einrichtung aufweist, um die Schaufeln der Manschetteneinheiten im allgemeinen radial auszufahren bzw. zu schwenken, **gekennzeichnet durch** die Schritte:
- ein Loch (41) mit vorherbestimmter Tiefe und Durchmesser wird in den Erdboden gebohrt;
 - auf die Installationsvorrichtung (20, 120) wird die eine oder werden die mehreren Manschetteneinheiten (10a, 10b) aufgesetzt, um eine Einheit zu bilden;
 - die Einheit wird in die Bohrung (41) abgesenkt;
 - die Schaufelausfahreinrichtung der Installationsvorrichtung wird betätigt, um die Schaufeln (12) von jeder der Manschetteneinheiten (10a, 10b) in den Erdboden auszufahren;
 - die Installationsvorrichtung wird entfernt bzw. abgehoben;
 - der Mast oder Pfeiler (50) wird in das Loch (41) und durch die eine oder mehr Stützmannschetten (11) abgesenkt;
 - der Mast oder Pfeiler (50) wird ausgerichtet und

- positioniert, wobei Mastpositionierungs- und Mastausrichtungseinrichtungen (53, 54, 55, 56) verwendet werden, welche als Teil der Stütze ausgelegt sind; und
- der verbleibende Abschnitt des Loches wird wieder aufgefüllt.

Revendications

1. Système d'installation de supports pour le support souterrain de mâts ou poteaux, comprenant un ou plusieurs ensembles de collier support et un instrument d'installation pour l'installation des colliers dans le sol, chacun des ensembles de collier (10a, 10b) comprenant un collier globalement annulaire (11) muni de plusieurs lames (12) pénétrant dans le sol, reliées de façon pivotante au collier, caractérisé en ce que le système d'installation de supports forme une unité constituée d'un ou de plusieurs ensemble(s) de collier et de l'instrument d'installation, cette unité étant abaissée dans un trou préalablement aménagé, présentant une profondeur et un diamètre prédéterminés, et l'instrument d'installation (20, 120), qui est mis en place à travers les ensembles de collier, comprenant un arbre de déploiement (21, 121) et des moyens associés à cet arbre pour déployer les lames (12) des ensembles de collier (10a, 10b) de manière globalement radiale vers l'extérieur, de manière qu'elles pénètrent dans les parois du trou (41), l'instrument d'installation (20, 120) pouvant être retiré, une fois que ledit ou lesdits un ou plusieurs ensemble(s) de collier a/ont été installé(s).
2. Système d'installation de supports selon la revendication 1, caractérisé en ce que les moyens permettant de déployer les lames des ensembles de colliers comprennent des moyens à cames (24, 124, 23, 123) portés par l'arbre de déploiement (21, 121), un actionneur (22, 122) pouvant entrer en engagement avec au moins une partie de chacun des ensembles de collier, et des moyens destinés à déplacer l'actionneur (22, 122) de façon sélective en translation, axialement le long d'une partie de l'arbre de déploiement (21, 121), de manière à forcer les lames (12) de chacun des ensembles de collier (10a, 10b) contre les moyens à cames, en déployant ainsi les lames (12) radialement vers l'extérieur.
3. Système d'installation de supports selon la revendication 2, caractérisé en ce que l'arbre de déploiement (21) est substantiellement creux, et en ce que les moyens destinés à déplacer l'actionneur de façon sélective en translation comprennent un vérin hydraulique (26) relié à une source de fluide sous pression, un axe d'entraînement (25) coulissant à

l'intérieur de l'arbre de déploiement (21) et étant actionné par le vérin hydraulique (26), et des moyens de clavetage (31) destinés à relier l'actionneur (22) à l'axe d'entraînement (25) à travers des fentes (32) ménagées dans l'arbre (21).

