Sept. 16, 1969 R. G. GALLAGHER ET AL 3,466,826

INSULATED CURTAIN WALL CONSTRUCTION

Filed Sept. 28, 1967 3 Sheets-Sheet 1

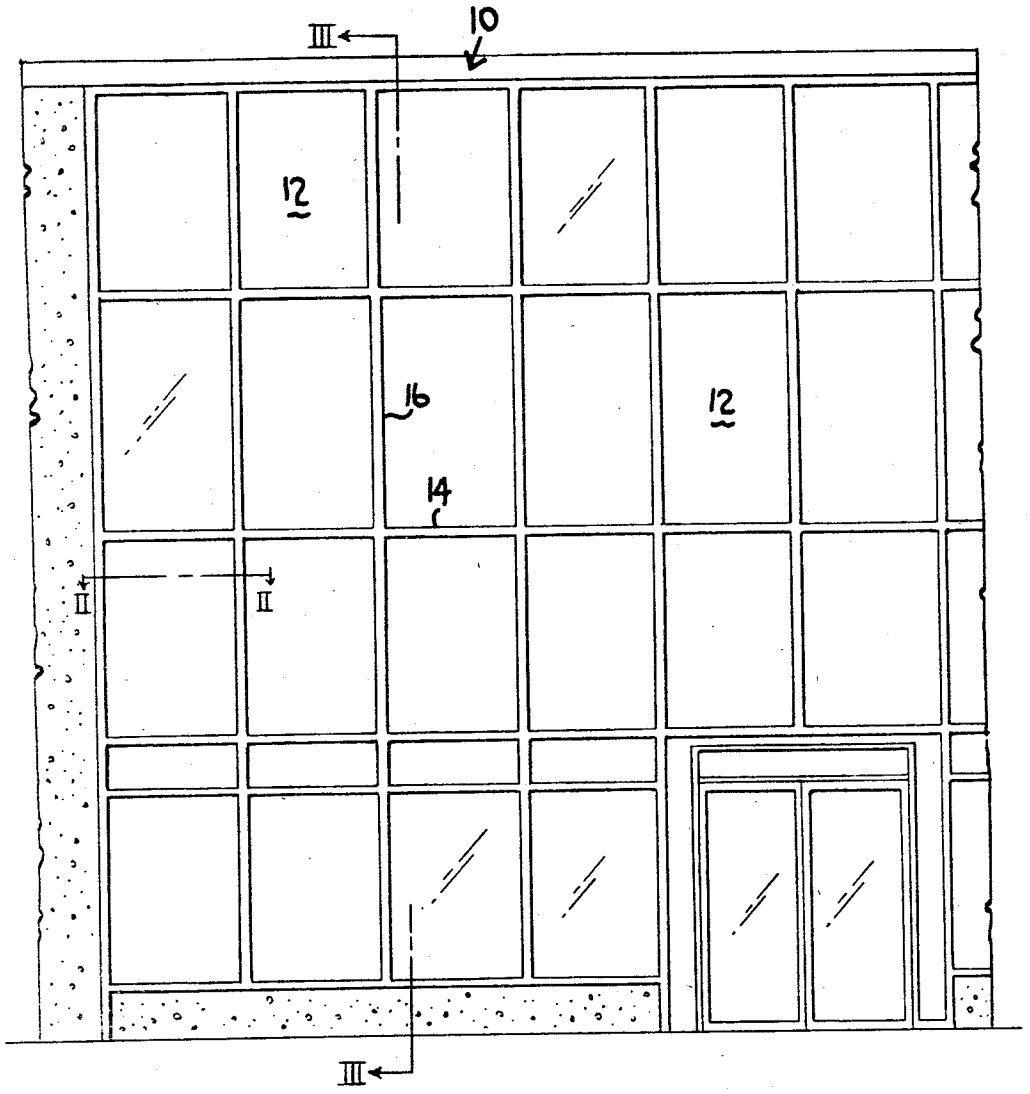


FIG. 1

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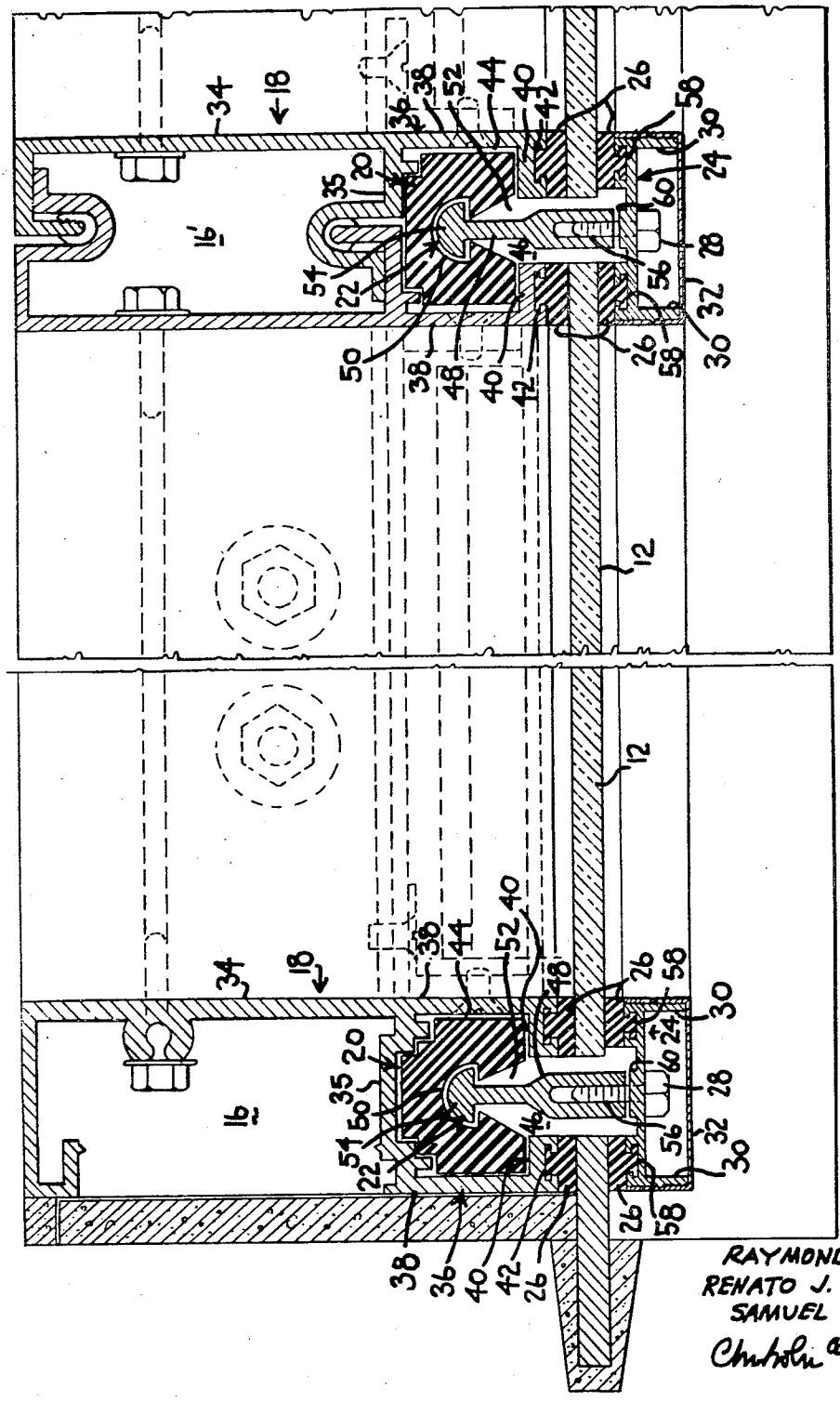


