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- (56) Prior Art Documents
AU 605389
US 4574539
US 3139163
- (57) Claim

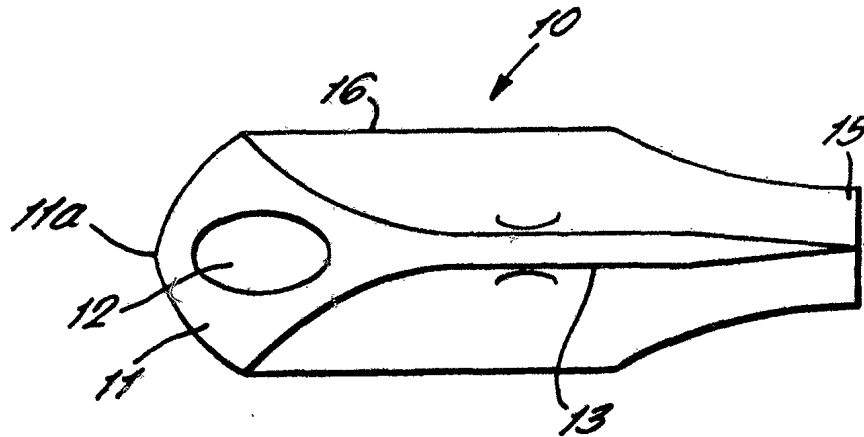
1. A ground anchor comprising a body portion having a generally triangular cross-section extending substantially along its length having concave sides and a continuous convex lower surface from one edge of the body portion where the sides and lower surface meet to an opposite edge, wherein the terms concave and convex are as defined herein.



INTE.

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<p>(21) International Application Number: PCT/GB94/01066 (22) International Filing Date: 18 May 1994 (18.05.94) (30) Priority Data: 9322642.1 3 November 1993 (03.11.93) GB (71) Applicant (for all designated States except US): PLATIPUS ANCHORS LIMITED [GB/GB]; Perrywood Business Park, Honeycrock Lane, Salfords, Redhill, Surrey RH1 5DZ (GB). (72) Inventor; and (75) Inventor/Applicant (for US only): AGG, Charles [GB/GB]; Dene Farm, Dean Oak Lane, Leigh, Reigate, Surrey RH2 8PY (GB). (74) Agent: BOULT WADE TENNANT; 27 Furnival Street, London EC4A 1PQ (GB).</p>		<p>(81) Designated States: AT, AU, BB, BG, BR, BY, CA, CH, CN, CZ, DE, DK, ES, FI, GB, GE, HU, JP, KG, KP, KR, KZ, LK, LU, LV, MD, MG, MN, MW, NL, NO, NZ, PL, PT, RO, RU, SD, SE, SI, SK, TJ, TT, UA, US, UZ, VN, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).</p> <p>Published <i>With international search report.</i></p> <p>687055</p>

(54) Title: IMPROVEMENTS IN GROUND ANCHORS



(57) Abstract

The invention relates to ground anchors (10) of the type which are attached to cables and rods and driven into the ground and tilted transversely by tensioning the cable. A ground anchor comprising a body portion (11) having a generally triangular cross section extending substantially along its length having generally concave sides and a continuous convex lower surface from one edge of the body portion where the sides and lower surface meet to an opposite edge.

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IMPROVEMENTS IN GROUND ANCHORS

The invention relates to ground anchors of the type which are attached to cables and rods and driven into the ground and tilted transversely by tensioning the cable.

A variety of ground anchors already exist including tubular anchors, such as those described in GB-A-1555580 and EP-A-0208153. These anchors are driven into the ground and then rotated to a horizontal locked position. As the surface area of these anchors is not particularly large, they are not appropriate for some uses where a particular degree of strength and resistance to removal from the ground is required.

Improvements have been made to such anchors which resulted in the addition of wings to provide a greater planar or surface area to resist the anchors from being pulled from the ground once in their tilted locked position. Examples of such wing anchors are known from EP-A-0313936, US-A-4574539 and US-A-3282002. Each of these anchors has different specific features which enable the anchors either to be easily driven into the ground, to prevent its withdrawal therefrom or to ease the ability of rotate the anchor once embedded in the ground.

However, in hard ground conditions wing-type anchors are not generally suitable because of the increase in the quantity of ground media to be moved. For such conditions high capacity small profile anchors, such as the original tubular anchors, are most suitable.

It is therefore an object of the present invention to further improve anchors of the small profile type in these respects.

