United States Patent [19]

Sauer et al.

[11] **3,760,548**

[45] **Sept. 25, 1973**

[54] **BUILDING PANEL WITH ADJUSTABLE TELESCOPING INTERLOCKING JOINTS**

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[22] Filed: **Oct. 14, 1971**

[21] Appl. No.: **189,428**

[52] **U.S. Cl.** **52/593**, 52/309, 52/404, 52/578, 52/588

[51] **Int. Cl.** **E04c 2/34**, E04b 2/32

[58] **Field of Search** 52/578, 579, 588, 52/589, 593, 404, 483, 489, 309, 619

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Assistant Examiner—John R. Masterman
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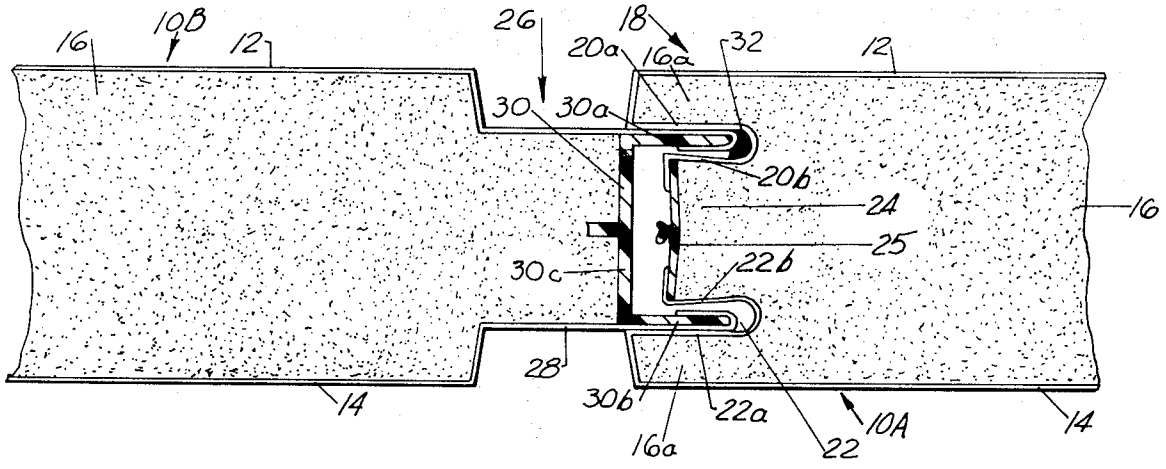
[57] **ABSTRACT**

A building panel construction made up of a plurality of interlocked side-by-side panels. Each panel comprises spaced, parallel front and rear sheets having therebetween an insulating, rigid core element bonded under pressure to the inside surface of the sheets. One edge of each panel is provided with a pair of spaced grooves having a recessed male member therebetween. The other edge of each panel is provided with an edge portion of reduced thickness and an end formed by a channel to form a female member into which a recessed male member of an adjoining panel may project, the outwardly projecting flanges of the channel being received by the spaced grooves on either side of the recessed male member of the adjoining panel.

10 Claims, 3 Drawing Figures



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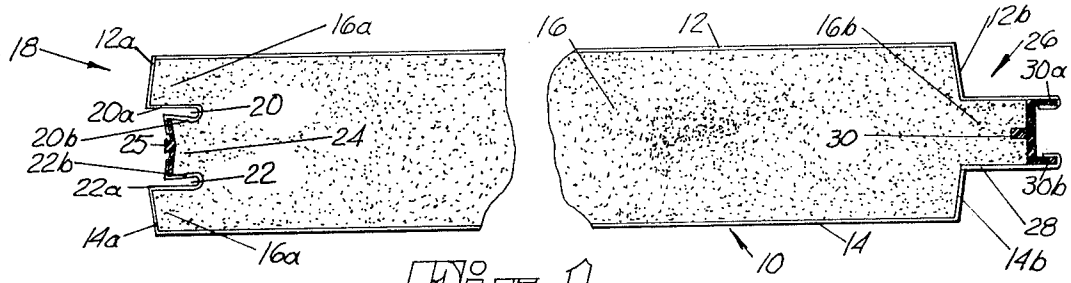

