United States Patent [19]

Barber

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[54] **EXPANSION JOINT SEAL**

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[52] **U.S. Cl.** **428/373;** 49/498; 52/403; 404/64; 428/376

[51] **Int. Cl.** **E01c 11/10**

[58] **Field of Search** 161/38, 166, 159, 160, 161/161; 404/64, 65, 67, 74, 48, 49; 49/475; 52/403

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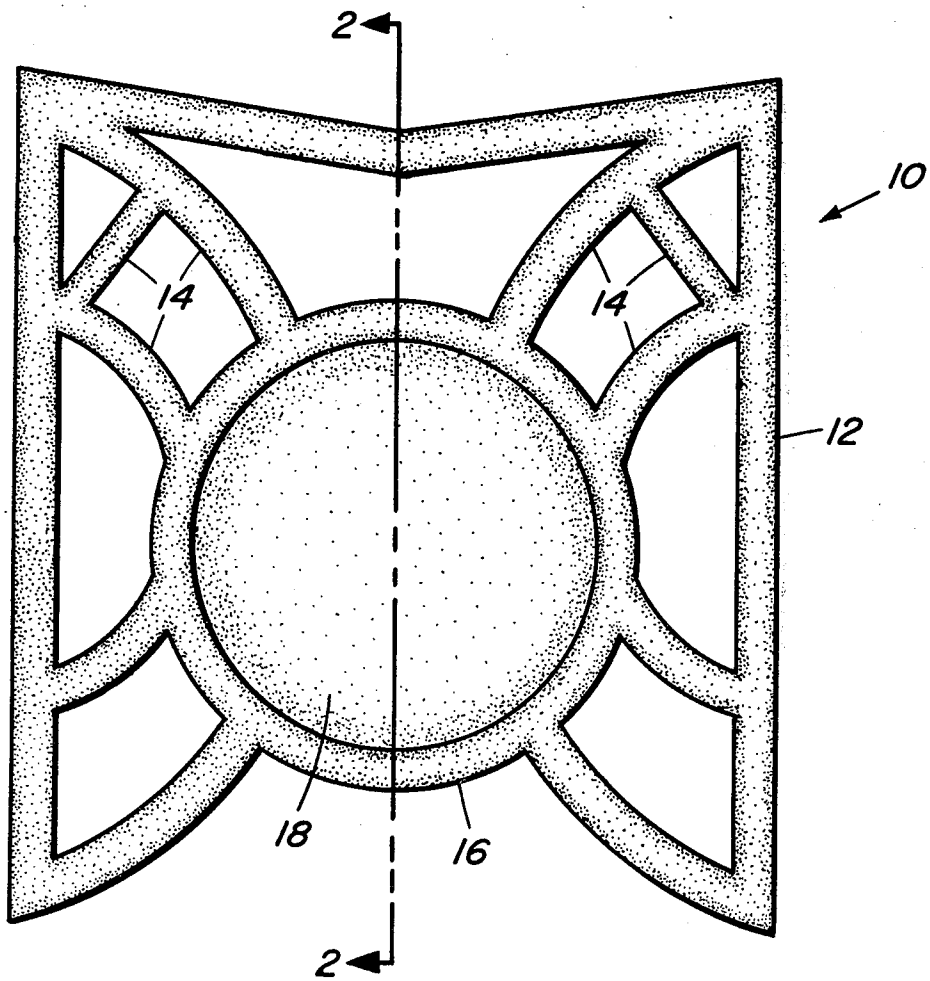
Primary Examiner—Herbert B. Guynn
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[57] **ABSTRACT**

An expansion joint seal is formed of two plastic, resilient materials and is used in joints between sections of formed concrete or structural metal wherever normal contraction and expansion of the sections occur adjacent to the joints. A core of the seal is formed from one plastic material, such as polybutadiene, which has a consistent resiliency over an extremely wide range of temperatures normally encountered in the outside environment.

The second material is usually neoprene and forms spaced inner and outer shells and linking supporting ribs. The inner shell is formed about the core. The linking supporting ribs provide for a collapsing and expansion effect when the adjacent concrete or metal sections are expanding or contracting while the highly resilient core provides a superior resiliency for the seal.

