

(19)



(11)

EP 3 540 142 B1

(12)

EUROPEAN PATENT SPECIFICATION

(45) Date of publication and mention
of the grant of the patent:
31.03.2021 Bulletin 2021/13

(51) Int Cl.:
E04C 2/04 (2006.01) E04C 2/288 (2006.01)

(21) Application number: **19155655.4**

(22) Date of filing: **06.02.2019**

(54) **TIE**

VERBINDER

CONNECTEUR

(84) Designated Contracting States:
**AL AT BE BG CH CY CZ DE DK EE ES FI FR GB
GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO
PL PT RO RS SE SI SK SM TR**

(30) Priority: **12.03.2018 FI 20184042 U**

(43) Date of publication of application:
18.09.2019 Bulletin 2019/38

(73) Proprietor: **Anstar Oy
15540 Villähde (FI)**

(72) Inventor: **PULKKANEN, Juha
15540 Villähde (FI)**

(74) Representative: **Papula Oy
P.O. Box 981
00101 Helsinki (FI)**

(56) References cited:
DE-A1- 2 023 363 DE-U- 1 937 051

EP 3 540 142 B1

Note: Within nine months of the publication of the mention of the grant of the European patent in the European Patent Bulletin, any person may give notice to the European Patent Office of opposition to that patent, in accordance with the Implementing Regulations. Notice of opposition shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European Patent Convention).

Description

[0001] The object of the invention is a tie according to the preamble of claim 1 for connecting internal layer and external layer of a sandwich building element to each other. Furthermore, the object of the invention is a sandwich building element, which comprises an internal layer and an external layer.

[0002] Ties are used to bind an internal layer and an external layer of concrete sandwich building elements to each other. Ties are installed into fresh concrete of the external layer. Insulations of the element are placed between ties so that ties are in edgings of insulations. Thereafter, the internal layer of the element is cast on the insulation so that the tie extends also into concrete of the internal layer. After concrete has hardened, ties bind the internal layer and the external layer and the insulation between them to each other.

[0003] Document DE 20 23 363 A1 discloses a tie according to a preamble of claim 1.

[0004] The aim of this invention is to achieve an improved tie for connecting internal layer and external layer of a sandwich building element to each other.

[0005] The aim of the invention is achieved with a tie according to claim 1, which tie comprises an internal bar fittable into the internal layer of the building element, and an external bar, which is fittable into the external layer, and the internal bar and the external bar being parallel with each other and at a distance from each other, and a bracing connecting the internal bar and external bar. Additionally, the tie comprises a looplike further bond for fastening the tie to a building element. The bracing, the internal bar, the external bar and the further bond are formed from the same wire blank by bending. The bracing comprises three sides of which a first side and a second side are arranged in the V-form to form a first angle opening towards the internal bar, and the first side, the second side and the internal bar form a triangle, wherein the first side and the second side form sides for the triangle and the internal bar forms the base for the triangle, and the second side and a third side are arranged in the V-form to form a second angle opening towards the external bar. The second side, the third side and the external bar form a triangle, wherein the second side and the third side form sides for the triangle and the external bar forms the base for the triangle. The further bond is formed in the wire blank between the first side and the internal bar.

[0006] According to the invention the whole tie, i.e. internal bar, external bar bracing and further bond are formed of the same wire blank by bending. Significant advantages can be achieved by the invention. By further bond the fastening of a tie into a building element can be improved. A tie according to the invention, a part of a bracing, second bar and a further bond between them are formed from the one and the same wire blank by bending. The whole tie, i.e. bracing, internal bar and external bar and further bond are preferably formed from the one and the same wire blank by bending. Then the

bracing, further bond and the internal bar and/or the external bar do not have to be formed as separate parts at first, and thereafter to form a tie of them by connecting the parts together by welding. A tie according to the invention can be produced by cutting the wire forming the tie or a part of the tie to a wire blank of desired length and by bending the wire blank to its final form so that the blank forms the whole tie or a desired part of the tie. Alternatively, wire blank can be bent to a desired form at first and then the wire can be cut. Then the wire is drawn out of the wire coil, bent to a desired form, and finally, the wire is cut. The production method speeds up the production of a tie significantly and thus reduces production costs compared to a traditional solution. The wire forming a tie can be bent to a desired form by existing bending devices.