FIG 1

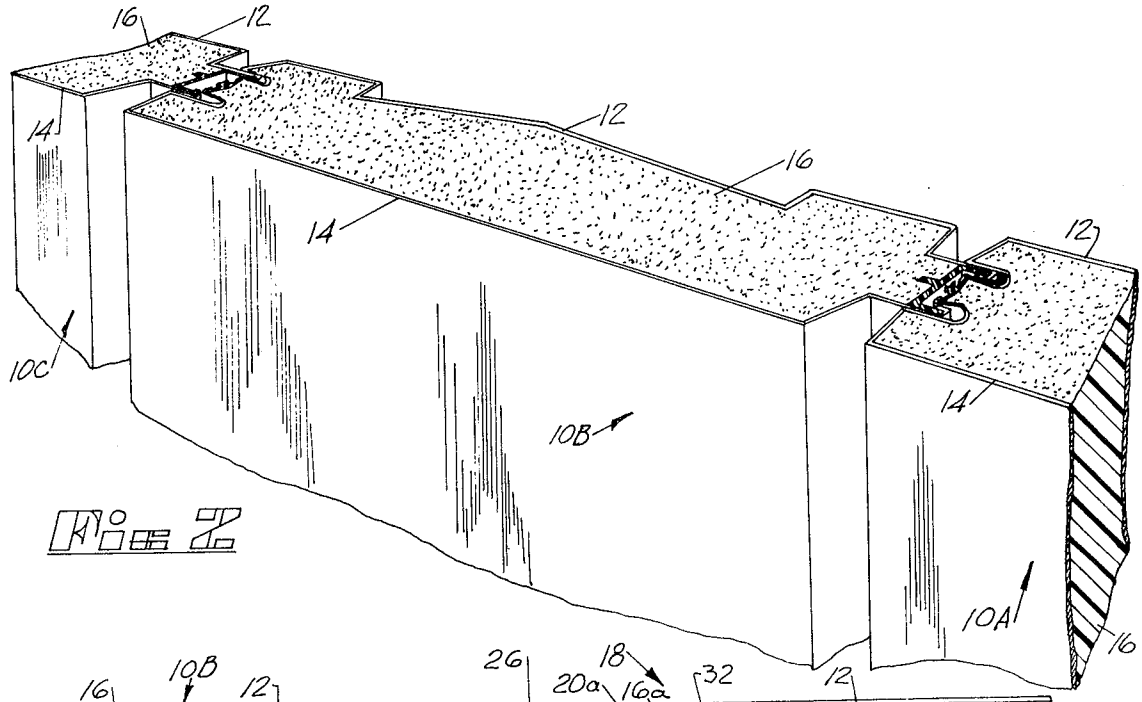

FIG 2

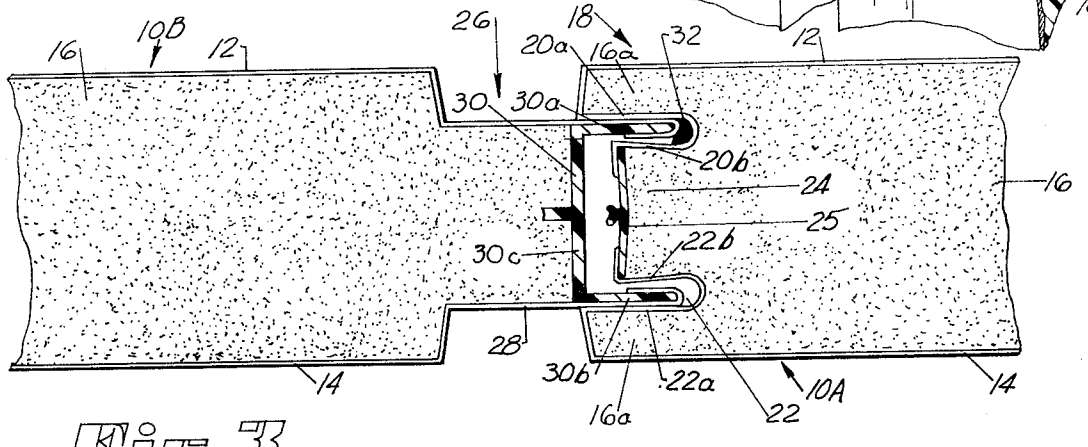

FIG 3

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BUILDING PANEL WITH ADJUSTABLE TELESCOPING INTERLOCKING JOINTS

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to a panel construction suitable for sidewalls and the like for buildings, and, more particularly, it relates to an improved panel edge construction which provides an adjustable, telescoping, interlocking joint between adjoining panels.

2. Description of the Prior Art

In the use of conventional panels for erecting buildings and the like, difficulty has been experienced in obtaining a satisfactory interlocking joint connecting adjacent panels in generally edge-to-edge relationship. While many prior art expedients have proven to be satisfactory in some respects, they have generally proven to be unsatisfactory, in that the edges of adjoining panels are abutted closely and do not allow for contraction or expansion due to temperature changes and variations in alignment, and if such occur, the result is unsightly joint spacing. Additionally, while some prior art expedients have provided interlocking joints wherein the edges of adjoining panels do not abut, they have proven to be unsatifactory because of thermal conduction problems between the front and rear sheets of the panels and because of the extreme difficulty of manufacture of the panels, such as formation in place of the foamed core elements between the sheets of the panels. Examples of such prior art expedients are found in United States Letters Pat. Nos. 3,557,509, in the name of J.F. Blaski, and 3,372,520, in the name of E.E Hensel.

Further, most of the panels and joint designs of the prior art have not permitted variation in thickness of panels without changing the forming rolls on a rolling machine to accommodate each thickness desired.

Accordingly, the building industry is seeking a panel which permits optimum thickness design for specific load, span and thermal requirements, and which will provide ease in maintaining the dimensional module and dimensions for openings, overall size, and appearance, as well as ease and economy of manufacture and erection, while at the same time, permitting limited movement to maintain module and weather tightness.

SUMMARY OF THE INVENTION

