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EUROPEAN PATENT APPLICATION

21 Application number: 88103378.1

51 Int. Cl.4: E04C 1/39 , E04B 2/18

22 Date of filing: 04.03.88

30 Priority: 05.03.87 DK 1137/87
05.03.87 DK 1138/87

43 Date of publication of application:
07.09.88 Bulletin 88/36

84 Designated Contracting States:
AT BE CH DE ES FR GB GR IT LI LU NL SE

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54 A method of erecting a wall of building blocks with through-going ducts, and an implement for use when carrying out the method.

57 In a method of erecting a brick wall (1) with vertical through-going ducts (4), the new feature consists in that temporary core members (5) are placed in those ducts (4) desired to be kept open with a view to later accommodating wires, pipes etc.

With this arrangement it is avoided that mortar penetrates into the ducts (4) and causes an obstruction of these.

The implement for use when carrying out the method is shaped as a mandrel (5) adapted to be placed in the vertical ducts prior to the placement of mortar (6) between the bricks (3). Preferably, each mandrel (5) has a spring (9,11) acting as "barbs" preventing the mandrel (5) from falling down through the duct (4). Gripping recesses (8) on top of the mandrel (5) makes it easier to lift the mandrel from one course to the next.

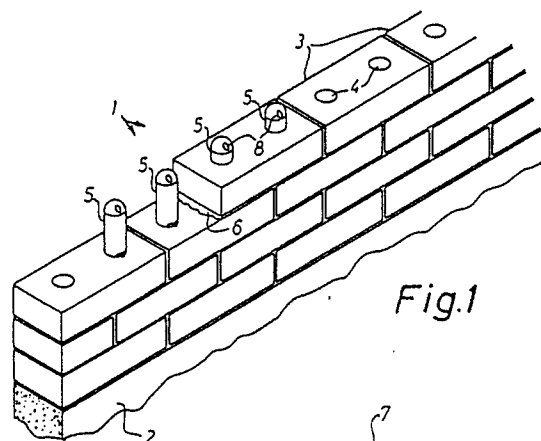


Fig.1

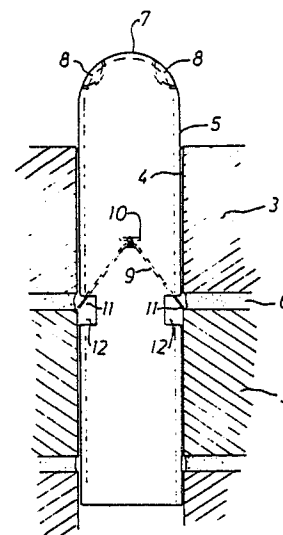


Fig.2

EP 0 281 149 A1

A method of erecting a wall of building blocks with through-going ducts, and an implement for use when carrying out the method.

The present invention relates to a method of erecting a wall or other part of a building structure, such as indicated in the preamble of claim 1, also indicating the nature of the method.

It is known, cf. e.g. US patent No. 2,701,959 and GB patent application No. 2,016,058, to erect a wall of blocks with through-going ducts in such a manner, that the through-going ducts in each block are aligned with each other and form ducts extending through a considerable distance in the wall and capable of being used e.g. for accommodating wires, pipes and the like.

With the known methods of this kind it is necessary to take great care when placing the joint material, i.e. mortar or the like, during the erection, in order to avoid the through-going ducts being blocked and thus becoming useless for the purpose referred to above.

It is on this background the object of the present invention to provide a method of the kind referred to initially, which does not suffer from the drawbacks referred to above, it being possible to carry out the method substantially without taking more care than what is normally necessary when erecting brick walls or the like. This object is achieved with a method according to the present invention being characterized by the steps set forth in the characterizing clause of claim 1. When proceeding in this manner, the temporary core member or members will prevent joint material, i.e. mortar or the like, from penetrating into the through-going ducts, these thus being held open to the extend desired.

By proceeding as set forth in claim 2 it is possible to avoid unnecessary delays in the erecting work, at the same time as it is ensured that the through-going ducts are kept open to the extend desired.

