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(54) **MODULAR ARCHITECTURAL CONSTRUCTION SYSTEM COMPRISING UNIVERSAL INTERCONNECTABLE PARTS**

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(57) **ABSTRACT**

This system or process has managed to produce unique parts in order to universalise the process so that in this way we can simplify the construction processes to only manufacture of a few products, so that our house models or other models can be obtained, with one and two storeys.

This simplification in the manufacturing process results in a simplification of the infrastructure of our installed plant capacity.

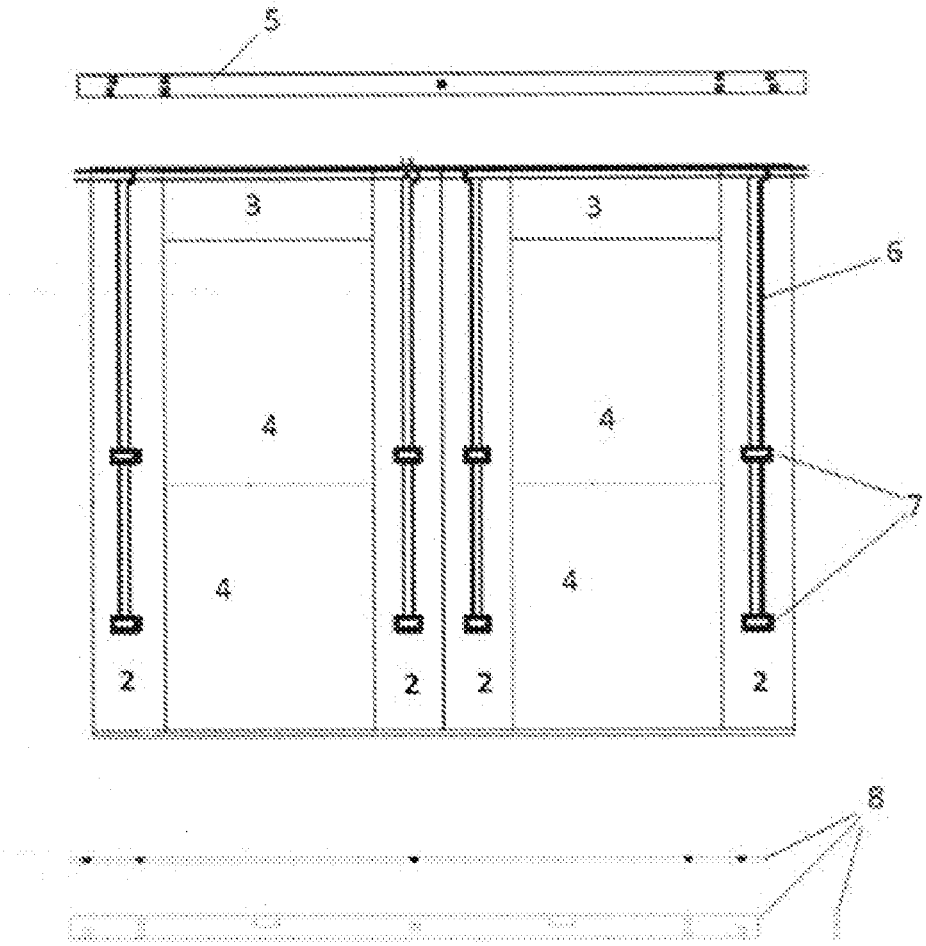


FIG. 1.

