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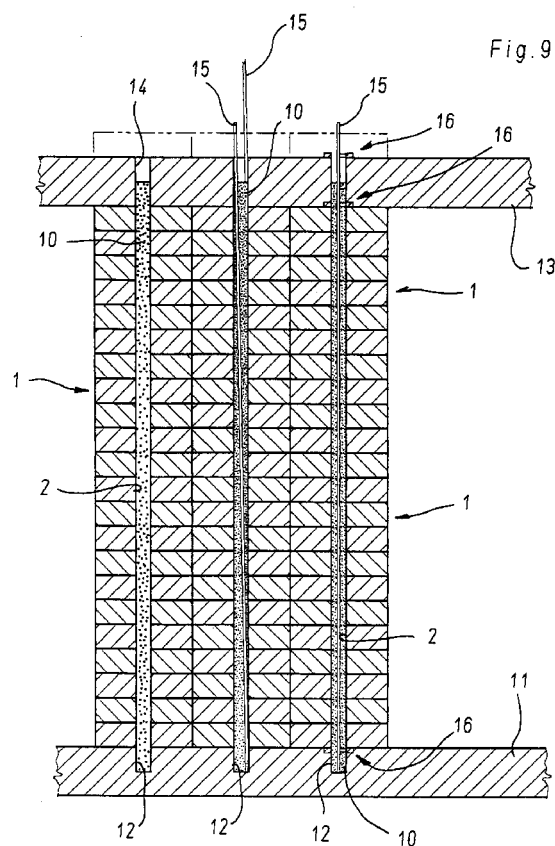
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(54) **Method for erecting masonry made of bricks and/or blocks and associated product**

(57) A method for obtaining stable masonry without having to deposit considerable layers of cementing material between each brick or block that constitutes a wall or a pillar, by adopting for example bricks or blocks (1) provided with a central hole (2) which, when said bricks or blocks are superimposed, forms a vertical channel in which a resistant core is formed by pouring cementing material (10); the core is advantageously connected to a footing structure (16) and a head beam (13) by means of vertical holes (12, 14) in which it is insertable at least one reinforcement rod (15), optionally centered by means of centering elements (16); the bricks or blocks (1) can be staggered or not in their stacked courses: in the latter case, the brick or block is provided with end notches in order to form a vertical hole or opening by arranging the bricks or blocks face to face on a same course; the method is used in building walls and pillars of buildings and internal and external masonry structures of any kind, obtaining a new product.



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## Description

**[0001]** The invention relates to a method for erecting masonry made of bricks and/or blocks and to the associated product, i.e. to a new method for building walls and/or pillars by means of stones or blocks of any kind, for the interior of habitable buildings and for outdoor masonry and even for masonry unrelated to residential building; the structures built, and their components, constituting a new product which also is the subject of a patent application.

**[0002]** The prior art comprises masonry made of bricks and/or compact blocks, or also made of bricks provided with small transverse vertical holes in order to improve the grip of the mortar by moderate and partial penetration therein, or provided with longitudinal horizontal lightening holes; the bricks are laid in horizontal courses, generally with their elements overlapped by staggering them in order to "bind" the masonry and increase its stability: a significant and uniform layer of mortar being interposed, brick by brick or block by block, and between consecutive bricks and blocks, between one course and the next, said mortar being designed for cementing the masonry by setting, in order to avoid its tipping or degradation in general due to stresses.

**[0003]** However, such a method of positioning and stabilizing individual bricks or blocks, which implies rigorous vertical positioning, longitudinal alignment and stabilization for each individual element, entails an enormous waste of time and consequent extremely high costs.

**[0004]** This prior art is susceptible of considerable improvement as regards the possibility to avoid, or at least reduce, accuracy in the positioning of the individual components of the masonry and the associated individual stabilization by means of mortar, while obtaining uniform and very stable masonry.

**[0005]** A consequence of the above is the necessity to solve the problem of finding a method which allows to build masonry which is uniform and highly stable in considerably shorter times, thus reducing costs and obtaining a new product.

