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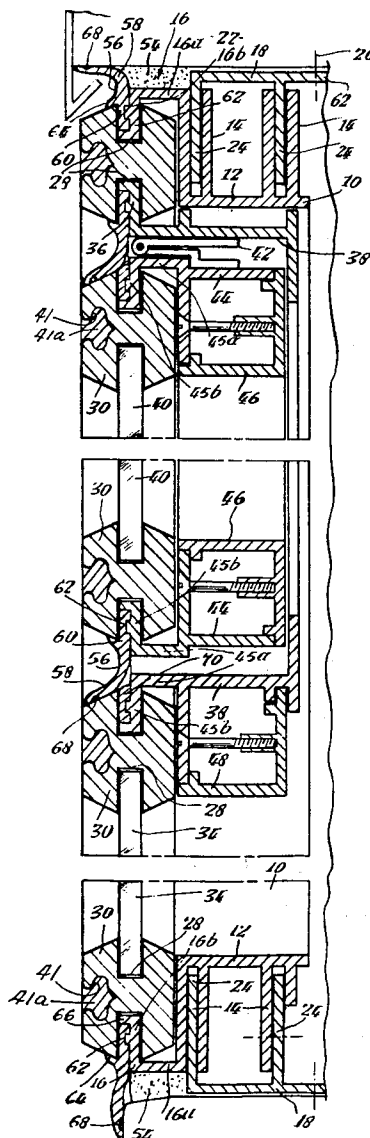
[54] **A SEALING ARRANGEMENT FOR A BUILDING
 STRUCTURAL ASSEMBLY**
 7 Claims, 4 Drawing Figs.

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E04f 1/36
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207, 208, 213, 235, 475-477, 400; 49/496, 497,
487, 489, 485, 488, 463, 368

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ABSTRACT: The sealing arrangements for structural assemblies which comprise one or more frames carrying window lights or opaque infill panels and which require weatherproof sealing with contiguous parts of the structural assembly.

The illustrated arrangements make use of known flexible sealing strips which hold the panes or panels in the frame by securing to such strips a supplementary sealing strip that is also flexible and extends from the frame to seal against an adjacent element of the structural assembly. This supplementary strip can bear freely against said element or it may be positively engaged thereby. The arrangement is equally applicable to sealing the adjoining edges of two adjacent frames or the adjoining edges of a smaller frame, e.g. an opening window light, in a larger frame.



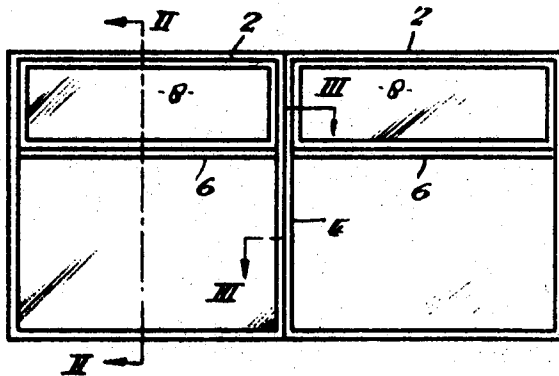
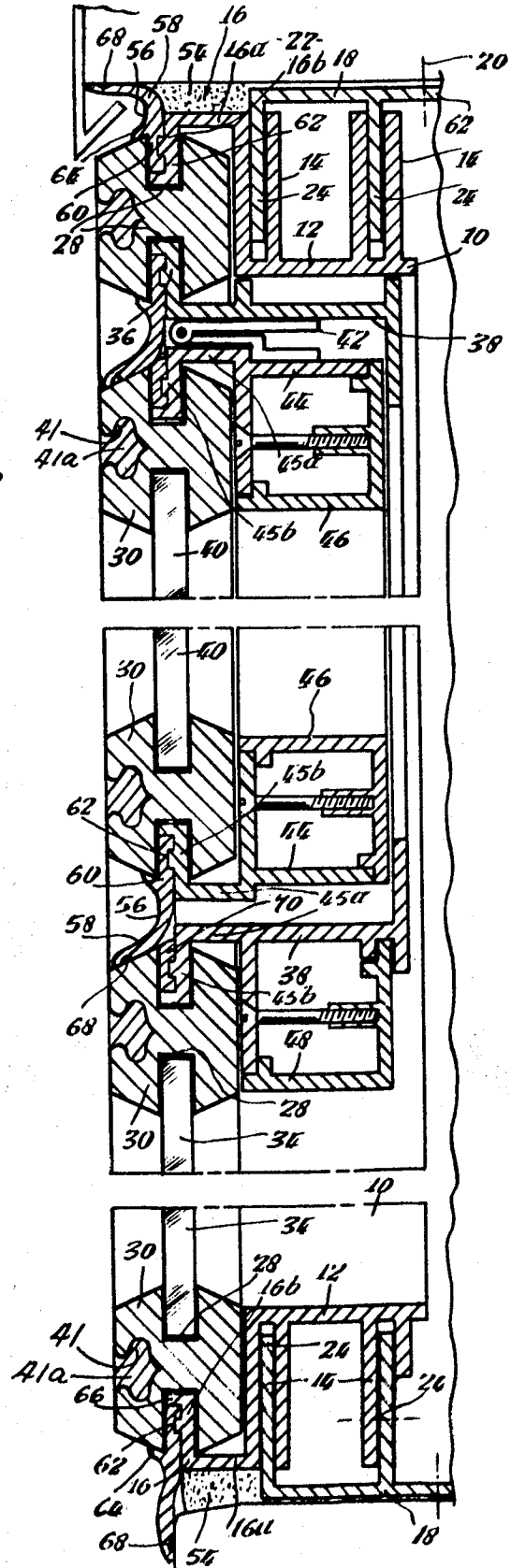


