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(54) **EXPANSION JOINT COVER**

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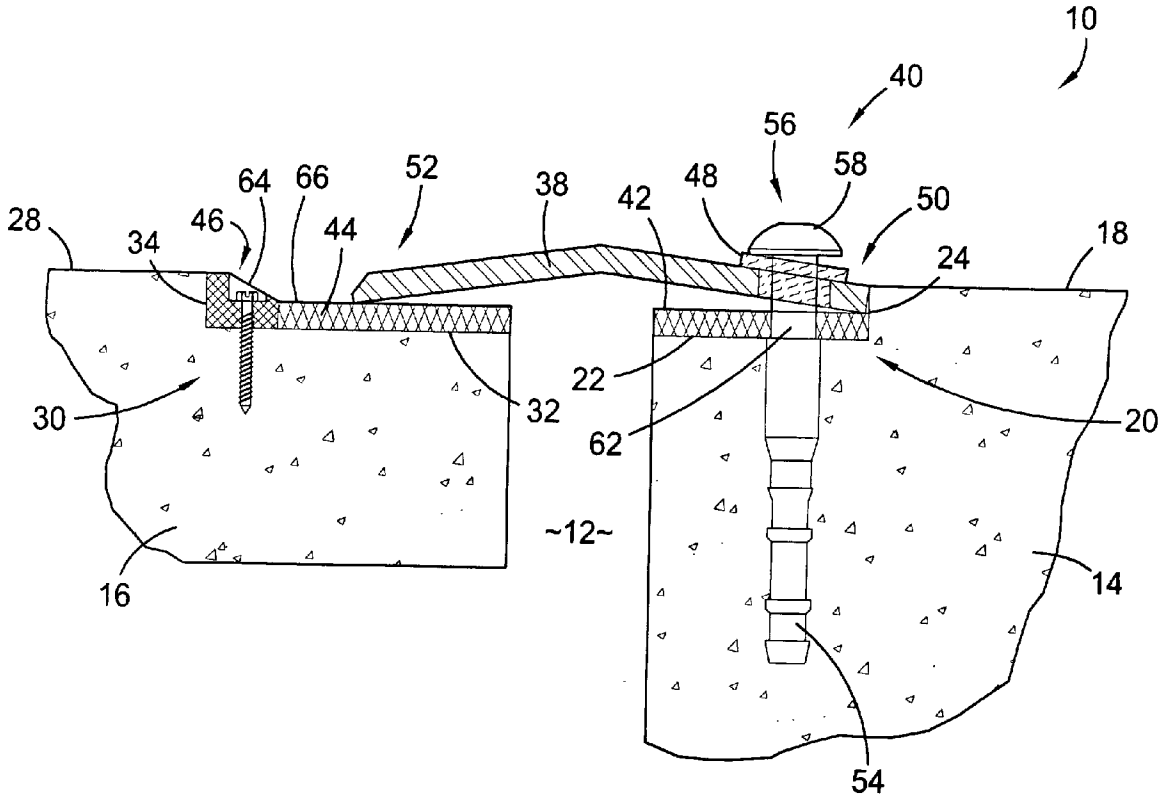
(57) **ABSTRACT**

An expansion joint cover (**10**) broadly comprises a cover plate (**38**) to cover an expansion joint (**12**) between a first and second surface (**14,16**), an anchor assembly (**40**) to secure the plate (**38**) to the first surface (**14**), an insert (**46**) to protect the second surface (**16**), and one or more resilient bushings (**48**) to isolate the plate (**38**) from the anchor assembly (**40**). Under adverse conditions, such as during seismic events, the surfaces (**14,16**) may move significantly with respect to one another, thereby causing the plate (**38**) to slide over the second surface (**16**) and the insert (**46**) and deform the bushings (**48**). Thus, the flexibility of the plate (**38**), the durability of the insert (**46**), and the resilience of the bushings (**48**) all cooperate to allow the cover (**10**) to minimize stresses otherwise transferred to the anchor assembly (**40**).



