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(54) **THERMAL INSULATED BUILDING ELEMENT**

BAUELEMENT FÜR DIE MANTELBLETONBAUWEISE

ELEMENT DE CONSTRUCTION A ISOLATION THERMIQUE

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Description

[0001] The invention relates to a thermal insulated building element, which together with connecting elements is suitable for making a building system quickly, which is also suitable for housing and exact fastening of any reinforcement.

[0002] Due to the development of building technologies, introducing of new materials, great changes have taken place in the building industry. The requirement of proper thermal insulation values in building systems providing high quality buildings in a short time is an ordinary claim nowadays. The most frequently used material in the construction industry is still concrete as the proper thermal insulation of concrete can be ensured.

[0003] In the state of art Hungarian utility model HU U 2348 makes known a thermal insulated building element. Here the solution is, that the building element is covered with polystyrene panels on both outer and inner sides, and the space between the polystyrene panels on the outer and inner sides is filled with load-bearing concrete and occasionally reinforcement is put into the concrete. The parallel polystyrene panels on the outer and inner sides are fixed by connecting cross clamps and on the side edges of the polystyrene panels groove profile and bolt profiles fitting each other are formed.

[0004] The characteristics of the solution made known there is, that the connecting cross clamps have rectangular cross section, the thickness of which is preferably 1.5- 5 mm, width 20-50 mm and there are perforations of 6 - 12.5 mm size in the middle line of the width corresponding with the thickness of the building element in the distance of 120, 250, 300, 360 mm and at each end of the cross clamp holes of circular shape housing the closing pipe or section holes housing the closing bolt are formed. In the polystyrene panel there are holes of vertical position from the inner side towards the outer side conforming with the rectangular section of the connecting cross clamps, into which the connecting cross clamps are pushed in the position of connecting the polystyrene panel and there are parallel circle shape holes or section shape holes of horizontal position in the outer side of the polystyrene panel going through the opening crosswise, closing pipes or closing bolts fastening the polystyrene panels are fixed to the hole of circle or section shape and at the side edges of the polystyrene panels there are protruding ribs on both sides of the bolt-profile, whereas on both sides of the groove profile there are arched, lengthwise channels.

[0005] German publication DE 196 33 111 makes known a connecting element, made preferably of recycled plastic, which is applied on the outer and inner surface of a case element in the form of a T-shape slot, distributed above the whole surface and fixed to each other in a stabile way. Due to the bit surface of connection during casting of concrete of filling in of concrete no deformation occurs.

[0006] A lightened multipurpose structure, preferably

with interior skeletal frame and formwork is made known in Hungarian patent application P 98 03027 published on 29 January 2001, which consists of concrete or reinforced concrete load-bearing structure made between form work. It is characterized by that, it consists of formwork not to be removed serving as building elements and concrete or reinforced concrete structures created by joining the elements beside each other in the spaces and the building elements provide for one or more outer of the building structure as formwork not to be removed.

[0007] This application makes known furthermore a building element to be applied in a building structure, which building element comprises bodies of plane and/or broken and/or curved surface or joining surfaces of hollow or partially hollow bodies. The building element is characterized by that, it has at least one outer surface forming the surface of the building structure and has furthermore an inner surface, and has at least one complex rib-surface, the value of the angle of which is $90^\circ \geq \gamma > 0^\circ$, preferably an acute angle, for example $5^\circ \dots 15^\circ$. In the building element on this part of the rib-surface the size of the section surface parallel with the outer building surface is increasing and one part or the whole of the section of the rib-surface is point-symmetrical. There is a part of the outer building surface, the shape of which is a K side polygon, where $K \geq 3$, for example a triangle, square, pentagon, hexagon.

[0008] Document US 5,852,907 A discloses a tie for interlocking parallel and spaced apart foam panels. The tie is formed of an elongate planar strap formed of a heavy gauge polypropylene having a lattice arrangement of openings for flow of concrete. Each of the opposite ends of the strap has an end plate and an inside plate spaced to bracket a corner of a foam form panel with each of the plates extending in a perpendicular or "Y" axis direction to the longitudinal or "X" axis of the strap. Each of the end portions forming the bracket also has vane shelves extending between the end and inside plates in a "Z" axis direction to the strap for support of the foam form panel corner. "U" shaped holders in the edges of the strap and overcenter tabs in the openings provide retainers to hold reinforcement bars, commonly termed rebar.

[0009] Document US 2002/017070 A1 discloses a foamed plastic module for building an insulated concrete wall structure by stacking the modules together until the desired configuration of the structure is completed, and when the form is filled, a concrete monolithic waffle wall structure having foam insulation permanently attached to the opposed wall surfaces to form the inner and outer wall surfaces of an enclosure is realized. The module is made of foamed plastic material, such as expanded polystyrene, and is built in a pressure molding apparatus. Each module comprises a rigid form block of a generally rectangular configuration having a hollow interior of a particular predetermined configuration formed between spaced apart confronting sidewalls to form a cement waffle wall. The side walls of the module are secured one to the other by a plurality of spaced tension members that

can be formed of metal or plastic material. When formed of plastic, the tension members can have plastic rebar seats into which reinforcing steel can be snapped and held in position. The tension members are positioned at evenly spaced centers, including across adjoining modules, whereby the flanges thereof can be more easily located. Location of the recessed flanges is also accomplished by incorporation of molded raised vertical lines or depressed divets centered over the flanges and visible externally on the surface of the waffle wall module. When stacked vertically employing per-molded corner modules, the tension members, and internal horizontal and vertical core elements of the waffle wall are all evenly aligned.

[0010] When working out the solution according to the invention we aimed to realize a thermal insulated building element, which ensures placement of any reinforcement beside ensuring quick and easy process.

[0011] Working out the solution we realized, that if we connect elements made of polystyrene foam and joined with specially shaped connecting elements, which can ensure suitable placement and location of any reinforcement while necessary space of polystyrene element is ensured, then the set aim can be achieved.

[0012] The invention is a thermal insulated building element, which has joined polystyrene elements with a loadbearing part containing a metal framework between the polystyrene elements said loadbearing part is filled with concrete in-site, furthermore has connecting elements joining the polystyrene elements, which is characterized by that, connecting elements joining the polystyrene elements (1) are plastic connecting elements (19) where fastening holes (8) serving joining the polystyrene elements (1) as well as nests (20) joining a framework (18) in a space (30) between the polystyrene elements (1) are formed, wherein the plastic connecting elements (19) are placed and fixed into the polystyrene elements (1) by means of clamping profiles (17).

[0013] In one of the preferred embodiments of the building element according to the invention the nests placed in the connecting element have flexible fastening projections.

[0014] In another preferred embodiment of the building element according to the invention fastening holes in the connecting element are circular or section shaped.

[0015] In a further preferred embodiment of the building element according to the invention framework is a steel mesh frame and/or inner skeletal frame.

[0016] The solution according to the invention is set forth by the following description with the accompanying drawings wherein:

Fig 1 shows the lateral view of a preferred embodiment of the building element according to the invention.

Fig 2 shows E-E section of the building element according to Fig 1.

Fig 3 shows the enlarged view of detail F of the build-

ing element shown in Fig 2.

Fig 4 shows the perspective of a preferred embodiment of the building element according to the invention.

Fig 5 shows the elevation of the embodiment of the connecting element of the building element according to the invention.

Fig 6 shows the lateral view of the connecting element shown in Fig 1.

Fig 7 shows the perspective of the connecting element shown in Fig 1.

Fig 8 shows the front elevation of another embodiment of the connecting element shown in Fig 1 of the building element according to the invention.

Fig 9 shows the lateral view of the connecting element shown in Fig 8.

Fig 10 shows the perspective of the connecting element shown in Fig 8.

Fig 11 shows the elevation of the embodiment of the connecting element ensuring fastening of the building elements.

Fig 12 shows the perspective of the connecting element ensuring fastening of the building elements.

Fig 13 shows the embodiment of the building element according to the invention with higher thermal insulation values.

Fig 14 shows the top view of the building element according to Fig 13.

Fig 15 shows the view from G-G section of the building element according to Fig 13.

Fig 16 shows the perspective from G-G section of the building element according to Fig 13.

Fig 17 shows the lateral view of a possible embodiment of the girdle element joining the building element shown in Fig 13.

Fig 18 shows the top view of the girdle element according to Fig 17.

Fig 19 shows elevation view from H-H section of the girdle element according to Fig 17.

Fig 20 shows perspective from H-H section of the girdle element according to Fig 17.

Fig 21 shows the lateral view of a possible embodiment of the girdle element joining the building element shown in Fig 17 with the framework.

Fig 22 shows the top view of the girdle element joining the building element shown in Fig 21 with the framework.