Fig. 1.



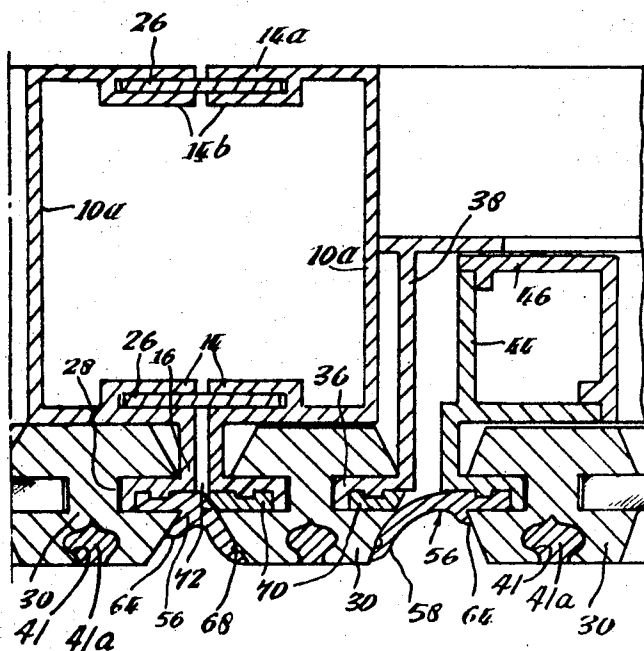


Fig. 3.

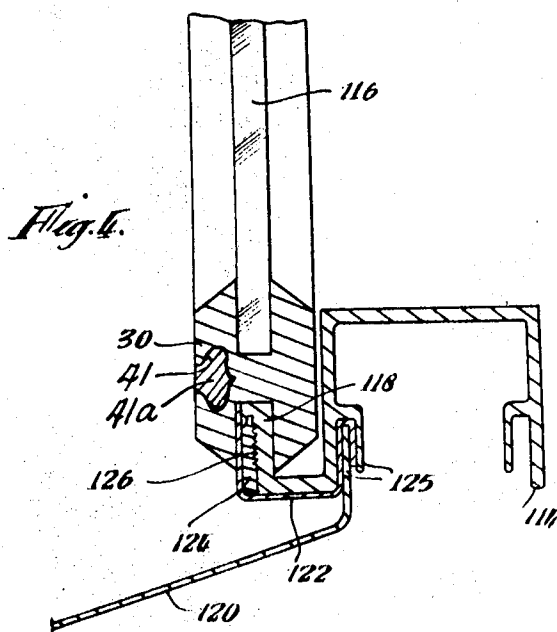


Fig. 4.

A SEALING ARRANGEMENT FOR A BUILDING STRUCTURAL ASSEMBLY

This invention relates to the construction of buildings and is concerned with the sealing means provided for the weatherproofing of framed and paneled building constructions, e.g. window frames and curtain walling.