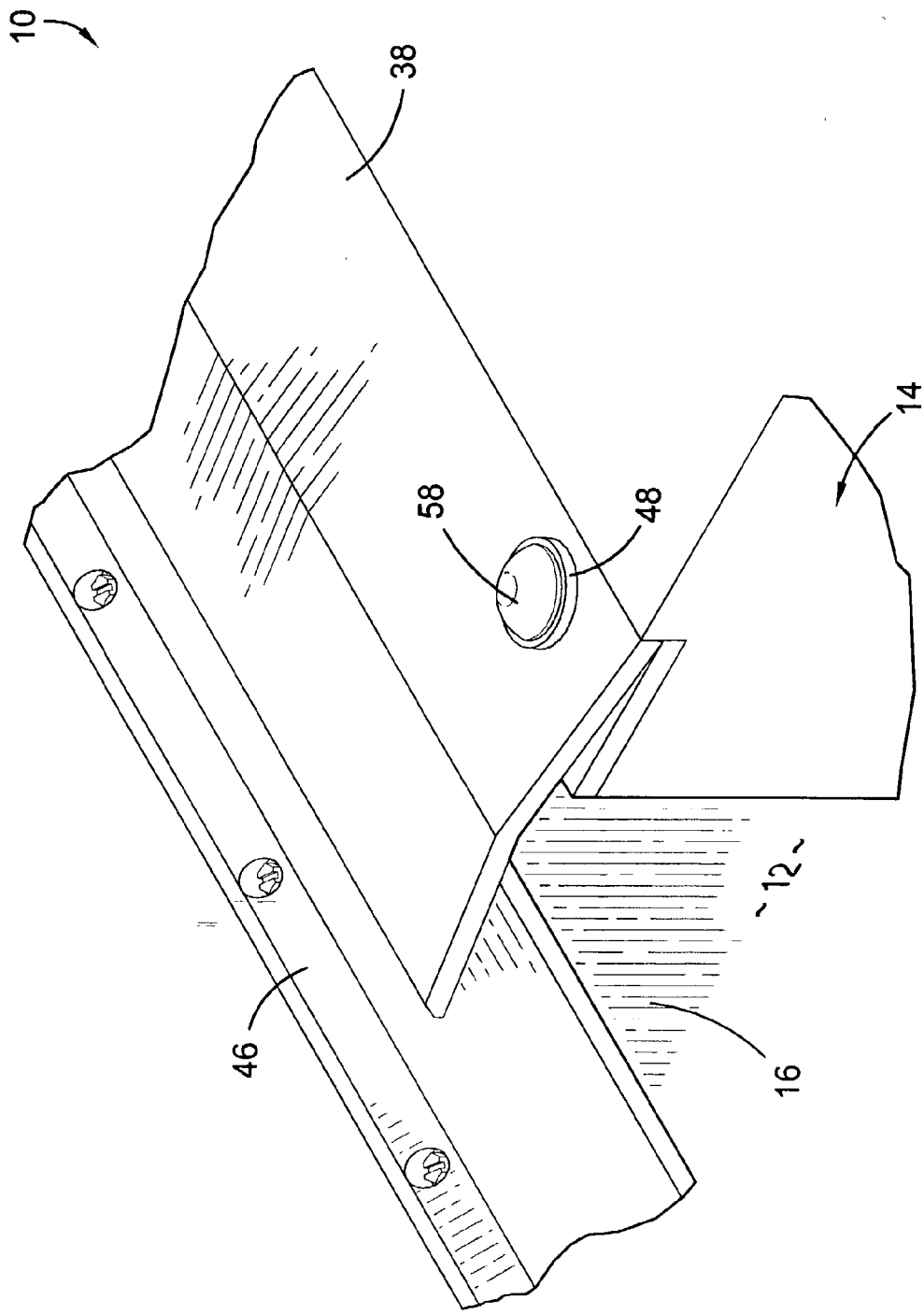


FIG. 1

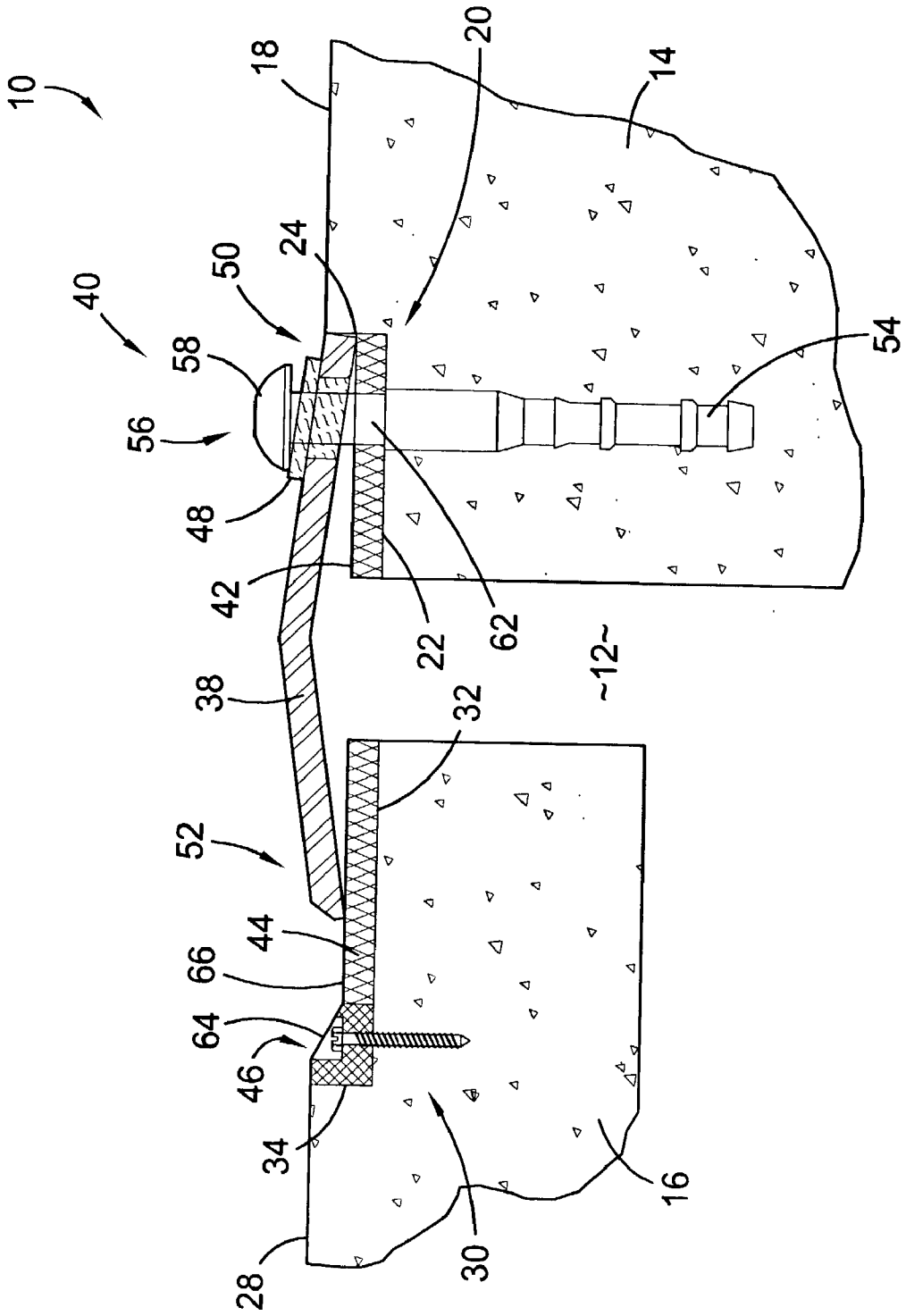

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FIG. 2

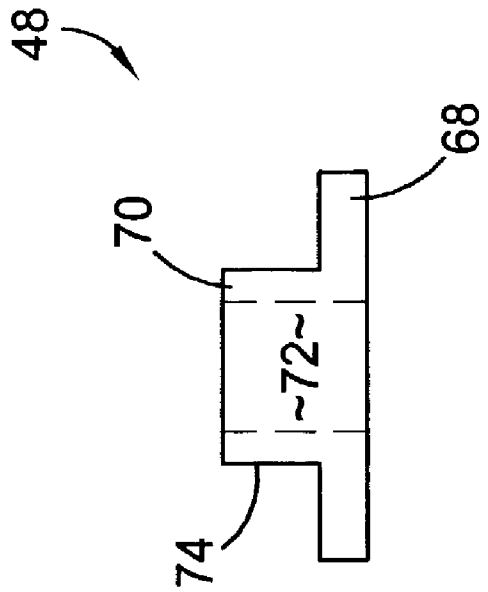

FIG. 4

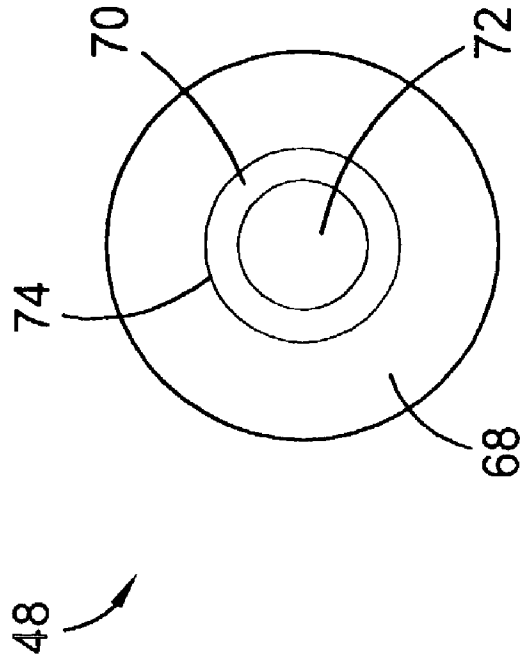

FIG. 3

EXPANSION JOINT COVER

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

[0002] The present invention relates to expansion joints and expansion joint covers. More particularly, the present invention relates to an expansion joint cover that can be installed over an expansion joint between a first surface and a second surface.

[0003] 2. Description of Prior Art

[0004] Prior art expansion joint covers include cover plates covering expansion joints between first and second building surfaces. Typically, a first edge of the plate is coupled to the first surface and an opposed second edge is slidably received in a transition recess defined in the second surface. The second edge slides in the recess during relative movement of the surfaces caused by thermal expansion and contraction.

[0005] The second surface typically presents a beveled recess wall where the recess meets an adjacent upper surface of the second surface. During a seismic event, the joint may narrow such that the second edge of the plate slides over the recess wall onto the upper surface of the second surface. The recess wall is therefore subject to spalling, corrosion and potential impact damage from the second edge of the plate during a seismic event. Additionally, stresses involved with the plate sliding onto the upper surface are typically transferred to bolts anchoring the plate, thereby inducing shock and shear forces capable of damaging the bolts.

[0006] Furthermore, since the plate and the bolts may be constructed of dissimilar metals, electrolysis may lead to galvanic corrosion of either the plate, the bolts, or both. Additionally, the movement described above can be quite noisy.

[0007] Finally, prior art expansion joint systems are typically designed for installation during building construction. As a result, installation on an existing building as a retrofit can be expensive and labor intensive.

[0008] Accordingly, there is a need for an improved expansion joint cover that overcomes the limitations of the prior art.