**[0006]** The invention solves the above problem by adopting a method which uses new masonry elements, each having one or more vertical through holes or openings, adapted to be superimposed with or without staggering in the different courses; each hole being such as to align vertically with corresponding holes of similar masonry elements superimposed so as to form, at each one of these vertical holes or openings, a vertical channel for pouring or inserting therein cementing material so as to constitute a core which is resistant to stresses, advantageously also to allow the possible insertion of at least one rod and of corresponding poured cementing material so as to constitute a reinforced core which is resistant to stresses; the optional sealing of plays and gaps between the superimposed and consecutive elements being obtained by plaster applied to the internal

face of the wall; another sort of sealing of the gaps being obtained by rapidly applying, on the upper surface of the brick or block, and at the joints, a coat of a liquid or creamy substance which has at least a sealing function; thermal insulation being achieved conventionally, for example by inserting an insulating substance in the interspace between the two walls constituting the masonry; means being provided for centering at least one rod in the channel; and completion of the brick and/or block masonry by means of footing and head beams at the necessary heights, even ones already provided in the skeleton and even prefabricated ones, with optional means for centering the rods in the corresponding vertical channels or holes and also with optional lateral centering of the bricks or blocks on the footing work, on the head beams and even below said beams, by means of optional lateral wings.

**[0007]** The advantages obtained by this invention are: erection of walls and/or pillars without having to interpose and adapt considerable layers of mortar between superimposed elements of different courses and between consecutive elements of a same course; the possibility to replace bricks in the current formats, for example 30x15x6 cm, with larger bricks or blocks in order to allow more rapid composition of the masonry volume; and greater wall width; stability against degradation and greater resistance to penetration and earthquakes; lower cost and greater safety.

**[0008]** Some embodiments of the invention are illustrated, merely by way of example, in the four accompanying drawings, wherein:

Figure 1 is a perspective view of a brick according to the invention, centrally provided with a circular hole which passes through its thickness;

Figure 2 is a longitudinal vertical sectional view of the brick of Figure 1;

Figure 3 is a plan view of the brick of Figure 1;

Figure 4 is, likewise, a plan view of the generic brick of Figures 1-3, which has a central hole whose shape is other than circular;

Figure 5 is a plan view of a brick, according to the invention, like the one of Figures 1, 2 and 3, but provided not only with the central circular hole but also with two semicircular centerline holes or openings at its two ends, so as to form a single hole when two bricks are mated;

Figure 6 is a plan view of a further embodiment of a brick according to the invention which has a central hole but has a square contour;

Figure 7 is a perspective view of a conventional brick, lightened by means of holes, with a central one of which shaped for the new vertical use;

Figure 8 is a sectional view, taken along a vertical longitudinal plane, of the brick of Figure 7;

Figure 9 is a sectional view of masonry according to the invention, which reproduces several embodiments of the masonry arranged side by side:

-- on the left, the piled stacking of bricks, formed as in Figures 1, 2 and 3, or optionally also as shown in Figures 4, 6, 7, 8, with central holes which are aligned vertically so as to constitute a channel which is designed for being filled with mortar or concrete or other adapted cementing material in general, in order to stabilize the stack;

-- in the center, a similar stacking, but with a loose rod inserted in the vertical channel and then locked in any position by pouring concrete or other binding agent;

-- on the right, another similar stacking, but with a rod which is centered beforehand above and below in the vertical channel;

Figure 10 is an enlarged-scale view of a detail of the embodiment shown on the right side in Figure 9, illustrating a possible centering means;

Figure 11 is a plan view of Figure 10;

Figure 12 is a partial and interrupted sectional view, taken along a vertical plane, of masonry obtained by using the brick of Figure 5 and a prefabricated head beam which has a transverse cross-section shaped like a letter C which is open upwards and acts as integral formwork for the reinforced-concrete casting for completing the beam, which has hollow vertical hubs for pouring therein, and in the corresponding vertical channels, cementing material and optionally also for inserting and centering therein vertical rods;

Figures 13 and 14 are sectional views, taken along the vertical planes XIII-XIII, XIV-XIV of Figure 12, respectively in the case of a prefabricated C-shaped head beam both with a hollow hub and without a hub, i.e. only perforated correspondingly on the bottom;

Figure 15 is a sectional view, similar to Figure 13, in the case of a double head beam and with vertical hubs to lie above masonry constituted by two walls arranged side by side and separated by an insulating interspace;

Figure 16 is a sectional view, similar to Figure 15, but with a double head beam provided only with vertical holes without the guiding hub.