Fig 23 shows the elevation view from I-I section of the girdle element joining the building element with the framework.

Fig 24 shows the perspective from I-I section of the building element with the framework.

Fig 25 shows a possible embodiment of the building element of the building element according to the invention.

[0017] Fig 1 shows the lateral view of a preferred embodiment of the building element according to the invention. Fig 2 shows E-E section of the building element

according to Fig 1. The figure shows polystyrene elements 1 in the connecting elements 19, into which placing and positioning of the framework 18 takes place. Fixing of connecting elements 19 into polystyrene elements 1 takes place with the clamping profiles 17. Joining of polystyrene elements 1 each other is ensured with the help of connecting element 21.

[0018] Fig 3 shows the enlarged view of detail F of the building element shown in Fig 2. The figure shows the connecting element 21 placed into polystyrene element 1.

[0019] Fig 4 shows the perspective of a third preferred embodiment of the building element according to the invention. Connecting of polystyrene elements 1 and positioning of the framework 18 is done with the help of the connecting elements 19 and fixing of the connecting elements takes place with the help of the clamping profiles 17 into the polystyrene element 1.

[0020] Fig 5 shows the elevation of the embodiment of the connecting element of the building element according to the invention. Fig 6 shows the lateral view of the connecting element shown in Fig 1. Fig 7 shows the perspective of the connecting element shown in Fig 1. The nest 20 was formed in the connecting element 19 placement of stiffener element 12 of the framework 18 takes place with a simple flipping. Fastening hole 8 was formed in connecting element 19 ensuring positioning of connecting element 19 in polystyrene element 1 with the help of the clamping profile 17 led through it.

[0021] Fig 8 shows the front elevation of another embodiment of the connecting element shown in Fig 1 of the building element according to the invention. Fig 9 shows the lateral view of the connecting element shown in Fig 8. Fig 10 shows the perspective of the connecting element shown in Fig 8. This case for positioning of the clamping profile 17 a profile opening 23 was formed. We aimed to make easier placing of clamping profile 17 by forming the profile opening 23.

[0022] Fig 11 shows the elevation of the connecting element ensuring fastening of the building elements to each other. Fig 12 shows the perspective of the connecting element 21 ensuring fastening of the building elements. The straining profiles 25 of the connecting element 21 as well as the narrow part 24. Placing of the connecting element 21 into the polystyrene elements 1 takes place as follows: The flexible connecting element is placed into one of the grooves 3 formed on the edge of one of the polystyrene elements 1, which is flexibly fixed with the straining profile 25 in the groove 3. Joining of the building elements according to the invention takes place with placing the connecting elements 21 to the sides of the polystyrene elements 1, then the adjoining polystyrene element 1 with the groove 3 on its side fit into this polystyrene element 1 and push it on to the connection profile 21. This way the adjoining building elements are fixed without shifting, which gives sufficient hold and positioning during compiling and filling with concrete.

[0023] Fig 13 shows another possible embodiment of the building element according to the invention. Fig 14 shows the top view of the building element according to Fig 13. Fig 15 shows the view from G-G section of the building element according to Fig 13. Fig 16 shows the perspective from G-G section of the building element according to Fig 13. In case we aim to get higher thermal insulation values then increasing of the wall thickness of the polystyrene element makes it possible. This case in order to ensure statical stability of the wall a hollow 28 suitable for forming a vertical pillar is formed in the polystyrene element 1. Building of the wall takes place according to the method described according to the invention.

[0024] Fig 17 shows the lateral view of a possible embodiment of the girdle element joining the building element shown in Fig 13. Fig 18 shows the top view of the girdle element according to Fig 17. Fig 19 shows elevation view from H-H section of the girdle element according to Fig 17. Fig 20 shows perspective from H-H section of the girdle element according to Fig 17. Fig 21, shows the lateral view of a possible embodiment of the girdle element joining the building element shown in Fig 17 with the framework. Fig 22 shows the top view of the girdle element joining the building element shown in Fig 21 with the framework. Fig 23 shows the elevation view from I-I section of the girdle element joining the building element with the framework. Fig 24 shows the perspective from I-I section of the building element with the framework. We had to take into consideration when creating the thermal insulated building element shown in figure 13, that in case of the basic formation, the solution is not suitable for making a girdle. To make it possible, we apply a possible embodiment of the formwork according to the invention. It can be seen in the figure, that a hollow 27 suitable for housing the relative reinforcement and forming the girdle is formed in the girdle 26 elements. The girdle 26 elements are connected with the connecting element 19, on which the framework 18 is placed.

[0025] Fig 25 shows a possible embodiment of the building-in of the building element according to the invention. In special purpose buildings, such as very tall buildings, or freezing houses beside keeping thermal insulation characteristics keeping structural parameters is also necessary. It can be ensured by the solution according to the invention such a way, that the polystyrene elements 1 and the connecting elements 19 as well as with the help of the framework 18 solutions in accordance with statical structural measurements.

[0026] In case of a possible preferable embodiment of the solution according to the invention formation of the interim supports of the skeletal frame takes place with the help of a steel bar led between the parallel guiding elements in wave-form. Another possible preferable embodiment is, when forming of the interim supports of the skeletal frame is solved by a ladder-like straight connection between the parallel guiding elements.

[0027] Connecting of the lateral and bottom-top edges

of the polystyrene elements is solved by a long plastic strap, which is put into the lengthwise groove made into the edges of the polystyrene elements, and when pushed together it flips into the edges of the polystyrene elements and flexibly closing there. When assembly takes place, the reinforcement is simply pushed between the polystyrene walls 1, then the plastic straps are pushed as well. This solution makes possible the application of the pre-fabricated interior reinforcements, for example application of steel grid. Notches in the walls and sides of the polystyrene element walls are formed with heat cut or grooving.

[0028] The advantage of the solution according to the invention is, that it makes possible easy and quick production of various thermal insulated walls in-site. Structural formation makes possible beside simple and durable connecting of polystyrene elements the placing and positioning of several reinforcements, grids, loadbearing structures.

Claims

1. Thermal insulated building element, which has joined polystyrene elements with a loadbearing part containing a metal framework between the polystyrene elements, said loadbearing part being fillable with concrete on-site, said thermal insulating building element furthermore having plastic connecting elements joining the polystyrene elements, in which plastic connecting elements (19) nests (20) joining the framework (18) in a space (30) between the polystyrene elements (1) are formed, **characterized in that**, in said plastic connecting elements joining the polystyrene elements (1) fastening holes (8) serving joining with the polystyrene elements (1) are formed, wherein the plastic connecting elements (19) are placed and fixed into the polystyrene elements (1) by means of clamping profiles (17) which are led through the fastening holes (8).
2. Building element according to claim 1 **characterized in that**, the nests (20) placed in the connecting element (19) have flexible fastening projections.
3. Building element according to claim 1 or 2 **characterized in that**, fastening holes (8) in the connecting element (19) are circular.
4. Building element according to any of claims 1 to 3 **characterized in that**, said framework (4) is a steel mesh frame and/or inner skeletal frame.

Patentansprüche

1. Thermisch isoliertes Bauelement, das miteinander

verbundene Polystyrenelemente mit einem zwischen den Polystyrenelementen angeordneten lasttragenden Teil mit einem Metallgerüst aufweist, wobei der lasttragende Teil vor Ort mit Zement befüllbar ist, wobei das thermisch isolierende Bauelement ferner Kunststoffverbindungselemente aufweist, welche die Polystyrenelemente verbinden, wobei in den Kunststoffverbindungselementen (19) Nester (20) ausgebildet sind, die das Gerüst (18) in einem Raum (30) zwischen den Polystyrenelementen (1) verbinden,

dadurch gekennzeichnet, dass

in den Kunststoffverbindungselementen, welche die Polystyrenelemente (1) verbinden, Befestigungsöffnungen (8) ausgebildet sind, welche zum Befestigen mit den Polystyrenelementen (1) dienen, wobei die Kunststoffverbindungselemente (19) mittels Klemmprofilen (17), die durch die Befestigungsöffnungen (8) geführt werden, in den Polystyrenelementen (1) angeordnet und befestigt werden.

2. Bauelement nach Anspruch 1, **dadurch gekennzeichnet, dass** die in dem Verbindungselement (19) ausgebildeten Nester (20) flexible Befestigungsvorsprünge aufweisen.
3. Bauelement nach Anspruch 1 oder 2, **dadurch gekennzeichnet, dass** die Befestigungsöffnungen (8) in dem Verbindungselement (19) kreisförmig sind.
4. Bauelement nach einem der Ansprüche 1 bis 3, **dadurch gekennzeichnet, dass** das Gerüst (4) ein Stahlgittergerüst und/oder ein Innenskelettgerüst ist.