SUMMARY OF THE INVENTION

[0009] The present invention overcomes the above-identified problems and provides a distinct advance in the art of expansion joint covers. More particularly, the present invention relates to an expansion joint cover that can be installed over an expansion joint between a first surface and a second surface. The cover broadly comprises a cover plate to cover the joint, an anchor assembly to secure the plate, a transition insert to protect the second surface, and one or more bushings to isolate the plate from the anchor assembly. The plate preferably presents a first edge positioned adjacent the first surface and a second edge positioned adjacent the second surface.

[0010] The anchor assembly preferably includes one or more concrete anchor members each inserted into a hole in the first surface and one or more bolts each threaded into one of the concrete anchor members. The insert protects the second surface from impact damage by the second edge of the plate during a seismic event.

[0011] Each bushing is preferably made of polyurethane or another resilient material, such as cork, rubber, or other flexible elastomer, and comprises a circular face positioned between the plate and the head of one of the bolts and a cylindrical sleeve positioned between the plate and the shank of one of the bolts. The sleeve preferably fits tightly between the shank and one of several penetrations in the plate, thereby securely holding the plate in position relative to the bolts.

[0012] Under normal conditions, such as during thermal expansion and contraction, the surfaces may move slightly with respect to one another. In this case, the plate slides over the second surface with minimal deformation of the plate and the bushings. Under adverse conditions, such as during seismic events, the building surfaces may move significantly with respect to one another. In this case, the plate slides over the second surface, may flex and slide over the insert, and may deform the bushings. Thus, the flexibility of the plate, the durability of the insert, and the resilience of the bushings all cooperate to allow the cover to minimize stresses otherwise transferred to the anchor assembly. Such stresses may otherwise shear the bolts, cause damage to the surfaces, or both.

[0013] Additionally, the bushings accommodate minor misalignment between the bolts and the penetrations in the plate. Such misalignment may occur during construction of the building, installation of the cover, or during the cover's service life. Without the bushings, the misalignment would otherwise induce stress on the anchor assembly leading to the damage described above.

[0014] Furthermore, the bushings prevent metal-to-metal contact between the plate and the bolts. Since the plate and the bolts may be constructed of dissimilar metals, electrolysis may otherwise lead to galvanic corrosion of either the plate, the bolts, or both. Additionally, the bushings minimize any noise associated with the movement described above. Finally, it can be seen that the bushings absorb any shock that may be associated with the movement described above, thereby reducing any such effects experienced by the anchor assembly.

BRIEF DESCRIPTION OF THE DRAWINGS

[0015] A preferred embodiment of the present invention is described in detail below with reference to the attached drawing figures, wherein:

[0016] **FIG. 1** is a perspective view of an expansion joint cover **10** constructed in accordance with a preferred embodiment of the present invention and shown covering an expansion joint;

[0017] **FIG. 2** is an elevation view of the cover;

[0018] **FIG. 3** is a plan view of a bushing of the cover; and

[0019] **FIG. 4** is an elevation view of the bushing.

DETAILED DESCRIPTION OF A PREFERRED EMBODIMENT

[0020] Referring to **FIG. 1**, an expansion joint cover **10** is shown constructed in accordance with a preferred embodi-

ment of the present invention. The cover **10** is used to cover an expansion joint **12** between a first building surface **14** and a second building surface **16** of a building such as a parking garage. Such building surfaces **14**, **16** are typically composed of concrete. However, the surfaces **14,16** can have similar or different configurations and textures and may be parallel, perpendicular, or otherwise situated relative to each other.

[**0021**] Referring also to **FIG. 2**, the first surface **14** preferably presents a first upper surface **18** and a mounting recess **20** preferably having a depth of approximately three quarters of an inch adjacent the joint **12**. The mounting recess **20** preferably presents a first support surface **22** and a first recess wall **24** between the first upper surface **18** and the first support surface **22**.

[**0022**] Similarly, the second surface **16** preferably presents a second upper surface **28** and a transition recess **30** preferably having a depth of about three quarters of an inch adjacent the joint **12**. The transition recess **30** preferably presents a second support surface **32** and a second recess wall **34** between the second upper surface **28** and the second support surface **32**. The support surfaces **22,32** are preferably substantially aligned, such that they are planar, in order to allow the cover **10** to effectively cover the joint **12**.

