



(51) International Patent Classification:
E04B 2/92 (2006.01)

(21) International Application Number:
PCT/IR2019/050018

(22) International Filing Date:
29 May 2019 (29.05.2019)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
139750140003002523
14 June 2018 (14.06.2018) IR

(72) Inventor; and

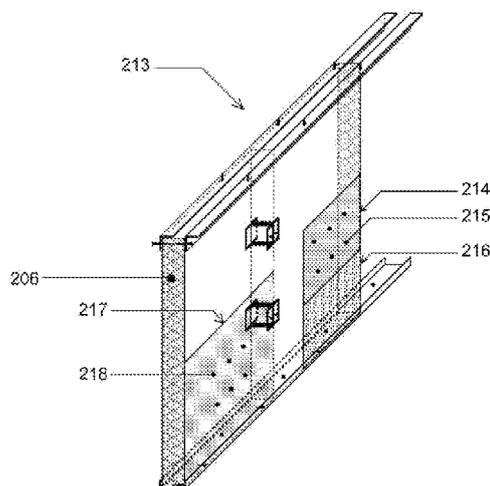
(71) Applicant: MIRFALLAH LIALESTANI, Seyed mohammadhossein [IR/IR]; no. 13 fifth alizadeh alley shariati St., 4741978593 Babolsar (IR).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JO, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM,

(54) Title: PREFABRICATED POLYETHYLENE SANDWICH BLOCK AND PANEL

[Fig.2E]



(57) Abstract: The embodiments herein provide a prefabricated polyethylene sandwich block and panel and a method for producing and erecting the same for constructing the internal and lateral walls in a building. The high weight and low heat insulation of the walls with traditional materials are the problems in construction industry, therefore, for lightening and strengthening of the buildings, by injection of polyurethane rigid foam or composition of rock wool with polyurethane foam between the two layers of polyethylene sheet or inside the prefabricated polyethylene block, a single sandwich block is produced and connected to the floor by screws and Runner while it is connected to the ceiling by two galvanized iron angles. The erected wall is coated with an expanded metal lath for integration and, in the end, facade coating, such as plaster layer, cement mortar layer, metal skin, high gloss p.v.c layer, tile, stone façade is covered on the wall.



TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW,
KM, ML, MR, NE, SN, TD, TG).

Published:

- *with international search report (Art. 21(3))*
- *in black and white; the international application as filed contained color or greyscale and is available for download from PATENTSCOPE*

Description

Title of Invention

[01] Prefabricated Polyethylene Sandwich Block and Panel

Technical Field

- 0 [02] One of the civil engineering objects is, weight reduction (lightening) of structures and buildings; to achieve this object, engineering produce and provide composite materials because these new materials are lightweight and high resistance. The embodiments herein generally relate to a building and construction industry and particularly a partition wall inside the buildings. The embodiments herein are more particularly related to a prefabricated lightweight sandwich panel and block for internal wall and lateral wall in the buildings and a method of fabricating lightweight sandwich panel and block. The embodiments herein relate to a lightweight and earthquake resistant polyethylene sandwich panel or block for internal and lateral walls in the buildings and a method of fabricating and erecting the same.

10 Background Art

- [03] The large-scale and growing need for housing and buildings has made it essential to employ modern methods and materials with the aim of speeding up construction, reducing weight of buildings, increasing life expectancy and strengthening buildings against earthquake more than ever before. The problems such as the longer periods of construction, a short life expectancy, and a high cost of construction require a proper solution such as the scientific use of modern methods and modern building materials to reduce the weight of building and building material, construction time, and enhance the durability of building and building material, and ultimately, reduce the construction costs.

- 20 [04] Reducing the building weight is one of the modern issues in the construction science and industry and is expanding and advancing day by day. This technology involves the reduction of the final weight of a building by means of employing modern techniques using new construction materials, optimizing construction methods, and reducing the building weight thereby not only saving costs, time and energy, but also mitigating the damages arising from the natural disasters such as earthquake and minimizing the damages arising largely from the weight of the building. To employ

30

weight reduction (lightening) techniques, the reasons behind the heaviness of buildings must be properly addressed at first. Once these reasons are identified, efforts should be made to either eliminate or minimize their effect on the final weight of the building.

◦ [05] The lesser the weight of the structure, the lesser the energy absorbed from earthquakes, and thus the seismic effect of the earthquake on the building is reduced. In other words, reducing the weight of (lightening) a building means providing more safety against earthquakes.

Summary of Invention

Technical Problem

١٠ [06] The use of traditional and old construction materials such as bricks and clay blocks and cement blocks not only increases the magnitude of the dead load of a building but also increases energy consumption thereby practically wastes energy. Moreover, a low erection speed and a high volume of building rubble arising from the use of such materials are among the other problems arising with the use of such traditional materials.

١٥ [07] On the other hand, as the weight of a building increases, the cost of the building structure increases thereby leading to a rise in the cost of the building. These issues can be considered as part of the numerous problems faced by this market.

٢٠ [08] Three-dimensional prefabricated panels (3.d.panel) are used as new construction materials. These panels consist of a polystyrene foam board as insulating core that is placed between two welded wire mesh and diagonal truss wire connecting two metal mesh to each other properly. In this model, the walls after being installed, are initially shotcreted at least 1.5 cm on each side and then, a cement mortar coating layer of a minimum thickness of 2 cm (ideally) will be covered on it; it increases the unit weight of the surface of the wall and consequently earthquake force and concrete and steel consumables in the structure will be increased.

٢٥ [09] This type of wall is implemented in several steps: the planting of the bars - the erection of the wall and the implementation of the flat, U, and L overlap mesh - the shotcrete and cement mortar coverage that increases the time and cost of the project. The finished wall is considered as a concrete armed wall, thus increasing the structure hardness and changes the structure frame behavior and causing more absorption of the

earthquake force on the structure. Also, mechanical and electrical installations are hard and time-consuming due to the presence of metal mesh.

[010] In the view of the foregoing description, there is a need for a prefabricated sandwich panel and block that reduces the structural and building weight. Further, there is a need for a prefabricated sandwich panel and block that controls the energy consumption in the buildings and reduces waste. Moreover, there is a need for a prefabricated sandwich panel and block that increases the speed of internal and lateral walls construction in the buildings and thereby reducing the cost of construction.

Solution to Problem

[011] The embodiments herein provide a prefabricated polyethylene sandwich panel or block and a method for producing and erecting a prefabricated polyethylene sandwich panel or block for constructing the internal and lateral walls in a building.

[012] According to an embodiment herein, the method comprising the steps of preparing and assembling a cast, placing and fixing two polyethylene skin or prefabricated polyethylene block in the cast, pouring the polyurethane foam in cream/gel condition or polyisocyanurate foam or combination of rock wool with polyurethane foam in the cast, time period to become hard and rigid polyurethane foam and connect to the interior surface of skin or block for strong adhesion property of polyurethane foam, disassembling the cast to remove a prefabricated polyethylene sandwich panel or block from the cast and panel or block ready to be forward to the construction sites for erection purpose.

