

①② **EUROPEAN PATENT APPLICATION**

②① Application number: 83850310.0

⑤① Int. Cl.³: **E 01 F 9/01, E 04 H 12/22,**
E 04 H 12/34, E 04 H 17/00,
E 04 H 17/20, E 04 H 17/26

②② Date of filing: 17.11.83

③③ Priority: 03.12.82 SE 8206927

⑦① Applicant: **Accurat Teknik AB, Valhallavägen 134,**
S-114 41 Stockholm (SE)

④③ Date of publication of application: 13.06.84
Bulletin 84/24

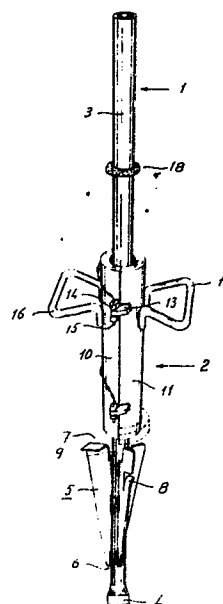
⑦② Inventor: **Regné, Rune, c/o Accurat Teknik AB**
Valhallavägen 134, S-114 41 Stockholm (SE)
Inventor: **Weglert, Thomas, c/o Accurat Teknik AB**
Valhallavägen 134, S-114 41 Stockholm (SE)

⑧④ Designated Contracting States: **AT BE DE FR GB IT NL**
SE

⑦④ Representative: **Avellan-Hultman, Oile, Avellan-Hultman**
Patentbyrå AB P.O. Box 5366, S-102 46 Stockholm 5 (SE)

⑤④ **Method and apparatus for mounting of a post or a post support.**

⑤⑦ A method and an apparatus for mounting of a support post in natural ground and compressed fillings comprising clay, moraine, gravel or sand and on asphalt-covered and plate-covered surfaces or in bores in rock or concrete material, whereby a support post (1) at the lower end (4) thereof is formed with one or more projecting wings (5) which preferably are triangular with the apex (6) thereof facing down and having an upper edge, and in which a separate annular drop hammer (2) is mounted with the post (1) extending through the bore of the hammer and with the hammer in contact with the upper edges (7) of the wings (5) whereupon the hammer repeatedly is lifted and let free to hit the wings until the support post (1) has been driven down in the ground or the bore, whereupon the hammer (2) is removed and possibly an outer post (17) is mounted and secured on the support post (1) and is connected to or provided with some means intended to be mounted on the post. In an embodiment of the apparatus for executing the method the wings (5) are formed with downwards extending slots (7) at the upper edge (7) of the wings (5) and adjacent the support post tube (3), which slots circumscribe a surface corresponding to the outer dimensions of the outer post and in which slots the outer post is resting when mounted. Means may be provided for safely securing the outer post to the support post, and means (8) may be provided for obstructing a pulling up of the support post when mounted in the ground.



P-822

ACCURAT TEKNIK AKTIEBOLAG

Method and apparatus for mounting of a post or a post support

The present invention relates to a method and an apparatus for mounting of a post or a post support. More particularly the invention is concerned with such a method in which the post can be driven down both in nature ground and in compressed filling materials comprising clay, moraine, gravel, sand, asphalt-covered surfaces and plate-covered surfaces etc., but the invention also includes the possibility of mounting the post in question in a bore provided in rock material or any other hard material. In this connection the expression "post" includes all types of posts like fence posts, stakes, information posts for water, electricity, drainage etc., posts for traffic signs and road marks, parking meters, waste paper baskets, ground mounted benches, electricity boxes etc. A special field of use for the invention is mounting of a small post which is utilized as a support for a larger post, for instance a traffic sign, a traffic direction sign or similar means.

When previously mounting posts in the earth comprising for instance clay, moraine, gravel or sand or any other relatively hard material a hole used to be poked and the post was driven down in this hole with the aid of a sledge or some other heavy object. The driving down of a pole in this way is a heavy and complicated work, especially in case of high posts whereby it may be necessary to bring a ladder or a similar means for making it possible to drive the post down. A pole thus driven down in the ground also may rather easily be rotated around the longitudinal axis thereof and therefore said pole is not suitable as a marking pole or as a support for a direction sign or similar means. There is also a risk that the pole gets loose in the ground and begins to wobble.

In order to anchor the pole more safely in the ground and so that the pole cannot be rotated, get loose or wobble in the ground

it is known to dig a hole in the ground and fill said hole with concrete and to force the post down in the non-hardened concrete. Also this method is a time consuming and heavy work and it is necessary to bring tools, concrete etc. when mounting the post. Generally it is necessary to back up the pole until the concrete has hardened. Also in this case there is a risk that the entire concrete block together with the post becomes loose in the ground depending on mechanical actuation, in case of frost release etc. since for practical reasons, the hole for the post generally is not made to a depth below the frost level and since the concrete lump provides a rather large surface for actuation by the frost.