[**0023**] Either recess **20,30** may be pre-existing in the corresponding building surfaces **14,16** or may be cut into the building surfaces **14,16**, in order to accommodate the cover **10**. Alternatively, the cover **10** may be installed on the building surfaces **14,16** without either one or both of the recesses **20,30**. However, this typically requires the cover **10** to protrude well beyond the building surfaces **14,16**, and therefore may not be desired.

[**0024**] The cover **10** broadly comprises a cover plate **38** to cover the joint **12**, an anchor assembly **40** to secure the plate **38**, a first and second support pad **42,44** to support the plate **38**, a transition insert **46** to protect the second building surface **16**, and one or more bushings **48** to isolate the plate **38** from the anchor assembly **40**. The plate **38** is preferably composed of approximately three eighths of an inch thick bent aluminum plate to present an approximately one half inch arch for increased structural strength, as illustrated in **FIG. 2**. The plate **38** extends along the joint's **12** length and is wide enough to span the joint **12**. Therefore, the plate's **38** length and width are dependent upon dimensions of the joint **12**. The plate **38** preferably presents a first edge **50** positioned in the mounting recess **20** and a second edge **52** positioned in the transition recess **30**. Either edge **50,52** may be beveled in order to avoid presenting sharp corners.

[**0025**] The anchor assembly **40** preferably includes one or more concrete anchor members **54** each inserted into a hole in the first building surface **14** and one or more bolts **56** each threaded into one of the concrete anchor members **54**. Each concrete anchor member **54** is preferably conventional and constructed of plastic. Each bolt **56** preferably includes a bolt head **58**, a threaded end, and a shank **62** therebetween. The head **58** preferably resides external to the plate **38** and holds the plate **38** adjacent the joint **12**. The threaded end preferably mates with the concrete anchor member **45** and holds the bolt **56** in place. The shank **62** preferably extends through one of several penetrations in the plate **38** adjacent the first edge **50** and through the first pad **42** and the bushing **48**.

[**0026**] Alternatively, the anchor assembly **40** may include one or more bolts **56** cast directly into the concrete making up the first building surface **14**. In this case, the anchor assembly **40** may also include a nut threaded onto each bolt **56** to secure the plate **38** over the joint **12**.

[**0027**] The pads **42,44**, are preferably approximately three eighths of an inch thick and preferably composed of a resilient, synthetic material, such as neoprene. The first pad **42** is preferably positioned in the mounting recess **20** between the first edge **50** of the plate **38** and the first support surface **22** and between the joint **12** and the first recess wall **24**. The first pad **42** supports the first edge **50** of the plate **38** and allows the plate **38** to flex and move relative to the first building surface **14**.

[**0028**] Similarly, the second pad **44** is preferably positioned in the transition recess **30** between the second edge **52** of the plate **38** and the second support surface **32** and between the joint **12** and the second recess wall **34**. The second pad **44** supports the second edge **52** of the plate **38** and allows the second edge **52** to slide thereon during relative movement between the building surfaces **14,16**.

[**0029**] The insert **46** is preferably integrally formed of metal, such as steel, aluminum, synthetic resin material, fiberglass, or a composite material. Such materials are chosen as needed to withstand expected loads of a particular installation. The insert **46** is preferably positioned in the transition recess **30** on the second support surface **32** and against the second recess wall **34**. The insert **46** is preferably beveled in order to avoid presenting sharp corners and in order to present a smooth transition wall **64** between the second support surface **32** and the second upper surface **28**. In particular, the transition wall **64** provides a transition between an upper face **66** of the second pad **44** and the second upper surface **28**.

