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(54) **An arrangement in a prefabricated reinforcement for connecting the reinforcement to at least two substantially vertical, raisable and lowerable support bars.**

(57) The invention relates to an arrangement in a prefabricated reinforcement (2, 3), for connecting the reinforcement to at least two substantially vertical, raisable and lowerable support bars (1), to which the prefabricated reinforcement is intended to be temporarily, detachably mounted with the aid of spring means (6, 11), in a predetermined position in a mould until an artificial-stone mass cast around the prefabricated reinforcement, particularly a lightweight gas concrete mass, has hardened sufficiently to hold the prefabricated reinforcement (2, 3) in position in the mould, said prefabricated reinforcement exhibiting in the mentioned predetermined position at least two mutually spaced horizontal reinforcement-bar parts (2) located substantially vertically one above the other, and at least two mutually spaced, upstanding reinforcement-bar parts (3) which connect the horizontal reinforcement-bar parts together. The spring means (6, 11) comprises at least two spring arms which form integral parts of the prefabricated reinforcement (2, 3) and each of which extends from an attachment location located on a reinforcement-bar part, at least the arm parts located at a distance from respective attachment locations extending between and substantially parallel to the horizontal reinforcement-bar parts (2), whereat each spring arm (6, 11) can be swung outwardly against its inherent spring force, to permit a support bar (1) to be received and clamped between said part of the spring arm and the horizontal reinforcement-bar parts (2).

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EP 0 060 232 A1

Fig. 1

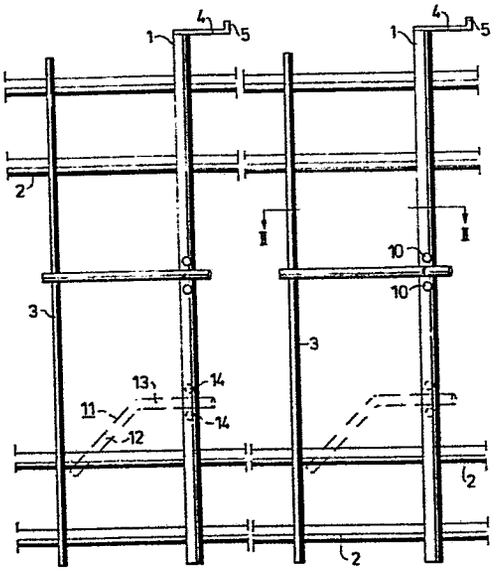
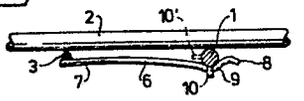


Fig. 2



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AN ARRANGEMENT IN A PREFABRICATED REINFORCEMENT FOR CONNECTING THE REINFORCEMENT TO AT LEAST TWO SUBSTANTIALLY VERTICAL, RAISABLE AND LOWERABLE SUPPORT BARS

The present invention relates to an arrangement in a prefabricated reinforcement having the form of a tied mesh reinforcement or a prefabricated reinforcement cage and intended for connecting said prefabricated reinforcement to at least two substantially vertical, raisable and lowerable support bars, to which the prefabricated reinforcement is arranged to be temporarily detachably fixed with the aid of spring means in a predetermined position in a mould until an artificial-stone mass, particularly lightweight gas concrete, cast around the prefabricated reinforcement has hardened sufficiently to hold the prefabricated reinforcement in place, said prefabricated reinforcement when arranged in said predetermined position exhibiting at least two mutually spaced, horizontal reinforcement-bar parts located substantially vertically one above the other, and at least two mutually spaced, upstanding reinforcement-bar parts which connect the first mentioned bar parts together.

