

[54] **MODULAR BUILDING PANEL HAVING
INTERLOCKING EDGE STRUCTURE**

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[56] **References Cited**

UNITED STATES PATENTS

2,644,552	7/1953	MacDonald	52/588 X
2,589,633	3/1952	Shepherd	52/620
2,142,305	1/1939	Davis	52/589

2,175,579	10/1939	Stratton	52/589
2,613,768	10/1952	Gillett	52/580

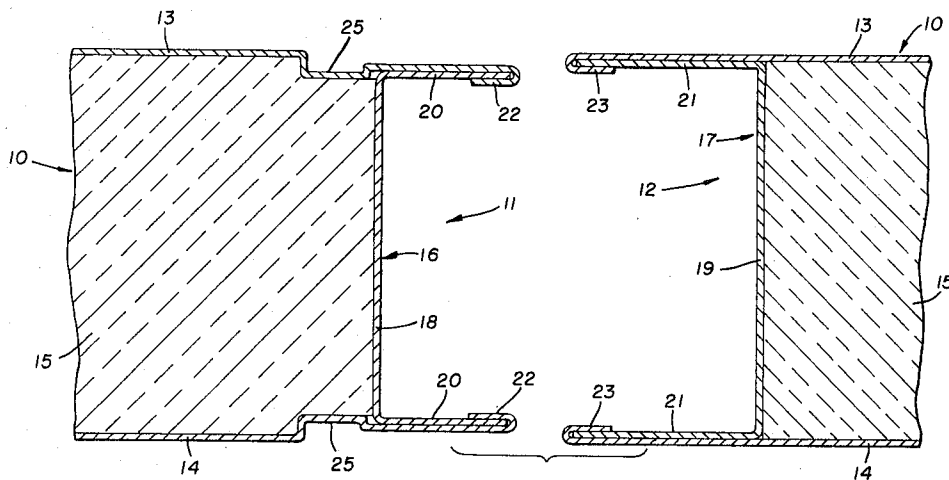
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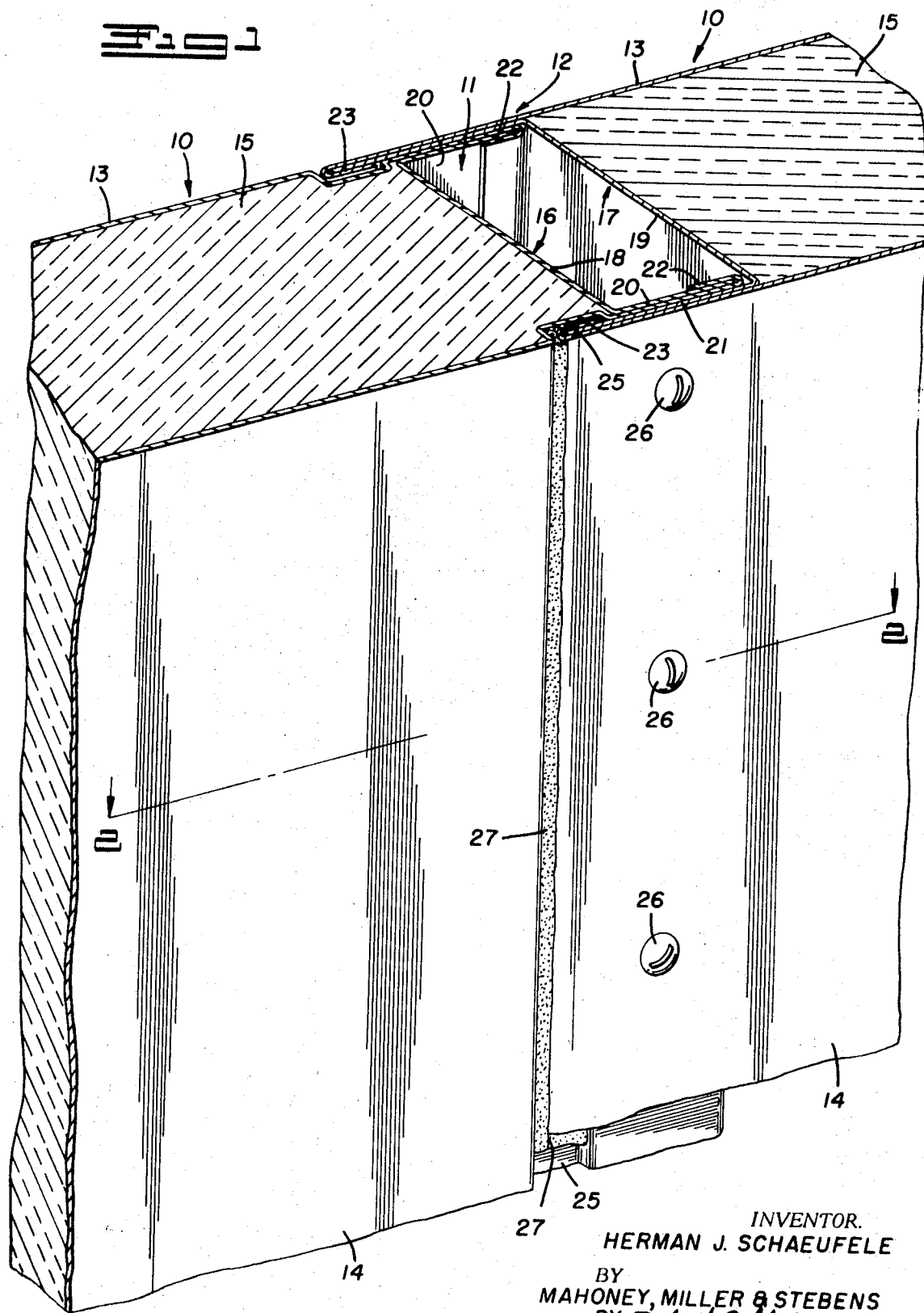
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[57] **ABSTRACT**

