Jan. 14, 1969 C. P. BALZER ET AL 3,421,267

ROOF EXPANSION JOINT COVERS

Filed Nov. 3, 1966 Sheet 1 of 3

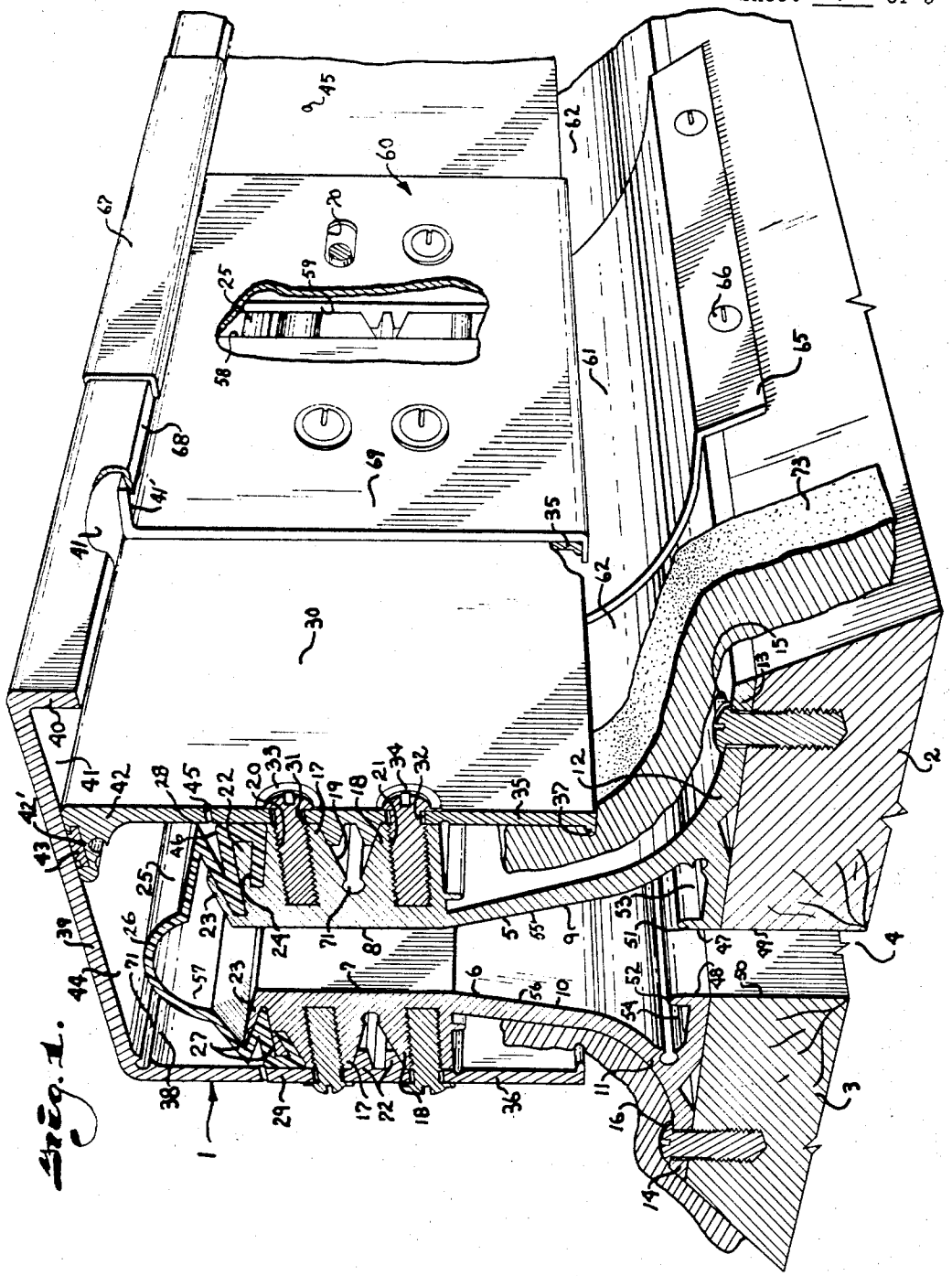


Fig. 1.

