

Translation of the specification

The present invention relates to a reinforcing rod holder for use in concrete connections, which has the shape of a hollow body for receiving the free, bent ends of the reinforcing rods and which comprises a first portion to face the concrete wall that is erected first, and a mating second portion, the first portion being intended to remain in the concrete wall.

Such a reinforcing rod holder is known from DE-A-3 320 847, wherein the portion that is to remain in the wall has the configuration of a bottom plate comprising either relatively long side walls or bent side walls. Thus, as all metal parts generally have to be wrapped in concrete because of the risk of corrosion, a rather substantial quantity of lost material remains in the wall and has to be embedded deeply, besides the complicated manufacturing process. Moreover, the other, cover-portion shaped element has the form of a channel and requires side portions that have to be separately manufactured and subsequently removed.

Further, EP-A 0 024 697 discloses a reinforcing rod holder comprising a hollow body in which the reinforcing rods can be accommodated, and a cover portion intended to face the concrete wall that is erected first. This holder, however, has no particular features allowing the cover portion to remain anchored in the concrete wall.

By contrast, it is the object of the present invention to provide a reinforcing rod holder the component parts of which may be transported easily and which is simple to equip and assemble, in which the free ends of the reinforcing rods may well be accommodated and are well

protected from the possibility of liquid cement penetrating, and which is less expensive both in terms of manufacture and with respect to the portion remaining inside the erected wall than reinforcing rod holders that are substantially manufactured from metal. This object is attained by a reinforcing rod holder as described in the claims.

The invention is explained in more detail hereinafter with reference to a drawing of embodiments.

Fig. 1 is a view from above of a first embodiment of a reinforcing rod holder according to the invention, part of which is shown without the cover portion;

Fig. 2 is a sectional view taken along the line II-II;

Fig. 3 shows a detail of Fig. 2 after the cover portion has been fitted;

Fig. 4 is a sectional view taken along the line IV-IV of Fig. 1;

Fig. 5 is a sectional view taken along the line V-V of Fig. 1;

Fig. 6 is an enlarged detail of a modified embodiment of the cover portion;

Fig. 7 is a view from above of a second embodiment of a reinforcing rod holder, part of which is shown without the cover portion;

Fig. 8 is a sectional view, taken along the line VIII-VIII of Fig. 7, of a modified embodiment of the cover portion;

Fig. 9 is a sectional view taken along the line IX-IX of Fig. 7;

Fig. 10 is a view from above of a third embodiment of a reinforcing rod holder, part of which is shown without the cover portion;

Fig. 11 is a sectional view taken along the line XI-XI of Fig. 10;

Fig. 12 is a sectional view of the reinforcing rod holder shown in Fig. 1, prior to its being embedded in concrete;

Fig. 13 illustrates a reinforcing rod with the remaining cover portion after being embedded in concrete.

The first embodiment of a reinforcing rod holder includes a box 1, which is formed from plastics material, and a cover portion 2 at the wall end which is formed from metal and remains in the wall after the reinforcing rod holder has been embedded in concrete. The cover portion remaining in the erected wall 55 is formed from only one plate which, on the one hand, is relatively simple to manufacture and, on the other hand, has smaller dimensions than hitherto-known portions of reinforcing rod holders which are formed from metal and are intended to remain in the erected wall.

The box 1 is provided with a circumferential, double, U-shaped edge 3 having an inner wall 4 and an outer wall 5. The outer wall 5 has indentations 6 which are distributed around the entire outer wall. When the reinforcing rod holder is embedded in concrete, these indentations 6 cause concrete to pass behind the cover portion plate 2 which is to remain behind, so that this plate is securely joined to the wall and cannot become loosened, even when the rods are straightened and the plastics portion of the holder is removed. Pins 7 are provided on the upper surface of the circumferential

edge and, as can be seen from Fig. 2, they extend through corresponding openings 8 in the cover portion and are compressed, see Fig. 3, by means of a suitable device in such a manner that they press and secure the cover portion onto the box. Raised portions 10, which are disposed in the centre of the box base 9 and protrude therefrom, serve the same purpose, and they also have pins 7 which fit into the corresponding openings 8 in the cover portion and are compressed. Each of the edges on the longitudinal sides is provided with a cover bar 11 which has, on its outer surface, recesses 12 which correspond to the indentations 6 and recesses 13 for exposing the pins 7. At the locations where the reinforcing rods 14 protrude from the box and cover portion, sockets 15 are provided in the cover bar 11 which extend through corresponding openings 16 in the cover portion. The sockets 15 taper upwardly and have, at their upper end, a hole 17 through which reinforcing rods are inserted. To permit the reinforcing rod to be inserted into the sockets, the inwardly directed portion 18 of the cover bar and the inner surface of the socket 15 have a slot 19, as can be seen from Fig. 4. Instead of being extruded from plastics material as three component parts, the box and the two cover bars and the sockets can be extruded from plastics material in one piece. To permit insertion of the rods, in this case, it is necessary for the entire box to be spread around its longitudinal central axis. The reinforcing rods 14 are bent in a conventional manner so that the free ends converge with respect to the longitudinal central axis of the box. As can be seen from Fig. 5, in particular, the sockets permit the entire rounded portion, i.e. the transitional area between the box portion and the free ends of the reinforcing rod, to be situated within the holder. This arrangement ensures that the reinforcing

rod can be fully straightened after removal of the plastics box and the sockets, as shown in Fig. 13.

