

(19)



Europäisches Patentamt

European Patent Office

Office européen des brevets



(11)

EP 0 859 098 B1

(12)

EUROPEAN PATENT SPECIFICATION

(45) Date of publication and mention
of the grant of the patent:
02.11.2005 Bulletin 2005/44

(51) Int Cl.7: **E04C 5/01**, E04C 5/065,
E04C 5/16, E04B 2/10

(21) Application number: **98500042.1**

(22) Date of filing: **13.02.1998**

(54) **Masonry wall with an Integral reinforcing system**

Mauerwerk mit Integralem Bewehrungssystem

Maçonnerie avec système d'armature intégrée

(84) Designated Contracting States:
AT BE CH DE DK ES FI FR GB IT LI NL PT SE

(30) Priority: **14.02.1997 ES 9700309**

(43) Date of publication of application:
19.08.1998 Bulletin 1998/34

(73) Proprietor: **Adell Argiles, Josep Maria**
28020 Madrid (ES)

(72) Inventor: **Adell Argiles, Josep Maria**
28020 Madrid (ES)

(74) Representative: **Gil-Vega, Victor**
Estébanez Calderon, 3 - 5B
28020 Madrid (ES)

(56) References cited:
DE-A- 1 913 379 **DE-U- 9 403 323**
FR-A- 1 457 422

EP 0 859 098 B1

Note: Within nine months from the publication of the mention of the grant of the European patent, any person may give notice to the European Patent Office of opposition to the European patent granted. Notice of opposition shall be filed in a written reasoned statement. It shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European Patent Convention).

Description

OBJECT OF THE INVENTION

[0001] The present invention provides a masonry wall with an integral reinforcing system, particularly with regards to the vertical reinforcement of the wall. The system involves reinforcement set in housing or channels provided within the wall and this reinforcement together with its corresponding anchorage and components may be used as framework or formwork in order to form an integral system which, in accordance with the established design theory, is always set in the precise position to allow the wall to work effectively in accordance with the design values of stress for the construction.

[0002] This integral reinforcing system is applicable to all types of masonry and does not affect the properties of the wall in those areas which do not require reinforcing, and will in no way affect the exposed face of the wall.

BACKGROUND OF THE INVENTION

[0003] The applicant is the patent holder of Spanish patent application No. 9501891 for a "Building unit for integral masonry". This system provides masonry walls with vertical channelling or voids of a suitable size which are connected through the unexposed face of the wall. Once the corresponding lateral access channel to the centre of the piece has been opened the reinforcement may easily be inserted within the masonry either during or after construction. This reinforcing system in no way affects the classical bond on the masonry which is necessary to ensure the wall's stability.

[0004] However, this patent does not cover certain significant aspects related to bricklaying techniques, and specifically that regarding: the form of the prefabricated longitudinal reinforcement; the anchors and supplementary components necessary for an integral reinforcing system and which ensure quick, simple and efficient construction; and the correct positioning and spacing of the longitudinal reinforcement with regard to the two faces of the wall.

[0005] The applicant is also the patent holder of Spanish patent publication No. ES-A-2130 919 regarding improvements on the abovementioned Spanish application, applicable to vertical reinforcement using special units.

[0006] German patent DE-A-19 13 379 also discloses a reinforcing system.

DESCRIPTION OF THE INVENTION

[0007] The integral reinforcing system proposed by this invention effectively covers the requirements indicated above and, as such, is focused on the longitudinal reinforcement, the anchors for the same and the series of supplementary elements.

[0008] The longitudinal reinforcement may be applied

to different types of reinforced masonry, namely.

- _Reinforced masonry.
- _Pre-stressed masonry.
- _Post-stressed masonry.
- _Hanging masonry.

[0009] Due to the special prefabricated nature of the said longitudinal reinforcement and its positioning, this reinforcement may also serve as guide frame within the masonry, which is accessible from the unexposed face of the wall (or the exposed face if so required), and which may be used to hold certain types of anchors and/or connectors. Indeed, these connectors could also be fitted to the free ends (upper and lower) of the said void reinforcement.

[0010] Once the anchors are fixed to the longitudinal reinforcement they may be then used to serve the following functions, to name but a few:

- _Fix the facing wall to a structural support.
- _Attach secondary elements to the supporting wall.
- _Attach various elements such as capping, angles, plumb lines, etc.

[0011] Any of these new possibilities could be considered for walls which are constructed in-situ or for walls which are prefabricated either on site or in workshop.

[0012] The longitudinal reinforcement is made up of one or several, individual or grouped longitudinal elements set parallel to each other at constant distances and joined by separators and spacers which may or may not be incorporated as part of the prefabricated component. These separators and spacers retain the parallel form of the reinforcement for the purposes of handling and its vertical placement within the wall near to both masonry faces during the construction.

[0013] The longitudinal reinforcement and anchors are designed to perform satisfactorily whether embedded in mortar, concrete, adhesives or cement glue and may even be placed completely or partially "free" of any binding material.

