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(54) Collar for concrete reinforcement cage

(57) A collar for a concrete reinforcement cage, comprising two spaced rings 212, 214 connected to one another by support bars 216 that extend between the planes of the rings. The support bars 216 are bent to define sections 216a and 216b that extend alongside the two rings 212, 214, the latter sections being secured by line welds 240 to the rings 212, 214.

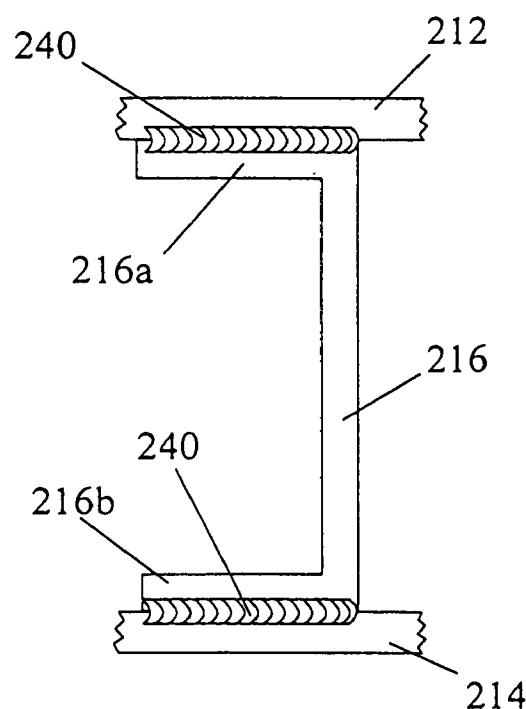


Fig. 2

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Description

The present invention relates to a collar on to which bars are tied to form a concrete reinforcement cage.

It is known to form a cage for concrete reinforcement, e.g. for reinforcing a concrete pile, by tying metal cage bars to collars arranged at intervals along the length of the cage. The collars are each formed by a pair of frames that are parallel to one another and spaced along the length of the cage. The frames are often circular, and will hereinafter be referred to as rings, but they may alternatively be polygonal and it is to be understood that such polygonal forms are within the scope of the term "rings". A plurality of support bars extend between the rings and are spot welded to the rings to form a rigid collar. The main cage bars are secured to the collars by wire ties that hold the cage bars against the rings and against the support bars extending between the rings.

A problem that has been found with a collar constructed in this manner is that the spot welds between the support bars and the rings can come apart when the cage is tilted by raising it at only one end, on account of the shearing forces that are exerted by the weight of the cage. Apart from the resultant weakening of the cage, the support bars can come away completely from the collars and they can cause injury to personnel standing beneath the cage as it is being manoeuvred into position.

It is an object of the present invention to mitigate the foregoing disadvantage.

According to the present invention, we provide a collar for a concrete reinforcement cage, comprising two spaced rings connected to one another by support members that extend between the planes of the rings, wherein the support members are shaped to define portions which extend alongside the two rings and are welded to the rings by welding along said portions.

The support members may comprise bars shaped to define sections that extend alongside the two rings and are welded thereto. Alternatively, the support members may comprise plates having edge portions that extend alongside the two rings and are welded thereto.

Whereas in the prior art, the support bars passed through the rings making only point contact with the rings and were only spot welded to the rings, in the present invention, the support bars or plates have sections or edges that run parallel to the rings and are welded to them along a line of welding that makes it much more difficult for shearing forces to separate the support bars or plates from the rings.

Preferably the welding comprises line welding along said portions. Although it is preferred that such line welding is uninterrupted, it will be appreciated that a line of welding can be interrupted without detracting greatly from its strength and indeed a line of discreet welds could provide substantially the same effect as a continuous line weld and are to be regarded as within the scope of the present invention.

Preferably each support bar is doubly bent at each end, whereby each support bar comprises a central section extending between the rings, two sections that run parallel to and are line welded to the rings, and two return sections each extending from a respective one of the rings towards the other, the two return sections being welded either to one another or to the central section of the support bar.

