United States Patent

[11] 3,581,450

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[54] **EXPANSION JOINT COVER**
11 Claims, 3 Drawing Figs.

[52] **U.S. Cl.** **52/58,**
52/403, 52/472, 52/573
[51] **Int. Cl.** **E04d 3/38,**
E04b 1/68
[50] **Field of Search** 52/472,
402, 396, 393—395, 573, 58; 94/18, 18.2

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ABSTRACT: The specification discloses an expansion joint cover for covering the expansion joint of a building. A pair of elongated and corrugated metal strips are spaced from one another along their elongated edges and joined to one another by means of elongated panel of flexible elastic material. The corrugations of said elongated strips allow for expansion along the longitudinal axis of said strip, and the elastomeric median strip allows for expansion in a direction perpendicular to said expansion joint cover.

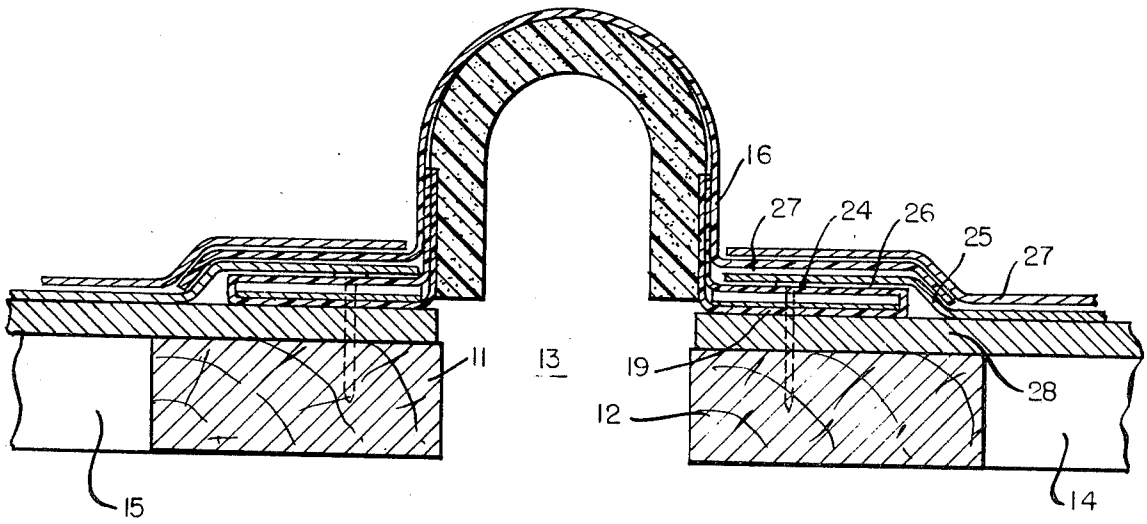


FIG. 1.

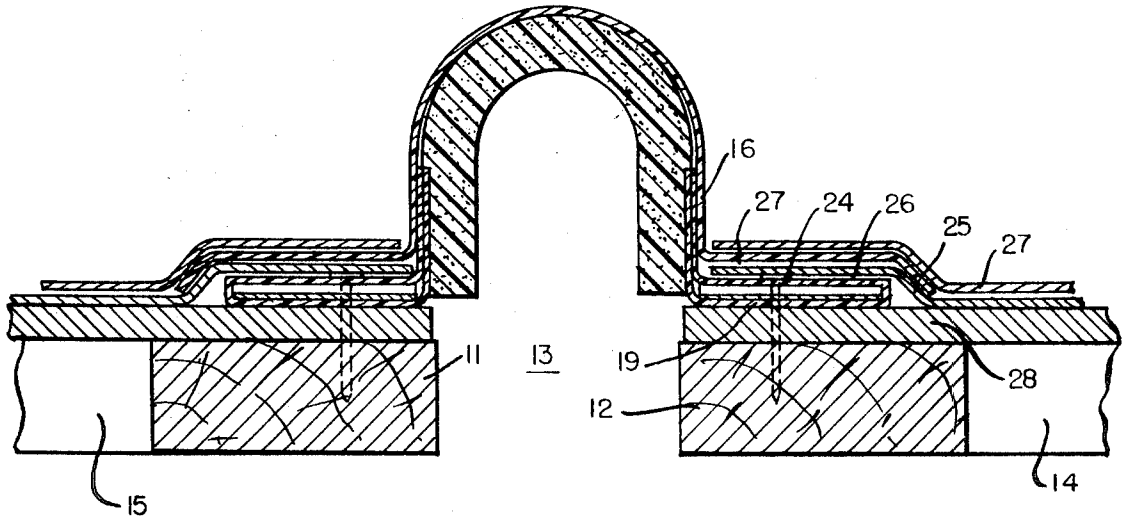


FIG. 2.

