

(12)

EUROPEAN PATENT APPLICATION

(21) Application number: 85890018.6

(51) Int. Cl.⁴: **E 04 C 5/06**

(22) Date of filing: 24.01.85

(30) Priority: 24.01.84 FI 840279

(43) Date of publication of application:
21.08.85 Bulletin 85/34

(84) Designated Contracting States:
AT BE CH DE FR GB IT LI NL SE

(71) Applicant: **RAKENNUSVALMISTE OY**

SF-30420 Forssa 42(FI)

(72) Inventor: **Kankkunen, Heikki Ilmari**
Turuntie 25 as 65
SF-30100 Forssa 20(FI)

(74) Representative: **Wolfram, Gustav, Dipl.-Ing.**
Schwindgasse 7 P.O. Box 205
A-1041 Wien(AT)

(54) **Spiral reinforcement structure for precast concrete elements and method for manufacturing a combined reinforcement mesh.**

(57) Described herein are a spiral reinforcement structure for concrete elements (1), such as concrete beams or columns, comprising a continuous metal wire or bar (4-7) bent into a number of spirally arranged consecutive windings (4, 5 and 6) with a spacing (d) in the longitudinal direction of the structure, and a method for manufacturing a combined reinforcement mesh (2-7, 2'-7').

According to the structure, the planes of the windings (4, 5 and 6) are substantially perpendicular to the longitudinal direction of the structure, and progress in said longitudinal direction from one winding (4, 5) to the next (6) takes place within a limited distance (7) of each winding at the same side of the structure. The method comprises inserting structures (4-7 and 4'-7') of the above kind laterally inside each other from a side at least partially opposite said side where the limited distance (7, 7') is situated and fastening the structures with one another.

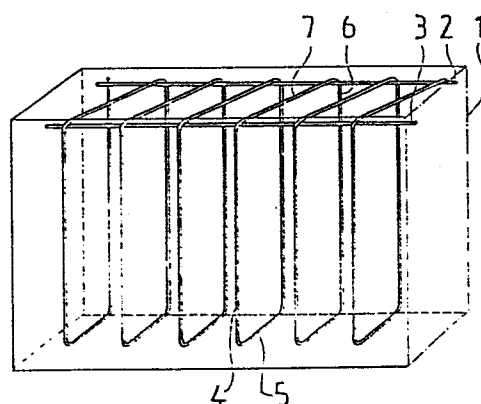


Fig.1

Spiral Reinforcement Structure for Precast Concrete Elements
and Method for Manufacturing a Combined Reinforcement Mesh

The present invention concerns a spiral reinforcement for precast concrete elements in accordance with the preamble of Claim 1. The invention also concerns a method for manufacturing a combined reinforcement mesh.

A spiral reinforcement is mainly used as a shear reinforcement in concrete columns and beams. The spiral reinforcement is manufactured in the form of a continuous band or "spring" by means of winding a wire spirally around form elements of different shapes, whereby the thickness of the reinforcement wire varies depending on the requirement of use, and the spacing between the windings can be adjusted as desired.

The object of the development of the present spiral reinforcement structure has been to provide an industrially produced product which is optimally suitable for reinforcement of columns and beams of varied forms.

The prior art technology comprises the following alternative for the manufacture of spiral reinforcement structures:

A continuous steel wire is wound around a form element mechanically so that the wire to be wound is rolled continuously such that consecutive windings touch each other. By winding the steel wire into a continuous band in which adjacent windings touch each other, it is possible to obtain a product that is advantageous in respect of storage and transportation costs.

The spiral reinforcement so obtained is then stretched from its unified tight winding so that the desired spacing of the windings is obtained. Hereupon, the spiral reinforcement is

cut off to suitable length and secured by binding either to main bars or to auxiliary bars, whereby it becomes a complete reinforcement.

Spiral reinforcements have been manufactured by means of a corresponding method by winding wires around most varied form elements.