FIG. 2

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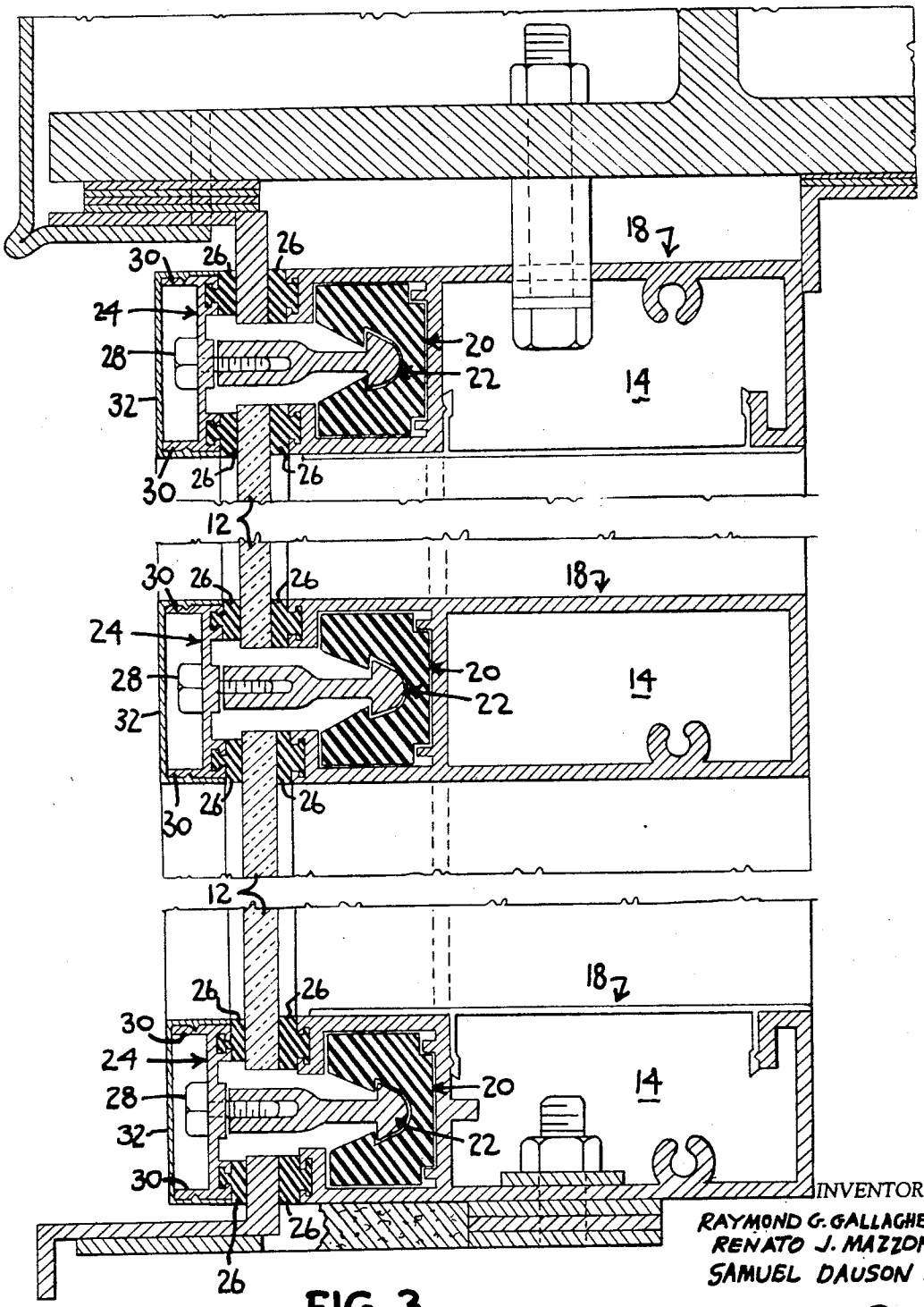


FIG. 3

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INSULATED CURTAIN WALL CONSTRUCTION

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Int. Cl. E04b 2/88
U.S. Cl. 52—395 5 Claims

ABSTRACT OF THE DISCLOSURE

An insulated curtain wall construction comprising a panel, a metal panel-backing member adjustably joined by metallic connector means to a metal panel-retaining member, insulating material disposed between said connector means and said backing member so that said panel-backing member and panel-retaining member are insulated from each other and insulating material disposed between said panel and said backing and retaining members so that said panel member is insulated from said backing and retaining members when an edge of said panel member is disposed therebetween.

Background of the invention

This invention relates to a wall construction and, in particular, to a novel, insulated curtain wall construction.

In U.S. Patent No. 3,336,707, assigned to the assignee of the present invention, there is disclosed an insulated curtain wall construction for mounting panels on a frame or grid structure comprising a T-shaped elastomeric structural glazing gasket having the body or arm portion of the gasket in supporting engagement with a panel, the leg portion of the gasket received in an inwardly directed mounting groove in a frame member and gasket engagement means supported within said groove and engaging the leg portion of the gasket to lock the assembly together.

In copending application Ser. No. 596,285, also assigned to the assignee of the present invention, there is disclosed an insulated wall construction for mounting panels comprising horizontal and vertical members interconnected to form a frame and wherein each frame member carries an outwardly directed flange on one common vertical face thereof, an elastomeric structural glazing gasket mounted on said flange to support a panel and insulating panel-backing strips disposed between said panel and said frame member. To the present inventors' knowledge, the above constructions represent the only fully insulated curtain wall systems of their kind.

