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2,918,151

SELF-SUSTAINING BUILDING UNIT AND WALL

Filed Feb. 15, 1956

3 Sheets-Sheet 1

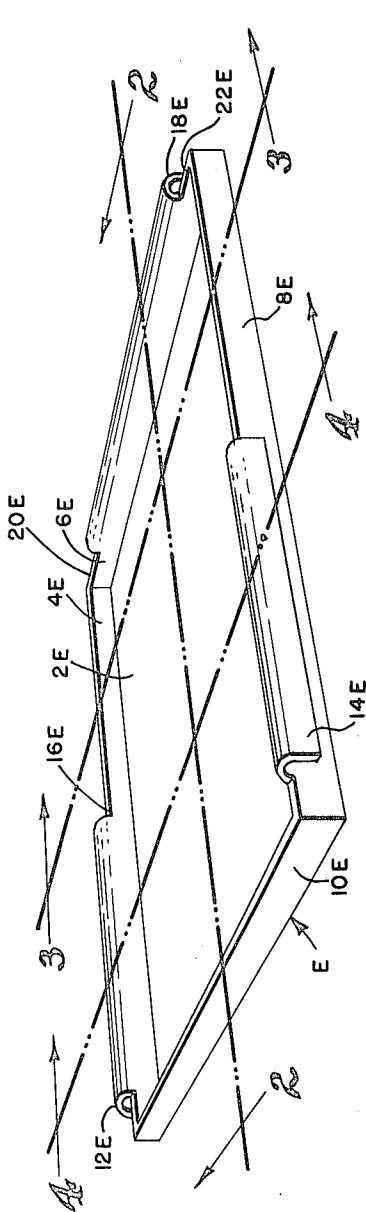


Fig. 1

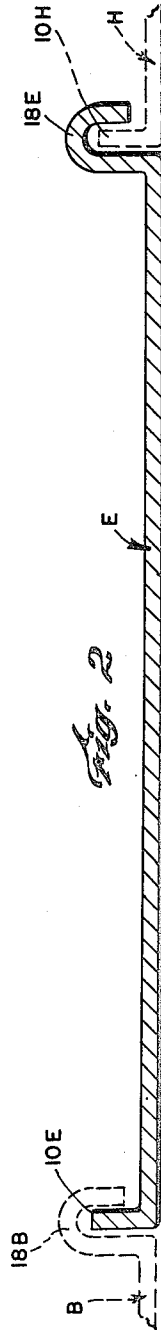


Fig. 2