4. Système d'installation de supports selon la revendication 2 ou la revendication 3, caractérisé en ce que l'arbre de déploiement (21) comporte une partie (60) extérieurement filetée, et une partie non filetée (61), l'actionneur (122) étant intérieurement taraudé de façon correspondante, et en ce que les moyens destinés à déplacer l'actionneur (122) de façon sélective en translation comprennent des moyens d'entraînement en rotation destinés à entraîner l'arbre de déploiement (121) en rotation de façon sélective.
5. Système d'installation de supports selon l'une quelconque des revendications précédentes, caractérisé en ce que les colliers annulaires (11) comprennent chacun une paire de demi-colliers (11a, 11b) substantiellement semi-cylindriques comportant chacun des rebords (13) s'étendant radialement vers l'intérieur, reliés l'un à l'autre et espacés l'un de l'autre via des moyens d'axes (14), et en ce que les lames (12) sont supportées de façon pivotante par les moyens d'axes (14) et entre les rebords (13).
6. Système d'installation de supports selon la revendication 2, caractérisé en ce que les moyens à cames (24, 124) comprennent une plaque d'appui du collier (34, 134) destinée à empêcher un déploiement trop poussé des lames (12) de l'ensemble de collier (10a).
7. Système d'installation de supports selon la revendication 6, caractérisé en ce que les moyens à cames (24, 124) comprennent en outre des moyens permettant de verrouiller la position de ceux-ci par rapport à l'arbre de déploiement (21, 121).
8. Système d'installation de supports selon l'une quelconque des revendications précédentes, caractérisé en ce que les bords des lames (12) commandées par cames présentent une configuration curviligne, de manière que les lames, lorsqu'elles sont déployées, percent les parois du trou (41).
9. Procédé d'installation de supports souterrains pour mâts et poteaux, du type comprenant un ou plusieurs ensemble(s) de colliers (10a, 10b) comportant chacun un collier (11) auquel sont reliées plusieurs lames pivotantes pouvant s'engager dans le sol, et utilisant un instrument d'installation (20, 120) du type comprenant des moyens destinés à déployer de manière substantiellement radiale les lames des ensembles de colliers, caractérisé par les

étapes consistant à:

forer un trou (41) d'une profondeur et d'un diamètre prédéterminés dans la terre;
 assembler, sur ledit instrument d'installation (20, 120), ledit un ou lesdits plusieurs ensemble(s) de collier (10a, 10b) de manière à former une unité;
 abaisser ladite unité dans ledit trou (41);
 actionner lesdits moyens de déploiement des lames de manière à déployer les lames (12) de chacun desdits ensembles de collier (10a, 10b) dans la terre; et à
 retirer l'instrument d'installation.

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10. Procédé d'installation de mâts et de poteaux, utilisant un système d'installation de supports, du type comprenant un support et un instrument d'installation, le support comportant un ou plusieurs ensembles de colliers (10a, 10b) à chacun desquels sont reliées plusieurs lames pivotantes (12) pouvant s'engager dans le sol, l'instrument d'installation ayant des moyens destinés à déployer de manière substantiellement radiale les lames des ensembles de colliers, caractérisé par les étapes consistant à :

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forer un trou (41) d'une profondeur et d'un diamètre prédéterminés dans la terre ;
 assembler, sur ledit instrument d'installation (20, 120), ledit un ou lesdits plusieurs ensemble(s) de colliers (10a, 10b), de manière à former une unité ;
 abaisser ladite unité dans ledit trou (41) ;
 actionner lesdits moyens de déploiement des lames de manière à déployer les lames (12) de chacun desdits ensembles de colliers (10a, 10b) dans la terre ;
 retirer l'instrument d'installation ;
 descendre ledit mât ou ledit poteau (50) dans le trou (41) et à travers le ou les plusieurs collier(s) de support (11) :
 ajuster et positionner le mât ou poteau (50) en utilisant les moyens d'ajustement et de positionnement (53, 54, 55, 56) de mât qui sont prévus comme faisant partie du support ; et
 remblayer la partie restante du trou.