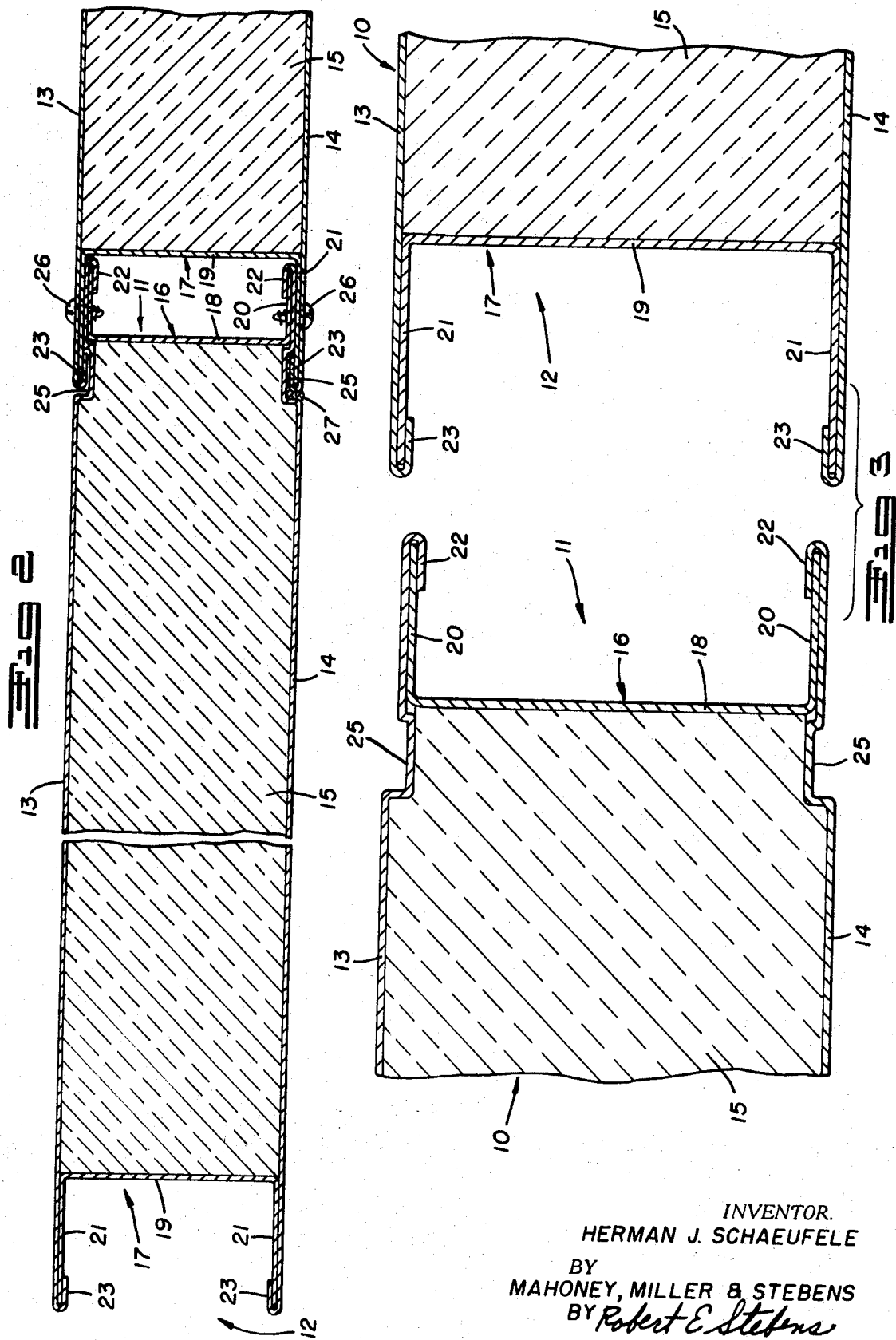
A building panel is provided for modular construction where a plurality of such panels are assembled in edge-wise relationship to form a structural barrier such as a wall. The panels are formed with opposed, longitudinally extending marginal edge portions of tongue and socket configuration that interfit in interlocking relationship with mating marginal edge portions of adjacently disposed panels. The tongue configured edge portion is provided with an outwardly opening, longitudinally extending groove spaced a distance inwardly from the edge and the socket-forming edge portion is provided with an inwardly directed bead that cooperatively interengages with the groove to interlock two adjacently disposed panels in assembled relationship.

