United States Patent [19]

O'Hanlon

[11] **3,854,260**

[45] **Dec. 17, 1974**

[54] **BUILDING SYSTEM**

[76] Inventor: **Edward J. O'Hanlon,** Lake George, N.Y.

[22] Filed: **May 4, 1972**

[21] Appl. No.: **250,202**

Related U.S. Application Data

[63] Continuation of Ser. No. 854,585, Sept. 2, 1969, abandoned.

[52] **U.S. Cl.** **52/309,** 52/259, 52/285, 52/468, 52/584

[51] **Int. Cl.** **E04c 1/00,** E04b 2/08

[58] **Field of Search** 52/459–468, 52/584, 417, 285, 309, 285, 584

[56] **References Cited**

UNITED STATES PATENTS

3,282,613	11/1966	Axelsonn	52/584
3,417,529	12/1968	Archinal et al.	52/468
3,583,118	6/1971	Lowery	52/417

FOREIGN PATENTS OR APPLICATIONS

37,200	7/1930	France	52/461

Primary Examiner—Henry C. Sutherland
Assistant Examiner—James L. Ridgill, Jr.
Attorney, Agent, or Firm—Pollock, Philpitt, & Vande Sande

[57] **ABSTRACT**

An improved building system of the type having modular sections comprised of a foam-type insulation between skins is made by extending the skins beyond the end of the insulation and forming flanges upon such extensions. The flanged extensions of two wall sections to be joined are brought together and a resilient extrusion is installed around the flanges, thus forming a channel defined by the ends of the insulation, the flanged extension and the extrusion itself. This channel is "foamed-in" with more insulating material to form a rigid structure.

2 Claims, 6 Drawing Figures

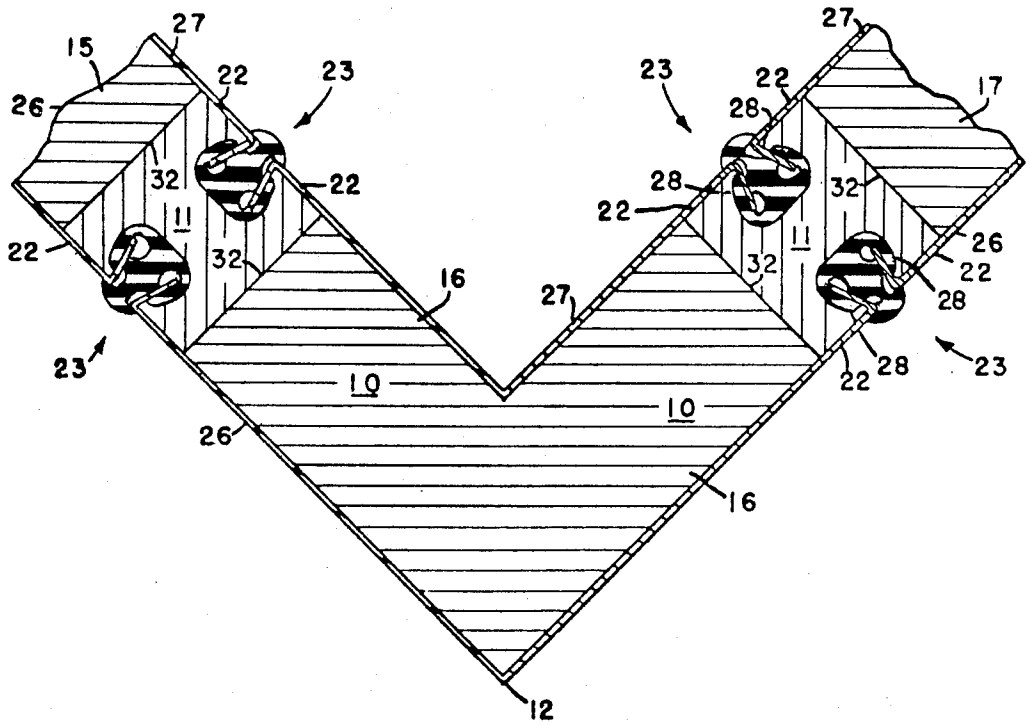
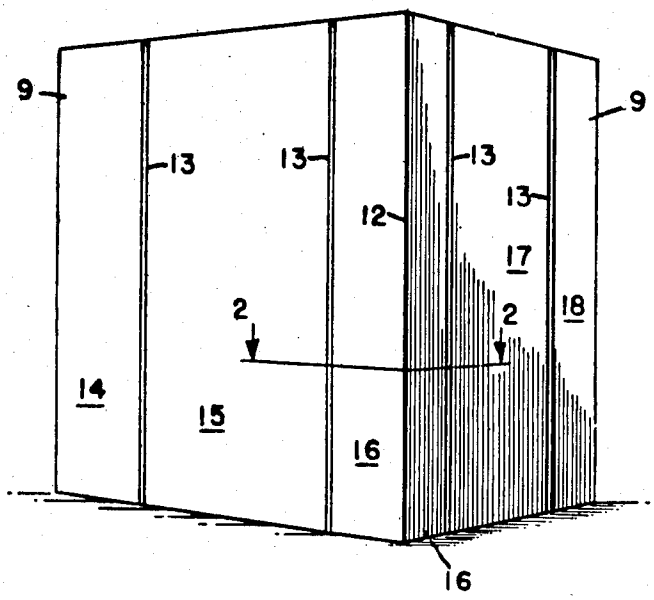