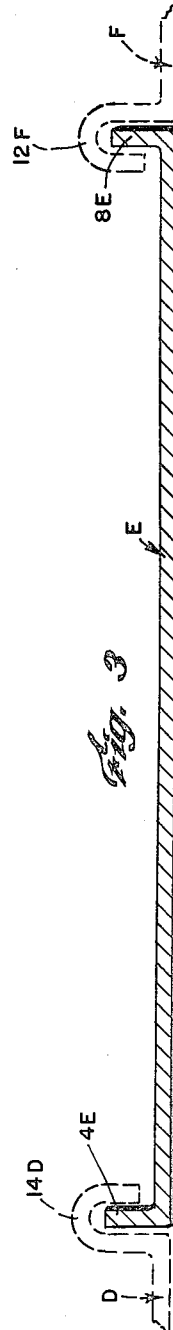


Fig. 3

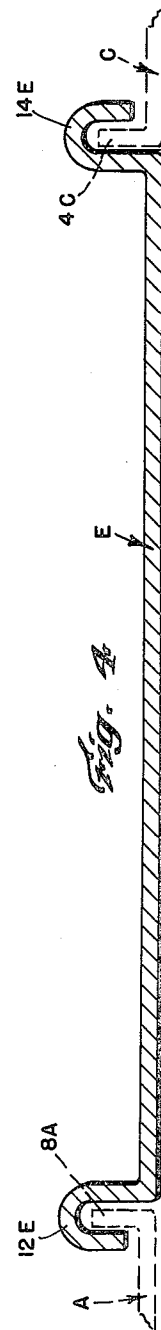


Fig. 4

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3 Sheets-Sheet 2

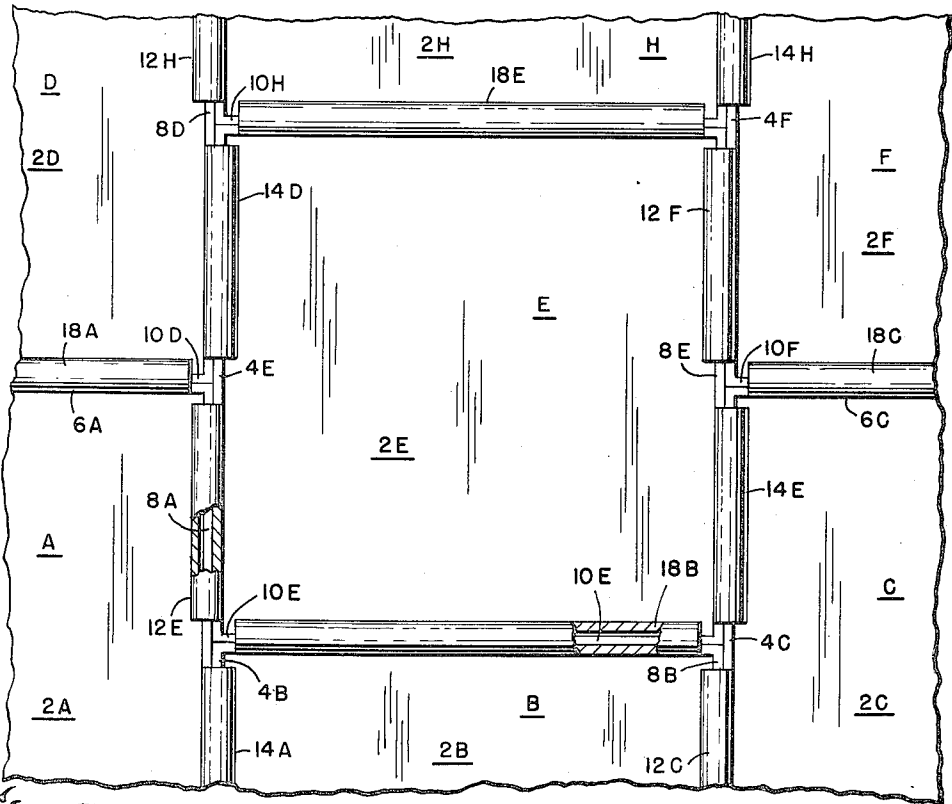


Fig. 7

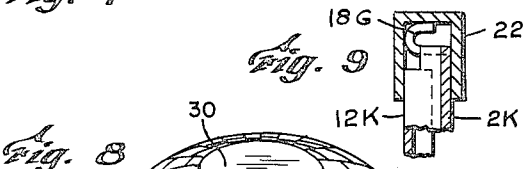


Fig. 8