**[0009]** In the figures, 1 designates the brick or block provided with a central hole which has, for example, a circular contour 2; 3 (Figure 4) designates a brick with a central hole 3a which is different from the circular one (for example oval) and is larger in the longitudinal direction in order to allow more space in positioning the rod without centering and allow better distribution of the concrete or cementing or binding material in general; 4 (Figure 5) designates a brick provided with a central hole 2 and with holes or notches, for example semicircular end ones 5, which are designed for forming holes or openings by arranging the ends of longitudinally con-

secutive bricks or blocks 4 face to face, so as to allow the forming of masonry by means of courses of bricks which are staggered by half of their length; 6 (Figure 6) designates a brick or block which has a square plan shape and is provided with a central hole 7 having any plan shape, for example for erecting pillars which have a square plan shape; 8 (Figure 7) designates a brick which is lightened by multiple perforations and is provided with a central hole 9 which can be used, in this case, to constitute a vertical channel in the stacking of lightened bricks and is adapted for pouring therein concrete or another binding agent with or without a rod inserted; 10 (Figure 9) designates a pouring of concrete (or cementing material in general) into the vertical channel obtained by superimposing the holes 2 of bricks 1; 11 designates a beam or footing structure, possibly made of bricks or stones, which is advantageously provided with optional lateral wings for centering and with at least one hole 12 in order to constitute a lower extension of said pouring; 13 designates a head beam, optionally provided with lateral wings, with vertical holes 14 for the pourings and the optional insertion therein of vertical rods 15, with a diameter of even just a few millimeters where sufficient, with or without a centering element 16, which can be connected to the reinforcement frame of said beam; 17 (Figures 10 and 11) designates internal radial protrusions of the thin ring 18 of the centering element 16, which is optionally wire-like and is in any case thin, these protrusions being interrupted in their central intersection region to allow to center the rod 15 between them; 19 designates an optional sleeve for connection between the upper end of a lower rod 15 and the lower end of an upper rod 15, which are inserted in the vertical channel; 20 (Figure 12) designates a prefabricated head beam which has a C-shaped transverse cross-section and acts as formwork for containing the casting 21 and the corresponding reinforcement rods to complete the cross-section of the beam, which has at least one row of hubs 22 rising from the bottom for the passage and centering therein of the rod 15 and for the passage through them of the cementing material 10 poured before the casting 21; 23 designates a C-shaped head beam which is similar to the head beam 20 but does not have the hubs 22, replaced by bottom holes 24 for simultaneously pouring concrete into the cavity of the head beam and into the vertical channels and in order to facilitate the insertion, in the channels, of very long rods 15; 25 designates a double head beam which also acts as formwork and is provided with hubs 22, and (Figure 16) 26 designates another double head beam which is provided only with bottom holes 24; 27 designates an interspace which is optionally provided with thermally insulating material 28; 29 designates optional thin layers of adhesive or mortar which are advantageously distributed in a single pass in order to fill any plays or gaps in the direct coupling of bricks and/or blocks which are not perfectly identical, smooth and square; 30 designates an optional plaster-

ing or facing in general of the internal face of the wall so as to act as insulation of the room with respect to the outside.

**[0010]** In the practical execution, the materials, the dimensions and the details of execution may be different from the ones mentioned but technically equivalent thereto without thereby abandoning the concept of the present invention.

**[0011]** Thus, the contour of the holes of the brick or of the block for forming the vertical channel and the passage therein of the rod can be not only circular or oval but also polygonal or mixtilinear.

**[0012]** The insertion of the cementing material by pouring into said vertical channel can further be obtained by gravity or under pressure.

**[0013]** The disclosures in Italian Patent Application No. MO99A000174 from which this application claims priority are incorporated herein by reference.

**[0014]** Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly, such reference signs do not have any limiting effect on the interpretation of each element identified by way of example by such reference signs.