When using support plates instead of bars, similar configurations can be cut out of a metal plate.

Advantageously, the cage may also comprise spacer bars that extend between the rings and have central regions bent out of the volume bounded by the rings and the support bars that act to position the cage with respect to the walls of the cavity into which concrete is poured. These spacer bars are optional and may not be required in all situations.

Conveniently, at least the central regions of the spacer bars have a corrosion resistant coating or are sheathed in a plastics sleeve. The plastics coating is not essential in all cases.

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

Figure 1 shows a conventional collar for a concrete reinforcement cage;

Figure 2 is a detail of a modification of the cage of Figure 1 constructed in accordance with a first embodiment of the invention, and

Figures 3, 4, 5, 6 and 7 are details similar to that shown in Figure 2 of four further embodiments of the invention.

The collar 10 of Figure 1 comprises two generally planar rings 12 and 14 that are spot welded to four support bars 16, 18, 20 and 22 extending between the two rings. As illustrated the rings are circular but they could alternatively be polygonal. Four spacer bars 24, 26, 28 and 30 also extend between the rings 12 and 14 and are spot welded to them and each of these has a regional 24a to 30a that is bent out of the volume bounded by the rings 12, 14 and the support bars 16 to 22. In some situations, the spacer bars are not required and they may be omitted.

The central regions 24a to 30a act to space the cage from the walls of the cavity into which the concrete is poured and because they may subsequently be partly exposed on the surface of the concrete after it has set, it is desirable, though not essential, that at least these regions should be protected against corrosion, preferably by being sheathed in a plastics sleeve.

As so far described, the collar 10 is conventional. In use, two or more such collars are used to form a cage. Cage bars are secured to the collars 10 by wire ties that are twisted around the cage bars and the support bars. This operations is normally carried out with the cage bars horizontal. Using a crane, the assembled cage is lifted by one end into a vertical position and it is then

lowered into the cavity into which concrete has been or will be poured. The spacer bars 24 to 30 act to centre the cage within the cavity during this step.

The problem that was found in using a cage constructed using a collar such as shown in Figure 1 is that the spot welding between the rings 12, 14 and the support bars 16 to 22 of the collar was not strong enough to withstand the shear forces that acted on the collars while the cage went through an inclined position when being raised from its horizontal to its vertical position using a crane.

To avoid this problem, the invention proposes using support members in the form of bars (Figure 2 to 6) or plates (Figure 7) that are line welded to the rings. When bars are used, they are shaped so that they should have a section running parallel to the rings 12 and 14 instead of merely intersecting the rings and line welding rather than spot welding the support bars to the rings. In Figure 2, the two rings 212, 214 are shown only in part together with only one of the support bars 216. The remaining three bars are not shown but they are all constructed and welded in the same manner.

In Figure 2, the support bar 216 is bent at both ends to define the sections 216a and 216b that run parallel to the rings 212 and 214 respectively. The line welds 240 that connect the support bar 216 to the rings 212, 214 extend over the region of overlap between the sections 216, 216b and the rings and make for a much stronger joint than the spot welding used in the prior art collar shown in Figure 1.

Though the embodiment of Figure 2 assures an improved connection between the support bars and the rings, the support bars are no stronger than in Figure 1. In the embodiments of the invention now to be described with reference to Figure 3 to 6, the section of the support bars extending between the two rings are strengthened in addition to the improvement of the welding between the support bars and the rings. In describing these embodiments, to avoid unnecessary repetition, the last two digits of each reference numeral will be the same for like components.

In Figure 3, which is a similar view to Figure 2 of a detail of a second embodiment of the invention, the support bar 316 is bent into a loop. In addition to the sections 316a and 316b being line welded to the rings 312, 314, in the same manner as in Figure 2, the return sections 316c and 316d of the loop are welded to each other by a further line weld 342. Each support bar now includes two limbs extending in parallel with one another between the two rings 312 and 314, and this increases the strength of the collar in particular its ability to withstand shearing forces that act in the planes of the rings to move the rings 312 and 314 in opposite directions.