The present invention provides a building panel construction made up of a plurality of interlocked side-by-side panels. Each panel comprises spaced, substantially parallel, front and rear sheets having therebetween an insulating, rigid core element bonded under pressure to the inside surface of the sheets. One edge of each panel comprises a pair of spaced grooves having a recessed male member therebetween. The end of the male member may be provided with a protective strip. Each of the spaced grooves is formed by an end portion of one of the sheets, the end portion being bent inwardly and engaging an edge portion of the core element, and then inwardly and outwardly to form a groove of generally U-shaped cross-section having outwardly extending flanges generally parallel to the sheets. If a protective strip is used, the flange of the groove closest to the recessed male member is lapped over one edge thereof. The other edge of the panel is provided with an edge portion of reduced thickness, the end portion of the sheets at said other edge of the panel being bent and offset inwardly and engaging an edge portion of the core element. The end of the panel edge of reduced thickness is formed by a channel of generally U-shaped cross-section having outwardly extending flanges engaging inner surfaces of the end portions of the sheet and being engaged by 180° bent end portions of the sheets to form a female member into which a recessed male member of an adjoining panel may project, the 180° bent end portions engaging the flanges of the channel and being received by the pair of spaced grooves on either side of the recessed male member of the adjoining panel such that the end of each edge portion of the adjoining panel formed by an end portion of the front and rear sheets is substantially aligned with the base of the channel.

Accordingly, an improved building panel construction is formed comprising a plurality of panels disposed in side-by-side relationship having interlocking and telescoping joints therebetween in which the edges of abutting panels are spaced apart to such an extent that minor adjustment in any one joint is not readily perceptible, and which will permit limited movement for ease and economy of erection in maintaining the dimensional module and to allow for variations in alignment, and which will also allow for expansion and contraction of the sheets from temperature changes.

While the core element of each panel may be of any thermal insulating material, in a preferred embodiment the core element is expanded in situ, integral, low density cellular material. Additionally, the groove in each panel adjacent the front sheet may be provided throughout its length with a weatherproofing sealant and/or gasket.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a plan view of a building panel in accordance with the present invention.