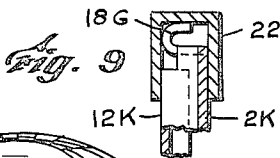


Fig. 9

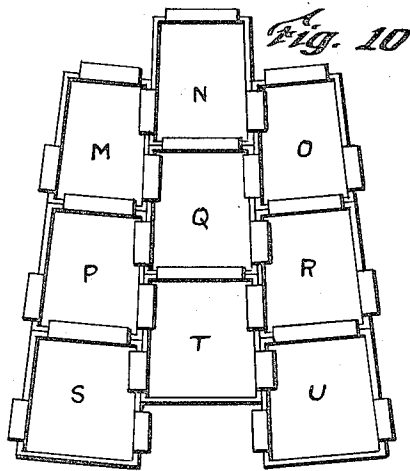


Fig. 10

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3 Sheets-Sheet 3

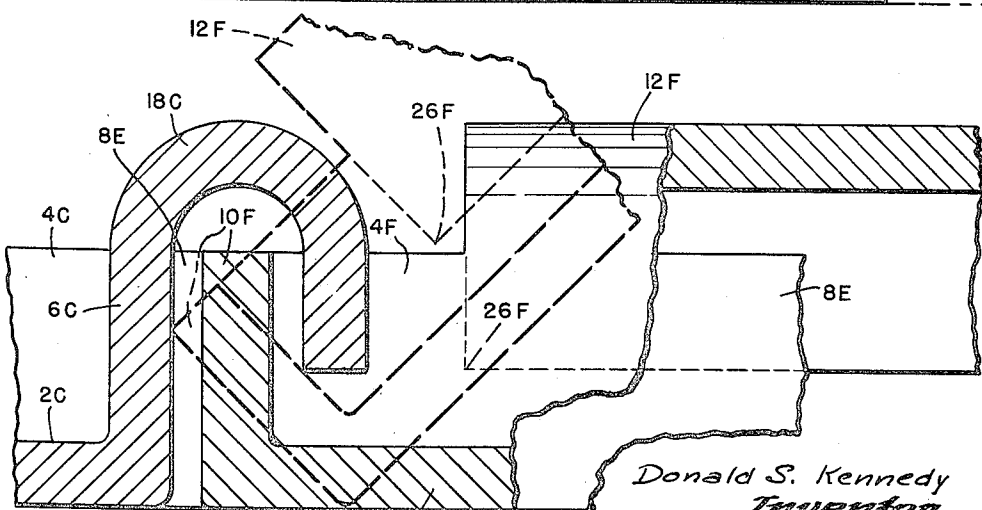
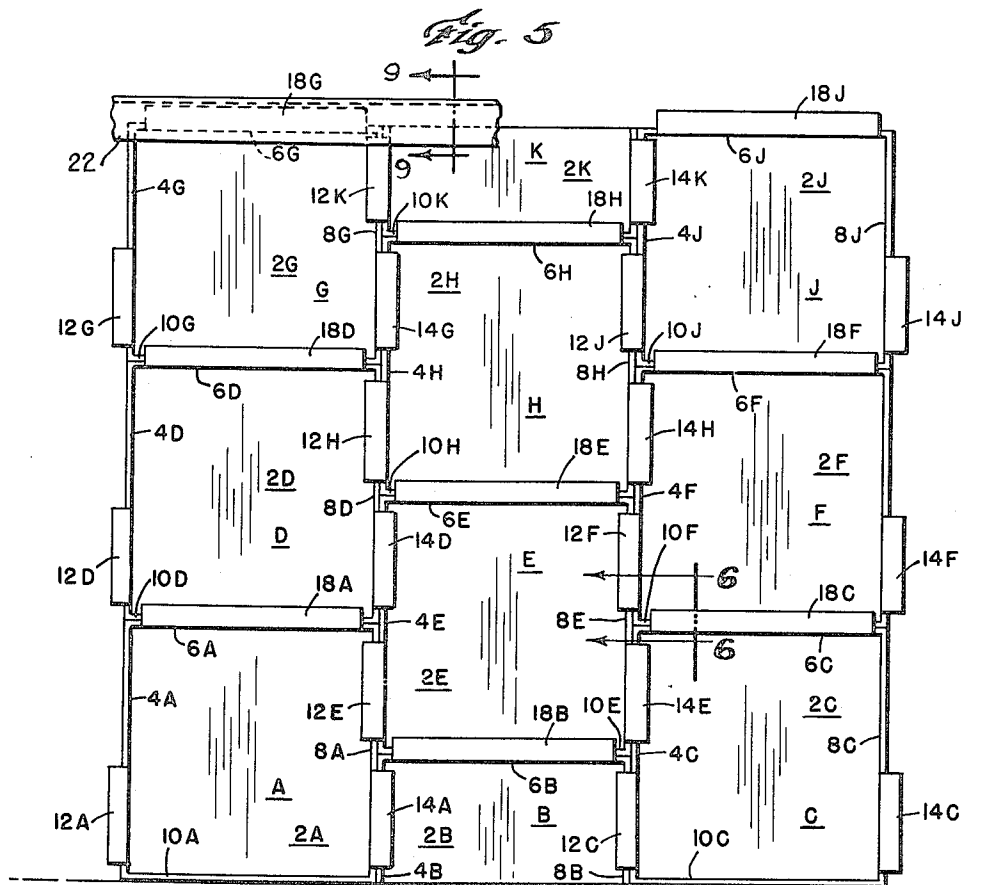