FIG. 1.


9
13
13
13
13
12
17
18
2
2
14
15
16
9
16

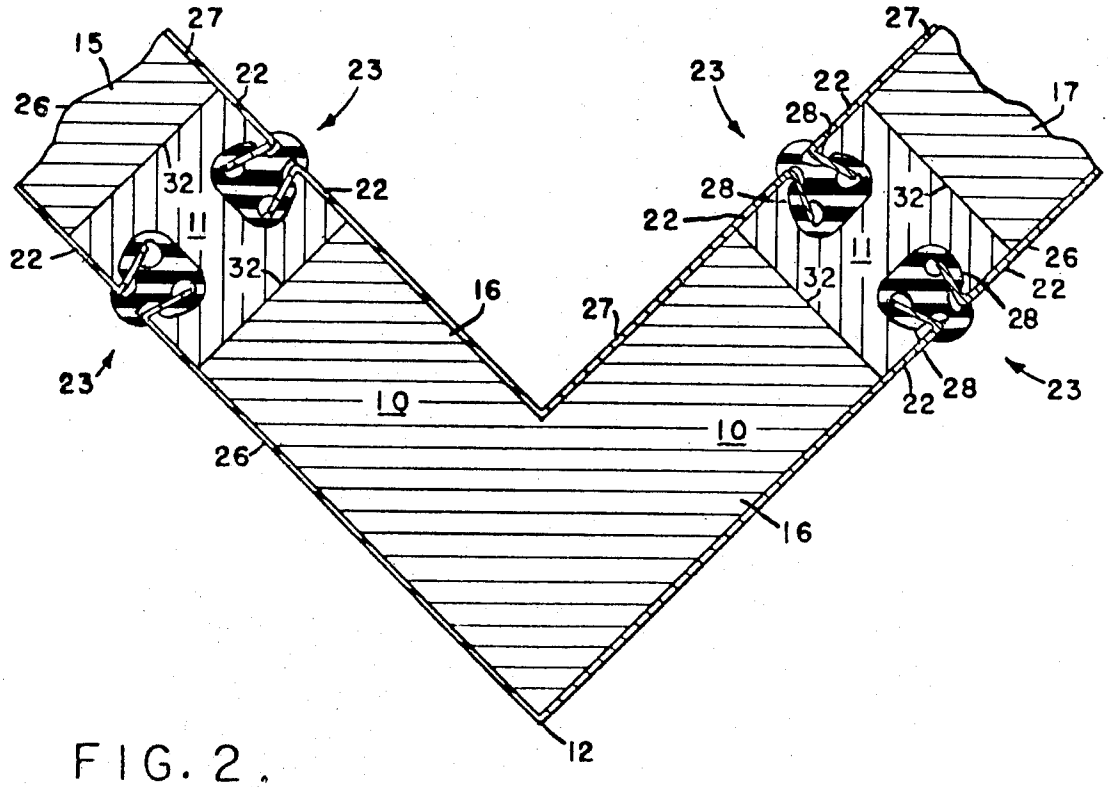

27
15
22
23
26
32
11
22
22
32
16
23
10
26
12
27
23
22
28
17
28
22
32
11
32
26
22
28
27
28
22
23
10
16

FIG. 2.