According to the invention there is provided a

ground anchor comprising a body portion having a generally triangular cross-section extending substantially along its length having concave sides and a continuous convex lower surface from one edge of the body portion where the sides and lower surface meet to an opposite edge, wherein the terms concave and convex are as defined herein.

Preferably the edges of said body portion curve or angle upwardly where the sides and lower surface meet. Edges of said body portion where the sides and lower surface meet are rounded.

In a preferred embodiment of the invention the anchor comprises a driving edge formed at one end of said body portion.

Preferably the body portion extends upwardly to form a keel, in which keel is formed an anchor eye. Alternatively a keel is formed on the body portion, in which keel is formed a socket.

The keel member is preferably convergent in the horizontal and/or vertical plane from the anchor eye or socket to the driving edge.

A preferred embodiment of the invention will now be described, by way of example only, with reference to the accompanying drawings, in which:-

Fig. 1 is a plan view of an anchor according to the invention;

Fig. 2 is a side elevation of the anchor of Fig. 1;

Fig. 3 is a front elevation of the anchor of Fig. 1;

Fig. 4 is a rear elevation of the anchor of Fig. 1;

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Fig. 5 is a schematic view of the anchor of Fig. 1 with the eye replaced with a swaged fitting;

Fig. 6 is a partial schematic view of the swaged fitting of Fig. 5 with parts omitted for clarity; and

Figs. 7a-7c are schematic views of the installation steps applied to a prior art anchor.

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As shown in Figs. 1-4 the anchor 10 comprises a generally triangular or bell-shaped body 11 having an axially extending blind bore 12 for receiving a driving tool. When viewed from one end, the anchor 10 is seen to have a triangular bell-shaped profile for a substantial length along its working surface. The sides of the anchor body 11 are, in profile, continuously concave from an upper edge of the working surface to edges 16 where the sides and lower surface meet. The lower surface of the body 11 is continuously convex from edge to edge. The edges 16, may curve or angle slightly upwardly from the horizontal. These edges 16 may be rounded or edge beads provided. It is to be noted that in the context of this specification the terms "concave" or "convex" are intended to include not only inwardly or outwardly rounded surfaces, but also surfaces which have flat regions which may be angled to other flat regions but which overall give an impression of concavity or convexity.

The body 11 extends upwardly to form a high keel 13 in which is formed an anchor eye 14 to which a cable may be attached. The high keel 13, which starts from the anchor eye 14, tapers downwardly towards a driving edge 15. The driving edge 15 may be sharpened to a chisel point. The keel 13 may also converge in the horizontal direction to form a point

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as it approaches the driving edge 15. The body portion 11 has a sharp tapering nose 11a at an end opposite to the driving edge 15.

In an alternative embodiment of the invention, as shown in Figs. 5 and 6, the eye 14 is replaced with a T-shaped swaged fitting 20. The fitting 20 is inserted into a socket 21 formed in the keel 13 with the cross bar 22 positioned longitudinally to the body 11. The fitting 20 can then be rotated through 90° to the position shown in Figs. 5 and 6 whereby the T-piece 22 is anchored in the socket 21 under the keel 13. The fitting 20 can then pivot in the direction of the arrow C.

In this embodiment of the invention, the working surface of the anchor extends to below the keel 13.

In use, a cable or rod is attached to the eye portion 14 or swaged fitting 20 and a driving rod is inserted into the bore 12. The anchor 10 is driven into the ground, driving edge 15 first to its installed position, by applying a force to the driving rod. Fig. 7a illustrates the installed position of a prior art anchor.

The driving edge 15 splits the ground media by way of separating the upper side and lower side and compresses the media out of the way. This enhances the ability of the anchor 10 to drive more quickly and easily through harder media. The high keel 13 further enhances significantly the ability of the anchor 10 to drive straight through difficult anchoring media.

Once the anchor 10 has reached its desired depth, the drive rod is removed from the bore 12. A pulling force is applied to the cable or rod which causes the anchor 10 to rotate in the ground to a generally horizontal load locked position (see Fig.

7A-B). Once the sharp nose 11a of the body 11 bites the back of the hole into which the anchor 10 is driven, this forms a fulcrum for the anchor 10 to turn about. The upwardly curved edges 16 of the anchor body 11 help to consolidate the turn of the anchor 10.