[013] According to an embodiment herein, provide a method for erecting the prefabricated polyethylene sandwich panel or block. The method comprises the steps of a runner (flanges = 5cm) punched on the floor by means of hilti gun stud and fixed in the walls place, the first galvanized iron angle having the dimension of 5cm X 5cm, is fitted on the ceiling where the wall is going to be erected and is fixed by means of hilti gun stud, and the panels or blocks are placed inside the roof runner and against the first ceiling angle, then the second ceiling angle is fitted in front of the panel or block to ensure it stands in place. The panels or blocks are connected to one another by means of discontinuous double runners that are jointed back to back to each other by screw, all of the connection on the panel or block to runner or angle done by screw, then exterior

surface of panel or block is covered by expanded metal lath (rib lath), at the end, the façade coating layer such as white plaster layer, cement mortar layer, tile, stone facade, etc, is implemented on the wall.

0 [014] According to an embodiment herein, a plurality of prefabricated polyethylene sandwich panel or block are fixed together to form an internal wall and a lateral wall in a building.

1 [015] According to an embodiment herein, the prefabricated polyethylene sandwich panel or block for constructing the internal and lateral walls in the buildings comprises two exterior skin and middle core and rib lath layer and two ceiling galvanized iron angles and a floor runner.

[016] According to an embodiment herein, the middle core is the polyurethane rigid foam and the exterior skins is the polyethylene plate ($t = 3\text{mm}$) and rib lath is the galvanized expanded metal lath and the floor runner is the lightweight galvanized iron profile U section.

2 **Advantageous Effects of Invention**

[017] The primary object of the embodiments herein is to provide a prefabricated polyethylene sandwich panel or block for constructing the internal and lateral walls in a building.

3 [018] Another object of the embodiments herein is to provide a method for erecting a prefabricated polyethylene sandwich panel or block.

[019] Yet another object of the embodiments herein is to provide a prefabricated polyethylene sandwich panel or block for constructing the internal and lateral walls in a building thereby reducing the heaviness of the construction materials.

4 [020] Yet another object of the embodiments herein is to provide a prefabricated polyethylene sandwich panel or block for constructing the internal and lateral walls in a building to reduce the structural and building weights.

[021] Yet another object of the embodiments herein is to provide a prefabricated polyethylene sandwich panel or block for constructing the internal and lateral walls in a

building to control energy consumption in the building and to prevent wastage of large quantities of energy.

0 [022] Yet another object of the embodiments herein is to provide a prefabricated polyethylene sandwich panel or block for constructing the internal and lateral walls in a building to increase the safety factor of building walls against earthquake and reduce bodily injuries and financial losses due to earthquake.

[023] Yet another object of the embodiments herein is to provide a prefabricated polyethylene sandwich panel or block for constructing the internal and lateral walls in a building to provide a fire resistant panel or block.

10 [024] Yet another object of the embodiments herein is to provide a prefabricated polyethylene sandwich panel or block for constructing the internal and lateral walls in a building to increase the acoustic impedance and thermal resistance factors.

[025] Yet another object of the embodiments herein is to provide a prefabricated polyethylene sandwich panel or block for constructing the internal and lateral walls in a building to increase the ductility of building walls.

[026] Yet another object of the embodiments herein is to provide a prefabricated polyethylene sandwich panel or block for constructing the internal and lateral walls in a building to increase the impact resistance against earthquake.

20 [027] Yet another object of the embodiments herein is to provide a prefabricated polyethylene sandwich panel or block for constructing the internal and lateral walls in a building to increase the usable area of building stories.

[028] Yet another object of the embodiments herein is to provide a prefabricated polyethylene sandwich panel or block for constructing the internal and lateral walls in a building to eliminate shotcrete layer and clay + plaster mortar layer.

30 [029] Yet another object of the embodiments herein is to provide a prefabricated polyethylene sandwich panel or block for constructing the internal and lateral walls in a building to increase the speed of building construction.

[030] Yet another object of the embodiments herein is to provide a prefabricated polyethylene sandwich panel or block for constructing the internal and lateral walls in a building to reduce the cost of construction.

[031] Yet another object of the embodiments herein is to provide a prefabricated polyethylene sandwich panel or block for constructing the internal and lateral walls in a building to prevent generation of a high volume of building rubble.

[032] These and other objects and advantages of the embodiments herein will become readily apparent from the following detailed description taken in conjunction with the accompanying drawings.

[033] These and other aspects of the embodiments herein will be better appreciated and understood when considered in conjunction with the following description and the accompanying drawings. It should be understood, however, that the following descriptions, while indicating preferred embodiments and numerous specific details thereof, are given by way of illustration and not limitation. Many changes and modifications may be made within the scope of the embodiments herein without departing from the spirit thereof, and the embodiments herein include all such modifications.

Brief Description of Drawings

[034] The other objects, features and advantages will occur to those skilled in the art from the following description of the preferred embodiment and the accompanying table and drawings in which:

Table. 1

[035] [Table. 1] The properties of the prefabricated polyethylene sandwich panel or block of the embodiments herein are tabulated.

Fig.1A

[036] [Fig.1A] illustrates a perspective view of a polyethylene sandwich panel.

Fig.1B

[037] [Fig.1B] illustrates a perspective view of a simple polyethylene sandwich block.

Fig.1C

[038] [Fig.1C] illustrates a perspective view of a tongue and groove polyethylene sandwich block.

Fig.2A

- [039] [Fig.2A] illustrates a perspective view of implementation the floor runner and the first ceiling angle.

Fig.2B

[040] [Fig.2B] illustrates a perspective view of placing prefabricated sandwich panel or block in the wall place.

Fig.2C

[041] [Fig.2C] illustrates a top cross-sectional view of implementation the discontinuous double runner.

Fig.2D

- [042] [Fig.2D] illustrates a perspective view of implementation the second ceiling angle.

Fig.2E

[043] [Fig.2E] illustrates a perspective view of implementation the expanded metal lath (rib lath) and facade coating.

Fig.3

- [044] [Fig.3] illustrates a front cross-sectional view of facade coating layer.
- [045] Although the specific features of the embodiments herein are shown in some drawings and not in others. This is done for convenience only as each feature may be combined with any or all of the other features in accordance with the embodiments herein.

20 Detailed Description of the Embodiments

[046] In the following detailed description, a reference is made to the accompanying drawings that form a part hereof, in which the specific embodiments that may be

practiced are shown by way of illustration. These embodiments are described in sufficient details to enable those skilled in the art to practice the embodiments and it is to understand that the logical, mechanical and other changes may be made without departing from the scope of the embodiments. The following detailed description is therefore not to be taken in a limiting sense.