## Claims

1. A method for erecting masonry made of bricks and/or blocks, comprising the arrangement of said bricks and/or blocks in a mutually adjacent configuration so as to form courses or layers and their overlapping, with or without staggering, by interposing a considerable layer of mortar for each brick and/or block, characterized in that the brick or block (1, 3, 4, 6, 8) provided in any case with at least one central hole (2, 3, 7, 9) and/or with end notches (5), is superimposed on a brick and/or block which is correspondingly provided with at least one vertical hole and/or notch, in order to constitute an element for forming at least one vertical channel which runs along all or part of the height of the masonry obtained by superimposing bricks and/or blocks.
2. The method according to claim 1, characterized in that said vertical channel is in any case filled with cementing material (10) by pouring so as to constitute a stress-resistant core.
3. The method according to claim 1, characterized in that at least one rod (15) is inserted in said vertical channel, said rod being advantageously associated with cementing material (10) for pouring in order to obtain a stress-resistant reinforced core.
4. The method according to one of claims 1, 2 and 3, characterized in that the footing masonry (11), optionally provided with lateral wings for centering the bricks and/or blocks, is provided beforehand with one or more vertical holes (12), all or part of which correspond to the vertical channels formed by the holes (2, 3a, 7, 9) and/or by end notches (5), having any profile, of the bricks or blocks (1, 3, 4, 6, 8) which are superimposed so as to constitute a lower extension of said vertical channel and of the corresponding stress-resistant core.
5. The method according to one of claims 1, 2, 3 or 4, characterized in that after the superimposing of the bricks and/or blocks (1, 3, 4, 6, 8) has been completed, after the cementing material (10) has been poured into the vertical channels formed by the holes (2, 3a, 7, 9) and/or by the end notches (5), having any profile, with optional insertion of one or more rods (15) in said vertical channels, the formwork and the frame are arranged on the top of the upper course in order to pour the cementing material (10) so as to form the head beam (13), which is advantageously connected to one or more of the resistant cores formed in said vertical channels.
6. The method according to one of claims 1, 2, 3 or 4, 5, characterized in that the head beam (13), optionally provided with lateral wings for centering bricks and/or blocks, is provided with one or more vertical holes (14), all or part of which correspond to the vertical channels formed by the holes (2, 3a, 7, 9) and/or by the end notches (5), having any profile, of the superimposed bricks or blocks (1, 3, 4, 6, 8) in order to allow the passage of the poured cementing material (10) and of the optional rods (15) so as to constitute said stress-resistant cores.
7. The method according to claim 4, characterized in that an element (16) for centering said at least one rod (15) is inserted in at least one of the holes (12) of the footing masonry (11) before pouring the cementing material (10) into the corresponding vertical channel, which is vertically aligned.
8. The method according to claim 6, characterized in that at least one element (16) for centering at least one rod (15) is inserted in at least one of the holes (14) of the head beam (13) before pouring the cementing material (10).
9. The method according to one of claims 1, 2, 3 or 4, characterized in that the cementing material (10) is poured through the bottom holes (24) of a prefabricated head beam (20) which has a C-shaped transverse cross-section which is hollow in an upward direction, at least one of said holes corresponding to at least one vertical channel of the underlying masonry constituted by said bricks and/or blocks (1, 3, 4, 6, 8), in order to obtain at least one said stress-resistant core associated with optional rods

- (15).
10. The method according to claim 9, characterized in that after pouring said cementing material (10) into at least one vertical channel through at least one bottom hole (24) of said head beam (20) which is prefabricated with a C-shaped transverse cross-section, said beam is provided with a reinforcement frame and is completed by cementing material (21) which is advantageously poured in connection with at least said stress-resistant core, associated with optional rods (15).
11. The method according to one of claims 1, 2, 3 or 4, characterized in that since the head beam (20) is prefabricated with a C-shaped transverse cross-section and is provided with at least one row of hubs (22) which protrude from the bottom, the pouring of cementing material (10) through said hubs and the optional passage through them of at least one rod (15) so as to form at least one resistant core is performed independently of the pouring of cementing material (21) adapted to complete said head beam (20).
12. The method according to claim 3, characterized in that the optional insertion of consecutive rods (15) in a same vertical channel is performed by insertion of the corresponding facing ends by means of a sleeve (19).
13. The method according to claim 1 and one of claims 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, characterized in that the bricks and/or blocks are arranged mutually adjacent and superimposed with an optional thin layer of liquid or creamy adhesive or cementing material (29) which is advantageously distributed in a single pass in order to seal any plays or gaps in the mating of bricks or blocks which are not perfectly identical, smooth and square.
14. A product, comprising at least one masonry element obtained by superimposing bricks and/or blocks, by interposing a considerable layer of mortar between each brick and/or block in order to give said structures resistance to stresses, characterized in that the masonry structure is constituted by bricks and/or block (1, 3, 4, 6, 8), each of which has at least one central hole (2, 3a, 7, 9) and/or end notches (5) having any profile, with each one of said holes or notches adapted to compose, by superimposing said bricks and/or blocks, at least one element of a vertical channel which forms a resistant core by pouring into said vertical channel cementing material (10), advantageously coupled to at least one rod (15) inserted in said vertical channel, by virtue of optional centering means.
15. The product according to claim 14, characterized in that the footing structure (11) and the head structure (13, 20) are advantageously coupled to the ends of said at least one resistant core.
16. The product according to claim 15, characterized in that said resistant core has a lower extension in the corresponding vertical hole (12) of the footing structure (11).
17. The product according to claim 15, characterized in that said resistant core has an upper extension in the corresponding vertical hole (14) of the head beam (13) along all or part of the length of said hole.
18. The product according to claim 15, characterized in that said resistant core has an upper extension in the corresponding hole (24) of a prefabricated head beam (23, 26) which has a C-shaped transverse cross-section.
19. The product according to claim 15, characterized in that said resistant core has an upper extension in the corresponding hole of at least one hub (22) of a head beam (20) or double beam (25) which has a C-shaped transverse cross-section.
20. The product according to claim 14, characterized in that said centering means are each advantageously constituted by a centering element (16), which consists of a thin ring (18) provided with internal radial protrusions (17), which are centrally interrupted for the passage of the rod (15).