Revendications

1. Élément de construction à isolation thermique, comprenant des éléments en polystyrène assemblés ainsi qu'une partie de portée de charge contenant une structure métallique disposée entre les éléments en polystyrène, ladite partie de portée de charge pouvant être remplie de béton sur le chantier, ledit élément de construction à isolation thermique comprenant en outre des éléments de connexion en plastique permettant d'assembler les éléments en polystyrène, des logements (20) assemblant la structure (18) située dans un espace (30) défini entre les éléments en polystyrène (1) étant ménagés dans lesdits éléments de connexion en plastique (19), **caractérisé en ce que :**

dans lesdits éléments de connexion en plastique assemblant les éléments en polystyrène (1) sont ménagés des trous de fixation (8) permettant d'assembler les éléments en polystyrène (1), et les éléments de connexion en plastique

(19) sont disposés et fixés dans les éléments en polystyrène (1) par l'intermédiaire de profilés de blocage (17) qui sont amenés à travers les trous de fixation (8).

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2. Élément de construction selon la revendication 1, **caractérisé en ce que** les logements (20) ménagés dans l'élément de connexion (19) présentent des saillies de fixation souples.

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3. Élément de construction selon la revendication 1 ou 2, **caractérisé en ce que** les trous de fixation (8) ménagés dans l'élément de connexion (19) sont circulaires.

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4. Élément de construction selon l'une quelconque des revendications 1 à 3, **caractérisé en ce que** ladite structure (4) est une armature en treillis métallique et/ou une ossature intérieure.

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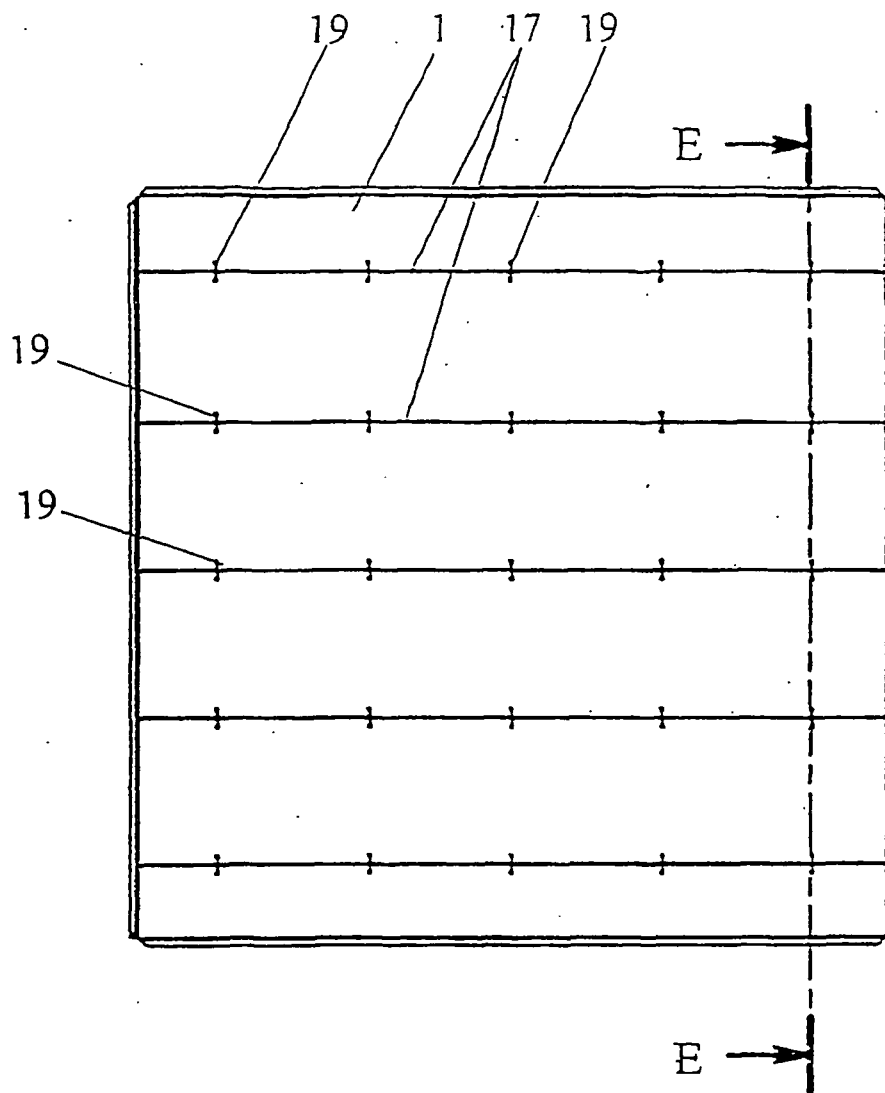