6 Claims, 3 Drawing Figures





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MODULAR BUILDING PANEL HAVING INTERLOCKING EDGE STRUCTURE

BACKGROUND OF THE INVENTION

Construction of modular-type building structures generally utilizes a plurality of panels assembled in edgewise relationship to form a wall or partition. An example of the type structure to which the panels of this invention are particularly applicable is an equipment housing such as may be used for air conditioning equipment. In this type of structure, the panels, as in accordance with prior art practice, are double-walled sheet metal with the interior space substantially filled with a thermal insulating material. Assembly of several panels into a composite wall in accordance with prior art practice requires auxiliary panel interconnecting components as the panels are merely fabricated to be placed in edge abutting relationship. The most common interconnecting component for such panels is an H-shaped beam that is disposed between two adjacent panels with the longitudinal marginal edge portions of the panels projecting into the respective channels at opposite sides of the H-shaped beam. A number of fastening devices such as sheet metal screws are usually inserted through one flange of the beam and the respective panel to form a rigidly secured assembly. It is also necessary to utilize a sealing or caulking compound at the juncture of each panel and H-shaped beam to attain an air or fluid-tight joint as is required for air conditioning equipment housings where these housings also form a part of the air conduit system.

Three notable disadvantages of such prior art structures are the added expense of providing and installing the H-shaped interconnecting beam, the difficulty in attaining an air-tight seal with caulking compound that must be placed in a blind hole and the tendency for a wall comprising several panels to be of a greater length than that predicted by actual panel and assembly dimensions. In assembly of a wall, a bead of caulking compound is placed in the bottom of a channel of an H-shaped beam at one corner and a satisfactory seal is anticipated as the panel is edge-wise inserted into this channel. However, unless the bead of caulking compound is of a substantially uniform dimension and without breaks, and the panel is inserted to the proper depth, there is a substantial possibility that there may not be a satisfactory air-tight seal. Improper depth of insertion leads to the third listed disadvantage of "growth" and may result from an improper caulking bead as well as assembly errors since there is no visible reference to determine proper depth of insertion. If a panel is not fully inserted, it will be readily seen that the assembled dimension of a panel and interconnecting H-shaped beam may exceed the predicted design dimension.