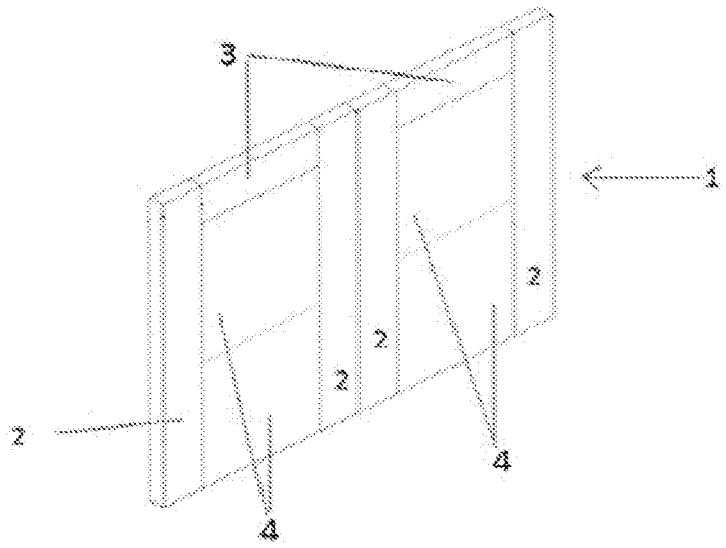


FIG 2

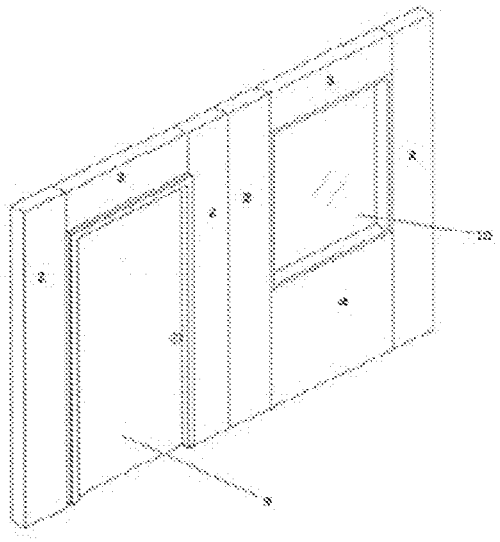


Fig 3

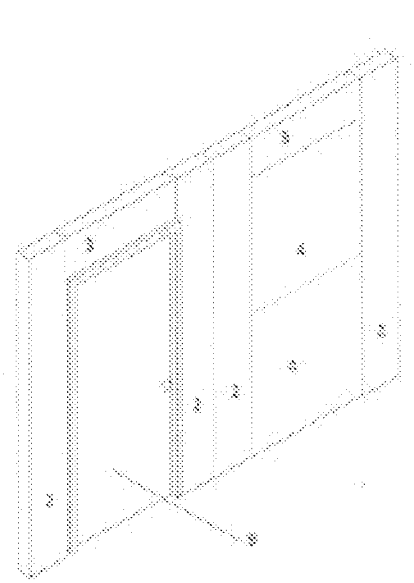


Fig. 4

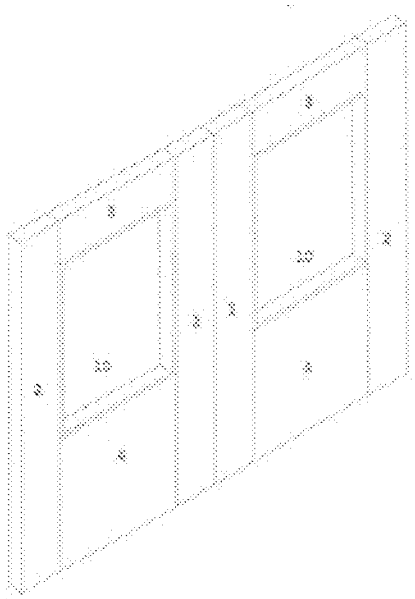
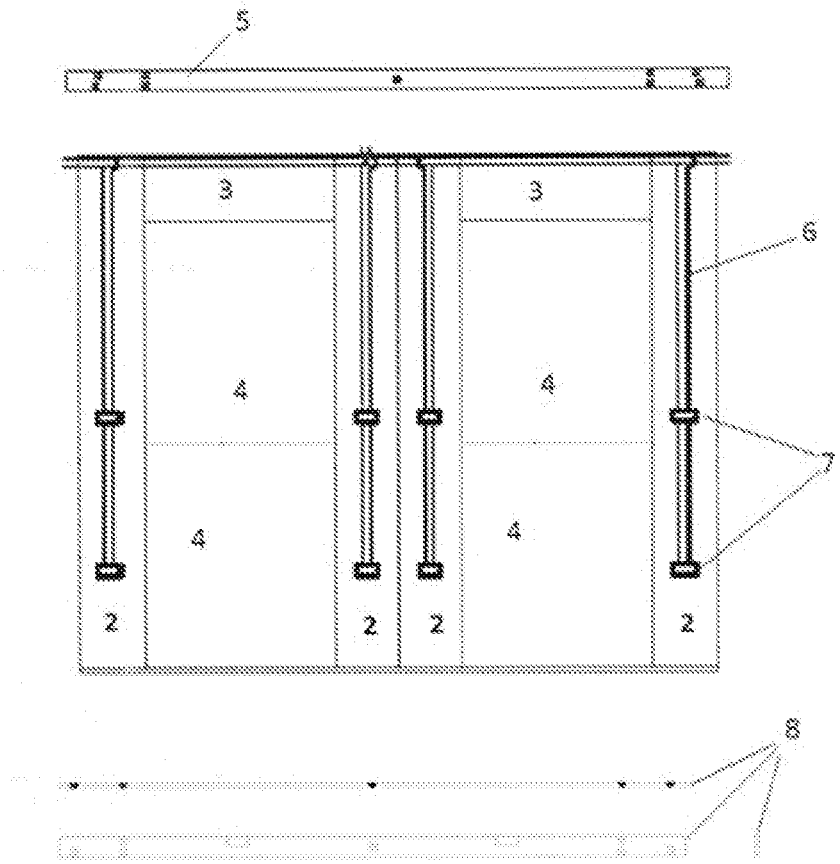