Another usual way of anchoring the post is to dig a hole and to place a concrete support in said hole and to put the post down into said concrete support. For a stable mounting of the post it is necessary that the upper surface of the concrete support is fixed mounted, for instance by means of asphalt, since it is normally difficult to compress the filling masses round the support. When mounting posts in the rock a bore is drilled in the rock and the post is moved down in said bore and is secured against rotation by means of wedges or in that the bore is filled with some substance like concrete, brimstone, glue, synthetic resin or similar substance before or possibly after the post is moved down in the bore. Also in this case the post must be stabilized for some time, and it is likewise necessary to bring different tools and some type of mass for securing the post against rotation and against unintentional pulling up of the bore.

The present invention is intended to solve the problems in the previously known method of mounting posts and to provide a method and an apparatus or mounting of posts in the first hand in nature ground and compressed filling masses comprising clay, mouraine, gravel, sand, asphalt-covered ground etc. but also in hard material like rock and concrete etc.

According to the invention the lower part of the post is formed with one or several outwards directed wings and a drop hammer of suitable form and weight and having a through bore is provided with the post extending through the bore of the drop hammer and the

hammer in contact with the upper wing or wings of the post, and the hammer is lifted and let free until the post has been driven down to the intended depth of the ground. The said depth should be such that the wings are completely driven down in the ground. At the end of the driving operation the hammer packs the ground or the earth around the post and possibly also above the wings. After the drop hammer is removed the post can directly be utilized, but according to the invention a coarser and higher post may be moved over the post which is driven down in the ground, and said outer post preferably is secured against rotation and against movement upwards from the inner post.

An apparatus according to the invention for executing the above described method comprises a post which at the lower end thereof has one or more outwards projecting wings, preferably triangular wings with the apex facing downwards, and a drop hammer having an axial through bore which is at least slightly greater than the diameter of the post, and in which the drop hammer is formed with a slot extending through the cylindrical body and which slot is equal to and slightly larger than the diameter of the post, so that the drop hammer may be mounted on the post by simply moving the drop hammer radially with the post entering the hammer through the said slot. Alternatively the drop hammer is made as two half cylindres which are hinge mounted to each other and which may be knocked to each other in the closed position. The drop hammer is formed with two or more handles for lifting the hammer, and it has a suitable size and weight. For normal cases a weight of about 10-30 kg may be suitable. At least at the lower end the drop hammer has a striking surface of a predetermined least dimension so that the hammer may strike the upper edges of the wings when driving the post down in the ground without cutting said upper edges of the wings. For a stable mounting of a coarse and high outer post on the inner post which is driven down in the ground the wings are formed with vertically extending slots at the upper edges thereof and adjacent the periphery of the post which slots correspond to an inscribed circle, the diameter of which is equal to or slightly larger than the diameter of the coarse and long outer post to be mounted. For stabilizing the coarse and

long outer post the inner post or support post may have one or more rings of an elastic material like rubber or plastic which maintains the outer post secured and centered on the support post. Alternatively the said slots at the upper and inner edges of the wings may be formed as bajonet slots and the outer post accordingly is formed with bajonet hooks engaging the said bajonet grooves when the outer post is in the bottom position and is rotated in relation to the support post.

Now the invention shall be described with reference to some preferred embodiments of the method and the apparatus and in connection to the accompanying drawings.

In the drawings figure 1 shows an embodiment of an apparatus according to the invention for mounting a post in the ground. Figure 2 shows the drop hammer included in the apparatus according to figure 1 in an open position. Figure 3 shows an alternative embodiment of the drop hammer. Figure 4 shows a modified embodiment of an inner post in the apparatus according to the invention, which may be used in combination with an outer post which is shown fragmentary. Figure 5 shows a further embodiment of a post according to the invention, and figure 6 shows a post arrangement according to the invention including an inner support post and an outer traffic mark post mounted thereon.

The apparatus shown in figure 1 generally comprises a support post 1, and a drop hammer 2 for driving the support post down in the ground. The support post 1 is made of a tube or bar 3 which may be flattened or pointed at the bottom end and which has a number of projecting wings. In the illustrated case there are three wings which is a suitable number for preventing a rotation of the vertical axis when the post is driven down in the ground and which also prevents the post from becoming loose and wobble in any direction. Possibly the post may have two wings provided at some angle to each other, for instance an angle of between 30 and 150°. The number of wings may be larger or less than three depending on the intended effect. In some cases it may be wanted that the post is yielding when acted on by a certain strength, for instance when hit by a vehicle, and in such case the post may have only one wing or

two wings provided on flight with each other, and whereby the post is placed with the wings in the direction of the possible hitting direction. Preferably the wings are triangular with the apex 6 facing down, and the wings are welded to the support tube 3 extending radially therefrom. In some cases, for instance in posts intended to be mounted in drilled bores in hard material like rock or concrete, it may be suitable to mount the wings on some angle to the radius so that the wings get an indication of folding or rolling round the post when being driven down in the bore. The wings are preferably formed with a horizontal upper edge 7, so that the drop hammer 2 gets the largest possible support surface when hitting the wings. For increasing the contact surface between the drop hammer and the wings the said wings may be formed with a thickened upper edge or the upper part of the wings may be fold at right angle as indicated on one of the wings of figure 1. Alternatively a piece of material may be welded to the upper edge of the wing on one side or both sides. Normally a post which has been driven down is secured with sufficient strength against pulling up of the ground, but if the safety against pulling up should be further increased one or more of the wings may be formed with a barb 8 somewhere at the outer obliquely extending edge. Such a barb may be made by cutting out an angle slot in the wing and folding said cut out portion out from the surface of the wing as indicated on one of the wings in figure 1.

