GRIPPING AND SEALING SYSTEM FOR SLAB FACING MATERIALS

Inventors: George J. Santry, New Canaan, Conn.; Harold R. Wacenske, Campbell, N.Y.

Assignee: Corning Glass Works, Corning, N.Y.

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Field of Search

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ABSTRACT

A mounting system for slab facing materials including a plurality of contiguous slabs, each slab having a kerf formed in the peripheral edges thereof. This system includes a structural channel member for each facing slab edge, with the structural channel members having first flange portions for cooperatively gripping each slab, and second flange portions with the second flange portions of adjacent channel members of two contiguous slabs defining first and second plenum chambers. Spline means inserted into the first plenum chamber act as both a moisture stop and an air pressure equalizer while gasket means are inserted into the second plenum chamber for cushioning and sealing purposes. Third flange portions of the channel members serve as a joiner member for attachment lugs. Structural channel members for corner joints are also set forth.

10 Claims, 5 Drawing Figures
Fig. 1

Fig. 2

INVENTORS
George J. Santry
Harold R. Wacenske

ATTORNEY
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BACKGROUND OF THE INVENTION

The field to which this invention pertains is that of building construction and more particularly to a wall mounting system for thin slab facing materials for both interior and exterior construction.

It is a well known building practice, especially in large office or apartment building construction, to build the basic support structure of one material, such as reinforced concrete, for example, and then form the exterior of the building, as well as parts of the interior, such as the lobby, with a facing of contiguous, thin slabs of material such as marble, granite or the like. This type of construction obviously lessens the total building expense since less stone is needed per square foot of coverage; installation is much faster than laying stone with mortar; the total weight of the stone is greatly reduced; and the facing is relatively easily removed or replaced if so desired.

Previously, several systems have been proposed by which thin stone slabs may be mounted as a permanent building facing in an attempt to gain the above advantages, with exemplary systems being disclosed by the several U.S. Pat. Nos. to Zibell, namely 3,234,702, 3,266,209 and 3,319,983 as well as the U.S. Pat. No. to Swenson 3,478,480. While such systems have proven generally acceptable they have also been subject to certain shortcomings and disadvantages.

In the Zibell system the stone slabs are provided with kerfs along the entire length of the upper and lower operative edges thereof to receive the castilever supporting and anchoring member. This not only weakens the stone along the edges, but also especially at the corners. Furthermore, the supporting and anchoring members have been of a configuration which requires an engagement with the groove in the stone, with this engagement being difficult to match during the installation. In addition, the stone slabs are supported in direct contact with the metal supporting and anchoring members, thus greatly increasing the chances of weakening and cracking under the forces of thermal expansion and contraction caused by the weather and the like. Still another disadvantage is the need for mortar or other joint filling material which is used to fill the joints between adjacent slabs.

In the Swenson system, while the panels do not require grooves along the entire length of the upper and lower operative edges thereof, the corners are still vulnerable to breakage during installation of the panels. While suitable materials are utilized to fill the clearance spaces between the slab kerfs and the semicircular disk retainer portions to prevent direct metal-to-stone contact, these spaces must be filled during the installation of the panels. This filling operation is time consuming and these materials also require a certain amount of set-up time which again is clearly undesirable from a cost standpoint.

Even though rubber sealing rods are utilized in the joints between adjacent faces for sealing purposes, they must be inserted after the panels are attached to the building and require a layer of caulking as a backup.

SUMMARY OF THE INVENTION

The present invention solves the previously-mentioned problems by utilizing a whole new mounting system for slab facing materials.

Each slab or panel has grooves or kerfs along the entire length of their peripheral edges. One embodiment of this invention features generally angularly-shaped metal structural channel members which completely frame each slab on all sides thereof, with forwardly extending channel first flange portions extending into the slab kerfs. Since each slab is completely framed prior to its installation, the edge and corner breakage problems encountered with the prior art systems are eliminated. In order to prevent point loading, as well as to provide sealing and cushioning, a layer of resilient material is interposed between the slab and the channel members thereby preventing slab-to-metal contact.