30

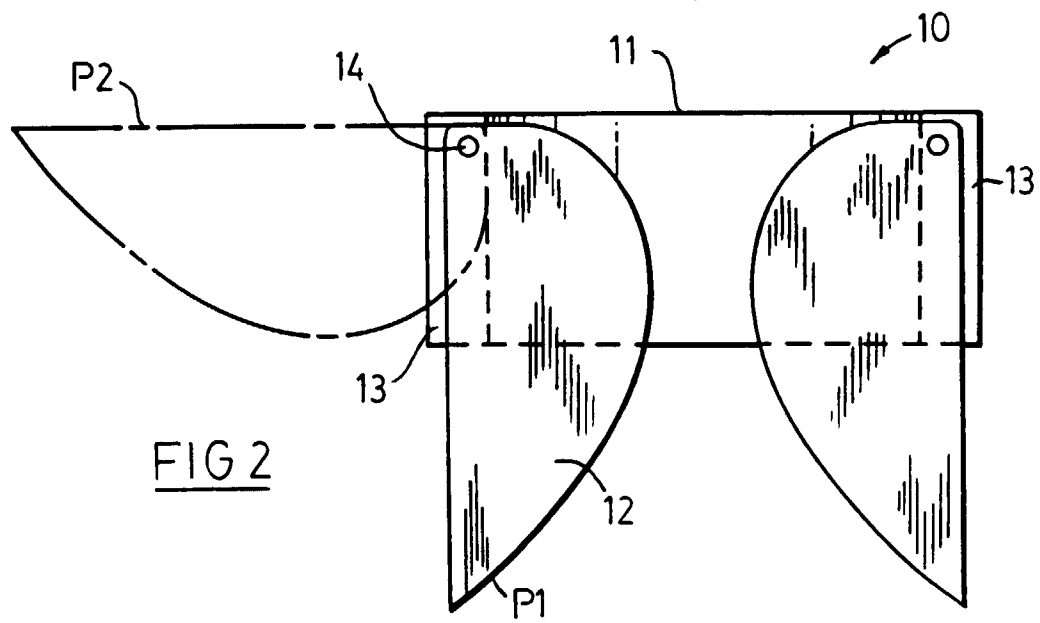
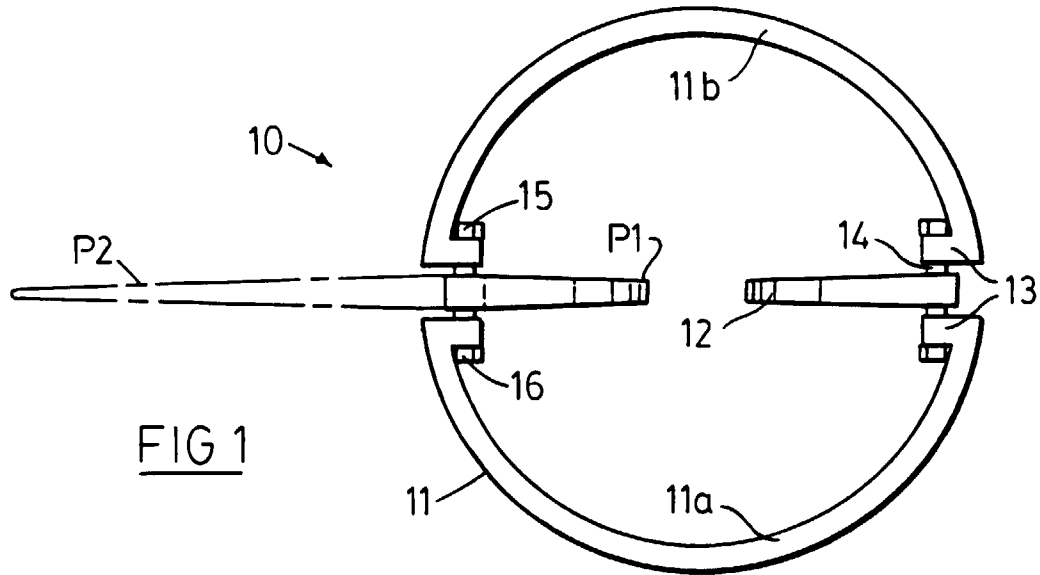