The support post may be used separately for instance as a post for fences or railings, as a support for waste paper baskets, parking meters etc. or as a support for marking signs, for instance for marking water or drainage equipment or electric equipment in the ground. In some cases there is a need for a post which is coarser or higher than the support post, or alternatively it may be considered advantageous to use a relatively small support post as a base for a more coarse outer post. In this case the wings 5 preferably are formed with cut out slots 9 at the upper edge thereof and adjacent the tube or the bar 3. The slots are formed with a depth which is sufficient for providing a holder for the outer post and with a width corresponding to an inscribed circle which is equal to or slightly larger than the diameter or width of the outer tube.

In order to obtain a safe securing of the outer post in relation to the inner post the cut out slots may have a bajonet like appearance as shown with numeral 9a in figure 4 and the outer post may have wedge like notches 9b adapted for engagement by rotation with the bajonet slots 9a.

In this connection it should be noted that the support post and/or the outer post must not necessarily be circular as shown in the drawings but the inner post or the outer post or both may have a square cross section form or any other cross section form to provide or enable special effects.

The drop hammer shown in figures 1 and 2 comprises two half cylinders 10 and 11 which are rotatably connected to each other by means of hinges 12. Opposite to the hinges each half cylinder has cooperating means for locking of the hammer in the closed position, for instance locking hooks 13 and 14 adapting to cooperate by means of a releasable pin 15. Preferably the drop hammer has such length that it is conveniently guided on the support post when being lifted and let down, and at least the bottom edge of the drop hammer should be formed with such width as to give a sufficient large contact surface with the upper edges of the wings so that the wings are not damaged when driving the post down in the ground or in the rock bore or the concrete bore. High hammers ought to have two different knocking means, one adjacent the top and one adjacent the bottom. For lifting purposes the drop hammer is formed with two lifting handles 16. The hammer has a weight which is suited for handling by one or possibly two workers, for instance a weight of 10-30 kg which weight is quite sufficient for driving the post down both in hard ground and in asphalt-covered or plate-covered ground surfaces.

The drop hammer also may be connected to a means for mechanically operating the hammer, for instance a hydraulic or pneumatic vibratory rock drill, and for this purpose the upper portion of the hammer may have a drill shank for the attachment of the rock drill. High frequency vibrations from the rock drill may drive the support post down in the ground as well as low frequency impacts by manually operating the drop hammer.

For increasing the contact surface of the hammer to the post

wings the bottom side of the hammer may be widened, for instance in that a ring of a suitable material is welded to the outside of the hammer and indicated with the dotted lines in figure 1. At the same time or alternatively the wings may be formed with a widened upper surface as mentioned above.

When handling short posts the drop hammer may be a closed cylinder which is mounted on the post from the top and which is lifted off the post when the post has been driven down to the intended depth in the ground. Alternatively the drop hammer may be formed with an axial slot extending through the cylinder wall as shown in figure 3. The slot should be at least as wide as the post and the hammer is mounted in that the drop hammer is moved radially onto the post and is removed in the opposite direction after the post has been driven down in the ground.

When utilizing the above described apparatus in natural ground or compressed fillings comprising clay, moraine, gravel or sand and on asphalt covered or plate-covered surfaces the place where the post is to be driven down is marked and the support post 1 is put with the lower end or the tip on the ground, the drop hammer 2 is mounted from the open position shown in figure 2 to a closed position and is locked by means of the pins 15 engaging the locking hooks 13 and 14 whereupon the hammer repeatedly is lifted some distance for instance 400-600 mm and is let free whereby the hammer hits the upper edges 7 of the wings 5. If the post should meet a stone or any other hard object in the ground it gives way automatically and then continues the movement down in the ground aside of the said stone. Thereby the wings act as stabilizing means maintaining the post in the vertical position. When the post has been driven down so far that the wings 5 with the upper edges 7 are located some hundred millimeters below the ground surface the post is considered completely driven down. At the same time as driving the post down the ground around the post is hardly compressed in that the hammer with the upper edge packs the ground.

If it is wanted to pack the ground over and aside the wings further earth, gravel or sand may be filled over the cavity which is formed in the ground by the drop hammer, and the hammer is once



again lifted and let free some further times, possibly with further filling of earth, gravel or sand, whereby the ground is hardly packed both over and aside of the wings.