Weather tightness of the joints between panels is resolved by the creation of two plenums where the panels abut. Rerewardly extending channel second flange portions having first and second flange faces define these plenum chambers. The first plenum chamber provides for the equalization of external and internal pressures and contains a resilient mechanical spline which acts as a moisture stop. The second plenum houses abutting hollow gaskets which provide a seal. A rearwardly extending channel third flange portion serves as both a stiffener and as a joiner member for attachment lugs. Thus, all joint-filling after installation may be eliminated if desired for economic reasons.

Other embodiments of this invention feature metal structural channel members for use in making inside and outside corner joints and feature diverging dual flange faces that are inserted into the kerfs formed in the adjacent peripheral edges of two adjacent angularly disposed slabs.

While the mounting system of this invention may be used with any of the well-known building facing materials, it is particularly useful when used in combination with a glass-ceramic facing material manufactured and sold by Corning Glass Works of Corning, N. Y. under the trademark PYRAM. This glass-ceramic material possesses high strength, low coefficient of expansion and remarkable resistance to deterioration from corrosives. Unlike natural granite, which has a coarse crystalline structure, PYRAM brand facing material has a fine crystalline structure and is substantially free from flaws. This phenomenon permits the material to be produced in thicknesses of 0.200 to 0.400 inches, with an equivalent strength in granite requiring a thickness of 2 to 3 inches to insure against structural failure. As a result of this unusual strength it is practicable to rabbet the edges of PYRAM brand facing material for gripping purposes without substantially weakening the edges or corners thereof.

In summary, this invention discloses a mounting system for thin slab facing materials including a plurality of contiguous slabs, each slab having a kerf formed in the peripheral edges thereof. This system includes a plurality of structural channel members including one structural channel member for each facing slab edge. Each channel member includes a main body portion adjacent to a rear surface portion of the slab facing material; a first flange portion on one end of the main body portion and having an inwardly directed flange face inserted into the kerf, with the channel members thereby cooperatively gripping each slab; a second flange portion in the vicinity of the one end and including spaced first and second outwardly-directed flange faces, with the adjacent channel members of two contiguous slabs (which are separated only by a protective edging tape between their first flange portions) defining both a first plenum chamber between the main body portions and the first outwardly-directed flange faces, and a second plenum chamber between the first and second outwardly-directed flange faces. The system further includes spline means inserted into the first plenum chamber and gasket means inserted into the second plenum chamber.

Furthermore, the system may include a third flange portion which serves as a joiner member for an attachment lug. In addition, the system may also utilize a structural channel member for gripping the two adjacent edges of two contiguous angularly disposed slabs. This channel member includes an angular main body portion; a first flange portion extending substantially from the middle of the main body portion and having diverging dual flange faces that are inserted into the kerfs of the two adjacent slab edges; and dual second flange portions spaced substantially between the middle and the two ends of the main body portion.

Other advantages and features of the invention will appear from the following description taken in connection with the associated drawings.
3,672,107

BRIEF DRAWING DESCRIPTION

FIG. 1 is a front view of one environment in which the mounting system of the present invention may be utilized, namely a planar wall.

FIG. 2 is an enlarged sectional view, taken on line 2—2 of FIG. 1 showing a joint detail.

FIG. 3 is a perspective view, partially in section, illustrating both the typical joint sealing system and the planar wall structural channel members of the present invention.

FIG. 4 is a perspective view of a typical outside corner joint.

FIG. 5 is a perspective view of a typical inside corner joint.

DETAILED DESCRIPTION

Referring now to the drawings in detail, FIG. 1, 2 and 3 illustrate a typical installation in which the mounting system of the present invention can be utilized and comprises a planar wall 12 constructed of a plurality of contiguous slabs or panels S of facing material.