Fig. 6

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SELF-SUSTAINING BUILDING UNIT AND WALL

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7 Claims. (Cl. 189—34)

This invention relates to a building unit of such character and construction that when assembled and interlocked with a plurality of other identical units a surface will be formed which will be self-supporting without requiring other strengthening locking or securing means such as nails, screws, bolts, clips, braces or other elements.

In connection with the housing of certain types of present day technical equipment, particularly in the field of electronics, it is desirable that the housing structure be entirely of materials which will have no adverse effect on the devices therein. One type of material in the form of a building panel that has been found particularly suitable for this type of construction is fibre glass impregnated with a polyester resin producing what is commonly known as fibre glass reinforced plastic. While such types of panels are particularly useful in buildings housing electronic equipment, it has been virtually impossible to organize such panels into complete structures without the use of separate supports and fastening means which ordinarily would be in the form of suitable metallic elements. These metallic elements while capable of holding the reinforced plastic panels together, produce undesirable effects on the electronic mechanism within the structure.

Accordingly, the present invention contemplates that the entire panel including the interlocking portions and the complete structure be of homogeneous materials. In a preferred form this will be fibre glass reinforced plastic but in other instances where other materials might be used without affecting the housed equipment, the panels could be made of sheet metal with the edges shaped to the required interlocking construction. In cases where a homogeneous construction is not necessary, the panels might be made of sheet material, such as plywood, to which properly shaped interlocking elements had been affixed appropriately to the edges of the panels.

A further understanding of the invention will be better understood as the description proceeds with the aid of the accompanying drawings in which

Fig. 1 is a perspective view of a single panel constituting the invention.

Fig. 2 is a vertical section on the line 2—2 of Fig. 1.

Fig. 3 is a vertical section on the line 3—3 of Fig. 1.

Fig. 4 is a vertical section on the line 4—4 of Fig. 1.

Fig. 5 shows a surface or wall formed by assembling a plurality of individual panels in interlocked position.

Fig. 6 is a greatly enlarged view taken in section on the line 6—6 of Fig. 5.

Fig. 7 is an enlarged view of one panel showing in greater detail the manner in which it is connected and interlocked with adjacent panels.

Fig. 8 is illustrative of the manner in which a cylindrical structure can be erected, using panels incorporating the principles of the invention.

Fig. 9 is a section taken on the line 9—9 of Fig. 5 showing means for securing the topmost course.

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Fig. 10 shows a wall formed from a group of trapezoidal panels which could be used in building a spherical wall.

Referring to Fig. 1 there is shown in perspective a single panel preferably of homogeneous material, incorporating all of the elements required for interlocking engagement with adjacent panels. Each panel in a given structure will be exactly like all of the other panels with the exception of certain half panels which are needed in the bottom row to start the structure and in the top row to finish the structure. Additionally, it will be understood that if a tapered or cone shaped structure is to be made, each panel will be in the form of a trapezoid with each ascending course being appropriately narrower than the previous course so as to engage properly therewith. Similarly, if the structure is to be hemispherical in shape, then each course will likewise become correspondingly narrower than the previous course but the vertical lines between the sections will be in the nature of meridians, as shown, for example, in the upper part of Fig. 8.

