

Fig. 1

Description

[0001] The present invention concerns a method for making walls of a prefab building.

[0002] In particular, the invention concerns a method for making walls of a prefab building which consists of prefabricating wall parts that fit into each other by joining stones according to a certain bond pattern, whereby certain stones that are not adjacent protrude on the side edges so as to form teeth which can mesh with a slight play between two protruding teeth of an adjacent wall part to be built on, on the one hand, and by assembling these wall parts on the building site by pushing them into each other with their teeth and by joining them on the other hand.

[0003] Hereby is aimed in particular, among others, to make the wall parts such that, after its realisation, the aspect of the prefab building cannot or can hardly be distinguished from a building built with bricks in a conventional way.

[0004] In a preceding patent application in the name of the same applicant, a method has already been described whereby brick wall parts are pre-constructed, after which they are joined on the building site.

[0005] The wall parts are hereby obtained by gluing bricks directly onto each other.

[0006] This method is very suitable for making inner walls, as the aspect of these walls hardly matters, as they are usually plastered afterwards.

[0007] However, the method for making outer walls described in this patent application is rather complicated, as joints are required to create an aspect of an outer wall, which joint is prefabricated according to the described method and is glued afterwards between the bricks to be stacked onto one another.

[0008] Another disadvantage of the above-mentioned method regards the transport of the wall parts after their fabrication.

[0009] If no special measures are taken, during the transport of the wall parts to the building site and when putting up the wall parts on the building site, the glue should preferably be able to overcome the tensile force of the wall's weight so as to prevent the wall parts from falling apart or at least avoid a weakening of the wall parts.

[0010] In other words, it is necessary to use glue of a very high quality which is extremely expensive, whereby the gluing must moreover be done with very great precision.

[0011] On the other hand, the use of iron strips is reported for the above-mentioned method, which are provided round the wall parts so as to keep the bricks together and expose the glue as little as possible to tensile forces during transport.

[0012] These iron strips must be removed after the wall parts have been put in place.

[0013] This method whereby use is made of iron strips is rather complicated and little efficient, especially if the strips have not been sufficiently tightened.

[0014] Also, the present invention aims to remedy one or several of the above-mentioned and other disadvantages.

[0015] The present invention hereby concerns a method for making walls of a prefab building which consists in prefabricating wall parts that fit into each other by joining stones according to a specific bond pattern, whereby certain stones that are not adjacent protrude on the side edges so as to form teeth which can mesh with a slight play between two protruding teeth of an adjacent wall part to be built on, on the one hand, and by assembling these wall parts on the building site by pushing them into each other with their teeth and by joining them on the other hand, whereby, during the production of the wall parts, use is made of a mould which is provided with a base plate onto which has been provided an embossed grid with a rectangular grid pattern, whereby every grid rectangle corresponds to a lateral face of a stone and the grid lines have a certain width so as to form a joint between the stones, and whereby the method consists among others in placing the stones with their lateral faces on the base plate between the grid lines, in providing mortar between the stones after the stones have been put in the mould, and in taking the wall part out of the mould after the mortar has set.

[0016] An advantage of this method according to the invention is that wall parts are obtained in a simple manner which are provided with a joint, such that the method can also be easily applied to make outer walls of a prefab building.

[0017] Another advantage of such a method according to the invention is that the stones can be arranged very quickly in the mould, as the stones are automatically kept in place thanks to the relief of the grid.

[0018] The method can also be easily automated, making it possible to save on labour and as a consequence possibly also on wages.

[0019] Naturally, all the advantages which are the direct result of prefabricating stone wall parts according to the method of the present invention apply.

[0020] Thus, the walls of a prefab building made of stone wall parts are more solid than those of the known conventional prefab buildings.

[0021] Another advantage of the method is that it takes far less time to erect a stone building on the building site itself than in the case where the walls have to be entirely built on the spot.

[0022] People hereby have to work less long under bad weather conditions for example.

[0023] An additional advantage is that such prefab walls can be manufactured in a closed workshop under controlled conditions, as a result of which better results can often be obtained than in case a wall is built in the open air.

[0024] Another advantage of this method according to the invention is that the wall parts can be easily stacked and joined so as to form a wall by means of a hoist in the shape of a crane or the like, such that no scaffolds need

to be erected during the construction of the building.

[0025] According to a preferred method of the invention, after the stones have been put in the mould, reinforcement bars are provided between the stones, whereby according to an even more preferred method, reinforcement bars are provided between the stones in the longitudinal direction of the stones as well as in the height.

[0026] This method according to the invention is advantageous in that, after the mortar has set, the wall parts are particularly robust and can withstand a tensile strain as such, such as for example during the transport of the wall parts.

[0027] Preferably, for every wall part, a number of reinforcement bars in the height are additionally provided with a ring at one far end, whereby said reinforcement bar is placed such between the stones in the wall that the ring protrudes from the mould or the wall part.

[0028] Of course, such rings are very practical to transport the wall part after the mortar has set, for example by means of hooks on a crane which are hooked in the rings.

[0029] The invention also concerns a building stone which can be used with a method according to the invention as explained above, whereby this building stone is specially designed to serve as the tooth of a wall part to be formed, and whereby this building stone has been excavated over a certain thickness of a part of its upper side and/or lower side, such that the stone has a smaller height over this part than on certain side edges.

[0030] The building stone is preferably provided with a rectangular side face and a rectangular crosscut face which corresponds in size to the lateral face and crosscut face of an ordinary stone as is used in the above-described method.

[0031] Such a building stone can be easily used in the above-mentioned method as it can be provided with its rectangular lateral face on the side edges of the mould between the grid lines with the rectangular crosscut face directed outwards, such that the singular, excavated shape of the stones forming the teeth does not cause any problems when filling the mould, and the protruding teeth, after the wall parts have been assembled, still look like normal stones.

[0032] It is also advisable, according to the invention, for the building stone to be provided with a passage in the height, and the building stone is preferably symmetrical in relation to a plane cutting the stone along its height.

[0033] Moreover, the above-mentioned passage in the building stone is preferably provided such that, when a wall part is provided with teeth formed of such building stones, the different passages will be aligned in relation to each other, such that when assembling two wall parts by making the teeth mesh, a columnar passage is obtained in which a reinforcement bar can preferably be provided, after which both wall parts can be coupled together by filling the columnar passage with a mortar.

[0034] It is clear that a very solid connection between

wall parts can be thus obtained in a simple manner.

[0035] The fact that the building stone has been excavated over a certain part also has a practical advantage.

[0036] For, in this way, when filling the columnar passage, part of the mortar can also be provided in the part of the building stones which has been excavated, such that a connection can be obtained in the above-mentioned column with reinforcement bars provided in the longitudinal direction between the stones and which are bent in the excavations.

[0037] The invention also concerns a mould to be used with a method as explained above, whereby this mould is provided with a base plate on which has been embossed a grid having a rectangular grid pattern with a cross pattern which corresponds to the pattern that is typically formed by the joints of a brick wall, whereby the grid lines have a width which corresponds to a typical joint width.

[0038] Moreover, the mould is preferably provided with standing walls on the outside having a height which is about the same as that of a typical stone width or somewhat larger than said stone width, and the grid lines are formed of laths provided with a sealing on their side edges.