6 Claims, 4 Drawing Figures



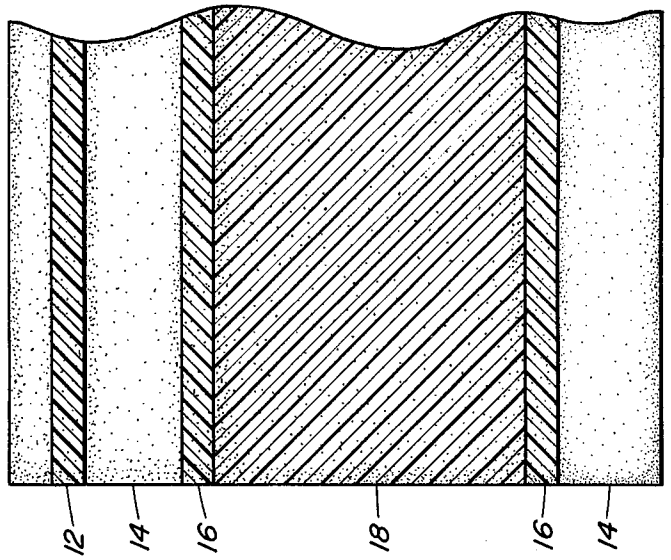


FIG. 2

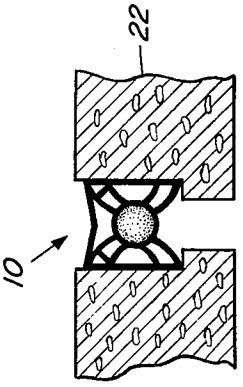


FIG. 4

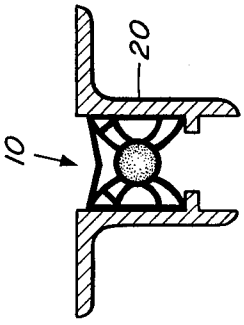


FIG. 3

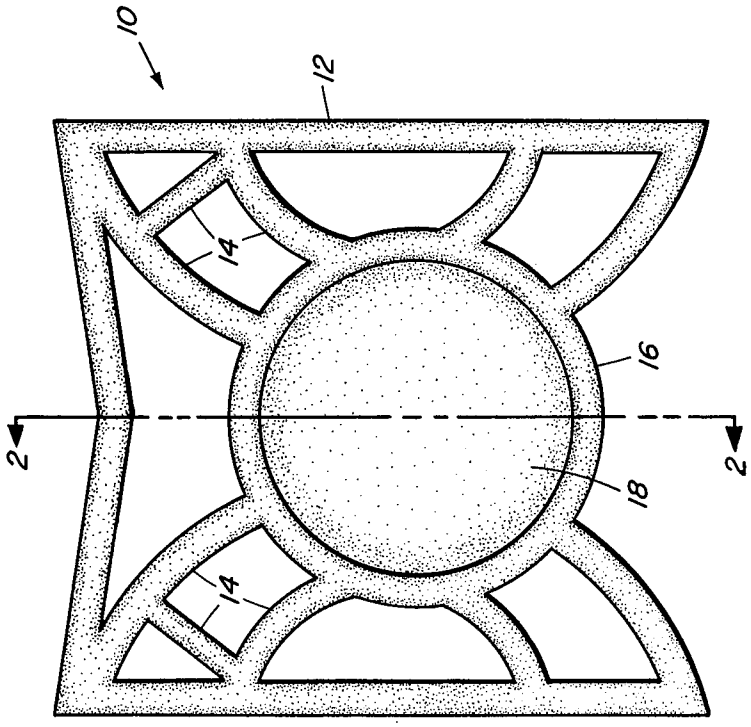


FIG. 1

EXPANSION JOINT SEAL

This invention relates to an expansion joint seal and more particularly pertains to a compression seal for waterproofing joints between sections of concrete and structural metal.

Presently available compression seals for waterproofing joints between sections of concrete and between joints formed by structural metal are usually made from a single material such as neoprene. These seals are manufactured by an extrusion process during which extremely high temperatures are generated. The high temperatures tend to scorch the seal as it is being manufactured. Thereafter the seal is cured either in a continuous salt bath or by steam.