[0007] In the following, the invention will be described in more detail by the aid of an example with reference to the attached drawings, wherein

Fig. 1 shows a side view of a tie according to one embodiment of the invention, and

Fig. 2 shows the tie of Fig. 1 installed in a sandwich building element.

[0008] The tie 1 presented in the drawings is used to connect internal layer 12 and external layer 13 of a building element 11 to each other. The tie 1 is so called beam tie, which is used to connect internal layer 12 and external layer 13 to each other in lower building elements in places where a conventional diagonal tie does not fit, for example above a window beam. Internal layer 12 and external layer 13 are produced of concrete.

[0009] A tie 1 comprises a diagonal, i.e. a bracing 4 and two bar threads, i.e. an internal bar 2 and an external bar 3. Internal bar 2 and external bar 3 are parallel with each other and at a distance from each other. The bracing 4 is formed of a wire. The bracing 4 comprises three sides 5, 6, 7, which form two angles 8, 9 opening in opposite directions. A first side 5 and second side 6 are arranged in the V-form so that they form a first angle 8. First angle 8 opens towards the internal bar 2. First side 5, second side 6 and the internal bar 2 form a triangle, preferably an isosceles triangle, wherein first side 5 and second side 6 form the sides for the triangle, and the internal bar 2 forms the base for the triangle.

[0010] A third side 7 and second side 6 are arranged in the V-form so that they form a second angle 9. Second angle 9 opens towards the external bar 3. Second side 6, third side 7 and the external bar 3 form a triangle, preferably a rectangular triangle. Then the external bar 3 and third side 7 are at a right angle to each other. The external bar 3 and the internal bar 2 are at a distance from each other. The external bar 3 and the internal bar 2 are parallel to each other. First angle 8 and second angle 9 are rounded. First angle 8 forms a first bond for fastening the tie 1 into the external layer 13 of the building element 11. Second angle 9 forms a second bond for

fastening the tie 1 into the internal layer 12.

[0011] Additionally, the tie 1 comprises a further bond 15 for fastening the tie 1 into the internal layer 12 or into the external layer 13 of the building element 11. In the embodiment of the drawings the tie 1 is attached into the internal layer 12 by a further bond 15. The further bond 15 is looplike. At least a part of the bracing 4, at least a part of the internal bar 2 or external bar 3 and further bond 15 are formed of the same wire blank by bending. Wire is of stainless steel. The diameter of the wire is 3-7 mm, typically 5 mm. The further bond 15 is formed into wire blank between bracing 4 and said bar, in the drawings internal bar 2. The further bond 15 is placed in thread blank between first side 5 and internal bar 2. Overlapping parts of the wire forming the loop of the looplike further bond 15 are welded together at a crossing point 16.

[0012] In the embodiment of the drawings the tie 1, i. e. bracing 4, internal bar 2 and external bar 3 and further bond 15 are formed of the same wire by bending. Wire forming the tie 1 is of stainless steel. The diameter of the wire is 3-7 mm, typically 5 mm. Bracing 4, e.g. first side 5 and/or second side of the bracing, are attached to the external bar 3 by welding, by spot welding, for example. The welding point is at the crossing point of first side 5 and/or second side 6 and the external bar 3. The wire forming the bracing 4, external bar 3, internal bar 2 and further bond 15 comprises only two ends, first end is at the end of the internal bar 2 and second end is at the end of the external bar 3.

[0013] A sandwich building element 11 according to the invention comprises an internal layer 12 and an external layer 13, which are bound to each other with a tie 1 described above. The internal bar 2 of the tie is placed into concrete of the internal layer 12, and the external bar 3 into concrete of external layer 13. Additionally, first angle 8 is placed into concrete of the external layer 13, and second angle 9 into concrete of the internal layer 12. Further bond 15 is placed into concrete of either an internal layer 12 as in figure 2 or into concrete of external layer 13. Between the internal layer 12 and external layer 13 there is insulation material 14, mineral wool, for example.