Fig. 5



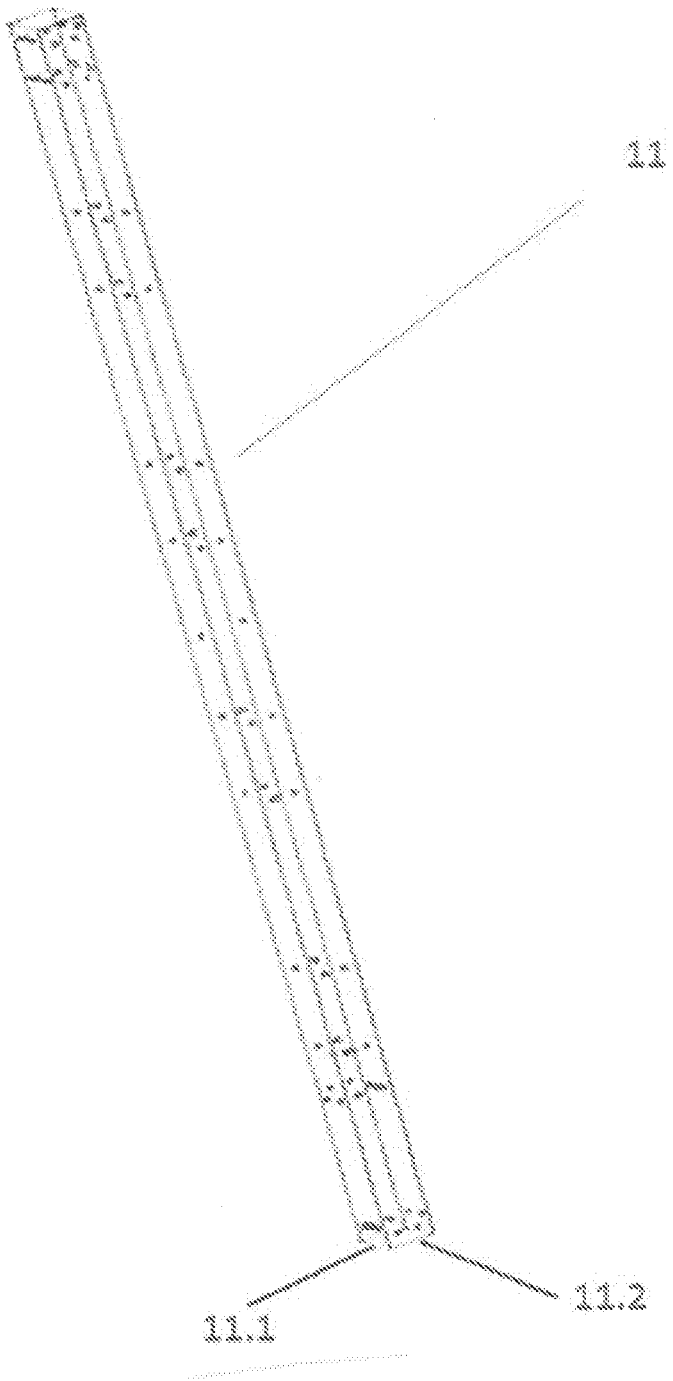


Fig. 6

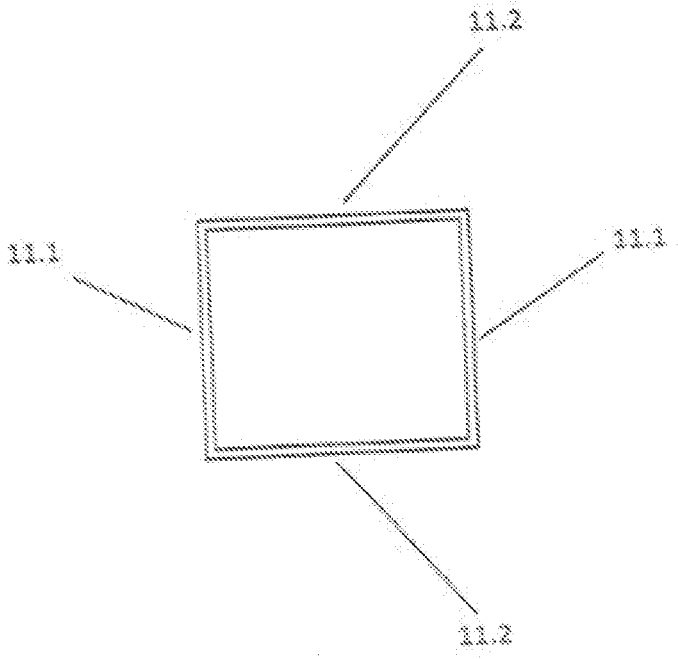
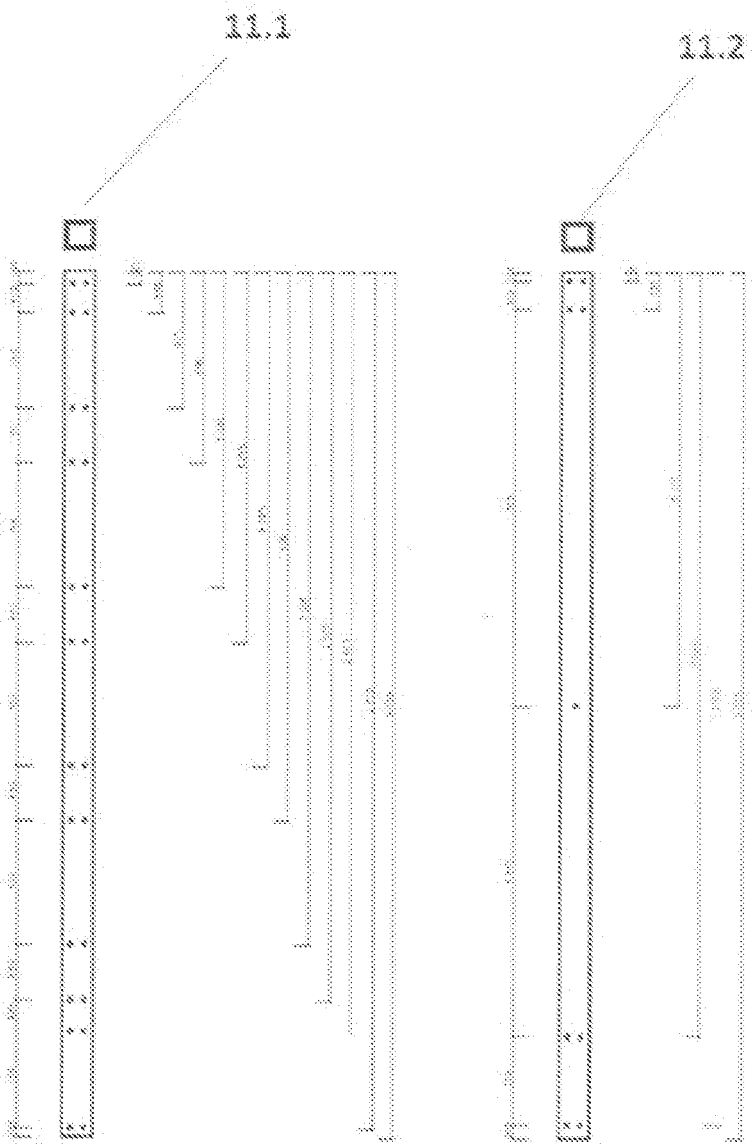