In metal window frames it is known to use sectional sealing strips of flexible material such as an artificial rubber between the frame and the or each light of the window. Such strips are known in which a pair of opposed grooves are provided to receive, respectively, an inwardly directed flange of the window frame and an outer edge of the glass pane of the window light. Between these grooves, the strip section has an indented region that increases the flexibility of the respective lips defining one side of each groove and so assists the assembly of the strip to its associated parts, this indented region afterwards receiving a firmly fitting filler strip which maintains pressure of the lips against the glass panes they hold. A corresponding arrangement is used to hold infill panels in curtain-walled constructions.

While these sealing strips are able to perform satisfactorily the task of providing a rainproof joint, difficulties have been experienced in maintaining a seal at the outer periphery of a frame where it meets a further frame or fits into an aperture of the surrounding structure. Because of thermal expansion differences it is necessary to allow for some movement between the frame and the structure adjoining it and normally a flexible mastic material is used to form an effective seal. However, repeated thermal movements reduce the flexibility of the mastic; moreover it is found that weathering, and in particular exposure to sunlight, can have a further deleterious effect on the flexibility of the mastic and as a result constant maintenance may be necessary.

It is an object of the present invention to provide a sealing arrangement that is able to give a satisfactory seal in these circumstances that requires less maintenance. A further object of the invention is to provide an improved sealing arrangement for parts of a structure that are intended to be displaceable, such as opening window lights.

A sealing arrangement for a frame according to the invention comprises a first sectional member of flexible material having at least one slot to receive an edge or lip portion of the frame in the peripheral region of the frame and includes also an auxiliary sectional member, similarly of flexible material, having a width greater than said slot and a thickness over at least a part of said width less than the slot whereby it can be sandwiched in the slot with the associated frame edge or lip to project from the slot and to be deformed into contact with a further structural element adjoining the side of the frame.

Thus, the auxiliary member can provide a more permanent rain barrier than the conventional mastic insert and it is also possible to supplement its sealing function with a mastic insert which can be inserted behind the member to be protected by it from weathering effects, if there is a suitable space between the frame and said further structural element.

The invention will be more particularly described with reference to the accompanying drawings, wherein:

FIG. 1 shows, as an example, a structural unit in which sealing arrangements according to the invention are incorporated, FIGS. 2 and 3 are respectively sections on the lines II—II and III—III in FIG. 1, and

FIG. 4 shows a detail of a structural unit incorporating a further form of sealing arrangement according to the invention.

Referring to FIGS. 1 to 3 of the drawings, the structure comprises two frames 2 placed side-by-side so that their adjacent edges form a central mullion 4, each frame having a transom 6 defining an upper light 8 which may be hinged. The unit may be regarded as a window or a part of a curtain wall since the framing requirements are the same in both cases, the panels fitted to the frames being of glass or opaque material respectively. The following description, will, however, be related to a window unit.

The frames are built up from metal sectional members 10 each comprising a web 12 from which a pair of bifurcated flanges 14 extend to form a channel, an angle extension 16 being located on the end of one of the flanges. Sectional fixing rails 18 are screwed at 20 to the surrounding structure 22 of the window aperture and have tongues 24 that seat in the bifurcations of the flanges 14 so that each window frame is secured transverse to its own plane but has some freedom in that plane to take up initial lack of fit and to permit relative thermal movements. At the mullion 4, the opposed members 10 of the two frames are held together by flat keying strips 26 (FIG. 3).

The inwardly turned flanges of the angle extensions 16 each seat in one of a pair of opposed slots 28 of a sectional rubber sealing strip 30. The opposite slot of the strip in the lowermost part of the window receives the edge of a glass pane 34 and in the uppermost part of the window the corresponding inwardly directed slot receives flange 36 of outer frame member 38 for window upper light 40. As seen best in FIGS. 2 and 3, a recess 41 is formed along one surface of strip 30 intermediate the opposed slots 28, and receives therein a filler strip 41a. The upper light of the window has a top pivot opening on a hinge 42 secured between the fixed outer frame formed by the sectional members 38 and an inner frame comprising sectional members 44, 46 that are secured together to form a rigid box section. The lower member 38 of the upper light outer frame is also supplemented by a member 48 to increase its rigidity similarly. In both instances, however, the pairs of members 44, 46 and 38, 48 can be replaced by a unitary member of equivalent closed-section form.