After the support post has been driven down in the ground the outer post may be pushed over the support post from above. The outer post 17, which is shown in the initial position in figure 4 and in the fully mounted position in figure 6 is secured in the slots 9 at the upper edges of the wings, whereby the outer post is mounted steadily. In case that the outer post 17 has a substantially larger inner dimension than the outer dimension of the support post 1, or if a direct metallic contact between the two posts should be avoided, one or more rings 18 of rubber or any other elastic material is mounted on the support post 1 before the outer post 17 is mounted. The rubber rings 18 prevent the outer posts from rotate around the support post. Depending on the friction between the outer post and the inner post a relatively large force is needed for removing the outer post from the inner post. If it is wanted to safely anchor the outer post the upper rubber ring as shown in figures 1 and 2 is secured by means of a conical ring of steel or synthetic resin which secures the rubber ring and thereby the outer post and prevents the outer post for moving upwards. As usual tables, signs, traffic lights or any other object may be mounted on the outer post as shown for instance in figure 6.

For preventing the outer post from rotating on the support post the wings and the outer post may be formed with a bajonet like means 9a and 9b as shown in figure 4 or the outer post may alternatively be somewhat slotted at the upper edge so that the slots of the outer post embrace the wings thereby securing the outer post to the wings, or the outer post may have some mechanical locking means like a locking screw which is mounted between the outer post and the support post.

As mentioned above the support post is quickly and simply secured in the ground at the same time as the ground around the post is strongly packed. Thereby the support post is effectively prevented from rotating or wobbling in any direction and also from unintentionally being pulled up from the ground. Depending on the



very little transversal action. The post can stand even a rather strong frost lifting action. If it is wanted to increase the safety against unintentional moving upwards of the support post the wing may be formed with barbs as previously mentioned. The said barbs do not to any substantially extent prevent the driving down of the post, but on the contrary the barbs is a strong obstacle against pulling up of the post from the ground.

When mounting the post on asphalt covered streets, roads, pavements the same procedure is followed as when mounting the post in the ground. Since the support post according to the embodiment shown in figure 1 is pointed or flattened at the bottom edge it is very well possible to force the post through even rather thick asphalt layers by means of a drop hammer, and the post is driven down through the asphalt layer with very small damages of the asphalt. Normally the asphalt does not need to be repaired after such mounting of the post.

If the post is to be used on places where the surface is covered by a square concrete plate, for instance on pavements and market places the wings may be mounted on the post so as to follow the design/the joint of the plates. When mounting a support for instance for a waste paper basket, or a bicycle stand, for occasional or permanent closing of a street etc. by means of a bar in a town it is therefore sufficient to remove a corner of a concrete plate by means of a cape chisel and to drive the post/the support down in the ground.

When driving the support post down in bores in rock or concrete material it is foreseen that the bore is somewhat wider than the post, and preferably the wings 5 are mounted on the tube or bar 3 in an angle to the radius. The driving down is made in the same way as when driving the post down in the ground. During the driving down the wings fold successively following the lowering of the post in the bore and the wings 5 successively fold round the tube 3 and thereby provide a wedge joint between the tube 3 and the bore of the rock or concrete preventing both rotation and wobbling and pulling up of the post from the bore.

In order to facilitate a driving down of a post meeting a stone



or some hard material the lower part 19 of the triangular wings may be kept free so that the said lower part 19 may fold in either direction thereby guiding the wing and the entire post past the stone or the hard object in the ground.

According to a further embodiment shown in figure 5 of the drawings the wings 5' are mounted in some angle to the axial direction of the post or in a screw formation so that the post is screwed down into the ground. Thereby the post is automatically secured against pulling up of the ground.

According to a still further embodiment of the invention the lower part of the drop hammer is formed with axial slots corresponding to the location of the wings 5 of the post, and said axial slots which are indicated with the dotted lines in figure 3, provide a guide for the hammer when driving the post down in the ground. Preferably the said axial slots 20 are of such length that the drop hammer does not completely leave the wings 5 during the hammer operation. This is of importance when operating the hammer by means of mechanical means like a rock drill. Thereby the slots 20 also prevent the wings from being damaged while being acted on by the drop hammer.

It is to be understood that the above description and the embodiments of the invention shown in the drawings are only illustrating examples and that many different modifications may be presented within the scope of the appended claims.

C L A I M S

1. Method for mounting of a post or a support post in natural ground and compressed fillings comprising clay, moraine, gravel sand or on asphalt-covered or plate-covered surfaces or in bores in rock or concrete material, characterized in that a support post (3) at the lower end (4) thereof is formed with one or more projecting wings (5) and in that a separat annular drop hammer (2) is mounted on the post with the post (3) extending through the bore of the drop hammer and with the hammer in contact with the upper edges (7) of the post wing or wings (5) whereupon the drop hammer repeatedly is lifted and let free to hit the wings (5) until the post has been driven down to the intended depth in the ground or the bore, and the drop hammer (2) is removed from the post (3), and the post (3) may be formed with or connected to the main object intended to be mounted on the post.

