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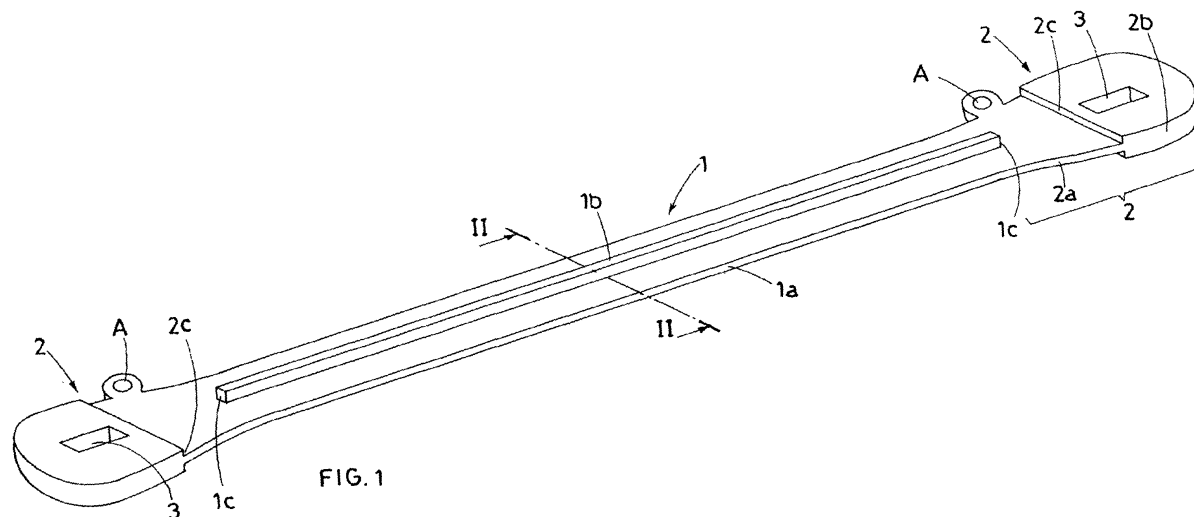
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(54) **Tie rod for the realisation of formworks for reinforced concrete**

(57) Tie rod (1) for the realisation of formworks for reinforced cement, which is obtained by moulding a single piece of plastic material and which comprises a sec-

tion (1a or 10a) ending on both sides with two enlarged ears (2 or 20) and featuring, in the centre of both opposite faces, a stiffening longitudinal rib (1b or 10b) interrupted near the ears (2 or 20) with central eye (3 or 30).



Description

[0001] The present patent application relates to a plastic moulded tie rod for the realisation of formworks.

[0002] The construction system of formworks used in the building sector, that is wooden structures used to consolidate castings of reinforced cement that contain and incorporate metal reinforcements, has been known for long.

[0003] Most of the times, these structures are represented by boxes with vertical walls, whose parallel sides are formed of wooden boards aligned and placed edgewise. In order to provide stability to the structure, a stable connection must be created between its opposite walls and between the various boards of each vertical wall.

[0004] To this end, according to the current technique, the parallel opposite walls of the formwork are joined by means of horizontal metal tie rods. In particular, tie rods are extremely thin and flat and their ends can lay flat, without causing excessive volume and undesired openings between the upper edge of the lower board and the lower edge of upper board of the vertical wall.

[0005] More precisely, the two ends with eye of each tie rod protrude from the opposite walls of the formwork, so that suitable vertical rods can engage in the "external" eyes to provide the stable connection of the boards of the opposite walls of the formwork.

[0006] It must be said that the most popular version of traditional horizontal tie rods is provided with an opposite pair of perpendicular tongues in internal position with respect to the end with eye. During operation, the perpendicular tongues are laid in vertical position in order to act as stop means for the internal sides of the two boards located immediately below or above the tie rod in the formwork wall.

[0007] The function of the tongues is to allow for placing the boards in a perfectly aligned position inside each vertical wall, as long as all boards touch the tongues of the horizontal tie rods located between them.

[0008] Once the formwork has been prepared, cement is cast inside it and remains there against the internal side of the walls until it consolidates. Once the cement has consolidated, the formwork can be removed.

[0009] In order to do so, it is necessary to remove first the vertical rods and then the boards of the vertical walls. Finally, it is necessary to cut the ends with eye of the tie rods that protrude from the sides of the cement manufacture, after removing the boards.

[0010] Only after eliminating the protruding ends with eye, it will be possible to give perfect planarity to the sides of the cement manufacture. The cut ends of each tie rod remain visible in the cement manufacture, flush with it and therefore in a position which is not detrimental for aesthetics or for the superficial continuity of the cement manufacture.

[0011] The new tie rod according to the present invention

has been devised based on the critical observation of the traditional technique, with the specific purpose of finding a solution to two typical disadvantages of current metal tie rods.

[0012] The first inconvenience is related to the poor functional efficiency of the tongues in traditional tie rods. As a matter of fact, the tongues have a quite light laminar structure and therefore the two tongues of each tie rod are not always capable of maintaining a perfect mutual vertical alignment and remaining perfectly aligned vertically with the other pairs of tongues of the other tie rods of the formwork.

[0013] It appears obvious that the imperfect alignment of the tongues will result in the imperfect vertical alignment of the boards of the walls of the formwork and consequently in the imperfect planarity of the walls of the cement manufacture obtained with the formwork.

[0014] The second inconvenience of traditional metal tie rods is related to the fact that their cut ends that are incorporated flush in the cement manufacture undergo rapid oxidation process, caused by exposure to rain and humidity.

