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(54) **COLUMN SHOE FOR FASTENING REINFORCED CONCRETE COLUMNS TO A BASE**

STÜTZENSCHUH ZUR BEFESTIGUNG VON VERSTÄRKTEN BETONSÄULEN AN EINEM SOCKEL

SABOT DE COLONNE PERMETTANT DE FIXER DES COLONNES EN BÉTON ARMÉ À UNE BASE

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(56) References cited:
EP-A2- 0 952 265
WO-A1-2012/056100
WO-A1-2014/096523

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Description

Field of the invention

[0001] The invention relates to a column shoe for fastening reinforced concrete columns to a base as defined in the preamble of independent claim 1.

[0002] Publication US 7,726,091 presents a support shoe for a concrete pillar has a base plate and two lateral plates arranged at lateral edges of the base plate and projecting upwardly at a right angle from the base plate. At least one reinforcement bar is connected to the support shoe for introducing forces into the concrete pillar. The two lateral edges and thus also the lateral plates connected thereto are arranged at an acute angle relative to one another, wherein the two lateral plates are formed as separate components connected to the base plate. Document WO 2012/056100 A1 discloses the features of the preamble of claim 1.

Objective

[0003] The object of the invention is to provide a column shoe which has both good stiffness and that optimizes forces transfer within the column shoe.

Short description

[0004] The column shoe of the invention is characterized by the definitions of independent claim 1.

[0005] Preferred embodiments of the column shoe are defined in the dependent claims.

List of figures

[0006] In the following the column shoe will described in more detail by referring to the figures, of which

Figure 1 shows one embodiment of the column shoe,
Figure 2 shows the column shoe shown in figure 1 from another angle,
Figure 3 shows the column shoe shown in figure 1 from another angle, and
Figure 4 shows the column shoe shown in figure 1 from above.

Detailed description of the invention

[0007] In the following, the column shoe for fastening reinforced concrete columns to a base and some embodiments and variants of the column shoe will be described in greater detail.

[0008] The column shoe comprises a bottom plate 1 with a bolt opening 2. The column shoe comprises additionally a side plate member 3 fastened to the bottom plate 1 for providing a bolt casing 4 of the bottom plate 1 and the side plate member 3. When the column shoe is casted into a reinforced concrete column and said reinforced concrete column is fastened to a base by means of the column shoe, a treaded rod such as a bolt or a treaded bar or the like, that projects from the base, penetrates the bottom plate 1 in the bolt opening 2 and nuts are screwed to the treaded rod bolt or a treaded bar to secure the column shoe to the treaded bar or bolt.

[0009] The column shoe comprises additionally main bonds, also called anchor bars 5, fastened to the side plate member 3 for fastening and/or anchoring the column shoe and the reinforced concrete column to one another.

[0010] The column shoe comprises additionally back bond means 6. One purpose of the back bound means is to transmit horizontal forces, such as lower horizontal forces, between the column and said treaded rod that projects from the base.

[0011] In the column shoe, the side plate member 3 is a monolithic solid structure comprising two side plate sections 7 and a connecting section 8 connecting said two side plates sections.

[0012] The column shoe is symmetrical with respect to an imaginary vertical central plane A of the bolt casing 4.

[0013] The side plate member 3 has a slot 14 extending from an upper edge 15 of the side plate member 3 at the connecting section 8 of the side plate member 3. Especially if the anchor bars 5 are fastened by welding to the inner surface 13 of each side plate sections 7 of the side plate member 3, as illustrated in the figures, such slot 14 makes it easier to securely weld the anchor bars 5 to the inner surface 13 of each side plate section 7 of the side plate member 3, because the slot 14 provides for a passage for the welding torch (not shown in the figures)

[0014] In the column shoe, the back bond means 6 comprises preferably, but not necessarily, a back anchor 9 fastened to the back surface 12 of each side plate sections 7 that face away from one another. If the column shoe has such back anchors 9, each back anchor 9 has preferably, but not necessarily, a fastening section 10 by means of which the back anchor 9 is fastened by welding to said back surface 12 of the side plates section by welding along the fastening section 10 and a vertical section 11 that extends in parallel with the anchor bars 5. The back bond means 6 are preferably, but not necessarily, dimensioned so, and the back bond means 6 are preferably, but not necessarily, fastened to said back surface 12 of the side plates section so, that the vertical section 11 of the back anchors 9 are arranged at a distance from one another. The back bond means 6 will be securely fastened to the side plate section 7 because the arranging of the back anchors 9 are securely fastened to the said back surface 12 of the side plates section by welding along the fastening section 10. Because of the provision of a back bond means 6 comprising of two separate back anchors 9, arranging of the column shoe with respect to the reinforcement structure of the reinforced concrete column is easy, when manufacturing the reinforced concrete column by casting.