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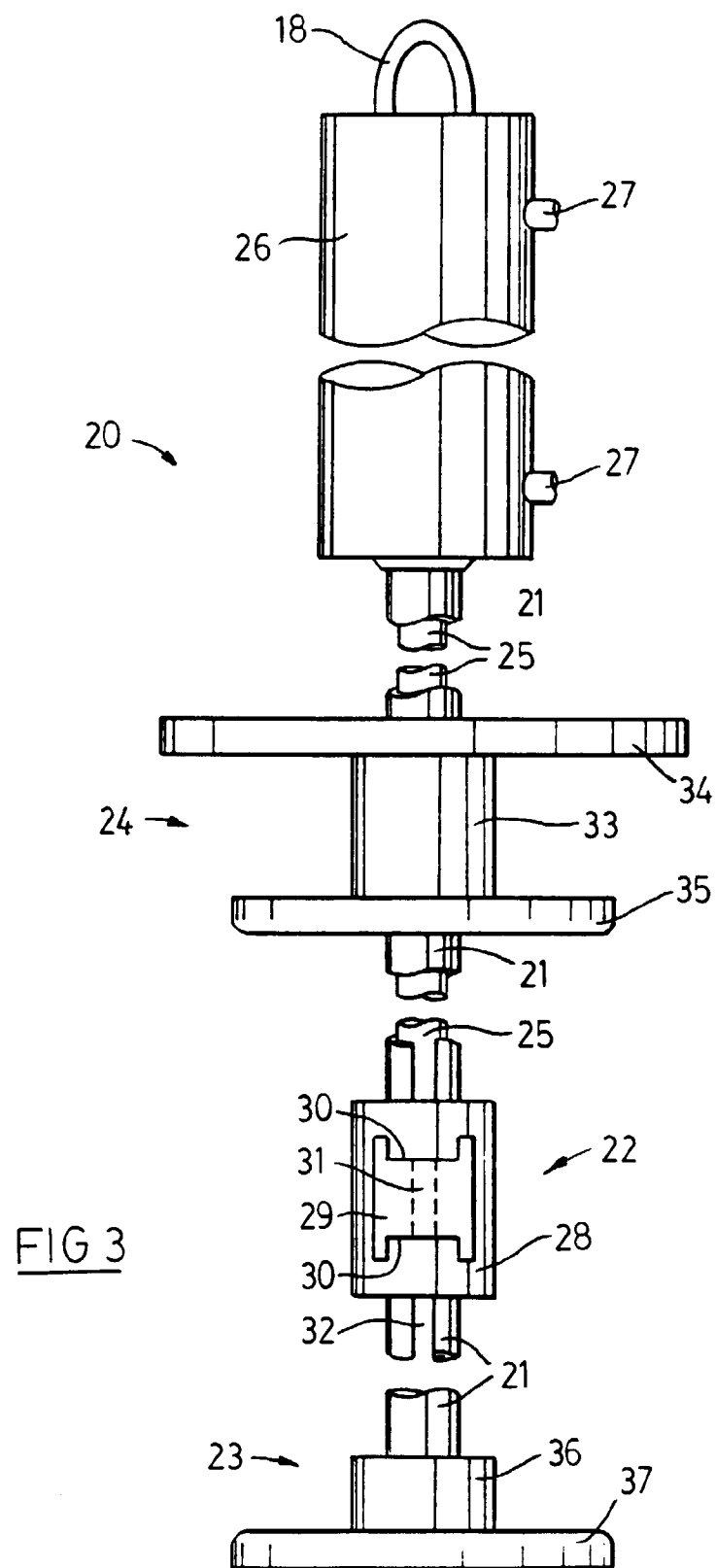