FIG. 2 is a fragmentary, perspective view with a portion in horizontal cross-section showing a plurality of building panels, as shown in FIG. 1, secured together in side-by-side relationship.

FIG. 3 is an enlarged, fragmentary plan view of an adjustable, telescoping, interlocking joint between adjoining building panels.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now to the drawings, and, more particularly, to FIG. 1, it will be seen that the rigid building panel 10 of the present invention comprises spaced, substantially parallel front and rear sheets 12 and 14, respectively, having therebetween an insulating, rigid core element 16 bonded under pressure to the inside surface of the sheets 12 and 14. By substantially parallel it is meant that one or both sheets may be patterned, shaped, configured, or the like, but that the juxtaposed end portions thereof extend in the same direction at substantially the same distance apart.

The core element 16 may be formed of any suitable thermal insulating material, such as material which is lightweight, fibrous or particulate aggregate held together by a binder. However, it has been found that best results are obtained when the core element comprises a material characterized as integral, low density, cellular material having uniform small voids, such as, for example, urethane or polystyrene, which is pressure expanded in situ.

One edge **18** of the panel **10** comprises a pair of spaced grooves **20** and **22** having a recessed male member **24** therebetween. Each of the grooves **20** and **22** are formed by an end portion **12***a* and **14***a* of the front and rear sheets **12** and **14**, respectively, the end portions **12***a* and **14***a* being bent inwardly and engaging an edge portion **16***a* of the core element **16**, and then inwardly and outwardly to form the grooves **20** and **22**, respectively, which are generally U-shaped in cross-section, having outwardly extending flanges **20***a* and **20***b*, and **22***a* and **22***b*, respectively, generally parallel to the sheets **12** and **14**. The flanges **20***b* and **22***b* of the grooves **20** and **22**, respectively, closest to the recessed male member **24** are lapped over one edge of the male member **24**, the end of which may be provided with a protective strip or cap **25**.

The other edge **26** of each panel **10** is provided with an edge portion **28** of reduced thickness where the end portions **12***b* and **14***b* of the front and rear sheets **12** and **14**, respectively, are bent and offset inwardly and engaging an edge portion **16***b* of the core element **16**. The end of the panel edge portion **28** of reduced thickness is formed by a channel **30** of generally U-shaped cross-section having outwardly extending flanges **30***a* and **30***b* which engage the inner surfaces of the end portions **12***b* and **14***b* of the front and rear sheets **12** and **14**, respectively. As can be seen, the outwardly extending flanges **30***a* and **30***b* of the channel **30** are engaged by 180° bent end portions **12***b* and **14***b* of the front and rear sheets **12** and **14**, respectively. The combination of the end portions **12***b* and **14***b*, the inner surfaces of which engage the outwardly extending flanges **30***a* and **30***b* of the channel **30**, and the 180° bent end portions thereof provide a more positive interlock between abutting panels, as compared to the use of only front and rear sheets of single thickness, due to the normal variation in the width of the sheets **12** and **14**. For example, the width of the sheets **12** and **14** may be oversized and the ends **12***b* and **14***b* thereof which form the 180° bent end portions can carefully control the size of the interlock.

The edges **12***a* and **12***b*, and **14***a* and **14***b*, of the front and rear sheets **12** and **14** of the panels **10** of the present invention are roll formed so that they conform to the aforementioned shape. After the roll forming operation is complete, a panel **10** is preferably formed by assembling spaced front and rear sheets **12** and **14** with a channel **30**, with or without a protective strip **25**, so as to form a mold cavity. However, a continuous moving belt could be utilized to temporarily form the mold cavity in lieu of a permanently affixed protective strip **25**. Integral, low density, cellular material is then expanded in situ within this cavity in order to form a unitary, insulating, rigid core element bonded under pressure to the inside surfaces of the sheets **12** and **14**.