As illustrated, slabs S may be rectangular, or in the alternative, may be any other shape consistent with good building design. Slabs S have grooves or kerfs 16 along the entire length of the peripheral edges thereof to receive the gripping portion of typical metal structural channel or panel-framing member 20. Structural channel member 20 is generally F-shaped and is comprised of main body portion 22 and first, second and third flange portions 24, 26, 28 respectively. Main body portion 22 is comprised of outer, intermediate and inner sections 30, 32, 34 respectively. Forwardly extending first flange portion 24, on one end of main body portion outer section 30, has inwardly-directed or re-entrant flange face 36 extending into slab kerf 16. Rearwardly extending second flange portion 26, between main body portion outer and intermediate sections 30, 32, has first and second outwardly-directed flange faces 38, 40 respectively. Flange faces 38, 40 are generally parallel to and spaced from main body portion outer section 30. Rearwardly extending third flange portion 28, between main body portion intermediate and inner sections 32, 34, acts as both a structural stiffener for main body portion 22, and as a joiner member for one end of an attachment lug A of any desired configuration. The other end of attachment lug A is shown attached to any fastening means B secured to structural components or members C of the structure on which slabs S are to be mounted. It should be noted that the features covering the actual attachment of structural channel member 20, and hence slab S, on a building structure have been illustrated merely to show the environment of one use of the system of the present invention. Thus, it should be emphasized that lug A and fastening means B form no part of the present invention. However, a fastening means of the type depicted by letter B is thoroughly described in co-pending U.S. application No. 36,108 filed May 11, 1970 and also assigned to the assignee of this invention.

As best seen in FIGS. 1 and 3, a plurality of structural channel members 20 (generally two oppositely directed pairs of members 20 in the case of rectangular slabs) surround the entire length of the peripheral edges of each slab S, and are cut and joined at the corners thereof as is well known in the art. Thus, as best seen in FIGS. 2 and 3, each slab S is completely framed by channel members 20, with main body portion 22 being adjacent to an outer rear surface portion of slab S. Inwardly-directed or re-entrant flange faces 36 are inserted into kerf or rabbit 16 thereby effectively gripping slab S. In order to prevent dust or metal particles from causing a point loading between slab S and channel members 20 a layer of resilient material 44 is interposed therebetween. Resilient material layer 44 acts both as a water-tight sealant, and a cushion, and preferably is a rubber-base material such as for example a silicon-base or polyurethane-base rubber.

The differences in the coefficients of expansion between aluminum channel members 20 and panels S may be compensated for by preheating channel members 20 to an established temperature, and then attaching them to panels S. This technique provides secure attachment at temperature extremes in excess of 180°F.

Adjacent panels S adjoin at their first flange portions 24, with metal-to-metal contact being prevented by the inter-position of a protective edging tape 46 therebetween. Weather tightness of the joints between the panels (as best seen in FIG. 2) is assured by two plenums 48 and 50 behind adjoining first flange portions 24. First plenum channel 48 is located between the adjacent main body outer sections 30 and the opposed first outwardly directed flange faces 38 of second flange portions 26. Second plenum channel 50 is located between the opposed first outwardly directed flange faces 38 and the opposed second outwardly directed flange faces 40. Second flange portion 26 with its first and second flange faces 38, 40 may be described as generally F-shaped. First plenum channel 48 provides for the equalization of the air pressure acting on the front and rear surfaces of panels S and contains a resilient mechanical spline 52, which acts as a moisture stop. Second plenum channel 50 contains two opposing, keyed, hollow neoprene gaskets 54 which by reason of their mutual contact are compressed and thereby provide a seal. Prior to installation, each gasket 54 may be wiped with glycerine which causes them to bond together. The dimensional tolerances of gaskets 54 allow compression to be maintained throughout the normal structural movement. It should be noted that prior to installation both spline 52 and gaskets 54 are cut at the proper angles in order to achieve smooth mating and sealing with like members at all corner junctions. Alternatively, special one piece corner gaskets (not shown) may be utilized.