As illustrated in Fig. 5, each of the panels will be identified as A, B, C, D, E, F, G, H, J and K. All of these panels are identical with the exception of B which constitutes the upper half of any of the full panels and K which constitutes the lower half of any of the full panels.

We will consider the panel shown in Fig. 1 as panel E for purpose of illustration. This panel comprises an imperforate surface 2E having extending upwardly therefrom four walls, 4E, 6E, 8E and 10E, of which walls 4E and 8E are the side walls, wall 6E is the top wall and wall 10E the bottom wall. Integral with walls 4E and 6E are the side hooks 12E and 14E, which are of equal length and commence at a point not far from the bottom wall 10E and terminate at a point 16E which is less than half the way along walls 4E and 8E.

Integral with the top wall 6E is an end hook 18E, which extends along the major portion of the top wall 6E, leaving a slight clearance at each end as at 20E and 22E.

An examination of the several cross-sections, shown in Figs. 2, 3 and 4, will illustrate the wall and hook constructions more particularly and will show how each of the side and end hooks are interlocked with corresponding portions of adjacent panels.

If we consider the panel E of Fig. 1 as it is shown in Fig. 5 it will be noted that it is interlocked with panel B at the bottom, panels A and D at the left side, panels C and F at the right side and panel H at the top. These panel letters have been appropriately applied to the adjacent panels shown in Figs. 2, 3 and 4 in dotted lines at either ends of the sections of panel E and part numbers have been applied to the hooks and flanges of the adjacent panels corresponding to those used in Fig. 1 with the additional letter to indicate the panel to which it belongs. Thus, for example, in Fig. 2 the end hook 18B of panel B overlies and engages the bottom wall 10E of panel E and the end hook 18E of panel E overlies and engages the bottom wall 10H of panel H.

In Fig. 3 the side hook portion 14D of panel D overlies and engages wall 4E of panel E and the hook portion 12F of panel F overlies and engages wall 8E of panel E. In Fig. 4 the hook portion 12E of panel E overlies and engages the upper wall portion 8A of panel A and the hook portion 14E overlies and engages wall portion 4C of panel C.

By further reference to Figs. 6 and 7, showing the structure in greater detail, the interlocking arrangement of the various elements will be more clearly understood.

Considering first Fig. 6 which is a section on the line 6—6 of Fig. 5 it will be observed that the hook 18C

of panel C overlies the bottom wall 10F of the panel F and the side hook 12F, broken away in part, overlies the side wall 8E of panel E. The tilted dotted line structure in Fig. 6 is illustrative of the manner in which during assembly of the elements the bottom wall 10F is brought into position under end hook 18C while the corner 26F of hook portion 12F is enabled to clear the top of wall 8E of the previously installed panel E. The method of assembly will be given in more detail hereinafter.

Referring to Fig. 7, the inter-connecting relationship of the panel E is shown with each of the adjacent surrounding panels. Starting at the bottom, hook 18B of panel B overlies bottom wall 10E. At the left hook 12E overlies wall 8A of panel A and the hook 14D of panel D overlies the upper portion of wall 4E. At the top, the hook 18E overlies bottom wall 10H of panel H. At the right, hook 12F of panel F overlies the upper portion of wall 8E and therebelow the hook 14E overlies the wall 4C of panel C.

From this description, it can be seen that the panel E is secured on all four sides to adjacent panels and the interlocking is such that panel E cannot be moved out of its position with respect to the other surrounding panels. If an attempt is made to push panel E through the wall, as viewed in Fig. 7, such motion would be prevented by the hooks 12E, 14E and 18E, engaging walls 8A, 4C and 10H. Conversely if an attempt were made to push the panel toward the viewer, such motion would be resisted by the hooks 14D, 12F and 18B, engaging the walls 4E, 8E and 10E. Likewise by inspection it will be seen that it would be impossible to rotate panel E about its vertical or horizontal axis.