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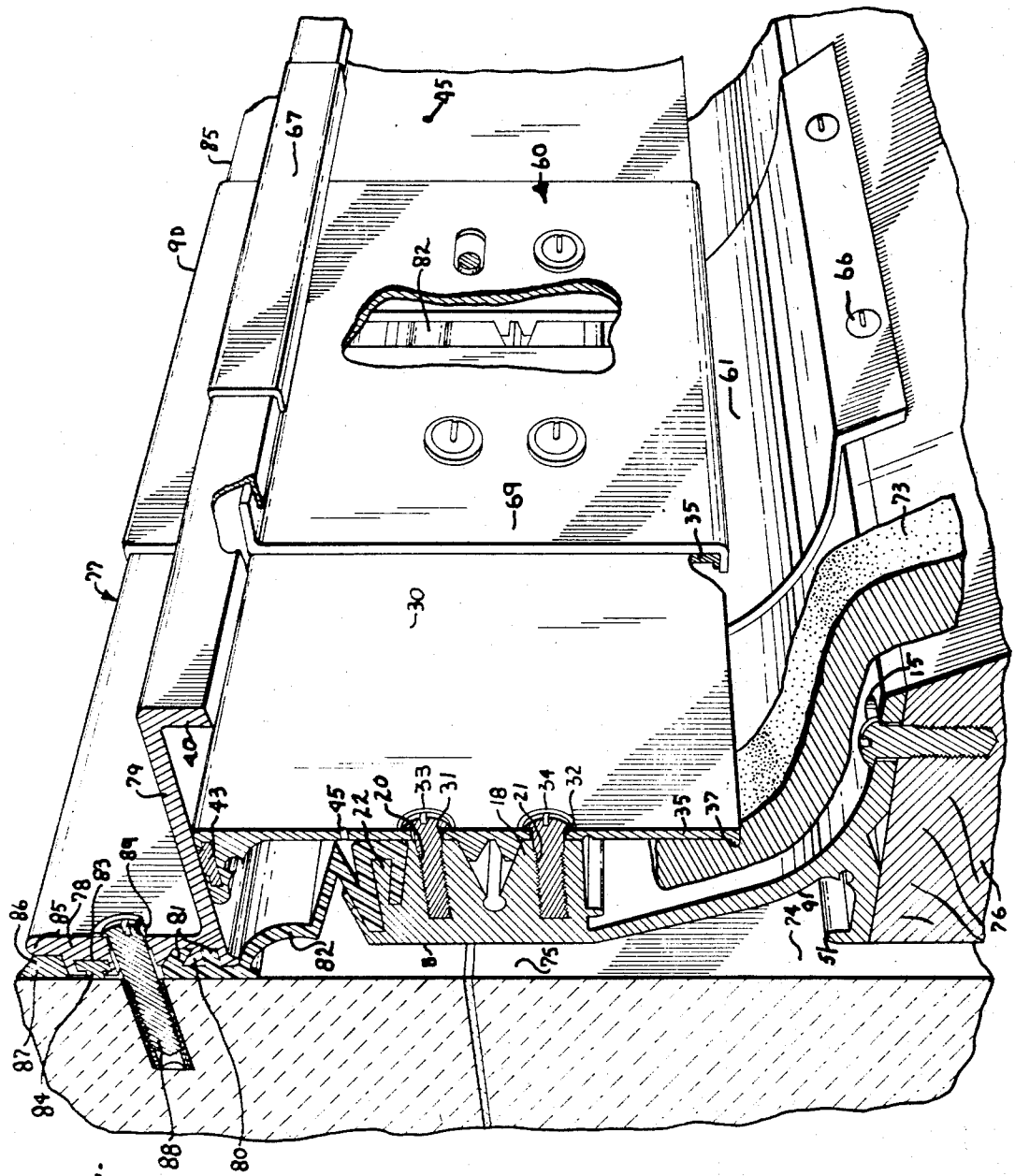


Fig. 2.

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Fig. 1.