Fig. 1

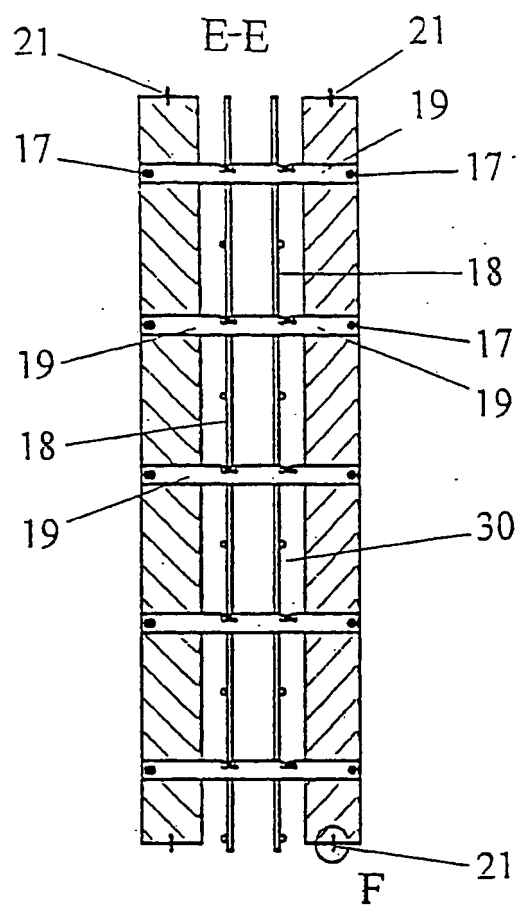


Fig. 2

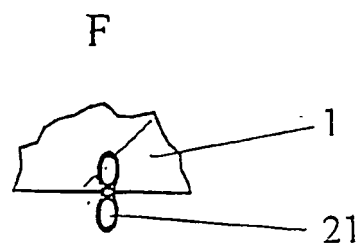


Fig. 3

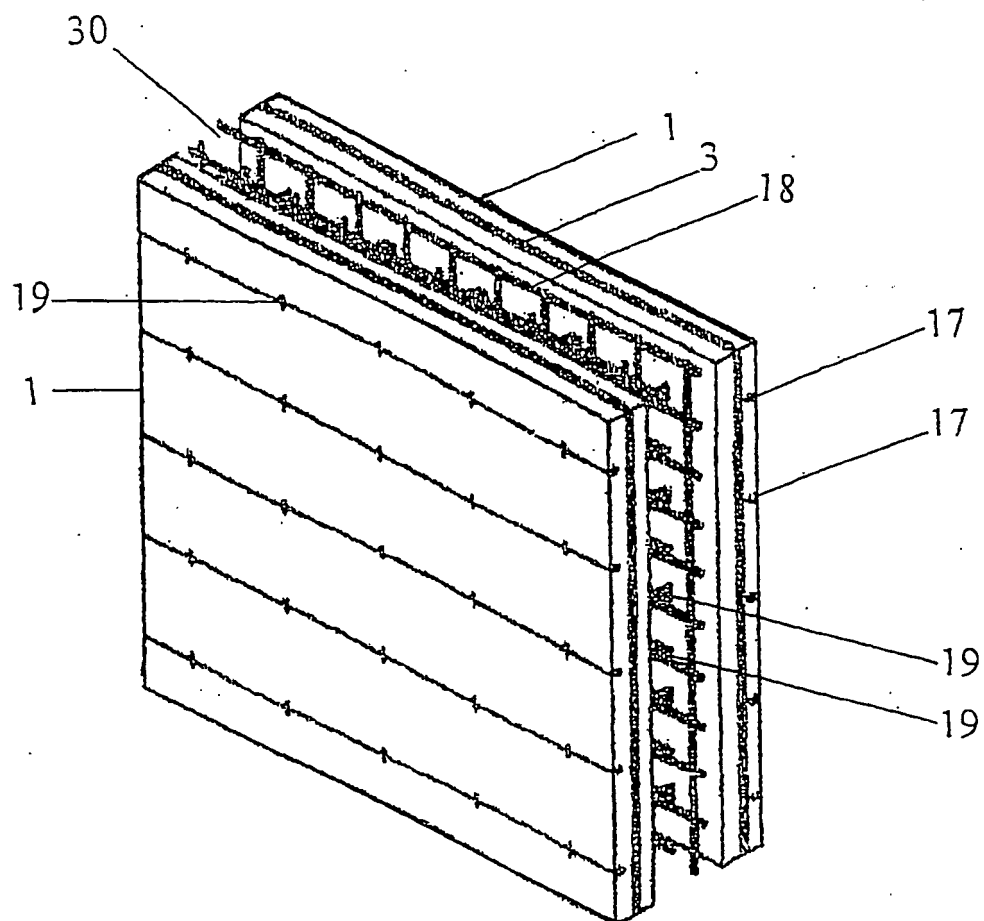


Fig. 4

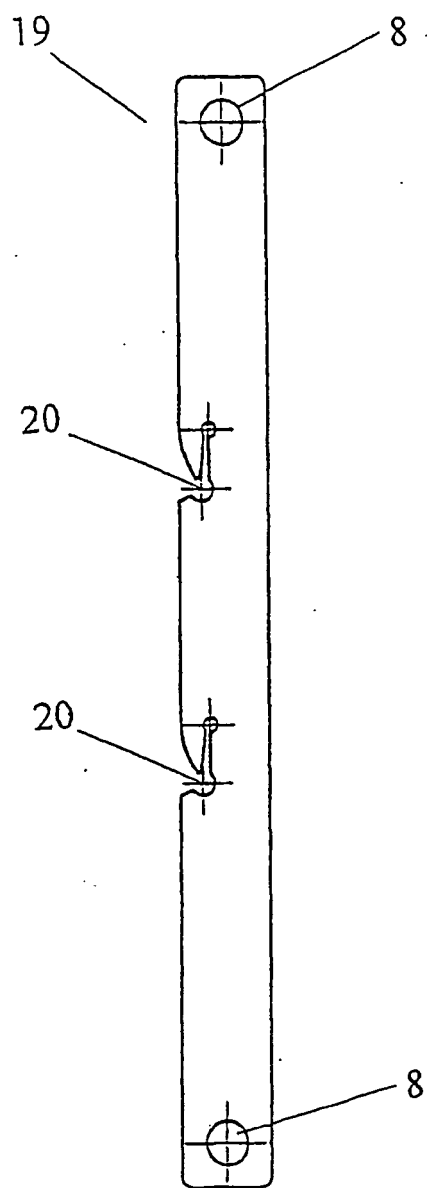


Fig. 5

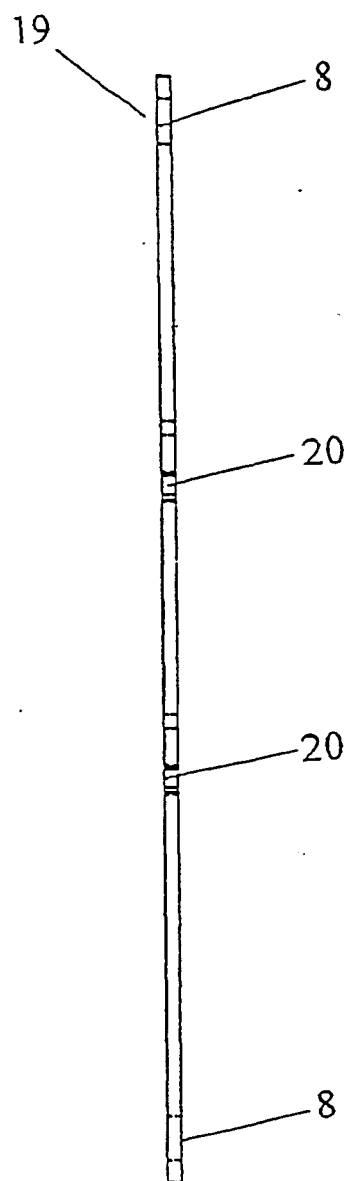


Fig. 6