[0015] The back anchors 9 are preferably, but not necessarily, identical and arranged symmetrically with respect to the imaginary vertical central plane A of the bolt casing 4.

[0016] The anchor bars 5 comprises two anchor bars 5 so that one anchor bar 5 is fastened to inner surface 13 of each side plate section 7 that faces one another.

[0017] The anchor bars 5 are preferably, but not necessarily identical. The anchor bars are arranged symmetrically with respect to the imaginary vertical central plane A of the bolt casing 4.

[0018] The fastening section 10 of each back anchor 9 extend preferably, but not necessarily, perpendicularly with respect to the vertical section 11 of the back anchor 9.

[0019] The bolt opening 2 in the bottom plate 1 is preferably, but not necessarily, symmetrically provided with respect to the imaginary vertical central plane A of the bolt casing 4.

[0020] The slot 14 is provided at the imaginary vertical plane A of the bolt casing 4.

[0021] The slot 14 extends between an inner surface of the side plate member 3 and an outer surface of the side plate member 3.

[0022] The slot 14 extend preferably, but not necessarily, between an inner surface of the connecting section 8 of the side plate member 3 and an outer surface of the connecting section 8 of the side plate member 3.

[0023] The anchor bars 5 are provided spaced apart from the slot 14.

[0024] It is apparent to a person skilled in the art that as technology advances, the basic idea of the invention can be implemented in various ways. The invention and its embodiments are therefore not restricted to the above examples, but they may vary within the scope of the claims.

Claims

1. A column shoe for fastening reinforced concrete columns to a base, wherein the column shoe comprising

   a bottom plate (1) with a bolt opening (2),
   a side plate member (3) fastened to the bottom plate (1) for providing a bolt casing (4) of the bottom plate (1) and the side plate member (3),
   anchor bars (5) fastened to the side plate member (3) for fastening the column shoe and the reinforced concrete column to one another, and
   back bond means (6) for transmitting horizontal forces between the reinforced concrete column and a threaded rod projecting from the base and through the bolt opening (2) in the bottom plate (1),
   wherein the side plate member (3) is a monolithic structure comprising two side plate sections (7) and a connecting section (8) connecting said two side plates sections, and
   wherein the bolt casing (4) being symmetrical with respect to an imaginary vertical central plane A of the bolt casing (4),
   wherein the anchor bars (5) comprise two anchor bars (5) so that one anchor bar (5) is fastened to inner surface (13) of each side plate sections (7) that faces one another,
   wherein a slot (14) extends from an upper edge (15) of side plate member (3) at the connecting section (8) of the side plate member (3),
   wherein the slot (14) is provided at the imaginary vertical plane A of the bolt casing (4),
   characterized by the slot (14) extending between an inner surface of the side plate member (3) and an outer surface of the side plate member (3), and
   by the anchor bars (5) being provided spaced apart from the slot (14).

2. The column shoe according to claim 1, **characterized**

   by the back bond means (6) comprising a back anchor (9) fastened to the back surface (12) of each side plate section (7) that face away from one another,
   by each back anchor (9) having a fastening section (10) by means of which the back anchor (9) is fastened by welding to said back surface (12) of the side plate members (3) by welding along the fastening section (10) and a vertical section (11) that extends in parallel with the anchor bars (5), and
   by the back bond means (6) being dimensioned so and the back bond means (6) being fastened to said back surface (12) of the side plates section so that the vertical section (11) of the back anchors (9) are arranged at a distance from one another.