[0039] An advantage of such a mould is that it can be easily filled with stones, whereby the sealing at the grid laths makes sure that, after the mould has been filled with mortar, there will be no leaks and, as a consequence, the joint to be formed remains open.

[0040] Moreover, this adjusted height of the mould makes it possible to provide mortar between the joints by daubing it for example with a smoothing trowel or the like over the face of the stones provided in the mould, such that a wall part can be obtained having the thickness of the width of a stone.

[0041] In order to better explain the characteristics of the invention, the following preferred methods for making walls of a prefab building are described as an example only without being limitative in any way, as well as a preferred embodiment of a building stone and a mould which can be applied with such a method, with reference to the accompanying drawings, in which:

figure 1 shows a mould according to the invention in perspective, whereby the front wall parts have been omitted, in which have been provided a number of stones as well as some filling elements according to a method of the invention;

figure 2 shows a section according to line II-II in figure 1;

figure 3 shows the part indicated with F3 in figure 2 to a larger scale;

figure 4 illustrates the application in perspective, analogous to figure 1, of different types of reinforcement steel between the stones of a filled mould;

figure 5 is a top view of the part indicated by F5 in figure 4, represented to a larger scale;

figure 6 shows a wall part in perspective which has

been made according to a first method of the invention;
 figure 7 shows a section of the wall part from figure according to an edge indicated by VII-VII;
 figure 8 shows in perspective how different wall parts according to the invention can be coupled to each other;
 figure 9 is a top view of the part indicated by F9 in figure 8;
 figures 10 and 11 represent two fastening elements which can be worked into a wall part according to an alternative method of the invention;
 figure 12 represents a mould, analogous to figures 1 and 3, which has been entirely filled with stones and different types of reinforcement steel according to the above-mentioned alternative method, as well as with some fastening means;
 figure 13 represents a section according to line XIII-XIII in figure 12, after the mould has been filled with mortar and the wall part has been taken out of the mould; and,
 figure 14 illustrates, in perspective, the use of applying fastening means so as to form a cavity wall.

[0042] The mould 1 according to the invention represented in figures 1 and 2 is formed of a base plate 2 provided with standing walls 4 on the outer edges 3.

[0043] Such a mould 1 can be used to make the walls of a prefab building, in particular wall parts 5 of such walls, as represented in figures 6 and 7, according to a method of the present invention.

[0044] To that end, the height A of the standing walls 4 is preferably about as large or somewhat larger than a typical stone width A' of a stone 6 with which the wall parts are made.

[0045] On the base plate 2 has been embossed a grid 7 with a rectangular grid pattern having a cross pattern which corresponds to the pattern which is typically formed by the joints of a brick wall.

[0046] Every grid rectangle 8 of the grid 7 corresponds to a lateral face 9 of a stone 6.

[0047] The grid lines 10 of this grid 7 have a width B which corresponds to a typical joint width B'.

[0048] As is represented in greater detail in figure 3, the grid lines 10 are formed of laths 11 provided with a sealing 13 on their side edges 12.

[0049] The sealing 13 may for example be formed of a rubber strip glued on the side edges 12 of the grid laths 11.

[0050] A first step of the method according to the invention consists in placing the stones 6 with their lateral faces 9 on the base plate 2 between the grid lines 10.

[0051] Also according to the method of the invention, in order to form teeth 14 on the wall parts at the side edges 15 of the mould 1, special building stones 16 are provided every other row, which building stones 16 have been specially designed to that end within the frame of the present invention.

[0052] These special building stones 16 forming the teeth 14 of the wall parts 5 have been excavated over a certain thickness 13 of a part of their upper sides 17 and their lower sides 18 so as to form a cavity 19 on each side 17 and 18.

[0053] Further, the building stones 16 forming the teeth 14 are made with a rectangular lateral face 20 and a rectangular crosscut face 21 which have the size of the lateral faces 9 and the crosscut faces 22 of the ordinary stones 6.

[0054] According to the method of the present invention, the lateral face 20 is placed on the base plate 2 of the mould 1 and the crosscut face 21 is directed towards the side edge 15 of the mould 1.

[0055] The building stones 16 are preferably symmetrical in relation to a plane cutting the stone 16 over its height C.

[0056] As a result, the stones 16 can be easily used on both side edges 15 of the mould 1, which would not be obvious, for example, if they were not symmetrical to the above-mentioned plane.

[0057] Further according to the method of the invention, a filling element the size of a part of a stone 6 is provided on the side edges 15 of the mould 1, every other row between the stones 16 forming the teeth 14, which filling element links up closely with the stones 16 of the adjacent rows forming the teeth 14, with the last stone 6 of the row in which the filling element 23 is situated and with a standing wall 4 of the mould 1.

[0058] Said filling element 23 can for example be made of a polymer foam or any other durable material whatsoever, such that it can be re-used.

[0059] After the mould 1 has been entirely filled with the ordinary stones 6, the stones 16 forming the teeth 14 and the filling elements 23, reinforcement bars are preferably provided between the stones 6 and 16 according to the invention, as is illustrated in figures 4 and 5.

[0060] Even more preferably, reinforcement bars 24 are provided between the stones 6 and 16 in the longitudinal direction DD' of the stones 6 and 16, as well as reinforcement bars 25 in the height EE' of the stones 6 and 16.

[0061] According to a preferred method of the invention, the reinforcement bars 24 for the longitudinal direction DD' are provided with a buckle 27 at both far ends which is such that, as is represented in detail in figure 5, the buckled far end 26 fits in the cavity 19 of the stones 16 forming the teeth 14.

[0062] The reinforcement bars 25 for the height EE' are preferably bent in a shape which corresponds to the pattern formed of the grid lines 10 on the base plate 2.

[0063] Moreover, it is advisable to provide a number of reinforcement bars 28 in the height EE' with a ring 30 at one far end 29 for every wall part 5, whereby such a reinforcement bar 28 is placed in such a manner between the stones 6 in the mould 1 that the ring 30 protrudes from the mould 1 or the wall part 5.

[0064] After the stones 6 and 16, the filling elements

23 and possibly the reinforcement bars 24 and 25 have been provided, it is the purpose of the method according to the invention to provide mortar in the mould 1 between the stones 6 and 16.

[0065] The sealings 13 hereby prevent the mortar from seeping through to the base plate 2, as a result of which the face of the wall part 5 resting on the base plate 2 would be soiled.

[0066] Naturally, the filling elements 23 prevent the part between the building stones 16 forming the teeth 14 from being filled with mortar.

[0067] After the mortar has set, the wall part 5 is taken from the mould 1, leading for example to a result as is represented in figures 6 and 7.

[0068] A wall part 5 is hereby obtained having a thickness which is equal to the width of a stone, and the stones 6 of the wall part 5 are coupled by the mortar as well as by the reinforcement bars 24 and 25 in the joints 34 between the stones 6.

[0069] An advantage of such a wall part 5 is that its aspect and weight hardly differ from those of the walls that are built in a conventional manner.

[0070] Moreover, a very solid whole is obtained whereby relatively few materials are used.