Since the frames formed by the members 10 are rigid units fitting within an already-formed window aperture that is usually made of different material, e.g. concrete, there must be additional sealing means provided around the outer edges of the frames both to take up the previously mentioned initial lack of fit and also to accommodate the effects of differential thermal expansion. To do this a flexible mastic compound 54 is injected under pressure into the space between the angle extensions 16 and the surrounding structure 22 of the window aperture.

To protect the mastic from direct exposure to weathering agents that could cause early hardening and shrinkage, there is provided a sealing shield in the form of an auxiliary sectional rubber strip 56 comprising a free limb in the form of a flexible leg 58 longer than the anticipated gap between the strip 30 and the wall of the window aperture. The leg 58 has a relatively small cross section and therefore has considerable flexibility so that it is able to accommodate variations in the gap width along the length of the frame and is also deformable when the frame is first located in place to allow the insertion of a mastic gun nozzle into the space 54.

Base portion 60 of the strip is located in the slot 28. Here the strip is positively located to the frame member flange with which it is sandwiched in the slot 28 by key and groove engagement 62 and it has a spur 64 that sits on the shoulder of the strip 30. Each frame member flange has a widened terminal portion 66 which fills the full width of the slot 28, the purpose of this being to permit the direct transference of the weight of the panes or panels to the frames without applying a bending or flexing force to the strips 30. In this embodiment of the invention there is also illustrated a recess 68 formed on the sealing face of the leg 58, the purpose of which is to produce a gap that will inhibit possible seepage of water past the face by capillary attraction.

Since the opening upper light of the window cannot have permanent sealing means, the strips 56 are similarly provided at those grooves 28 of the members 30, where the flanges of the upper horizontal one of the members 38 and the lower horizontal one of the members 44 are held, to provide depending sealing means that bear against the adjacent members 30 below them. The sealing means also extends along the vertical sides of the frame, mitered and welded joints connecting the horizontal and vertical portions. It will be noted that the sealing arrangement is not affected by the deformations imposed

by opening and closing the upper light due to the inherent flexibility of the legs 58 of the strips 56.

FIG. 3 shows the interconnection at the junction of the two fixed frames of the window and FIG. 1 indicates this to be the vertical junction at a mullion but the same arrangement can be used for a horizontal junction at a transom between two fixed frames. The figure shows how an auxiliary strip 56 extends from one strip 30 to overlap the adjacent strip 30 of the other frame which itself has a truncated flexible auxiliary strip 70 inserted as a filler in its outwardly facing slot 28, the strip 70 having an equivalent cross section to the base portion 60 of the strip 56. If required, the space 72 between the frames can also be filled with mastic. As an alternative to the strips 56, 70, a single strip can bridge the facing slots 28 of the members 30 to seat firmly in said slots but being sufficiently flexible to permit thermal movements between the two members 10a.

It will be readily appreciated that the above-described construction can be applied in an analogous manner to the erection of a curtain wall, opaque infill panels being used in place of the glass panes 34 for example. In the case of curtain walling there may be several frames abutting each other in series or forming a grid to fill a given wall area in the structure and the joints between abutting frames can be made in the same way as the mullion joint illustrated in FIG. 3. It may also be mentioned here that combinations of fixed and opening panels or lights other than those illustrated can be provided. As regards opening lights, while the construction of FIGS. 1 to 3 show these to be top hung, they can alternatively be bottom hung, side hung, horizontally hung, vertical or horizontal pivot hung or projecting top hung. As further alternatives, they may be mounted in horizontal or vertical slides.

In FIG. 4, the frame is built up from sectional members 114 of similar form to the members 10 and 80 of the earlier examples. As in those examples, a pane or infill panel 116 is held in the frame by a slotted sectional rubber sealing strip 30 in the outer slot of which seats angle extension 118 of the frame member. In this example, it is required to make a watertight seal between the frame member 114 and a sill 120. This is done by employing an auxiliary member or strip 122 in the form of a thin flexible material tape in conjunction with the main strip 30, one edge of the tape being secured in the outer slot of the strip 30, the width of the tape extending from that slot to a tongue and groove connection 125 between the frame member and the sill where its opposite edge is secured. The thickness of the strip 122 is considerably less than that of the limbs 58 and 110 of the earlier examples and it is therefore able to follow the contour of the frame member profile between its secured edges and is able to be wrapped around the inserted tongue of the sill in its connection to the frame member to form a waterproof barrier at the tongue and groove. To engage the strip 122 securely in the slot of the member 30 a filler strip 124 is inserted between it and the frame member flange which has a series of small ribs 126 to grip the strip 124.