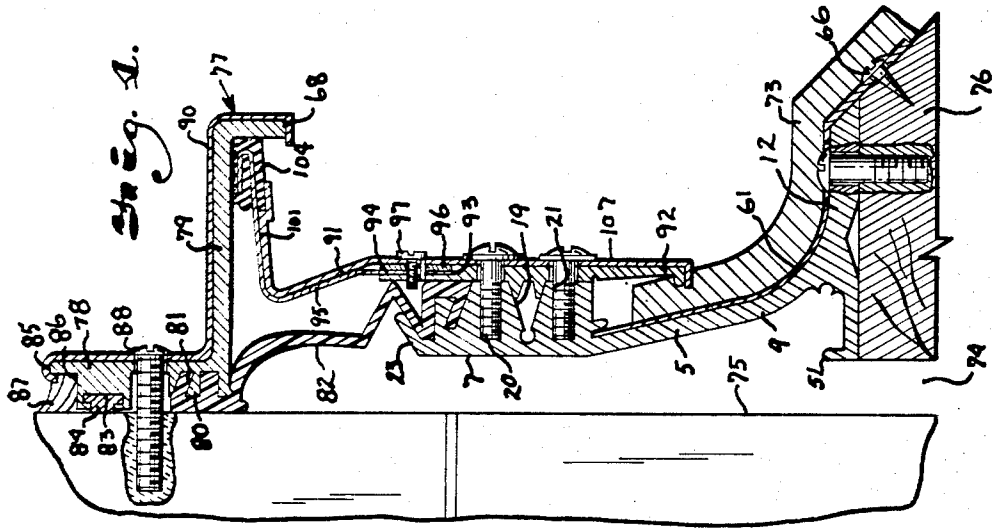
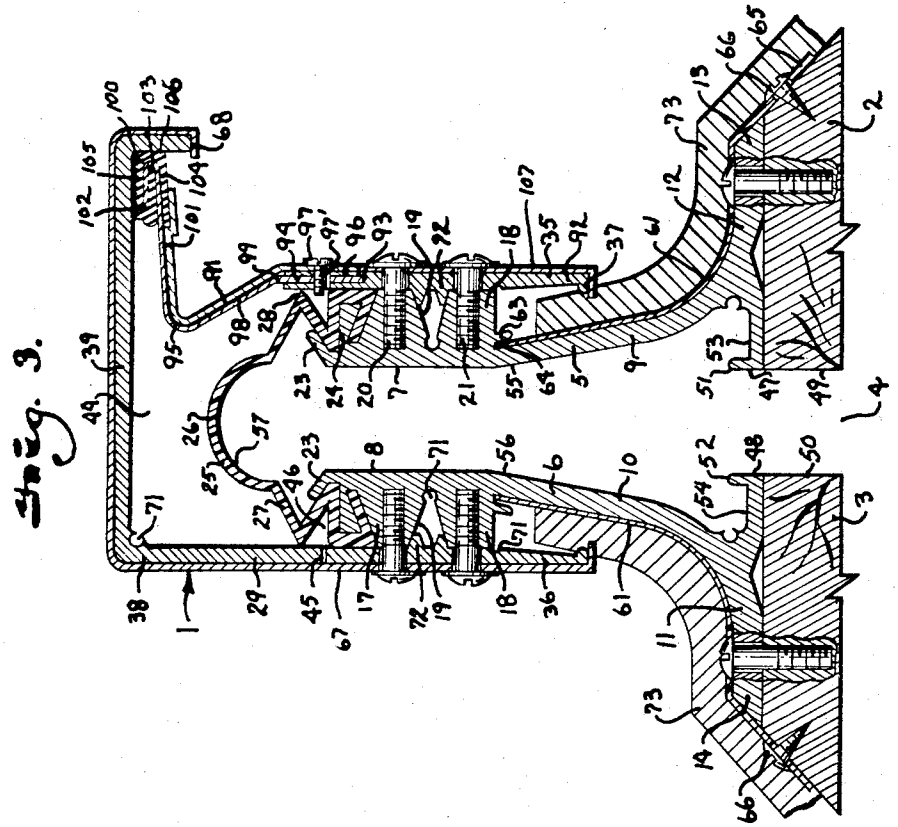


Fig. 3.