[0071] The mortar may hereby be a conventional mortar which is applied in an amount that can be compared to the amount used in the conventional building methods.

[0072] The above-mentioned rings 30 protruding from the wall part 5 can be easily used to transport the wall part 5 to the building site and during the installation of the wall part 5 on the building site, after which the rings 30 can be removed for example with tongs or a grinding disc or the like.

[0073] In order to couple and join wall parts 5 according to a method of the invention, the stones 16 forming the teeth 14 are preferably provided with a passage 31 in the height EE'.

[0074] As is illustrated in figures 8 and 9, one preferably makes sure that the passages 31, after the wall parts 5 have been formed, are aligned such in relation to each other that, when assembling two wall parts 5 by making the teeth 14 mesh, a columnar passage is obtained in which can be provided a reinforcement bar 32, after which both wall parts 5 can be coupled by filling the columnar passage with a mortar 33.

[0075] Moreover, it is the purpose that, when filling the columnar passage, part of the mortar 33 is provided in the excavated part 19 of the stones 16 forming the teeth 14, such that a connection with reinforcement bars 24 can be obtained in the above-mentioned column provided in the longitudinal direction EE' between the stones 6 and 16.

[0076] It is clear that a wall part 5 with teeth 14 and joints 34 is very suitable to serve as an outer wall 35.

[0077] For, when several wall parts 5 with such teeth 14 are coupled together, an aspect with a bond pattern is obtained which cannot be discerned from a conventional brick wall.

[0078] According to an alternative method of the method, before applying the mortar between the stones 6 and 16 in the mould 1, crosswise to the face of the base plate 2, are provided fastening means 36 which protrude from the face of the wall part 5.

[0079] Such fastening means 36 may for example have a shape as is represented in figures 10 and 11.

[0080] The application of the fastening means 36 in the mould 1 is illustrated in figure 12 and the obtained result after the mortar has been applied is illustrated in figure 13.

[0081] By means of figure 14 is further illustrated how such fastening means 36 can be used to mount a wall part 5 of an outer wall 35 made according to this alternative method at a certain distance from an inner wall 37 so as to form a cavity wall.

[0082] Hook-shaped fastening means 38 are hereby provided in the outer wall 35 according to figure 11 on the one hand, and fastening means 39 are provided in the inner wall 37 according to figure 10 on the other hand, on which struts 40 can be fixed, for example by screwing them in the fastening means 39 or the like.

[0083] The latter struts 40 are provided with openings 41 in which the hook-shaped fastening means 38 of the outer wall 35 can be hooked.

[0084] In this way it becomes clear that such a method according to the invention is extremely useful for constructing prefab buildings which, just as conventional buildings, are provided with a cavity.

[0085] As a function of the thickness of the insulation material to be applied, the fastening means may be provided with means which make it possible to adjust the thickness of the cavity wall.

[0086] To this end, the fastening means 39 can be provided with fixing holes 42 which are provided for example every cm at different distances from the inner wall 37, and which can be used for fixing the above-mentioned struts 40 at different distances from the inner wall 37.

[0087] The invention is by no means restricted to the method described as an example, nor to the building stones and mould applied thereby; on the contrary, such a method, building stones and mould can be made according to different variants while still remaining within the scope of the invention.

Claims

1. Method for making walls of a prefab building which consists of prefabricating wall parts (5) that fit into each other by joining stones (6,16) according to a certain bond pattern, whereby certain stones (16) that are not adjacent protrude on the side edges so as to form teeth (14) which can mesh with a slight play between two protruding teeth (14) of an adjacent wall part (5) to be built on, on the one hand, and of assembling these wall parts (5) on the building site by pushing them into each other with their teeth (14)

- and by joining them on the other hand, **characterised in that** during the fabrication of the wall parts (5) use is made of a mould (1) which is provided with a base plate (2) on which has been embossed a grid (7) with a rectangular grid pattern, whereby every grid rectangle (8) corresponds to a lateral face (9) of a stone (6,16) and the grid lines (10) have a certain width (B) so as to form a joint (34) between the stones (6,16), whereby the method further consists in placing the stones (6,16) with their lateral faces (9) on the base plate (2) between the grid lines (10), in applying mortar (33) between the stones (6,16) after the stones (6,16) have been placed in the mould (1), and in taking the wall part (5) out of the mould (1) after the mortar (33) has set.
2. Method according to claim 1, **characterised in that** the grid pattern is made as a cross pattern which corresponds to the pattern which is typically formed by the joints (34) of a brick wall.
 3. Method according to claim 1 or 2, **characterised in that** the method is applied to form an outer wall (35).
 4. Method according to any one of the preceding claims, **characterised in that** the base plate (2) of the mould (1) is provided with standing walls (4) on the outer sides (3) having a height (A) which is about the same as that of a typical stone width (A') or which is somewhat larger than said stone width (A').
 5. Method according to any one of the preceding claims, **characterised in that** the grid lines (10) are formed of laths (11) which are provided with a sealing (13) on their side edges (12).
 6. Method according to any one of the preceding claims, **characterised in that** the stones (16) forming the teeth (14) of the wall parts (5) are excavated over a certain thickness of a part of their upper sides (17) and their lower sides (18) so as to form a cavity (19) in which, when the wall parts (5) are joined, mortar (33) can be provided.
 7. Method according to claim 6, **characterised in that** the stones (16) forming the teeth (14) are made with a rectangular lateral face (20) and a rectangular crosscut face (21) having the same size as the lateral faces (9) and crosscut faces (22) of the other stones (6), whereby the stones (16) forming the teeth (14) are placed with their lateral faces (20) on the base plate (2) of the mould (1) with their crosscut faces (22) directed towards the side edges (15) of the mould (1).
 8. Method according to any one of claims 6 or 7, **characterised in that** the stones (16) forming the teeth (14) are symmetrical in relation to a plane cutting the stone (16) along its height (C).
 9. Method according to claims 6 to 8 included, **characterised in that** the stones (16) forming the teeth (14) are provided with a passage (31) in the height (EE').
 10. Method according to claim 9, **characterised in that** the passages (31) in the stones (16) forming the teeth (14), after the wall parts (5) have been formed, are aligned such in relation to each other that, when two wall parts (5) are assembled by making the teeth (14) mesh, a columnar passage is obtained in which can be provided a reinforcement bar (32), after which both wall parts (5) can be coupled to each other by filling the columnar passage with a mortar (33).
 11. Method according to claim 10, **characterised in that**, while the columnar passage is being filled, part of the mortar (33) is also provided in the excavated part (19) of the stones (16) forming the teeth (14), such that a connection with reinforcement bars (24) can be obtained in the above-mentioned column, provided in the longitudinal direction (DD').
 12. Method according to any one of the preceding claims, **characterised in that** on the side edges (15) of the mould (1), a filling element (23) the size of a part of a stone (6,16) is provided every other row between the stones (6,16) forming the teeth (14), which filling element links up closely with the stones (16) of the adjacent rows forming the teeth (14), with the last stone (6) of the row in which the filling element (23) is situated and with a standing wall (4) of the mould (1).
 13. Method according to claim 12, **characterised in that** the filling element (23) is made of a polymer foam.
 14. Method according to any one of the preceding claims, **characterised in that** after the stones (6,16) have been placed in the mould, reinforcement bars (24,25) are provided between the stones (6,16).
 15. Method according to claim 14, **characterised in that** reinforcement bars (24) are provided between the stones (6,16) in the longitudinal direction (DD') of the stones (6,16).
 16. Method according to claims 6 and 15, **characterised in that** the reinforcement bars (24) in the longitudinal direction (DD') are provided with a buckle (27) on both far ends (26)) which is such that the buckled far end (26) fits in the excavated part (19) of the stones (16) forming the teeth (14).
 17. Method according to any one of claims 14 to 16 included, **characterised in that** reinforcement bars (25) are provided between the stones (6,16) in the

height (EE') of the stones (6,16).

