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TRIM CAP STRUCTURE FOR A CURTAIN WALL MULLION

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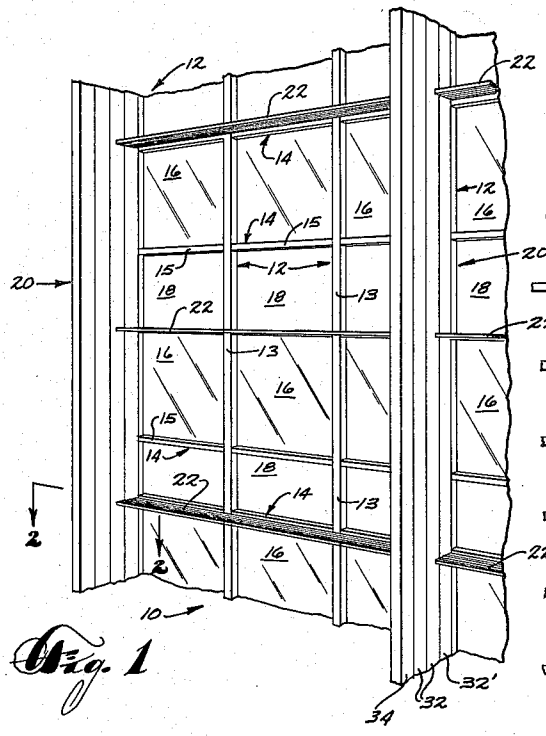


Fig. 1

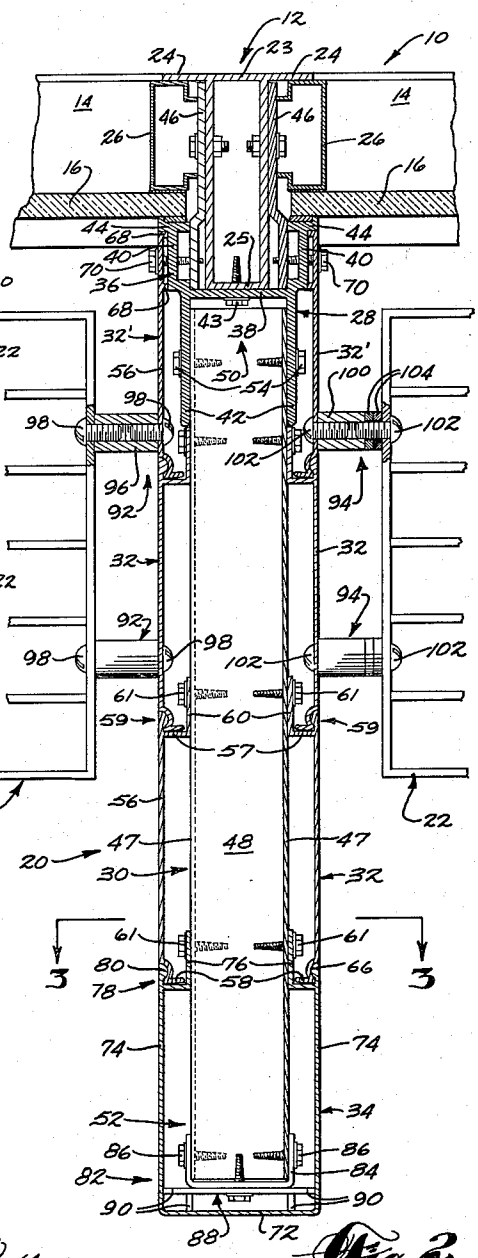


Fig. 2

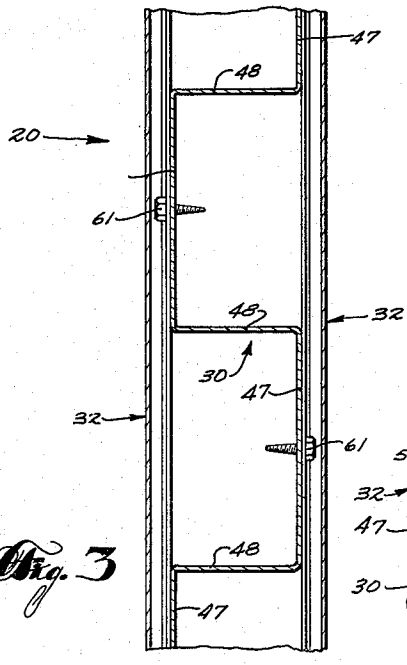


Fig. 3

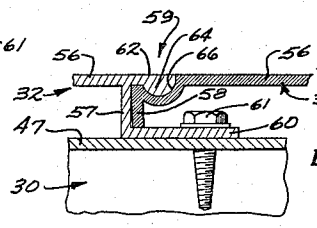


Fig. 4

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TRIM CAP STRUCTURE FOR A CURTAIN WALL MULLION

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This invention relates to a trim cap structure adapted to be secured to the vertical mullions of a curtain wall and, more particularly, to a trim cap structure that extends outwardly from the vertical mullion for a distance greater than normal.