[0014] Tie 1 is assembled at its place into the sandwich building element 11 so that the external bar 3 is placed into fresh concrete of the external layer 13. Also the tip of first angle 8 is placed into concrete of the external layer 13. Thereafter, insulations 14 of building element 11 are placed so that tie 1 or ties are in edgings of insulations 14. The internal layer 12 of the building element is cast on insulation 14 so that the internal bar 2 extends into concrete of the internal layer 12. Further bond 15 is in concrete of external layer 13 or in concrete of internal layer 12, as in figure 2. Also the tip of second angle 9 extends into concrete of the internal layer 12. After the concrete has hardened the tie 1 binds the internal layer 12 and the external layer 13 to each other.

[0015] It is obvious to the person skilled in the art that the various embodiments of the invention are not limited

solely to the examples described above, but that they may be varied within the scope of the claims presented below.

Claims

1. A tie (1) for connecting an internal layer (12) and an external layer (13) of a sandwich building element (11) to each other, which tie (1) comprises an internal bar (2) fittable into the internal layer (12) of the building element and an external bar (3) fittable into the external layer (13), and the internal bar (2) and the external bar (3) being parallel with each other and at a distance from each other, and a bracing (4) connecting the internal bar (2) and the external bar (3), and a looplike further bond (15) for fastening the tie (1) to a building element (11), wherein

- the bracing (4), the internal bar, the external bar (2, 3) and the further bond (15) are formed from the same wire blank by bending,
- the bracing (4) comprises three sides of which a first side (5) and a second side (6) are arranged in the V-form to form a first angle (8) opening towards the internal bar (2), and

the first side (5), the second side and the internal bar (2) form a triangle, wherein the first side (5) and the second side (6) form sides for the triangle and the internal bar (2) forms the base for the triangle, and the second side (6) and a third side (7) are arranged in the V-form to form a second angle (9) opening towards the external bar (3),

characterized in that

- the second side (6), the third side (7) and the external bar (3) form a triangle, wherein the second side (6) and the third side (7) form sides for the triangle and the external bar (3) forms the base for the triangle, and
- the further bond (15) is formed in the wire blank between the first side (5) and the internal bar (2).

2. The tie (1) according to claim 1, **characterized in that** the external bar (3) is fastened to the bracing (4) and/or the internal bar (2) is fastened to the bracing (4) by welding.
3. A sandwich building element (11) comprising an internal layer (12) and an external layer (13), **characterized in that** the internal layer (12) and the external layer (13) are bound to each other with a tie (1) according to claim 1 or 2, the internal bar (2) of which tie (1) is placed into concrete of the internal layer (12), the external bar (3) into concrete of the external layer (13) and the further bond (15) into concrete of

the internal layer (12).

ßeren Schicht (13) und die weitere Bindung (15) in Beton der inneren Schicht (12) gelegt sind.