[047] The embodiments herein provide a method for producing and erecting a prefabricated sandwich panel or block for constructing the internal walls and the lateral walls in a building.

[048] According to an embodiment herein, the method comprising the steps of preparing and assembling a cast, placing and fixing two polyethylene skin or prefabricated polyethylene block in the cast, pouring the polyurethane foam in cream/gel condition or polyisocyanurate foam or combination of rock wool with polyurethane foam in the cast, time period to become hard and rigid the polyurethane foam and connect to the interior surface of skin or block for strong adhesion property of polyurethane foam, disassembling the cast to remove a prefabricated polyethylene sandwich panel or block from the cast and panel or block ready to be forward to the construction sites for erection purpose.

[049] According to an embodiment herein, provide a method for erecting the prefabricated polyethylene sandwich panel or block. The method comprises the steps of a runner (flanges = 5cm) is punched on the floor by means of hilti gun stud and is fixed in the walls place, the first galvanized iron angle having the dimension of 5cm x 5cm, is fitted on the ceiling where the wall is going to be erected and is fixed by means of hilti gun stud, and the panels or blocks are placed inside the roof runner and against the first ceiling angle, then the second ceiling angle is fitted in front of the panel or block to ensure it stands in place. The panels or blocks are connected to one another by means of discontinuous double runners that are jointed back to back to each other by screw, all of the connection on the panel or block to runner or angle done by screw, then exterior surface of panel or block is covered by expanded metal lath (rib lath), at the end, the façade coating layer such as white plaster layer, cement mortar layer, tile, stone facade, etc, is implemented on the wall.

[050] According to an embodiment herein, a plurality of prefabricated polyethylene sandwich panel or block are fixed together to form an internal wall and a lateral wall in a building.

[051] According to an embodiment herein, the prefabricated polyethylene sandwich panel or block for constructing the internal and lateral walls in the buildings comprises two exterior skin and middle core and rib lath layer and two ceiling galvanized iron angles and a floor runner.

[052] According to an embodiment herein, the middle core is the polyurethane rigid foam and the exterior skins are the polyethylene plate ($t = 3\text{mm}$) and rib lath is the galvanized expanded metal lath and the floor runner is the lightweight galvanized iron profile U section.

[053] According to an embodiment herein, the dimensions and structure of the polyethylene sandwich panel or block with 5-20 cm thickness panel or block are as follows. The width (W) of the panel is set as 100 cm. The depth (D) of the panel is set within the range of 5-20 cm. The height (H) of the panel is set as 300 cm. The depth and height of the panel can be adjusted flexibly or dynamically in production line and according to the order of the customers, thereby reducing wastes of materials, and increasing the wall installation speed in a project. The thickness of all the flanges and webs in all divisions is set as $t = 3\text{ mm}$.

[054] According to an embodiment herein, a prefabricated polyethylene sandwich panel or block is a product designed and produced in full conformity to the climatic conditions of the dry and humid geographic regions. In this type of prefabricated polyethylene sandwich panel or block, the weak properties of the base materials such as fracture, and low compressive and tensile and impact resistance and bending strength are modified. To achieve this end, by means of exterior polyethylene skin with thickness = 3 mm on the surface of polyurethane foam to increase compressive and bending and tensile and impact strengths of the base material as a result of which the weight of the polyethylene sandwich panel or block is reduced greatly and the compressive and tensile and impact and bending strengths of the polyethylene sandwich panel or block is enhanced to a great extent. The acoustic coefficient of the polyethylene sandwich panel or block is quite high and provides good noise and thermal insulation.

[055] Furthermore, the prefabricated polyethylene sandwich panel or block of the embodiments herein provides other excellent features such as low weight, high bending and compressive and tensile and impact strengths. The prefabricated polyethylene sandwich panel or block of the embodiments herein, does in no way leads to a collapse or physical injuries in times of earthquakes. The prefabricated polyethylene sandwich panel or block provides a very high erection speed. In case of the use of prefabricated polyethylene sandwich panel or block forms the basis of structural design from the very beginning of the implementation of a project, the weight of a building can be reduced to a great extent, and in turn allowing considerable savings on steel and concrete.

[056] The prefabricated polyethylene sandwich panel or block of the embodiments herein, comprising two exterior polyethylene skin and/or prefabricated polyethylene block, and the polyurethane rigid foam in the middle core, it also can use prefabricated polystyrene foam board (density ≥ 15) or rock wool board instead of polyurethane foam (middle core) and by applying an industrial glue between skin surface and middle core, they can be connected to each other firmly.

[057] As soon as the polyethylene plate or block is placed in the cast, the cast is ready for the polyurethane foam in cream/gel condition or combination of rock wool and polyurethane foam to be poured into the cast. After a specified period of time, the product become hard and rigid and is removed from the cast and sandwich panel or block is ready to be forwarded to the construction sites for erection purposes.

[058] These polyethylene sandwich panels or blocks are erected as follows: a runner (flanges = 5 cm) is punched on the floor by means of hilti gun stud and fixed in the wall place, the first galvanized iron angle, having the dimensions of 5x5 cm, is fitted on the ceiling, where the wall is going to be erected, and is fixed by hilti gun stud, and the panels or blocks are placed inside the floor runner and against of the first angle and jointed by means of screw. Then, the second angle is fitted and punched in front of polyethylene sandwich panel or block to ensure it stands in place. The panels or blocks are connected to one another by means of double discontinuous runners that are connected back to back to each other by screw. Implementation of expanded metal lath (rib lath) on the walls and the lath connected to panel or block by screw or pneumatic punch to cover panels or blocks uniformly and the wall is ready for the facade coating layer. This procedure continues until the whole wall is completed.

[059] The polyethylene sandwich panels or blocks are completely waterproof and resistant to impact, heat and cold. The polyethylene sandwich panels or blocks are highly lightweight and reduce structural and building weights. The polyethylene sandwich panels or blocks allow an energy control and efficiency in buildings and reduce energy wastage. The use of polyethylene sandwich panels or blocks speed up building construction works. The polyethylene sandwich panels or blocks enhance the safety of building walls against fire and earthquake. The polyethylene sandwich panels or blocks increase the acoustic and thermal resistance factors in the building walls.

[060] The properties of the prefabricated polyethylene sandwich panel or block of the embodiments herein are tabulated below.

[061] Table.1 The properties of the prefabricated polyethylene sandwich panel or block of the embodiments herein are as following: the weight per unit area of each panel or block is 9 ± 1 kgf / square m, the weight per unit area of internal wall with plaster coating layer ($t=2 \times 10$ mm) on the two surfaces of the wall is 30 ± 2 kgf / square m, The weight per unit area of lateral wall with interior plaster coverage layer ($t=10$ mm) and exterior cement mortar layer ($t=20$ mm) on the surface of the wall is 56 ± 2 kgf / square m, the weight of dead load reduced per unit area of building stories is 175 ± 25 kgf / square m, reduction percentage of earthquake force is $35\% \pm 5\%$, reduction percentage of the steel and concrete materials weight is $25\% \pm 5\%$, average reduction percentage of energy wastage is 60% , the acoustic insulation is ≤ 40 db , water absorption is $\leq 1\%$, impact resistance against soft and hard mass is suitable and no cracking, performance against seismic loading is elasticity.