[0014] The longitudinal reinforcement and the connectors usually form an integral and resistant framework which may be suitably placed within the wall by the bricklayer. However, sometimes these two components may be fixed together by hand either before being placed in the wall or once the vertical reinforcement has been placed in the wall.

[0015] The anchors, as opposed to these transverse pieces and/or separators, are designed as a separate item which are fixed by hand by the bricklayer at a specific height in accordance with the characteristics of the item to support and/or be supported. These anchors could also be designed with a certain capacity for sliding movement up or down the vertical guide of the void reinforcement.

[0016] Finally, the supplementary components, while

apparently of a secondary nature, may often form an essential part of the system if it is to work correctly.

DESCRIPTION OF THE FIGURES

[0017] A set of figures are enclosed in order to complement the description of the system and to offer a better understanding of the characteristics of the invention when employed according to design. These figures while forming an integral part of this description should be taken to be illustrative and not limited to these alone. These figures indicate the following:

Figure 1.- This figure shows a perspective of pre-fabricated void reinforcement set in front of the corresponding masonry wall, prior to reinforcement, in accordance with the system described in the present invention.

Figure 2.- This figure shows a perspective of other types of void reinforcement which may be employed within the system described in the present invention.

Figure 3.- This shows a detail in perspective of one of the connectors which may be used in the longitudinal reinforcement.

Figure 4.- Shows a perspective of another type of connector which may be fixed to the corresponding reinforcement.

Figure 5.- Shows the perspective of a further solution with regards to reinforcement connectors.

Figure 6.- Shows a further example of lateral anchor, in this case employed with a different type of reinforcement.

Figure 7a.- Shows the perspective of an end anchor which has been suitably fixed to the corresponding longitudinal reinforcement.

Figure 7b.- Shows a variation in the form of end anchorage, on this occasion formed by bending the ends of the reinforcement itself.

Figure 7c Shows a further method of forming the said end anchor which in addition to being fixed to the reinforcement, is also fixed to the slab or support face (the anchor being fixed at its lower end).

Figure 8.- Shows the perspective of a supplementary element, in this case, the starting support profile for the base of overhanging masonry.

Figure 9.- Shows a type of end anchor which is bolted to the longitudinal bars.

PREFERRED EMBODIMENT OF THE INVENTION

[0018] From these figures, and particularly Figure 1, it may be seen how the longitudinal reinforcement (1) is housed in vertical voids (2) set within the masonry wall (3), the access to these voids (2) being made through lateral grooves (4) opened on the unexposed face of the wall (3).

[0019] The said reinforcement (1) may be formed by parallel longitudinal bars (5) which are suitably spaced and joined by connectors (6) which may be laid out in the zigzag form shown in figure 1, and with double longitudinal bars (5) or single bars. These connectors may be eliminated when the length of the reinforcement is very short, the bars may be joined together by a curved end piece (7) as shown in figure 2, moveable connectors (8) may be employed as shown in figure 3 and placed by the bricklayer himself, these latter connectors, which are manually fixed to the wall reinforcement, are made from plate angled at each end, a longitudinal cut being made in each angle and the sections turned asymmetrically and notched to adapt to the parallel and longitudinal wires or bars (1).

[0020] These said moveable connectors may also take the form of that indicated by (9) in figure 4 where a longitudinal plate is provided with semi-circular notches (10) which are designed to slot onto the main reinforcing bars (5).

[0021] The connectors may be joined within the same plane of the vertical reinforcement or on the sides of the same.

[0022] The connectors (11) may also be formed in a continuous strip which is then separated by the bricklayer, as in the form of the sinuously shaped rod shown in figure 5, which is subsequently split up into suitable lengths to suit the spacing of the reinforcing bars.

[0023] A further possibility is shown in figure 6, where an anchor plate (15'), this being a flat rectangular plate which lies horizontally and is simply fixed to the two vertical bars (5) of the reinforcement (1) by way of two notches stamped in the end of the plate in the form of a 'T'. The said plate (15') is also provided with a longitudinal slot (20') which allows it to be fixed to a floor slab or horizontal surface as required.

[0024] The reinforcement (1) may also be connected at the ends, as is illustrated by the anchor (21) shown in figure 7a. This anchor consists of an externally notched sleeve or ring which houses the semi-circular upper section (7) closing the ends of the two bars (5) to the reinforcement. The said sleeve (21) may be provided with two parallel circumferential notches for double reinforcing bars, or may simply be made in the form of a cylinder.

[0025] However, the ends of reinforcing bars themselves (5) may be looped (22) to form an anchorage in place of the ring (21), thereby eliminating the need for any additional element and subsequently be held by any suitable horizontal support.

