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(54) Support structure for cage for reinforcing a concrete pile

(57) A collar for use in a cage for reinforcing a concrete pile, comprising transverse frame means (10, 11) and clamping means (25, 26) fixed to the transverse frame means for engaging at least one reinforcing bar (43, 44) extending longitudinally of the cage to secure the reinforcing bar to the collar. The clamping means (25, 26) conveniently comprises scaffolding clamps.

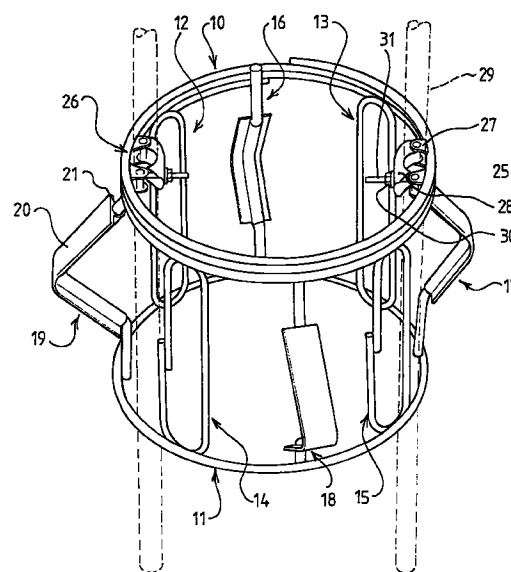


FIG 1

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Description

This invention relates to a support structure for use in a cage for reinforcing a concrete pile, the support structure maintaining a plurality of reinforcing bars extending in the longitudinal direction of the cage and pile in spaced relation to one another. Such a support structure is commonly called a collar, which term will be used herein for convenience.

A collar for a pile-reinforcing cage is disclosed in our published European patent application EP-0608068-A1. That collar comprises two spaced-apart superimposed transverse frames which in use are secured to the longitudinally extending reinforcing bars of the cage, and metal rods extending longitudinally between the two transverse frames, at least three of the rods extending between the frames having radially outwardly off-set guide portions which lie outside the volume bounded by the frames and which are corrosion resistant. The guide portions serve to locate the collar within the concrete so that an adequate thickness of concrete surrounds all parts of the collar and thus the cage.

Pile-reinforcement cages usually are assembled on site, each cage being assembled from two collars and an appropriate number of separate longitudinal reinforcing bars. While some of the bars of the cage need only to be connected to the collars by ties which serve to hold them in place until concrete is poured around the cage to form a pile, it is necessary for two or more of the bars to be connected to each collar by a stronger method. This is to enable the cage to be handled, and in particular lifted, as a strong substantially rigid unit.

Bars have been connected to collars for this purpose by fasteners, each comprising a U-bolt which embraces the reinforcing bar and a part of the collar, a bridging piece being fitted on the two free ends of the limbs of the U-bolt and tightened by nuts on threaded end portions of such limbs. These enable strong connections to be achieved, but they require the nuts carefully to be tightened to the correct torque. If there are several such connections around the collar, it is possible for the tightening of one to interfere with the correctly-tightened status of the adjacent one, and there thus arises a danger that the cage might come apart when being lifted.

It is broadly the object of the present invention to provide a collar which enables this problem to be overcome or ameliorated.

According to the present invention, therefore, we provide a collar for use in a cage for reinforcing a concrete pile, comprising transverse frame means and clamping means fixed to the transverse frame means and adapted to engage at least one reinforcing bar extending longitudinally of the cage to secure said at least one reinforcing bar to the collar.

Preferably the clamping means comprises a respective clamping device for engaging each reinforcing bar required to be secured to the collar. There may

be two clamping devices disposed diametrically opposite one another with respect to the transverse frame means. There may be more clamping devices if required.

Preferably each clamping device comprises a base portion fixed to the transverse frame means of the collar and a clamping portion defining with the base portion a formation in which a reinforcing bar can be received, and able to be moved relative to the base portion by a fastening means to clamp the reinforcing bar in said formation. Preferably the clamping portion is pivotable relative to the base portion, and conveniently such a clamping device is of the type commonly referred to as a scaffolding clamp and well known for use in securing scaffolding components together.

Preferably the collar is of the type disclosed in our European published patent application aforesaid, comprising two spaced superimposed transverse frames and a plurality of support rods extending therebetween, at least three of such rods having radially outwardly off-set guide portions lying outside the volume bounded by the frame. The support rods may have sections which extend alongside the two transverse frames and are line welded thereto, as disclosed in our published European patent application 0756049-A1. Alternatively, as also described in EP-0756049-A1, the two spaced apart transverse frames may be connected to one another by support plates extending between the frames, each support plate having edges which are line welded to the respective frames.