With the immovability of panel E with respect to its neighbors established, it follows that each of the other panels is equally immovable with respect to its neighbors and consequently it will be seen that a self-sustaining wall can be erected requiring no additional connecting or supporting elements.

As can be seen from Figs. 5, 7, 8 and 10, all of the individual panels are staggered with respect to adjacent panels and therefore, on the bottom or starting row of panels, it is necessary that a series of half panels be provided. One such panel is shown at B in Fig. 5, which half panel is identical with the top half of any of the full sized panels. Similarly, when the top of the structure is reached there will of necessity be a series of half panels, one of which is shown at K, which half panel is exactly like the lower half of a full sized panel.

In assembling a wall, a section of which is shown in Fig. 5, a series of full sized and half sized panels, such as A, B and C, are connected together and, in one form of structure, may be arranged in a circle, there being enough play between the side hook portions, and the side walls that they engage to permit such arrangement. At the start of the structure, some temporary support may be needed until the interlocking of the second course of panels has commenced. With panels A, B and C in position, the panel E is then brought into position by tilting it sufficiently with its upper edge toward the viewer so that the bottom wall 10E may be hooked under upper hook 18B and the side hooks 12E and 14E will have their lowermost corners clear the walls 8A and 4C. With this achieved the panel E is then swung into vertical position as shown.

Thereafter panel D is brought into engagement with panels A and E by tilting it forward the same as was done with panel E and in a manner illustrated in greater detail in Fig. 6 whereby the bottom wall 10D is brought under hook 18A and hook 14D can clear wall 4E after which panel D is swung to vertical position as shown. Panel F is then installed in the same manner to be in engagement with panels E and C. After this, panel H is installed in the same manner that panel E was installed

after which panels G and J are put into position and finally half panel K is brought into position.

From the foregoing description a section of wall, 3 panels wide, has been built up but it will be understood, of course, that the number of vertical courses in the wall may be of any selected number and, as suggested above, they may be arranged in a circle. If this is done it will be apparent that a cylindrical wall may be established, which is entirely self supporting and the interlocked panels are by the nature of the hook engaging elements prevented from falling either inwardly or outwardly.

As the top of the structure is reached some means for securing the last upper course must be provided. For example, in Fig. 5 panel K while being prevented from falling away from the viewer because of the engagement of hooks 12K and 14K with walls 8G and 4J, nevertheless could fall toward the viewer and accordingly, some means must be provided for securing the last course. This might take the form of an inverted U-shaped ring 22, as illustrated in Fig. 9, which could be dropped over the final upper courses to engage the tops of hooks 18G, 12K, 14K and 18J and the back sides of panels 2G, 2K and 2J.

Another method of finishing off the upper end of the structure would be to have a number of tapered or trapezoidal sections all utilizing the above explained interlocking principles, which would cause the wall to tilt or curve inwardly with the vertical courses converging, as illustrated in Figs. 8 and 10. The center opening, when reduced to a suitable dimension, could then be filled by a single disc of material, such as 30, which would support the inner edges of the final course of whole and half panels. The circumference of panel 30 would have therein a channel of adequate dimensions into which the edges of the final courses would fit in the same manner as shown in Fig. 9.

From the foregoing explanation, it will be seen that the invention consists of a novel type of panel, which provides and permits such interlocking engagement with adjacent panels of like construction as to produce a self-supporting surface or wall, horizontal or vertical. Accordingly, it is my intention to claim the invention in the form of an individual panel of novel construction and a group of interlocked panels forming a structural surface, which may be of unlimited extent and, according to the rectangular configuration of the individual panels, may produce a wall of any desired configuration, as for example, a conical wall, a spherical or hemispherical wall, a cylindrical wall or a plane wall or otherwise.