As already mentioned above, the cover portion 2 is formed from metal. Since this cover portion remains in the wall, it is advantageous for as good a connection as possible to be established between this metal portion and the wall. For this reason, it is desirable to provide the cover portion with a rough surface; this may be effected, for example, by producing the cover portion from expanded metal or, as shown in Fig. 6, by providing the cover portion with stamped and relatively sharp-edged raised portions 20. Other steps may also be taken, however, to increase the roughness of the surface.

In certain countries, there are regulations stipulating that unprotected metal, i.e. metal which is not rust-proof, must be covered with a minimum layer of concrete, for example 25 mm. This would signify that the metal plate must have the prescribed minimum spacing from an edge. To permit the metal plate to be moved nearer the edge, it is indispensable according to such regulations to protect the metal either by applying a layer of plastics material or by spraying with other resistant materials, for example, by means of electrostatic powder coating or the like. Thereby it is clear that only the outer edge of the cover portion needs to be coated and not the entire metal plate.

It is also possible for the connection between the box portion and the cover portion to be effected in a manner other than by means of expanding pins. It is also possible, for example, to join the two portions together by means of spot-welding or glueing, or to use other suitable securing means. In this embodiment, it may also prove appropriate to construct the metal plate in a

multi-component manner so that, for example, it may be divided along the central axis.

Figures 7 to 9 illustrate a second embodiment of a reinforcing rod holder, whereby both the manufacture and the assembly of the reinforcing rod holder are an improvement over the first embodiment. Box 1 is the same as described above, but the cover bars on the longitudinal sides are missing and the cover portion has different cut-away portions. Instead of having the cover bars on the longitudinal sides, the reinforcing rods 14 are supported by transversely disposed rod holders 25 which also prevent liquid cement from penetrating therein. The rod holders, which are also formed from plastics material, have a length which corresponds to the width of the box 1 and a cross-section which is shown in Figure 9, i.e. having a box-shaped form with a wide, circumferential edge 26, whereby the two transversal side edges come to rest on the longitudinal sides of the box 1, and the cover portion is supported on all four circumferential edges. The upper portion of the rod holder converges in the centre to form a rib 27 which has a longitudinal central slot 28 extending to the openings 29 which are disposed at each end and through which the two shanks of the reinforcing rod 14 engage. The rib may have a reinforced portion 30 in the centre. On one side, the support member is connected to a hold-down member 31 which, as the name suggests serves to hold-down the reinforcing rods.

For the assembly of the reinforcing rod holder, the rods are first of all inserted into the box 1 with the bent shank ends converging towards the centre, certain markings possibly having been applied previously to determine the spacings between the rods. The rod holders are then passed over the bows and pressed-down, whereupon

the cover plate 32 is mounted thereon. The cover plate 32, in addition to having the above-described holes 8 for the pins 7, is provided with transversely extending slots 33 which are disposed according to the desired spacings between the reinforcing rods. As stated above, the pins 7 are subsequently pressed-down, either by means of a hammer, by compressed air or by a suitable device, and consequently the cover plate is secured to the box. As the cover plate is pressed-down, it also presses upon the circumferential edge 26 of the rod holder whereby, on the one hand, the rod holder acts on the shank ends of the reinforcing rod together with the hold-down member 31 and, on the other hand, causes the slot 28 in the rod holder to be compressed, whereby liquid cement is effectively prevented from penetrating therein.

In a modified arrangement, the two longitudinal sides 3a of the box 1 may have recesses in which the two transverse edges of the rod holder engage in order to permit the insertion of these edges at predetermined locations. As can be seen from Fig. 9, in particular, the use of rod holders having a central rib ensures that the entire curvature of the reinforcing rods is situated inside the holder, thereby ensuring complete straightening after they have been embedded in concrete.