2. Method according to claim 1, characterized in that the post (3) is driven down so far in the ground by means of the drop hammer (2) that the wing or wings (5) with the upper edge (7) thereof are located at or preferably some distance below the ground surface, whereupon the drop hammer in the last driving down stage concurrently packs the ground hardly round the post (3) and the wings (5) and preferably above the wings (5).

3. Method according to claim 1 or 2, characterized in that the upper edges (7) of the wing or wings (5) are formed with a widened portion to increase the contact surface between the drop hammer (2) and the wings (5) and that the wings are formed with means, for instance fold out barbs (8), for counteracting a pulling up of the post from the ground when driven down.

4. Method according to claim 1, 2 or 3, characterized in that an outer post (7) is mounted on the support post (3) which is secured in the ground or in the bore of the rock or the concrete material, whereby the wings (5) at the upper edge (7) thereof and adjacent the post tube or bar (3) is formed with downwards extending slots (9) circumscribing a surface corresponding

to the outer surface of the said outer post (17), and in that the outer post (17) from above is moved over the support post (3) so as to be surrounded by the wing slots (9) at the lower end of the post.

5. Method according to claim 4, characterized in that the wing slots (9a) are bajonet like and that the outer post (17) is formed with bajonet engagement notches (9b) for safely securing the outer post (17) in relation to the support post (1) by a rotary movement.

6. Method according to claim 4 or 5, characterized in that one or more rings (18) of a plastic or elastic material is mounted on the support post (3) before the outer post (17) is pushed over the support post.

7. Method according to any of the preceding claims, characterized in that the wings (5) are mounted in a screw form on the support post (3) or that the lower end (19) of the wings is maintained free for folding in case of hitting a stone or any other hard object in the ground, so that the support post is driven down in an at least partly rotatory movement in the ground.

8. Apparatus for executing the method according to any of the preceding claims for driving a support post down in natural ground or for compressed fillings comprising clay, moraine, gravel, sand or in asphalt-covered or plate-covered surfaces or in bores in rock or concrete material and comprising a support post (1) which at the lower end (4) has one or more outwards projecting wings (5) characterized in that the apparatus comprises a separate annular drop hammer (2) adapted to be mounted on the support post with the post extending through the bore of the drop hammer and with the hammer in contact with the upper edge (7) of the wing or wings (5), and in which the drop hammer is formed with two cylindric halves (10, 11) which are hinge mounted (12) to each other and can be locked (13-15) to each other, or the drop hammer is formed with an axial slot extending through the cylinder wall thereof to enable a mounting of the drop hammer by a radial movement onto the support post, and whereby the wings (5) preferably are formed with horizontal upper edges (7) for giving the drop hammer the largest possible contact surface.

9. Apparatus according to claim 8, characterized by an outer post (17) to be mounted on the support post (1), whereby the wings (5) at the upper edge (7) thereof and adjacent the support post tube (3) is formed with axially extending slots (9), which circumscribe a surface corresponding to or being slightly larger than the outer area of the outer post (17), and whereby the outer post (17) when mounted is resting in and is secured by the slots (9) of the wings (5), and in that the outer post is formed with or connected to the main object, for instance the rail, the fence, the table, the sign etc. intended to be mounted on the post.

10. Apparatus according to claim 8 or 9, characterized in that the wings (5) are triangular with the apex (6) facing down, and in that one or more of the wings (5) at the obliquely extending outer edges are slotted and formed with outwards folded barbs (8) with the apex facing down for preventing unintentional pulling up of the support post (1) from the ground.

11. Apparatus according to claim 9 or 10, characterized in that means (18; 9a, 9b) are provided for safely securing the outer post (17) on the support post (1) when fully mounted.

12. Apparatus according to claim 8, characterized in that the drop hammer (2) is formed with a widened portion at the bottom end thereof and/or that the wing (5) at the upper edges thereof are formed with a widened surface for increasing the contact surface of the drop hammer and the wings.

13. Apparatus according to any of claims 8-12, characterized in that the wings (5) for a post intended to be driven down in the ground are directed radially outwards, whereas the wings (5) for a post intended to be driven down in a bore of rock or concrete material are mounted in an angle to the said radius.

14. Apparatus according to any of claims 8-13, characterized in that the wings (5) are mounted in a screw formation.

15. Apparatus according to any of claims 8-14, c h a r a c -
t e r i z e d in that the lower part (19) of the wing or wings (5)
is free for being folded in either direction in case of hitting a
stone or any other hard material when being driven down in the
ground.