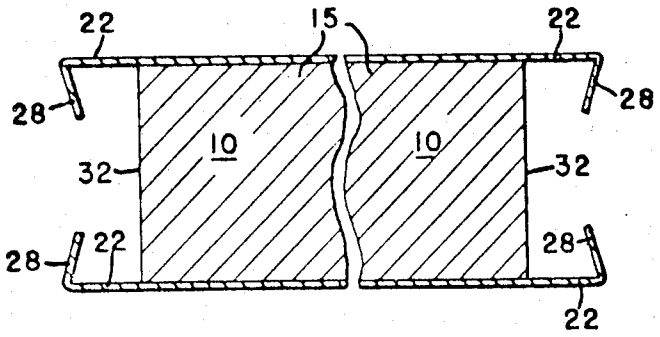


FIG. 3.

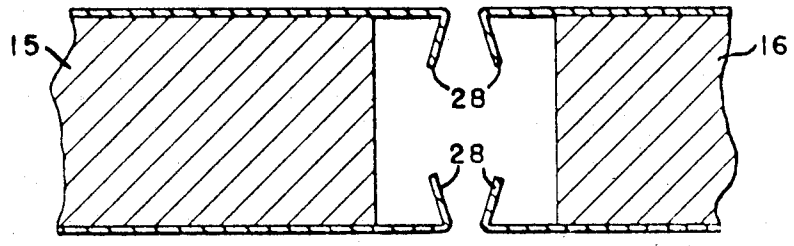


FIG. 4.

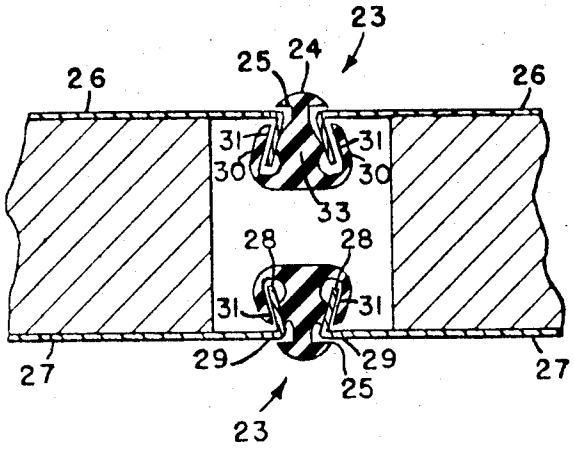


FIG. 5.

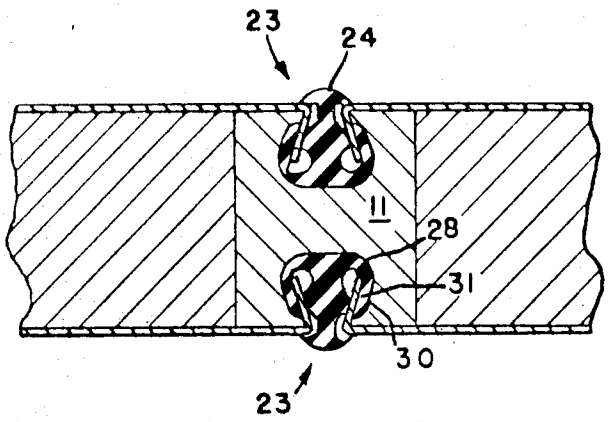


FIG. 6.

BUILDING SYSTEM

This is a continuation, of application Ser. No. 854,585, filed Sept. 2, 1969 now abandoned.

BACKGROUND OF THE INVENTION.

This invention relates to modular building systems and more particularly relates to an improved joint for use in such systems.

The use of prefabricated sections in erecting structures of all types, including walk-in refrigerators, buildings, garages, trailers and the like is common practice today. Various methods have been used to join the sections of such structures, examples of which methods may be found in the following U.S. Pats.: B. I. Blickman, et al, No. 3,252,258; P. S. O'Brien No. 3,367,076; Tillinghast, No. 3,242,625; and N. B. Elliott, et al, No. 3,320,706.