[062] Fig.1A illustrates a perspective view of a polyethylene sandwich panel, Fig.1B illustrates a perspective view of a simple polyethylene sandwich block, Fig.1C illustrates a perspective view of a groove and tongue polyethylene sandwich block, with respect to Fig.1A to Fig.1C, the embodiment herein, provide the method for producing a prefabricated panel 100 or block 104,108 for constructing the internal and lateral walls in a building.

[063] According to an embodiment herein, the method to produce the panel 100 or block 104,108 comprising the steps of: a plurality of cast is prepared and assembled together, a polyethylene skin ($t=3$ mm, $W=100$ cm, $H=300$ cm) 101 or prefabricated

polyethylene block ($t=3\text{mm}$, $5\text{CM} \leq D \leq 20 \text{ CM}$, $W=100\text{cm}$, $H=300\text{cm}$) 105,111 is fixed in the cast, these form the exterior surface 101,105,111 of prefabricated sandwich panel 100 or block 104,108.

0 [064] According to the embodiment herein, a cream/gel polyurethane or polyisocyanurate foam (in fluid condition) or combination of rock wool with polyurethane foam is poured between polyethylene plate 101 or block 105,108, the polyurethane foam become hard and rigid 102,106 and connected to exterior surfaces 101,105,111 firmly on the adhesion area 103, the prefabricated sandwich panel 100 or block 104,108 is removed from the cast and is ready for the erection process.

10 [065] According to the embodiments herein, a prefabricated polystyrene foam board (density ≥ 15) or prefabricated rock wool board can be used instead of polyurethane rigid foam 102,106 and by applying an industrial adhesive layer 103 between exterior surface 101,105,111 and the middle core 102,106, they can be connected and fixed to each other firmly and form prefabricated sandwich panel 100 or block 104,108.

15 [066] Polyethylene plate 101 or block 105,111 is to enhance tensile, compressive, bending, impact strength of prefabricated sandwich panel 100 or block 104,108. With adding the web 107 in the cross section of a prefabricated polyethylene sandwich block 104,108 is to enhance load bearing capacity in the cross section and is to enhance the stiffness of cross section, although prefabricated block 104,108 can be produced without
20 web 107 in the cross section. Also with designing and creating tongue 109 and groove 110 on the cross section edge and in height direction of block 108, the block 108 can be connected and fixed to one another simply and firmly and there is no need to implement discontinuous double runner in direction of block height.

[067] The embodiment herein, provide a method for erecting the prefabricated
25 polyethylene panel 100 and prefabricated polyethylene sandwich block 104,108 for internal and lateral wall in a building. The erection method comprising the steps as following:

[068] Fig.2A illustrates a perspective view of implementation the runner and the first
30 angle, Fig.2B illustrates a perspective view of placing prefabricated sandwich panel or block in the wall place, Fig.2C illustrates a top cross sectional view of implementation the discontinuous double runner, Fig.2D illustrates a perspective view of implementation

the second angle, Fig.2E illustrates a perspective view of implementation the expanded metal lath (rib lath) and façade coating.

0 [069] In the step 1 (200), with respect to Fig.2A, the lightweight galvanized iron profile U section and flanges=5 cm, 201 (runner) is punched on the floor by means of hilti gun stud 203 and is fixed in the wall place according to architect plane. After that, the first light weight galvanized iron angle and dimension is 5cmx5cm, 202 is fitted and punched perpendicular to the ceiling, where the wall is going to be erected by means of hilti gun stud 203.

10 [070] In the step 2, (204), with respect to Fig.2B, prefabricated sandwich panel or block 206 is placed inside the floor runner 201 and against the first ceiling angle 202, then panel or block 206 is jointed to floor runner 201 and ceiling angle 202 by means of screw 205, the prefabricated panel or block 206 is connected to one another by means of double discontinuous runner 207 which are jointed back to back to each other 207 and to panel or block 206 by applying screw 209, the double discontinuous runner 207 is jointed to the panel or block 206 by applying screw 208. The next panel or block 206 is placed exactly beside the first one and this procedure continues until the whole wall is completed.

20 [071] With respect to Fig.2C, the first panel or block 206-1 is erected and the first piece of double discontinuous runner 207-1 is jointed to the element 206-1 by means of screw 208-1, after this the second piece of double discontinuous runner 207-2 is jointed back to back to the first piece of double discontinuous runner 207-1 and is connected to the first panel or block 206-1 by means of screw 209, the next panel or block 206-2 is erected and is placed inside the second piece of double discontinuous runner 207-2 and are jointed to each other by means of screw 208-2, this caused to panels or blocks 206 are connected to each other firmly and forming the continuous wall.

30 [072] In step 3, (211), with respect to Fig.2D, the second galvanized iron angle 212 is fitted in front of the panel or block 206 and is punched and fixed on the ceiling by means of hilti gun stud203, then second ceiling angle 212 is jointed to panel or block 206 by means of screw 205. This procedure forming a continuous wall 211 that panels or blocks 206 are connected to each other firmly and are fixed in the wall place by means of the floor runner 201 and ceiling angles 202,212.

[073] With respect to Fig.2E, the expanded galvanized metal lath (rib lath) layer 214, is covered on the panels or blocks 206, by means of screw 215 or pneumatic punch, after covering prefabricated wall 206, by rib lath layer 214, façade coating layer 216, such as white plaster layer, cement mortar layer, tile, stone facade, etc is implemented as the final coverage. Also, the prefabricated plaster board or cement board 217 can be installed on the panel or block 206 and connected to prefabricated wall 206 by means of screw 218 directly, in this case, the rib lath layer 214, is removed.

[074] Fig.3 illustrates a front cross sectional view of façade coating layer, and with respect to sections 300,301,302,303,304, the embodiment herein, provide various kind of façade coating layer for internal and lateral wall in the building, the section 300,301,302 are related to lateral walls and 303,304 are related to internal walls, the middle core 305 and polyethylene layer 306 are the main components of all prefabricated wall and difference of the sections is in the expanded metal lath 307 and the façade coating layer 308,309,310,311.

[075] The sections 303,304 are used for internal partitions, in the section 303, on the both exterior surface of the wall 308 are covered by applying the white plaster ($5\text{mm} \leq t \leq 10\text{mm}$) layer 308, in the section 304, the façade layer 311, is p.v.c skin or high gloss p.v.c skin ($t=1\text{mm}$) or prefabricated flexible stone sheet layer ($t=2\text{mm}$), which is glued on the polyethylene layer 306.