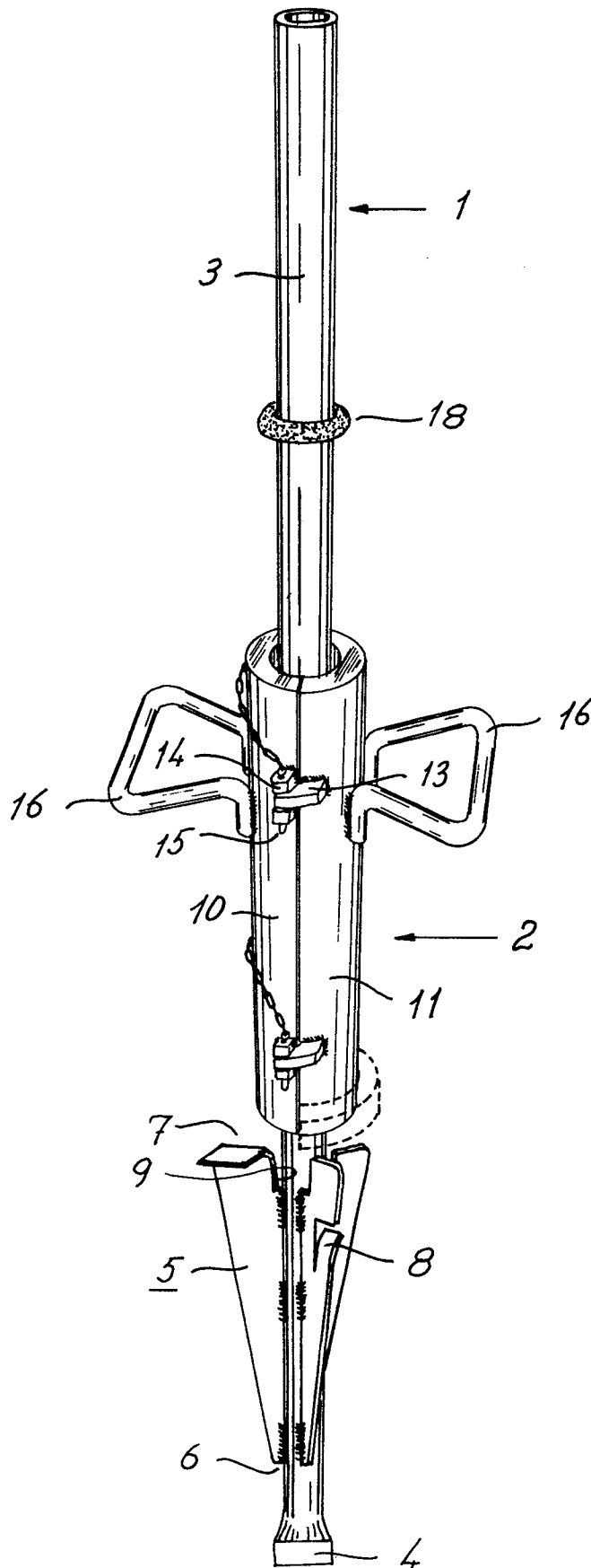


Fig. 1

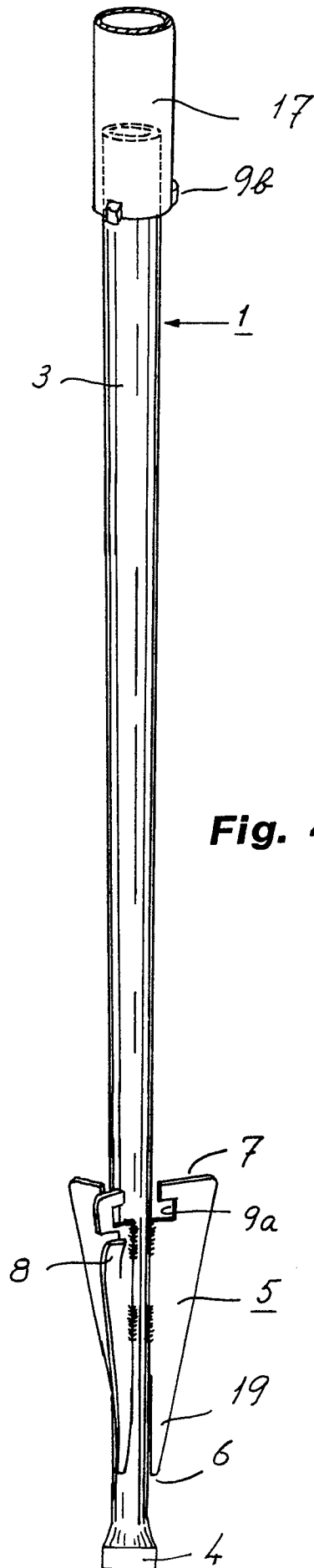


Fig. 4

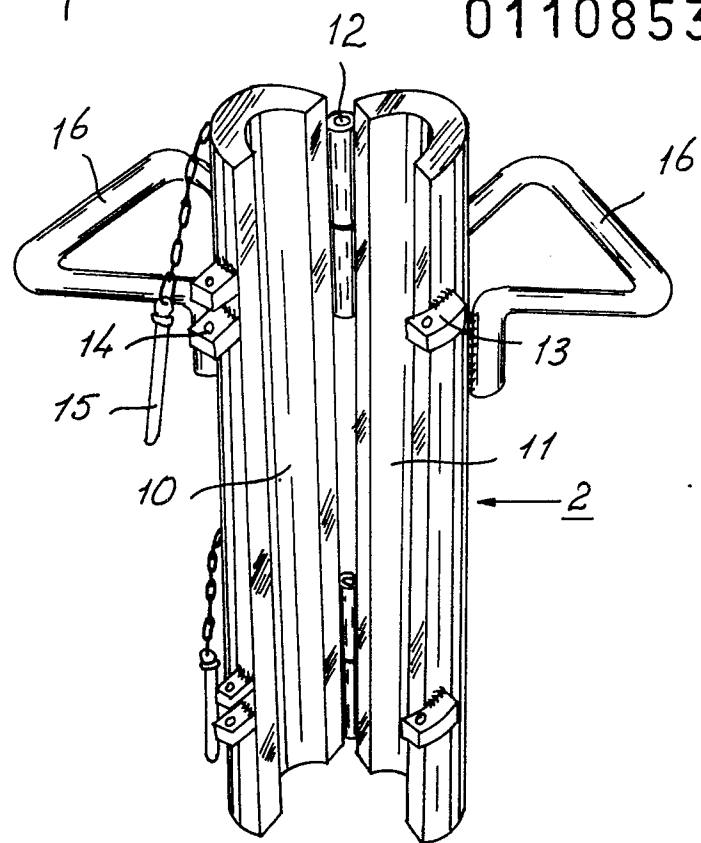