By proceeding as indicated in claim 3 it is possible to erect the wall in question by laying respective courses in a simple bond, the ducts in each building block cooperating with one or a number of temporary core members to ensure that the building in one course are correctly positioned in relation to the blocks in the immediately subjacent course.

The present invention also relates to an implement for use in carrying out the method according to the invention, said implement being constructed as said forth in claim 4. Such an implement may, with one or a number of mandrel members, be placed in the ducts in question during that period of time, in which there is a risk of mortar penetrating into the ducts, so that the latter are held open

without any further action being necessary.

The embodiment said forth in claim 5 makes it easier to insert the mandrel or mandrels in the duct or ducts in question.

The embodiment said forth in claim 6 is especially suited for use while erecting walls with vertical ducts, as the gripping recesses may be used for lifting the mandrel or mandrels upwards through the building blocks as the successive courses are being laid. In this case, the further development said forth in claim 7 is especially suitable, as the spring or the pawl member prevents the mandrel from falling back down through the duct.

The embodiment of the implement according to the invention set forth in claim 8 is especially suitable for use with building blocks with a number of through-going ducts corresponding to the number of mandrels.

The embodiment set forth in claim 9 is especially suitable for use during the placing of building blocks with horizontal ducts, as the handle makes it possible to hold the implement in an equilibrium position, in which the mandrel or mandrels extend(s) substantially horizontally.

Again, the embodiment of the implement according to the invention set forth in claim 10 is especially suitable for erecting a wall with vertical ducts, as the length of the mandrel enables it to exert a mutual guiding action on at least two courses.

The invention is now to be explained in a more detailed manner with reference to the partly diagrammatic drawing, in which

Figure 1 in isometric perspective shows a brick wall during its erection,

Figure 2 in a greatly magnified scale shows a mandrel used during the erection of the brick wall shown in Figure 1,

Figure 3 shows the symmetry relations with the preferred placements of the through-going ducts in the building blocks,

Figure 4 shows how the principles of the invention may be utilized when erecting a brick wall, in which some of the building blocks have horizontal through-going ducts, a specially shaped mandrel with associated handle being used for this purpose, and

Figure 5 in the same manner as Figure 4 shows the erection of wall of blocks with horizontal ducts, but in this case with two such ducts in each block and using a double mandrel constructed for this purpose.

The brick wall 1 shown in figure 1, being in the process of erection, rests in a known manner on a

foundation 2 and consists in a likewise known manner of a number of bricks 3.

In the example shown in figure 1, each brick 3 comprises two vertical ducts 4, situated on each side of and in such a distance from the transverse symmetry plane of each brick, that when the bricks are laid in a simple bond pattern as shown, each duct 4 will be aligned with one of the ducts in each of the two subjacent bricks.

In the example shown in figure 1, the second, third, fourth and fifth (as taken from the left in figure 1) vertical through-going duct in the brick wall 1 constituted by the mutually aligned ducts 4 in each brick 3, are kept free from mortar by means of a corresponding number of temporary core members in the form of mandrels 5, being shown in more detail in figure 2.

As will be seen by viewing figures 1 and 2 together, each mandrel 5 extends through its own vertical duct with a small portion below situated in the upper part of a duct 4 in a brick 3 in the second course, taken from below, and all the way through a duct 4 in a brick in the third course. The fourth course, in this case the top one, is not yet complete, while the last-placed brick embraces the two mandrels 5 situated farthest to the right, these mandrels thus extending through ducts 4 in three courses, while the two mandrels 5 situated farthest to the left are ready to receive the next brick in the fourth course. Before this occurs mortar 6 is, of course, placed over the whole of the surface, on which the new brick is going to rest.