[076] Section 300,301,302, are used for the lateral walls, in the section300, on the interior surface of the wall 308 is covered by white plaster layer ($5\text{mm} \leq t \leq 10\text{mm}$) and the exterior surface of the wall 309 is covered by cement mortar layer ($15\text{mm} \leq t \leq 20\text{mm}$) or stone façade 309.

[077] In the section 301, the interior surface of the wall 308 is covered by white plaster layer ($5\text{mm} \leq t \leq 10\text{mm}$) and the exterior surface of the wall 310 is covered by metal skin ($t= 0.5 \text{ mm}$) that is connected on the polyethylene layer 306.

[078] In the section 302, the interior surface of the wall 308 is covered by white plaster layer ($5\text{mm} \leq t \leq 10\text{mm}$) and the exterior surface of the wall 310 is covered by metal skin ($t= 0.5 \text{ mm}$) that is connected on the middle core (polyurethane foam) 305.

[079] The prefabricated polyethylene sandwich panel or block of the embodiments herein is completely water resistant. The prefabricated polyethylene sandwich panel or block is resistant against sound transfer, heat and fire. The panel is highly lightweight and reduces the structural and building weights. The polyethylene sandwich panel or block allows energy control and efficiency in buildings and reduces energy wastage. the use of these prefabricated polyethylene sandwich panel, speeds up the construction of internal walls and the lateral walls in the buildings. The polyethylene sandwich panel or block enhances the safety of building walls against fire and earthquake. The prefabricated polyethylene sandwich panel or block increases the acoustic and thermal resistance factors in the building walls.

[080] The foregoing description of the specific embodiments will so fully reveal the general nature of the embodiments herein that others can, by applying current knowledge, readily modify and/or adapt for various applications such specific embodiments without departing from the generic concept, and, therefore, such adaptations and modifications should and are intended to be comprehended within the meaning and range of equivalents of the disclosed embodiments. It is to be understood that the phraseology or terminology employed herein is for the purpose of description and not of limitation. Therefore, while the embodiments herein have been described in terms of preferred embodiments, those skilled in the art will recognize that the embodiments herein can be practiced with modification within the spirit and scope of the appended claims.

[081] Although the embodiments herein are described, it will be obvious for a person skilled in the art to practice the invention with modifications. However, all such modifications are deemed to be within the scope of the claims.

[Table.1]

weight per unit area of each panel or block	$9 \pm 1 \frac{kgf}{m^2}$
weight per unit area of internal wall with plaster coating layer (t=2x10mm) on two surface of wall	$30 \pm 2 \frac{kgf}{m^2}$
weight per unit area of lateral wall with interior plaster coverage layer (t =10mm) and exterior cement mortar layer (t=20mm) on the surface of wall	$56 \pm 2 \frac{kgf}{m^2}$
weight of reduced dead load per unit area of building stories	$175 \pm 25 \frac{kgf}{m^2}$
reduction percentage of earthquake force	$35\% \pm 5\%$
reduction percentage of the steel and concrete materials weight	$25\% \pm 5\%$
average reduction percentage of energy wastage	60%
acoustic insulation	≤ 40 db
water absorption	$\leq 1\%$
impact resistance against soft and hard mass	suitable and no cracking
performance against seismic loading	Elastic performance

Claims

- 0
10
15
20
25
30
- [Claim 1]** A method for producing and erecting the prefabricated polyethylene sandwich block or panel, the method comprising the steps of: preparing and assembling a cast, placing and fixing two polyethylene skin or prefabricated polyethylene block in the cast, pouring the polyurethane foam in cream/gel condition or polyisocyanurate foam or combination of rock wool with polyurethane foam in the cast, the polyurethane foam become hard and rigid after time period and connect to the interior surface of skin or block for strong adhesion property of polyurethane foam, disassembling the cast to remove a prefabricated polyethylene sandwich panel or block from the cast and panel or block ready to be forward to the construction sites for erection purpose. a runner (flanges = 5cm) is punched on the floor by means of hilti gun stud and is fixed in the walls place, the first galvanized iron angle having the dimension of 5cm X 5cm, is fitted on the ceiling where the wall is going to be erected and is fixed by means of hilti gun stud, and the panels or blocks are placed inside the roof runner and against the first ceiling angle, then the second ceiling angle is fitted in front of the panel or block to ensure it stands in place. The panels or blocks are connected to one another by means of discontinuous double runners that are jointed back to back to each other by screw, all of the connection on the panel or block to runner or angle done by screw, then exterior surface of panel or block is covered by expanded metal lath (rib lath), at the end, the façade coating layer such as white plaster layer, cement mortar layer, tile, stone facade, etc, is implemented on the wall.
- [Claim 2]** The method according to claim1, wherein the prefabricated polyethylene sandwich block or panel is used as the internal wall and lateral wall in a building.
- [Claim 3]** The method according to claim1, wherein the prefabricated polyethylene sandwich block or panel provide and form a light weight internal and lateral wall and increase the safety factor and resistance of the wall against earthquake and reduce the energy wastage in a building.
- [Claim 4]** The method according to claim1, wherein the middle core is polyurethane rigid foam or combination of the rock wool and polyurethane foam or polyisocyanurate foam or polystyrene foam board or rock wool board.

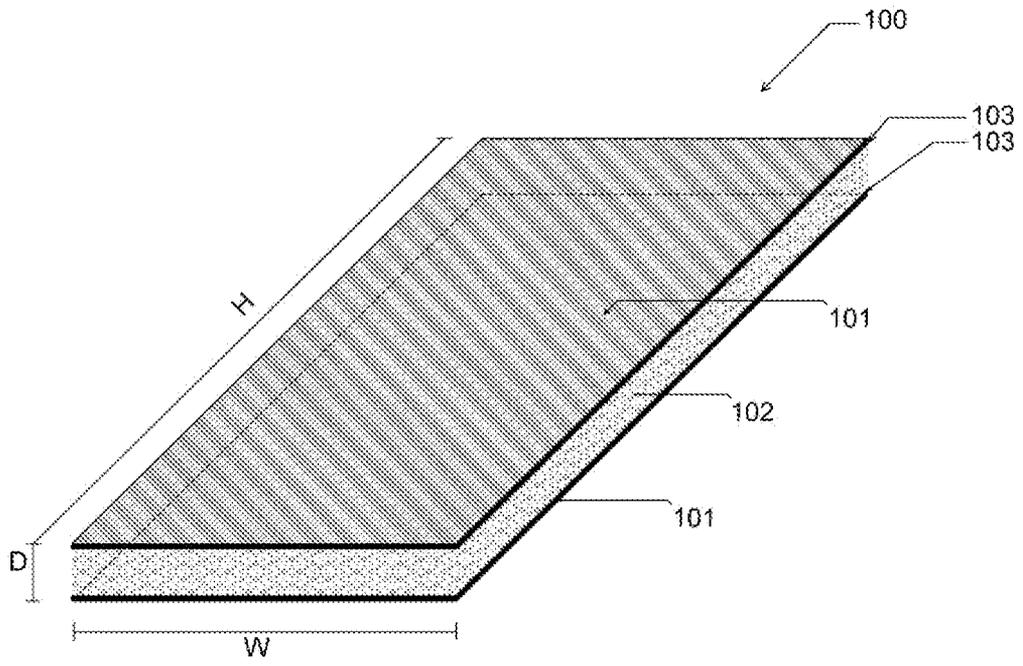
[Claim 5] The method according to claim1, wherein the exterior skin is polyethylene skin or prefabricated polyethylene block.