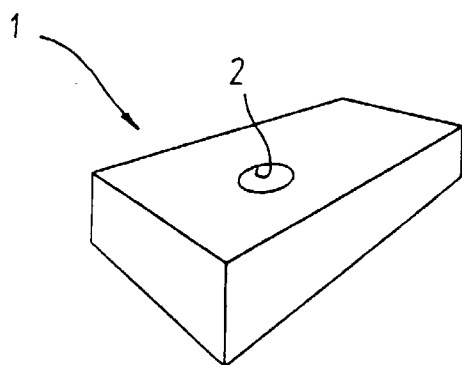


Fig. 1

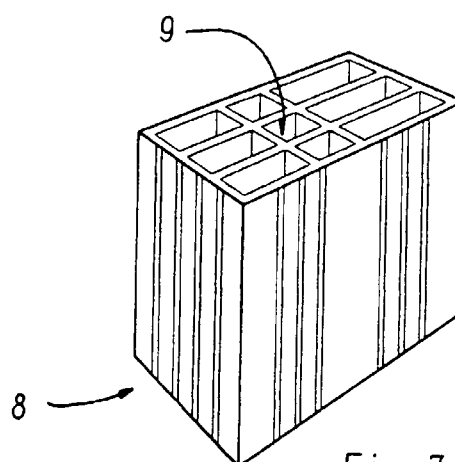


Fig. 7

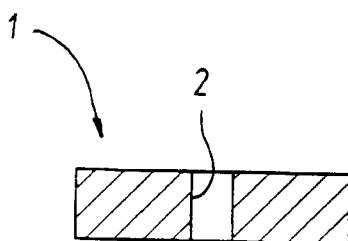


Fig. 2

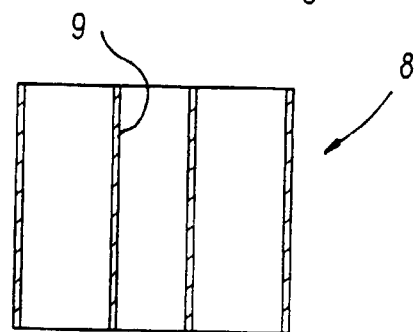


Fig. 8