In the example shown, each mandrel 5 is in the form of a short tube with a rounded end 7, in which two gripping recesses 8 are formed, said recesses being intended to be used when the mandrel 5 is to be pulled upwards, e.g. with two fingers, when the next course is to be laid. Each mandrel 5 is freely movable in the upward direction, but is prevented from moving downwards by a spring 9, the middle part of which is secured to a cross piece 10 inside the mandrel 5 and the ends 11 of which protrude through two windows 12 in the wall of the mandrel. The spring 9 is pre-stressed in the outward direction, so that its ends 11 tend to move outwards, whereby they, should the mandrel move downwards, will engage surface irregularities in a duct 4 or abut against the upper side of a brick 3. In this way it is prevented that the mandrel 5 falls down in the duct, at the same as its function as a core and as a guide for the next brick is ensured. In its lower end, the mandrel 5 may be equipped with an eyelet or a similar member (not shown), in which it is possible to tie a cord or rope to be used later for pulling electrical wires and the like through the ducts.

In the example shown and described it is a prerequisite that the foundation 2 comprises suit-

able openings or ducts (not shown) communicating with the vertical ducts in the brick wall 1, which have been held open by the mandrels 5 during the erection of the wall.

Figure 3 shows three bricks 3a according to another embodiment, in addition to the ducts 4 shown in figure 1 comprising a central duct 13 and two end ducts 14. As shown, the configuration of the ducts is such that the duct pattern in each brick 3a is symmetrical about a first symmetry plane 15, each half-pattern on each side of the first symmetry plane 15 being symmetrical about a second symmetry plane 16 situated on each side of the first symmetry plane 15 at a distance equal to one-fourth of the dividing distance 17. By this arrangement it is achieved that when the bricks 3a are laid in bond in the same manner as the bricks 3 in figure 1, firstly the ducts 4 will be mutually aligned in the same manner as shown in figures 1 and 2, and secondly the central duct 13 in each brick 3a will be aligned with two cooperating end ducts 14 in each brick above or below. This embodiment gives a somewhat greater freedom in the choice of the positions of the through-going ducts than in the example shown in figure 1, and it may, of course, be possible to draw upon twice the number of through-going ducts.

The brick 3b shown in figure 4 has longitudinal ducts 4b being aligned with each other in the finished brick wall. Instead of the mandrels 5 shown in figures 1 and 2 for placing in the vertical ducts 4, this embodiment employs a mandrel 5b without "barbs", making it possible to pull the mandrel out when it has completed its function as a temporary core. Because of the weight, the mandrel 5b is also preferably hollow, and to make it easier to handle it is provided with a handle 18 extending parallel to the mandrel 5b proper, said handle being connected to the mandrel through a connecting piece 19. As indicated in the drawing, the handle 18 is covered with braid 20 or otherwise treated with a view to improving its grip characteristics.

As distinct from the brick 3b shown in figure 4, the brick 3c shown in figure 5 comprises two longitudinal ducts 4c and 4d, and further a number of longitudinal ducts 21 with a smaller diameter. The ducts 4c and 4d are adapted to cooperate with two mandrels 5c and 5d being rigidly connected to each other through a bridge piece 22 and - in the same manner as shown in figure 4 - connected through a connecting piece 19 with a handle 18 with braid 20.

When vertically and horizontally extending ducts inside a brick wall are to communicate with each other, this can be achieved by means of one or a number of bricks (not shown), in which are shaped both vertical ducts corresponding to one or

a number of the ducts 4, 13 and 14, as well as one or a number of horizontal ducts corresponding to the ducts 4b, 4c and 4d. When placing such a brick in the brick wall, one will initially proceed as indicated in figure 1, i.e. using vertical mandrels for those vertical ducts to be held open, whilst avoiding placing mortar in the vertical heading joints at each end of the brick. After removal of the vertical mandrels, one or a number of horizontal mandrels are placed in position as shown in figure 4 or 5, and the heading joints are filled with mortar, whereupon the horizontal mandrel or mandrels also is/are removed. It is also possible to use bricks with ducts extending transversely to the plane of the brick wall, e.g. for connecting wires or pipes for electrical sockets or switches or water taps etc. respectively. Such transversal ducts may be closed off by a thin wall or membrane, which - in the same way as is known from electrical connection boxes - are broken when the duct in question is to be used. Removable plugs may also be used for this purpose.