Figures 10 and 11 illustrate another embodiment of a reinforcing rod holder which, compared with the preceding example, provides further simplification both in the manufacture and in the assembly. Here also, the box 34 has a circumferential, double, U-shaped edge 35 with an inner wall 36 and an outer wall 37. The indentations 38 here are substantially longer than those in the two preceding examples, with the result that more concrete can pass behind the cover plate for better securement

thereof. At the top end of each of the two longitudinal sides 39 of the inner edge 36, there is a shoulder portion 40 on which the edges 41 of the transverse sides of the rod holders 42 are supported, such edges being correspondingly shorter than those described in the preceding embodiment. The box also has a longitudinal central rib 43, which is raised from the base to substantially the same height as the circumferential edge 35. The hold-down member 44 of the rod holder is provided with recesses 45 which are disposed on both sides of the longitudinal central rib 43 and serve as guide means. To permit the reinforcing rods to be accurately aligned before the cover plate 46 is deposited, it is preferable to provide means for aligning the rod holders. Such means may be, for example, small recesses 47 which are provided on the sides of the longitudinal central rib and in which corresponding cams 48 engage, such cams being disposed at the guiding ends 49 - facing the longitudinal central rib 43 - of the recesses 45 in the hold-down member. However, other marking means may also be provided; for example, small pins may be provided on the upper edge of the longitudinal central rib, such pins engaging in holes in the hold-down member, or vice versa. In order to ensure an approximate alignment of the reinforcing rods during their insertion into the box, corresponding markings may be provided on the longitudinal edges of the box. The cover plate 46 is of a design similar to that of the preceding example, but here the pins 7 are only disposed on the circumferential edge and engage in corresponding openings 8. However, it is also possible to provide pins on the longitudinal central rib 43, such pins engaging through corresponding openings in the cover portion. The rib 50 in the rod holder does not have any reinforcement in the centre and is particularly well-suited to forming a tight seal, since it has shown that, when a pressure is exerted upon

the edges 41 which are disposed on both sides of the rib, the two edges of the slot 51 in the rib are pressed towards each other.

For the purpose of securing the rods in the holder, it is advantageous to use holder inserts 52 which are also supported on the two shoulder portions 40 of the longitudinal edges and have recesses 53 disposed on both sides of the longitudinal central rib 43.

The assembly for this last-described rod holder is very simple. First of all, the reinforcing rods are inserted at previously designated locations; the rod holders are mounted at the marked locations and the holder inserts are placed thereon; subsequently the cover plate is mounted and then the pins are compressed by means of a hammer or a suitable device in order to secure the cover plate. It is apparent from the description, especially from the last two examples, that it is not necessary for any tools to be used for the assembly of this reinforcing rod holder except a hammer.

However, the reinforcing rod holder offers substantial advantages not only in terms of its manufacture and assembly, but also in terms of its securement and in terms of erecting the connecting wall. By providing the rod holders with the raised rib 50, or 27 in the preceding example, the second wall is provided with a tooth-like arrangement relative to the first wall and increases the securement.

Figure 12 is a sectional view of a portion of a secured reinforcing rod holder. The two casing boards 21 and 22 are visible, and it can be seen that the reinforcing rod holder is secured in the casing board 22 by means of nails 23. Nailing the reinforcing rod holder is consi-

derably simplified in that the nails can be hit through the opening 8 and, above all, through the pins 7, with the result that the suitable locations can very easily be discovered, the nails being partially guided. After the rod holder has been embedded in concrete, the free ends 24 of the reinforcing rod are straightened out (see Fig. 13), and subsequently the box is easily removed. If necessary, the cover bars 11 are also removed. As already mentioned above, because concrete engages behind the cover plate 32, 2 or 46, it is ensured that said plate is firmly anchored in the wall and is not loosened, neither when the reinforcing rod is straightened nor when the box portion is pulled away.

In the two last-described embodiments also, the box is preferably formed from a plastics sheet. The material of the cover plates 32 or 46 is the same as that of the cover plate 2 in the first example and may consist of expanded metal or a metal plate with a roughened surface. In addition, the base of the box 1 or 34 has bearing and guide surfaces to ensure that the reinforcing rods are securely held-down.

The three reinforcing rod holders, which have been described above and illustrated, relate to reinforcing rods provided with a bow and two free shanks, but it is possible to provide a suitably modified reinforcing rod holder for reinforcing rods which have only one shank and an open bow. Thus, the width of the reinforcing rod will be only approximately half that of the reinforcing rod as shown in Fig. 10 for example, and the other longitudinal wall which has the same shoulder portion 40 is disposed at the location of the longitudinal central rib 43. The rod holders and the holder inserts are then suitably shaped, i.e. the rod holders have an opening in the centre and a suitably shaped

hold-down member, whereas the holder inserts have only one recess. Here also, the reinforcing rods can first of all be inserted, and then the rod holders and the insert parts are deposited or placed, whereupon the cover plate can be mounted and is secured by means of the pins which extend through corresponding openings.