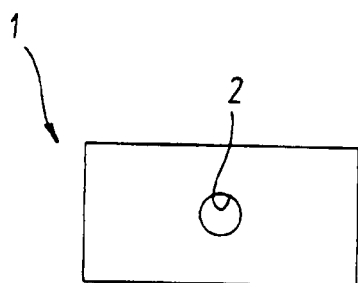


Fig. 3

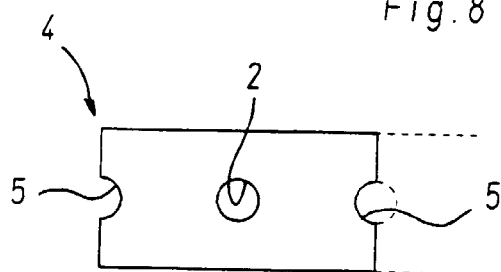


Fig. 5

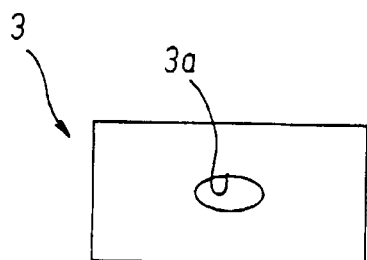


Fig. 4

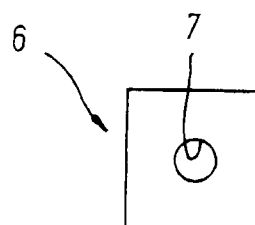
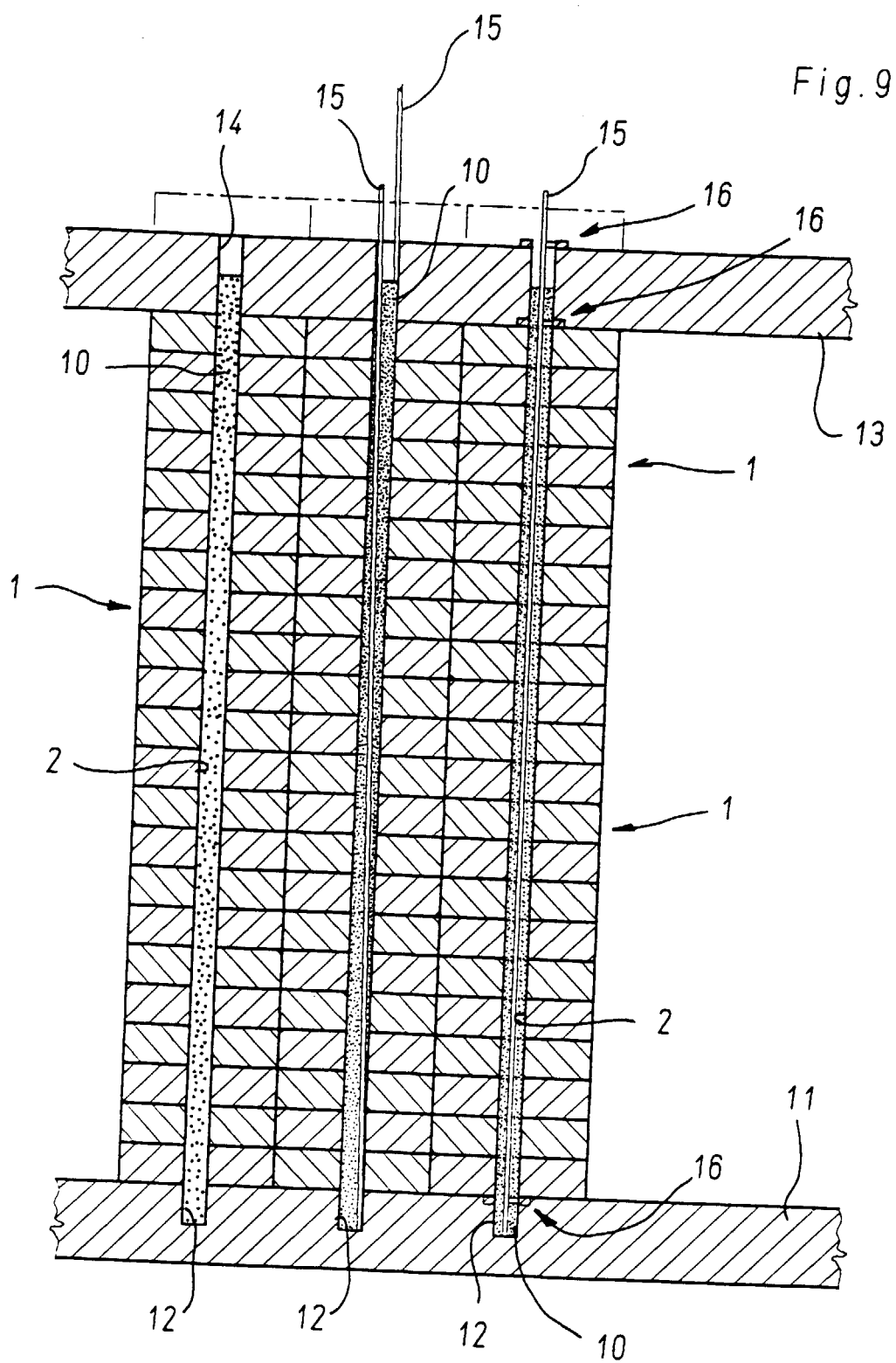