Fig. 2

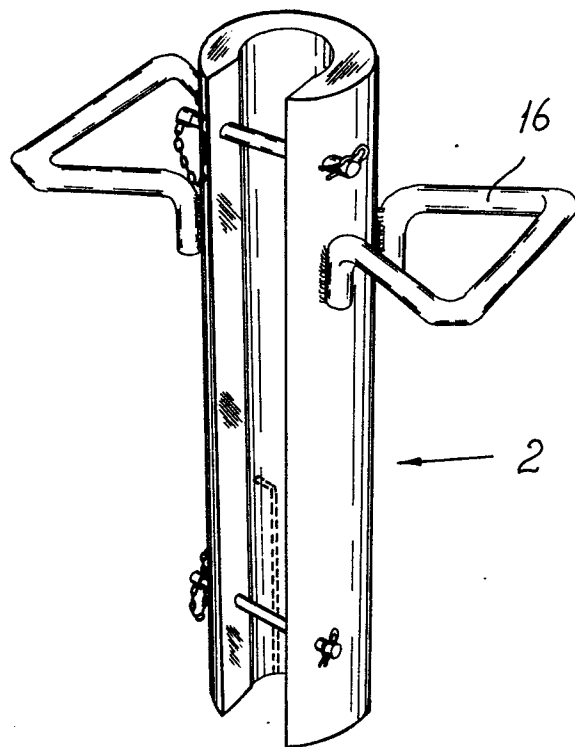
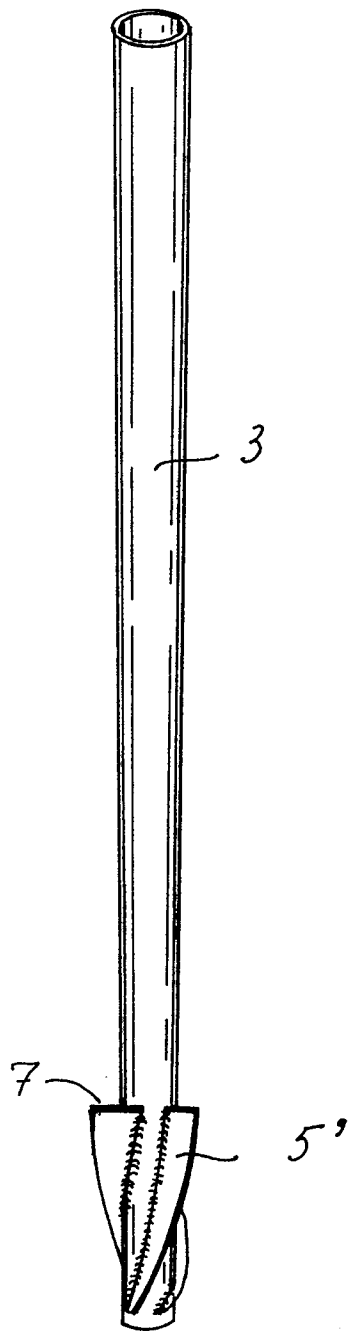
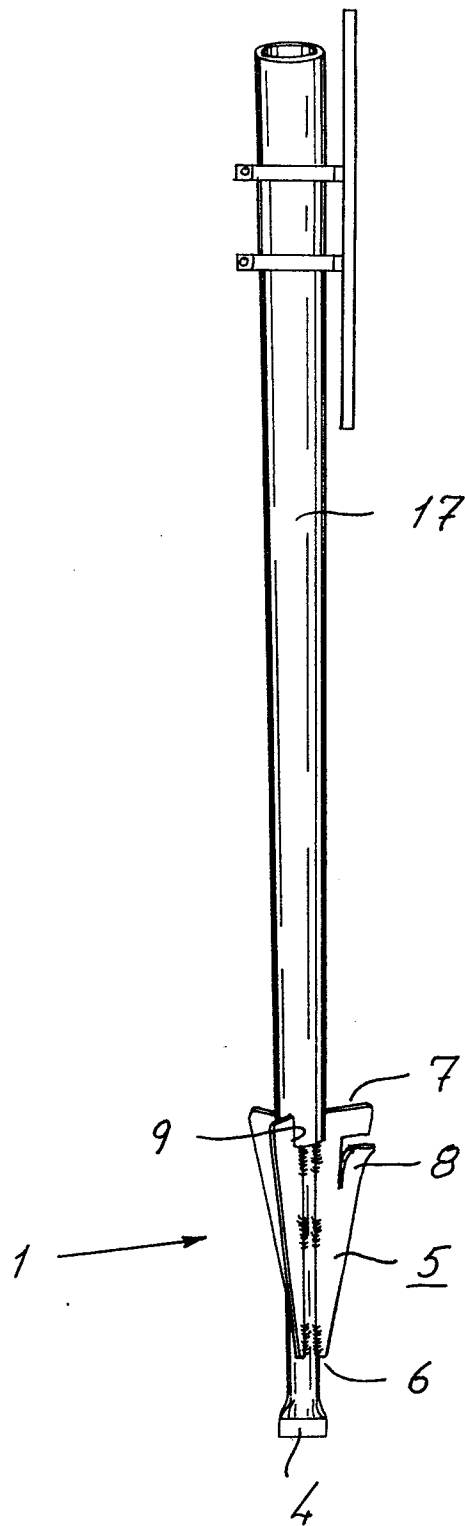