In the embodiment of Figure 4, in addition to the return sections 416c and 416d being secured to one another by the line weld 442, the section 416d is secured by the line weld 444 to the central section of the support bar 416.

In Figure 5, the return sections 516c and 516d are not welded to one another and instead both are welded to the central section of the support bar 516 by line welds 544.

The embodiment of Figure 6 is similar to that of Figure 5 and it differs from it in that the sections 515a and 515b in Figure 5 lie on the same side of the central section of the support bar 516 whereas in Figure 6 the two sections 616a and 616b lie on opposite sides of the central section of the support bar 616.

The triangular structures that are formed in the support bars of the embodiments of Figures 4 to 6 all provide additional strength by bracing the central section of the support against bending when the collar is subjected to shear forces.

The embodiment of Figure 7 differs from those described by reference to Figures 2 to 6 in that a support plate 716 cut out of sheet steel is used in place of a bar. It will be readily apparent that, in this embodiment, the structure is analogous to the embodiments described by reference to Figure 4 and 5 and this embodiment therefore does not require detailed explanation. It will also be apparent that the shapes shown in Figure 2, 3 and 7 can also be cut out of steel sheet. However, in the simplest embodiment using support plates made of sheet steel instead of support bars, each support plate may consist of a thin rectangular strip line welded along its top and bottom edges to the two rings.

The invention has been described throughout by reference to collar having only two rings but it will be readily apparent that, where a longer collar is needed, more than two spaced rings may be used.

Although it is to be preferred that the welding between the support members and the rings is uninterrupted line welding as described above and shown in the drawings, it will be appreciated that if a line weld were to be interrupted this would not detract greatly from the strength of the weld and is to be regarded as within the scope of the invention. Further, a number of discreet welds extending along the portions of the support members alongside the two rings of the collar is also very little less effective than uninterrupted line welding in mitigating the disadvantage first herein described in relation to known cages and is also to be regarded as within the scope of the invention.

The invention can be considered, in the embodiments illustrated above, as the connection of the support members to the rings of the collar at positions which are offset in the direction circumferentially at the collar from the main longitudinal tension/thrust axis of the support members. This connection enables shearing forces as above described to be better resisted.