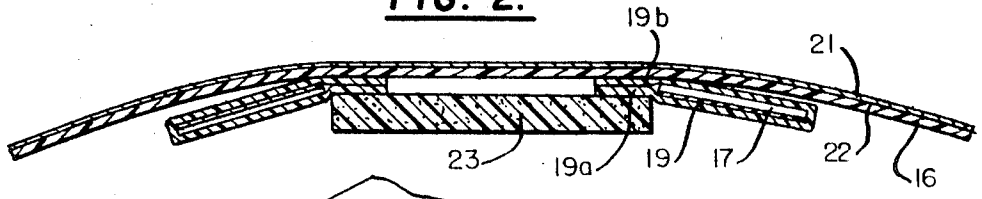
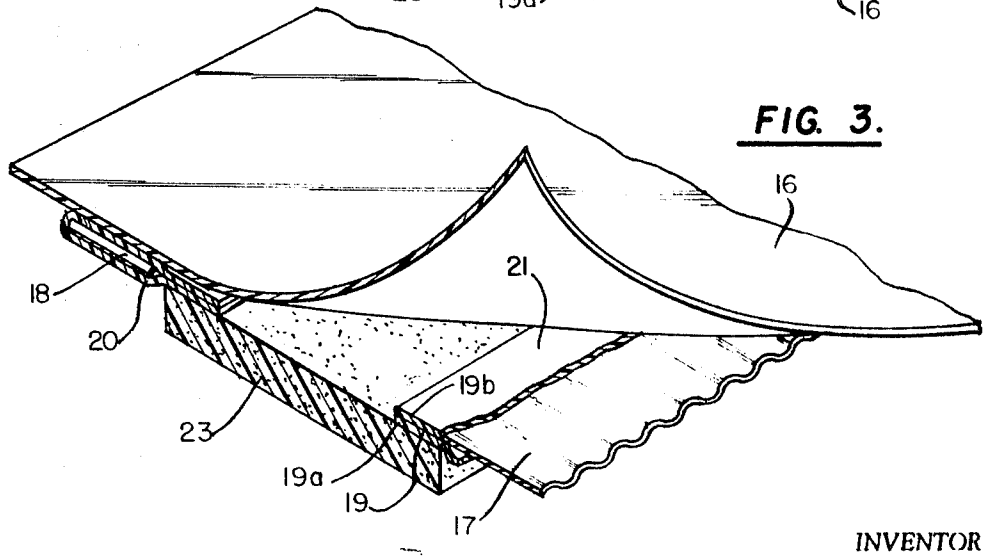


FIG. 3.



INVENTOR

Francis J Patry

EXPANSION JOINT COVER

BACKGROUND OF THE INVENTION

The present invention concerns improvements in the techniques and means for joining the panels in roof structures, flashings, water stops, expansion joints, deck joints, splices and the like. In this respect, the present invention is particularly concerned with a structural unit which may be used in the aforementioned arrangements or which may be employed in conjunction with other such units through appropriate splicing techniques in the fabrication of relatively large structural expanses capable of use in roofs, walls and other constructions; and adapted in such arrangements to assume various shapes and surface contours not readily possible with building materials conventionally employed.

The prior art devices, an example of which is disclosed in U.S. Pat. Re. No. 25,733 to Harvey L. Patry et al., disclose an expansion joint cover for use in these situations. However, it has been found desirable to provide for expansion along the longitudinal axis of the expansion joint to prevent the expansion joint from working loose and breaking the seal between it and the adjoining flashing or roofing surface.

If the structural beams in a roof are formed of iron or steel, they will expand at the rate of five sixty-fourths of an inch for every 10 feet of length, for every 100° change in temperature. Thus, if each panel in a roof section were 50 ft. across, the change from midwinter to midsummer in the length of the expansion joint would amount to approximately one-half inch. This in many cases has resulted in the "popping" of the expansion joint cover along its longitudinal edge where it is affixed to adjacent panels of the roof deck. In very large buildings where the spaces between adjoining panels or expansion joints may be as much as 100 feet, it is desirable to provide some means of accommodating the expansion along the longitudinal direction of the expansion joint to prevent the "popping" of the expansion joint cover and the break in the waterproof seal that results therefrom.