3. The column shoe according to claim 2, **characterized**
   by the back anchors (9) being identical and being arranged symmetrically with respect to the imaginary vertical central plane A of the bolt casing (4).

4. The column shoe according to claim 2 or 3, **characterized**
   by the fastening section (10) of each back anchor (9) extending perpendicularly with respect to the vertical section (11) of the back anchor (9).

5. The column shoe according to any of the claims 1 to 4, **characterized**
   by the anchor bars (5) being identical and being arranged symmetrically with respect to the imaginary vertical central plane A of the bolt casing (4).

6. The column shoe according to any of the claims 1 to 5, **characterized**
by the bolt opening (2) in the bottom plate (1) being symmetrically provided with respect to the imaginary vertical central plane A of the bolt casing (4).

7. The column shoe according to any of the claims 1 to 6, **characterized**
by the slot (14) extending between an inner surface of the connecting section (8) of the side plate member (3) and an outer surface of the connecting section (8) of the side plate member (3).

Patentansprüche

1. Stützenschuh zur Befestigung von armierten Betonstützen an einer Basis, wobei der Stützenschuh umfasst:

eine Bodenplatte (1) mit einer Bolzenöffnung (2),
ein an der Bodenplatte (1) befestigtes Seitenplattenelement (3) zur Bereitstellung eines Bolzengehäuses (4) der Bodenplatte (1) und des Seitenplattenelements (3),
am Seitenplattenelement (3) befestigte Ankerstäbe (5), um den Stützenschuh und die armierte Betonstütze aneinander zu befestigen, und
rückseitige Verbindermittel (6) zur Übertragung von horizontalen Kräften zwischen der armierten Betonstütze und einer Gewindestange, die aus der Basis heraus- und durch die Bolzenöffnung (2) in der Bodenplatte (1) hindurchragt,
wobei das Seitenplattenelement (3) eine monolithische Struktur ist, die zwei Seitenplattenabschnitte (7) und einen die zwei Seitenplattenabschnitte verbindenden Verbindungsabschnitt (8) umfasst, und
wobei das Bolzengehäuse (4) symmetrisch zu einer imaginären vertikalen mittleren Ebene A des Bolzengehäuses (4) ist,
wobei die Ankerstäbe (5) zwei Ankerstäbe (5) umfassen, sodass ein Ankerstab (5) an der Innenfläche (13) jedes Seitenplattenabschnitts (7) befestigt ist, die einander zugewandt sind,
wobei eine Ausnehmung (14) ausgehend von einer Oberkante (15) des Seitenplattenelements (3) am Verbindungsabschnitt (8) des Seitenplattenelements (3) verläuft,
wobei die Ausnehmung (14) an einer imaginären vertikalen Ebene A des Bolzengehäuses (4) vorgesehen ist,
gekennzeichnet dadurch, dass sich die Ausnehmung (14) zwischen einer Innenfläche des Seitenplattenelements (3) und einer Außenfläche des Seitenplattenelements (3) erstreckt, und
dass die Ankerstäbe (5) beabstandet zur Ausnehmung (14) vorgesehen sind.

2. Stützenschuh nach Anspruch 1, **gekennzeichnet dadurch,**

dass die rückseitigen Verbindermittel (6) einen Rückseitenanker (9) umfassen, der an der rückseitigen Fläche (12) jedes Seitenplattenabschnitts (7) befestigt ist, die voneinander abgewandt sind,
jeder Rückseitenanker (9) einen Befestigungsabschnitt (10), über den der Rückseitenanker (9) durch Schweißen entlang des Befestigungsabschnitts (10) an der rückseitigen Fläche (12) der Seitenplattenelemente (3) schweißtechnisch befestigt wird, und einen parallel zu den Ankerstäben (5) verlaufenden vertikalen Abschnitt (11) aufweist, und
dass die rückseitigen Verbindermittel (6) so dimensioniert sind und die rückseitigen Verbindermittel (6) an der rückseitigen Fläche (12) des Seitenplattenabschnitts so befestigt sind, dass die vertikalen Abschnitte (11) der Rückseitenanker (9) in einem Abstand zueinander angeordnet sind.