What I claim and desire to secure by Letters Patent is:

1. A structural assembly comprising, a generally planar frame, a further structural element of the assembly being disposed adjacent at least one edge of said frame and sealing means arranged between said edge and said further element, the sealing means comprising a first sectional member of flexible material having opposed slots, one slot receiving said edge of the frame and the other slot receiving an edge of a panel for the frame, said first sectional member having a recess formed therein along one surface for receiving a filler strip, there being further provided a sectional auxiliary member of flexible material having a width greater than the depth of said one slot and over at least a part of said width, a thickness less than the width of said slot, said part of said auxiliary member being sandwiched in said one slot with said frame edge and extending from the slot to said further structural element and being deformed into contact with said further element, said part of the sectional auxiliary member received in said first slot including a longitudinal groove and said edge of the frame

wedged in said first slot including a longitudinal keying element seated in said longitudinal groove for keying said sectional auxiliary member in said first slot, and a filler strip seated in said recess securing the edge of the frame and said part of said sectional auxiliary member in the first slot and securing the panel edge in the second slot, the arrangement being such that said edge of the panel and said edge of the frame together with said part of said sectional auxiliary member can be inserted freely into the opposed slots of said first sectional member and said filler strip can then be inserted in said recess, thereby to secure the parts inserted in said opposed slots.

2. A sealing arrangement according to claim 1 wherein a thickened portion is provided on the sectional auxiliary member in an intermediate region of its width, said thickened portion having opposed faces disposed adjacent and outside said first slot with one of said faces bearing against the first sectional member and the opposite of said faces of said thickened portion urged against a region of said frame edge contiguous with the first slot.

3. A sealing arrangement according to claim 1 wherein the sectional auxiliary member has a contact face in engagement with said further element, a longitudinal recess being provided on said face to form an interruption in the bearing interface between said face and said further element.

4. An assembly according to claim 1 wherein said extending end is engaged in a tongue-and-groove connection of said frame and element.

5. An assembly according to claim 4 wherein the auxiliary member is flexed between its secured ends to lie against the contiguous surface of the profile of the frame.

6. A structural assembly comprising, a generally planar frame, a further structural element of the assembly being disposed adjacent at least one edge of said frame and sealing means arranged between said edge and said further element, the sealing means comprising a first sectional member of flexible material having opposed slots, one slot receiving said edge of the frame and the other slot receiving an edge of a panel for the frame, said first sectional member having a recess formed therein along one surface for receiving a filler strip, there being further provided a sectional auxiliary member of flexible material having a width greater than the depth of said one slot and over at least a part of said width, a thickness less than the width of said slot, said part of said auxiliary member being sandwiched in said one slot with said frame edge and extending from the slot to said further structural element and being deformed into contact with said further element, said further structural element providing a surrounding aperture forming means within which said frame is located in a manner permitting relative displacement between the frame and the aperture structure parallel to the plane of the frame, said sectional auxiliary member extending from the outer periphery of the frame and into sealing contact against the inner peripheral region of the structural element aperture-forming means, and a filler strip seated in said recess securing the edge of the frame and said one part of said sectional auxiliary member in the first slot and securing the panel edge in the second slot, the arrangement being such that said edge of the panel and said edge of the frame together with said part of said sectional auxiliary member can be inserted freely into the opposed slots of said first sectional member and said filler strip can then be inserted in said recess, thereby to secure the parts inserted in said opposed slots.

7. A structural assembly comprising, a generally planar frame, a further structural element of the assembly being disposed adjacent at least one edge of said frame, the adjoining regions of the frame and structural element carrying respective sealing means arranged between said edge and said further element, the sealing means each comprising a sectional member of flexible material having opposed slots receiving respective edges of the frame and of the edge portion of the structural element, said sectional members having adjacent slots of similar width, said sectional members each

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having a recess formed therein along one surface for receiving a filler strip, there being further provided for each of said opposed slots of said sectional members, a sectional auxiliary member of flexible material having over at least a part thereof, a thickness less than the width of its respective slot, said part of one of said auxiliary members being sandwiched in its respective slot with said frame edge and extending from the said slot to said further structural element and being deformed

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into contact with said further element, said part of the other of said auxiliary members being sandwiched in its respective slot with said structural element edge portion and being truncated and terminating substantially at the mouth of its slot, and a filler strip seated in the recess of each of said sectional members.

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