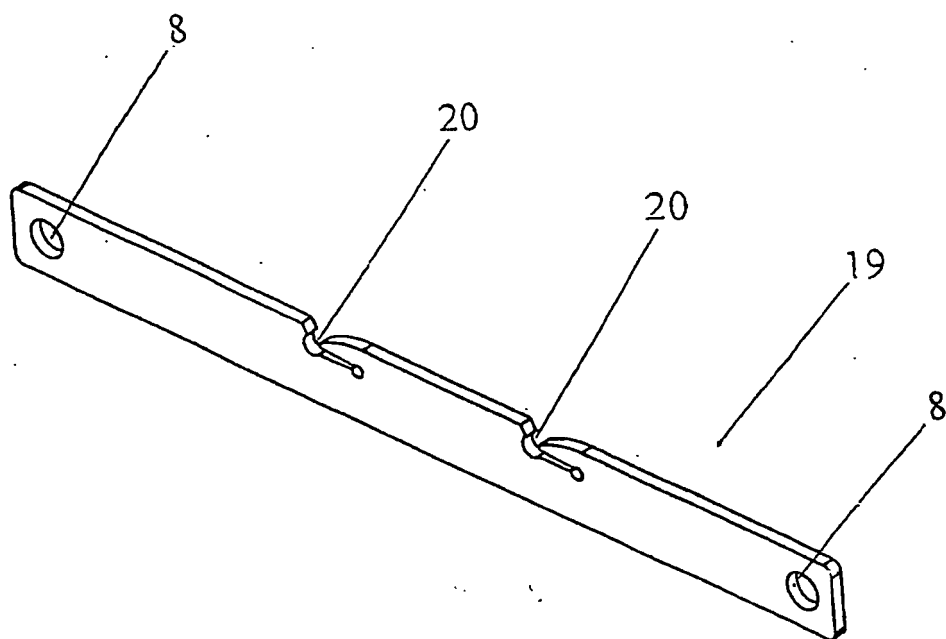


Fig. 7

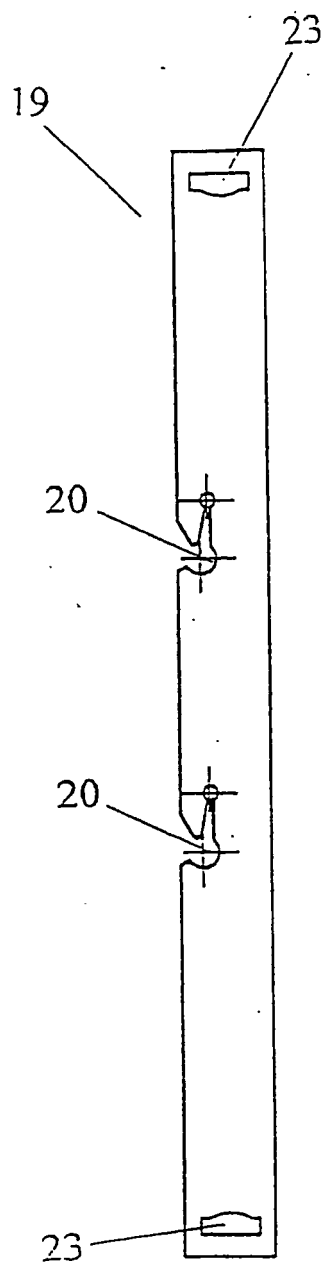


Fig. 8

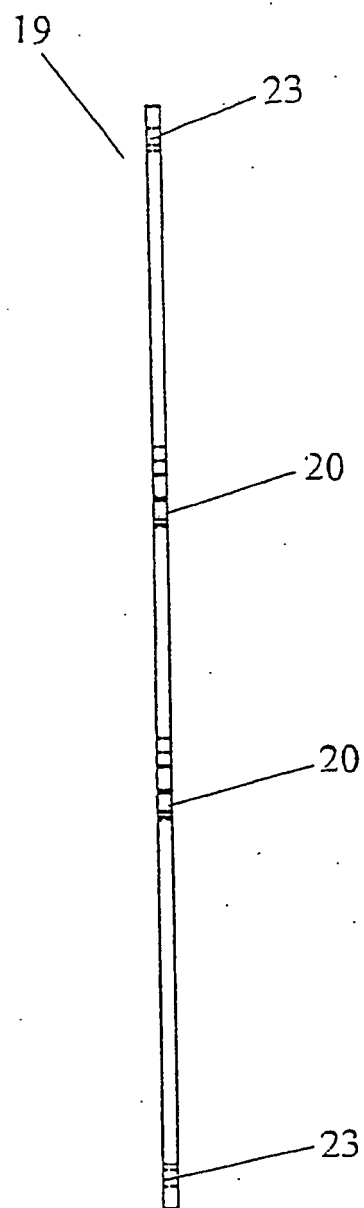


Fig. 9

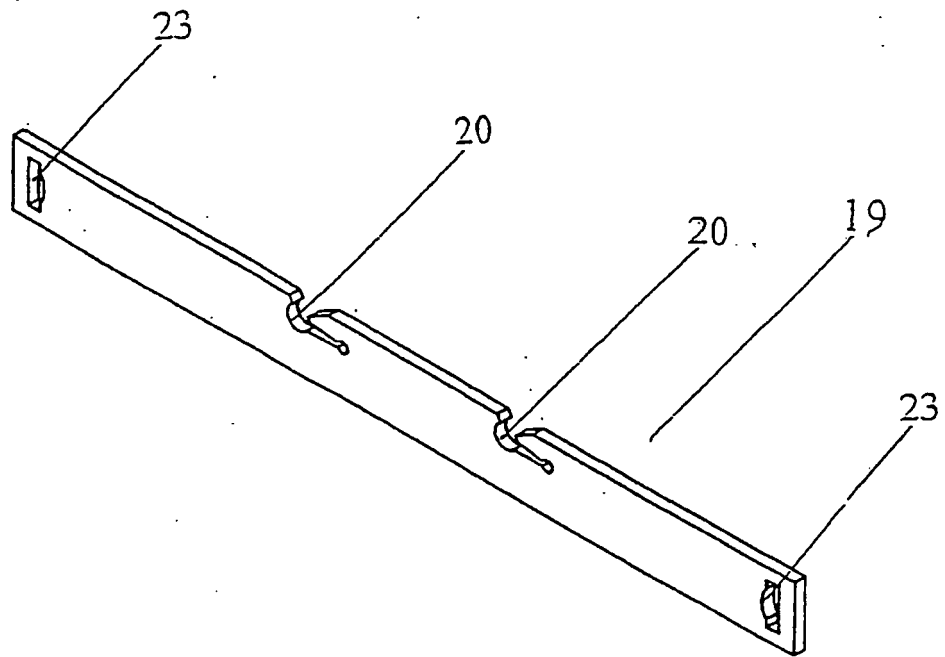


Fig. 10

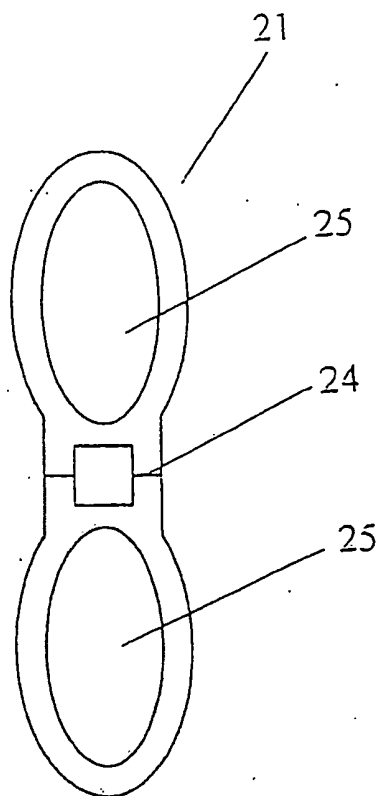


Fig. 11