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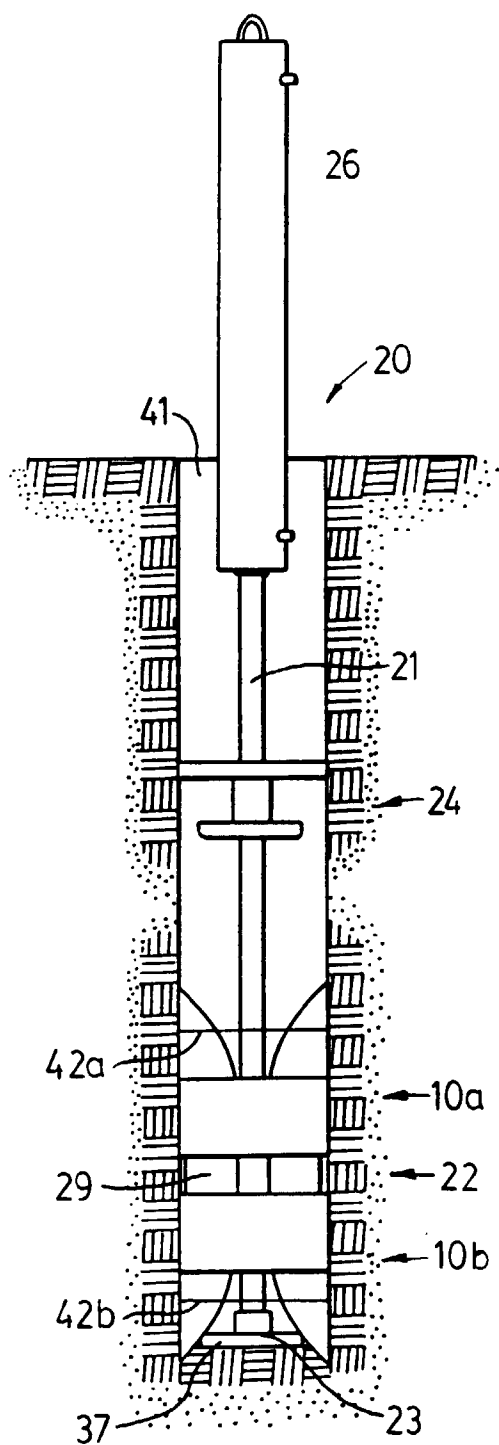