Fig. 6



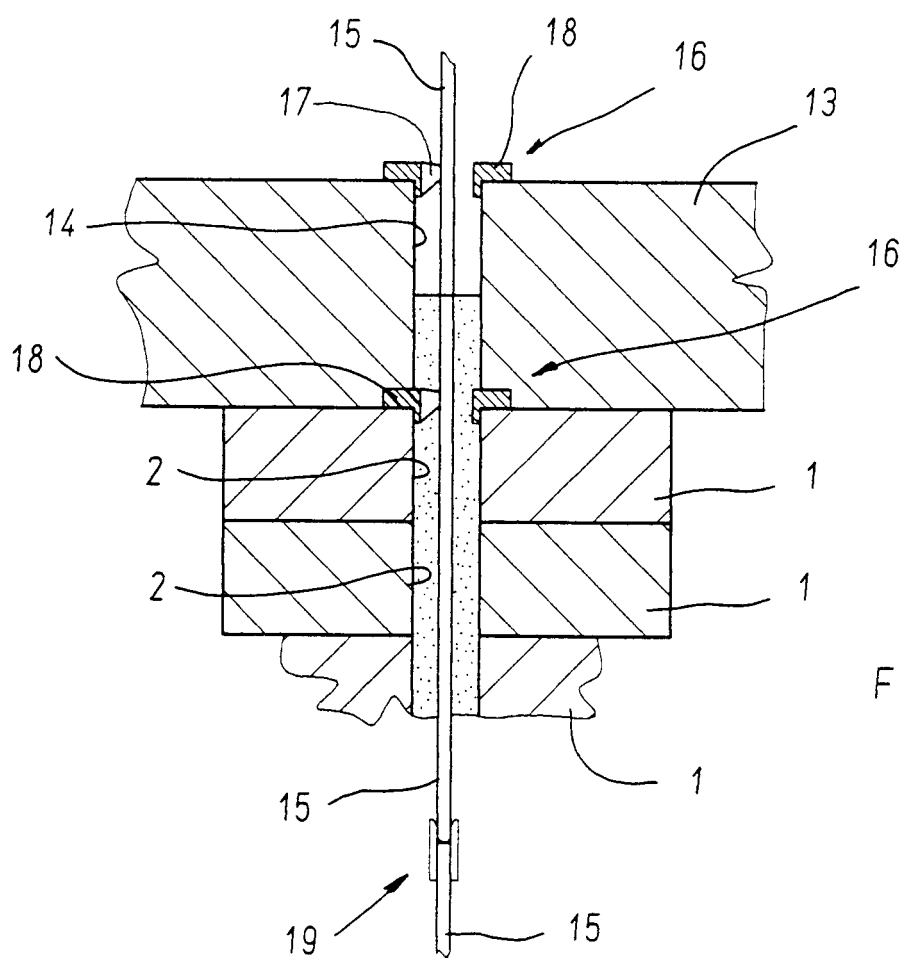


Fig. 10

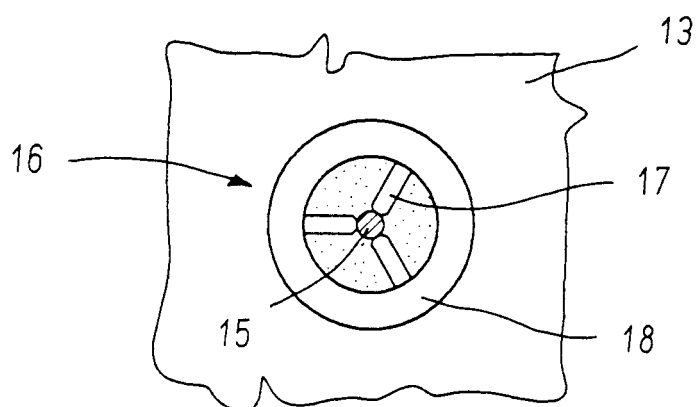


Fig. 11



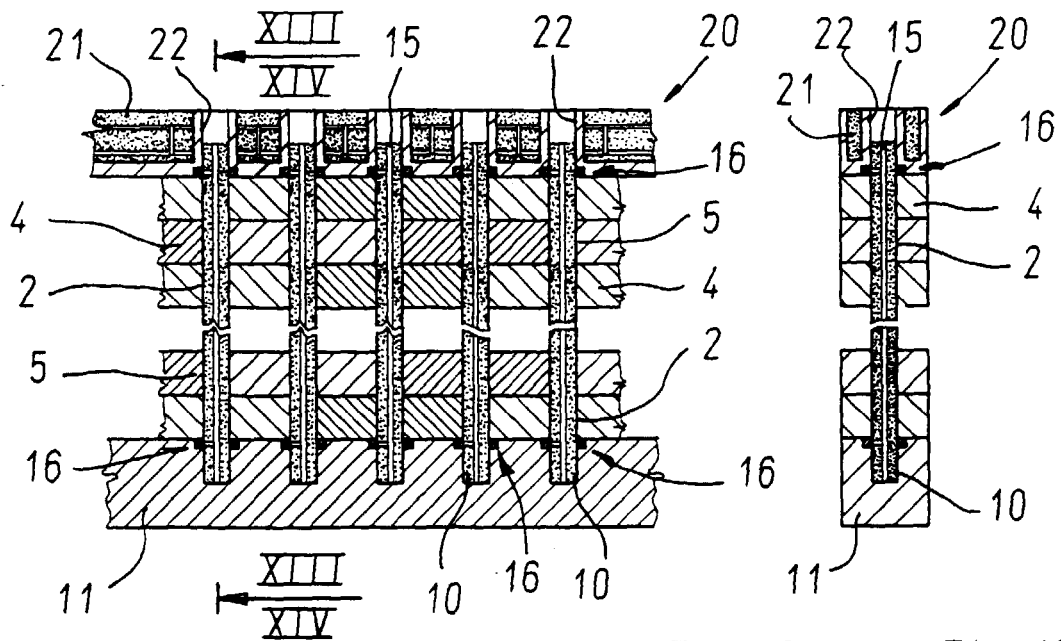


Fig. 12

Fig. 13

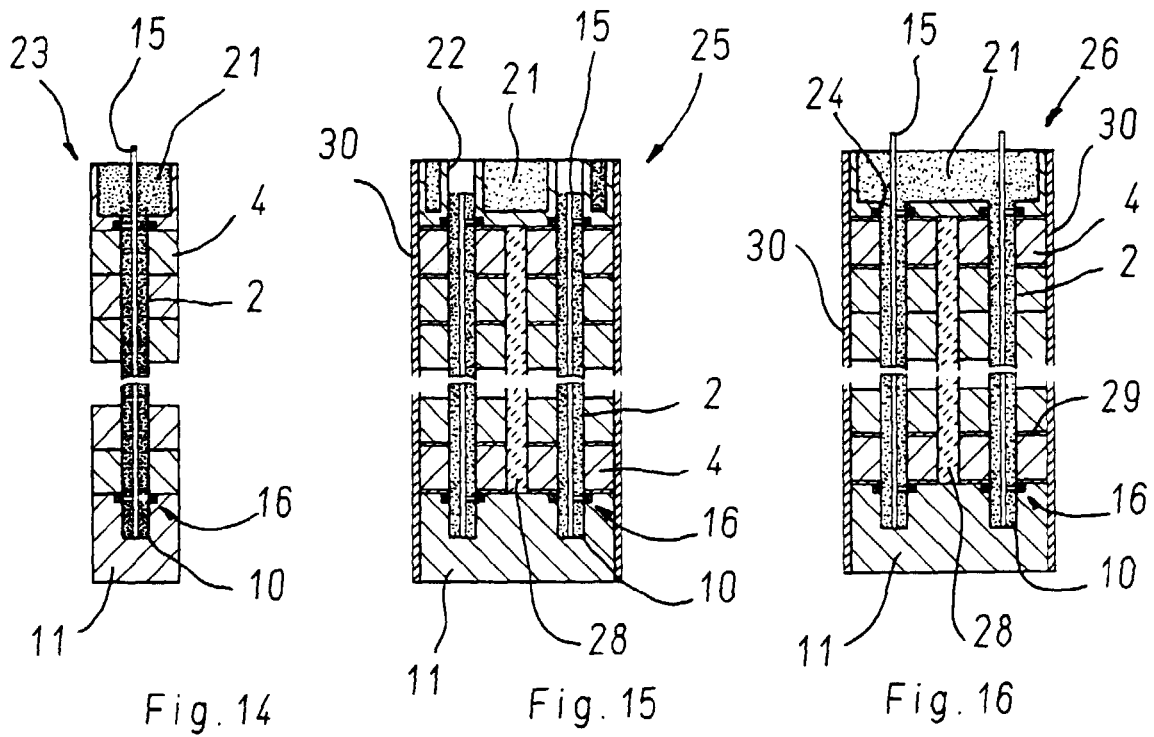


Fig. 14

Fig. 15

Fig. 16



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# EUROPEAN SEARCH REPORT

Application Number  
EP 00 11 5087

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
X	DE 41 17 615 A (SCHORR) 27 February 1992 (1992-02-27)	1, 2	E04B2/26 E04B2/20
Y	* column 2, line 10 - line 57; figures 1-6 *	3	
A	* abstract *	14	
Y	DE 91 00 993 U (HEBEL GMBH) 27 May 1992 (1992-05-27) * claim 1; figures 1,2,4,5 *	3	
A	FR 2 570 421 A (FERNANDEZ NAVARRO) 21 March 1986 (1986-03-21) * figures 1,4,6,35 *	4, 15, 18	
			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
			E04B
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 25 October 2000	Examiner Mysliwetz, W
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ON EUROPEAN PATENT APPLICATION NO.**

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25-10-2000

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