The use of prefabricated sections comprised of a pair of skins separated by a foam-type insulator is becoming increasingly popular, particularly where it is desired to construct a controlled environment structure, such as a walk-in cooler. Naturally, in structures of this type it is highly desirable to have joints which are substantially as well insulated as the rest of the structure. Obviously, if metal bolts or other conductive structures penetrate the joints of such a structure, its insulating qualities are impaired. It is also desirable to have joints which use a minimum number of uniform parts and which are relatively easy to construct at the site of erection of the structure.

Finally, it is highly desirable to have joints which have relatively smooth and easily cleanable exposed surfaces and which do not have pockets or crevices or holes which will tend to collect dirt or other foreign substances. This is particularly important in structures such as refrigerators which are intended to house food and which must constantly be cleaned.

SUMMARY OF THE INVENTION.

It is an object of the present invention to provide a modular building system wherein the assembly of sections may be accomplished by "foaming-in" insulating material into the joints.

It is a further object of the invention to provide a modular building system wherein the sections may be assembled by a foaming process at the site of erection of the structure.

It is a further object of the invention to provide a joint which is hermetically sealed and which is suitable for use in modular buildings, trailers, refrigerators, walk-in coolers, and the like.

It is a further object of the invention to provide a modular building system having joints which are rigid and which have strength sufficient to withstand the forces normally incident upon such joints.

It is a further object of this invention to provide a sealed joint of the type mentioned wherein the penetration of thermally conductive materials through the wall at the joint is held to a minimum.

It is a further object of this invention to provide a joint of the type mentioned which will utilize the pressures created by the expansion of foam-type fillers to hold the various sections together in tight engagement with each other.

It is a further object of this invention to provide a joint of the type mentioned having exterior surface structures which are easy to clean and which offer no pockets or crevices or holes for the reception and collection of dirt and other foreign substances.

It is a further object of this invention to provide a joint of the type mentioned which will be economical to manufacture and relatively easy to construct.

The objects of this invention are carried out by the provision of a flanged member extending beyond the end surface of each section to be joined. A joining member is installed around each pair of corresponding flanges of sections being joined. A filler material is installed so as to be in pressing engagement with the end surfaces, the flanged members and each joining member.

FIG. **1** is an external perspective view of a structure employing the invention.

FIG. **2** is an enlarged sectional view taken along line **2—2** of FIG. **1**, parts being broken away.

FIG. **3** shows a typical building section before assembly.

FIG. **4** shows two sections positioned for assembly.

FIG. **5** is an enlarged view of the ends of two sections with extrusions in place prior to the installation of filler material.

FIG. **6** is an enlarged view of the completed joint.

FIG. **1** shows two walls **9** which meet at corner **12.** These walls are comprised of modular sections **14, 15, 16, 17** and **18** which may be of various sizes and shapes and which meet at joints **13.**

FIG. **2** is a sectional view of FIG. **1** showing a portion thereof in an enlarged view. Sections **15, 16** and **17** are each constructed with inner and outer coverings, **27** and **26** respectively. These coverings are usually made of relatively thin materials such as sheet aluminum and are commonly called "skins." Filler material **10** may be an insulator of any suitable type such as polyurethane. It is desirable to use a filler material which will adhere to skins **26** and **27.** Note that filler material **10** terminates in end surfaces **32.**

Each of the skins has an extension **22** which terminates in a flange **28.** For reasons which will become clear later, it is desirable for the flange to be formed so as to make an acute angle with extension **22.** The joints between the sections shown in FIG. **2** have pairs of corresponding flanges. In other words, a flange upon one section becomes joined with a flange upon the next section. The connecting device in each instance is joining member **23.** This member is preferably an extrusion of a resilient substance such as silicone rubber. It has been found convenient to form such an extrusion in continuous strips which may be stored in rolls. Suitable lengths are cut therefrom as needed.

Holding material **11** is preferably of the same substance as filler material **10.** In fact, when polyurethane is used for both, filler material **10** and holding material **11** become a continuous, homogeneous insulator passing from one wall section to the next without interruption. Holding material **11** may be installed at the site of erection of the structure. Specifically, it has been found very convenient to use a portable foaming unit to foam in polyurethane at the joints as sections are assembled.

In practical application, the erection of adjoining sections of the structure being built proceeds in steps. First, two wall sections such as **15** and **16** are brought together end to end. Then, extrusion **23** is slid over each pair of flanges **28.** Thus, there is formed a channel for the reception of holding material **11.** This channel

is bounded by the end surfaces **32** of filler material **10,** the extensions **22,** the flanges **28,** and the extrusions **23,** partially covering the flanges. Holding material **11** is then foamed in to fill this channel. After the foam sets, the joint **13** becomes rigid and is well sealed.