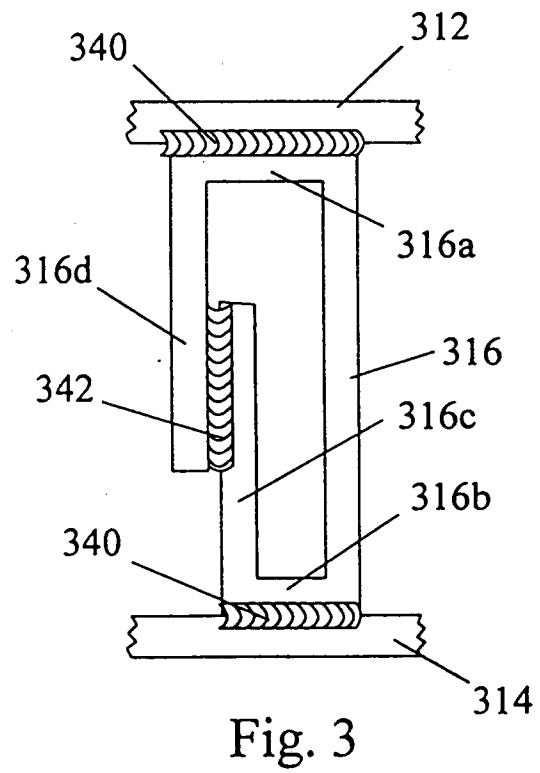
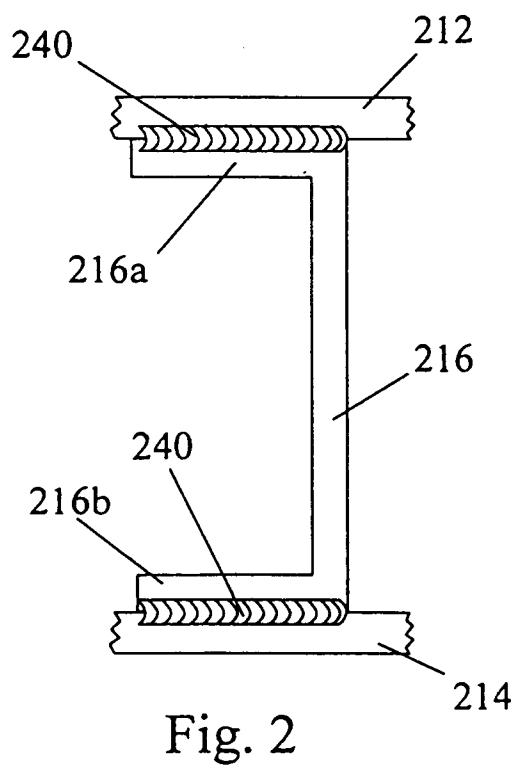
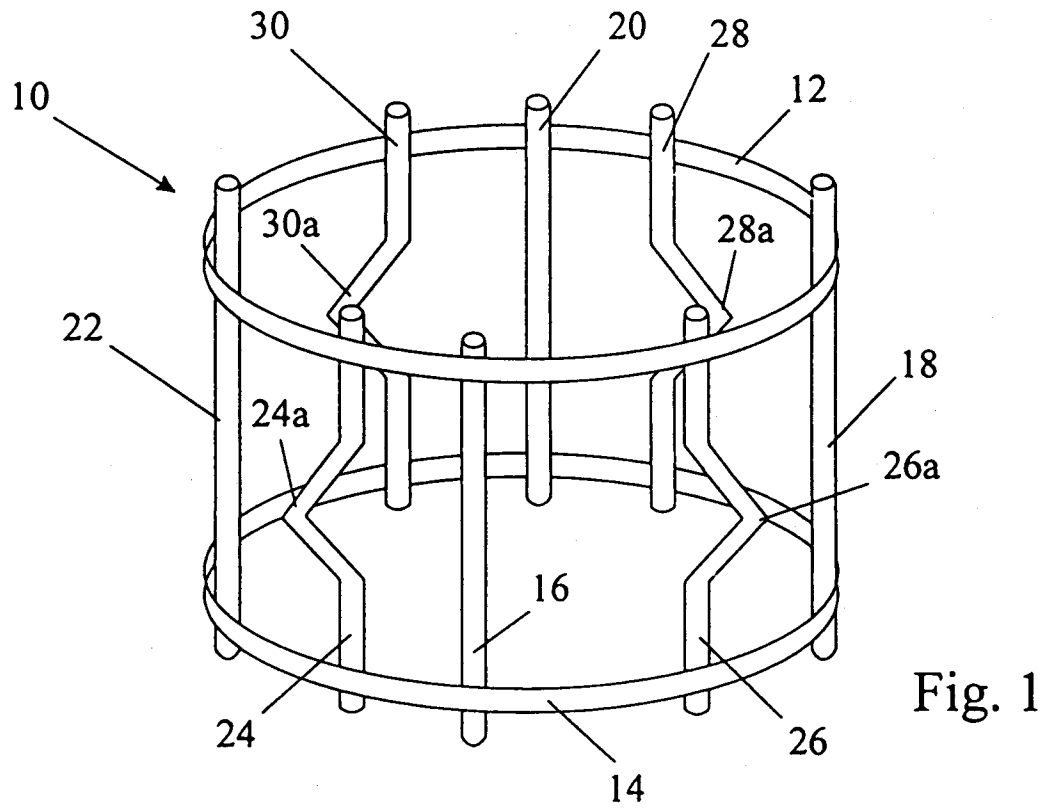
The features disclosed in the foregoing description, or the following claims, or the accompanying drawings, expressed in their specific forms or in terms of a means for performing the disclosed function, or a method or process for attaining the disclosed result, as appropriate, may, separately or in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

forms thereof.