[0026] In the variation shown in figure 7c, the anchorage to the reinforcement (1) is made at the lower end of the same, in such a way that the double reinforcing bar (5) is set on the surface of the floor slab while the longer reinforcing bar (5') is set against the side of the same, the said reinforcement (1) being fixed in position by way of a bracket (29) which clamps the reinforcement and is bolted together (30) and then, in turn, fixed to the floor slab (28) by a threaded pin (31) as illustrated in the said figure.

[0027] The system is then completed with the said supplementary elements, such as the support profile (34) shown in figure 8 which is designed to slot on to the reinforcement (1) by way of horizontal grooves (35) set into the lower section of the profile, thereby allowing the said profile (34) to serve as the starting support for overhanging brick or blockwork. Other supplementary elements include; retention anchors for rising parapets of balconies or roofs; hanging brackets which may serve to support the housing for blinds or other window coverings; and plumb and levelling lines particularly in the manual erection of the brick or blockwork, and which obviously allow for adjustment within the direction of the three axes of the wall.

[0028] Figure 9 shows a type of end anchorage where the longitudinal bars (5) of reinforcement (1) are bolted to an anchor plate (37).

[0029] Finally, this system also allows the prefabrication of longitudinal reinforcement using only one component, and therefore one material unit. In this case there is no difference between the connectors and the vertical reinforcement. This would include plates bent to form open or closed sections, with plate of greater or lesser gauge and draw. Double reinforcement may be "U" shaped, cross the void in the form of an "X", or vertically overlap, as in the traditional form of bars in reinforced concrete, in order to give longitudinal continuity to the reinforcement.

[0030] It is not considered necessary to prolong this description as any expert in the field will immediately comprehend the scope of the invention and the advantages that may be derived from the same.

Claims

1. Masonry wall with an integral reinforcing system which provides vertical reinforcement set within both faces of the said walls, and placed in voids set in the interior of the brick or blockwork, opened on the unexposed face, having four basic components: longitudinal reinforcement; transverse connectors and/or spacers to the said reinforcement, lateral anchors and/or end anchors and retention anchors, **characterized in that**

- the lateral anchors are formed by a flat rectangular plate (15') which may be fixed to the rein-

forcement (1) by way of two notches stamped in the end of the plate in the form of a "T" (19) and which may slide up and down the longitudinal bars (5), the said plate (15') being provided with a longitudinal slot (20') which allows it to be fixed to a support as required.

- the end anchors are formed by channelled rings (21), cylinders or other similar elements which may adapt to the side and end closing (7) of the longitudinal bars (5) of the reinforcement (1), or
- the end anchorage is formed by the looping of the ends (22) of the reinforcing bars (5) themselves.
- The retention anchors consist of a support profile (34), designed to slot on the reinforcement (1) by way of horizontal grooves (35).

2. The masonry wall as described in claim 1, in which the longitudinal reinforcement (1) is formed from bars, wires, flats, plates, pipes and similar, in different shapes and section and be single, double or multiple, with open ends or with folded ends (7) so as to form a single component.

3. The masonry wall as described in claim 1, in which the transverse connectors and/or spacers are formed from bars or plates (6) which are directly welded or fixed to the vertical bars (5) of the reinforcement (1), either within the plane of the reinforcement or on either side, in a perpendicular or angled position, or may be independent elements that are fixed to the reinforcement on site by the bricklayer.

4. The masonry wall as described in claim 3, in which the independent connectors and/or spacers are formed from plates (8) angled at each end with a longitudinal cut being made in each angle and the sections offset asymmetrically and internally notched to adapt to the longitudinal bars (5) of the reinforcement (1).

5. The masonry wall as described in claim 3, in which the independent connectors and/or spacers are formed by plates (9) with notched edges (10) which slot on to the bars (5) of the reinforcement (1).

6. The masonry wall as described in claim 3, in which the independent connectors and/or spacers form a continuous strip of indefinite length in the form of a sinuously shaped rod (11), which is split up into suitable lengths by the bricklayer to suit the spacing of the bars (5) of the reinforcement (1).

7. The masonry wall as described in claim 1, in which the longitudinal reinforcement is held at the lower and/or upper end of the same, and where the inner longitudinal bars (5) rest on the slab (28) while the

longer outer bars (5') are positioned against the edge of the said slab, the reinforcement being fastened by a holding bracket (29) which is laterally fixed to the reinforcement (1) by a transverse bolt (30) and, in turn, fastened to the slab (28) by way of a threaded pin (31).

8. The masonry wall as described in claims 1 to 15, in which the ends of the bars (5) of reinforcement (1) are threaded to receive a hooped anchor plate (37) which is fastened to the bars (5) through perforations (38).