In known forms of wall construction prior to the above inventions, various attempts were made to provide a thermal grid barrier, i.e., a thermal break in the grid or frame members, as well as a thermal break between the panel members and the grid or frame members, to prevent transfer of heat and cold from one member to another. However, none of these known forms of construction were found to be completely satisfactory.

Even with the advent of the above-mentioned inventions wherein for the first time completely satisfactory constructions were provided for producing both structurally and functionally sound thermal wall system, these systems were nevertheless restricted in appearance and required maintaining close tolerances in the manufacture of their component parts. Each of the foregoing systems required the use of an exposed elastomeric glazing gasket, the appearance of which in a composite wall assembly might not always completely fulfill the aesthetic desires of the architect and/or building owner. Moreover, each of the above-mentioned systems might well be characterized as non-adjustable systems in that they contained no provision for positively obtaining a water-tight and/or structurally-tight wall other than by maintaining strict control over field erection and tolerance deviations in the manufacture of their component elements or parts. Thus, the present invention is directed to providing a solution to these latter-mentioned problems and, more specifically, to providing a thermally insulated wall system that is not hampered by tolerance considerations and that may be adapted to provide almost any desired appearance.

The present invention, like those disclosed in the aforementioned patent and copending application, combines all of the best features of known types or forms of curtain wall construction and provides a novel curtain wall system that is structurally sound, that is relatively easy and inexpensive to install, that inherently possesses a complete thermal grid barrier, and that is comparable or lower in cost to any known form of wall construction.

In addition, the curtain wall system of the present invention, unlike those disclosed in the aforementioned patent and copending application, is adjustable to accommodate tolerance deviations and, accordingly, is not inherently or unduly hampered by tolerance considerations. Also, the curtain wall system of this invention permits wide versatility in the finish, color, shape and/or appearance of depth of section of the panel-framing members by reason of employing cap or cover members that can be fabricated to provide practically any desired appearance.

Moreover, the basic curtain wall system of this invention can be completely reversed and thus can accommodate mounting the panels either from the interior or the exterior of the building for maximum freedom in design and installation.

Furthermore, the curtain wall system of the present invention provides a clean or uninterrupted sight line, particularly when viewing directly into the curtain wall. This is important both aesthetically and functionally where the system employs the use of transparent panels.

Novel features of the present invention that make the foregoing advantages possible involve the use of an insulating material that separates and thermally isolates a metal panel-backing member from a metal connector member, which in turn is joined to a spaced, opposed, metal panel-retaining member to which said connector member is threadably or adjustably joined. The metallic panel-backing member and panel-retaining member are each spaced from an interposed panel member by means of insulating glazing material. Furthermore, the panel-retaining member is provided with suitable means to attach thereto a wide variety of cover members.

The foregoing and other features and advantages of this invention will be better understood when reference is had to the accompanying drawings, wherein similar parts are usually designated by the same numeral and in which:

FIG. 1 represents an outside elevation of a typical curtain wall constructed in accordance with the present invention;

FIG. 2 is a typical cross-section along the line II—II of FIG. 1 showing the details of vertical framing members constructed in accordance with the present invention; and

FIG. 3 is a typical cross-section along the line III—III of FIG. 1 showing the details of horizontal framing members constructed in accordance with the present invention.

The curtain wall **10**, depicted in FIG. 1, consists of a plurality of panels **12**, which are separated and supported along their peripheral edges by horizontal and vertical panel-framing members or grid members **14** and **16** of substantially identical cross-section. The frame member shown at **16'** in FIG. 2 is a split member. Split members

are frequently employed to accommodate expansion in the walls of a building. For the purpose of the present invention, however, the frame member **16'** may also be a one-piece extrusion or it may be a sectionalized member of cross-sectional configuration somewhat different than that shown in FIG. 2. In addition, unitary and/or sectionalized frame members can be used in any desired combination. Notwithstanding the above, the essential requirements of the horizontal and vertical members **14** and **16** of the present invention are the same, and thus, for the purpose of the following description, reference may be had to either FIG. 2 or 3 for details that are common and essential to both members.

Although FIG. 1 is intended to show horizontal and vertical framing members supporting a plurality of panels covering a complete wall section, it will be appreciated from the following description that the present invention is equally well adapted to single or muliple panel constructions. The panels **12** may be of an insulating or non-insulating type and of any suitable material or construction.