To add to the aesthetic presentation of a curtain wall, it is often desirable that selected ones of the trim caps of the vertical mullions be extended outwardly for a distance greater than normal. The resulting trim cap structure must of necessity be strong enough to sustain the prevailing wind loads without adding a considerable amount of structural metal. Further, each trim cap structure should be alignable in spaced parallel relation with the other outwardly extended trim caps. Still further, it must have an aesthetically pleasing exterior appearance.

Accordingly it is the primary object of this invention to provide a trim cap structure that has an aesthetically pleasing exterior appearance.

Another object of this invention is to provide a trim cap structure that may be aligned in spaced substantially parallel relation with the other trim cap structures of the present invention.

Still another object of this invention is to provide a trim cap structure that may be quickly and easily erected.

Yet another object of this invention is to provide a trim cap structure that has a minimum number of exposed fasteners.

These and other objects and advantages of the present invention will become apparent from the following detailed description by reference to the accompanying drawings in which:

FIGURE 1 is a fragmentary perspective view of a curtain wall assembly wherein the present trim cap structure is installed;

FIGURE 2 is a cross-sectional view taken along the line 2—2 of FIGURE 1 and illustrating the component parts of the present trim cap structure;

FIGURE 3 is a cross-sectional view taken along the line 3—3 of FIGURE 2 further illustrating the present trim cap structure; and

FIGURE 4 is a fragmentary cross-sectional view, on an enlarged scale, illustrating the connection between the facing sheets of the present trim cap structure.

Referring to FIGURE 1, there is illustrated a curtain wall **10** comprising the exposed wall of a building. The curtain wall **10** includes a plurality of vertical mullions **12** and a plurality of horizontal muntins **14**. Positioned between the vertical mullions **12** and the horizontal muntins **14** are glazing **16** and decorative panels **18**. The vertical mullions **12** and the horizontal muntins **14** are covered by means of trim caps **13** and **15** respectively which give a finished appearance to the curtain wall **10**.

Secured to selected ones of the vertical mullions **12**, are the trim cap structures **20** of the present invention. The trim cap structures project in outboard relation with the curtain wall **10**. Extending between and connecting the adjacent trim cap structures **20** are platforms **22**. The platforms **22** comprise in part a means for aligning the trim cap structures **20** in spaced parallel relation with each other. The platforms **22** preferably are positioned at the top of the glazing **16** so that they do not obstruct the view of the occupants of the building.

A typical construction of the curtain wall is illustrated

in FIGURE 2. The vertical mullion **12** as herein shown comprises a rectangular body portion **23** having a pair of laterally extended rear flanges **24** and an outboard end **25**. The trim cap structure **20** is shown secured to the outboard end **25**. The horizontal muntins **14** project laterally from and are secured to the vertical mullion **12**. The glazing **16** is positioned between the vertical mullion **12** and the horizontal muntins **14**. The glazing **16** is retained in place by means of fixed glazing beads **26** which abut the inner surface of the glazing **16** and which are secured to the vertical mullion **12** by means of bolts (not shown). The external means by which the glazing **16** is retained in place will be described later in this specification.

The vertical mullion **12** has been specifically illustrated in FIGURE 2 but it should be understood that the present trim cap structure may be adapted to be secured to the vertical mullions of other types of curtain wall constructions. As for example, the vertical mullions illustrated in U.S. Patents 2,885,040; 2,901,785; 2,914,145; 2,916,108 and 2,944,641.

The trim cap structure **20** will now be described by reference to FIGURES 2, 3 and 4. In general the trim cap structure **20** comprises a support member **28**, a corrugated structural element **30**, a plurality of facing sheets **32**, **32'** and a cap member **34**.

Those of the vertical mullions **12** which are not provided with the trim cap structure **20** of this invention are instead provided with conventional trim caps **13** as in conventional curtain wall assemblies. The support member **28** is not required in those ones of the vertical mullions **12** which are equipped with the conventional trim caps **13**. Instead the trim caps **13** are secured in outboard relation to those vertical mullions **12** thus equipped by any convenient means, e.g., as suggested in the aforementioned Patents 2,885,040; 2,901,785; 2,914,145; 2,916,108; and 2,944,641. The manner in which such conventional trim caps **13** are secured to the vertical mullions **12** forms no part of this present invention which instead is concerned with the improved trim cap structure **20** and the platforms **22**.

Support member 28

The support member **28** comprises a substantially C-shaped inboard portion **36** having a support web **38** and support legs **40**. A pair of spaced vertical outboard flanges **42** is provided on the support web **38**. The C-shaped inboard portion **36** embraces the outboard end **25** and is secured thereto preferably by means of bolts **43**.