It will be appreciated from the above explanation that the side hooks and end hook of any panel, as for example hooks 12E, 14E and 18E of panel E could be reduced in length and still be effective to hold the panel in position. However, by making the hooks of generous dimensions, the general rigidity of the structure should be improved. Similarly, the walls that are engaged by the hooks need be no longer than the hooks. That form lending itself to greatest strength and simplicity of manufacture may be utilized.

It is my invention to cover all changes and modifications of the example of the invention herein chosen for purposes of the disclosure which do not constitute departures from the spirit and scope of the invention.

I claim:

1. A free standing wall comprising a plurality of identical interlocked building units, each said unit comprising a panel having an upstanding flange at each side thereof, two of said opposed flanges having inverted U-shaped elongated extensions located entirely between the horizontal center line and one end of said unit, and an inverted U-shaped elongated extension on the other end of said unit remote from the two first mentioned extensions, said three elongated extensions forming three hooks which overlie corresponding flange portions on three separate adjacently positioned units in which two of said

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separate units are on opposite sides of said unit and staggered with respect thereto and said third separate unit is aligned with said unit.

2. A free standing wall comprising a plurality of identical interlocked building units, each said unit comprising a four-sided panel having thereon three hook members, each hook member comprised of an upstanding flange portion and a downturned extension, one hook member being at one end of said panel and the other two hook members being at the sides remote from said one hook member and beyond the longitudinal center point of said sides, three wall sections, one wall section being on the other end of said panel opposite said one hook member, and the other two wall sections being at the sides between said one hook member and said center points, said hook members overlying and engaging the cooperating wall sections of three separate adjacently positioned units.

3. A free standing wall comprising a plurality of identical interlocked building units, each said unit comprising a four-sided panel having an upstanding wall about all four sides, two oppositely disposed hooks, each hook comprising a portion of said wall and a downturned extension thereof, the length of each hook being less than one half the length of said wall and located on one side of the mid-point of said wall, and a third hook on the side of said panel remote from said two hooks, said third hook comprising a portion of the wall on said remote side and a downturned extension thereof, said hooks being in engagement with walls of three other identical units positioned adjacent thereto.

4. A free standing wall as set forth in claim 3, said third hook of each unit extending along the length of said remote side for a major portion thereof.

5. A free standing wall comprising a plurality of identical interlocked building units, each said unit comprising a four-sided panel with four upstanding walls extending about the periphery of said panel, first and second hook portions on two of said opposed walls, said first and second hook portions formed by extensions of

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said walls extending outwardly and downwardly away from said panel and disposed entirely on the same side of the longitudinal center point of each of said walls, and a third hook portion attached to that wall which is the more remote from said opposed hook portions, said third hook portion also formed by an extension of said remote wall extending outwardly and downwardly away from said panel, said first and second hook portions engaging walls of two other identical units and said third hook portion engaging the wall of a third identical unit spaced from said two other units.

6. A wall comprised of a plurality of similar building units assembled in adjacent vertical courses, each of said units having a four sided panel, four upstanding walls connected to the four sides of said panel, three of said walls having hooks thereon and the fourth wall being a free wall, side hooks attached to opposed side walls and being on the same side of the longitudinal center points of said side walls, those portions of the side walls on the other side of said center points constituting free side wall sections, and a third hook on that wall that is remote from said free wall and said opposed side hooks, said opposed side hooks overlying the free side wall sections of the side walls of two adjacent units, the third hook overlying the free wall of another adjacent unit, the said free wall of said unit being engaged by the overlying hook of another adjacent unit and each free side wall section of said opposed walls of said unit being engaged by a side hook of another adjacent unit, each of said hooks comprised of a downturned extension on the outer side of its respective wall.

7. A wall as set forth in claim 6 in which alternate vertical courses contain half units at the top and bottom of said wall.

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