Revendications

1. Mur de maçonnerie avec un système de renfort intégral qui fournit un jeu de renforcement vertical des deux côtés desdits murs, et placé dans une série de vides à l'intérieur des briques ou bâtiment, ouvert du côté non exposé, ayant quatre éléments de base : renforcement longitudinal ; connecteurs transversaux et / ou pièces d'écartement audit renforcement ; ancrages latéraux et / ou ancrages terminaux et ancrages de retenue, **caractérisé en ce que**

- les ancrages latéraux sont composés d'une plaque plate rectangulaire (15') qui peut être fixée au renforcement (1) au moyen de deux entailles estampées à l'extrémité de la plaque sous forme de « T » (19) et qui peut glisser vers le haut et vers le bas des barres longitudinales (5), ladite plaque (15') étant pourvue d'une rainure longitudinale (20') qui lui permet d'être fixée à un support selon les besoins.
- les ancrages terminaux sont composés d'anneaux cannelés (21), de cylindres ou d'autres éléments similaires qui peuvent s'adapter à la fermeture latérale et terminale (7) des barres longitudinales (5) du renforcement (1), ou
- l'ancrage terminal est composé de boucles des extrémités (22) des barres de renforcement (5) elles-mêmes.
- les ancrages de retenue consistent en un profil de support (34), conçu pour s'insérer dans le renforcement (1) au moyen de rainures horizontales (35).

2. Le mur de maçonnerie tel que décrit à la revendication 1, **caractérisé parce que** le renforcement longitudinal (1) est composé de barres, câbles, fonds, plaques, tubes et similaires, sous différentes formes et section et est simple, double ou multiple avec des extrémités ouvertes ou des extrémités repliées (7) de façon à former un élément unique.

3. Le mur de maçonnerie tel que décrit à la revendication 1, **caractérisé en ce que** les connecteurs transversaux et / ou pièces d'écartement sont composés de barres ou plaques (6) qui sont directement soudées ou fixées aux barres verticales (5) du renforcement (1) ou bien sur le plan du renforcement ou sur l'autre côté, dans une position perpendiculaire ou en angle ou peuvent être des éléments indépendants qui sont fixés au renforcement sur place par le maçon.

4. Le mur de maçonnerie tel que décrit à la revendication 3, **caractérisé en ce que** les connecteurs indépendants et / ou pièces d'écartement sont composés de plaques (8) en angle à chaque extrémité avec une entaille longitudinale faite à chaque angle et la courbure des sections asymétriquement et intérieurement encochée pour s'adapter aux barres longitudinales (5) du renforcement (1).

5. Le mur de maçonnerie tel que décrit à la revendication 3, **caractérisé en ce que** les connecteurs indépendants et / ou pièces d'écartement sont composés de plaques (9) avec des bords encochés (10) qui s'insèrent dans les barres (5) du renforcement (1).

6. Le mur de maçonnerie tel que décrit à la revendication 3, **caractérisé en ce que** les connecteurs indépendants et / ou pièces d'écartement forment une bande continue de longueur indéfinie sous forme d'une baguette sinueuse (11), qui est fendue en plusieurs longueurs appropriées par le maçon pour s'adapter à l'écartement des barres (5) du renforcement (1).

7. Le mur de maçonnerie tel que décrit à la revendication 1, **caractérisé en ce que** le renforcement longitudinal est maintenu à l'extrémité inférieure et / ou supérieure de celui-ci, et **en ce que** les barres longitudinales intérieures (5) reposent sur la dalle (28) tandis que les barres extérieures plus longues (5') sont placées contre le bord de ladite dalle, le renforcement étant fixé par un support de fixation (29) qui est fixé latéralement au renforcement (1) par un boulon transversal (30) et, à son tour, attaché à la dalle (28) au moyen d'une cheville filetée (31).

8. Le mur de maçonnerie tel que décrit aux revendications 1 à 15, **caractérisé en ce que** les extrémités des barres (5) du renforcement (1) sont filetées pour recevoir une plaque d'ancrage cerclée (37) qui est attachée aux barres (5) à travers des perforations (38).

9. Le mur de maçonnerie tel que décrit aux revendications 1 à 15, **caractérisé en ce que** les extrémités des barres (5) du renforcement (1) sont filetées pour recevoir une plaque d'ancrage cerclée (37) qui est attachée aux barres (5) à travers des perforations (38).

Patentansprüche

1. Mauerwerk mit einem integrierten Armierungssy-

stem, das eine vertikale Armierung zur Verfügung stellt, die zwischen beiden Oberflächen besagter Wände angepasst und in Hohlräumen installiert wird, die innerhalb des Ziegelsteins oder des Blockwerks vorgesehen sind, an den nicht freiliegenden Oberflächen offen sind, vier grundlegende Komponenten haben: Längsarmierung; Querverbindungs-
glieder und/oder Abstandhalter zu besagter Armierung, Seitenverankerungen und/oder Endverankerungen und Sicherungsanker, **dadurch gekennzeichnet dass,**

- die Seitenverankerungen durch eine flache, rechteckige Platte (15') gebildet sind, die an den Armierungen (1) mittels zwei Kerben befestigt werden können, die am Ende der Platte in Form eines "T"s (19) eingestanz sind und die an den Längsstangen (5) nach oben und unten entlanggleiten können, wobei besagte Platte (15') mit einem Längsschlitz (20') versehen ist, der, wie gefordert, eine Befestigung an einem Auflager erlaubt.
- die Endverankerungen werden durch geriffelte Ringe (21), Zylinder oder andere ähnliche Elemente gebildet, die den Seiten und Endabschlüssen (7) der Längsstangen (5) der Armierung (1) angepasst werden können, oder
- die Endverankerung wird aus der Verschlingung der Enden (22) der Armierungstangen (5) selbst gebildet.
- die Sicherungsanker bestehen aus einem Stützprofil (34), das so ausgelegt ist, dass es mit der Armierung (1) mittels horizontaler Rillen (35) zusammengefügt wird.