[**0030**] In the preferred embodiment, the transition recess **30** is wide enough so that the second edge **52** remains therein supported by the second pad **44** during expected widening and narrowing of the joint **12** due to thermal expansion and contraction. However, during a seismic event, the building surfaces **14,16** may move toward one another so that the second edge **52** slides over the transition wall **64** and onto the second upper surface **28**. During such movement, the transition wall **64** guides the second edge **52** between the upper face **66** of the second pad **44** and the second upper surface **28**.

[**0031**] The insert **46** is preferably constructed of materials less subject to spalling and corrosion than the concrete making up the second recess wall **34**. Because of this, the insert **46** ensures reliable operation of the cover **10** for many years. Moreover, the insert **46** protects the second recess wall **34** from impact damage by the second edge **52** during a seismic event.

[**0032**] Referring also to **FIGS. 3 and 4**, each bushing **48** is preferably made of polyurethane or another resilient material, such as cork, rubber, or other flexible elastomer, and comprises a circular face **68** positioned between the plate **38** and the head **58** of one of the bolts **56** and a cylindrical sleeve **70** positioned between the plate **38** and the shank **62** of one of the bolts **56**. The face **68** is preferably approximately one and one half inches in diameter and approximately three sixteenths of an inch thick. The sleeve

70 preferably includes an approximately one half inch internal diameter **72** that tightly fits around the shank **62**, an approximately three quarters of an inch external diameter **74** that tightly fits within one of the penetrations in the plate **38**, and an approximately three eighths of an inch length allowing the sleeve **70** to substantially completely penetrate the plate **38**. Thus, the bushings **48** securely hold the plate **38** in position relative to the bolts **56**, which are secured to the first building surface **14**.

[**0033**] Under normal conditions, such as during thermal expansion and contraction, the building surfaces **14**,**16** may move slightly with respect to one another. In this case, the plate **38** slides over the second pad **44** with minimal deformation of the plate **38**, the pads **42**,**44**, and the bushings **48**. Under adverse conditions, such as during seismic events, the building surfaces **14**,**16** may move significantly with respect to one another. In this case, the plate **38** slides over the second pad **44**, may deform either of the pads **42**,**44** and the bushings **48**, and may flex and slide over the transition wall **64** of the insert **46**. Thus, the flexibility of the plate **38**, the resilience of the pads **42**,**44** and the bushings **48**, and the durability of the insert **46** all cooperate to allow the cover **10** to minimize stresses otherwise transferred to the anchor assembly **40**. Such stresses may otherwise shear the bolts **56**, cause damage to the building surfaces **14**,**16**, or both.

[**0034**] Additionally, the bushings **48** accommodate minor misalignment between the bolts **56** and the penetrations in the plate **38**. Such misalignment may occur during construction of the building, installation of the cover **10**, or during the cover's **10** service life. Without the bushings **48**, the misalignment would otherwise induce stress on the anchor assembly **40** leading to the damage described above.

[**0035**] Furthermore, the bushings **48** prevent metal-to-metal contact between the plate **38** and the bolts **56**. Since the plate **38** and the bolts **56** maybe constructed of dissimilar metals, electrolysis may otherwise lead to galvanic corrosion of either the plate **38**, the bolts **56**, or both. Additionally, the bushings **48** minimize any noise associated with the movement described above. Finally, it can be seen that the bushings **48** absorb any shock that may be associated with the movement described above, thereby reducing any such effects experienced by the anchor assembly **40**.

[**0036**] While the present invention has been described above, it is understood that other materials and/or dimensions can be substituted. For example, the face **68** of the bushings **48** maybe between one inch and two inches in diameter, and between one sixteenth of an inch and one half inch thick; but, are preferably sized to be wider than the head **58** of the bolts **56**. The bushings **48** may resemble a grommet and comprise two faces **68** each disposed at opposing ends of the sleeve **70**. In this case, the faces **68** may have diameters that differ from one another. Additionally, the internal diameter **72** of the sleeve **70** may be between one quarter inch and three quarter inches; but, is largely dependent upon the diameter of the shank **62** of the bolts **56**. Furthermore, the external diameter **74** of the sleeve **70** maybe between one half inch and one inch; but, is largely dependent upon the diameter of the penetrations in the plate **38**. Finally, the length of the sleeve **70** may be between one quarter inch and one half inch; but, is largely dependent upon the thickness of the plate **38**. In this manner, the dimensions of the bushings **48** may be chosen to accommodate the dimensions of the plate **38** and the bolts **56**. These and other minor modifications are within the scope of the present invention.