18. Method according to claim 17, **characterised in that** the reinforcement bars (25) in the height (EE') are bent in a shape which corresponds to the pattern formed by the grid lines (10) on the base plate (2). 5
19. Method according to claim 17 or 18, **characterised in that** for every wall part (5), a number of reinforcement bars (28) in the height (EE') are additionally provided with a ring (30) at one far end (29), whereby said reinforcement bar (28) is placed such between the stones (6,16) in the wall that the ring (30) protrudes from the mould (1) or the wall part (5). 10
20. Method according to claim 19, **characterised in that** after the mortar (33) has set, the above-mentioned rings (30) are used to transport the wall part (5). 15
21. Method according to any one of the preceding claims, **characterised in that** before the mortar (33) is applied between the stones (6), crosswise to the plane of the base plate (2), fastening means (36) are provided which protrude from the plane of the wall part (5). 20
22. Method according to claim 21, **characterised in that** the fastening means (36) are used to mount a wall part (5) of an outer wall (35) at a certain distance from an inner wall (37) so as to form a cavity wall, whereby hook-shaped fastening means (38) are provided in the outer wall (35) on the one hand, and fastening means (39) are provided in the inner wall (37) on the other hand on which struts (40) can be fixed, which struts (40) are provided with openings (41) in which the hook-shaped fastening means (38) of the outer wall (35) can be hooked. 25
23. Building stone (16) to be applied in a method according to any one of the preceding claims so as to form teeth (14) on the wall parts (5), **characterised in that** it has been excavated over a certain thickness of a part of its upper side (17) and its lower side (18) so as to form a cavity (19). 30
24. Building stone according to claim 23, **characterised in that** it is provided with a rectangular lateral face (20) and a rectangular crosscut face (21). 35
25. Building stone according to claim 24, **characterised in that** it is provided with a passage (31) in the height (EE'). 40
26. Building stone according to claim 25, **characterised in that** it is symmetrical in relation to a plane which cuts the stone (16) along its height (C). 45
27. Mould to be used in a method according to any one

of claims 1 to 22 included, **characterised in that** it is provided with a base plate (2) on which has been embossed a grid (7) with a rectangular grid pattern having a cross pattern which corresponds to the pattern which is typically formed by the joints (34) of a brick wall, whereby the grid lines (10) have a width (B) in conformity with a typical joint width (B').

28. Mould (1) according to claim 27, **characterised in that** the base plate (2) of the mould (1) is provided with standing walls (4) on the outer sides (3) having a height (A) which is about the same as that of a typical stone width (A') or which is somewhat larger than said stone width (A').
29. Mould according to claim 27 or 28, **characterised in that** the grid lines (10) are formed of laths (11) which are provided with a sealing (13) on their side edges (12).