Fig. 7

Fig. 8



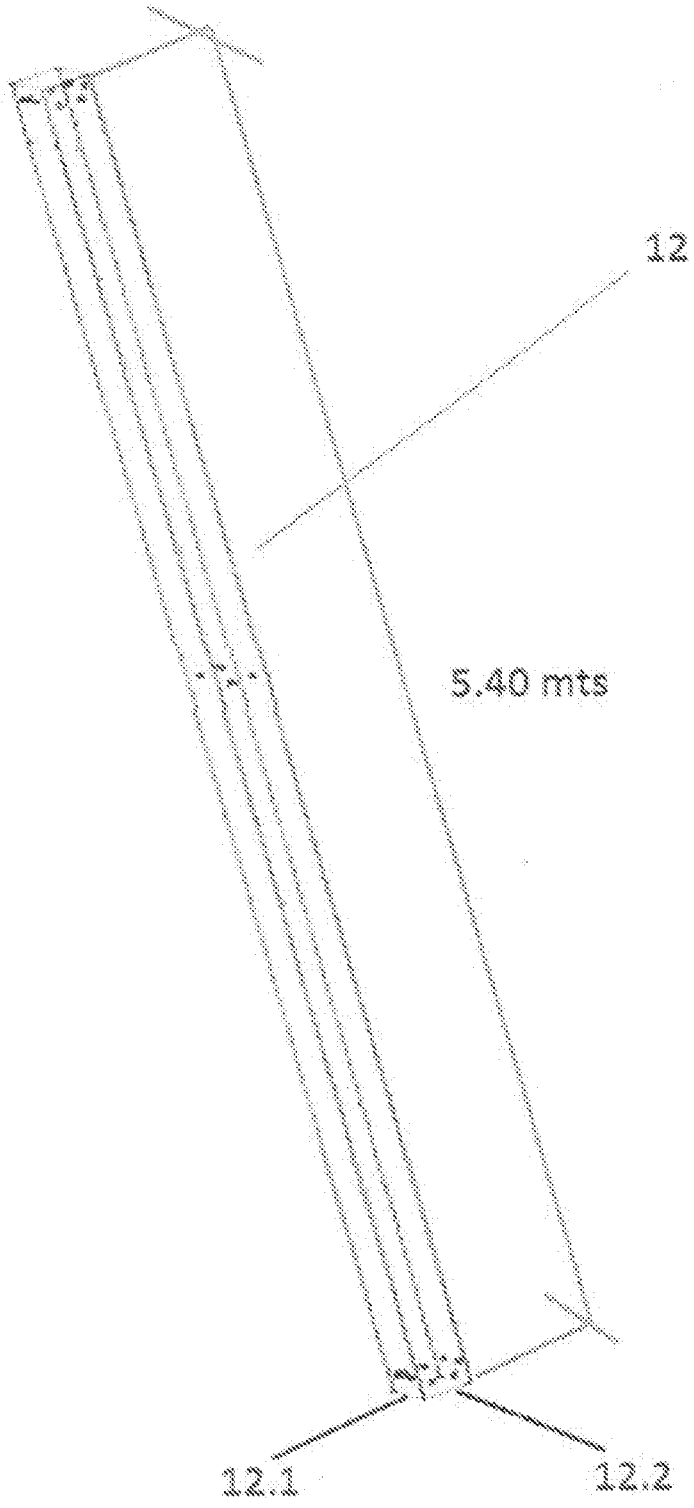


FIG. 9

Fig. 10

Fig. 11

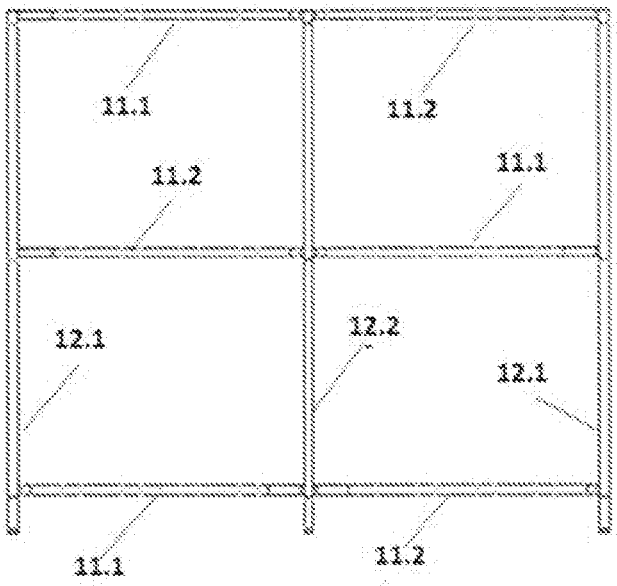


Fig. 12

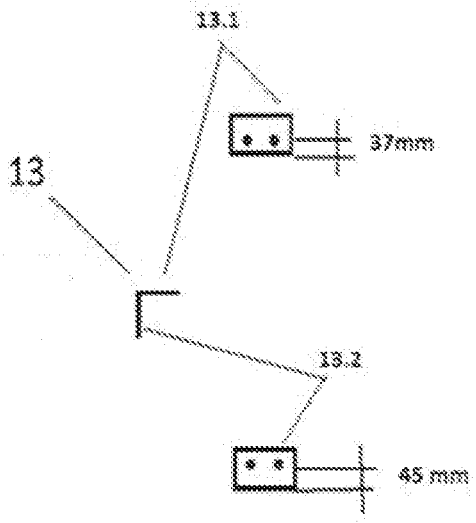


Fig. 13

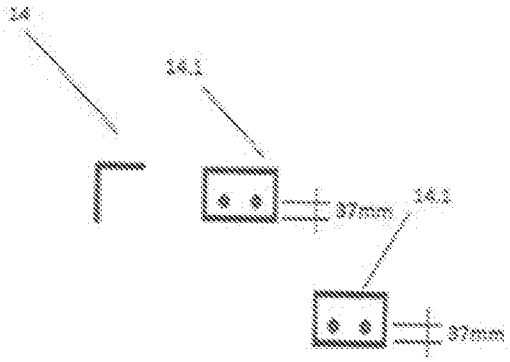


Fig. 14

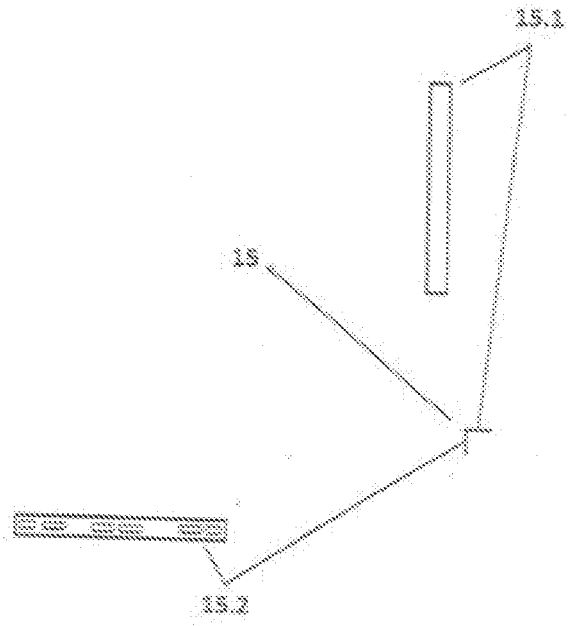


Fig. 15

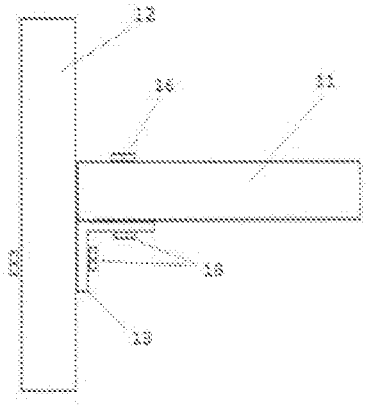


Fig. 16

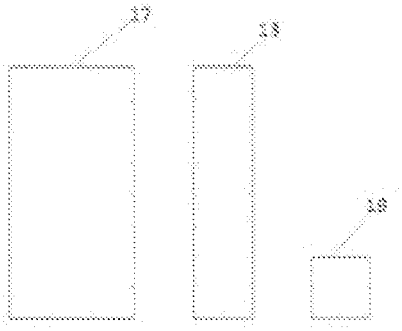


Fig. 17

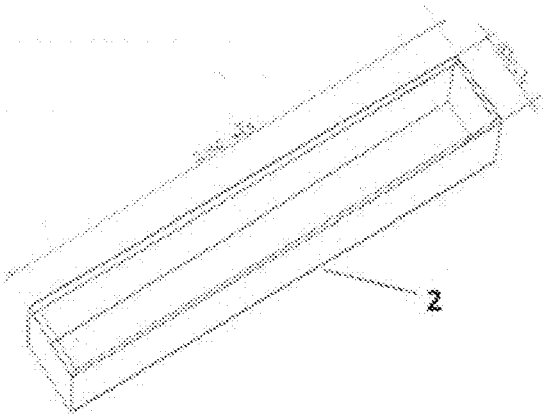


Fig. 18

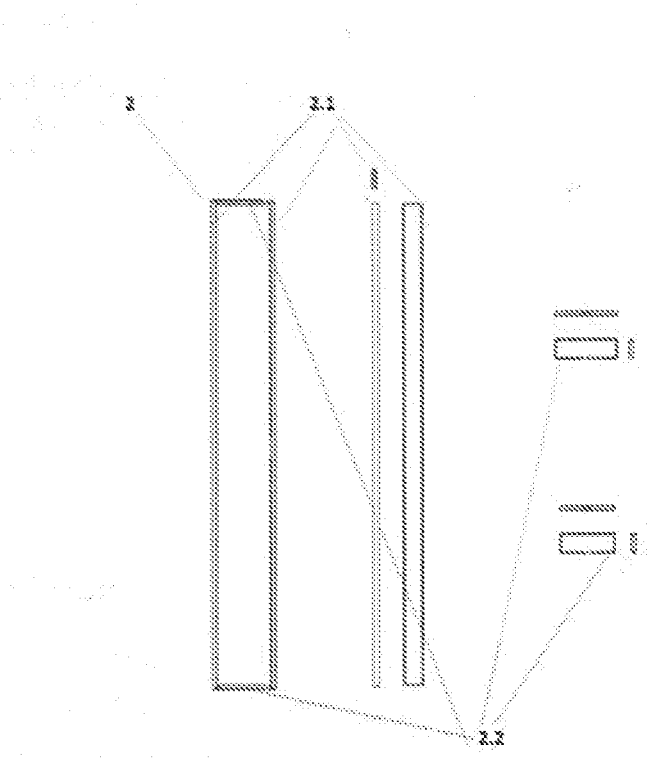


Fig. 19

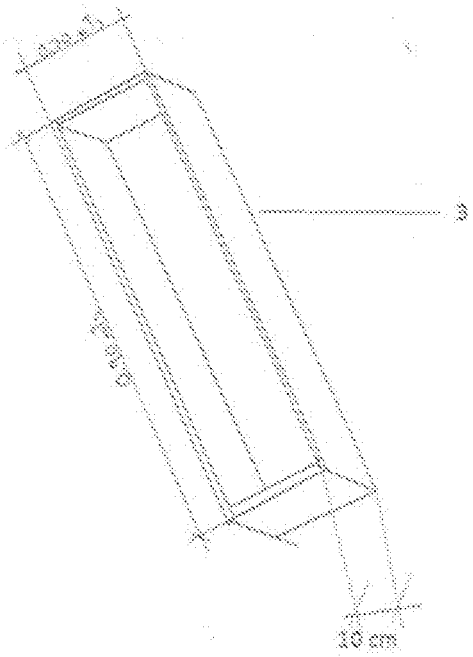


Fig. 20

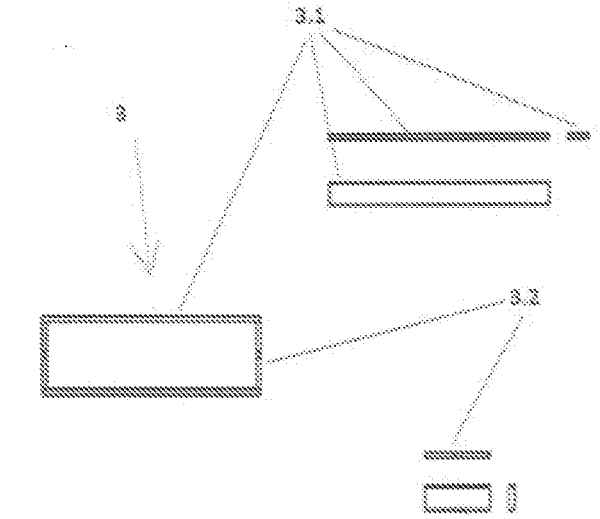


Fig. 21

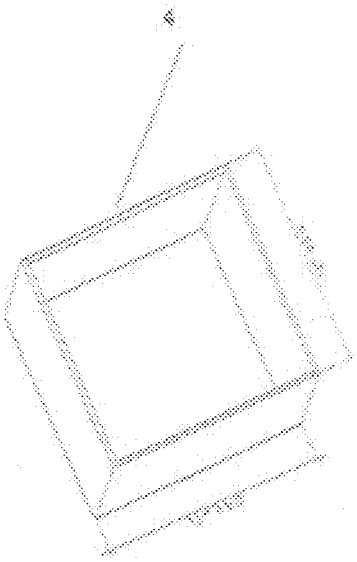


Fig. 22

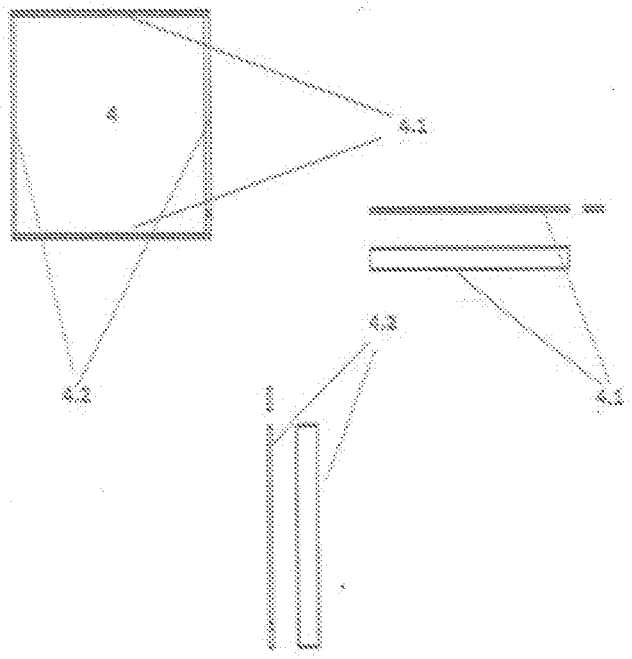


FIG. 23

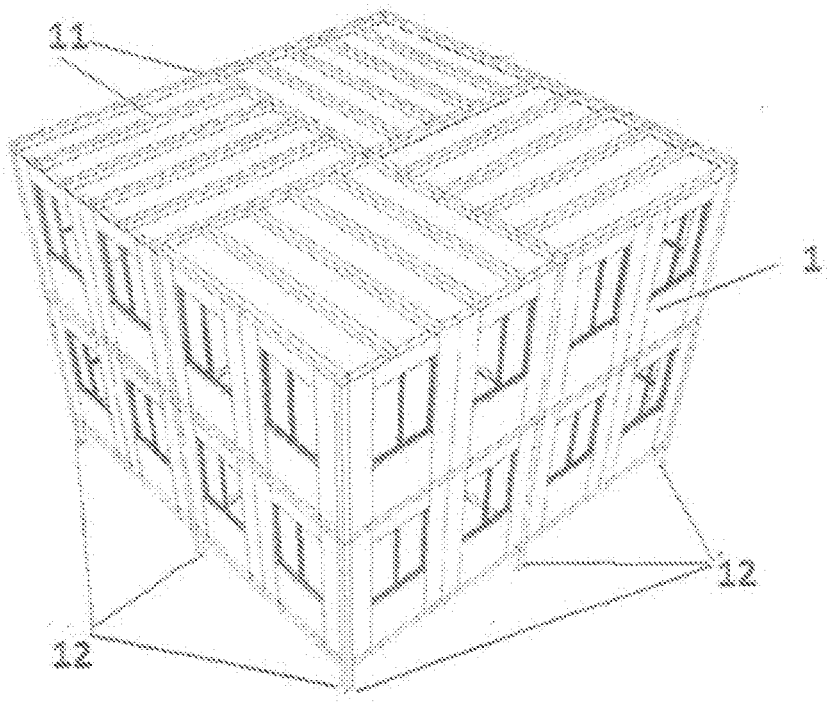
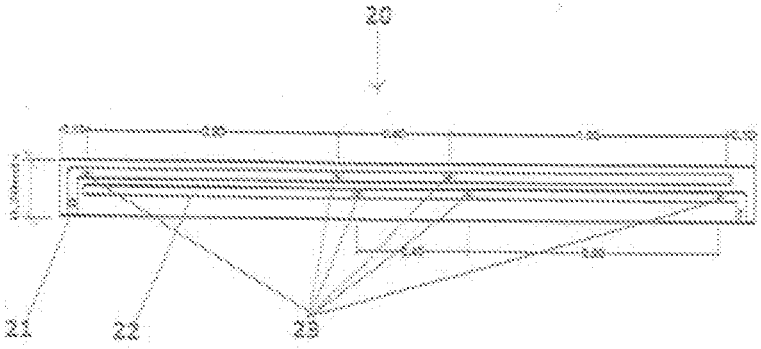
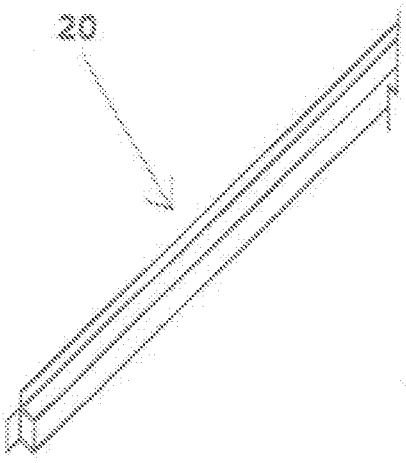


Fig. 24





MODULAR ARCHITECTURAL CONSTRUCTION SYSTEM COMPRISING UNIVERSAL INTERCONNECTABLE PARTS

FIELD OF THE INVENTION

[0001] The invention pertains to prefabricated construction. More specifically, the invention pertains to modular construction.

DESCRIPTION OF THE RELATED ART

[0002] The modular construction system described in this document differs from the system developed in patent 7695 in that another connector concerning patent 7695 is used. This is basically a connector that allows the system