One such arrangement is known to the art (see SE Patent Specification 178 342). This arrangement has become known in particular through its application in conjunction with the casting of lightweight gas concrete. In this respect, there is first prepared a lightweight gas concrete starting mixture, by slurring lightweight-gas-concrete raw material, i.e. silica-containing material and hydraulic binder, water and a pore-forming substance - normally aluminium powder - in a vessel. The concrete mass is then moulded in a mould having a prefabricated reinforcement in the form of a tied mesh reinforcement or a prefabricated reinforcement cage suspended therein. The tied mesh re-

inforcement or reinforcement cage is hung from supports which rest on the edges of two mutually opposite sidewalls of the mould, said supports carrying a plurality of depending cylindrical support bars, from which the tied mesh reinforcement or the reinforcement cage is hung. The tied mesh reinforcement or the prefabricated reinforcement cage may comprise at least two horizontal, mutually spaced reinforcement-bar parts located vertically one above the other and at least two mutually spaced upstanding reinforcement-bar parts which connect said horizontal reinforcement-bar parts together. Each cylindrical support bar is provided on two mutually opposite sides thereof with series of mutually separated, transverse notches which serve as guide grooves for two legs of a stirrup-like clamping means, the centre part of which outside the actual support bar is bent to form a hook, which grips around one of the longitudinally extending reinforcement-bar parts in the tied mesh reinforcement or the prefabricated reinforcement cage. The notches of the aforementioned series of notches on the support bars are arranged in mutually opposite, superimposed pairs. The tied mesh reinforcement or the reinforcement cage is fastened to a respective support bar with the aid of a clamping means by causing the legs of the clamping means to occupy a pair of the notches on the support bar. When the lightweight-concrete forming mass has been cast in the mould, the mass is permitted to expand through the action of the pore-forming agent. As the mass expands, it will rise in the mould to a level lying above the upper parts of the prefabricated reinforcement, and the cast body is then allowed to set to a semi-stiff, cheese-like consistency. The support bars are then turned through 90°, to move the legs of the clamping means out of engagement with respective notches on the support bar, whereafter the bar is lifted from the cast body.

The use of the aforedescribed clamping means is encumbered with a number of disadvantages. The prime disadvan-

tage is that a separate working operation is required for mounting each clamping means. Since a large number of clamping means must be mounted manually in order to connect a prefabricated reinforcement to the support bars, the assembly work is, as a whole, considerably time consuming. The costs involved when manually handling and storing the clamping means also represent a disadvantage.

It has now been found that the aforedescribed disadvantages, and other disadvantages connected with the aforedescribed known method can be eliminated, or at least substantially reduced, when, in accordance with the invention, the spring means mentioned in the introduction comprises at least two spring arms which form integral parts of the reinforcement and each of which extends from an attachment location on a reinforcement-bar part, at least the arm parts located at a distance from respective attachment locations extending between and substantually parallel with the horizontal reinforcement-bar parts, whereat each spring arm can be swung outwardly against the action of its inherent spring force to permit a support bar to be received and clamped between said part of said spring arm and the horizontal reinforcement-bar parts.

According to one suitable embodiment of the invention, the spring arms can be attached to a respective one of the upstanding reinforcement-bar parts between two horizontal reinforcement-bar parts and extend in their entirety substantially parallel to the latter.

According to another embodiment of the invention, the spring arms may extend in one and the same direction and be angled outwardly at the free ends thereof, to enable the prefabricated reinforcement to be readily pushed onto the support bars in the transverse direction thereof.

One important advantage afforded by the arrangement according to the invention is that the spring means can be readily manufactured and mounted to the reinforcement in conjunction with the manufacture thereof. The spring means

normally have the form of spring arms and can then be produced from wire wound on a storage reel, by unwinding from said reel and cutting it into pieces of suitable length, forming one end thereof to provide an outwardly bent free end and a curved portion adjacent thereto, capable of retaining a support bar, and welding the thus formed wire element to the prefabricated reinforcement. The support bar is suitably provided with locating means which are arranged in mutually opposite pairs in the longitudinal direction of the bar and between which the retaining part of the spring arms extends and engages the support bar, to hold said support bar by the clamping action of said arms. The aforementioned locating means prevent the support bars from moving in their longitudinal direction relative to the prefabricated reinforcement. To this end, said locating means suitably have the form of pegs welded to the support bars. It is of lesser account that the support bars, with their pairs of pegs, are more complicated with respect to manufacture, since they are intended to be used in conjunction with a number of sequential casting operations. The spring arms are intended to constitute disposeable items, and one advantage afforded therewith is that they can be manufactured at relatively low costs. The pegs can be replaced with notches, grooves or the like formed in the support bars, with which the retaining part of the spring arms engage while clamping the support bar firmly in one angular position thereof.