Usually, a rectangular, polygonal, circular, or conical element has been used as form element.

In the manufacture of a conventional continuous spiral reinforcement, a steel wire or bar is unwound continuously off a reel and around a form element best suitable for the purpose, the shape of which is preferably rectangular and oblong. The winding point remains stationary when the oblong form element revolves appropriately. When the speed of rotation of the reel or the running resistance of the steel wire is increased, the steel wire is deformed around the form element when the latter is rotated, being shaped in accordance with the form element.

Even though the method used provides a highly rational method of manufacture of a shear reinforcement and permits a very wide selection of applications of use, it is not, as such, particularly well suitable for the manufacture of shear reinforcements of precast units of varied forms.

The object of the present invention is to provide a more advanced alternative for the manufacture of spiral reinforcements, which alternative widens the scope of application of spiral reinforcements and is, as a product, more finished and owing to which, it is possible, by making use of automation, to achieve an individually dimensioned reinforcement directly.

The invention is based on the idea that the planes of the windings in the reinforcement are generally perpendicular to

the longitudinal direction of the reinforcement and that progress from one winding to the next takes place within a limited distance of each winding.

More specifically, the spiral reinforcement structure according to the invention is characterized by what is stated in the characterizing part of Claim 1.

The method according to the invention is characterized by what is stated in the characterizing part of Claim 4.

As compared with the prior art methods of winding a spiral reinforcement, in the present system, in stead of a smooth, constant longitudinal shifting of the form element, the form element is shifted jerkwise. Hereby, the longitudinal shifting can be adjusted in advance to any desired length and it may take place during the 0 to 90 degree period of rotation of the form element, in stead of the prior art 0° to 360° cycle of rotation.

By means of jerkwise longitudinal shifting, the longitudinal progress of the spiral reinforcement can be made as long as desired, and, in additon to this, the progress always takes place at the same side of the spiral reinforcement, and, moreover, the length of the spiral reinforcement can be made directly such that it corresponds to a desired length of the reinforcement. In view of subsequent handling and permanent dimensional accuracy of the spiral reinforcement, it is easily possible, at this winding stage, to add longitudinal auxiliary bars parallel to the form element, e.g., by spot-welding by means of an automatic machine in connection with the winding operation.

Thus, spiral reinforcement meshes can be produced by means of rational methods of production, the spacing of the windings can be made as desired, whereby material economies are obtained. Moreover, the product is a finished spiral reinfor-

cement mesh in respect of the spacing of windings and of the length of the reinforcement, ready to be mounted in its mould.

Owing to the longitudinal shifting taking place jerkwise, whereby the progress in the spacing between the windings is always located at one side, spiral reinforcement cages can be combined by placing one into the other, unhindered by diagonality of the windings. This factor permits an efficient utilization of the application of spiral reinforcement meshes in sections of varied shapes.

The invention will be examined in more detail in the following, reference being made to the enclosed drawings.

Figure 1 is a perspective view of the arrangement of a spiral reinforcement according to the invention within a concrete beam.

Figure 2 shows a reinforcement blank attached ~~attached~~ to an auxiliary bar.

Figures 3 to 8 and 10 show cross-sectional views of spiral reinforcement and auxiliary bar arrangements in various columns and beams.

Figure 9 shows a cross-sectional view of the reinforcement arrangement of Figure 8, with reinforcement bars inserted.

The spiral reinforcement structure for the concrete beam 1 is made of a continuous metal wire 4-7. The wire 4-7 is bent into a number of spirally arranged consecutive rectangular windings with a spacing (d) in the longitudinal direction of the structure. Parallel auxiliary bars 2 and 3 are inserted within the structure so as to act as upper support and fastening means for the windings. Fastening of the wire 4-7 is made by means of spot-welding 8.