OBJECTS OF THE INVENTION

It is therefore an object of this invention to provide an expansion joint cover that is capable of expansion along its longitudinal dimension, as well as its traverse dimension.

It is also an object of this invention to provide an expansion joint cover with a new and improved method of sealing an expansion joint to a roof deck.

It is also an object of this invention to provide for an insulated expansion joint cover that is capable of longitudinal expansion.

It is another object of this invention to disclose a new and novel way of bonding a corrugated panel and an elastomeric panel.

It is another object of this invention to provide an expansion joint wherein dissimilar types of metal panels may be joined into a single panel capable of expanding and contracting at different rates with temperature changes.

It is a further object of the present invention to provide an improved structural building unit capable of connecting two similar metals or dissimilar metals to form an elastic and waterproof expansion joint for metal flashings, concrete or steel structures.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is a sectional view of the expansion joint cover installed between adjacent panels of the roof deck.

FIG. 2 is a sectional view of the new and improved expansion joint cover.

FIG. 3 is an isometric view with the upper layer pulled away to disclose the details of construction utilized in our new and improved expansion joint cover.

DETAILED DESCRIPTION OF THE INVENTION

FIG. 1 discloses our invention in a sectional view of the improved expansion joint cover as installed between adjacent panels of a roof deck. Block members **11** and **12** are provided along the edges of the expansion joint to provide nailing strips for the expansion joint cover. The joint per se is actually the space **13** between panels **14** and **15** with the new and improved invention being more properly described as an expansion joint cover, covering the joint. The structural members of the roof deck have been left out of FIG. **1** in order to clarify inventive concepts disclosed herein.

FIG. **3** is an isometric view of our new and improved expansion joint cover with the upper flap **16** pulled away for purposes of clarity. In the preferred embodiment of our invention two elongated and corrugated strips **17** and **18** are spaced apart from each other along their elongated edges. The strips are enclosed in a covering means illustrated as **19** and **20** respectively that completely envelop the elongated and corrugated strips.

In the preferred embodiment of our invention, the covering means **19** and **20** comprise elongated strips of fabric which have been impregnated or saturate-coated with an elastomer. In one application of the invention, nylon was used for the fabric and neoprene for the elastomer, however it is understood that the invention is not limited to these materials. The strips are then folded upon themselves along their longitudinal dimension and the corrugated strips **17** inserted between the folds **19***a* and **19***b*. The covering means is of sufficient width that when folded upon itself it extends beyond the edge of the corrugated strip and is adhesively sealed to form a seam edge **21** which runs the entire length of the covering means and is adjacent to the corrugated and elongated strip **17**. Although a neoprene saturate nylon is used in one embodiment of our invention, it should be readily understood that any type of covering means or envelope could be used to surround the corrugated and elongated strip. For example, strip **17** could be placed within an extrusion die, and the covering **19** extruded around strip **17** as the strip is passed from within the die. In this alternate of the invention it would also be necessary to provide a sealing seam **21** as shown in FIG. **3**.

In one embodiment of our invention, the corrugated strip **17** is approximately 2 inches in width and is of indefinite length with the neoprene-impregnated nylon being of 6 inches in width so that when folded upon itself it yields a 1-inch seam illustrated at **21**. Due to the corrugations present in strips **17** and **18** and the flexible nature of the relatively wide cover strip **16**, the expansion joint cover when completed may be rolled upon itself for delivery and installation in a roll of indeterminate length.

In one embodiment of our invention, as will be noted in FIG. **2**, the relatively wide elongated strip **16** is a laminate material. Although the lamination is not necessary to the practice of our invention, it has been found desirable because of the long life and service characteristics provided by the laminate. In one of these embodiments, a laminate is formed of a very thin layer **21** of polyvinyl fluoride plastic, such as that sold Du Pont under the trade name "TEDLAR." This surface part of the laminate is generally 2 mils thick and is bonded to an elastomer or synthetic rubber base **22** which is approximately 38 mils in thickness to provide the approximately 40-mil laminate cover illustrated at **16**. Although a thin layer of plastic and a relatively wide layer of elastomer were utilized in this embodiment, it should be understood that any equivalent material could be utilized with any appropriate thickness. With this construction it is possible to provide colored materials in the surface layer to match the various colors of roof decks without marring the aesthetic beauty of a white roof deck with a black or off color expansion joint cover.