Further characterizing features of the invention will be apparent from the following description, which is made with reference to an examplary embodiment illustrated in the accompanying drawing, in which

Figure 1 is a side view of a prefabricated reinforcement suspended from support bars and connected thereto by an arrangement according to the invention, and

Figure 2 is a sectional view taken on the line II-II in Figure 1.

In the drawing, the reference 1 identifies a support bar suspended from a support (not shown), the ends of which rest on the edges of two mutually opposite side walls of a mould for moulding lightweight gas concrete. Suspended in the mould is a prefabricated reinforcement in the form of a prefabricated reinforcement cage comprising a plurality of horizontal, mutually spaced reinforcement-bar parts 2 located vertically one above the other, and upstanding, mutually spaced reinforcement-bar parts 3 which connect the horizontal reinforcement-bar parts together. The support bar 1 has at the top thereof a crank means 4 which is provided with a crank handle 5 on the free end thereof. When the mould is empty, or when it contains a lightweight concrete mass which has not yet set to a stiff consistency, the crank means 4 serves as a means for hanging the support bar 1 and the prefabricated reinforcement 2, 3 connected therewith. As soon as the cast lightweight gas concrete mass has solidified to a coherent body, and said body is able to support the prefabricated reinforcement therein, the supports (not shown) can be removed, and the support bars 1, subsequent to being turned through 90° by means of the crank handle 5 and the means 4, can be lifted up out of the said body and removed therefrom.

For the purpose of connecting the prefabricated reinforcement 2, 3 to the support bars 1, there is used spring means in the form of spring arms 6, which are connected to an upstanding reinforcement-bar part 3 by means of welds 7, as shown in more detail in Figure 2. Each spring arm 6 can be swung outwardly, against the action of its inherent spring force, in a plane perpendicular to the longitudinal direction of the reinforcement-bar part 3. When seen in a direction from the end which is opposite to the end attached to the upstanding reinforcement-bar part 3, each spring arm 6 is firstly bent outwardly to form a guide part 8, and then bent to form a part 9 intended for retaining a support bar 1 in the position in which said support bar supports the prefabricated reinforcement 2, 3. The guide part 8 has a form

which enables the support bar 1 to be readily inserted into engagement with the retaining part 9 from one side, the spring arm 6 simultaneously being swung outwardly somewhat against the inherent spring force thereof. In order to ensure positive connection between the upstanding reinforcement-bar part 3 and the support bar 1, the support bar is provided with a plurality of pairs of pegs 10, arranged along a generatrice of the support bar 1, said support bar having a circular cross-section, at locations which correspond to the attachment locations for the spring arm, or spring arms when each upstanding reinforcement-bar part 3 is provided with more than one spring arm. In the position in which the support bar 1 is connected with the upstanding reinforcement-bar part 3, the retaining part 9 of the spring arm 6 grips the support bar 1 between the two pegs 10 of a respective pair of pegs and clamps the support bar firmly against the horizontal reinforcement-bar parts 2. As soon as the mass cast in the mould solidifies to a semi-plastic consistency, the support bars 1 are rotated through 90° by means of the crank handle 5 and the means 4, so that the peg 10 shown in Figure 2 now takes the position shown by reference 10'. When the pegs 10 are moved to this latter position, they are no longer able to prevent movement of the support bars 1 in their longitudinal direction. The support bars 1 can now readily be lifted from the moulded body against the frictional force generated by the clamping action, and subsequently removed from the mould together with the supports, for use in a subsequent moulding operation.

Figure 2 illustrates in more detail how the spring arm 6 connected to the upstanding reinforcement-bar part 3 firmly clamps the support bar 1 against horizontal reinforcement-bar parts 2 while, at the same time, the support bar is prevented from moving by the pegs 10. Subsequent to rotating the support bar 1 through 90°, the bar can be readily removed by lifting it from the moulded body.