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Claims

1. A reinforcing rod holder for use in concrete connections, which has the shape of a hollow body for receiving the free, bent ends of the reinforcing rods (14) and which comprises a first portion (2,32,46) to face the concrete wall (55) that is erected first and a mating second portion (1,34), the first portion being intended to remain in the concrete wall, characterized in that the first portion is a metal plate (2,32,46) and the second portion has the shape of a box (1,34) consisting of plastics material and having a circumferential edge (3,35), and in that the edge is formed by two U-shapedly interconnected walls (4,36; 5,37), the outer wall (5,37) being provided with indentations (6,38) in view of back-filling the metal plate (2,32,46) with concrete.

2. A reinforcing rod holder according to claim 1, characterized in that, in order to secure the metal plate (2,32,46), the box (1,34) is provided with pins (7) which may be inserted into corresponding openings (8) of the metal plate and compressed above them.

3. A reinforcing rod holder according to claim 1 or 2 intended for reinforcing rods having a clamp and two free, bent shanks, characterized in that it comprises transversely disposed rod retainers (25,42) having two openings for the free ends of the reinforcing rod shanks, and that the cover plate (32,46) is provided with oblong openings (33) at the place of the reinforcing rod clamps.

4. A reinforcing rod holder according to claim 3, characterized in that the rod retainer (25,42) is provided with a circumferential edge (26), a projecting



rib (27,50) comprising a slot (28) and connecting the two openings for the reinforcing rod shanks, and a hold-down member (31,44) disposed on one side.

5. A reinforcing rod holder according to one of claims 1 to 4, characterized in that the box (34) comprises a shoulder portion (40) on its inner longitudinal edges (39), on which the broad sides of the circumferential edge (26) of the rod retainers (42) rest, and in that the base of the box is provided with a projecting longitudinal center rib (43) pointing inwards.

6. A reinforcing rod holder according to one of claims 1 to 5, characterized in that the hold-down members (44) of the rod retainers (42) comprise two recesses (45) disposed on both sides of the longitudinal center rib.

7. A reinforcing rod holder according to claim 6, characterized in that the longitudinal center rib (43) and the recesses of the hold-down member comprise means (47,48) for aligning the rod holders.

8. A reinforcing rod holder according to one of claims 1 to 4, characterized in that the rod retainers (25) rest on the longitudinal sides of the edges and that the box (1) is provided in its center line area with raised portions (10), on each of which a securing pin (7) passing through a corresponding opening (8) of the cover (2,46) is arranged.

9. A reinforcing rod holder according to claim 8, characterized in that the longitudinal sides (3a) of the edges comprise recesses for receiving and aligning the rod retainers.



10. A reinforcing rod holder according to one of claims 1 to 9, characterized in that it further comprises holder inserts (53) resting either on the longitudinal edges or on the shoulders (40) of the longitudinal edges and having two recesses (54) which may extend around the longitudinal center rib (43).

11. A reinforcing rod holder according to claim 1 or 2, characterized in that on each of the longitudinal edges of the box, a cover bar (11) is provided which comprises cutouts (12) on the outside corresponding to the indentations (6) of the outer wall, as well as cutouts (13) provided at the place of the pins (7), and that at the places where the clamps of the reinforcing rods (14) project, sockets (15) are formed which extend around the shanks of the reinforcing rods while gripping and tightening them, and which pass through corresponding openings (16) of the cover.

12. A reinforcing rod holder according to claim 11, characterized in that the sockets (15) are tapered towards the top, and that there is a slot (19) on their inner side as well as on the portion (18) of the cover bar (11) that is pointing inwards, in order to allow insertion of the reinforcing rod shanks.

13. A reinforcing rod holder according to claim 11 or 12, characterized in that the box (1) and the cover bars (11) including the sockets (15) are made of plastics material in one piece.

14. A reinforcing rod holder according to one of claims 11 to 13, characterized in that in its center line area, the box comprises raised portions (10) on each of which a securing pin (7) is provided which passes through a corresponding opening (8) of the cover.



15. A reinforcing rod holder according to claim 1 or 2 intended for reinforcing rods having a clamp and one free shank, characterized in that it comprises rod retainers resting on the longitudinal edges below shoulders of the longitudinal edges and having openings for receiving the free shank, and that the cover plate is provided with openings corresponding to the top portion of the rod retainers.

16. A reinforcing rod holder according to one of claims 1 to 15, characterized in that at least the marginal portions of the cover (2,32,46) are provided with a protective coating.

17. A reinforcing rod holder according to claim 16, characterized in that said protective coating is a plastics coating or an electrostatically applied coating.

18. A reinforcing rod holder according to one of claims 1 to 17, characterized in that the cover (2,32,46) is formed of stretched metal.

19. A reinforcing rod holder according to one of claims 1 to 17, characterized in that the cover comprises means, in particular sharp-edged projections (20), for increasing its surface roughness.

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