BRIEF DESCRIPTION OF THE INVENTION

Building panels fabricated in accordance with this invention comprise pairs of sheet metal skins secured together in spaced parallel relationship following the prior art practice but the opposed longitudinal marginal edge portions of each panel are formed as mating tongues and sockets for interfit in assembled relationship with adjacent panels. In addition to the interfit of the tongue-forming longitudinal marginal edge portion of one panel with a channel-form socket in the longitudinal marginal edge portion of an adjacent panel, the

sheet metal skins forming the surfaces of the panels are provided with an interfitting bead and groove providing an interlock as to adjacent assembled panels. The bead and groove are formed in the marginal edge portions of the panels and also extend parallel to the longitudinal edge so as to interlock when two adjacent panels are assembled. The tongue and socket construction forms integral columns or beams which eliminate the need for auxiliary components such as the prior art H-shaped beams, thereby resulting in simplification of assembly with consequent cost reduction. Of equal importance is the fact that an air-tight seal may be readily attained by placing a bead of caulking compound in the groove of the panel skin prior to assembly. Interlocking therewith of the bead formed in the adjacent panel provides visual assurance of the effectiveness of the seal and readily permits correction where necessary. The interfitting bead and groove also provides a positive control as to dimensional length of assembled panels within the tolerances of manufacture thereby preventing "growth."

These and other objects and advantages will be readily apparent from the following detailed description of an embodiment of the invention and the accompanying drawings.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of a fragmentary wall section comprising a pair of adjacently disposed panels embodying this invention.

FIG. 2 is a horizontal sectional view taken along line 2-2 of FIG. 1.

FIG. 3 is an enlarged horizontal sectional view of the interfitting marginal edge portions of two adjacent panels prior to assembly.

DETAILED DESCRIPTION OF AN EMBODIMENT OF THE INVENTION

A fragmentary portion of a vertically disposed wall is shown in FIG. 1 with the wall section comprising a pair of building panels 10 fabricated in accordance with this invention and adjacently disposed in assembled relationship. Each of the building panels 10 comprises an elongated structure which in the illustration is disposed in a vertical plane with the longitudinal axis thereof also vertically oriented. As is the usual practice with modular-type building construction each of the panels 10 are of a length and width as dictated by the specific construction requirements. Since the invention resides in the interfitting relationship of two adjacently disposed panels only fragmentary portions of the right and left marginal edge portions of two adjacent panels are shown in FIG. 1. The two edge portions are designated respectively as the tongue 11 and socket 12 and it will be understood that each of the panels would be formed with an opposed marginal edged portion of the opposite tongue or socket figuration. With respect to the illustrated embodiment it will be seen that the panel at the left side of FIG. 1 would also have a socket formed along its left vertical edge (not shown) while the panel at the right of the drawing would have a tongue configured marginal edge portion formed along the right side thereof (also not shown). Specific configuration of the upper and lower end portions of each of the panels does not form a part of this invention and the ends are not illustrated or described. It will be understood, however, that the upper and lower end portions would be

configured to inter-fit with respective mating structural elements to complete a unitary modular housing.

The illustrated panels 10 are of a thermally insulating type fabricated with two spaced apart, sheet metal skins 13 and 14 with a space between the two skins being substantially filled with an insulating material 15 having the desired thermal characteristics for a particular installation. This insulating material does not form a structural element of the panels and therefore, may be omitted in constructions where thermal insulation is not required. However, when utilized, the insulating material 15 is preferably uniformly distributed throughout the interior of the panels to provide uniform thermal insulation.

Referring to FIGS. 2 and 3, it will be seen that the tongue 11 and socket 12 are configured to interfit in interlocking relationship. Formation of the tongue and sockets 11 and 12 is substantially similar in that channels 16 and 17 extending the length of the panels are positioned in the respective marginal edged portion of each between the metal skins 13 and 14. Both channels 16 and 17 are similarly oriented in that the open side of each faces outwardly of the panel thereby positioning the respective interconnecting webs 18 and 19 a distance inwardly from a terminal edge of the skins 13 and 14. The respective flanges 20 and 21 are disposed in parallel contacting engagement with the inner surfaces of the skins 13 and 14 and are secured in fixed relationship to the skins by any suitable technique such as spot welding. Accordingly it will be seen that the rigid interconnection of the skins 13 and 14 with the channels 16 and 17 results in the formation of a self-supporting panel with the rigidity and structural strength thereof being determined by the thickness of the skins 13 and 14 and the thickness of channels 16 and 17. The longitudinally extending extreme edge portions 22 and 23 of the skins 13 and 14 are rolled over and around the respective flanges 20 and 21 and extend a distance along the inner wall surfaces of the flanges thereby forming rounded edge surfaces that facilitate assembly of the tongues 11 and sockets 12 and also enhancing the structural strength of the panel. Another factor affecting structural strength is the material utilized in fabrication of the skins and channels with steel being the most widely utilized material.