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United States Patent Office 3,421,267
Patented Jan. 14, 1969

3,421,267

ROOF EXPANSION JOINT COVERS

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Filed Nov. 3, 1966, Ser. No. 591,797
U.S. Cl. 52—58 2 Claims
Int. Cl. E04d *13/14;* E04b *1/62;* E04f *17/00*

ABSTRACT OF THE DISCLOSURE

Expansion joint covers for roof structures include elongated rigid sections having an elongated flexible seal extending therebetween with an upwardly directed crown portion, a walled cover structure for protecting the seal, and weep holes in the cover structure to drain condensate forming within the cover structure. The sections form gutters to catch moisture condensing on joint walls below the seal and the cover structure includes a flexible wall where used between roof structure sections which may move both horizontally and vertically.

This invention relates to building construction and more particularly, to expansion joint deck covers.

Expansion joints in roof structures are commonly provided to allow for relative movement between structures caused by temperature variations or other forces. Such expansion joints are usually in the form of an elongated slot or opening defined by horizontally spaced apart structural edge members or an edge member spaced horizontally from a vertical end wall or riser. Expansion joint covers have been used to prevent the elements from entering into the slot or opening, the prime requisite of such covers being the ability to expand and contract across the joint without permitting leakage or entry of the elements from the outside to the inside of the building.

Existing joint covers however, have presented one or more undesirable features, for example, a tendency to admit internally formed condensation into the joint and trap condensation in enclosed cover portions, excessive resistance against relative movement between opposed cover parts and between cover parts and the structural edge members causing loosening with respect to the structural edge members, excessive flexing, rubbing or exposure of parts causing short seal life, poor seal joints between flexible and rigid parts, lack of resistance against shocks or strains, and inability to permit both vertical as well as horizontal relative movement between the joint forming members.

The principal objects of the present invention are: to provide an expansion joint cover assembly wherein enclosed condensate is quickly drained to the exterior; to provide such a joint cover having gutters for catching condensate forming on interior cover walls whereby the condensate is not admitted into the building; to provide such an expansion joint cover having a highly flexible seal joined to side members through a tortuous seal path producing an improved seal joint therebetween; to provide such a cover assembly wherein great freedom is permitted for the cover sections to move horizontally relative to each other as well as to expand and contract longitudinally on the structural edge members; to provide cover structure having freedom to permit both horizontal and vertical relative movement; to provide such cover structure which resists cracking or damage due to shocks or strain; and to provide such a deck cover assembly which is relatively simple and inexpensive in construction, presents little resistance to movement with the expansion joint while maintaining a tight, effective seal, and is well suited for its intended purpose.

Other objects and advantages of this invention will become apparent from the following description taken in connection with the accompanying drawings wherein are set forth by way of illustration and example certain embodiments of this invention.

FIG. 1 is a fragmentary cross-sectional perspective view showing an expansion joint cover assembly embodying this invention mounted on horizontally spaced apart structural members forming an expansion joint.

FIG. 2 is a fragmentary cross-sectional perspective view of a modified expansion joint cover assembly embodying this invention adapted for use between a structural roof member and a vertical wall or riser.

FIG. 3 is a cross-sectional end elevation through a further modified joint cover structure adapted to permit both vertical and horizontal relative movement between structural members.

FIG. 4 is a cross-sectional end elevation through a still further modified expansion joint cover assembly similar to that of FIG. 2 but adapted to permit both vertical and horizontal relative movement.

Referring to the drawings in more detail:

The reference numeral **1** (FIG. 1) generally indicates an expansion joint deck cover assembly embodying this invention. The assembly **1** is shown mounted on roof structural members **2** and **3** disposed in spaced relationship and defining an elongated slot or joint **4** therebetween. The assembly **1** comprises a pair of elongated relatively rigid sections **5** and **6** for example, of extruded aliminum, each being mirror images of the other. The sections **5** and **6** respectively have upper portions **7** and **8**, intermediate portions **9** and **10** and foot portions **11** and **12**.

The foot portions **11** and **12** extend respectively horizontally away from the joint **4** at **13** and **14** and have longitudinally spaced apart screw receiving longitudinally oval slots **15** therethrough for mounting the foot portions along the structural members **2** and **3**. The foot portions are secured in position on the structural members by means of suitable screws **16**. The oval slots **15** permit longitudinal movement to relieve any tendency to bind due to variations in temperature expansion characteristics between the foot portions and the structural members. With the foot portions **11** and **12** so mounted, the intermediate portions **9** and **10** extend upwardly and inwardly toward each other above the joint **4**.