It should be apparent that the invention can be employed with several variations. For example, the sections used need not be constructed of a foam-type insulator separated by aluminum sheets. Rather, such sections could be hollow so long as they had a structure forming an end surface **32** so that a suitable channel for the reception of holding material **11** is created when sections are brought together end to end. Furthrmore, holding material **11** need not be a foam-type substance but can be any substance which can be installed under pressure and which will either maintain that pressure or which would become suitably hardened so as to hold the various parts of the joint in rigid alignment.

To more fully appreciate the nature and operation of the preferred embodiment of this invention, reference may be made to FIGS. **3, 4** and **5** wherein typical structures are shown at various stages of construction. FIGS. **3,** for example, shows section **15** prior to its being joined with section **16.** As can be observed, there are pockets at each end formed by the end surfaces **32** of the filler material **10,** by skin extensions **22** and by flanges **28.**

FIG. **4** shows parts of sections **15** and **16** placed together end to end. FIG. **5** shows the structure of FIG. **4** with the joining member, extrusion **23,** installed thereon. FIG. **5** also shows the details of extrusion **23.** As can be seen, the extrusion is generally comprised of a core **33** which passes between corresponding flanges and wings **30** surrounding coresponding flanges **28.** Extrusion **23** is seen to be only loosely in place prior to the installation of holding material.

The extrusion has a button **24** having a flat surface **25** for making a tight seal with the exterior of skin **26.** There are also cam surfaces **29** which will force the entire extrusion **23** toward the interior as sections **15** and **16** are moved together. Wings **30** of the extrusion are preferably made flexible and have a flat surface **31.**

FIG. **6** shows the structure with holding material **11** in place. It can be noted that flat surfaces **31** are now in tight engagement with flanges **28.** This is because holding material **11** is installed so as to press against wings **30.** It has been found that using polyurethane for holding material **11** is highly desirable and that the pressures generated by the foaming process during erection are more than adequate to cause tight seal to be made between flat surfaces **31** and flanges **28.**

The structure resulting from the use of the joint above described is one of great strength. It is almost as strong as any other part of the walls shown. Furthermore, it has highly desirable insulating characteristics. There is no metallic or other thermally conductive material penetrating to any great depth in the wall and the joint has become a continuation of the insulation of the sections assembled. The only exposed portion of the joint is button **24.** This presents a smooth, easily cleanable surface which does not have holes or crevices which will collect food particles or other foreign substances.

What has been described is the preferred embodiment of a structure and a method which can be used for joining modular sections of building structures. It will be appreciated that various modifications of this invention can be made without departing from the spirit thereof. It is intended by the appended claims to encompass such variations within their scope.

What is claimed is:

1. In a building construction formed at least in part of thermally insulating panels each formed of a pair of parallel skins and an intervening layer of insulating material, means for joining two such panels in edge-to-edge relationship comprising in combination,

a flange at each edge of said skin interiorly of the panel and formed by the folding of said edge back upon the skin at an acute angle relative thereto,

a pair of separate resilient joining members each adapted to engage the adjoining skins on a respective one of the sides of the two panels to be joined, each said resilient joining member extending over the full length of the edges of said panels being joined,

each said resilient joining member comprising:

a. a central core portion of outwardly diverging cross section lying between and abutting over at least a portion of its opposed surfaces the opposed flanges of the skins on the respective panels to be joined, said central core portion being provided on its outwardly diverging sides with at least one protruding cam element for forcing said joining member inwardly of said joined panels when the panels to be joined are urged toward each other,

b. a first end portion integrally formed with said central core portion at one end thereof and adapted to flushly fit against the juxtaposed skins on the outside of the panels being joined,

c. and a pair of wing portions each also integrally formed with said central core portion at the other end thereof and each adapted to slide and fit behind a respective one of the flanges of the juxtaposed skins internally of the panels to be joined.

2. The combination of claim **1** wherein the space between said skins at the region of the joint between two adjoining panels is filled with polyurethane foam which exerts a force against said wing portions to bring them into intimate contact with the respective flanges of said skins.

* * * * *