Claims

1. A collar for a concrete reinforcement cage, comprising two spaced rings (212, 214; 312, 314; 412, 414; 512, 514; 612, 614; 712, 714) connected to one another by support members (216, 316, 416, 516, 616, 716) that extend between the planes of the rings, wherein the support members are shaped to define portions (216a, 216b; 316a, 316b; 416a, 416b; 516a, 516b; 616a, 616b; 716a, 716b) which extend alongside the two rings and are welded to the rings by welding along said portions. 5
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2. A collar according to claim 1, wherein said welding comprises line welding (240, 340, 440, 540, 640, 740) along said portions. 15
3. A collar according to claim 1 or claim 2 wherein said support members comprise bars shaped to define sections that extend alongside the two rings and are welded thereto (Figs 2-6). 20
4. A collar according to claim 3 wherein each support bar is doubly bent at each end, whereby each support bar comprises a central section extending between the rings, two sections that run parallel to, and are welded to, the rings, and two return sections each extending from a respective one of the rings towards the other, the two return sections being welded either to one another or to the central section of the support bar. 25
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5. A collar according to claim 3 or 4, further comprising spacer bars that extend between the rings and have central regions bent out of the volume bounded by the rings and the support bars, the spacer bars acting to position the collar with respect to the walls of the cavity into which concrete is poured. 35
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6. A collar according to claim 5, wherein at least the central regions of the spacer bars have a corrosion resistant coating or are sheathed in a plastics sleeve. 45
7. A collar according to claim 1 or claim 2, wherein said support members comprise plates having edge portions that extend alongside the two rings and are welded thereto (Fig 7). 50

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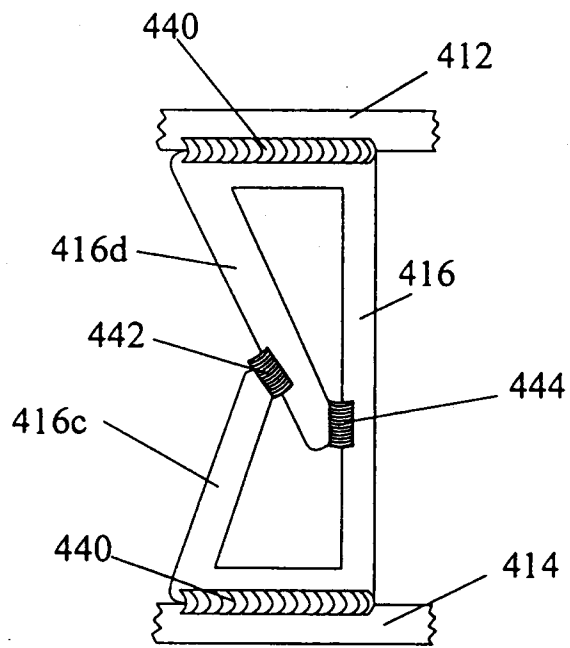