A transverse L-shaped flange **44** is provided on the inboard ends of the support legs **40**. The L-shaped flanges **44** abut the outer surface of the glazing **16** and provide the aforementioned external retaining means.

A stiffening element **46** is secured to each side of the rectangular body portion **23** and extends outwardly between the outboard end **25** and the support legs **40**. The stiffening elements **46** extend vertically between the horizontal muntins **14**.

It should be understood that the configuration of the C-shaped inboard portion **36** may be changed in order to adapt the support member **28** to vertical mullions having other shapes.

Corrugated structural element 30

The corrugated structural element **30** is best illustrated in FIGURES 2 and 3. The corrugated structural element **30** is aligned vertically with the support member **28** and has horizontally disposed corrugations having crests **47** and connecting webs **48**. The corrugated structural element **30** also has an inboard edge **50** and an outboard edge **52** (see FIGURE 2). The inboard edge **50** is positioned between the spaced flanges **42** and secured therein

by means of bolts 54 extending through the flanges 42 and the crests 47.

Facing sheets 32, 32'

The facing sheets 32, 32' preferably comprise extruded aluminum elements and are of two types. Namely, intermediate facing sheets 32 and end facing sheets 32'.

Generally, the intermediate facing sheets 32 comprise a substantially U-shaped element having a web 56 and a pair of legs 57, 58 which depend inwardly from the web 56. The intermediate facing sheets 32 are positioned on the corrugated structural element 30 in vertically aligned abutting relation. The facing sheets 32 include connecting means 59 which is illustrated on an enlarged scale in FIGURE 4. As can be seen, the leg 57 is provided with a flange 60 which extends substantially perpendicular therefrom and outwardly of the facing sheet 32. The flange 60 is secured to the crests of the horizontally disposed corrugations preferably by means of bolts 61. The web 56 is provided with a web extension 62 on one side thereof which projects beyond the leg 57. A ridge 64 is provided on the inner surface of and adjacent to the end of the web extension 62. A groove 66 is provided at the intersection of the web 56 and the leg 58.

As can be seen in FIGURE 4, the web extension 62 overlaps a portion of the web of the adjacent facing sheet whereby the flange 60 and the bolt 61 are hidden from external view. Furthermore, the ridge 64 is engageable in the groove 66 whereby the exposed surfaces of the facing sheets are coplanar.

The end facing sheets 32', have a somewhat different configuration. Specifically, the leg 57 together with the flange 60 of the intermediate facing sheets 32 are missing. In their place a pair of spaced bosses 68 is provided on the inner surface of the web 56. The spaced bosses 68 maintain the web 56 in coplanar relation with the webs 56 of the other facing sheets 32. A bolt 70 secures the facing sheet 32' to the support leg 40 and the stiffening element 46.

As can be seen in FIGURE 2 the facing sheets 32, 32' enclose both sides of the corrugated structural element 30.

Cap member 34

The cap member 34 comprises a substantially U-shaped element which encloses the outboard edge 52 of the corrugated structural element 30. The cap member 34 has a cap face 72 and cap webs 74. An inwardly offset flange 76 is provided at the ends of the cap webs 74. Also a leg extension 78 having a ridge 80 on its inner surface is provided at the end of the cap webs 74. The inwardly offset flange 76 and the leg extension 78 with the ridge 80 of the cap member 34 correspond in shape and function with the flange 60 and the web extension 62 with the ridge 64 respectively. Hence the bolt 61 secures the inwardly offset flange 76 to the crests 47 of the corrugated structural element 30. The leg extension 78 overlaps a portion of the web 56 with the ridge 80 engaged in the groove 66.

In order to properly position the cap member 34, a plurality of spacer means 82 are provided. The spacer means 82 comprise a channel shaped element 84 secured to the outboard edge 52 of the corrugated structural element 30 by means of bolts 86. A spacer plate 88 is secured to the channel-shaped element 84 and includes spacing lugs 90. Thus when the cap member 34 is positioned over the outboard edge 52, the spacing lugs 90 abut the inner surface of the cap face 72 and maintain the cap member 34 in spaced relation with the corrugated structural element 30.

An object of this invention is to provide a trim cap structure having a minimum number of exposed fasteners. As can clearly be seen in FIGURE 2, the only fasteners which are exposed are the fasteners 70. The other fasteners are hidden from external view by the overlapping configuration of the connecting means 59.

Platform 22

Referring to FIGURE 2, the platform 22 preferably comprises a lightweight grid-like structure.

First fastener elements 92 secure one end of the platform 22 to the adjacent trim cap structure. Second fastener elements 94 secure the other end of the platform 22 to the other trim cap structure.