The triangular or bell-shaped working surface area of the anchor 10 offers a significant increase in potential load over traditional tube-style anchors whilst the anchor remains a small profile anchor which is necessary for hard ground conditions. The shaped surface offers high load possibilities for a small surface area anchor by focusing the frustum of soil more clearly.

The rounded edges 16 of the anchor 10 further enhance the frustum area and reduce spill-off during high loadings and therefore reduce mechanical shear.

The anchor 10 may be made from any suitable material depending on its required use, such as iron/steel, copper and brass based alloys, aluminium, non-ferous materials and possibly non-metallic materials.

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The claims defining the invention are as follows:

- 5 1. A ground anchor comprising a body portion having a generally triangular cross-section extending substantially along its length having concave sides and a continuous convex lower surface from one edge of the body portion where the sides and lower surface meet to an opposite edge, wherein the terms concave and convex are as defined herein.
- 10 2. An anchor as claimed in claim 1 in which the edges of said body portion curve or angle upwardly where the sides and lower surface meet.
- 15 3. An anchor as claimed in claim 1 or claim 2 in which edges of said body portion where the sides and lower surface meet are rounded.
- 20 4. An anchor as claimed in any one of the preceding claims further comprising a driving edge formed at one end of said body portion.
- 25 5. An anchor as claimed in any one of the preceding claims in which the body portion extends upwardly to form a keel, in which keel is formed an anchor eye.
- 30 6. An anchor as claimed in any one of claims 1 to 4 in which a keel is formed on the body portion, in which keel is formed a socket.
7. An anchor as claimed in claim 5 or claim 6 in which the keel is convergent in the horizontal and/or vertical plane from the anchor eye or socket to the driving edge.
- 35 8. An anchor substantially as hereinbefore



described with reference to and as shown in the accompanying drawings.

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FIG. 1.

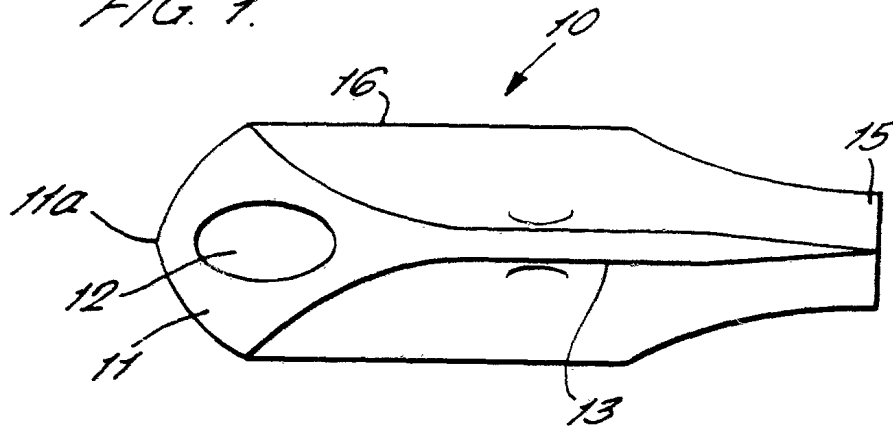


FIG. 2.

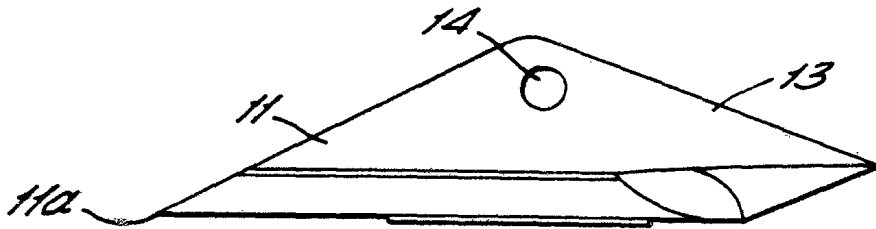


FIG. 3.

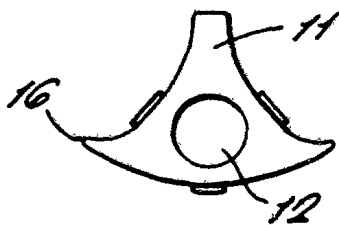


FIG. 4.

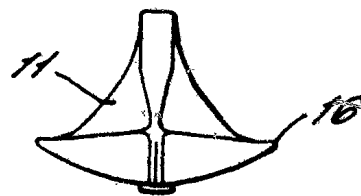


FIG. 5.