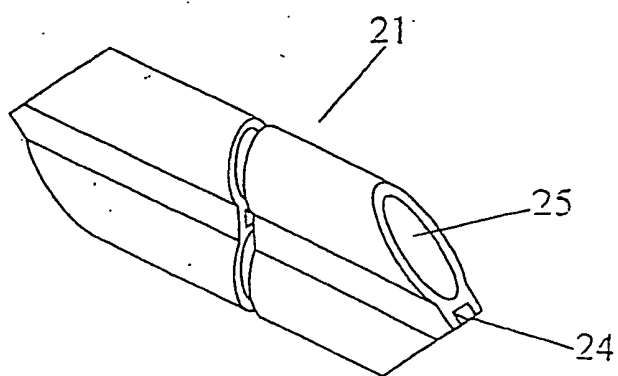


Fig. 12

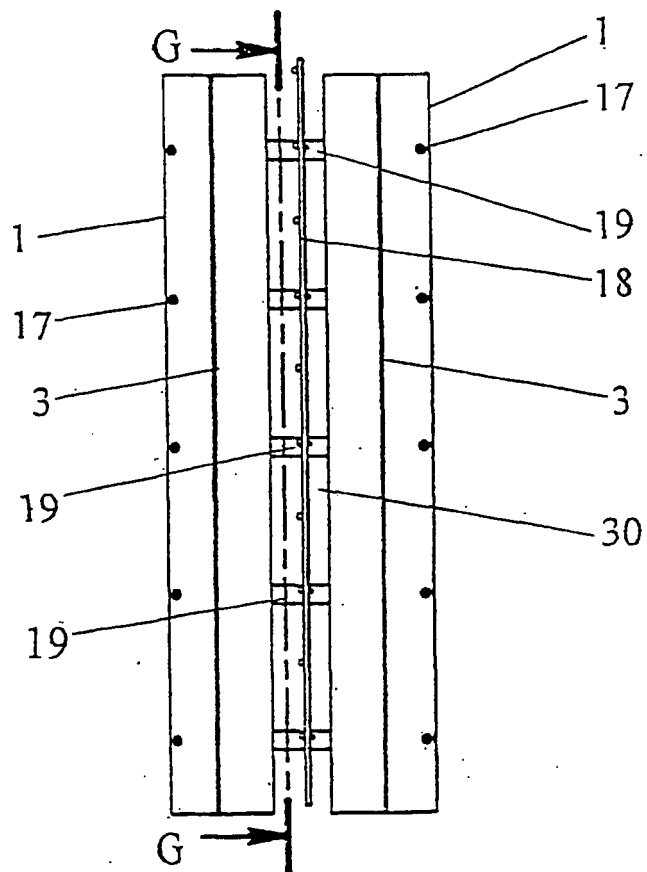


Fig. 13

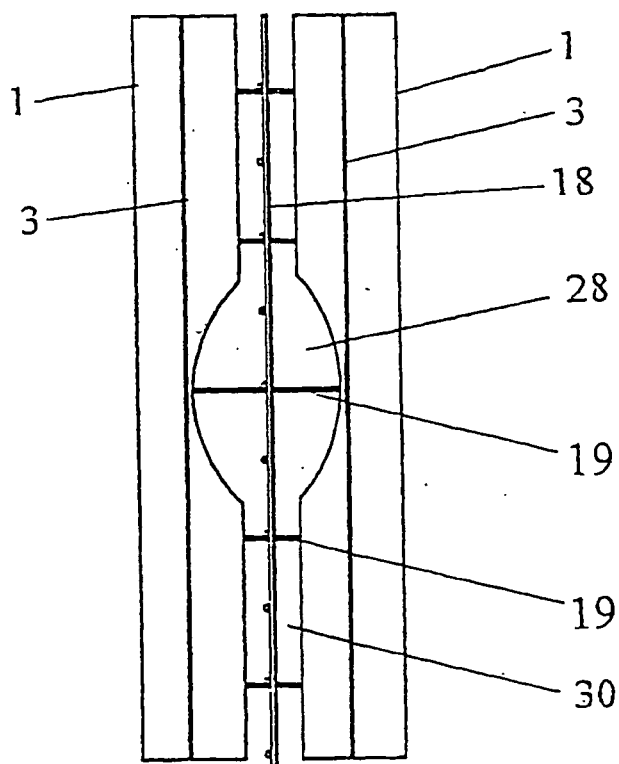


Fig. 14

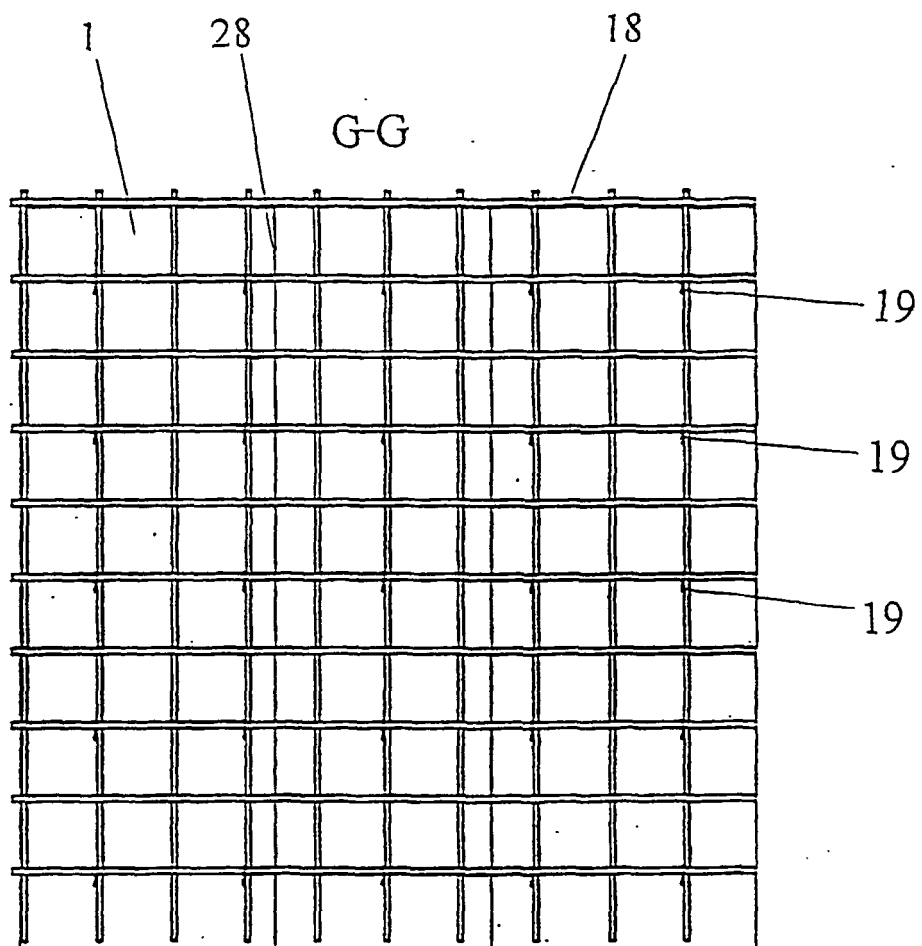


Fig. 15

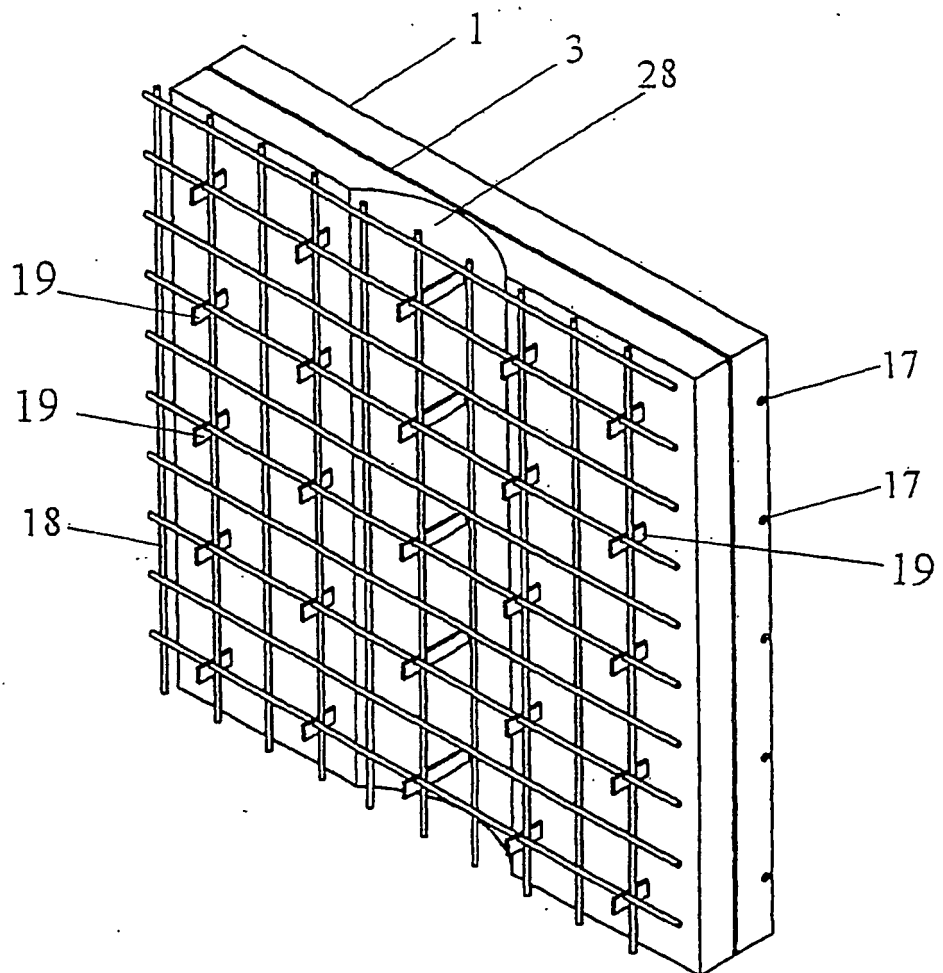


Fig. 16

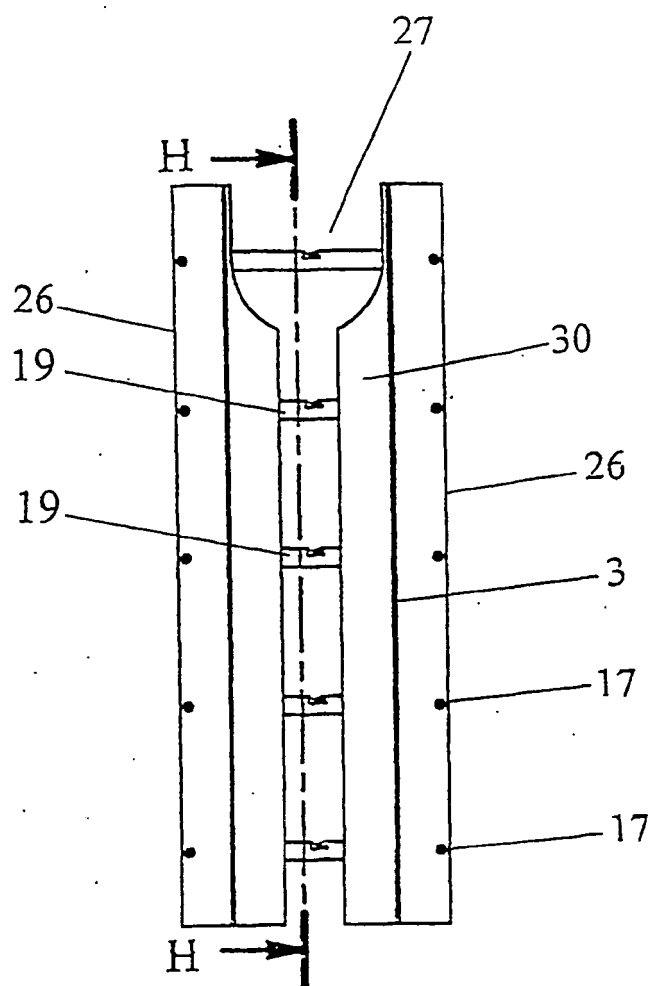