The planes of the windings 4,5 are substantially perpendicular to the longitudinal direction of the structure. Hereby, both vertical sides 4 and 6 and the bottom side 5 in each winding lie in the same plane. The progress in the longitudinal direction of the structure from one winding to the next, however, takes place within the upper side 7 of the windings. Hence the upper sides 7, although parallel in relation to each other, are obliquely arranged in relation to the planes defined by the three other sides 4-6 in each winding. Hence, the length (a) of the upper side 7 is considerably^y longer than the length (b) of the bottom side 5, as appears from Figure 2 in an exaggerated manner.

The windings of the structure may have any desired form. Preferably, however, they are tetragonal, e.g., rectangular or quadratic.

The spiral reinforcement structures so obtained are particularly suitable for manufacturing combined reinforcement meshes 2-7, 2'-7' of the type indicated in Figures 4, 5 and 7-10. As the planes of each reinforcement structure 4-7 and 4'-7' are perpendicular to the longitudinal direction thereof, and by choosing the spacing (d) to be the same in each structure, the structures can easily be inserted laterally inside each other from a side of the structures where no auxiliary bars 2,3 or 2',3' are present. This idea comes clearly out from Figures 4, 5 and 7 to 10, requiring no additional comments.

Figures 3 and 6 show in cross section a quadratic and a rectangular winding as placed inside a beam and a column element, respectively.

Figure 9 shows the combined reinforcement mesh structure of Figure 8, comprising two rectangular spiral structures 2-7 and 2'-7' placed in a T-like manner partially inside each other. The combined structure has been provided with additional longitudinal reinforcement bars 10.

Claims:

1. A spiral reinforcement structure for concrete elements (1), such as concrete beams or columns, comprising

- a continuous metal wire or bar (4-7) bent into a number of spirally arranged consecutive windings (4, 5 and 6) with a spacing (d) in the longitudinal direction of the structure,

c h a r a c t e r i z e d in that

- the planes of the windings (4, 5 and 6) are substantially perpendicular to the longitudinal direction of the structure, and
- progress in said longitudinal direction from one winding (4, 5) to the next (6) takes place within a limited distance (7) of each winding at the same side of the structure.

2. A structure as claimed in Claim 1, wherein the windings (4, 5 and 6) have a tetragonal, e.g., rectangular or quadratic shape, c h a r a c t e r i z e d in that the limited distance comprises one side (7) of the tetragon (5, 4, 7, 6) only.

3. A structure as claimed in Claim 2, wherein the windings (4, 5 and 6) have a rectangular shape, c h a r a c t e r i z e d in that the limited distance comprises one short side (7) of the rectangle (5, 4, 7, 6).

4. A method for manufacturing a combined reinforcement mesh (2-7, 2'-7') for concrete elements (1), such as beams or columns, comprising at least two spiral reinforcement structures (4-7 and 4'-7') at least partially arranged inside each other, c h a r a c t e r i z e d by

- using such spiral reinforcement structures (4-7 and 4'-7') in which the planes of the windings (4, 5

and 6) are substantially perpendicular to the longitudinal direction of the structure and in which progress in said longitudinal direction from one winding (4, 5) to the next (6) takes place within a limited distance (7) of each winding at the same side of the structure,

- inserting and fastening longitudinal auxiliary bars (2, 3 and 2', 3') within each structure at the side thereof where said limited distance (7, 7') is situated, and
- ins~~er~~ting the structures (4-7 and 4'-7') laterally inside each other from a side at least partially opposite said side where the limited distance (7, 7') is situated and fastening the structures with one another.