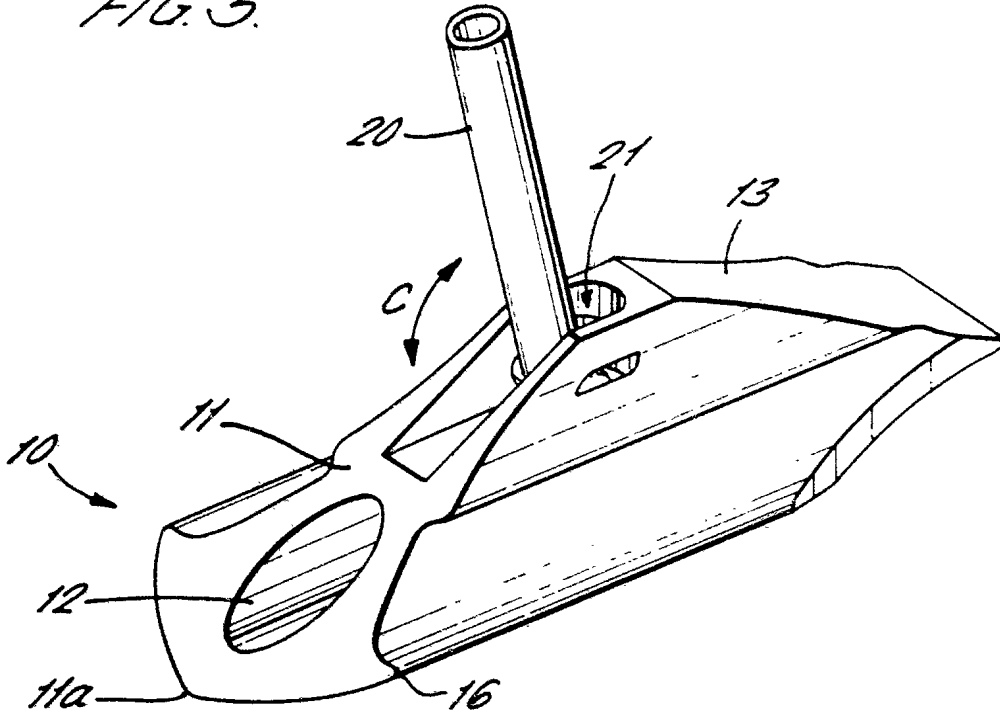


FIG. 6.

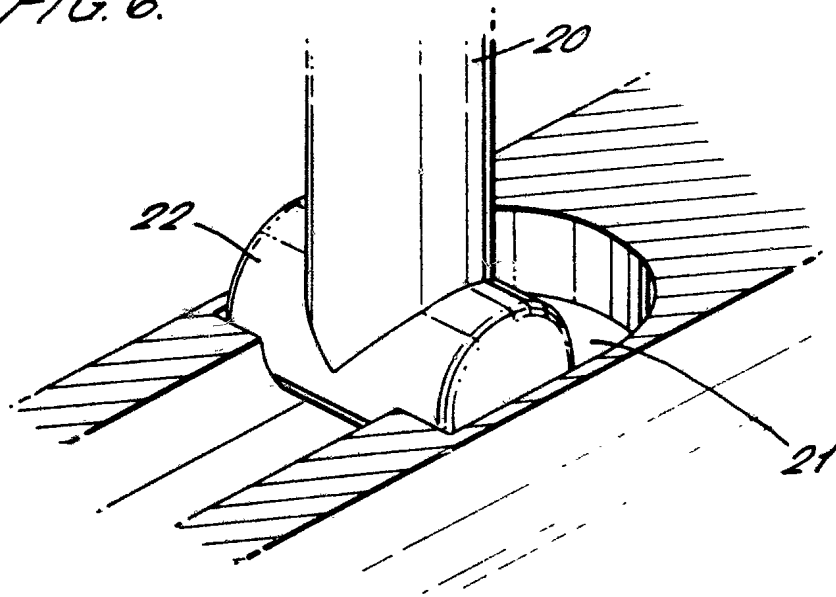


FIG. 7a.