The upper portions **7** and **8** each have spaced apart upper and lower longitudinally contiuous outwardly extending bosses **17** and **18** thereon respectively forming an outwardly opening V-shaped groove **19** therebetween. The respective bosses **17** and **18** have longitudinally spaced apart threaded blind bores **20** and **21** extending thereinto above each other. The upper portions **7** and **8** also each have outwardly projecting adjacent lips **22** and **23** spaced above the bosses **17** forming tortuous sealing paths **24** for engaging an elongated flexible seal **25** now described.

The seal **25** is preferably of flexible vinyl having an elongated central dome or crown **26** bulging upwardly and extending above and across the upper portions **7** and **8**. The seal **25** is shaped in a manner forming downwardly sloping legs **27** which project oppositely outwardly to an edge **28** where they turn respectively inwardly into engagement with the upper lip **23**. The legs of the seal **25** then project horizontally outwardly, downwardly and then inwardly and upwardly so as to cover the exposed surfaces of the lips **22**. Thus, the legs of the seal **25** closely follow the tortuous path **24** to produce a highly effective seal between the upper portions **7** and the seal **25**. This prevents movement of air or moisture thereacross although great freedom is provided for the sections **5** and **6** to move toward and away from each

other with horizontal relative movement of the structural members 2 and 3. During such movement the spacing variation is taken up by varying the height and curvature of the crown 26 and the flexible movement of the seal legs 27.

First and second elongated extruded vertical side walls 29 and 30 (FIG. 1) are preferably formed of the same material and in the same manner as the sections 5 and 6. The side walls 29 and 30 each have bores 31 and 32 therethrough and spaced therealong for receiving screws 33 and 34 which threadedly engage respective boss bores 20 and 21 for rigidly mounting the respective side walls on the upper portions 7 and 8 in parallel spaced apart relation.

The side walls 29 and 30 each have a leg 35 and 36 depending vertically below the respective lower bosses 18 and terminating in a protrusion 37 directed toward but spaced from the respective section intermediate portions 9 and 10. The first side wall 29 has an upper portion 38 projecting above the seal dome 26. A horizontal wall 39 is integral with and supported by the first side wall upper portion 38 and extends across the assembly covering the seal dome 26. The horizontal wall 39 extends beyond the second side wall 30 and has a depending lip 40 positioned outwardly of the second wall 30. The horizontal wall 39 has a lower surface 41 extending at right angles or normal to the second side wall 30.

The second side wall 30 has an upper portion 42 projecting above the seal dome 26, in the manner of the upper portion 38, and terminates in an upwardly open gasket receiving groove 42' extending therealong. A suitable nonmetallic gasket 43 is slidably received in the gasket groove 42' and slidably contacts the lower surface 41 to provide a moving seal between the wall 30 and the wall 39 to substantially enclose a volume or space 44 directly above the seal 25. A plurality of weep holes 45 extend through the respective side walls 29 and 30 and are spaced longitudinally therealong adjacent the seal legs 27 where the legs are engaged in sealing contact with the inside surfaces of the side walls 29 and 30. Due to the slope of the seal dome 26 and seal legs 27, condensate water forming within the volume 44 drains down to the lowest points 46 within the volume 44 which is the junction between the seal legs 27 and the inside surfaces of the side walls 29 and 30. Since this is the point where the weep holes 45 are located, the condensate water drains through the weep holes to the exterior where it evaporates.

The foot portions 11 and 12 extend horizontally inwardly beneath the junction with the intermediate portions 9 and 10 and terminate in inner edges 47 and 48 respectively located adjacent the sides 49 and 50 of the joint 4. The foot portion inner edges 47 and 48 each have an upwardly extending lip 51 and 52 respectively integral therewith forming gutters 53 and 54 with the foot portions and inner lower part of the intermediate portions 9 and 10. The gutters 53 and 54 catch downwardly running condensation formed on the inside surfaces 55 and 56 of the intermediate portions and the inside surface 57 of the seal 25 preventing the moisture from falling into the joint 4.