to work with an artificial floor (**11**) and not necessarily with a concrete slab, and at the same time it allows for building two floors with the kit's double-size connector (**12**), and then this structure that adds the universal wall panels of patent 7695 may be assembled, but with substantial improvements in its characteristics until a second floor is built. There are supporting parts for the artificial floor structure (**15**), which is additionally a different way to build the universal wall panel (**1**) based on patent 7695, which now allows for changing the door from right to left or vice versa, as well as the window, without the need to turn the wall panel around, as in patent 7695. However, it is considered to be the same universal wall panel of patent 7695 but improved with certain advantages for internal production, and at the same time it is added the fact that to make this wall panel parts (**2**), (**3**), and (**4**) (FIG. **1**) are built to make the universal wall panels described in FIGS. **1** and **2**, which finally make up the same wall panel, also considering the electrical circuits, but not the water pipes. However, this facilitates production.

DESCRIPTION OF THE INVENTION

[0003] The modular construction system or process of the present utility model application makes the construction of prefabricated houses simpler, more practical, and allows for the assembly a second floor, unlike patent 7695 (FIG. **23**). In addition, this system or process provides a reduction in operating costs. Said procedure consists of the following components: WALL PANELS, SINGLE-SIZED AND DOUBLE-SIZED CONNECTORS, A UNIVERSAL WATER BOX SYSTEM, AND LOCKING ANGLES for assembly. They all are completely identical to one other, that is, each component has a unique or standard shape, in order to optimise the process and facilitate mass production. The characteristics of the construction system that is intended to be patented herein are described below:

a) Universal Wall Panel

[0004] The wall panels have the distinctive feature that they are all identical to one other, as in patent 7695. However, the improvement lies in that this wall panel is at the same time formed of sub-products or parts which are also universal. This allows for quick assembly and is an improvement or refinement of patent 7695, that is, universal from its sub-products, and there is also exterior and interior finishing, as well as the ability to include a door or window by optionally removing the switch box (**4**)/outlet, among others. Furthermore, each one of the wall panels contains a circuit wiring inside, which allows for universality in all of the wall panels.