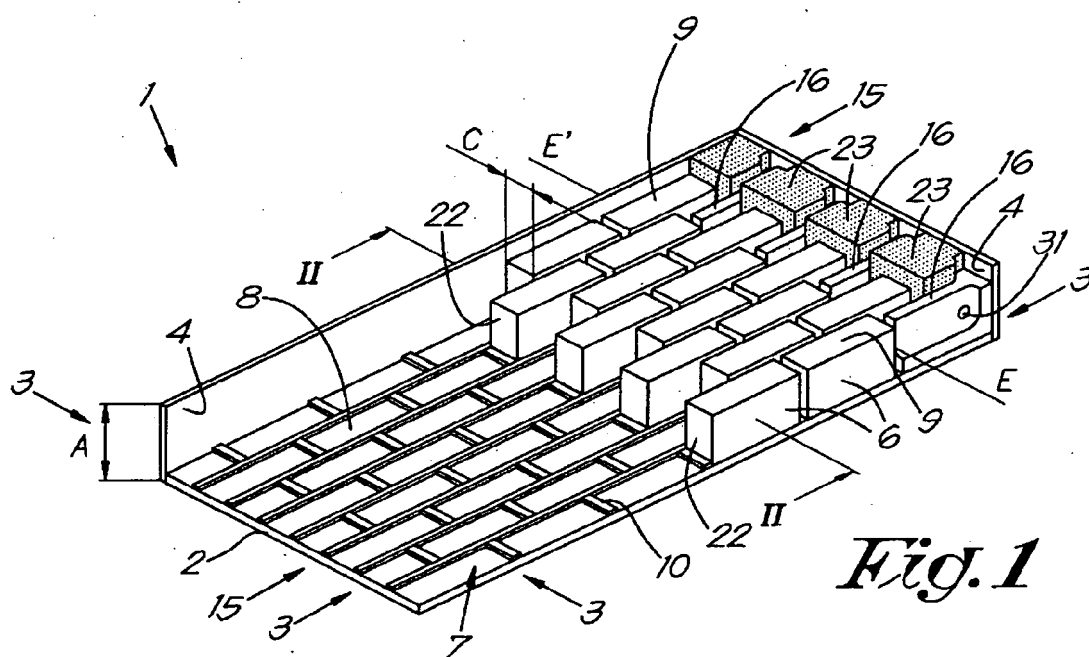


Fig. 1

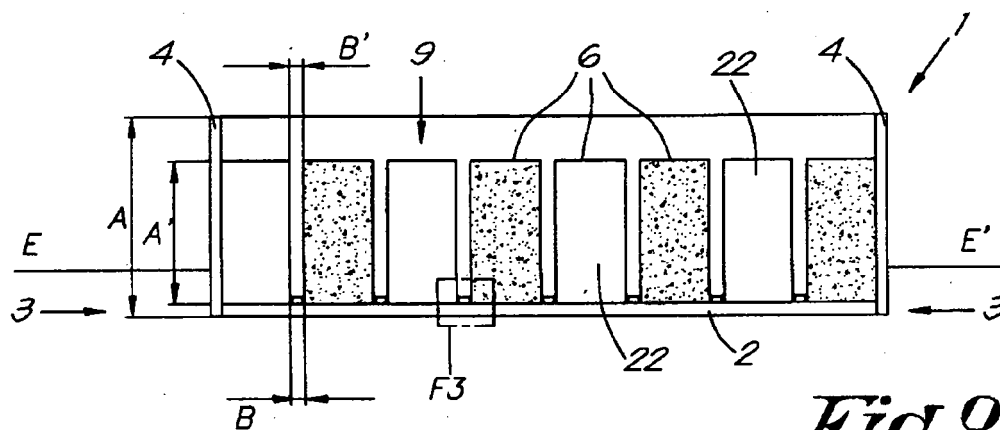


Fig. 2

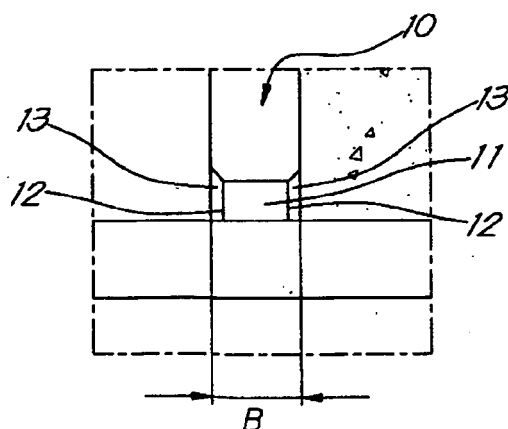