2. Das Mauerwerk übereinstimmend mit Anspruch 1, **dadurch gekennzeichnet, dass** die Längsarmierung (1) durch Stangen, Drähte, Flachstäbe, Platten, Rohre und ähnliches, in verschiedenen Formen und mit verschiedenen Querschnitten gebildet wird, die einfach, doppelt oder vielfach sein kann, offene oder gebogene Enden (7) haben kann, um so einen einzigen Komponenten zu bilden.

3. Das Mauerwerk übereinstimmend mit Anspruch 1, **dadurch gekennzeichnet, dass** die Querverbindungsstücke und/oder Abstandhalter aus Stangen oder Platten (6) gebildet werden, die direkt an die vertikalen Stangen (5) der Armierung (1) angeschweisst oder befestigt werden, entweder auf der Ebene der Armierung oder an beiden Seiten in einer senkrechten oder abgewinkelten Position, oder die unabhängige Elemente sein können, die an der Armierung durch den Ziegelmaurer auf der Baustelle befestigt werden können.

4. Das Mauerwerk übereinstimmend mit Anspruch 3, **dadurch gekennzeichnet, dass** die unabhängigen

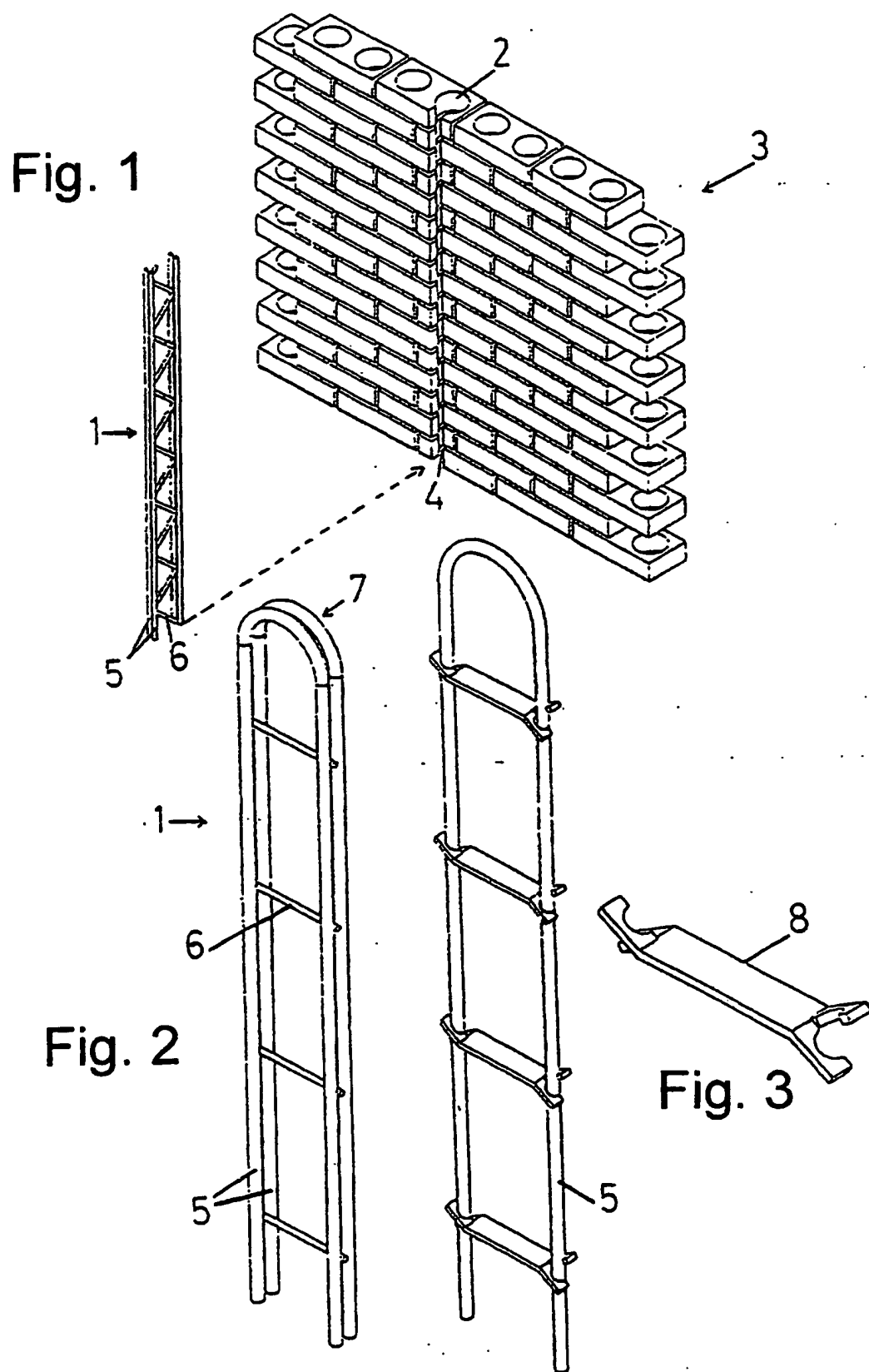
Verbindungsstücke und/oder Abstandhalter durch Platten (8) gebildet werden, die an jedem Ende mit einem Längsschnitt abgewinkelt sind, der an jedem Winkel durchgeführt wird und bei denen die Abschnitte symmetrisch versetzt und innen gerillt sind, um sie an die Längsstangen (5) der Armierung (1) anzupassen.