Immediately below the cover laminate **16**, FIG. **2** discloses a relatively thick insulating strip **23** that runs the entire length of the expansion joint and is axially aligned with the relatively wide cover strip **16**. The insulating strip **23** is adapted to pro-

vide additional thermal and acoustic insulation and thereby make the expansion joint more soundproof. If such insulating characteristics are not desired, the strip of insulating material may be replaced with a single strip of said laminate material, so that the edges **19***a* and **19***b* of the envelope **19** are securely fastened between two layers of laminate material. Alternatively the lower strip could be a single layer of nonlaminate elastomer.

Alternatively, a single strip of laminate material may be utilized between the corrugated strips and their envelopes, or a relatively wide strip may be utilized wherein said strips are attached thereto and as illustrated in FIG. **2** with the insulating strip removed.

The relatively wide strip **16** provides the necessary strength and is adapted to withstand the stresses and strains to which the expansion joint would normally be subjected. This strip is capable of an elongation of at least 100 percent and has a tensile strength of 1,000 pounds per square inch. In this latter respect it should be noted that the synthetic elastomer is a synthetic rubber which has the characteristic qualities of natural rubber such as resilience, abrasion resistance, low compression set and low permeability; and retains these properties to a high degree under long exposure to sunlight, weather, ozone, oxygen, oils, greases, heat and chemicals.

The relative thickness of the fabric has been exaggerated in FIG. **2** to more clearly disclose the construction of our invention. In actual practice the insulating strip **23** is bonded across its entire width to strip **16**.

As shown in FIG. **2**, the seam edge of envelopes **19** and **20** are sealed between insulating strip **23** and cover strip **16** along their longitudinal edges so that the corrugated strips **17** and **18** are spaced apart from one another and extend beyond the sealed joint between strip **23** and strip **16**.

This seal may be accomplished by means of epoxy or other adhesive or by vulcanizing, or both, in any conventional manner to provide a tight waterproof and durable seal.

When the expansion joint is installed as shown in FIG. **1**, the upper layer **16** is lifted up out of the way exposing the extended portions of envelope **19** and the corrugated strip **17**. When wooden blocks **11** and **12** are utilized, the strip may be installed by means of conventional roofing nails **24** which are driven through the envelope and corrugated strip every 2 to 4 inches along the length of the strip. Thus anchored, the strip is free to expand vertically within the corrugations and along the longitudinal axis of the expansion joint. If the base member of the expansion joint expands at a greater rate than the corrugated strip, the corrugated flutes will provide the necessary elongation between the nails or other anchoring means. Thus it is noted that the expansion is not transmitted longitudinally of the entire strip, but is taken up in short sections between fastening points. Since this expansion is taken up in short sections, the fabric cover **19** always presents a flat surface where it is bonded to the substrate membrane **28**.

Although in the preferred embodiment of our invention, nailing blocks **11** and **12** are provided in the roof deck, the present invention is equally suitable to any other type of construction technique, such as sockets, clips, retaining flanges and the like.

As illustrated in FIG. **1**, after the corrugated strip is nailed securely through the roofing membrane to nailing block **12**, the first layer **25** of roofing or stripping felt is applied over the top of the corrugated strip. This joint **26** is then sealed with a cold adhesive, hot asphalt, pitch, or other appropriate adhesive to insure a continuously sealed joint. Cover **16** is then brought over the first roofing ply **25** to form a second joint **27** which may also be sealed by means of cold adhesive or hot asphalt or pitch. If a colored membrane is applied over the roof panel as is done in decorative roof decks, the latter membrane **27** may be applied over the top of covering strip **16** and secured by adhesive, asphalt or other securing means.

It should be pointed out that membrane **19** is stretched tightly over the corrugated flutes of strip **17** and provides a flat surface between cover **19** and a roofing base **28**. This flat surface provides a waterproof seal between the expansion joint cover and the roof base that would not be provided if the corrugated flutes were installed without the envelope. Conversely, if the covering or envelope is extruded or sprayed over the strip, it would be advantageous to provide for at least one flat surface to be formed on said covering to assist in providing the waterproof seal. The corrugated strip **17** may be formed of heavy or lightweight plastic, galvanized iron, copper, aluminum, or other material. Due to the protection provided by envelope **19** it has been desirable to employ galvanized iron which is much more inexpensive than copper and aluminum and provides for the same life of the material.