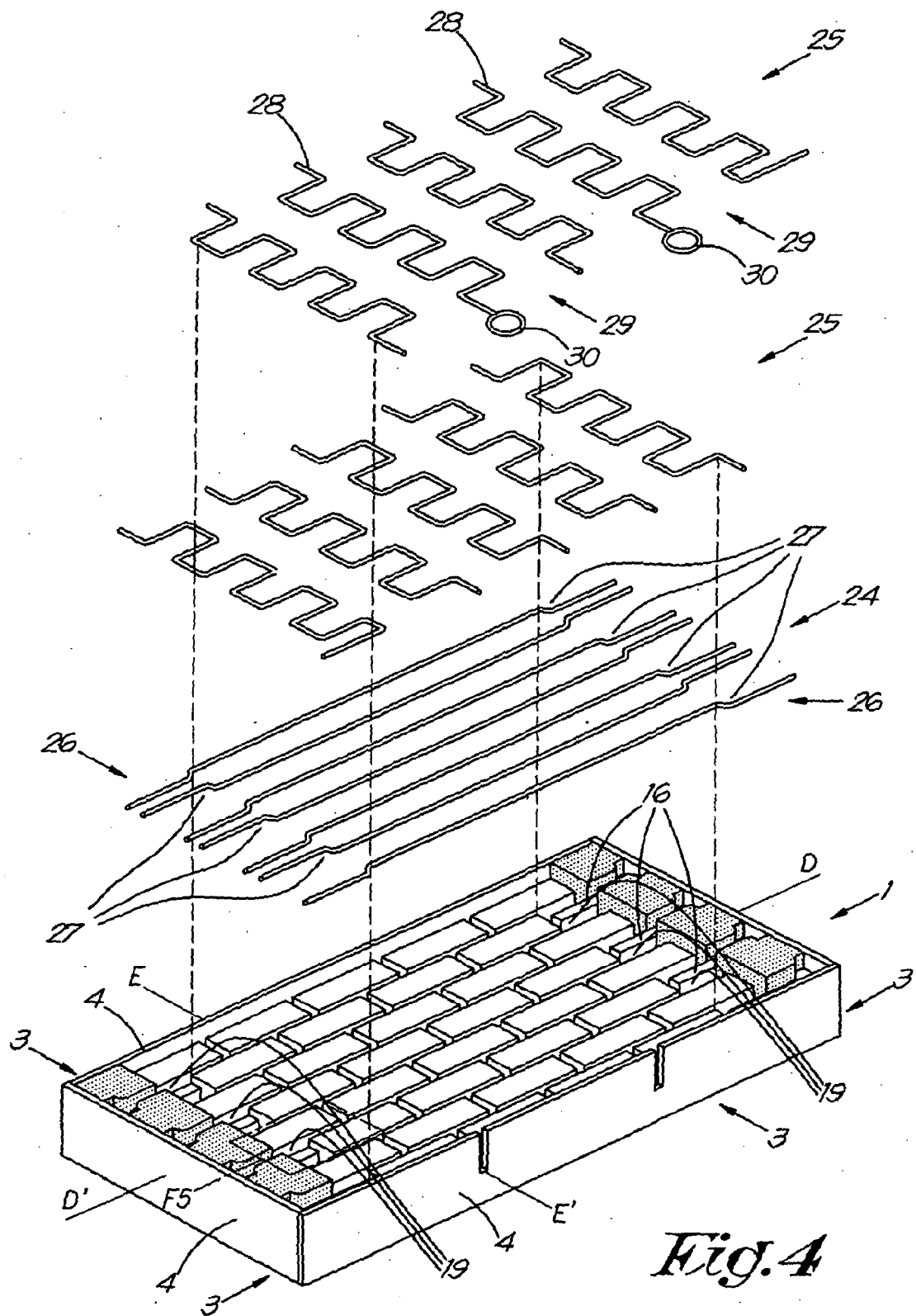
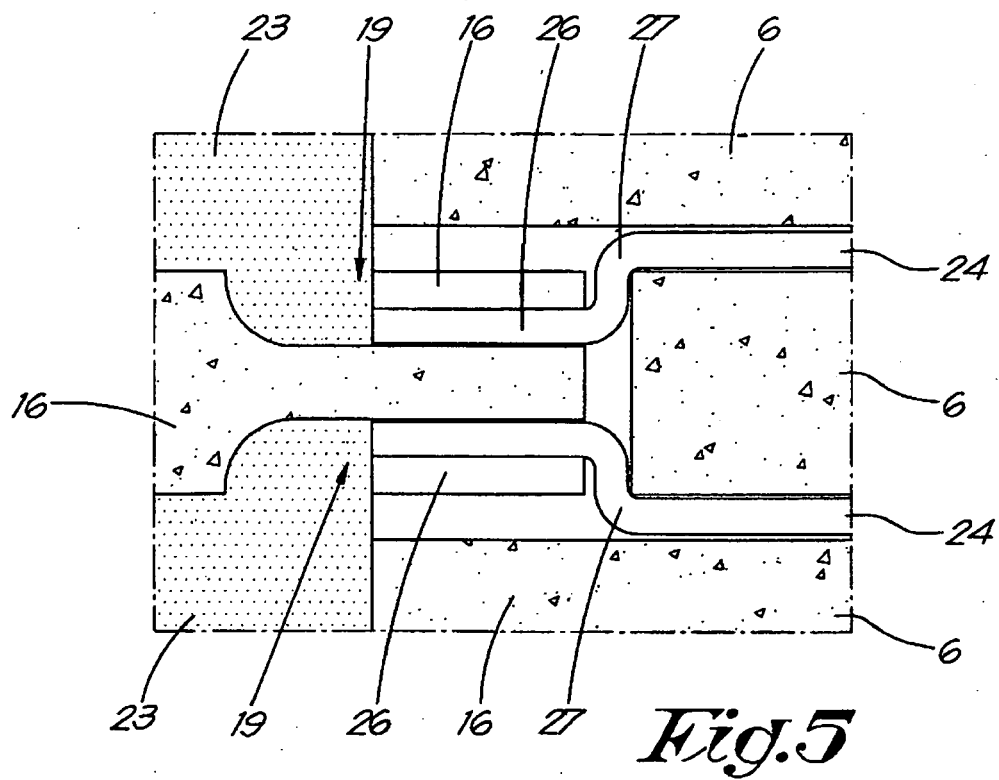
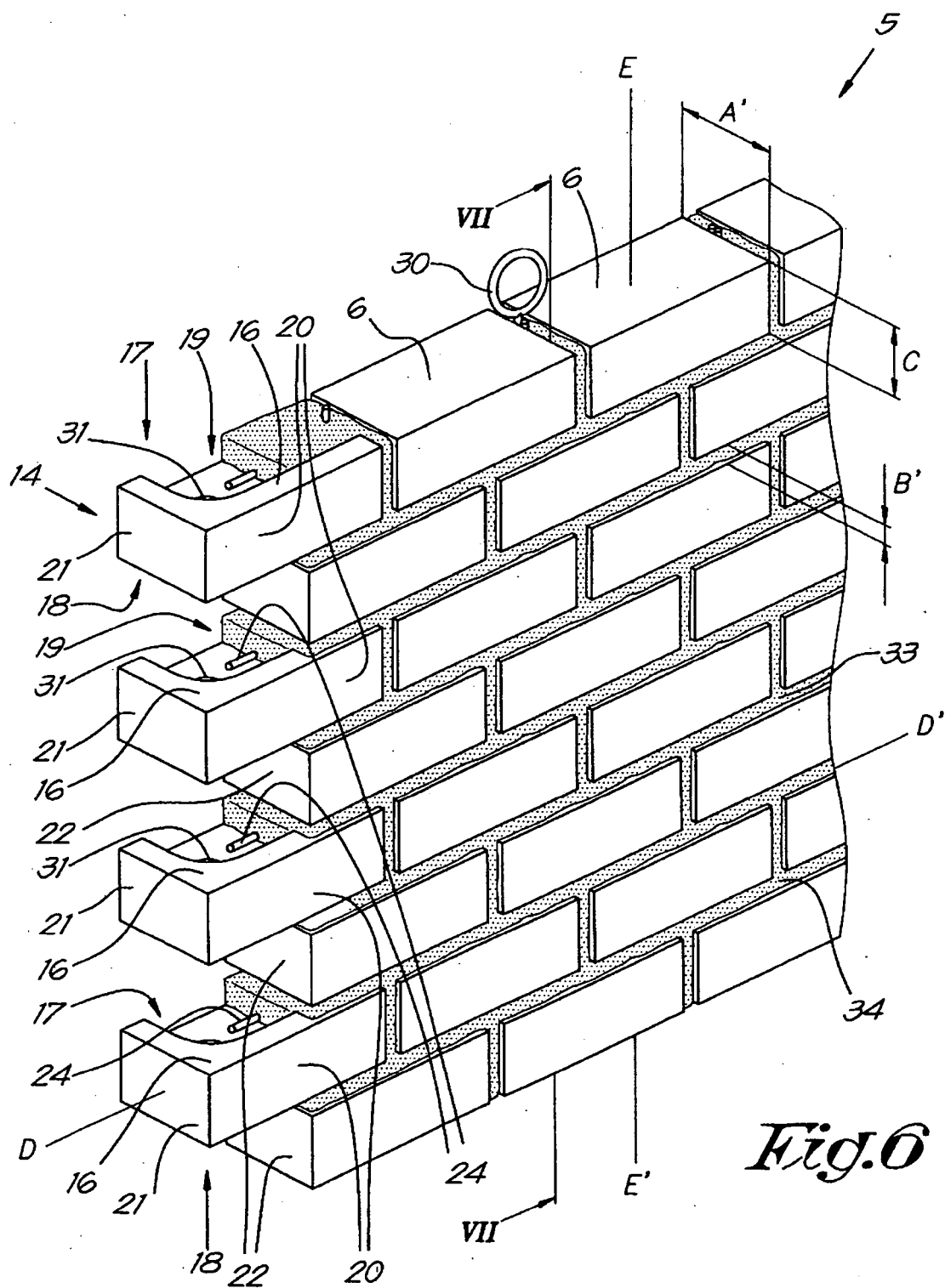
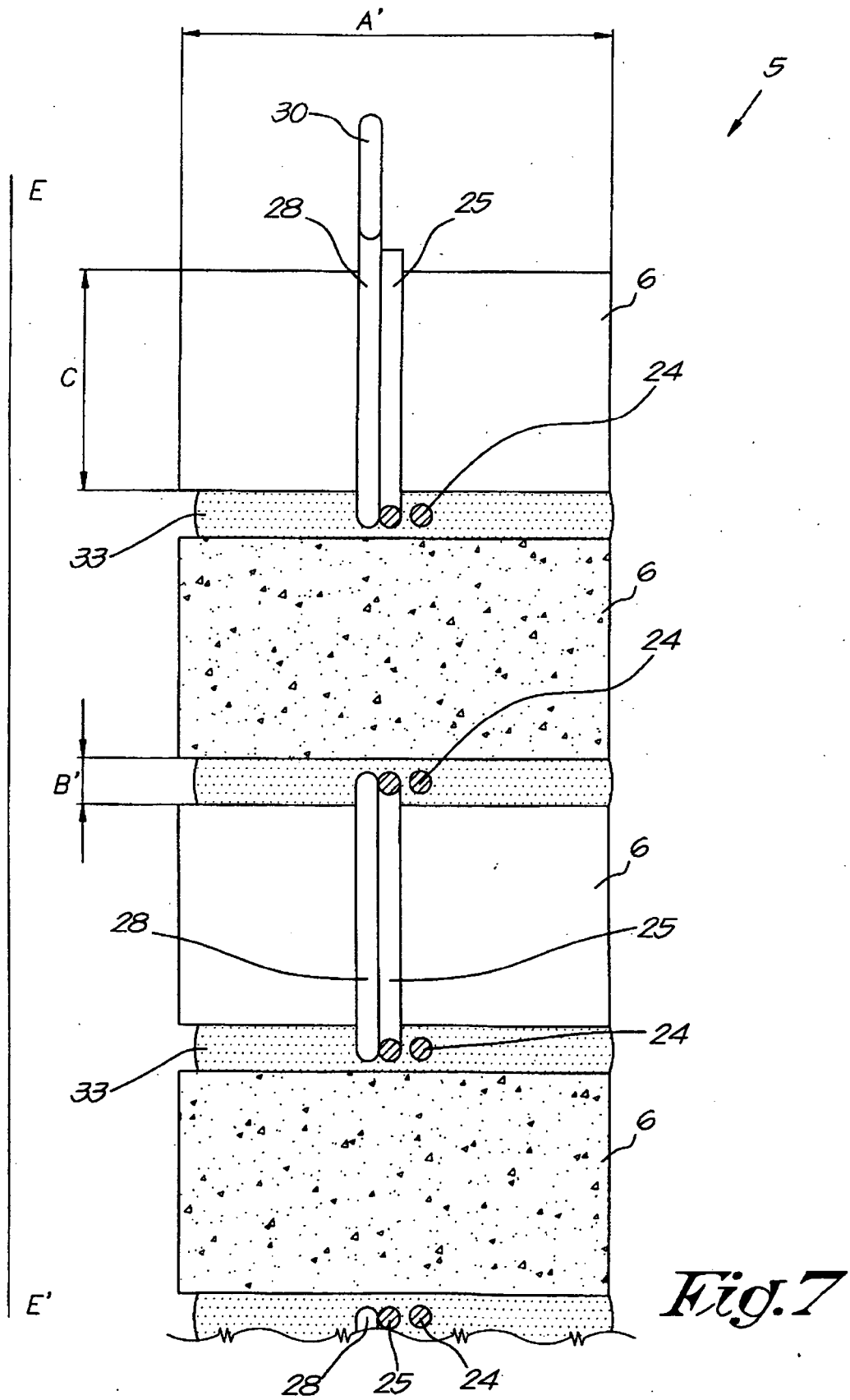