5. Das Mauerwerk übereinstimmend mit Anspruch 3, **dadurch gekennzeichnet, dass** die unabhängigen Verbindungsstücke und/oder Abstandhalter durch Platten (9) gebildet werden, die gerillte Kanten (10) aufweisen, die mit den Stangen (5) der Armierung (1) zusammengefügt werden.

6. Das Mauerwerk übereinstimmend mit Anspruch 3, **dadurch gekennzeichnet, dass** die unabhängigen Verbindungsstücke und/oder Abstandhalter einen fortlaufenden Streifen mit einer unbestimmten Länge bilden und zwar in Form eines geschlängelten Profilstabes (11), der durch den Ziegelmaurer in passende Längen aufgeteilt wird, um den Zwischenräumen der Stangen (5) der Armierung (1) angepasst zu werden.

7. Das Mauerwerk übereinstimmend mit Anspruch 1, **dadurch gekennzeichnet, dass** die Längsarmierung am unteren und/oberen Ende derselben gehalten wird und dass die Innenlängsstangen (5) auf der horizontalen Ziegellage (28) ruhen während die längeren Aussenstangen (5') gegen die Kanten besagter horizontaler Ziegellage angeordnet werden, wobei die Armierung mittels einer Halteklammer (29) befestigt wird, die seitlich an der Armierung (1) durch einen Querbolzen (30) befestigt ist, und, der seinerseits am Stab (28) mit einem Gewindestift (31) befestigt ist.

8. Das Mauerwerk übereinstimmend mit en Ansprüchen 1 bis 15, **dadurch gekennzeichnet, dass** die Enden der Stangen (5) der Armierung (1) ein Gewinde aufweisen für die Aufnahme einer umschnürenden Ankerplatte (37), die an den Stangen (5) durch Lochungen befestigt ist.