The sections 5 and 6 are supplied, for example, in 10-foot lengths and when mounted on the structural members 2 and 3, approximately a half-inch is recommended between adjacent ends 58 and 59 to permit longitudinal expansion in response to temperature changes in the assemblies. The seals 25 are normally supplied in rolls of greater than 10-foot lengths and normally extend across the longitudinal expansion space provided between adjacent sections, FIG. 1. To prevent the elements from entering the transverse joint space, a joint cover generally indicated 60 is provided. The cover 60 comprises a sheet metal lower panel 61 which overlaps the opposite ends 58 and 59 and covers the outside surface 62 of each of the intermediate portions 9 and 10 adjacent the joint. The lower panels 61 extend from an upper position 63 (FIG. 3) within a groove 64 formed adjacent the lower bosses 18 to a lower position 65 which projects over and beyond the outer foot portions at 13. The lower panels 61 are suitably secured in position by screws 66 extending therethrough and into the respective structural members 2 and 3.

The joint covers 60 include a first sheet metal upper panel 67 (FIG. 3) which is longitudinally coincident with the lower panels 61 and covers the exterior of the first side walls 29 adjacent the transverse joint. The first upper panel 67 turns and covers the horizontal wall 39 and further the depending lips 40 and the exposed edges 68 of the first side wall depending lip 40. A second sheet metal upper panel 69 (FIG. 1) is also longitudinally coincident with the lower panels 61 and covers the exterior of the second side walls 30 adjacent the transverse joint. The panel 69 is turned outwardly at 41' loosely contacting the horizontal wall lower surface 41 and inwardly over the lower edge of the second side wall depending leg 35.

The upper panels 67 and 69 have longitudinally directed oval slots 70 therethrough in positions corresponding to the threaded boss bores 20 and 21 adjacent the opposed ends 58 and 59 for receiving screws therethrough in mounting the respective panels but permitting the longitudinal movement of the ends 58 and 59 toward and away from each other without causing binding or buckling of the metal.

Stress relieving channels or grooves 71 are provided in the structure at corners and other locations of high stress to permit deflection of the assembly under shock or strain without producing stress concentrations which may result in cracking. The grooves 71 are also located at the juncture of the groove 19 between the respective bosses 17 and 18 for the same purpose.

The respective side walls 29 and 30 have inwardly projecting teeth 72 forming tapering outside surfaces which mate with the inwardly directing surfaces of the groove 19 to accurately position the side walls with respect to the remaining cover structure. The slight deflection of the sections 5 and 6 at the upper portions 7 and 8 due to the receipt of the teeth 72 is relieved by the groove 71 located at the juncture between the bosses 17 and 18.

The above described expansion joint cover assembly thus provides an accurate, rugged structure which freely permits the horizontal expansion and contraction of the longitudinal joint 4 without permitting leakage between the interior and exterior of the building. Longitudinal expansion and contraction of the joint cover structure itself is freely permitted for maintaining minimum stress therein. Roof covering material 73 adjacent the joint 4 is easily received between the depending legs 35 and 36 and the respective intermediate portions 9 and 10. A seal is produced with the material 73 upon tightening the screws 33 and 34. The flexible seal 25 is protected against outside exposure by means of the enclosing structure formed by the side walls. Condensate forming in the enclosed volume 44 is permitted to drain through the weep holes 45 in order to further maintain a desirable environment for the seal 25 which promotes long life. The accidental introduction of water between the seal 25 and the sections 5 and 6 is effectively resisted by the tortuous seal path 24 provided therebetween. Condensation or accidental water produced within the cover apparatus below the seal 25 is caught in the gutters 53 and 54 rather than introduced into the building structure.