Since the tongue 11 of a panel must interfit within the socket 12 of an adjacent panel, the marginal edge portion of a panel in the area of the tongue is preferably of a relatively reduced thickness. The reduction in thickness will be substantially that of the combined thickness of the channel flanges 21 and the respective skins 13 and 14. Thus, with the two panels assembled in interfitting relationship as is shown in either FIG. 1 or 2, the outer surfaces of the skins 13 and 14 in the region of the tongue 11 will be adjacently disposed to the inner surfaces of the flanges 21 of the channel 17 forming the socket of the opposite panel.

Formed in each skin 13 and 14 of each panel are a pair of longitudinally extending grooves 25. Each of the grooves 25 may be formed in the respective skin 13 and 14 as a channel-form recess that opens outwardly of the panel. The depth of each groove is substantially the thickness of the rolled edge 23 which forms a bead and is of a width to receive the respective rolled edge portion 23. By appropriately locating grooves 25 relative to the terminal edge of the tongue 11, the bead-forming rolled edge 23 of the socket 12 will be positioned in the

respective groove when the two panels are disposed in assembled relationship as illustrated in the figures. It will also be apparent that the depth of the channels 16 and 17 of the respective tongues and sockets are dimensioned accordingly to permit the bead-forming edge 23 to interfit and thereby interlock with the respective groove 25 when the panels are properly assembled. Also, while a bead and groove is shown at each side of a panel skin, it will be apparent that one of the interfitting beads and groove may be omitted.

An important advantage of the panel construction of this invention is that the interfitting tongue and sockets 11 and 12 formed in the opposed longitudinal edge portions of each panel serve to dimensionally locate each panel relative to the other when assembled and provide structural strength at the joint between the two panels. The interlocked tongue 11 and socket 12 of each pair of assembled panels 10 forms a structural column or beam capable of supporting axially imposed loads and transverse wind loads in vertical panel installations and transverse loads in the case of horizontal panel installations. Conventional fabrication techniques permit relatively close control of dimensional tolerances such as the dimensions of the grooves 25 and their location relative to the terminal edge of the tongue 11. This control of dimensional tolerance as to the groove 25 in combination with the equally controllable dimensions of the beads 23 results in the desired close control as to interfitting of the tongues and sockets and which in turn prevents the undesirable growth in longitudinal dimensions of assembled panels constructed in accordance with prior art practices.

Assembly of two panels as shown in FIGS. 1 and 2 merely comprises forcing the tongue 11 of one panel into the socket 12 of the adjacent panel to an extent where the beads 23 drop into the respective grooves 25. Assembling of the panels will result in a degree of flexing of the side walls forming the socket 12 since the space between the rolled edge portions 23 will be slightly less than the outer width of the tongue 11. The sheet metal utilized in fabrication of panels of this type readily adapts to and accepts the degree of flexing movement required for interfitting and assembly of the panel.

Additional structural rigidity may be obtained with assembled panels of this invention by mechanically securing together the panels along the overlapping tongue and socket portions 11 and 12. In the illustrated embodiment, a plurality of sheet metal screws 26 are driven through the overlapping portions of the sockets and tongues to rigidly secure together the assembled panels. Other means of fastening may be employed such as welding, although this is not illustrated, through running a weld seam at the juncture of the rolled edge 23 of the socket 12 with the adjacent corner of a groove 25.