According to another aspect of the invention, we provide a cage for reinforcing a concrete pile, comprising two collars in accordance with the first aspect of the invention and a plurality of reinforcing bars extending therebetween, at least one of such reinforcing bars being connected to the collars by the clamping means on the collars.

The invention will now be described by way of example with reference to the accompanying drawings, of which:-

Figure 1 is a perspective view of a collar in accordance with the invention;

Figure 2 is a diagrammatic elevation of a pile-reinforcement cage incorporating collars in accordance with the invention.

Referring firstly to Figure 1 of the drawings, a collar for use in a cage for reinforcing a concrete pile comprises two transverse frames indicated generally at 10, 11, each being in the form of a ring. The frame 10 comprises a relatively long length of steel bar such as a concrete reinforcing bar coiled into a tight helix, while the frame 11 is similarly constructed but from a shorter length of bar such that the free ends of the length of bar overlap for a part only of the circumference of the frame. Although not depicted in the drawing, it will be appreciated that concrete reinforcing bar has a surface configured to grip concrete in which it is embedded.

The frames 10, 11 are secured to one another in superposed relationship as illustrated by four supporting bars indicated generally at 12, 13, 14, 15 extending therebetween and welded thereto. Each of the supporting bars 12 to 15 is made of steel bar somewhat thinner than that used for the frames 10, 11, bent into the illustrated elongate shape with generally parallel portions and generally semi-circular end portions, the latter being line welded to the frames 10, 11. There may be more than four supporting bars.

There further extend between the frames 10, 11 four spacer bars 16, 17, 18, 19 which are welded to the frames and each of which has, as shown for the spacer bar 19, a centre region 20 which is bent out of the volume bounded by the frames 10, 11 and the supporting bars 12 to 15. The centre regions as 20 of the spacer bars act to space the collar, and thus the cage including the collar, from the walls of a cavity into which concrete is poured to form a pile. Because the regions 20 of the spacer bars might be partly exposed on the surface of the concrete after it is set, such regions are protected against corrosion by being sheathed in a plastics sleeve as indicated at 21, or otherwise.

The frame 10 is provided with two diametrically opposed clamping devices 25, 26. The clamping device 25 comprises a base portion 27 which is welded to the frame 10 and a clamping portion 28 which is pivotably attached to the base portion 27. The portions 27, 28 define opposed halves of a formation able to receive a reinforcement bar indicated in outline at 29. The clamping portion 28 is able to be drawn towards the base portion 27 by a nut 30 on a bolt 31 which is held captive to the base portion 27, tightening of the nut 30 in abutment with the clamping portion 28 causing the latter firmly to clamp the reinforcing bar 29 to hold it to the collar.

The clamping device 26 is of the same construction as the clamping device 27, and it will be appreciated that such clamping devices are of a configuration and mode of operation which is generally known in clamping devices for use in scaffolding structures. Scaffolding clamps themselves may be utilised.

A concrete pile-reinforcement cage is shown in Figure 2 of the drawings. The cage comprises two collars 41, 42 each of which is as described above, spaced from one another. The collar 41 will be the top collar of the cage when in use in a pile, and its frame having the clamping devices is lowermost. A plurality of reinforcing bars extend between and beyond the collars and a diametrically opposed pair 43, 44 of such reinforcing bars are held by the clamping devices of the two collars. The other reinforcing bars are held to the collars by other means such as metal ties or the like, or possibly separate fastening devices of the U-bolt type as hereinbefore referred to.

When a cage as illustrated is assembled on site, the use of the clamping devices on the collars enables the reinforcing bars engaged by the clamping devices to connect the collars together in a rigid structure which enables the cage to be handled and lifted without dan-

ger of failure. It will be appreciated that if required more than the two clamping devices illustrated may be provided in each collar: it would be possible for all the reinforcing bars to be held to the collars by such clamping devices if required.

The features disclosed in the foregoing description, or the following claims, or the accompanying drawings, expressed in their specific forms or in terms of a means for performing the disclosed function, or a method or process for attaining the disclosed result, as appropriate, may, separately or in any combination of such features, be utilised for realising the invention in diverse forms thereof.