Apart from the ducts 4, 4b to 4d, 13 and 14, all intended to cooperate with temporary mold cores in the form of mandrels to keep the connection between the ducts open, the bricks or building blocks in question may also comprise other ducts for other purposes. Thus, figure 5 shows a number of longitudinal ducts 21 with smaller diameters, that may e.g. be used to accommodate steel reinforcements, but such ducts, which may extend in various directions, may also in a known manner be used to improve the heat-insulating properties and the engagement of the mortar with the brick or building block in question.

Even though all the ducts shown in the drawing have a circular cross-sectional shape, it lies within the scope of the invention to shape the bricks or building blocks with through-going ducts with a non-circular cross section. In that case, the mandrels in question are, of course, to be shaped in a corresponding manner.

Claims

1. A method of erecting a wall (1) or other part of a building structure comprising

a) a number of elementary building blocks (3,3a to 3c) with through-going ducts (4,4b to 4d,13,14), of which at least some are aligned with ducts in adjacent blocks or other structural elements (2), and

b) joint material (6) situated in the spaces between adjacent building blocks and holding same in desired relative positions,

said method being of the kind, in which building blocks and portions of unhardened joint material are placed alternately in succession to form said wall or part, after which said joint material is allowed to harden, **characterized** in that during the placement of a portion of unhardened joint material on or against a first building block and the succeeding placement of the next building block in succession adjacent the first one in contact with said portion of joint material, at least one temporary core member (5,5b to 5d) is kept in position in at least one duct in said first building block so as to extend into at least one duct in said next building block aligned therewith.

2. A method according to claim 1, **characterized** in that said temporary core member is kept in position as stated only for a period of time sufficient for said joint material to become substantially non-flowable.

3. A method according to claim 1 or 2, **characterized** in that as building blocks are used such, in which at least one pattern of ducts as viewed in a direction parallel to the axes of said ducts is symmetrical about a first symmetry plane (15) normal to and bisecting the dimension of each block in a direction normal to said duct axis, each half-pattern on each side of said first symmetry plane (15) also being symmetrical about second symmetry planes (16) on either side of and parallel to said first symmetry plane (15) and situated at a distance from the latter equal to one-quarter of the desired distance (17) between the first symmetry planes (15) in adjacent blocks in the latter's final position in said wall or part.

4. An implement for use in carrying out the method according to any or anyone of the claims 1 to 3, **characterized** by at least one mandrel member (5,5b to 5d) with a diameter or thickness only slightly less than the diameter or the light aperture of the ducts in question in the building blocks and with a length at least sufficient for the mandrel member to extend by a substantial distance through a first duct in a first block, the adjacent interspace between two blocks with its contents of joint material (6) as desired in the final product, and a duct in an adjacent block.

5. An implement according to claim 4, **characterized** in that at least one mandrel member is rounded or pointed, at least in one end.

6. An implement according to claim 4 or 5, **characterized** by gripping recesses (8) provided in at least one free end of at least one mandrel member (5).

7. An implement according to one or any one of the claims 4 to 6, **characterized** by a spring (9, 11) or a pawl member equivalent thereto protruding from at least one side on at least one mandrel

member (5) and adapted to permit movement of the mandrel member in one direction only through a duct in a building block.

8. An implement according to any or any one of the claims 4 to 7, **characterized** by at least two mutually parallel mandrel members (5c,5d) substantially rigidly connected to each other through a bridge member (22) secured to one end of the mandrel members, the other ends of which extend in one and the same direction.

9. An implement according to one or anyone of the claims 4 to 8, **characterized** by at least one handle (18,20) extending parallel to and in the same direction as at least one mandrel member (5b,5c,5d).

10. An implement according to any or anyone of the claims 4 to 7, **characterized** in that it substantially consists of one single mandrel member (5), the length of which is greater than the total length of two mutually aligned ducts in two adjacent building blocks with the addition of the interposed joint material (fig. 2).