[0005] This wall panel is a standardised part that is made from universal boxes (**2**,**3**, and **4**), which allows for faster production than the wall panel in patent 7695 but has the same function. Another feature that makes it more versatile is that the built-in water system is now removed and has become another universal part of the kit, since now it is easier to build the wall panel and also to add the water system as two separate components. In the case of electrical conduits of two-storey buildings, the conduit cannot go through the wall connector in the first floor since the wall connector may lose structure. Then, for the wall panels of the first floor, the electrical conduits shall go above the wall connector, always inside the structure and always in the upper part of the wall panel as in patent 7695. In the upper wall panels, it is possible to make the built-in electric links go through the connector, thus optimising the installation speed in the second floor. Furthermore, this wall panel is universal and used to completely assembly the prefabricated house models and other structures for different purposes, that is, the wall panels are universal or standard; therefore, it is possible to connect a wall panel with another wall panel through a universal connector and always fit one another. In addition, the wall panels already structured to allow for the correct functioning of electricity for all of the houses. In this regard, not only does the wall panel have holes, but also water pipes and electrical conduits, as well as switches, outlets, among other things, in addition to doors and windows, which shall have a fixed position (by default) on all manufactured wall panels. All wall panels are sized 2.40-m high, 3-m long, and 10-cm thick. All power, water and drainage connections are pre-installed and can be used or left unused as needed. This approach allows for mass production and optimal manufacturing speed.

b) Universal Wall Connector (**11**)

[0006] This connector differs in that it is a dual connector, acting as a kit. This second double-sized connector (**12**) is used to build the second floor. This connector consists of a square tubular structure, with holes in fixed positions that allow for the synchronised assembly of the structure so that by using this connector plus the double-sized one it is possible to tie up the floor grid, the columns of one and two floors, and the perimeter frames to finally build a single-sized part, except for the double-sized connector. There is also the possibility of removing the entire upper grid, either in the ceiling of the second floor for that case, or in the upper grid in the case of one-storey buildings. This possibility becomes obvious and simple since the wall connector is designed for said purpose, so the two options are jointly offered.

c) Universal Water System (**20**)

[0007] This part (**20**) of the system kit (FIG. **24**) is a box that houses or holds a cold-water pipe network and a hot water pipe network in parallel form, where the upper pipe (**21**) has an outlet downward diversion on the left side, which is used as network supply; and the lower pipe (**22**) has the same arrangement, but the other way around. This system is designed to be coupled to the wall panel and also has 4 outlets that go into the wall panel (**23**). These outlets have threaded "tee" ends ready to insert some nipples which are also threaded and shall go through the wall panels in case

it is required to use this part. This water system part is also universal and meets any need.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008] Please note that in order to illustrate explanatory figures in this document, it was decided to use certain materials as an example. This does not specify at any time that the system described herein only works with the materials possibly indicated in some figures. In this system or utility model, it does not matter what material is used for manufacturing. The important thing is that it works correctly.

[0009] FIG. **1**: shows a universal wall panel with a different internal structure developed with universal boxes (**2**, **3** and **4**), which allows for a higher manufacturing speed and also allows for changing the position of the door from right to left and vice versa by removing the box (**4**) and window.

[0010] FIG. **2**: another embodiment of wall panel with a door (**9**) and window (**10**) instead of boxes (**4**).

[0011] FIG. **3**: shows an embodiment of the wall panel wherein two parts are removed and replaced by a door in this case.

[0012] FIG. **4**: another embodiment with two windows (**10**) replacing two parts or boxes (**4**) in the wall panel (**1**).

[0013] FIG. **5**: the same wall panel in front view showing composition of universal boxes (**2**, **3**, and **4**), improved power circuit (**6**) in the boxes (**2**) that make up the wall panel and upper tie-down strips (**5**) that make up structure for the wall panel, and a bottom tie-down strip having the same function (**8**).

[0014] FIG. **6**: shows a wall connector (**11**) and its two opposite sides (**11.1**) and (**11.2**).

[0015] FIG. **7**: shows the wall connector plant view, where a square section and sides (**11.1**) and (**11.2**) that are opposite to each other can be seen.

[0016] FIG. **8**: shows position dimensions of connector holes on sides (**11.1**) and (**11.2**) respectively.

[0017] FIG. **9**: shows a double-sized pipe having two opposite ends (**12.1**) and (**12.2**) with a length difference of 5.40 metres.

[0018] FIG. **10**: shows the same double-sized wall connector and its two opposite sides (**12.1**) and (**12.2**).

[0019] FIG. **11**: shows an assembly embodiment of wall connectors (**11**) and (**12**) in front view, where the position of sides (**11.1**) and (**11.2**) as well as the sides of the double-sized connector (**12.1**) and (**12.2**) are shown.

[0020] FIG. **12**: shows the bolt inserting angles (**13**) that tie the connectors in a typical way to any fastening points.

[0021] FIG. **13**: shows another angle (**14**) with a small variation in the position of the holes (**14.1**), identical on both sides of the angle.

[0022] FIG. **14**: shows long angles (**15**) with two sides (**15.5**) and (**15.2**) to fix floor parts (**17**) (**18**) (**19**), shown in FIG. **16**.

[0023] FIG. **15**: shows an embodiment wherein the connectors (**12**) are locked in for two floors and a typical embodiment (**11**) for one floor through an angle (**13**).

[0024] FIG. **16**: shows typical floor parts for fixed orthogonal spaces which always have the same shape in this system.

[0025] FIG. **17**: shows the box (**2**) assembled by the wall panels, in perspective.

[0026] FIG. **18**: shows the same box (**2**) broken into its parts (**2.1**) (**2.2**).

[0027] FIG. **19**: shows the box (**3**) assembled by the wall panels, in perspective.

[0028] FIG. **20**: shows the same box (**3**) broken into its parts (**3.1**) and (**3.2**).

[0029] FIG. **21**: shows an optional box **4**, in perspective, that can be replaced by doors or windows as required.

[0030] FIG. **22**: shows the same box, broken into its parts (**4.1**) and (**4.2**).