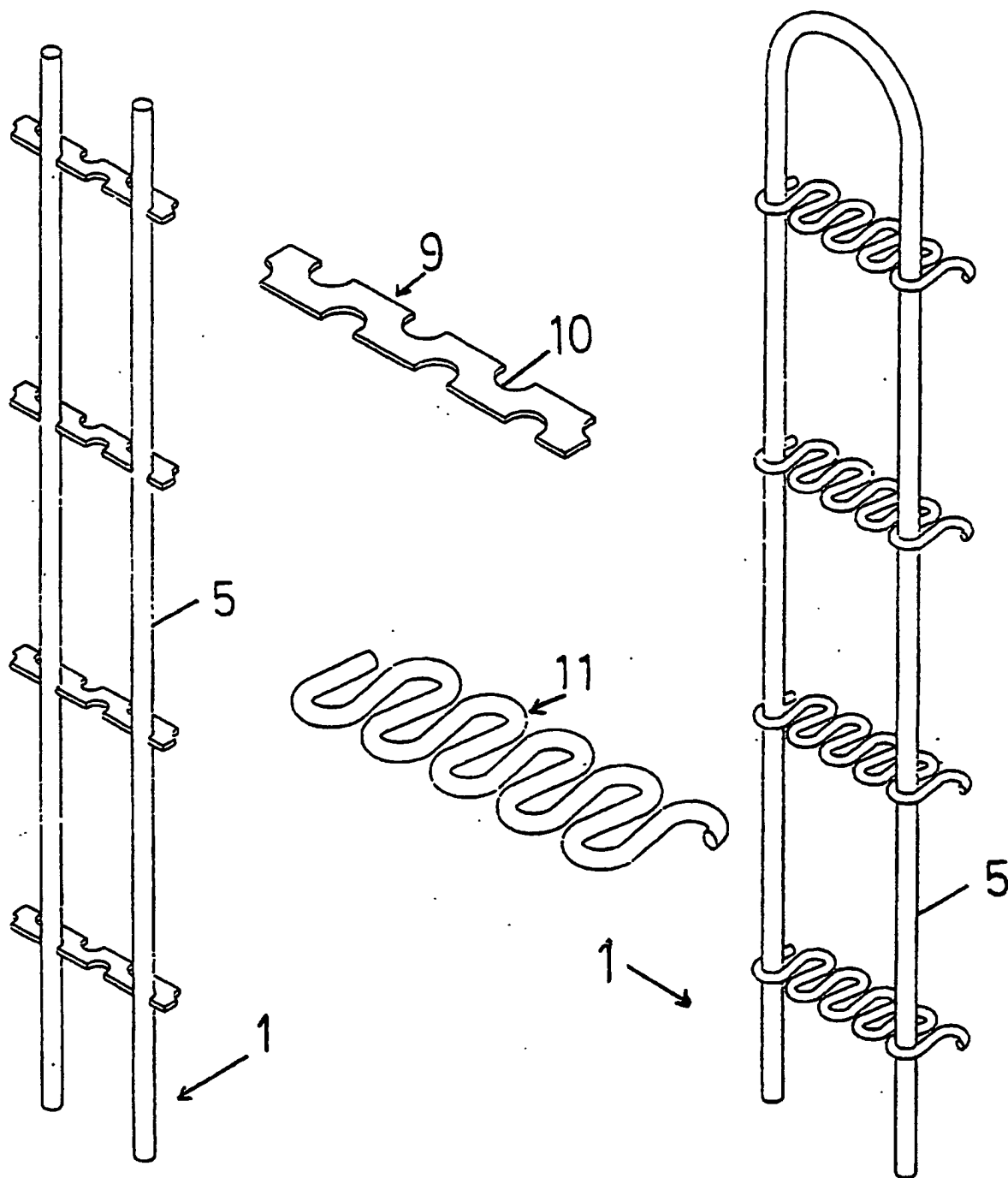
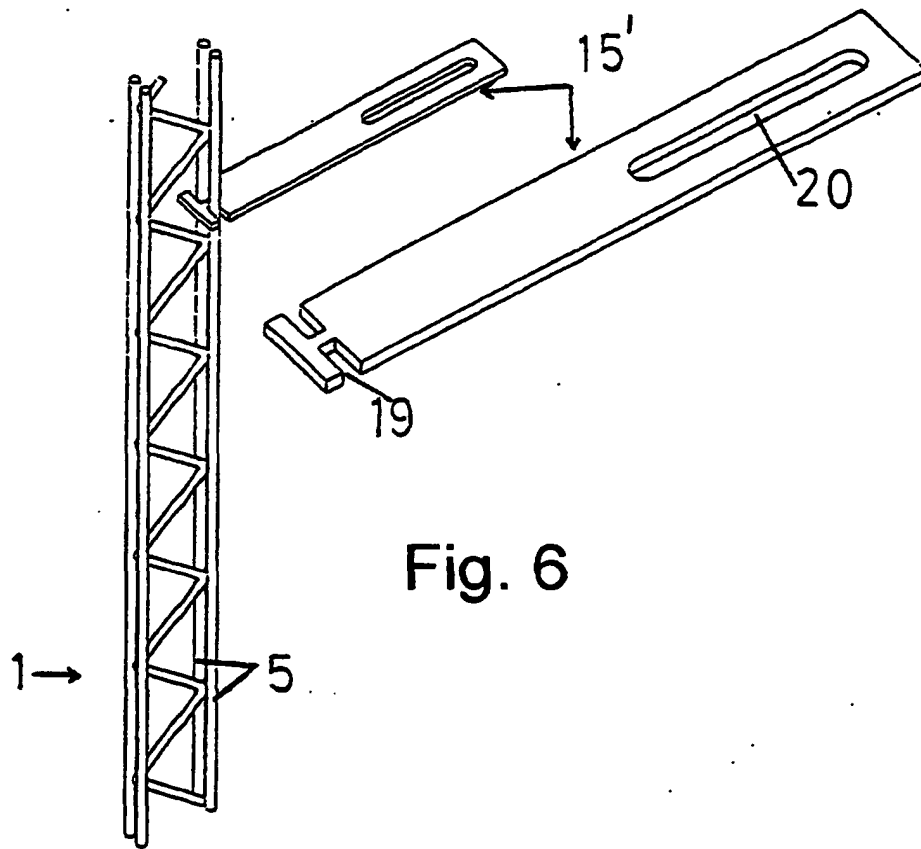