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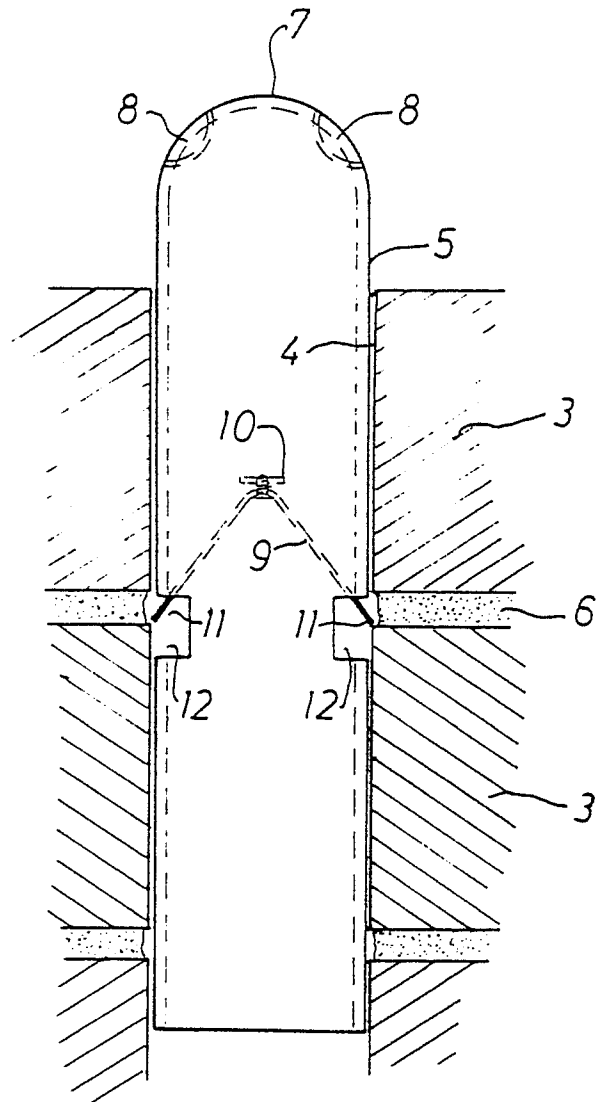
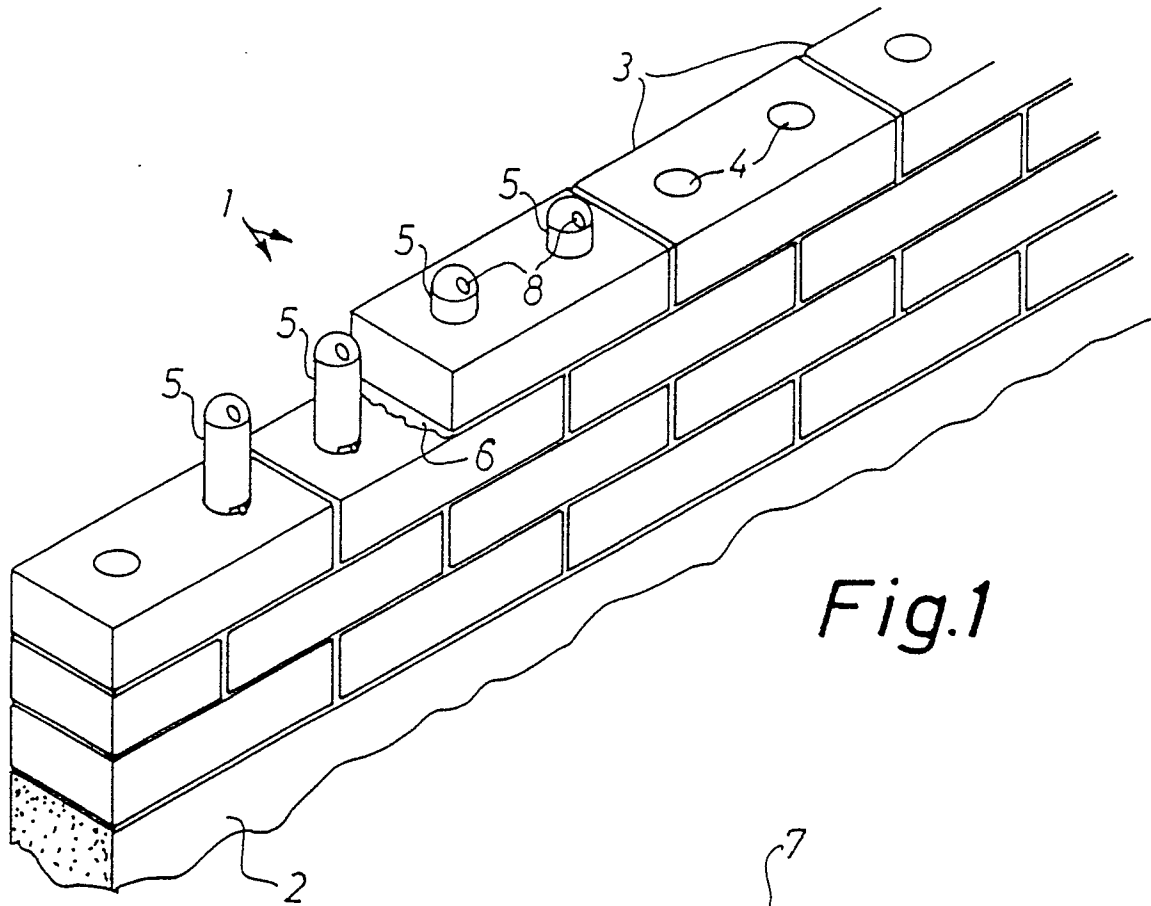