The first fastener element 92 comprises an internally threaded cylindrical spacer 96 secured between and to the platform 22 and the facing sheets 32, 32' preferably by means of bolts 98. The first fastener element 92 maintains the platform spaced from one of the trim cap structures.

The second fastener element 94 comprises an internally threaded cylindrical spacer 100 which is somewhat shorter than the spacer 96. Spacers 100 are secured to the facing sheets 32, 32' preferably by means of bolts 102. A number of washer element 104 are positioned between the spacer 100 and the platform 22. Bolts 102 extending through the washer elements 104 secure the spacer 100 to the platform 22. Hence the second fastener element 94 is extensible. By providing the proper number of washer elements 104, the next-in-line trim cap structure may be forced toward or away from the previously erected trim cap structure. Hence the trim cap structures are aligned in spaced substantially parallel relation with each other.

I claim:

1. A vertical trim cap structure secured to the vertical frame elements of a curtain wall in aligned relation therewith, comprising:
   - a support element secured along the vertical frame elements of said curtain wall and having a pair of spaced vertical outboard flanges;
   - a corrugated structural element vertically aligned with the said support element and having horizontally disposed corrugations, said corrugated structural element having an inboard edge thereof secured between the said spaced flanges;
   - a plurality of vertical facing sheets secured to and enclosing both sides of the said corrugated structural element; and
   - a cap member secured to and enclosing the outboard edge of said corrugated structural element.

2. The vertical trim cap structure of claim 1 wherein the said facing sheets comprise substantially U-shaped elements having
   - a web defining the exposed wall of the said facing sheets,
   - a pair of legs depending inwardly from the said web, the leg of one facing sheet abutting the leg of the adjacent facing sheets,
   - a flange extending substantially perpendicular from one of said legs, said flange being secured to the said horizontally disposed corrugations of said corrugated structural element, and
   - a web extension projecting beyond the said one of said legs and overlapping the web of the adjacent facing sheet whereby the said flange is hidden from external view.

3. The trim cap structures of claim 2 including:
   - a groove in said facing sheet at the intersection of the said web and the other of said legs, and
   - a ridge on the inner surface of and adjacent the end of the said web extension, said ridge being engaged in the said groove whereby the exposed surfaces of the said facing sheets are coplanar.

4. In a curtain wall structure having a plurality of laterally spaced vertical mullions, an outwardly extended vertical trim cap structure secured to selected ones of said vertical mullions, and alignment means for maintaining the said trim cap structures in spaced substantially parallel relation, the improvement in said alignment means comprising:
   - a platform extending between adjacent ones of said trim cap structures,

said platform extending in outboard relation to those ones of said vertical mullions which are not provided with an outwardly extended vertical trim cap structure,

first fastener elements securing one end of the said platform to the adjacent trim cap structure, and

second fastener elements securing the other end of the said platform to the other trim cap structure,

at least one of said fastener elements being extensible whereby the lateral spacing of said adjacent ones of said trim cap structures may be varied.

5. In a curtain wall structure, the combination comprising:

a plurality of spaced vertical mullions;

vertical trim cap structures, one each secured to selected ones of said vertical mullions and extending outwardly therefrom for a substantial distance; each of said trim cap structures comprising:

a support element secured along the vertical frame elements of said mullions and having a pair of spaced vertical outboard flanges,

a corrugated structural element vertically aligned with said support element and having horizontally disposed corrugations, said corrugated structural element having an inboard edge thereof secured between said spaced flanges,

a plurality of vertical facing sheets secured to and enclosing both sides of said corrugated structural element, and

a cap member secured to and enclosing the outboard edge of said corrugated structural element;

at least two vertically spaced platforms extending between adjacent ones of said trim cap structures;

said platform extending in outboard relation to those ones of said vertical mullions which are not provided with an outwardly extended vertical trim cap structure,

first fastener elements securing one end of said platforms to the facing sheets of one of said adjacent trim cap structures; and

second fastener elements securing the other end of said

platforms to the facing sheets of the other of said adjacent trim cap structures;

at least one of said fastener elements being extensible whereby said adjacent trim cap structures may be brought into parallelism.

6. In a curtain wall structure, the combination comprising:

a plurality of laterally spaced vertical mullions;

a trim cap member secured to at least half of said vertical mullions;

a vertical trim cap structure secured to the remaining ones of said vertical mullions and extending outwardly therefrom for a substantially greater distance than said trim cap members;

at least two, vertically spaced platforms extending adjacent to one of said trim cap structures;

said platform extending in outboard relation to those ones of said vertical mullions which are not provided with an outwardly extended vertical trim cap structure,

first fastener elements securing one end of said platforms to one of said adjacent trim cap structures; and

second fastener elements securing the other end of said platforms to the other of said adjacent trim cap structures;

at least one of said fastener elements being extensible whereby the last to be erected trim cap structure may be brought into parallelism with the previously erected trim cap structure.

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