It will, of course, be understood that a panel **10** according to the present invention may also be made by simply assembling the sheets **12** and **14** and the channel **30**, with or without the protective strip **25**, around a core element **16**, and that core elements **16** of varying thickness may be maintained in inventory.

It will, of course, be further understood that panels **10** of any desired thickness may be made simply by varying the distance between the spaced front and rear sheets **12** and **14**, and providing channels **30**, with or without protective strips **25**, which will accommodate such spacing. The configuration of the end portions **12***a* and **12***b*, and **14***a* and **14***b*, of the front and rear sheets **12** and **14** will remain the same irrespective of the desired thickness of the panel **10**. Accordingly, the panel and joint design of the present invention permit variation in thickness of panels without changing the rolls of the rolling machine, permitting optimum thickness design for specific load, span, and thermal requirements.

The channels **30**, and the strips **25** if used, of the panels **10** are preferably composed of good thermal insulating materials, such as plastic or some other nonmetallic material, in order to prevent thermal conduction between the front and rear sheets **12** and **14**. However, they could also be made from sheet metal which is foraminous so as to reduce its thermal conductivity.

It should, perhaps, also be noted that the sheets **12** and **14** of the panels **10** may be formed of sheet metal and provided with prefinished architectural faces. For example, the front sheet **12** may be provided with a prefinished architectural exterior face and the rear sheet **14** may be provided with a prefinished interior architectural face.

As will be more fully explained hereinafter in connection with FIGS. **2** and **3**, weather tightness may be supplemented by plant applied sealants and/or gaskets **32** deposited in the groove **20** adjacent the front sheet **12** of the panel **10**. Any suitable sealants, resilient sealing materials, preformed gaskets, and the like, which resist the passage of air and water between the sheets **12** and **14** may be utilized.

An improved building panel construction comprising a plurality of panels **10A**, **10B** and **10C** disposed in side-by-side relationship is shown in FIGS. **2** and **3**. Each panel **10A**, **10B**, **10C**, etc., is of a width and of a length which is determined by the requirements of the building and the location of the supporting members. In a typical embodiment, the panels are approximately 24 inches wide and are supported at approximately 14 foot vertical intervals, which provide satisfactory strength for most installations.

As can be seen, the channel **30** on the edge **26** of one panel forms a female member into which the recessed male member **24** on the edge **18** of an adjoining panel may project, with the 180° bent end portions **12***b* and **14***b* of the front and rear sheets **12** and **14** which engage the outwardly extending flanges **30***a* and **30***b* of the channel **30** being received by the pair of spaced grooves **20** and **22** on either side of the recessed male member **24** of the adjoining panel, such that the end of each edge portion **16***a* of the adjoining panel formed by an end portion **12***a* and **14***a* of the front and rear sheets **12** and **14**, respectively, is substantially aligned with the base **30***c* of the channel **30**, to form a plurality of panels **10A**, **10B** and **10C** disposed in side-by-side relationship having interlocking and telescoping joints therebetween in which the adjacent edges **18** and **26** of abutting panels, for example, panels **10A** and **10B**, and panels **10B** and **10C**, are spaced apart to such an extent that minor adjustment in any one joint is not readily perceptible. Additionally, such construction will permit limited movement for ease and economy of erection in maintaining the dimensional module, will allow for variations in alignment, and will also allow for expansion and contraction of the sheets **12** and **14** from temperature changes.

Weather tightness of the joint between adjoining panels may be supplemented by plant applied sealants and-

/or gaskets 32 which extend throughout the length of the bottom of the groove of each panel adjacent the sheet which provides the exterior face of the panel, such as the groove 20 adjacent the front sheet 12, which preferably provides the prefinished architectural exterior face of the panel 10.

While certain preferred embodiments of the invention have been specifically illustrated and described, it is understood that the invention is not limited thereto, as many variations will be apparent to those skilled in the art, and the invention is to be given its broadest interpretation within the terms of the following claims.