15 Claims

1. A collar (41, 42) for use in a cage for reinforcing a concrete pile, comprising transverse frame means (10, 11) and clamping means (25, 26) fixed to the transverse frame means and adapted to engage at least one reinforcing bar (43, 44) extending longitudinally of the cage, to secure said at least one reinforcing bar to the collar.
2. A collar according to Claim 1 wherein said clamping means comprises a respective clamping device (25, 26) for engaging each reinforcing bar required to be secured to the collar.
3. A collar according to Claim 2 comprising two of said clamping devices (25, 26) disposed diametrically opposite one another with respect to the transverse frame means.
4. A collar according to Claim 2 or Claim 3 wherein each said clamping device (25, 26) comprises a base portion (27) fixed to the transverse frame means of the collar, and a clamping portion (25) defining with the base portion (27) a formation in which a said reinforcing bar can be received, said clamping portion being able to be moved relative to the base portion by a fastening means (30, 31), to clamp the reinforcing bar in said formation.
5. A collar according to Claim 4 wherein said clamping portion (28) is pivotable relative to the base portion (27).
6. A collar according to any one of Claims 2 to 5 wherein each clamping device comprises a scaffolding clamp.
7. A collar according to any one of the preceding claims comprising two spaced superimposed transverse frames (10, 11) and a plurality of support rods (12-19) extending therebetween, at least three of said support rods (16-19) having radially outwardly offset guide portions lying outside the volume bounded by the frame.

8. A cage for reinforcing a concrete pile, comprising two collars (41, 42) in accordance with any one of the preceding claims and a plurality of reinforcing bars extending therebetween, at least one (43, 44) of such reinforcing bars being connected to the collars by the clamping means of the collars.

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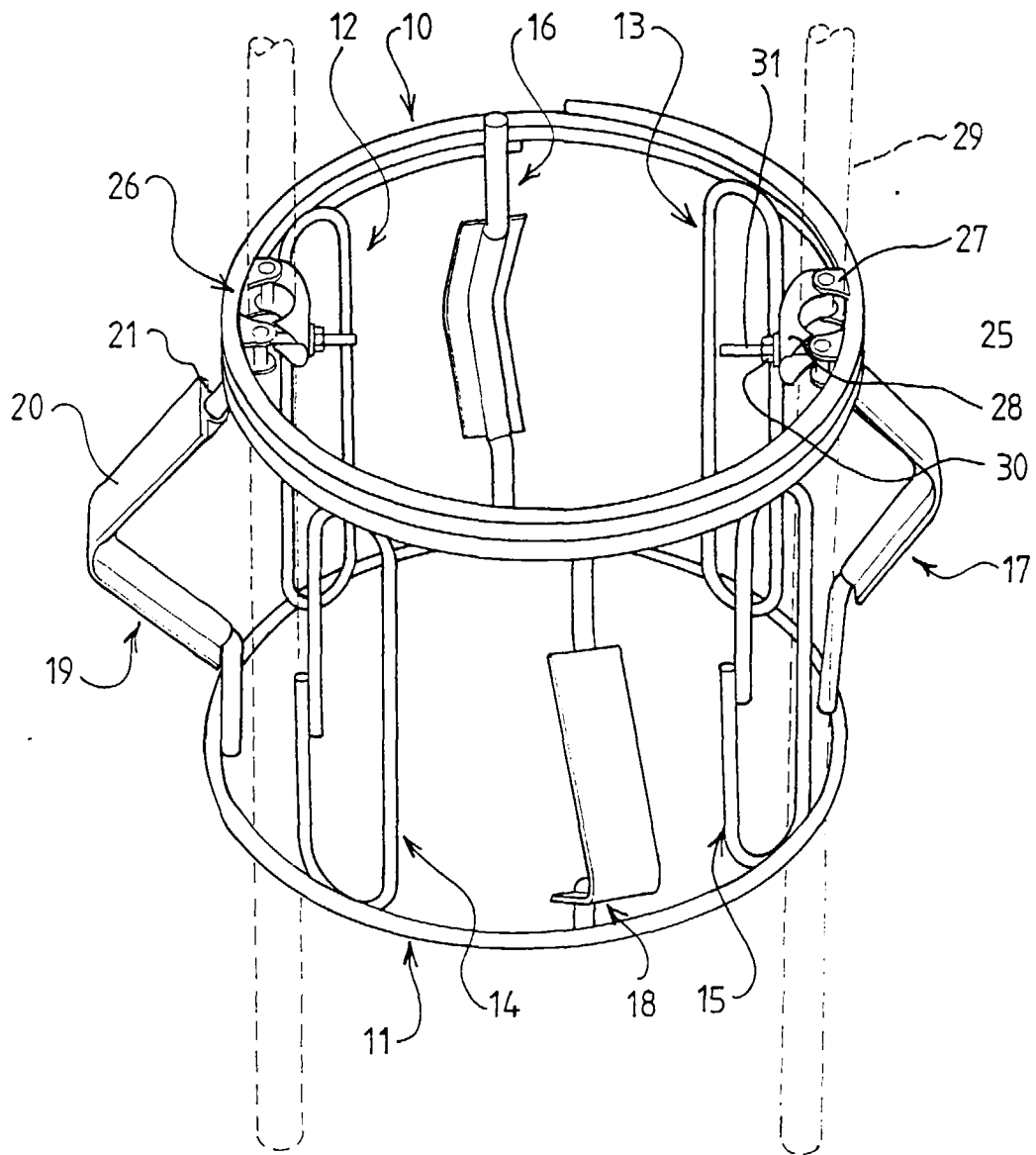