In accordance with an alternative embodiment of the invention, shown in Figure 1 in chain lines, the spring arm is angled to form two spring-arm portions, of which one end of spring-arm portion 12 is connected to a horizontal reinforcement-bar part 2, while the end of the other spring-arm portion 13 projects between two pegs 14 of a pair of pegs arranged on the support bar 1. The support bar 1 is firmly clamped to the longitudinally extending reinforcement-bar parts 2 by the spring action of the angled spring-arm 11. Subsequent to rotating the support arm 1 through 90^{o}, to a position in which the spring arm 11 is out of latching engagement with the pegs 14, the support arm 1 can be readily lifted up out of the moulded body against the frictional forces created by the clamping action of the spring arm or spring arms, subsequent to said moulded body having set to a suitable semi-plastic consistency.

In this embodiment, the end of the spring-arm portion 13 is also suitably angled outwardly at the free end thereof, to facilitate mounting of the prefabricated reinforcement on the support bars 1 in the transverse direction thereof, in a manner similar to that illustrated in Figure 2. Said spring arm portion is adjacent the free end thereof bent to form a curved portion able to retain the support bar 1, in the manner illustrated in Figure 2.

The spring arms 6, 11 can be readily manufactured, by unwinding wire or strip-like material from a storage reel, and cutting the material into pieces which have an inherent spring effect. Subsequent to shaping these pieces to form the angled part 8 and the curved part 9, they can be readily welded to the prefabricated reinforcement, either to an upstanding reinforcement-bar part 3 or to a horizontal reinforcement-bar part 2, during manufacture of said reinforcement.

C L A I M S

1. An arrangement in a prefabricated reinforcement (2, 3) having the form of a tied mesh reinforcement or a prefabricated reinforcement cage, for connecting the reinforcement to at least two substantially vertical, raisable and lowerable support bars (1), to which the reinforcement (2, 3) is intended to be temporarily detachably mounted with the aid of spring means (6, 11) in a predetermined position in a mould until an artificial-stone mass cast around the prefabricated reinforcement, particularly a lightweight gas concrete mass, has hardened sufficiently to retain the prefabricated reinforcement (2, 3) in position in the mould, said prefabricated reinforcement (2, 3) exhibiting when arranged in said predetermined position at least two mutually spaced, horizontal reinforcement-bar parts (2) located substantially vertically one above the other, and at least two mutually spaced, upstanding reinforcement-bar parts (3) which connect the first mentioned bar parts together, characterized in that said spring means (6, 11) comprises at least two spring arms which form integral parts of the reinforcement (2, 3) and each of which extends from an attachment location on a reinforcement-bar part (3 or 2, respectively), at least the arm parts located at a distance from respective attachment locations extending between and substantially parallel to the horizontal reinforcement-bar parts (2), whereat each spring arm (6, 11) can be swung outwardly against the action of its inherent spring force to permit a support bar (1) to be received and clamped between said part of said spring arm and the horizontal reinforcement-bar parts (2).

2. An arrangement according to Claim 1, characterized in that the spring arms (6) are connected to a respective one of the upstanding reinforcement-bar parts (3) between two horizontal reinforcement-bar parts (2) and extend in their entirety substantially parallel to the latter.

3. An arrangement according to Claim 1 or Claim 2, characterized in that the spring arms (6, 11) extend in one and the same direction and are angled outwardly at their free ends, to enable the prefabricated reinforcement (2, 3) to be readily pushed onto the support bars (1) in the transverse direction of said bars.