Fig. 17

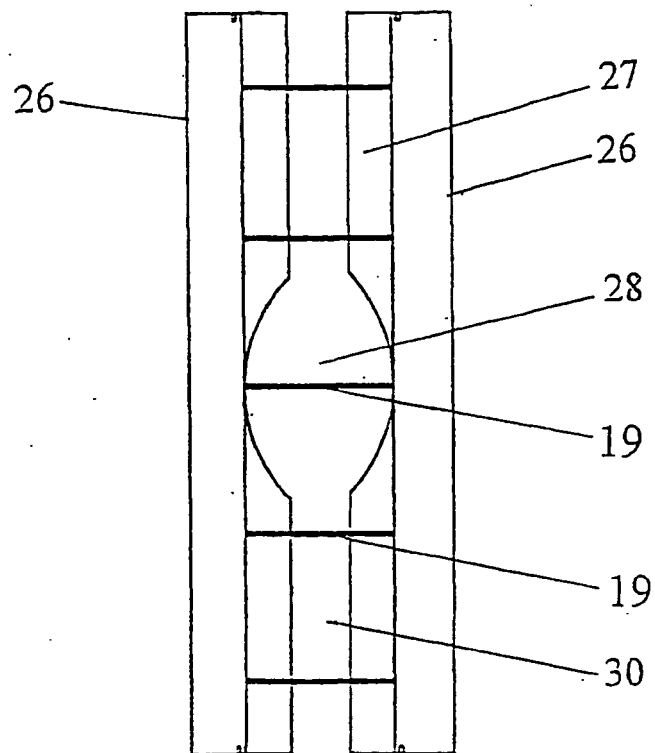


Fig. 18

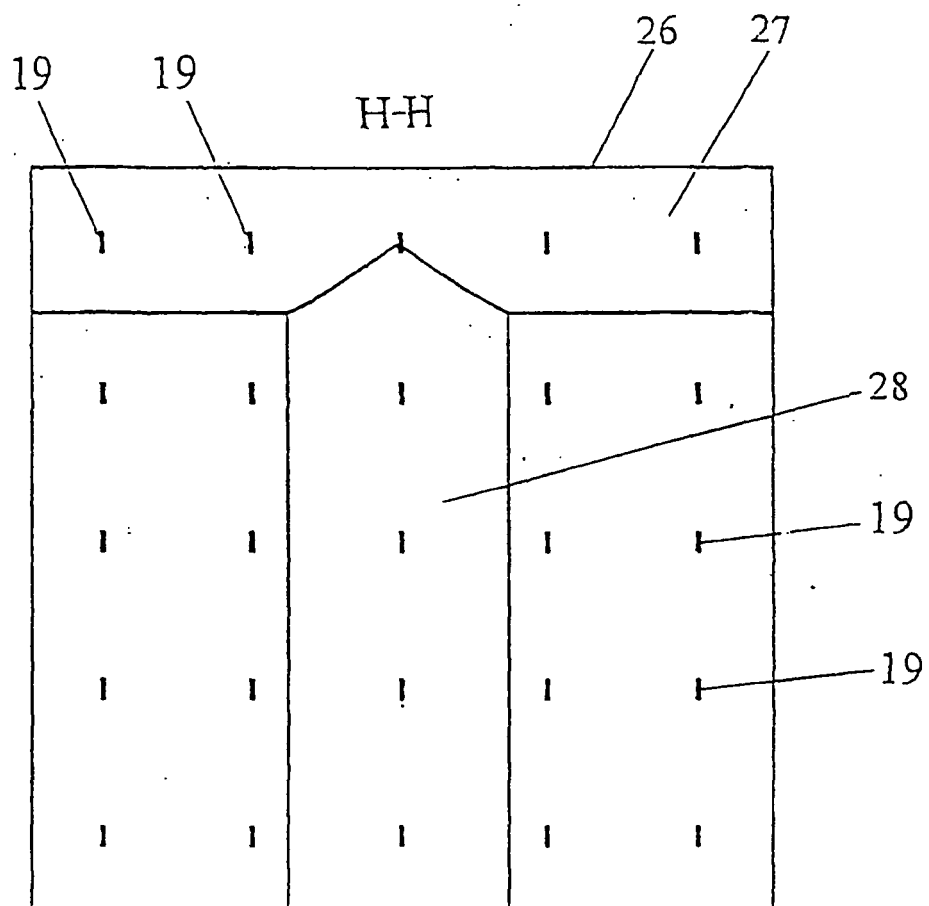


Fig. 19

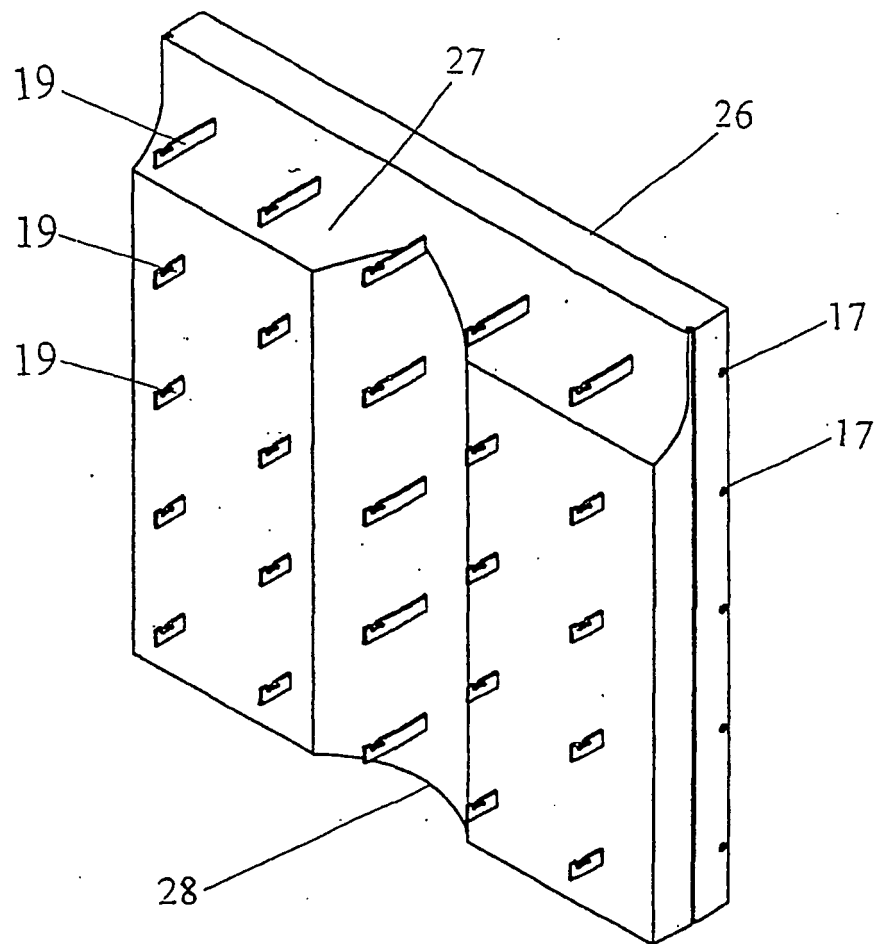


Fig. 20

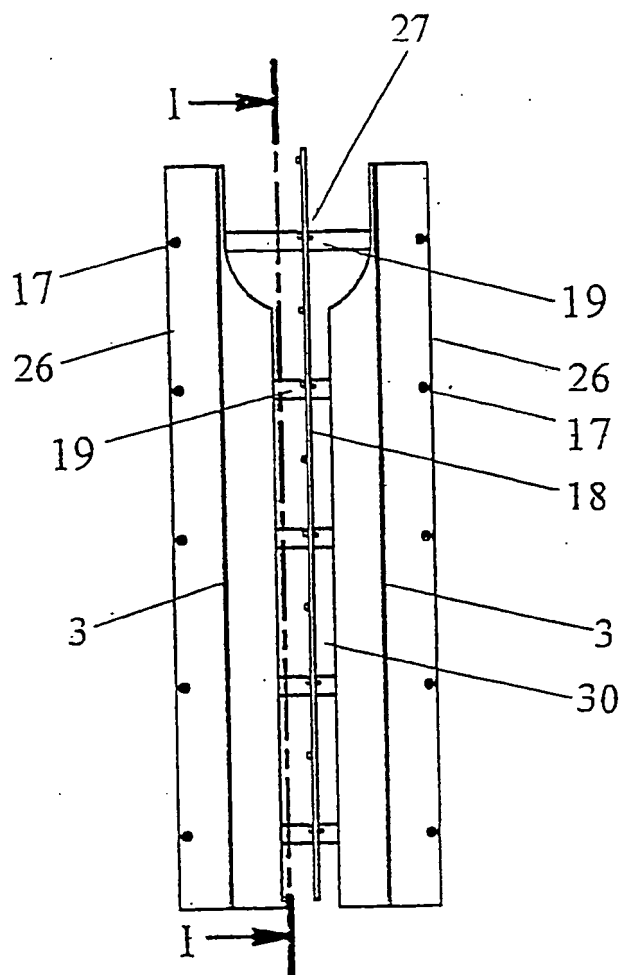


Fig. 21

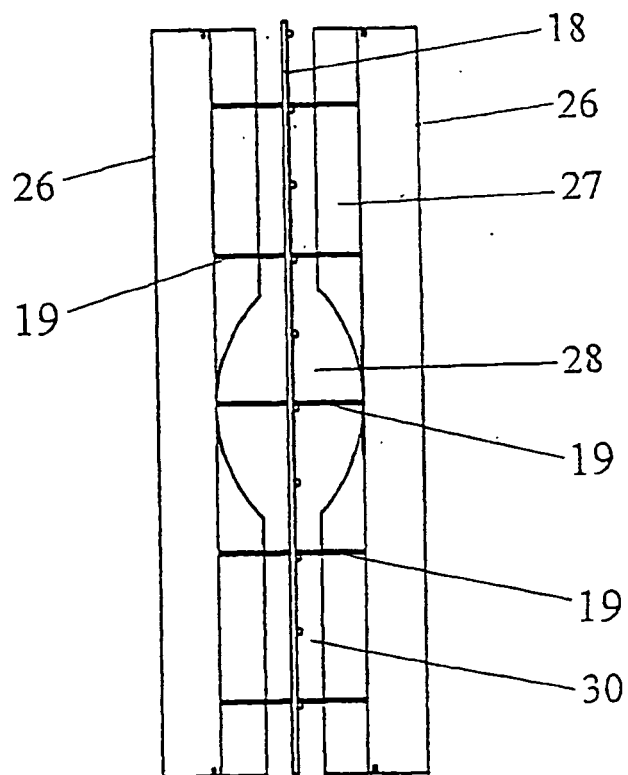