Referring to FIG. 1, horizontal framing members **14** and vertical framing members **16** are joined to form a rigid structural frame or framework. With particular reference being had to FIGS. 2 and 3, the horizontal and vertical framing members **14** and **16** are each composed essentially of a metal panel-backing member **18**, insulating material **20**, a metal connector **22**, and a metal panel-retaining member **24** to which connector **22** is adjustably joined. The metallic panel-backing member **18** and panel-retaining member **24** are each spaced from an interposed panel member **12** by means of insulating glazing strips **26**. The panel-retaining member **24**, in the embodiment shown, is attached to connector member **22** by screw fasteners **28** and, in addition, is provided with a pair of longitudinally extending ribs or flanges **30** over which a cover or cap member **32** is snapped into place.

Referring specifically to FIG. 2 for further details, panel-backing member **18** is an elongated structural member composed of a tubular or channel-shaped stiffening portion **34** that imparts rigidity and strength to the framing member and that carries thereon a panel-backing portion **36** which may be either a separate member joined to the stiffening portion or may be formed integrally with the stiffening portion **34**.

In the embodiment shown, panel-backing portion **36** comprises a pair of integral flanges **38** extending from the stiffening portion **34** of the panel-backing member **18** and having a structure formed thereon, such as longitudinally extending flanges **40** that carry longitudinally extending grooves **42**, adapted to support insulating glazing strips **26**. Between longitudinally extending flanges **38** and **40** and web **35** of stiffening portion **34**, there is provided an inwardly directed, longitudinally extending C-shaped groove **44** which receives and retains one or more insulating members **20** and one or more connector members **22**. Thus, it is contemplated that the insulating members **20** and/or connector members **22** may either be continuous members that are essentially coextensive with the length of C-shaped groove **44** or one or both may comprise members of relatively shorter length, e.g., 1½ inches to 4 inches, appropriately spaced along the length of C-shaped groove **44** and joined in assembled relation.

C-shaped groove **44**, as aforesaid, is formed by longitudinally extending flanges **38** and **40** and web **35** of stiffening portion **34** of the panel-packing member. Flanges **40** provide means for positively resisting disengagement of insulating members **20** from C-shaped groove **44**. The opening or access **46** into C-shaped groove **44** provided between flanges **40** provides means for extending connector member **22** forwardly or outwardly from the C-shaped groove **44** of panel-backing member **18**. As shown, access opening **46** is larger than the corresponding linear dimension of the proximate portion of stem **48** of connector member **22** so that in the installed position of the connector member **22** there is no physical contact between connector member **22** and panel-backing member **18**.

Insulating member **20** is a generally C-shaped member of natural or synthetic rubber or other insulating material that essentially corresponds in outer peripheral shape and size to the peripheral shape and size of C-shape groove **44**. C-shaped insulating member **20** has a longitudinally extending C-shaped groove **50** formed therein. In its installed position, the opening **52** into C-shaped groove **50** of insulating member **20** corresponds in location to the opening **46** in C-shaped groove **44** of the panel-backing portion **36** of the panel-backing member for the purpose of receiving connector member **22**. C-shaped groove **50** of insulating member **20** essentially corresponds in shape and size to the outer peripheral shape and size of the companion portion **54** of connector member **22** which, as shown, is securely received and retained by insulating member **20**.

Connector member **22** is a metal member of essentially uniform cross-section which, in the embodiment shown, has an interlocking portion **54** that essentially corresponds in outer peripheral shape and size to the shape and size of C-shaped groove **50** of insulating member **20**. Integrally formed with the interlocking portion **54** of connector member **22** is a stem portion **48** that extends forwardly and outwardly from insulating member **20** and has a screw groove **56** formed in its distal end for the purpose of securing thereto panel-retaining member **24**.

As should be apparent, interlocking portion **54** of connector member **22** need not necessarily assume the precise shape shown and other interlocking shapes than that shown are considered to be within the contemplation of this invention. In addition, insulating member **20** need not necessarily assume the precise shape shown and, in fact, it is contemplated that insulating member **20** or insulating material of any shape could be molded onto or about or otherwise structurally associated with one end of connector member **22** so that metal connector member **22** can be supported on backing member **18** and spaced therefrom by insulating material.