Patentansprüche

1. Band (1) zur gegenseitigen Verbindung einer inneren Schicht (12) und einer äußeren Schicht (13) eines Verbundbauteils (11), wobei das Band (1) einen inneren Stab (2), der in die innere Schicht (12) des Bauteils anpassbar ist, und einen äußeren Stab (3), der in die äußere Schicht (13) anpassbar ist, aufweist, und der innere Stab (2) und der äußere Stab (3) parallel zueinander und in einem Abstand voneinander sich befinden, und eine Verstrebung (4), die den inneren Stab (2) und den äußeren Stab (3) verbindet, und eine schlingennähnliche weitere Bindung (15) zum Befestigen des Bandes (1) an einem Bauteil (11), wobei die Verstrebung (4), der innere Stab, der äußere Stab (2, 3) und die weitere Bindung (15) durch Biegen aus dem gleichen Drahtzuschnitt gebildet sind, die Verstrebung (4) drei Seiten aufweist, von denen eine erste Seite (5) und eine zweite Seite (6) in V-Form angeordnet sind, um einen ersten Winkel (8) zu bilden, der sich zu dem inneren Stab (2) hin öffnet, und die erste Seite (5), die zweite Seite und der innere Stab (2) ein Dreieck bilden, wobei die erste Seite (5) und die zweite Seite (6) die Seiten für das Dreieck bilden, und der innere Stab (2) die Basis für das Dreieck bildet, und die zweite Seite (6) und eine dritte Seite (7) in V-Form angeordnet sind, um einen zweiten Winkel (9) zu bilden, der sich zu dem äußeren Stab (3) hin öffnet, **dadurch gekennzeichnet, dass** die zweite Seite (6), die dritte Seite (7) und der äußere Stab (3) ein Dreieck bilden, wobei die zweite Seite (6) und die dritte Seite (7) die Seiten für das Dreieck bilden und der äußere Stab (3) die Basis für das Dreieck bildet, und die weitere Bindung (15) in dem Drahtzuschnitt zwischen der ersten Seite (5) und dem inneren Stab (2) gebildet ist.
2. Band (1) nach Anspruch 1, **dadurch gekennzeichnet, dass** der äußere Stab (3) an der Verstrebung (4) befestigt ist und/oder der innere Stab (2) durch Schweißen an der Verstrebung (4) befestigt ist.
3. Verbundbauteil (11), umfassend eine innere Schicht (12) und eine äußere Schicht (13), **dadurch gekennzeichnet, dass** die innere Schicht (12) und die äußere Schicht (13) mit einem Band (1) nach Anspruch 1 oder 2 miteinander verflochten sind, der innere Stab (2) des Bandes (1) in Beton der inneren Schicht (12), der äußere Stab (3) in Beton der äu-

5 Revendications

1. Armature (1) pour relier l'une à l'autre une couche interne (12) et une couche externe (13) d'un élément de construction sandwich (11), laquelle armature (1) comprend une barre interne (2) pouvant être mise en place dans la couche interne (12) de l'élément de construction et une barre externe (3) pouvant être mise en place dans la couche externe (13), et la barre interne (2) et la barre externe (3) étant parallèles l'une à l'autre et à distance l'une de l'autre, et un élément de contreventement (4) reliant la barre interne (2) et la barre externe (3), et une liaison supplémentaire (15) en forme de boucle pour rendre l'armature (1) solidaire d'un élément de construction (11), dans laquelle

- l'élément de contreventement (4), la barre interne (2), la barre externe (3) et la liaison supplémentaire (15) sont formés à partir du même tronçon de fil par pliage,

- l'élément de contreventement (4) comprend trois côtés dont un premier côté (5) et un deuxième côté (6) sont disposés en forme de V de façon à former un premier angle (8) s'ouvrant vers la barre interne (2), et

le premier côté (5), le deuxième côté et la barre interne (2) forment un triangle, dans lequel le premier côté (5) et le deuxième côté (6) forment des côtés du triangle et la barre interne (2) forme la base du triangle, et

le deuxième côté (6) et un troisième côté (7) sont disposés en forme de V de façon à former un second angle (9) s'ouvrant vers la barre externe (3),

caractérisée en ce que

- le deuxième côté (6), le troisième côté (7) et la barre externe (3) forment un triangle, dans lequel le deuxième côté (6) et le troisième côté (7) forment des côtés du triangle et la barre externe (3) forme la base du triangle, et

- la liaison supplémentaire (15) est formée dans le tronçon de fil métallique entre le premier côté (5) et la barre interne (2).

2. Armature (1) suivant la revendication 1, **caractérisée en ce que** la barre externe (3) est rendue solidaire de l'élément de contreventement (4) et/ou la barre interne (2) est rendue solidaire de l'élément de contreventement (4) par soudage.

3. Élément de construction sandwich (11) comprenant

une couche interne (12) et une couche externe (13),
caractérisé en ce que la couche interne (12) et la
couche externe (13) sont reliées l'une à l'autre par
une armature (1) suivant la revendication 1 ou 2, la
barre interne (2) de ladite armature (1) étant située
dans le béton de la couche interne (12), la barre ex-
terne (3) dans le béton de la couche externe (13) et
la liaison supplémentaire (15) dans le béton de la
couche interne (12).