FIG 4

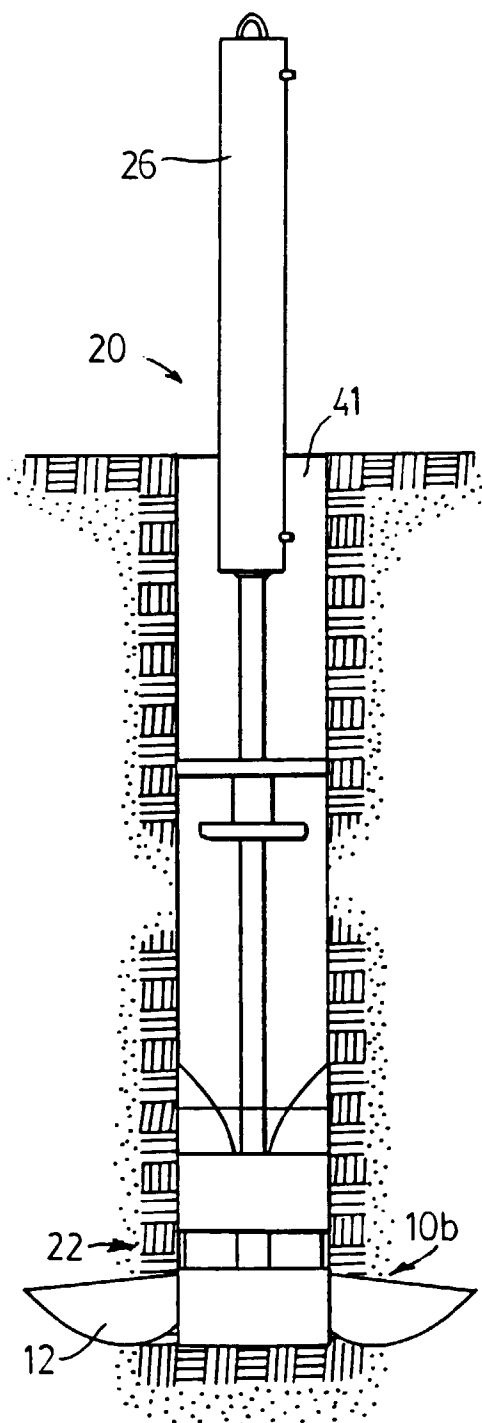


FIG 5

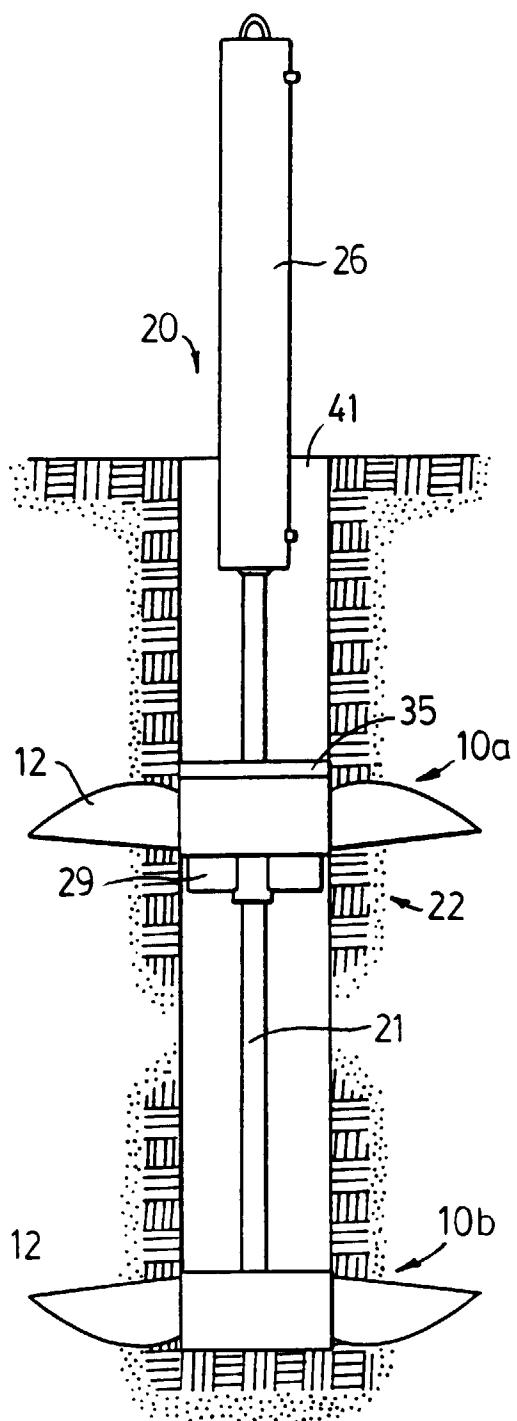


FIG 6

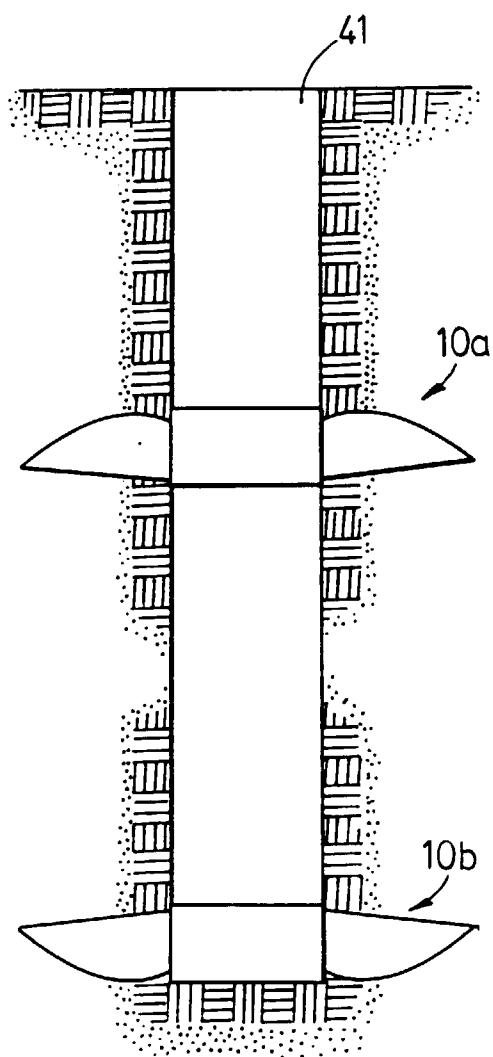