[0015] The rain or humidity drops dripping along the walls of the cement manufacture in contact with the oxidised ends of the internal tie rods get a rusty colour and deposit it on the walls of the cement manufacture when the same are lowered.

[0016] This means that, some time after its realisation, the cement manufacture presents rusty drippings immediately after the cut end of the internal tie rods, which are very visible and alter the general aesthetics of the cement manufacture.

[0017] The new tie rod according to the present invention does not suffer oxidation since its structure is entirely obtained with moulded plastics.

[0018] It also guarantees the perfect planarity of the boards that are located edgewise to form the vertical wall of the formwork.

[0019] The reason is that it not only uses a stop means for the internal side of each wall, but is also has a transversal housing in internal position with respect to the traditional ends with eye on both sides, capable of exactly housing the edge of the board, preventing the board from sliding forward or backwards with respect to its perfectly aligned position with the other boards of the same wall of the formwork.

[0020] For major clarity the description of the present invention continues with reference to the enclosed drawings, which are intended for purposes of illustration and not in a limiting sense, whereby:

- fig. 1 is the axonometric view of the tie rod according to the present invention;
- fig. 2 is the section of figure 1 with plane II-II;
- fig. 3 is an axonometric view of a simplified version of the tie rod according to the present invention.

[0021] With reference to the enclosed figures, the tie

rod (1) according to the present invention has a monolithic structure obtained with moulded plastic materials, showing a long central section (1a) with longitudinal stiffening ribs (1b) on both sides and joined with two perfectly symmetrical large ears (2) on opposite sides, having a vaguely drop-like shape.

[0022] In particular, the longitudinal stiffening ribs (1b) extend slightly beyond the connections located between the central section (1a) and the lateral ears (2).

[0023] Each ear (2) has a different thickness, since the most internal part (2a) has the same thickness as the central rectilinear section (1a) of the tie rod (1), and the most external part (2b), with basically semi-elliptical profile and traditional eye (3), has a double thickness; it being provided that the two parts with different thickness are joined by rectilinear steps (2c) with transversal direction on both sides of the tie rod (1).

[0024] It can be said that the most internal and thinnest part (2a) located on each side of the two ears (2) is bordered by two projecting parts with higher thickness on opposite sides; inwards, this part is bordered by the end (1c) of the rectilinear rib (1b) of the central section (1a) and outwards by the transversal step (2c).

[0025] The distance between the two projecting parts (1c, 2c) is not casual; it is slightly higher than the thickness of the traditional wooden boards that are typically used for the realisation of formworks for reinforced concrete.

[0026] For this reason, thanks to the presence of the two projecting parts (1c, 2c), the thinner internal sections (2a) of each ear (2) act as seats for the exact housing and automatic centring of the edges of the boards used for the formwork.

[0027] It appears obvious that, thanks to the presence of the two projecting parts (1c, 2c), the board can be correctly matched with the tie rod (1) only in one of the housings (2a); once correctly inserted between the two projecting parts (1c, 2c) that delimit the housing (2a), the board cannot slide forward or backwards, being held in place by the projecting parts.

[0028] If the internal thinner sections (2a) of each ear (2) are designed to match with the edges of the boards of the formwork, it appears obvious that the cement manufacture will not incorporate the internal sections (2a) and the external sections (2b) of the ear (2). This means that, once the formwork has been removed, each ear (2) will protrude from the consolidated cement manufacture.

[0029] Now the ear (2) is cut flush with the external side of the cement manufacture; practically, in the tie rod (1) according to the present invention, the transversal cutting line is located slightly beyond the end (1c) of each rib (1b) of the central section (1a), that is on the ideal internal transversal edge of the thinner section (2a) of each ear (2) that acted as centring housing for the edge of the board during the construction of the formwork.

[0030] In any case, the presence of the new plastic tie

rod (1) inside the consolidated cement manufacture guarantees that the external walls of the cement manufacture are free from the rust stains that are typical when using traditional metal tie rods.

[0031] Finally, letter (A) is used to indicate two short pierced appendixes that can be used to fix the tie rod to the top of the formwork with nails, on the upper edges of the last boards of two opposite walls.

[0032] Fig. 3 shows a simplified version of the tie rod according to the present invention, that differs from the first version only in that the tie rod (10) obtained by moulding a single piece of plastic material terminates on both sides with two enlarged ears (20) with constant thickness equal to the thickness of the central section (10a) with longitudinal stiffening ribs (10b) interrupted near the ear (20) with central eye (30).

Claims

1. Tie rod for the realisation of formworks for reinforced cement, **characterised by** the fact that it is obtained by moulding a single piece of plastic material and by the fact that it comprises a section (1a or 10a) ending on both sides with two enlarged ears (2 or 20) and featuring, in the centre of both opposite faces, a stiffening longitudinal rib (1b or 10b) interrupted near the ears (2 or 20) with central eye (3 or 30).
2. Tie rod according to the previous claim, **characterised by** the fact that the ears (2) have the same thickness as the section (1a).
3. Tie rod according to claim 1, **characterised by** the fact that the ears (2) have an internal part (2a) with the same thickness as the section (1a) and an external part (2b) with higher thickness, joined to the first one by a rectilinear step (2c) with transversal direction.
4. Tie rod according to the previous claims, **characterised by** the fact that one of the longitudinal edges of the section (1a or 10a) feature two short lateral pierced appendixes (A) immediately beyond the ends of the ribs (1b or 10b).