What we claim is:

1. A rigid building panel comprising spaced, substantially parallel front and rear sheets having therebetween an insulating, rigid core element of expanded in situ, integral, low density, cellular material bonded under pressure to the inside surfaces of said sheets, one edge of said panel comprising a pair of spaced grooves having a recessed male member therebetween, the end of said male member having a protective strip, each of said spaced grooves being formed by an end portion of one of said sheets, said end portion being bent inwardly and engaging an edge portion of said core element, then inwardly and outwardly to form a groove of generally U-shaped cross-section having outwardly extending flanges generally parallel to said sheets, and then inwardly to lap over one edge of said protective strip, and the other edge of said panel having an edge portion of reduced thickness, the end portion of said sheets at the other edge of said panel being bent and offset inwardly and engaging an edge portion of said core element, a channel of generally U-shaped cross-section forming the end of said panel edge of reduced thickness, said channel having outwardly extending flanges engaging inner surfaces of the end portions of said sheets and being engaged by 180° bent end portions of said sheets to form a female member into which a recessed male member of an adjoining panel may project, said 180° bent end portions of said sheets being received by the pair of spaced grooves on either side of the recessed male member of the adjoining panel, such that the end of each edge portion of said adjoining panel formed by an end portion of said front and rear sheets is substantially aligned with the base of said channel, to form an interlocking and telescoping joint in which abutting panel faces are spaced apart to such an extent that minor adjustment in the joint is not readily perceptible, and which will permit limited movement for ease and economy of erection in maintaining the dimensional module and to allow for variations in alignment, and which will also allow for expansion and contraction of the sheets from temperature changes.

2. A building panel according to claim 1, wherein said front sheet is provided with a prefinished architectural exterior face and said rear sheet is provided with a prefinished interior architectural face.

3. A building panel according to claim 1, wherein said front and rear sheets are metallic and said channel is nonmetallic.

4. A building panel according to claim 1, wherein said channel is of foraminous metal.

5. An improved building panel construction comprising a plurality of panels disposed in side-by-side relationship, each panel having spaced, substantially parallel front and rear sheets having therebetween an insulating, rigid core element of expanded in situ, integral, low density, cellular material bonded under pressure to the inside surface of said sheets, one edge of each said panel comprising a pair of spaced grooves having a recessed male member therebetween, the end of said male member having a protective strip, each of said spaced grooves being formed by an end portion of one of said sheets, said end portion being bent inwardly and engaging an end portion of said core element, then inwardly and outwardly to form a groove of generally U-shaped cross-section having outwardly extending flanges generally parallel to said sheets, and then inwardly to lap over one edge of said protective strip, and the other edge of said panel having an edge portion of reduced thickness, the end portion of said sheets at the other edge of each said panel being bent and offset inwardly and engaging an edge portion of said core element, a channel of generally U-shaped cross-section forming the end of said panel edge of reduced thickness, said channel having outwardly extending flanges engaging the inner surfaces of the end portions of said sheets and being engaged by 180° bent end portions of said sheets to form a female member into which said recessed male member of said adjoining panel may project, said 180° bent end portions of said sheets being received by said pair of spaced grooves on either side of said recessed male member of said adjoining panel, such that the end of each edge portion of said adjoining panel formed by an end portion of said front and rear sheets is substantially aligned with the base of said channel, to form a plurality of panels disposed in side-by-side relationship having interlocking and telescoping joints therebetween in which the edges of abutting panels are spaced apart to such an extent that minor adjustments in any one joint is not readily perceptible, and which will permit limited movement for ease and economy of erection in maintaining the dimensional module and to allow for variations in alignment, and which will also allow for expansion and contraction of the sheets from temperature changes.

6. The building construction according to claim 5, wherein said groove adjacent said front sheet in each panel is provided throughout its length with a seal which resists the passage of air and water therebetween.

7. The building construction according to claim 6, wherein said seal comprises a resilient sealing material.

8. The building construction according to claim 6, wherein said seal comprises a preformed gasket.

9. The building construction according to claim 5, wherein said front and rear sheets of each panel are metallic and said channel of each panel is nonmetallic.

10. The building construction according to claim 5, wherein said front sheet of each panel is provided with a prefinished architectural exterior face and said rear sheet of each panel is provided with a prefinished interior architectural face.

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