Panel-retaining member **24** is essentially an elongated clip member extending the full length of each of the horizontal and vertical framing members and having formed on opposite longitudinal edges thereof a structure, such as grooves **58**, adapted to support insulating glazing strips **26**. Intermediate said longitudinal edges there is provided on said retaining member **24** a longitudinally extending boss **60**, which, in the installed position of retaining member **24**, preferably engages with or is only separated a short distance from the surface or distal end of connector member **22** that has formed therein the opening to screw groove **56**. Suitable apertures (not shown) are provided in panel-retaining member **24** and extend through boss **60** for the purpose of adjustably securing panel-retaining member **24** to connector member **22** and relative to panel-backing member **18** by means of screw fasteners **28** extending through said apertures and received in screw groove **56**. Also formed at or near the longitudinal edges of panel-retaining member **24**, but on the side opposite that which is adapted to carry insulating glazing strips **26**, are longitudinally extending flanges or ribs **30** over which a metal cover or cap member **32** is snapped and securely locked into place. Cover or cap members **32** can be of almost any desired shape, finish, color and depth of section. In the embodiment shown, cover member **32** is a U-shaped channel member having a web that presents a flat outer surface parallel to the curtain wall panels and a pair of flanges that present flat side surfaces which are coplanar with the side surfaces of the horizontal and vertical stiffening members.

The preferred method of assembly of the curtain wall construction of this invention involves inserting the interlocking portion **54** of connector member **22** longitudinally into the companion groove **50** in insulating member **20**;

inserting the foregoing assembly longitudinally into the C-shaped groove **44** in panel-backing member **18**; erecting a plurality of panel-backing members into a grid or frame of horizontal and vertical members; affixing insulating strips **26** to the panel-backing members; setting a panel in place against each thus-formed frame of insulating strips; affixing insulating strips **26** to panel-retaining member **24**; joining or securing a panel-retaining member **24** to each panel-backing member **18** by means of screw fasteners **28** being threadably received in screw groove **56** of connector member **22**; and snapping cover member **32** over flanges or ribs **30** to provide the completed assembly.

It will be appreciated that, among other novel features, the construction of this invention provides a metal-faced, insulated curtain wall system having adjustable panel-retaining members to accommodate any build-up of tolerances in the panel-backing members, insulating members and connector members, and, accordingly, an insulated system that is not inherently or unduly hampered by tolerance considerations. Also, the curtain wall system of this invention permits wide versatility in the finish, color, shape and/or appearance of depth of section of the panel-framing members by reason of employing cap or cover members that can be fabricated to provide practically any desired finished appearance.

We claim:

1. An insulated curtain wall construction comprising a panel having an edge disposed between a metal panel-backing member and a metal panel-retaining member, a metallic connector member bridging a space between said backing member and said retaining member and joining said backing member and retaining member in assembled relation, said metallic connector member having a first portion received and retained within a logitudinal mounting groove on said backing member, said first portion of said connector member being retained within said mounting groove in interlocking engagement with a block of insulating material that supports said first portion of said connector member in spaced relation to said backing member, means carried on said backing member and coacting with said block of insulating material to prevent extraction of said insulating material through the longitudinal opening into said mounting groove, said connector member having a second portion extending outwardly of said mounting groove and having formed on its distal end means for adjustably securing thereto said panel-retaining member, said panel-retaining member being adjustably secured to said second portion of said connector member and having means formed on opposite longitudinal edges thereof to support insulating glazing strips, and insulating glazing material disposed between said panel and said panel-backing member and between said panel and said panel-retaining member.

2. An insulated curtain wall construction according to claim **1**, wherein said panel-retaining member has means formed thereon for supporting a cover member and a channel-shaped cover member is affixed to said cover member supporting means.

3. An insulated curtain wall construction according to claim **2**, wherein said metal panel-backing member comprises an elongated structural member having a longitudinally extending channel-shaped stiffening portion that carries thereon a longitudinally extending panel-backing portion, and said panel-backing portion comprises a pair of flange members extending from said stiffening portion and defining therebetween said longitudinal mounting groove for receiving and retaining said block of insulating material and said first portion of said metallic connector member, said flanges having formed on the free ends thereof said means to prevent extraction of said block of insulating material through the longitudinal opening into said mounting groove.

4. An insulated curtain wall construction according to claim **3**, wherein said means to prevent extraction of said block of insulating material comprises a pair of longitudinally extending, opposed flanges that restrict the longitudinal opening into said mounting groove.

5. An insulated curtain wall construction according to claim **4**, wherein said block of insulating material comprises an elongated elastomeric member that essentially corresponds in cross-sectional shape and size to the cross-sectional shape and size of said mounting groove, and said elastomeric member has a longitudinal groove formed therein that interlocks with said first portion of said connector member and essentially corresponds in cross-sectional shape and size to the cross-sectional shape and size of said first portion of said connector member.

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U.S. Cl. X.R.

52—208, 235, 464, 732