Where a fluid-tight seal is required, as in the case of air-conditioning equipment housings, it is possible through utilization of the building panels of this construction to position a sealing element 27 in at least one of the grooves 25. This sealing element 27 may comprise a suitable caulking compound that is placed as a bead in the groove 25 prior to assembly of two adjacent panel sections. Consequently, with the tongues 11 and socket 12 interfitted as illustrated, the bead 23 of the socket will be positioned in the groove 25 and will displace the caulking compound into proper sealing rela-

tionship between the adjacent surfaces. Visual inspection of the completed joint at the groove will thus enable one to determine whether a suitable fluid-tight seal has been obtained. Should there be breaks or openings along the joint as evidenced by an absence of the sealing compound it is possible to readily remedy and correct the error through addition of additional caulking compound at the appropriate points. Application of a caulking compound to obtain the fluid-tight seal is only required at the interfitting bead and groove at the one side of the panels as is shown in the several figures of the drawings. Also, this sealing element may take the form of a gasket that may be applied either in the field at the time of assembly of the panels or in the factory at the time of their fabrication.

The preceding description of a specific embodiment of this invention has been directed to planar panels as shown in the accompanying drawings. It will be understood that the advantageous tongue and socket configuration shown incorporated with the planar panels may be readily adapted to other modular building sections such as corner or angle structures and may also be utilized in other than a vertical plane. For example, the panels may be applied in the form of a horizontal ceiling or roof section with the interfitting tongue and socket 11 and 12 providing adequate structural rigidity to form a self supporting surfacing member.

It will be readily apparent from the foregoing description of an embodiment of this invention that a novel building panel is provided for modular construction having a novel tongue and socket construction greatly facilitating assembly of panels resulting in economy of fabrication and assembly. In addition, the novel tongue and socket construction enables a relatively close dimensional tolerance to be maintained in assembly of several panels and readily permitting visual inspection to determine the existence of a fluid-tight seal as between adjacent panel sections. Also, the assembled tongue and socket portions materially add to the structural strength of an assembly of the panels of this invention.

Having thus described this invention, what is claimed is:

1. An interlocking building panel comprising opposed, sheet form surface skins secured together in structurally rigid relationship forming a double-walled panel having opposed, longitudinally extending, marginal edge portions of mating tongue and socket configuration adapted to interfit edgewise in interlocking relationship with a mating marginal edge portion of an adjacent panel, said opposed marginal edge portions having respective bead and groove conformations ex-

tending longitudinally thereof and configured to interlockingly interfit, said groove being formed in the surface skin of the tongue-forming marginal edge portion in inwardly spaced parallel relationship to the terminal edge thereof, and a U-shaped channel extending longitudinally thereof at each respective marginal edge portion and rigidly secured to said surface skins, the channel at one of said marginal edge portions disposed to open outwardly thereby forming said socket to receive the second of said marginal edge portions, the channel at said tongue-forming marginal edge portions disposed to open outwardly and having a web extending transversely between said surface skins immediately adjacent the edge of said groove to prevent relative flexing of said surface skins at said groove.

2. An interlocking building panel according to claim 1 wherein said groove opens outwardly from the respective surface skin, said other marginal edge portion having said bead formed on an inner wall of said socket to interfit with said groove formed in an adjacently disposed panel assembled therewith.

3. An interlocking building panel according to claim 2 wherein said tongue-forming marginal edge portion is of a relatively reduced thickness to interfit in the socket formed in the other marginal edge portion, and said groove is formed at the juncture of said reduced thickness marginal edge portion with a main body portion of the panel and the reduction in thickness of said marginal edge portion being of the order of the thickness of wall portions of said socket in the other marginal edge portion to form a substantially uninterrupted and contiguous skin surface as between two panels assembled into a unitary structure.

4. An interlocking building panel according to claim 3 wherein each of said surface skins is similarly provided with bead and groove conformations.

5. An interlocking building panel according to claim 1 in which the channel at the socket-forming marginal edge portion comprises side walls juxtaposed to respective surface skins with the surface skins folded around the edge of a respective channel wall to form said bead.

6. An interlocking building panel according to claim 5 wherein that portion of the surface skin forming said bead is folded over in a flat configuration against the inner wall surface of said socket with the depth of said groove and relatively reduced thickness of said tongue-forming marginal edge portion cooperating with the bead of the socket-forming marginal edge portion to provide a substantially uninterrupted and contiguous skin surface as between two assembled panels.

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