FIG 1

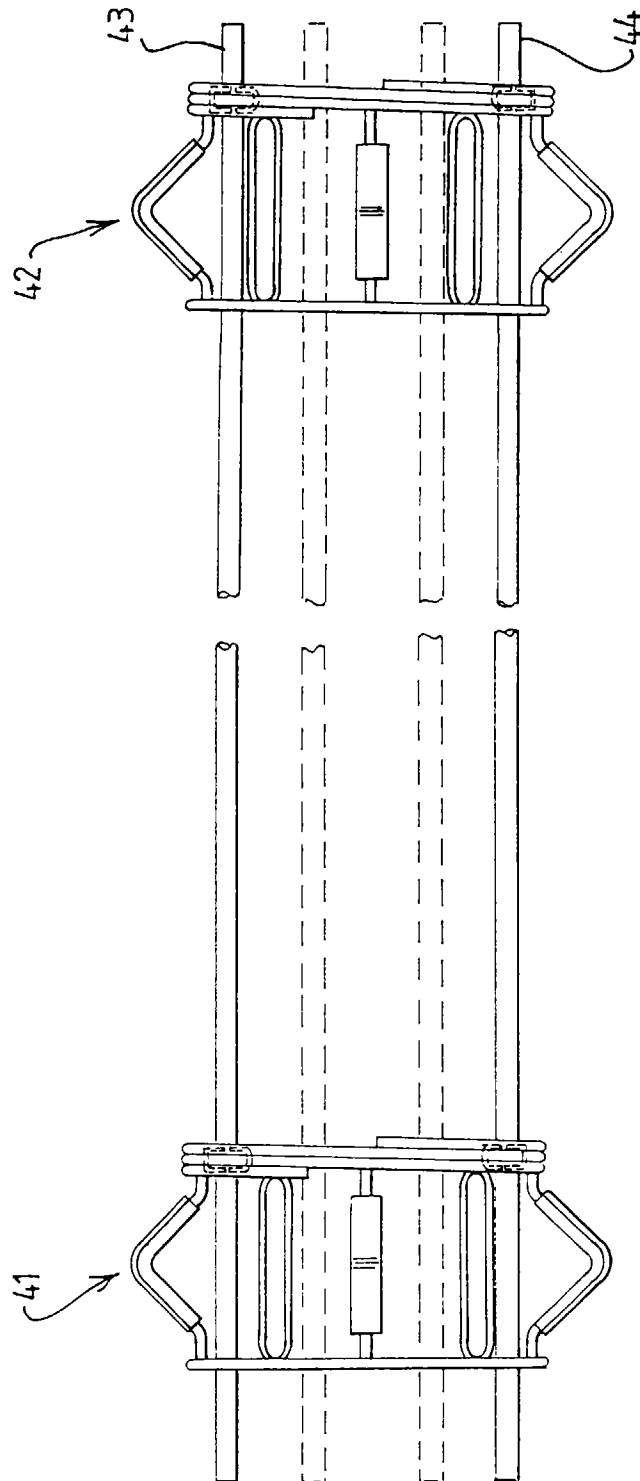


FIG 2



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EUROPEAN SEARCH REPORT

Application Number
EP 97 10 3160

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.6)
Y	DE 80 00 422 U (LANDSHUTER BAUEISENBIEGEREI GMBH) 11 May 1983	1,8	E04C5/06 E02D5/38
A	* page 4, paragraph 2 - page 8, paragraph 3; figures 1-6 *	2	
Y	---		
Y	GB 2 235 223 A (BACHY) 27 February 1991	1,8	
A	* figures 1,2 *	7	
Y	---		
A,D	EP 0 608 068 A (GRAY ENGINEERING LIMITED) 27 July 1994	1,7	
	* figures 1-3 *		
Y	---		
A	FR 658 897 A (SOUTHERN ET AL.) 21 June 1929		

The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			E04C E02D
Place of search	Date of completion of the search	Examiner	
BERLIN	2 May 1997	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	
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