While there have been described above what are presently believed to be the preferred form of the invention, variations thereof will be obvious to those skilled in the art and all such changes and variations fall within the spirit of the invention and are intended to be covered by the generic terms in the appended claims, which are variably worded to that end.

We claim:

1. An expansion joint comprising
   a. a pair of elongate spaced apart block members
   b. an expansion joint cover member overlying said spaced apart block members, said cover member having a pair of elongate strips, each strip having a first elongate edge, said elongate edges being spaced apart from one another and overlying said elongated block members, flexible means overlying and joining said first elongate edges, said expansion joint cover member being characterized in that said elongate strips have corrugations transverse to the direction of said elongate edges,
   c. fastening means for attaching said strip to said underlying elongated block members, said elongate strips having sufficient resiliency to allow for expansion transverse to the corrugations.

2. An expansion joint cover comprising:
   a. a pair of elongate and corrugated strips spaced from one another along their elongate edges with the axis of said corrugations lying transversely to the axis of said elongation,
   b. an elongate strip of flexible material overlying and joining said corrugated strips in a spaced apart relationship,
   c. a first and second covering means for enclosing each of said corrugated strips in an elongate envelope, with said first covering means attached along one longitudinal edge to said strip of flexible material, and said second covering means attached along one longitudinal edge to the other elongate edge of said strip of flexible material, so that said corrugated strips are mounted within said covering means and attached to said strip of flexible material with their longitudinal axes parallel to one another in a spaced apart relationship.

3. An expansion joint as claimed in claim **2** wherein said covering means comprises a strip of waterproof material which is folded upon itself along its longitudinal axis, said material being of sufficient with to completely cover said corrugated strip, when said corrugated strip is inserted between the folds of said material.

4. An expansion joint as claimed in claim **2** wherein said covering means comprises an extruded plastic coating, said coating completely covering the corrugated strip and completely filling the voids of said corrugation on at least one side of said strip to provide a relatively flat surface thereon.

5. An expansion joint cover comprising a pair of elongate strips, each strip having a first elongate edge, said first elongate edges being spaced apart from one another, flexible means joining said first elongate edges, said expansion joint cover being characterized in that said elongate strips have corrugations transverse to the direction of said elongate edges, and having sufficient resiliency to allow for expansion transverse to the corrugations, said cover also having a second relatively wide overlying elongate strip of material axially aligned with said first elongate strip of material and attached to said first strip along its center portion, said relatively wide strip

being of sufficient width to overhang beyond the corrugated strips attached to each side of the first elongate strip.

6. An expansion joint cover as claimed in claim 5 wherein said first strip is a relatively thick insulating material.

7. An expansion joint cover as claimed in claim 5 wherein said relatively wide elongate strip is a laminate formed of a plastic which is bonded to an elastomeric base.

8. An expansion joint cover comprising

a. a relatively thick closed cell elongated strip of insulating material,

b. first and second elongated and corrugated strips, said strips having the axes of their corrugations transverse to their longitudinal axis,

c. a first and second waterproof envelope for completely covering said corrugated strips, each of said envelopes having a seam edge defined along one side of said envelope and adjacent to the corrugated strip,

d. a relatively wide elongated strip axially aligned with said insulating strip and overlying said insulating strip and said corrugated strips, said seam edge of said first envelope being mounted between said relatively wide strip and said

insulating strip and axially aligned therewith, said seam edge of said second envelope being spaced apart and mounted between said relatively wide strip and said insulated strip and axially aligned therewith,

e. said insulating strip being bonded across its entire length to said relatively wide strip, with said seam edges of first and second envelopes bonded therebetween on each edge of said insulated strip with the corrugated strips extending outwardly beyond the bond.

9. An expansion joint cover as claimed in claim 8 wherein said elongated and corrugated strip is formed of plastic.

10. An expansion joint cover as claimed in claim 8 wherein said relatively wide elongated strip is a laminate formed of a layer of plastic which is bonded to an elastomeric base.

11. An expansion joint cover as claimed in claim 8 wherein said envelope comprises a strip of waterproof material which is folded upon itself along its longitudinal axis, said material being of sufficient width to completely cover said corrugated strips and extend beyond to create said seam edge when said corrugated strip is inserted between the folds of said material.