[0031] FIG. **23**: example of embodiment with double-sized wall connectors (**12**) and single-sized wall connectors (**11**) with wall panels (**1**) on the outer side of the building.

[0032] FIG. **24**: shows the water system (**20**) part where two pipes, one for cold water (**21**) and the other for hot water (**22**), and their respective outlets for the wall interior with tee (**23**) ends, and the sides indicating where the water is taken in are shown. A section of a perspective on the other side of the box going to the outer side is also shown.

DETAILED DESCRIPTION OF THE INVENTION

[0033] The modular construction system of the present invention consists of wall panels (**1**), single-sized connectors (**11**) and double-sized connectors (**12**), water system parts (**20**), universally enabled floors (**17**) (**18**) (**19**), floor supports (**15**) and angles with predetermined holes (**13**) (**14**), that is to say, they are all completely identical to one another, fit together in a complementary manner, and are characterised by:

a) Wall Panels (**1**)

[0034] The wall panels have the distinctive feature that they are all identical to one another, that is, universal, and internally consisting of universal boxes (**2**) (**3**) (**4**) with exterior and interior finishing, as well as a section for a door (**9**), window (**10**) by removing the box (**4**) in that case, switches (**7**), among other things. Furthermore, each wall panel contains electrical conduits (**6**) embedded inside which allows for perfect fitting to the other wall panels (**1**), as well as the water pipes through the new universal part of the water system network (**20**). It manages to have a greater number of power points (**7**).

[0035] This wall panel (**1**) is a standardised part made to use the same wall panel to completely assembly several models of prefabricated houses, that is to say, these wall panels are universal; therefore, it is possible to connect the wall panel to another wall panel (through a universal connector), and for it to always fit, in this case, a universal electrical conduit already structured to allow the correct operation of services (power and water) for any house.

[0036] The wall panel works on the first floor, making a small cut at the time of installation to prevent hitting the angle (**13**) (**14**) and provide the connector with a supporting structure. This wall panel can always be made with any type of construction material, for example, concrete, wood, melamine, fibre-reinforced cement, plastic, metal, etc. All the walls are usually 2.40-m high, 3-m long and 10-cm thick; with all of the utility conduits and/or circuits ready to be used, in order to optimise the process and facilitate mass production.

b) Connectors

[0037] This connector (**11**) and a double-sized connector (**12**) as a kit to build a second storey. This connector consists

of a square tubular structure, with holes in predetermined positions that allow for the synchronised assembly of the structure so that by using this connector plus the double-sized one, it is possible to secure the floor grid, the columns of one and two floors, and the perimeter frames. There is also the possibility of removing the entire upper grid, either in the ceiling of the second floor for that case, or in the upper grid in the case of one-storey buildings. This possibility becomes obvious and simple since the wall connector is designed for said purpose, so the two options are jointly offered.

c) Water Network System Part

[0038] This part of the system kit (**20**) is a box that houses or holds a cold-water pipe network (**22**) and a hot water pipe network (**21**) in parallel form, where the upper pipe has an outlet downward diversion on the left side, which is used as network supply; and the lower pipe has the same arrangement, but the other way around. This system is designed to be coupled to the wall panel and also has 4 outlets that go into the wall panel. These outlets have threaded "tee" ends (**23**) ready to insert some nipples which are also threaded and shall go through the wall panels in case it is required to use this part. This water system part is also universal and meets any need.

e) Floor Parts and Floor Fasteners

[0039] Thanks to the universal system altogether, these parts have allowed us to cut these floor plates (**17**) (**18**) (**19**) in only three parts that have a unique and universal way to fill up the spaces among four columns. In our system, these columns are always identical and offer the ability to always create identical spaces. For this, the unique parts that support this floor (**15**) have been created, thanks to the system as a whole.

Example of Embodiment

[0040] A prototype has been manufactured to test the functionality of the system or process as a whole.

What is claimed is:

1. A modular construction system consisting of:

a) at least one wall panel (**1**) interconnected with another wall panel; and

b) at least one wall connector (**11**) uniting the wall panels; distinctive in that

the wall panel (**1**) consists of a pair of horizontal boxes (**3**), wherein the ends of the horizontal box (**3**) are interconnected with a pair of vertical boxes (**2**);

the wall connector (**11**) consists of a hollow square tubular structure with a groove in the upper end; and

also consists of at least one upper tie-down strip (**5**) interconnected with the wall panel and a lower tie-down strip (**8**) interconnected with the vertical boxes (**2**).

2. A modular construction system according to claim **1**, wherein for each pair of vertical boxes (**2**) at least one door (**9**), one window (**10**), another vertical box (**4**) and combinations thereof are mounted.

3. A modular construction system according to claim **1**, wherein each wall panel (**1**) contains inside power wiring (**6**), and each wall panel has an electrical conduit for power wiring (**6**) and its respective outlet/switch (**7**).

4. A modular construction system according to claim **1**, wherein there is a water system (**20**) interconnected with one of the walls (**1**), consisting of an independent box (**20**) that incorporates a hot water pipe network (**21**) and a cold-water pipe network (**22**) in parallel form, and their respective outlets into the wall panel interior through tee connectors (**23**).

5. A modular construction system according to claim **1**, wherein there are floor parts (**17**,**18**,**19**) all interconnected to the wall connectors (**11**) to fill the spaces between the four columns formed among the four connectors respectively.

6. A modular construction system according to claim **1**, wherein the wall connector (**11**) is interconnected with another wall connector (**12**) for the building of a second floor.

7. A modular construction system according to claim **1**, wherein there is at least one connector fastening angle (**13**) to interconnect with the connectors (**11**, **12**), secured by fastening devices (**16**).

8. A modular construction system according to claim **1**, wherein there is at least one connector fastening angle (**14**) to interconnect with the end connectors of the construction system.

9. A modular construction system according to claim **1**, wherein there is in addition one floor fastening angle (**15**) to support the floor parts (**17**, **18**, **19**).

10. A modular construction system according to claim **1**, wherein the horizontal boxes (**3**), the vertical boxes (**4**), the wall connectors (**11**,**12**), the upper tie-down strip (**5**), the lower tie-down strip (**8**), the floor parts (**17**,**18**,**19**) and the fastening angles (**13**,**14**,**15**) have holes in their outer surface to ensure interconnection to each other.

* * * * *