[Claim 6] The method according to claim1, wherein the blocks or panels are connected by means of screw to the floor runner and two ceiling angles.

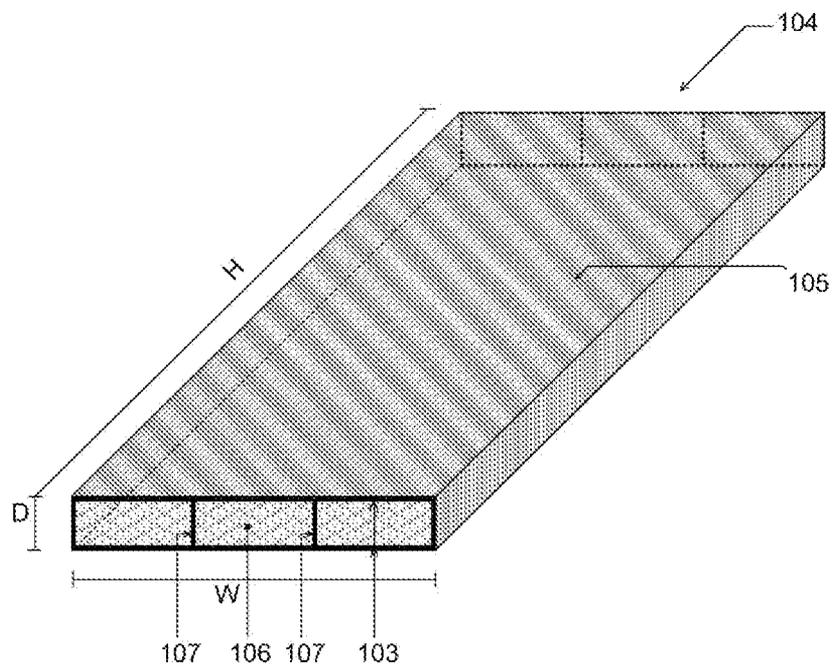
- **[Claim 7]** The method according to claim1, wherein the expanded metal lath (rib lath) is covered on the prefabricated polyethylene sandwich block and panel by means of screw to act as the integrated partition wall.

[Claim 8] The method according to claim1, wherein the façade coating is plaster layer or cement mortar layer or metal sheet layer or high gloss p.v.c layer or tile or stone façade.

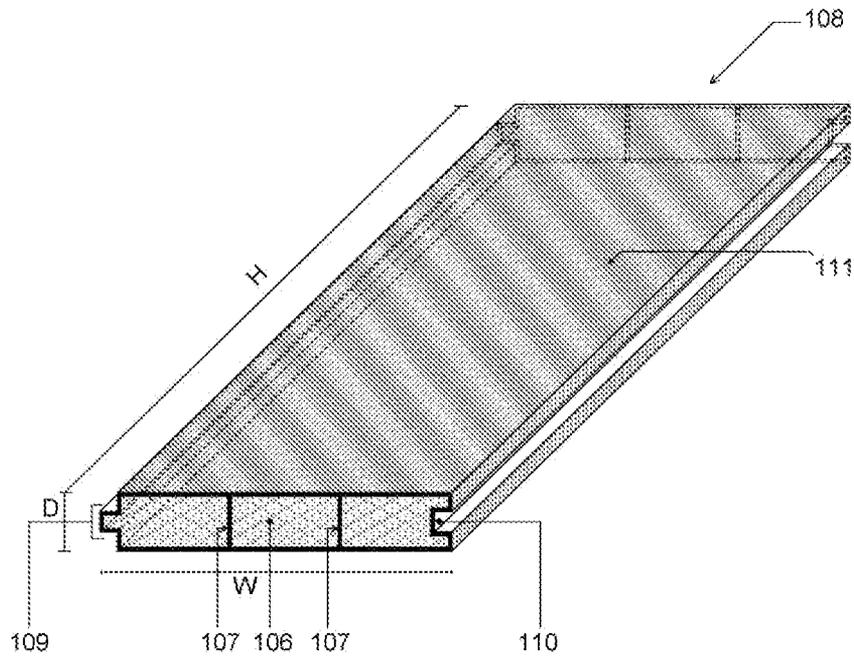
[Fig.1A]



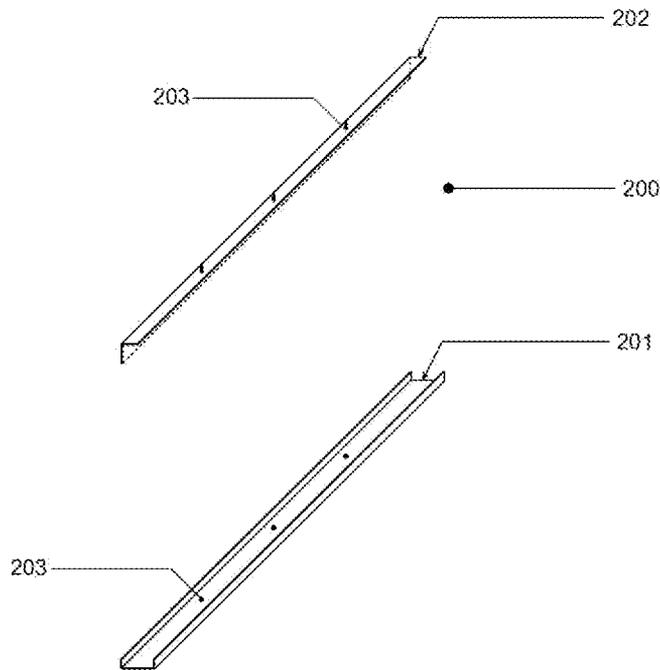
[Fig.1B]