Fig. 3

**Fig. 5****Fig. 6**



European Patent
Office

EUROPEAN SEARCH REPORT

0110853

Application number

EP 83 85 0310

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. ³)
X	US-A-2 067 890 (COLLORD) * Page 1, right hand column, line 29 - page 2, right hand column, line 33 - figures 1-4 *	1-3, 8, 10, 12, 13	E 01 F 9/01 E 04 H 12/22 E 04 H 12/34 E 04 H 17/00 E 04 H 17/20 E 04 H 17/26
X	US-A-2 086 213 (COLLORD) * Page 1, right hand column, line 15 - page 3, left hand column, line 5; figures 1-4 *	1, 2, 8, 10, 13	
A	EP-A-0 011 197 (SILBERNAGEL) * Page 7, line 22 - page 10, line 14; figures 1, 2 *	1-4, 8, 13	
A	US-A-2 282 049 (HAGGART, JR.) * Left hand column, line 46 - right hand column, line 41; figures 1-6 *	1, 8	TECHNICAL FIELDS SEARCHED (Int. Cl. ³) E 01 F 9/00 E 04 H 12/00 E 04 H 17/00
A	DE-U-6 946 184 (STREIF) * Claims 1, 2; figures 1-3 *	1, 8, 10, 13	
A	US-A-4 120 125 (CVETAN) * Column 2, lines 18-60; figures 1-5 *	1, 2	
The present search report has been drawn up for all claims			
Place of search BERLIN		Date of completion of the search 20-02-1984	Examiner PAETZEL H-J
CATEGORY OF CITED DOCUMENTS		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document			



European Patent
Office

EUROPEAN SEARCH REPORT

0110853

Application number

EP 83 85 0310

Page 2

DOCUMENTS CONSIDERED TO BE RELEVANT			Page 2
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. ³)
A	DE-U-1 975 940 (THOMAS DRAHTZAUNBAU- UND BAUSTOFFGROSSHANDLUNG) * Claim 6; figures 1,2 *	3,10	
A	FR-A-2 456 811 (ETABLISSEMENTS LACOUR & CIE.) * Figures 1,2 *	3,10	
A	GB-A-1 187 723 (TREFILERIES LEON BEKAERT P.V.B.A.) * Figures 1,4,5 *	5,11	
A	DE-U-7 301 051 (MÜLLER) * Page 1, paragraph 4; claim 3; figure *	6	
A	DE-U-1 709 253 (KAYSER) * Claim 6; figure 3 *	7,14	TECHNICAL FIELDS SEARCHED (Int. Cl. ³)
A	US-A-3 712 389 (SMOAK)		
A	DE-U-7 009 551 (STREIF)		
The present search report has been drawn up for all claims			
Place of search BERLIN		Date of completion of the search 20-02-1984	Examiner PAETZEL H-J
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	