Referring to FIG 2, an embodiment of this invention is shown which is adapted for use at a joint 74 located between a vertical wall or riser 75 and a structural roof member 76. This modified assembly is indicated by the reference numeral 77 and comprises structure identical to approximately the right half of the assembly 1 described above in connection with FIG. 1. However, the structure forming the juncture with the wall 75 includes an extruded section 78 which is integral with the horizontal wall 79 and has a plurality of projecting lips 80 forming a tortuous

seal path with corresponding portions **81** on the modified seal **82**. The section **78** has a groove **83** opening toward the wall **75** and receiving a gasket **84** which projects therefrom against the wall **75** and produces a seal therewith. A lip **85** extends upwardly from the section **78** forming a trough **86** for receiving suitable calking compound **87** to improve the seal at the juncture with the wall **75**. A suitable anchor screw **88** extends through oval slots **89** spaced along the section **78** for maintaining the section tightly against the wall **75** but permitting longitudinal expansion and contraction of the structure as described above. A sheet metal upper panel **90** is suitably modified to cover the exterior surfaces of the section **78** at the junction between sections including the upwardly extending lip **85**.

Referring to FIG. 3, the deck cover assembly shown is identical with that described in connection with FIG. 1 with the exception that the side wall **30** is replaced with a compound side wall **91** permitting freedom of relative movement both vertically and horizontally between the structural members **2** and **3**. Such double freedom of movement is required, for example, in areas where seismic disturbances can be expected. The side wall **91** comprises a lower portion **92** identical to the lower portion of the side wall **30** (FIG. 1) but having an upper portion **93** adapted to receive thereagainst the lower anchor flange **94** of a thin, flexible spring wall **95**. The lower anchor flange **94** is rigidly secured in position by an elongated holding bar **96** through which spaced apart screws **97** extend which are threadedly engaged with the wall upper portion **93**. Weep holes **97'** extend through the side wall **91** and function as the weep holes **45** noted above.

The spring wall **95** preferably is of resilient metal and extends along the entire length of the deck cover assembly, that is, coextensive with the sections **5** and **6**. The spring wall **95** includes a lower wall portion **98** normally sloping downwardly and outwardly of the assembly and integrally joining the lower anchor flange **94** in a curved joint **99**. A curved joint **100** integrally connects the upper end of the wall portion **98** to the inner end of an upper wall portion **101** forming part of the spring wall **95**. The upper wall portion **101** normally extends outwardly generally parallel to horizontal wall **39** and terminates in an outer end **102** which is turned upon itself forming a channel **103**. The outer end **102** is flexibly secured to the lower surface **41** at the junction with the depending lip **40** by means of a seal connector **104**. The seal connector **104** is preferably of vinyl and spirals about the end **102**, filling the channel **103**, to form an effective seal therebetween. A portion **105** of the seal connector outer surface is ridged so as to receive a suitable adhesive **106** for securing the seal connector, and thereby the end **102**, to the lower horizontal wall **39**. A panel **107** which functions like the panel **69** described above covers adjacent ends of the side wall **91**, including the spring wall **95**, at the longitudinal break between assembly sections. The panel **107**, however, is flexible at least where it covers the spring wall **95** and is resiliently sprung thereagainst to maintain contact therewith during vertical and/or horizontal movement between the structural members **2** and **3**.

The structure shown in FIG. 4 is identical with that shown in FIG. 2 but modified in the same manner and for the same purpose as the structure of FIG. 3 over that of FIG. 1.

It is to be understood that although certain forms of this invention have been illustrated and described, it is not to be limited thereto except insofar as such limitations are included in the following claims.

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

1. An expansion joint cover assembly for roof members disposed in spaced relationship and defining an elongated joint therebetween, said assembly comprising:
   (a) an elongated relatively rigid section, said section having an upper portion, an intermediate portion and a foot portion, said foot portion extending respectively away from said joint and having screw receiving openings therethrough for mounting said foot portion along one of said roof members,
   (b) said upper portion having projecting lip means,
   (c) an elongated flexible seal having an upwardly directed crown portion extending across said joint and terminating on one side thereof in leg means engaged with said lip means and forming a sealing path therewith,
   (d) upper and lower longitudinally extending bosses projecting outwardly from said upper portion and having adjacent walls forming a V groove therebetween, and
   (e) cover means for said seal and including an upwardly extending side wall mounted on said bosses, said side wall having inwardly directed projections in said groove and engaging said adjacent walls for positioning said side wall with respect to said section.

2. The cover assembly as set forth in claim **1** including:
   (a) a stress relieving channel at the base of said V groove and extending therealong.

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U.S. Cl. X.R.

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