Fig. 4

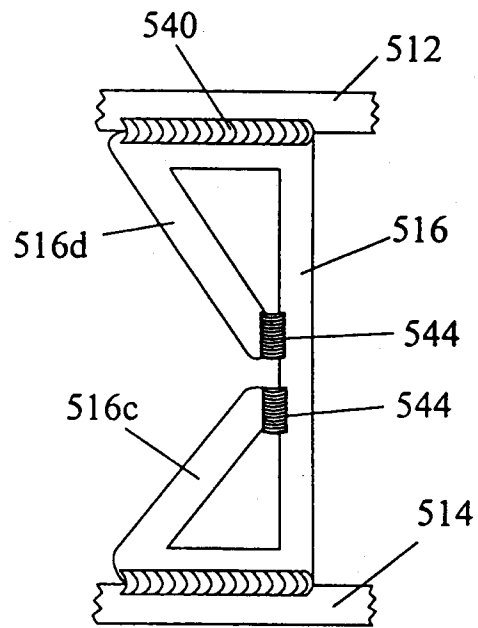


Fig. 5

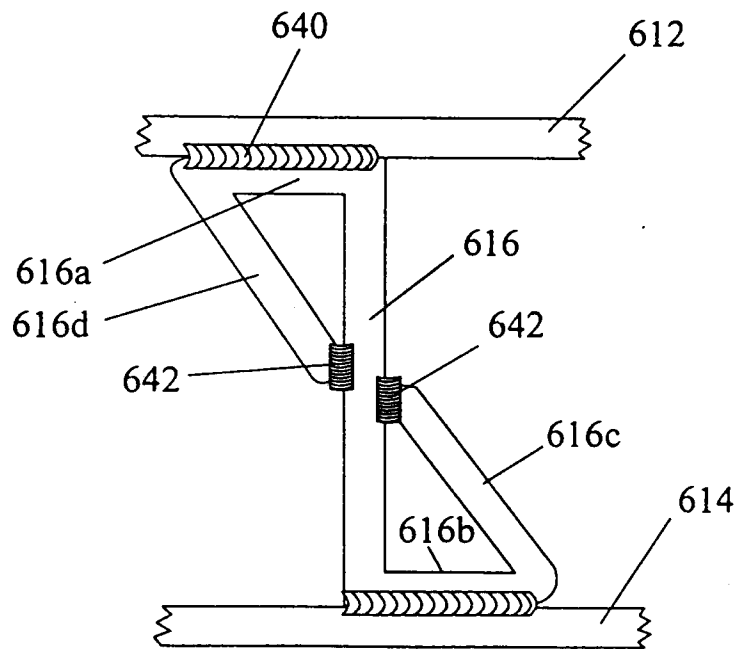


Fig. 6

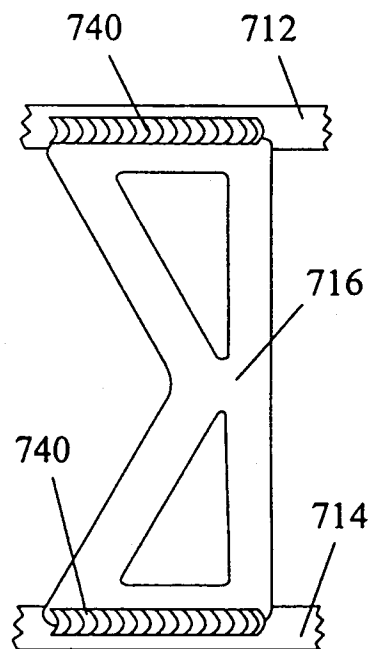


Fig. 7



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EUROPEAN SEARCH REPORT

Application Number
EP 96 11 1788

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)
A	GB-A-2 235 223 (BACHY) 27 February 1991 * page 1, line 22 - page 7; figures * ---	1	E04C5/06 E04C5/18
A	GB-A-2 274 299 (GRAY PREFABRICATION SERVICES L) 20 July 1994 * page 1, line 29 - page 5; figures * ---	1,5,6	
A	DE-U-87 02 254 (BTH BIEGETECHNIK HASAK GMBH) 25 June 1987 * page 5, line 26 - page 6; figures * ---	1,5	
A	DE-U-90 11 064 (BTH BIEGETECHNIK HASAK GMBH) 27 September 1990 * page 5, paragraph 4 - page 8; figures * ---	1,5	
A	FR-A-1 474 698 (SÜDWESTSTAHL G.M.B.H.) -----		
			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			E04C E02D
The present search report has been drawn up for all claims			
Place of search BERLIN		Date of completion of the search 5 November 1996	Examiner Paetzel, H-J
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