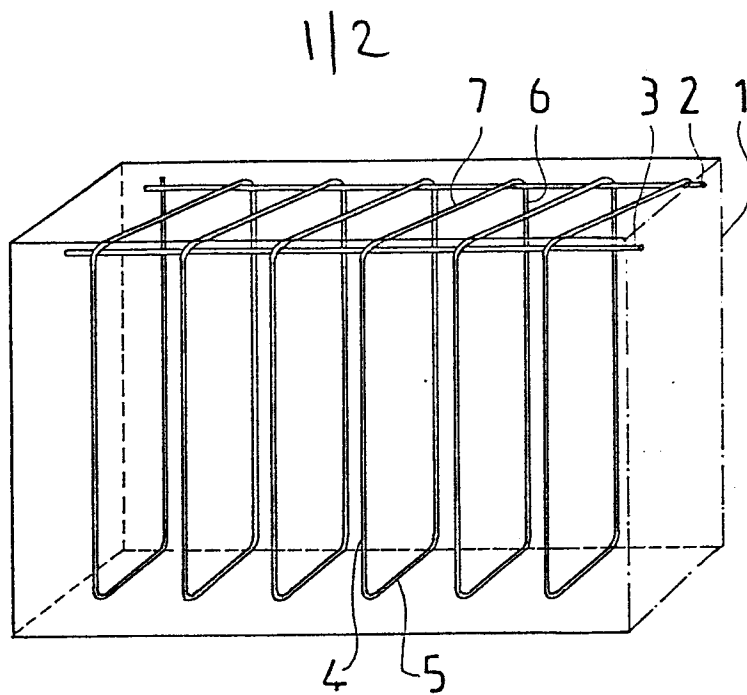


Fig. 1

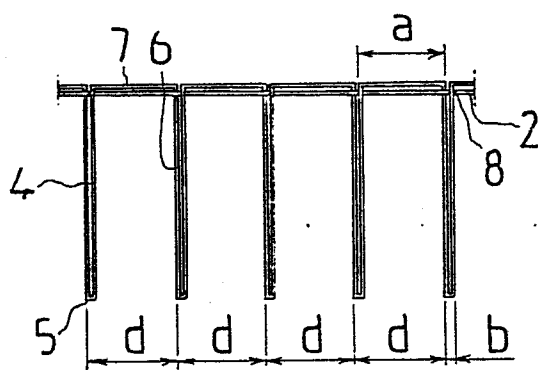


Fig. 2

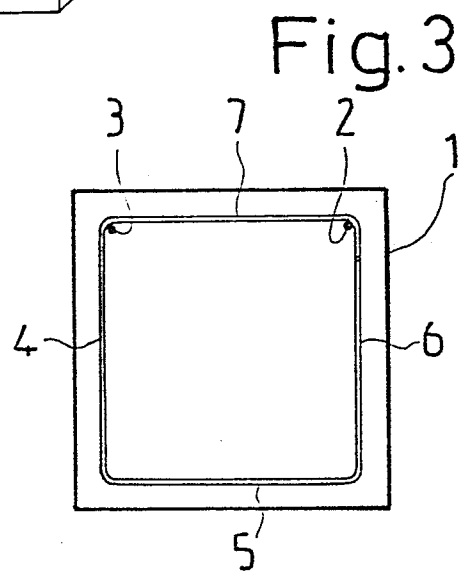


Fig. 3

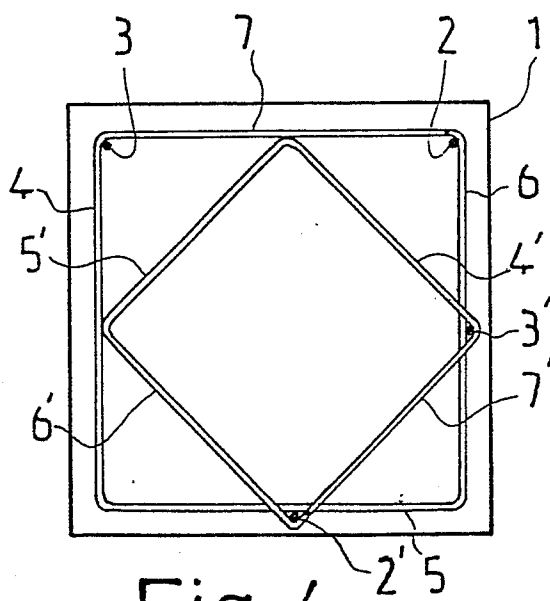


Fig. 4

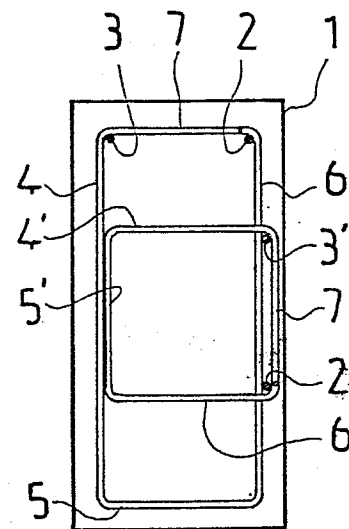


Fig. 5