Fig. 1

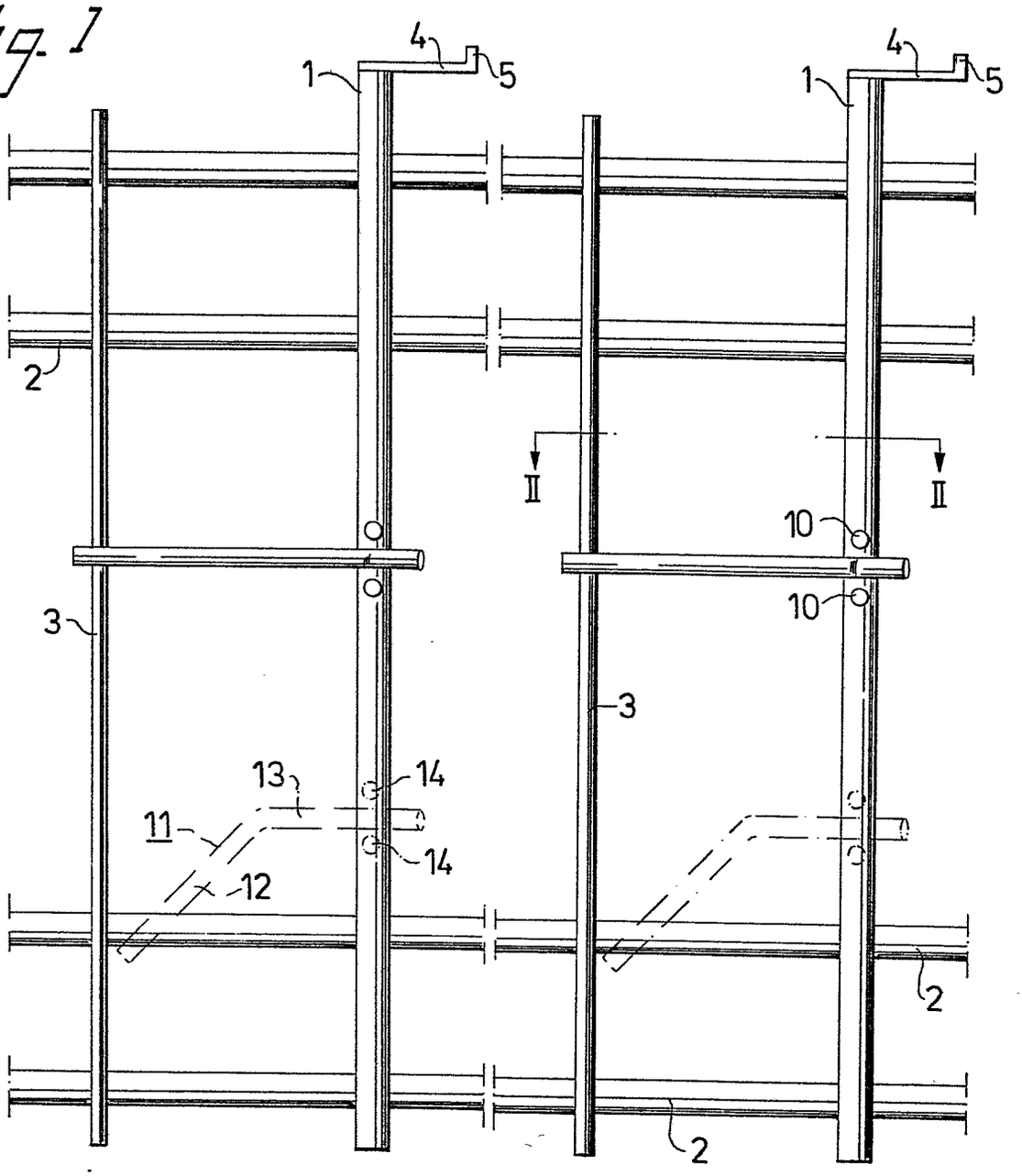
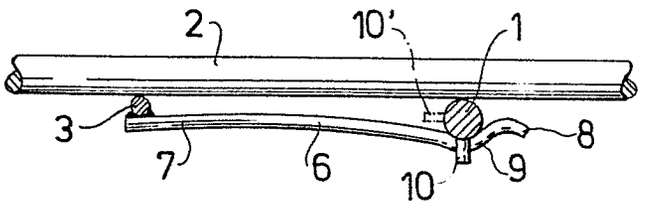


Fig. 2



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EUROPEAN SEARCH REPORT

Application number

EP 82 85 0037.1

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)
A	BE - A - 522 231 (INTERNATIONELLA SIPOREX AKTIEBOLAGET) * page 2, lines 1 to 16, 44 to 51, 55 to 60; fig. *		E 04 C 5/00 E 04 C 5/06
D,A	SE - C - 178 342 (INTERNATIONELLA SIPOREX AB) * fig. 1, 2 *		

TECHNICAL FIELDS SEARCHED (Int.Cl. 3)

E 04 C 5/00

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

X The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Berlin	17-05-1982	v. WITTKEN

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