FIG 7

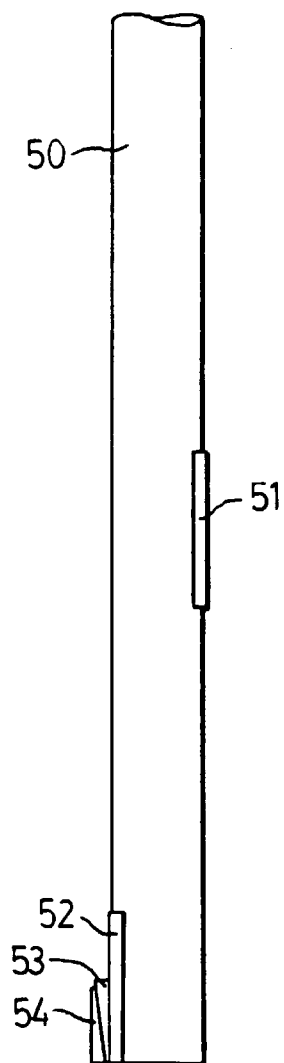


FIG 8

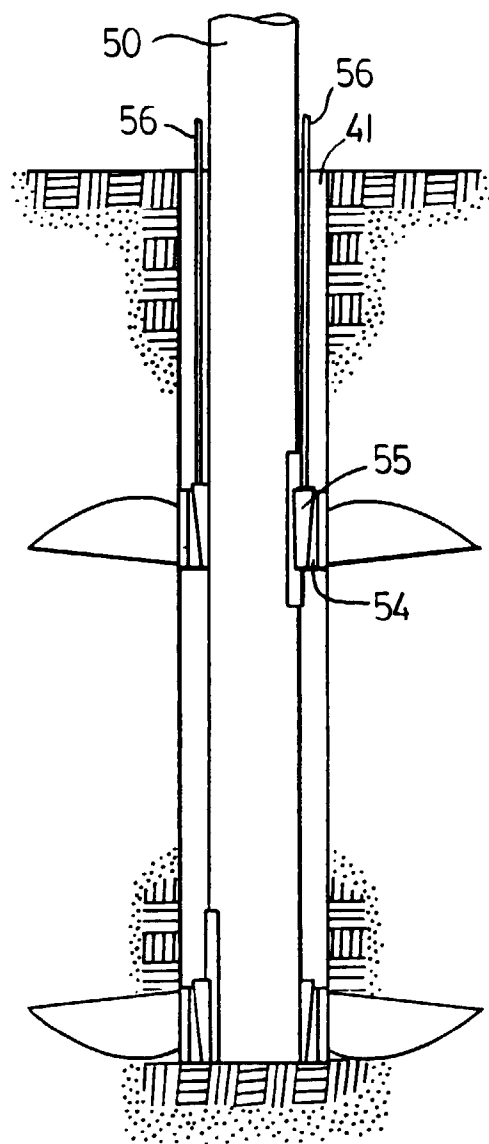


FIG 9