Having thus described a preferred embodiment of the invention, what is claimed as new and desired to be protected by Letters Patent includes the following:

1. An expansion joint cover operable to cover an expansion joint between a first surface and a second surface, the cover comprising:

a cover plate operable to span the joint;

an anchor operable to penetrate the plate, thereby securing the plate to the first surface; and

a bushing between and operable to physically isolate the plate and the anchor.

2. The cover as set forth in claim 1, wherein the bushing is resilient and thereby further operable to allow the plate to move with respect to the anchor allowing the cover to accommodate movement between the surfaces.

3. The cover as set forth in claim 1, wherein the anchor is secured directly into the first surface.

4. The cover as set forth in claim 1, wherein the anchor includes a concrete anchor member disposed within a hole in the first surface and a fastener threaded into the concrete anchor member.

5. The cover as set forth in claim 1, wherein the bushing includes a circular face and a cylindrical sleeve.

6. The cover as set forth in claim 5, wherein the face is approximately one and one half inches in diameter and approximately three sixteenths of an inch thick.

7. The cover as set forth in claim 5, wherein the sleeve has an approximately one half inch internal diameter that tightly fits around at least a portion of the anchor.

8. The cover as set forth in claim 5, wherein the 1 sleeve has an approximately three quarters of an inch external diameter that tightly fits within a penetration in the plate.

9. The cover as set forth in claim 5, wherein the sleeve has an approximately three eighths of an inch length allowing the sleeve to substantially completely penetrate the plate.

10. An expansion joint cover operable to cover an expansion joint between a first surface and a second surface, the cover comprising:

a cover plate operable to span the joint;

an anchor secured directly into the first surface and operable to penetrate the plate, thereby securing the plate to the first surface; and

a resilient bushing between and operable to physically isolate the plate and the anchor, thereby operable to allow the plate to move with respect to the anchor allowing the cover to accommodate movement between the surfaces.

11. The cover as set forth in claim 10, wherein the anchor includes a concrete anchor member disposed within a hole in the first surface and a fastener threaded into the concrete anchor member.

12. The cover as set forth in claim 10, wherein the bushing includes a circular face and a cylindrical sleeve.

13. The cover as set forth in claim 12, wherein the face is approximately one and one half inches in diameter and approximately three sixteenths of an inch thick.

14. The cover as set forth in claim 12, wherein the sleeve has an approximately one half inch internal diameter that tightly fits around at least a portion of the anchor.

15. The cover as set forth in claim 12, wherein the sleeve has an approximately three quarters of an inch external diameter that tightly fits within a penetration in the plate.

16. The cover as set forth in claim 12, wherein the sleeve has an approximately three eighths of an inch length allowing the sleeve to substantially completely penetrate the plate.

17. An expansion joint cover operable to cover an expansion joint between a first surface and a second surface, the cover comprising:

a cover plate operable to span the joint;

an anchor assembly including

a concrete anchor member disposed within a hole in the first surface, and

a fastener threaded into the concrete anchor member and operable to penetrate the plate, thereby securing the plate to the first surface; and

a flexible bushing between and operable to physically isolate the plate and the anchor, the bushing including

a circular face approximately one and one half inches in diameter and approximately three sixteenths of an inch thick, and

a cylindrical sleeve with an approximately one half inch internal diameter that tightly fits around the fastener, an approximately three quarter inch external diameter that tightly fits within a penetration in the plate, and an approximately three eighths of an inch length allowing the sleeve to substantially completely penetrate the plate.

* * * * *