3. Stützenschuh nach Anspruch 2, **gekennzeichnet dadurch,**
dass die Rückseitenanker (9) identisch sind und symmetrisch zur imaginären vertikalen mittleren Ebene A des Bolzengehäuses (4) angeordnet sind.

4. Stützenschuh nach Anspruch 2 oder 3, **gekennzeichnet dadurch,**
dass sich der Befestigungsabschnitt (10) jedes Rückseitenankers (9) rechtwinklig zum vertikalen Abschnitt (11) des Rückseitenankers (9) erstreckt.

5. Stützenschuh nach einem der Ansprüche 1 bis 4, **gekennzeichnet dadurch,**
dass die Ankerstäbe (5) identisch sind und symmetrisch zur imaginären vertikalen mittleren Ebene A des Bolzengehäuses (4) angeordnet sind.

6. Stützenschuh nach einem der Ansprüche 1 bis 5, **gekennzeichnet dadurch,**
dass die Bolzenöffnung (2) in der Bodenplatte (1) symmetrisch zur imaginären vertikalen mittleren Ebene A des Bolzengehäuses (4) vorgesehen ist.

7. Stützenschuh nach einem der Ansprüche 1 bis 6, **gekennzeichnet dadurch,**
dass sich die Ausnehmung (14) zwischen einer Innenfläche des Verbindungsabschnitts (8) des Seitenplattenelements (3) und einer Außenfläche des Verbindungsabschnitts (8) des Seitenplattenelements (3) erstreckt.

Revendications

1. Sabot de colonne pour attacher des colonnes en béton armé à une base, ledit sabot de colonne comprenant :

   une plaque inférieure (1) avec un trou à boulon (2),
   un élément de plaque latéral (3) attaché à la plaque inférieure (1) pour fournir un boîtier de boulon (4) de la plaque inférieure (1) et de l'élément de plaque latéral (3),
   des barres d'ancrage (3) attachées à l'élément de plaque latéral (3) pour attacher entre eux le sabot de colonne et la colonne en béton armé, et
   des moyens de lien arrière (6) pour transmettre des forces horizontales entre la colonne en béton armé et une tige filetée dépassant de la base à travers le trou à boulon (2) dans la plaque inférieure (1),
   ledit élément de plaque latéral (3) étant une structure monolithique comprenant deux parties de plaque latérales (7) et une partie de liaison (8) reliant lesdites deux parties de plaque latérales (7), et
   ledit boîtier de boulon (4) étant symétrique par rapport à un plan central vertical imaginaire A du boîtier de boulon (4),
   lesdites barres d'ancrage (5) comprenant deux barres d'ancrage (5) de telle façon qu'une barre d'ancrage (5) soit attachée à la surface intérieure (13) de chacune des parties de plaque latérales (13) qui sont orientées l'une à l'opposé de l'autre,
   une échancrure (14) s'étendant à partir d'un bord supérieur (15) de l'élément de plaque latéral (3) sur la partie de liaison (8) de l'élément de plaque latéral (3),
   ladite échancrure (14) étant prévue au plan vertical imaginaire A du boîtier de boulon (4),
   caractérisé en ce que l'échancrure (14) s'étend entre une surface intérieure de l'élément de plaque latéral (3) et une surface extérieure de l'élément de plaque latéral (3), et
   que les barres d'ancrage (5) sont prévues à une distance de l'échancrure (14).

2. Sabot de colonne selon la revendication 1, **caractérisé en ce**

   que les moyens de lien arrière (6) comprennent un ancrage arrière (9) attaché à la surface arrière (12) de chacune des parties de plaque latérales (7) qui sont orientées l'une à l'opposé de l'autre,
   que chaque ancrage arrière (9) comporte une partie d'attache (10) moyennant laquelle l'ancrage arrière (9) est attaché par soudage à la surface arrière (12) des éléments de plaque latéraux (5) par soudage le long de la partie d'attache (10) et une partie verticale (11) qui s'étend parallèlement aux barres d'ancrage (5), et
   que les moyens de lien arrière (6) sont dimensionnés de telle façon et que les moyens de lien arrière (6) sont attachés à la surface arrière (12) de la partie de plaque latérale de telle façon que les parties verticales (11) des ancrages arrière (9) soient disposées à une distance entre elles.