Fig. 22

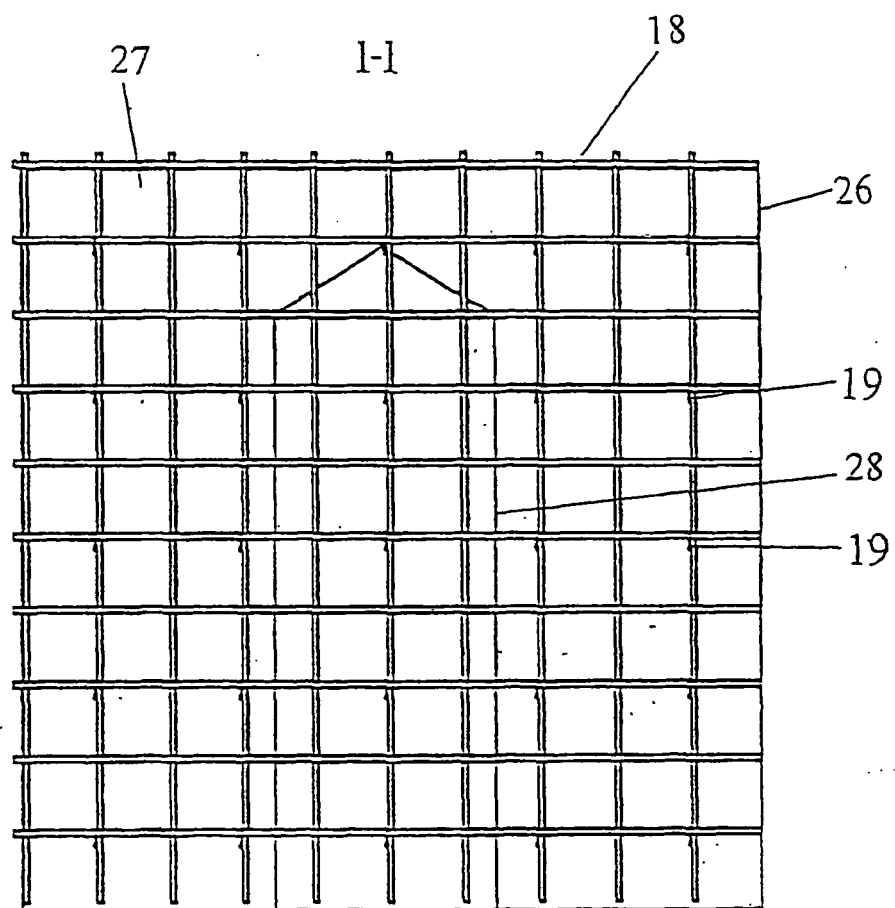


Fig. 23

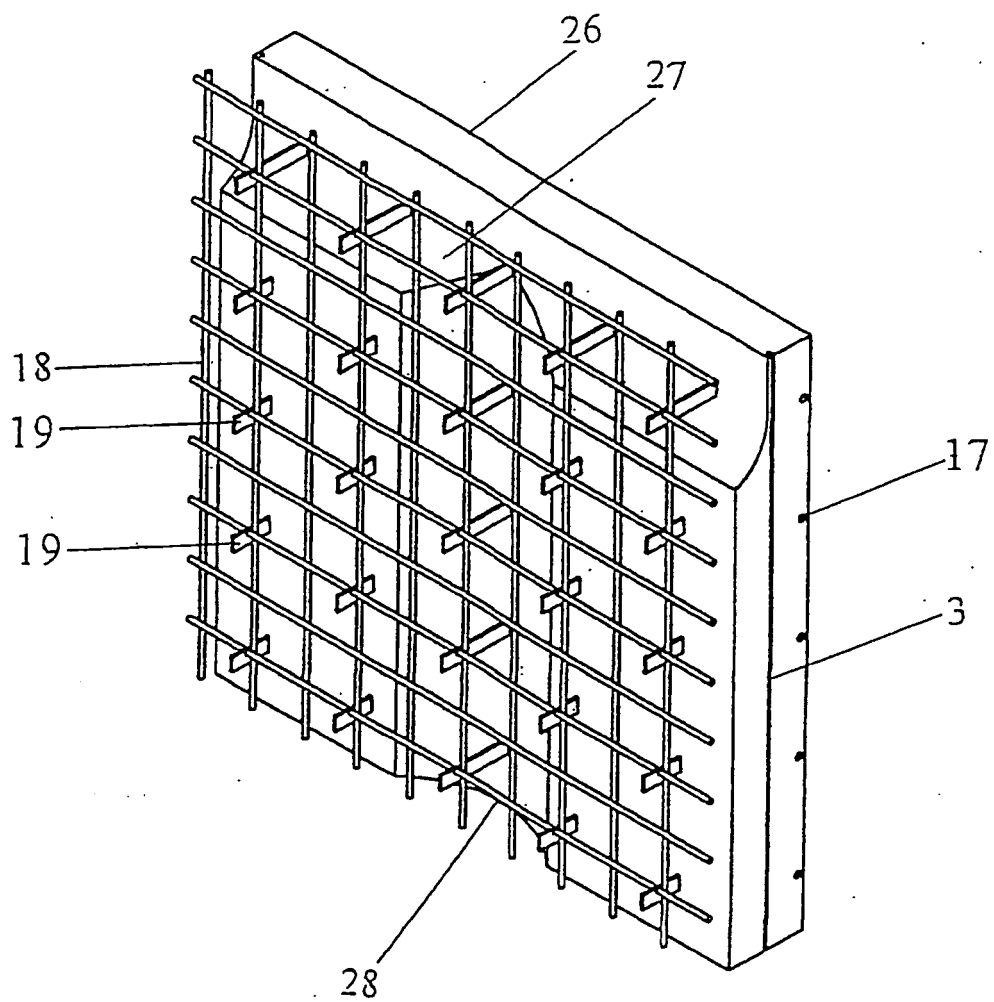


Fig. 24

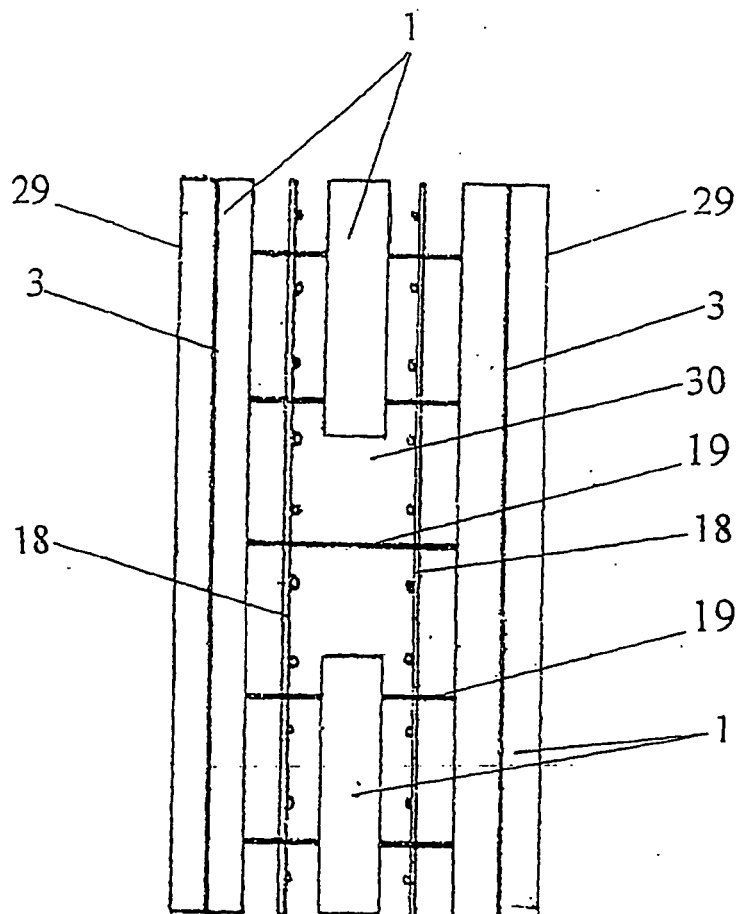


Fig. 25

REFERENCES CITED IN THE DESCRIPTION

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