Fig. 4

Fig. 5



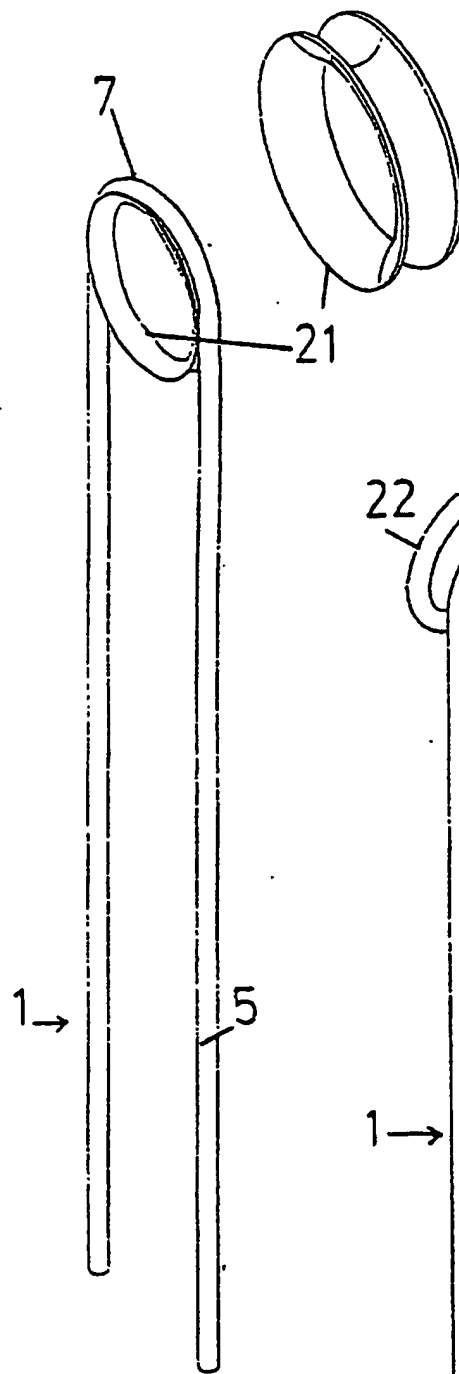


Fig. 7a

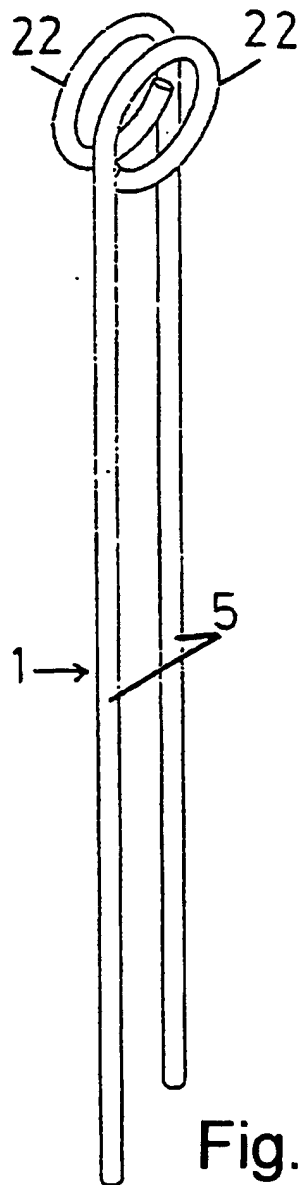


Fig. 7b

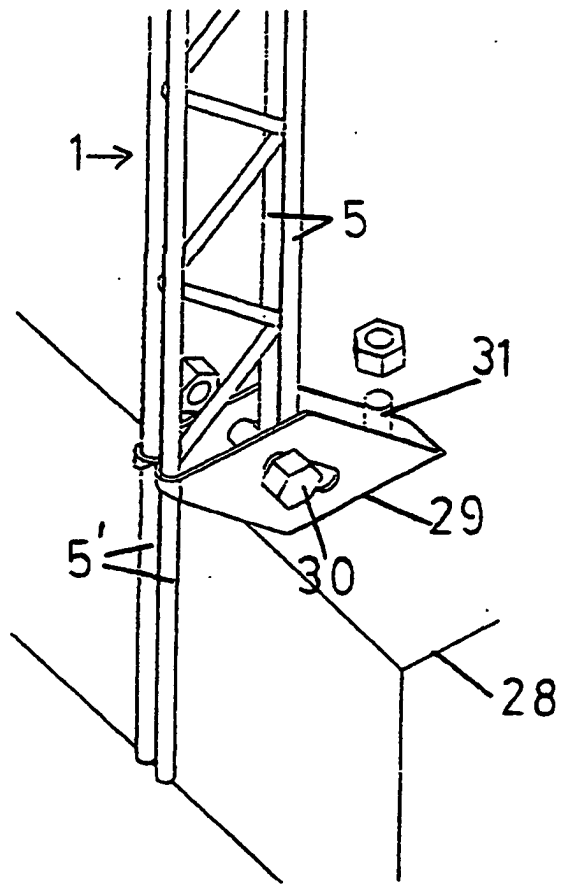


Fig. 7c