FIG. 4, which is a perspective view of a typical outside corner joint assembly 58, shows panels or slabs S joined in a corner relationship by means of structural channel or panel-framing member 60 having channeled main body portion 62, first flange portion 64 and second dual flange portions 66. Main body portion 62 is comprised of channeled intermediate section 68 and dual flat end sections 70. First flange portion 64 extends outwardly from the middle of main body intermediate section 68 and has diverging dual first flange faces 72 which fit into kerfs or grooves 16 in panels S. Dual second flange portions 66 extend rearwardly at the junctions of main body intermediate section 68 with dual end sections 70. As previously discussed with reference to channel member 20, a layer of resilient material 64 is interposed between channel member 60 and panels S.

FIG. 5, which is a perspective view of a typical inside corner joint assembly 58a, shows slabs S joined by means of structural channel or panel-framing member 60a having channeled main body portion 62a, first flange portion 64a and dual second flange portions 66a. Main body portion 62a is comprised of channeled intermediate section 68a and dual flat end sections 70a. First flange portion 64a extends inwardly from the middle of main body intermediate section 68a and has diverging dual first flange faces 72a which again fit into kerfs or grooves 16 in panels S. Dual second flange portions 66a extend rearwardly at the junctions of main body intermediate section 68a with dual end sections 70a. A layer of resilient material 44 is again interposed between channel member 60a and panels S.

With both corner joint assemblies 58 and 58a, a plurality of structural channel members 20 are used to surround the remaining peripheral edges of slabs S (three sides in the case of rectangular slabs). Intersecting structural channel members 20 and 60 (or 60a) as well as spline 52 and gaskets 54 are cut at the proper angles in order to achieve smooth mating and sealing with each other and like members at these corner junctions. Again, special corner gaskets (not shown) may be utilized.

Metal structural channel members 20, 60 and 60a can be formed, rolled or extruded and may, for example, be made of extruded aluminum alloy.

While this invention has been described in connection with possible forms or embodiments thereof, it is to be understood that changes or modifications may be resorted to without de-
We claim:
1. In planar wall mounting system for thin slab facing materials, the combination of a plurality of contiguous unconnected slabs, with every slab having a kerf formed in each peripheral edge thereof, and multiple substantially similar structural channel members, permanently attached to every one of said facing slabs, for independently gripping and framing each peripheral edge of every one of said facing slabs, each of said structural channel members comprising:
   a. a main body portion substantially parallel with and adjacent to the rear surface of every one of said facing slabs;
   b. a first flange portion on one end of said main body portion and having an inwardly directed flange face;
   c. a second flange portion, extending from said main body portion, in the vicinity of said one end; and
   d. a third flange portion, extending from said main body portion, and spaced from said first and second flange portions, wherein the inwardly directed flange face of the first flange portion of one of said structural channel members is fixedly inserted into the kerf formed in each peripheral edge of every facing slab, thereby cooperatively gripping said facing slab therebetween.

2. In a corner wall mounting system for thin slab facing materials, the combination of two adjacent angularly disposed slabs with both slabs having a kerf formed in at least the adjacent peripheral edges thereof, and a structural channel member for permanently gripping said adjacent peripheral edges, wherein said structural channel member comprises:
   a. an angular main body portion adjacent to rear surface portions of said angularly disposed slabs;
   b. a first flange portion extending from one side of said main body portion substantially in the middle of said main body portion and having diverging dual flange faces; and
   c. dual second flange portions extending from another side of said main body portion and spaced substantially between the middle and the two ends of said main body portion.

3. The corner wall mounting system of claim 2 wherein said two adjacent angularly disposed slabs form an outside corner and said dual second flange portions are rearwardly and inwardly converging.

4. The corner wall mounting system of claim 2 wherein said two adjacent angularly disposed slabs form an inside corner and said dual second flange portions are rearwardly and outwardly diverging.