Fig. 2

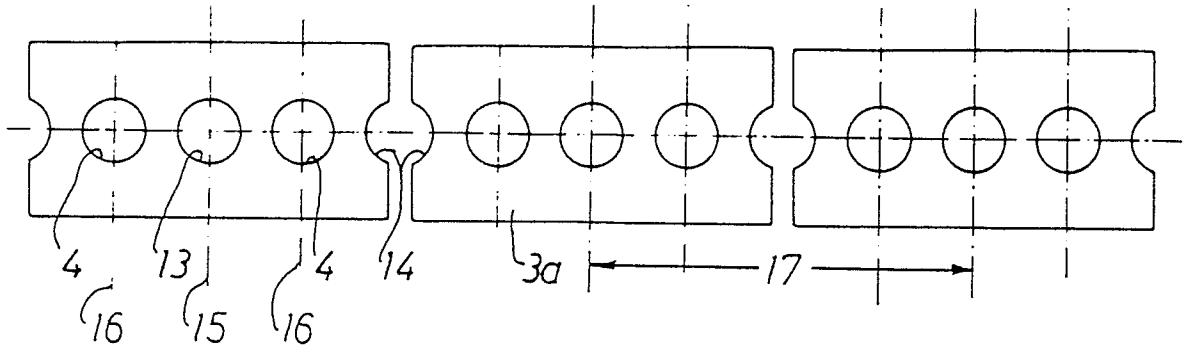


Fig. 3

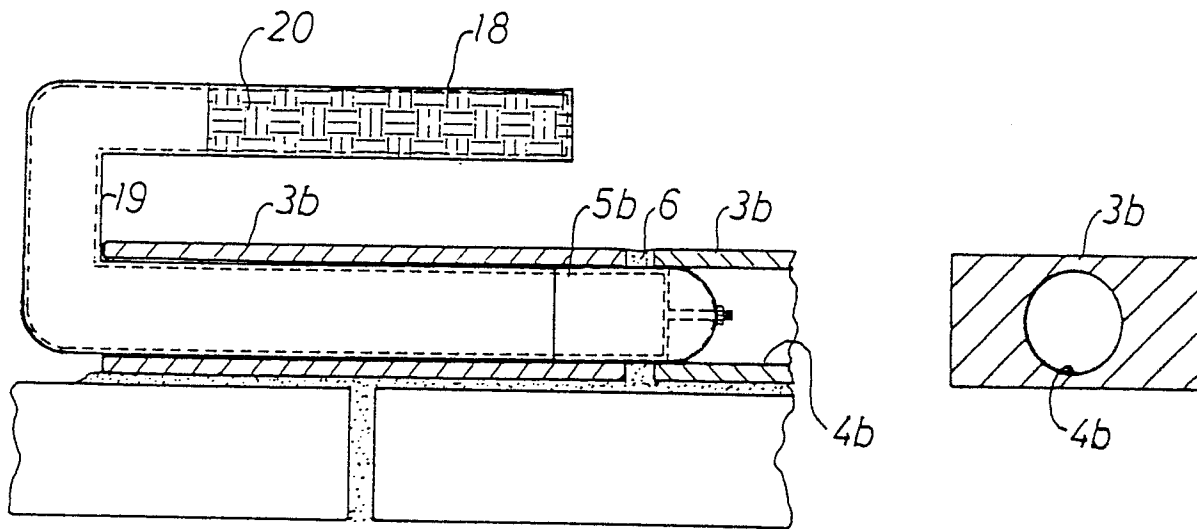


Fig. 4

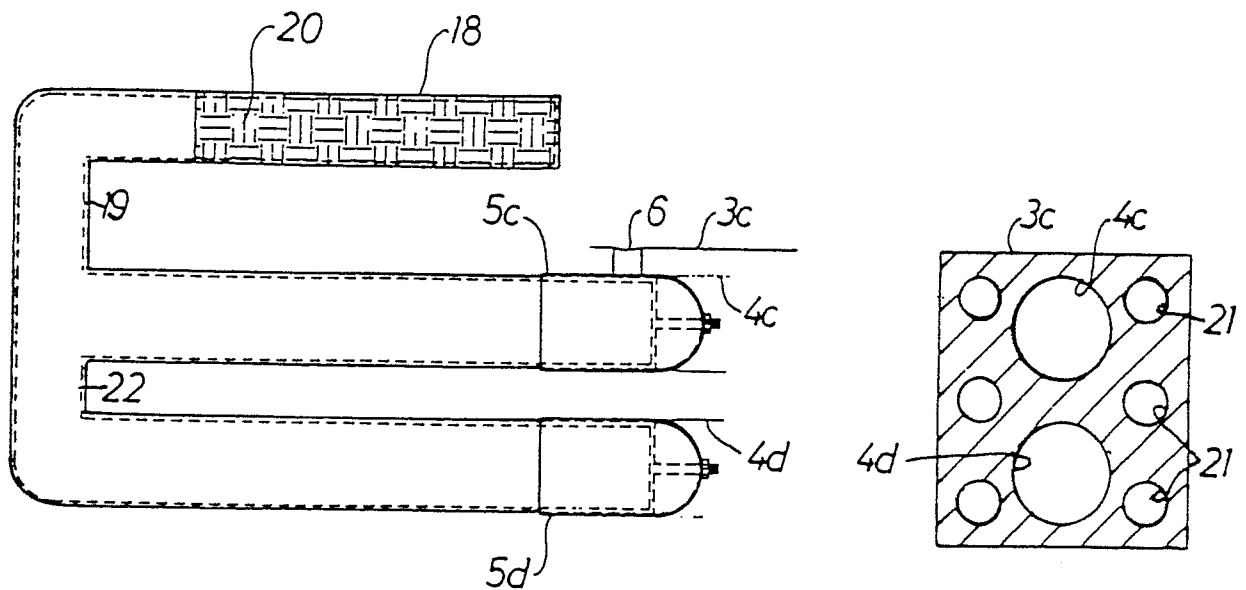


Fig. 5



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. 4)
A	GB-A- 779 795 (POLAND) * Whole document *	1, 3, 4	E 04 C 1/39 E 04 B 2/18
A	GB-A-2 159 552 (MILLAR) * Figure 1; page 1, lines 106-130 *	1	
			TECHNICAL FIELDS SEARCHED (Int. Cl. 4)
			E 04 C E 04 B E 04 G
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 09-06-1988	Examiner MYSLIWETZ W.P.
CATEGORY OF CITED DOCUMENTS 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 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			