5

10

15

20

25

30

35

40

45

50

55

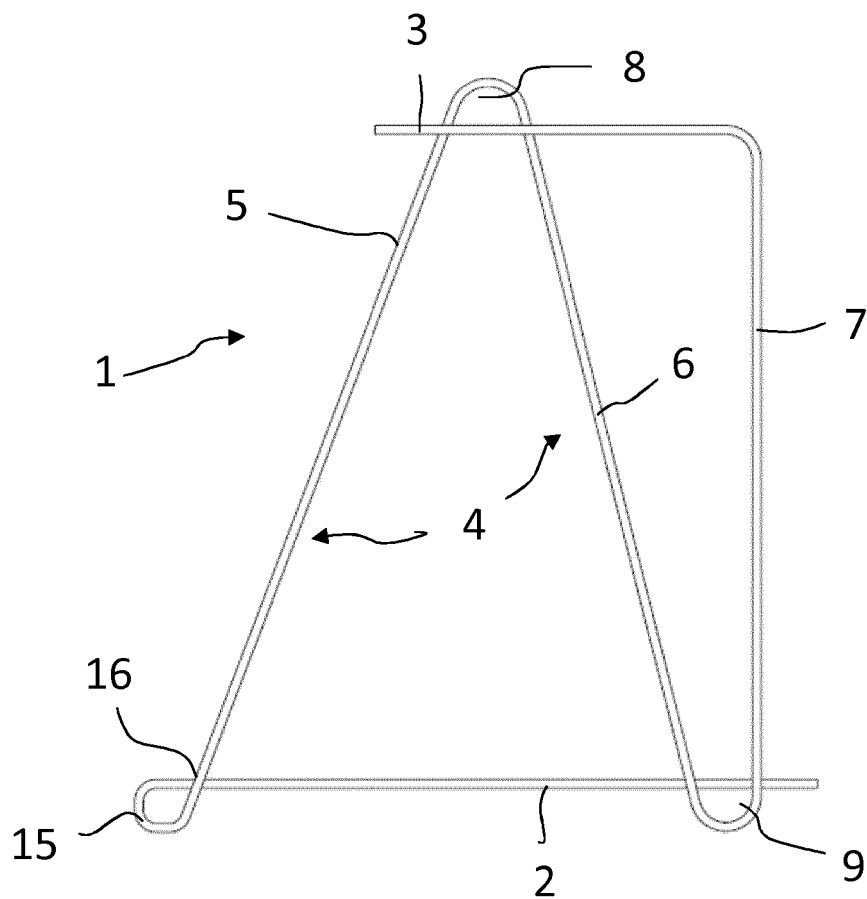


Fig. 1

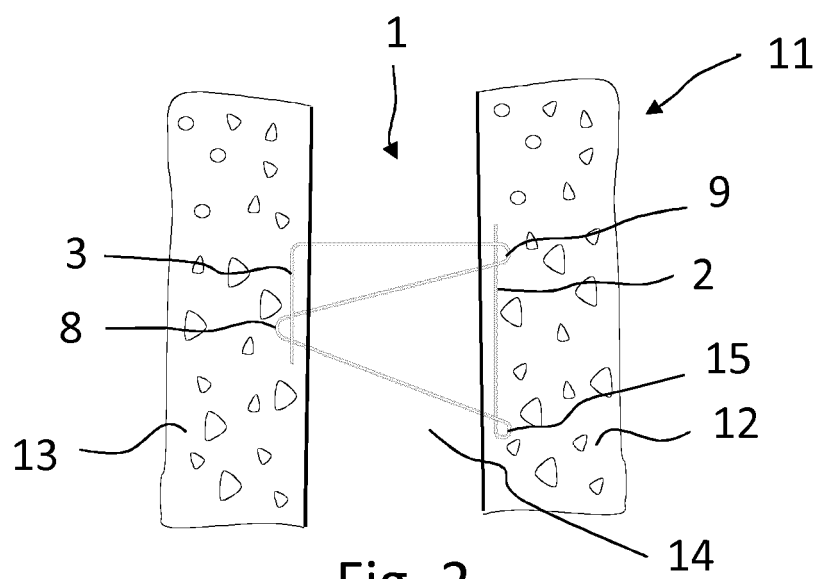


Fig. 2

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- DE 2023363 A1 [0003]