5. In a planar wall construction, the combination of a plurality of contiguous thin slabs of facing material, with every slab having a kerf formed in each peripheral edge thereof, and an apparatus for sealing adjacent edges of each of said facing slabs, said apparatus comprising:
   a. a plurality of substantially similar juxtaposed structural channel members, one of such juxtaposed channel members having attaching means inserted into the kerf of each of said contiguous facing slab edges, with each of said channel members including:
      a. a main body portion adjacent to a rear surface portion of each of said facing slabs, and
      b. a flange portion rearwardly extending from said main body portion in the vicinity of one end of said main body portion and including spaced first and second outwardly-directed flange faces, wherein the juxtaposed channel members of two contiguous slabs defined a first plurality chamber between said main body portions and said first flange faces of said facing slabs and a second plurality chamber between said first and second flange faces of said facing slabs.

b. spline means inserted into said first plurality chamber, said spline means serving as a moisture stop and said plurality also serving as an equalizer for the air pressures acting on said facing slab front and rear surfaces; and
c. gasket means inserted into said second plurality chamber for sealing purposes.

6. The wall construction of claim 5 wherein said spline means comprises a resilient, curved, mechanical spline, and said gasket means includes two abutting, oppositely disposed, hollow and resilient gaskets which by reason of their abutment are compressed and thereby provide a seal.

7. In a planar wall construction, the combination of a plurality of contiguous thin slabs of facing material, with every slab having a kerf formed in each peripheral edge thereof, and an apparatus for gripping and sealing adjacent edges of each of said facing slabs, said apparatus comprising:
   a. a plurality of substantially similar juxtaposed structural channel members, one of such juxtaposed channel members being provided for each of said facing slab edges, with each of said channel members including:
      a1. a main body portion adjacent to a rear surface portion of every facing slab, and
      a2. a first flange portion on one end of said main body portion and having an inwardly directed flange face inserted into the kerf formed in each peripheral edge of every facing slab, thereby cooperatively gripping said facing slab therebetween;
      b. a second flange portion extending from said main body portion in the vicinity of said one end, said second flange portion extending in a direction opposite to that of said first flange portion, and including spaced first and second outwardly-directed flange faces, with the juxtaposed channel members of two contiguous slabs, which adjoin at their first flange portions, defining both a first plurality chamber between said main body portions and said first outwardly-directed flange faces, and a second plurality chamber between said first and second outwardly-directed flange faces;
      b1. spline means inserted into said first plurality chamber, said spline means acting as a moisture stop, with said first plurality chamber and also providing for the equalization of the air pressures acting on said slab front and rear surfaces; and
      c. hollow, resilient, gasket means inserted into said second plurality chamber for sealing purposes.

8. The wall construction of claim 7 including a third flange portion extending from said main body portion and spaced from said first and second flange portions, said third flange portion extending in a direction opposite to that of said first flange portion and serving as a joiner member for an attachment lug.

9. In a planar wall construction, the combination of a plurality of unconnected adjacent panel members and an apparatus for independently and permanently gripping the peripheral edges of each panel member and sealing adjacent edge portions of said unconnected panel members, said apparatus comprising a plurality of juxtapositioned substantially identical structural channel members, one of such juxtapositioned channel members being secured to adjacent rear edge portions of each of said panel members, means forming a first and second plurality chamber between said juxtapositioned unconnected structural channel members rearwardly of a rear surface of said panel members, sealing means positioned within one of said plurality chambers, and moisture stop means positioned within the other of said plurality chambers, said other plurality chamber also equalizing air pressure acting upon front and rear surfaces of said panel members.

10. In the planar slab construction as defined in claim 9 wherein said means for forming a first and second plurality chambers comprises opposed unconnected F-shaped flange portions integral with and extending rearwardly of each of said structural channel members, and said second plurality chamber being formed between substantially parallel first and second
outwardly-directed flange faces of the opposed F-shaped flange portions.

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