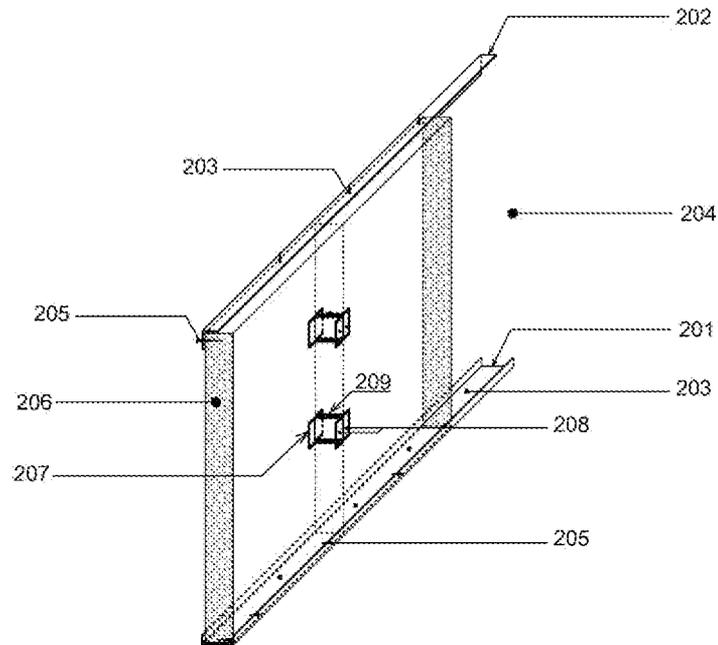
[Fig.1C]



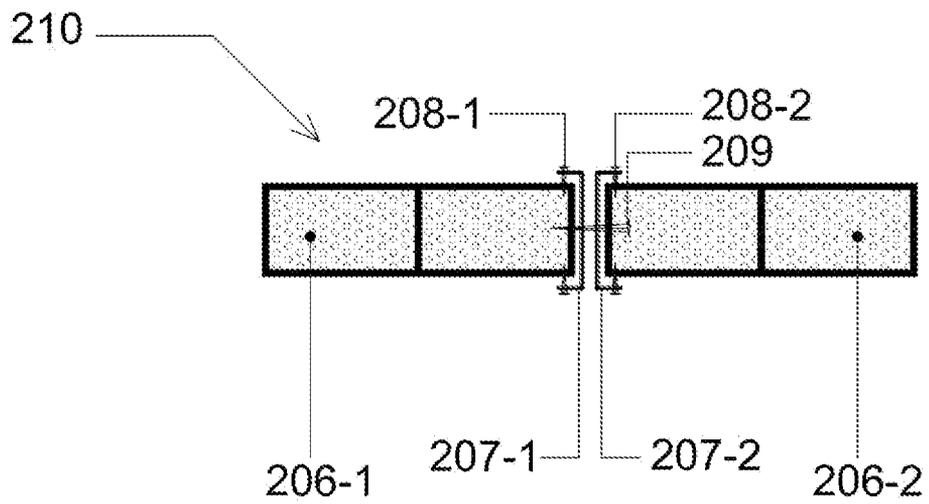
[Fig.2A]



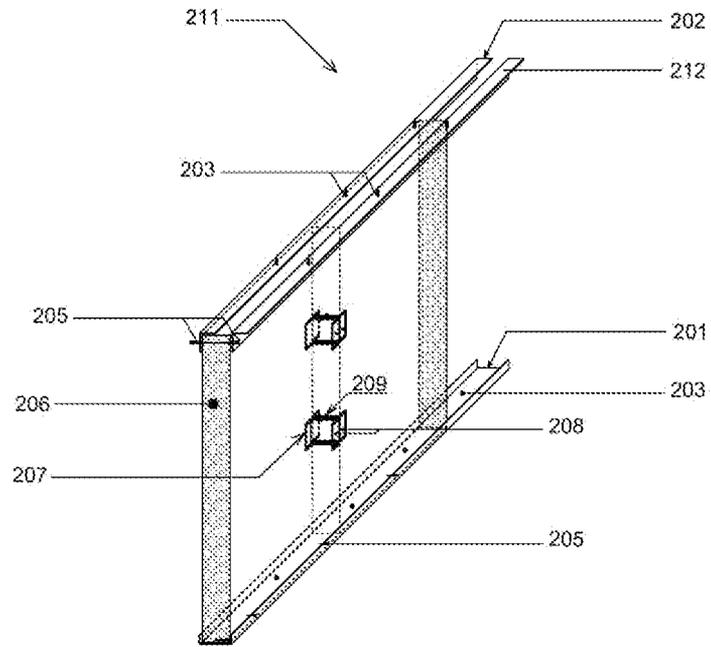
[Fig.2B]



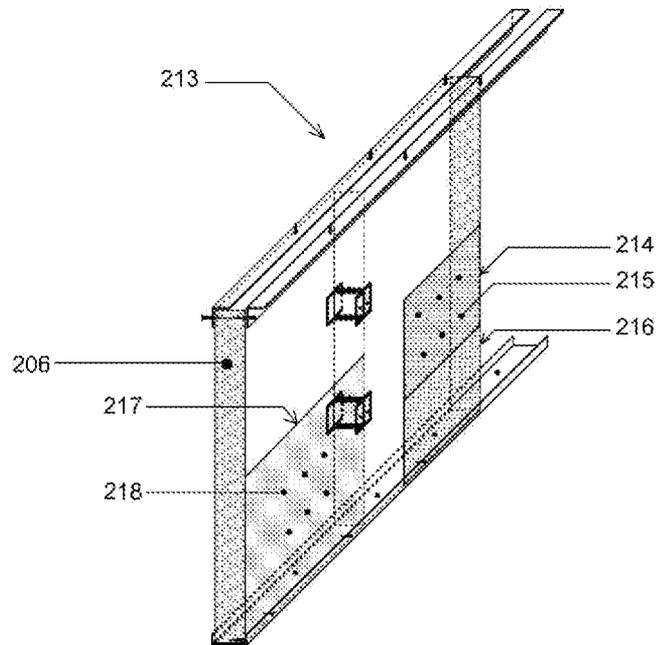
[Fig.2C]