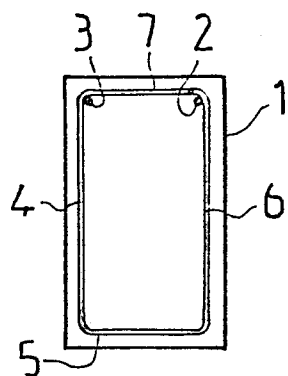


Fig. 6

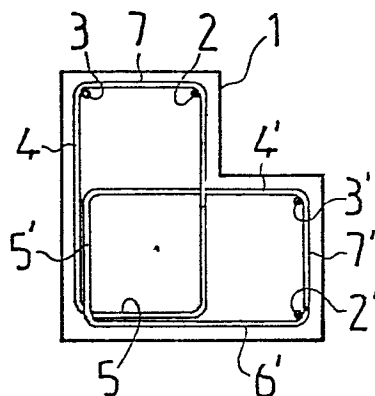


Fig. 7

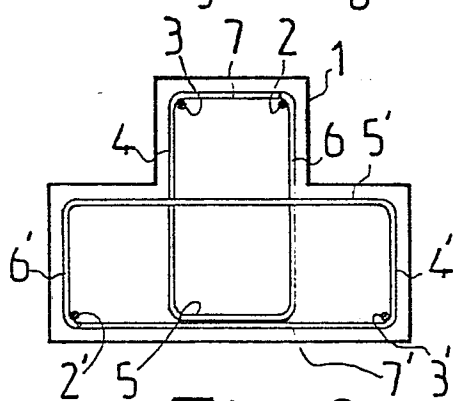


Fig. 8

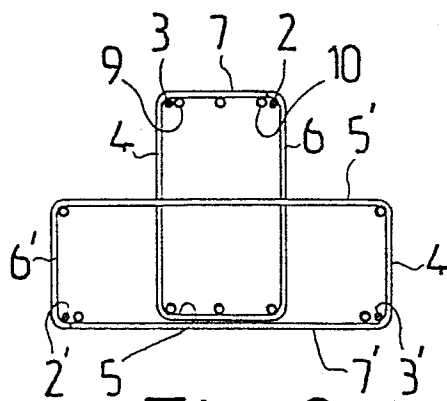


Fig. 9

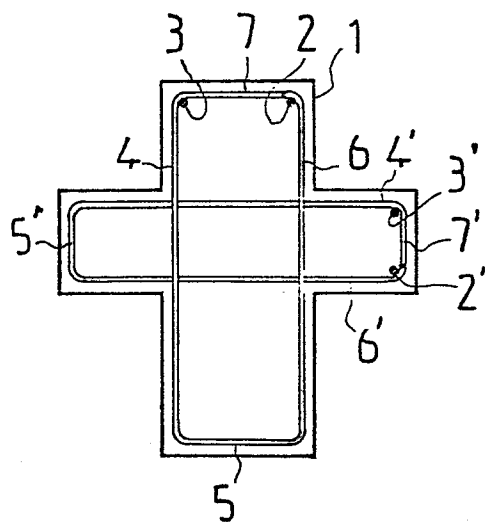


Fig. 10