3. Sabot de colonne selon la revendication 2, **caractérisé en ce**
   que les ancrages arrière (9) sont identiques et disposés de manière symétrique par rapport au plan central vertical imaginaire A du boîtier de boulon (4).

4. Sabot de colonne selon la revendication 2 ou 3, **caractérisé en ce**
   que la partie d'attache (10) de chaque ancrage arrière (9) s'étend perpendiculairement par rapport à la partie verticale (11) de l'ancrage arrière (9).

5. Sabot de colonne selon l'une des revendications 1 à 4, **caractérisé en ce**
   que les barres d'ancrage (5) sont identiques et disposées de manière symétrique par rapport au plan central vertical imaginaire A du boîtier de boulon (4).

6. Sabot de colonne selon l'une des revendications 1 à 5, **caractérisé en ce**
   que le trou à boulon (2) dans la plaque inférieure (1) est prévu de manière symétrique par rapport au plan central vertical imaginaire A du boîtier de boulon (4).

7. Sabot de colonne selon l'une des revendications 1 à 6, **caractérisé en ce**
   que l'échancrure (14) s'étend entre une surface intérieure de la partie de liaison (8) de l'élément de plaque latéral (3) et une surface extérieure de la partie de liaison (8) de l'élément de plaque latéral (3).

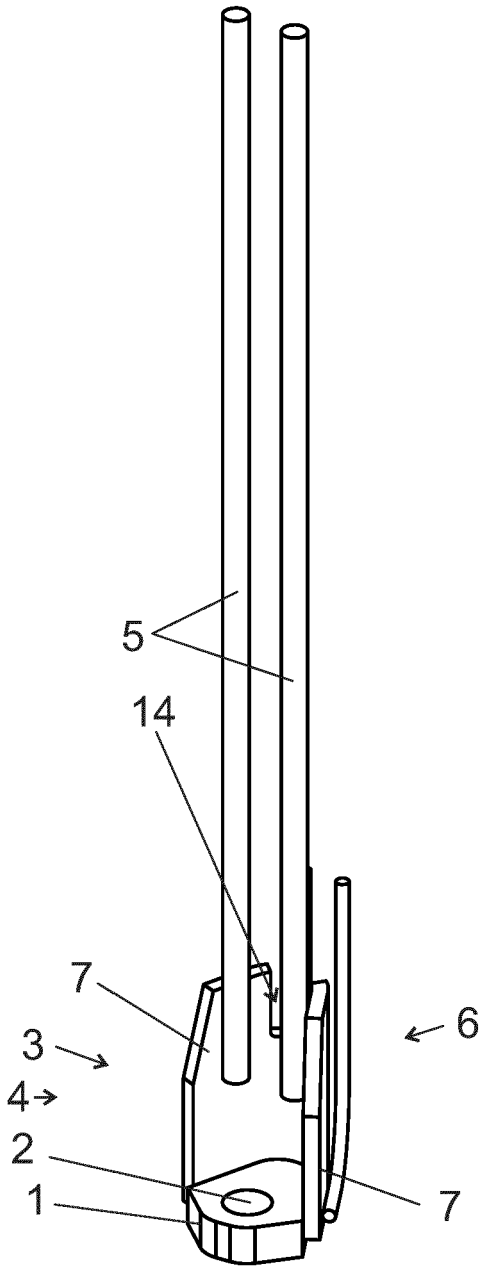


FIG 1

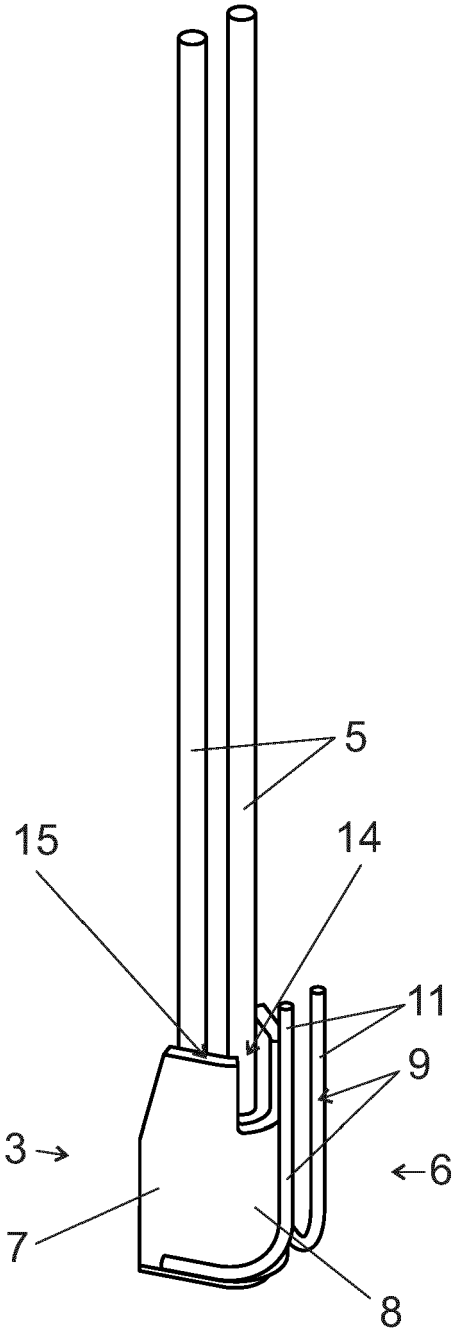


FIG 2

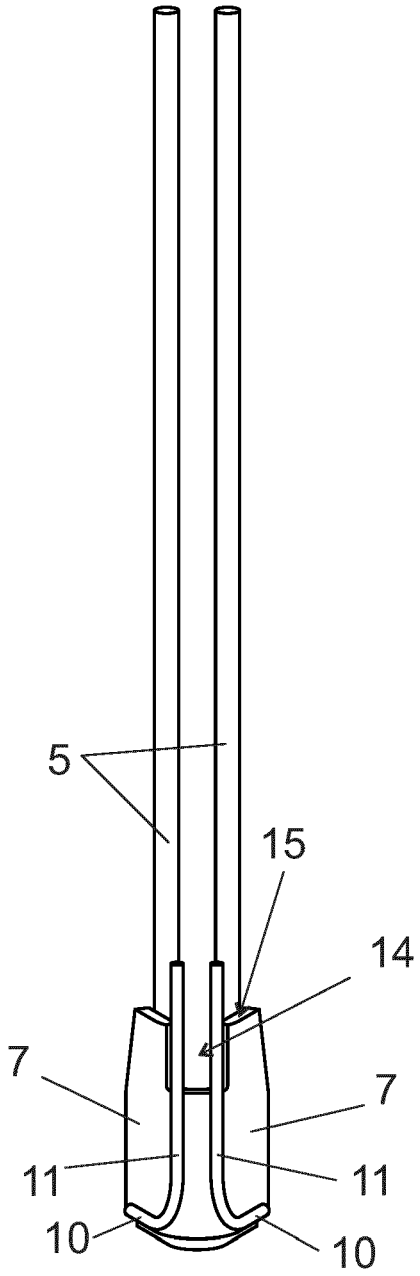


FIG 3

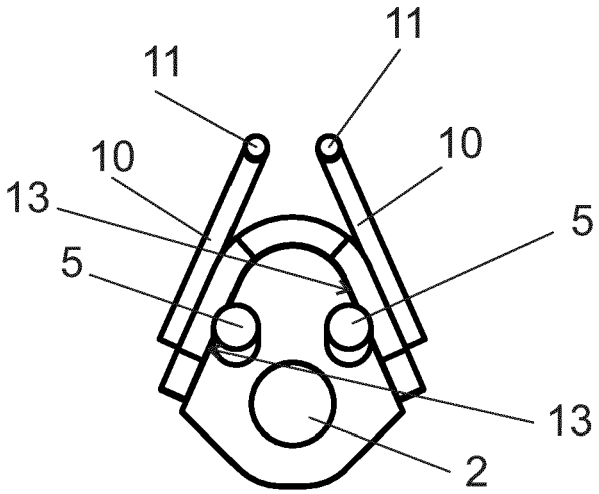


FIG 4

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- US 7726091 B **[0002]**
- WO 2012056100 A1 **[0002]**