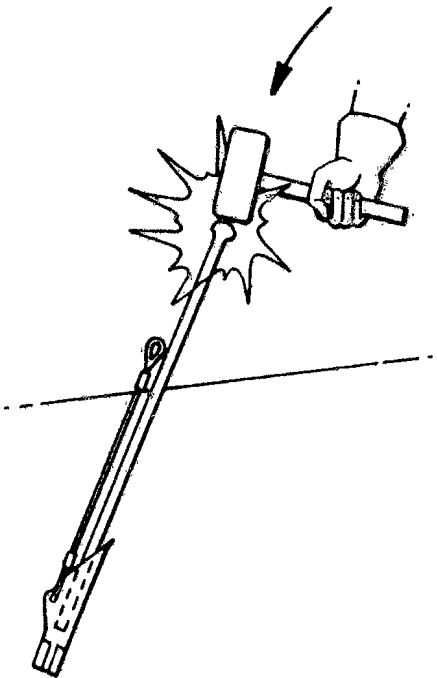


FIG. 7b.

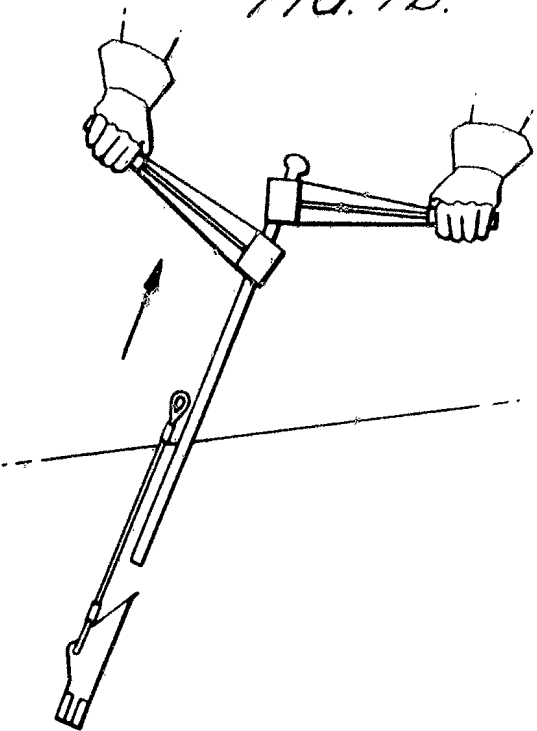
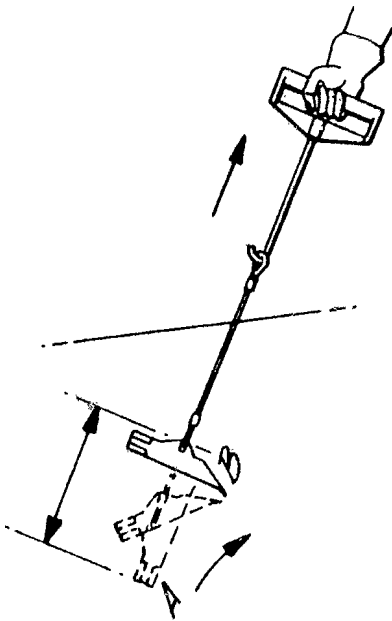


FIG. 7c.



INTERNATIONAL SEARCH REPORT

International Application No
PCT/GB 94/01066

A. CLASSIFICATION OF SUBJECT MATTER IPC 6 E0205/80		
According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED		
Minimum documentation searched (classification system followed by classification symbols) IPC 6 E02D		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
Electronic data base consulted during the international search (name of data base and, where practical, search terms used)		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US,A,4 574 539 (DEIKE) 11 March 1986 cited in the application see abstract; figures ---	1,3-8
A	AU,A,605 389 (DEIKE) 10 January 1991 see figures ---	1,3-5,7, 8
A	US,A,3 139 163 (HALLER) 30 June 1964 see figures 1,6,7 -----	1,4,8
<input type="checkbox"/> Further documents are listed in the continuation of box C. <input checked="" type="checkbox"/> Patent family members are listed in annex.		
* Special categories of cited documents : "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier document but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art. "&" document member of the same patent family		
Date of the actual completion of the international search 8 September 1994		Date of mailing of the international search report 05-10-1994
Name and mailing address of the ISA European Patent Office, P.B. 5818 Patentaan 2 NL - 2280 HV Rijswijk Tel. (+ 31-70) 340-2040, Tx. 31 651 epo nl, Fax (+ 31-70) 340-3016		Authorized officer Blommaert, S

INTERNATIONAL SEARCH REPORT

information on patent family members

International Application No PCT/GB 94/01066
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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US-A-4574539	11-03-86	NONE	
AU-A-605389	10-01-91	AU-A- 2691088 AU-B- 582118 AU-A- 2975484	23-03-89 16-03-89 03-01-85
US-A-3139163		NONE	