Fig.3









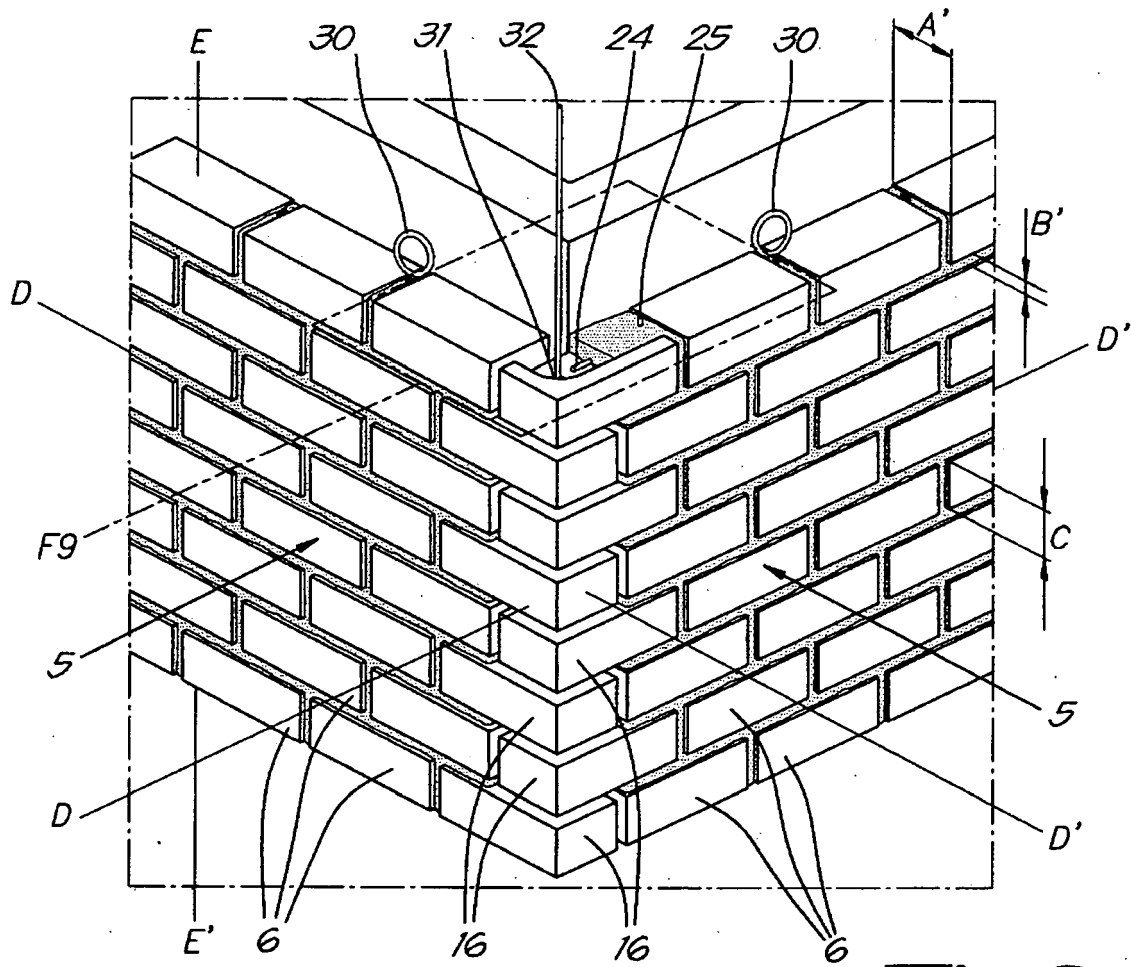


Fig. 8

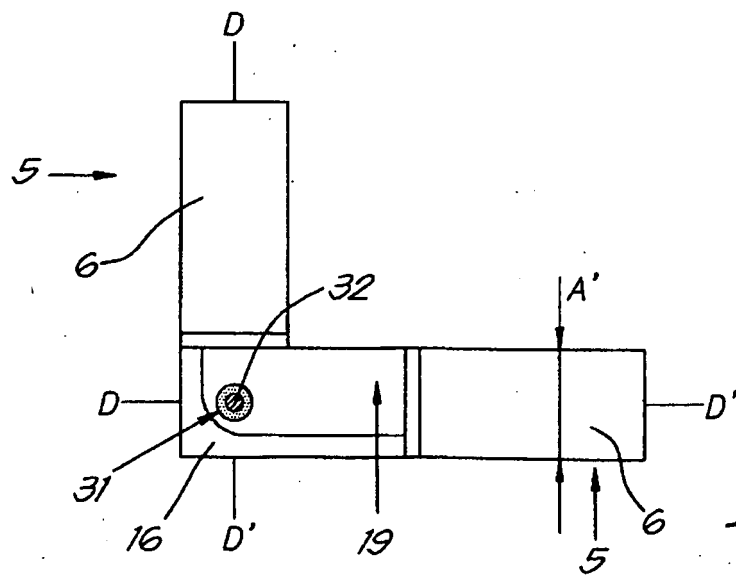


Fig. 9

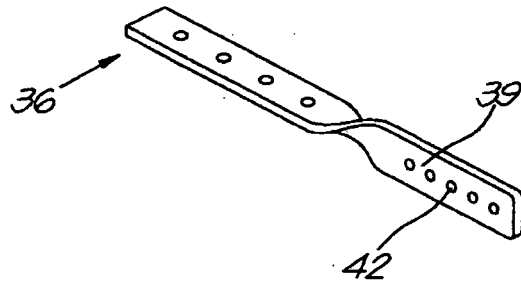


Fig. 10

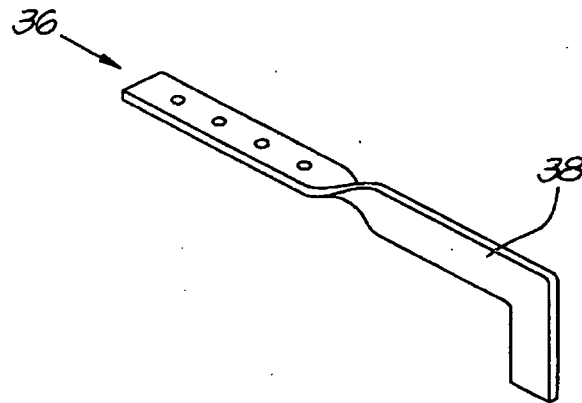


Fig. 11

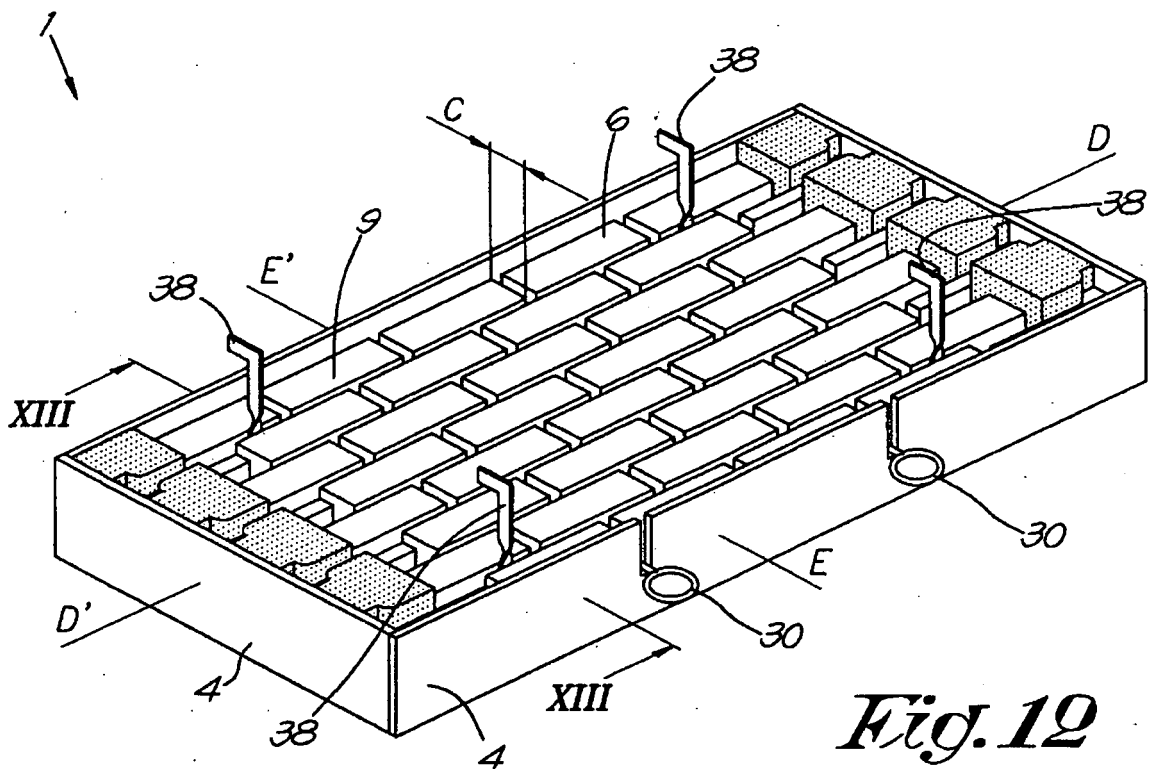


Fig. 12

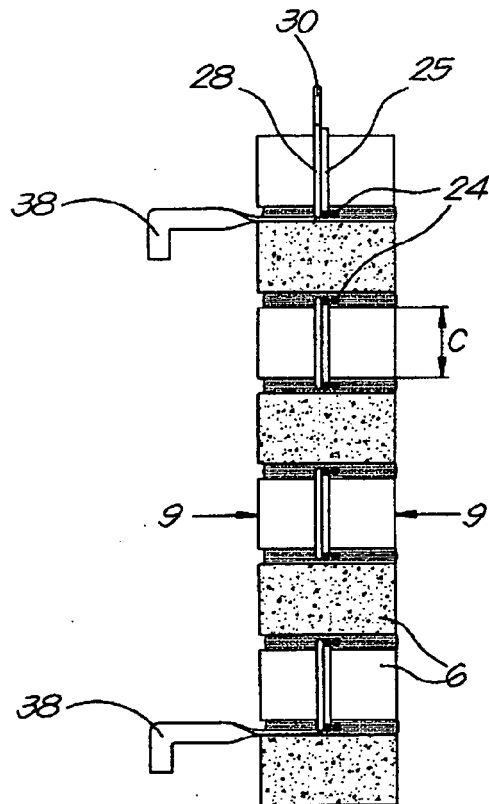


Fig. 13

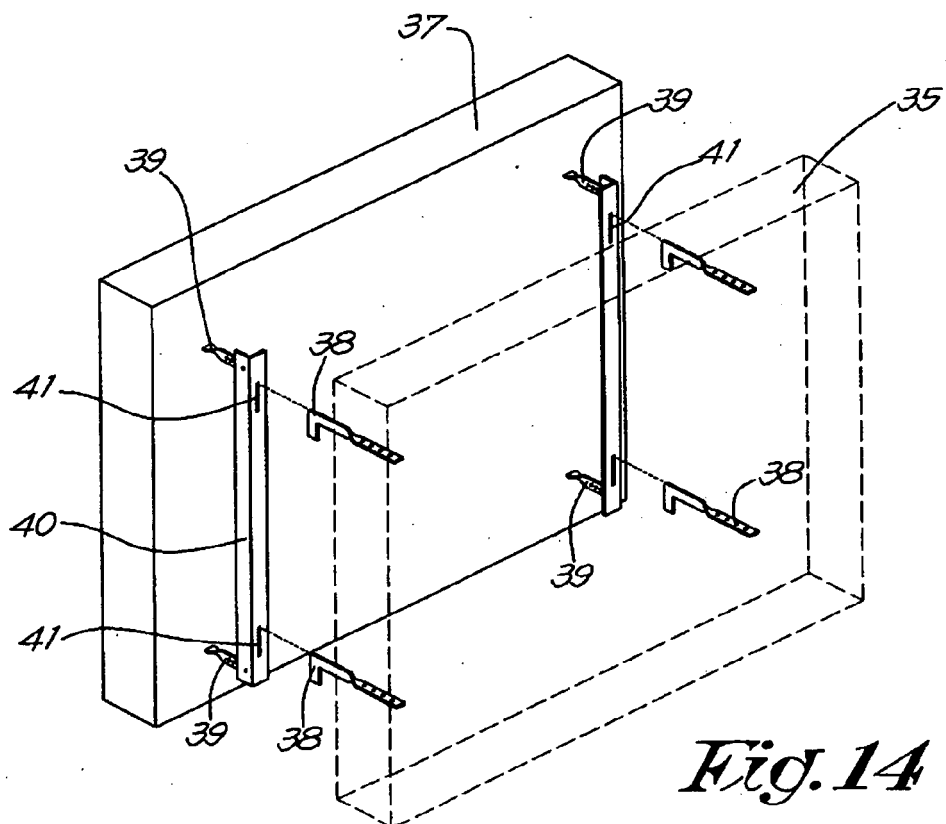


Fig. 14



EUROPEAN SEARCH REPORT

Application Number
EP 08 01 4125

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			E04C B28B
Place of search		Date of completion of the search	Examiner
The Hague		18 November 2008	Mysliwetz, Wolfgang
<p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document</p>			

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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18-11-2008

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