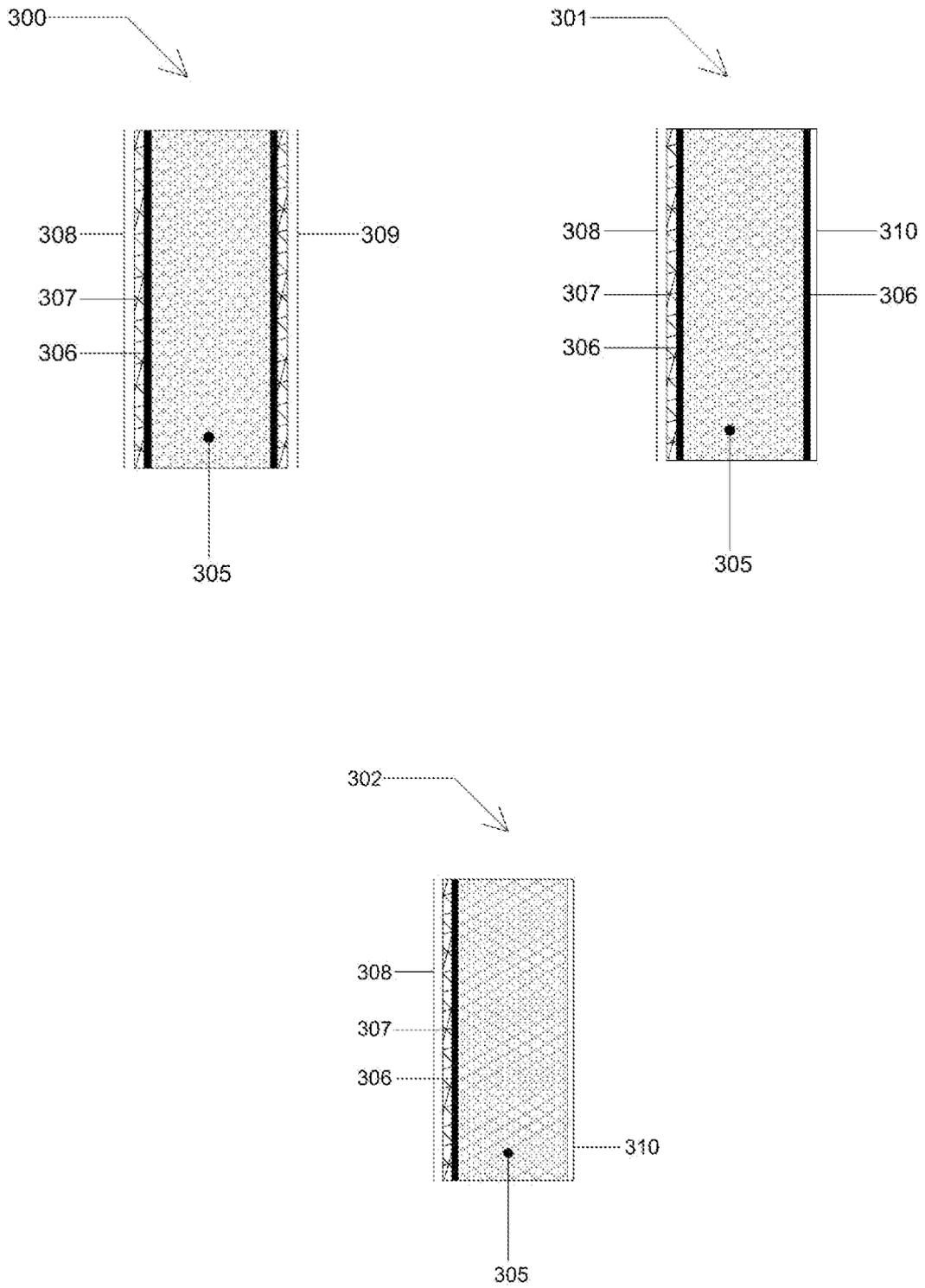
[Fig.2D]

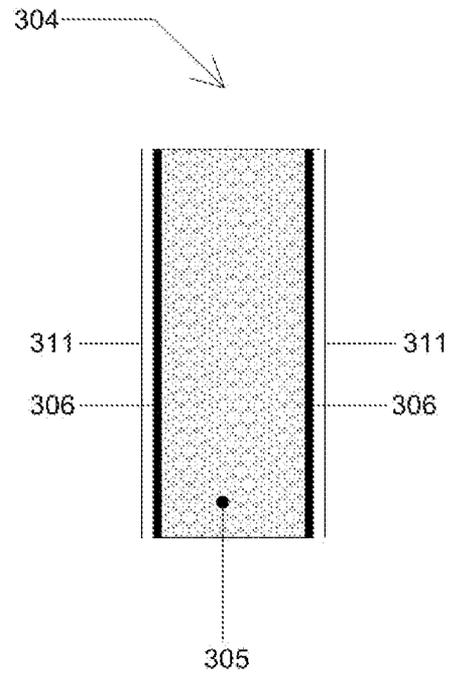
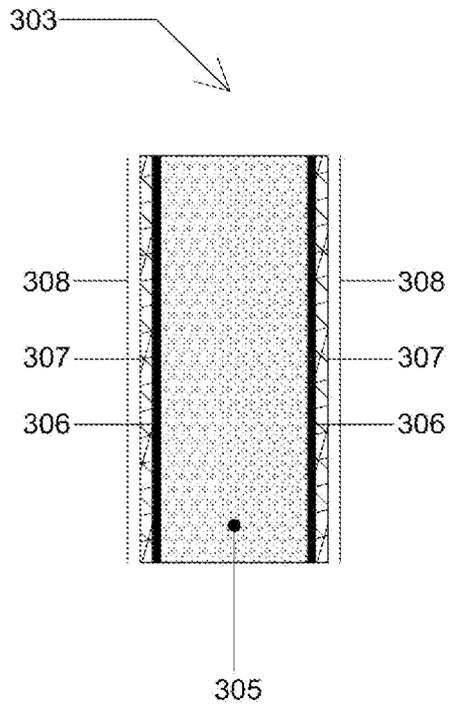


[Fig.2E]



[Fig.3]





INTERNATIONAL SEARCH REPORT

International application No.
PCT/IR2019/050018

A. CLASSIFICATION OF SUBJECT MATTER E04B2/92 Version=2019.01		
According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED		
Minimum documentation searched (classification system followed by classification symbols) E04B		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) TotalPatent One, IPO Internal Database		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	JP04128033A (MAKURO BOODO KK) 28 April 1992 (28.04.1992) Abstract; Figures 2-3; Claim 1	1-5
Y	CN102966193A (CHONGQING PUXIANG BAODING METAL PRODUCTS CO., LTD) 13 March 2013 (13.03.2013) Abstract; description para 8,11,14; Figure 2; Claims 1-5	4, 5
Y	US3608266A (ARCHITECTURAL PARTITIONS) 28 September 1971 (28.09.1971) Abstract; description (column 5, line 1-20, column 6, line 40-55); Figures 1,2,4,12,15; Claims 1,3	1-3, 6-8
Y	US3990205A (INTERFLEX SYSTEMS INC) 09 November 1976 (09.11.1976) Abstract; description (column 4, line 34-64); Figures 1,3; Claim 1	1-3, 6-8
<input type="checkbox"/> Further documents are listed in the continuation of Box C. <input checked="" type="checkbox"/> See patent family annex.		
* Special categories of cited documents: "A" document defining the general state of the art which is not considered to be of particular relevance "D" document cited by the applicant in the international application "E" earlier application or patent but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family		
Date of the actual completion of the international search 14-08-2019		Date of mailing of the international search report 14-08-2019
Name and mailing address of the ISA/ Indian Patent Office Plot No.32, Sector 14, Dwarka, New Delhi-110075 Facsimile No.		Authorized officer Amit Kumar Meena Telephone No. +91-1125300200

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/IR2019/050018

Citation	Pub.Date	Family	Pub.Date
US 3608266 A	28-09-1971	GB 1317609 A	23-05-1973
		GB 1317610 A	23-05-1973
		CA 920324 A	06-02-1973