These seals are structured in such a way that various inner webs link the inner walls of a shell. Due to the spatial separation of the various webs, the inner webs are rarely cured at the same level as the remaining portions of the seal.

If, as a result, the webs are undercured, the webs tend to stick when the seal is compressed considerably at high temperatures. If the webs are at optimum cure, the shell is overcured which causes the seal to crack during aging while under compression.

In addition, with the material used to make the seals, such as neoprene, the seals tend to lose a much needed compression deflection force at low environmental temperatures. This usually occurs at temperatures where the polymer starts to crystallize and compression forces are lost and resiliency is even more drastically lost. These characteristics are most undesirable because the seal is most needed at lower temperatures to keep salt, snow and ice from penetrating beyond the seal.

It is an object, therefore, of this invention to provide a new and improved expansion joint seal.

Another object of this invention is to provide an expansion joint seal capable of maintaining consistent resiliency over a wide temperature range to which the seal is subjected in the outside environment.

Still another object of this invention is to provide an expansion joint seal having a highly resilient center which is substantially crystallization free surrounded by rib-like resilient structure.

Other objects and attendant advantages of this invention will become apparent and understood from the following detailed specification and accompanying drawings in which:

FIG. 1 is an end view of an expansion joint seal having a polybutadiene core and neoprene surrounding structure;

FIG. 2 is a side elevation sectional view taken along line 2—2 of FIG. 1 showing the expansion joint seal;

FIG. 3 is an end view of the expansion joint seal installed in a joint to be sealed between spaced metal beams, and,

FIG. 4 is an end view of the expansion joint seal installed in a joint to be sealed between spaced sections of formed concrete.

Referring to FIGS. 1 and 2, there is shown an expansion joint seal 10 which is used to seal joints between spaced sections of structural facilities such as buildings, parking structures, schools, shopping centers, highways, bridges and the like wherever a waterproof joint is desirable.

The seal 10 is formed with an outer structure of a resilient plastic, such as neoprene and includes an outer shell 12, a plurality of web-like ribs 14 and an inner shell 16. The neoprene structure is an integrally formed unit having flexibility to permit expansion and contraction of the structure.

A core 18, composed of open cell sponge-like polymer such as, for example, polybutadiene, is contained within the outer shell 16. Polybutadiene provides an open cell core which is crystallization free. This is critically important at low temperatures, for example below 20° F.

The neoprene ribs 14 extend generally radially from four areas of the polybutadiene core 18. As illustrated in FIG. 3, the seal 10 is placed in a joint between metal beams 20 and, in FIG. 4, in a joint between sections 22 of formed concrete. When the seal 10 is compressed considerably, the core 18 is compressed enough to allow its resilient nature, which is particularly important at low temperatures, to exert a force outwardly against the ribs 14. This, in turn, forces the outer shell 12 of the seal 10 firmly against the adjacent surfaces of the metal beams 20 and the concrete sections 22 to seal the joint.

The neoprene shell 12 and ribs 14 serve to provide an oil resistant and weather resistant sealing effect while the polybutadiene, open cell sponge core 18 provides a superior resilience, resistance to compression set with desirable sealing pressures at low temperatures.

Obviously many modifications and variations of the present invention are possible in light of the above teachings. It is, therefore, to be understood that within the scope of the appended claims the invention may be practiced otherwise than as specifically described.

What is claimed is:

1. An expansion joint seal for sealing a joint between spaced sections, comprising:
   - a resilient outer shell for engaging adjacent surfaces of the spaced sections;
   - a resilient inner shell;
   - a sponge-like core held within the inner shell and being contiguously surrounded thereby for providing outwardly directed forces, the sponge-like core being composed of a material which is substantially crystallization free and capable of maintaining resiliency over a wide environmental temperature range; and,
   - a plurality of web-like ribs disposed between the inner and outer shells, the ribs extending substantially radially from the inner shell toward the outer shell and being affixed to the interior surfaces of the outer shell and to the exterior surfaces of the inner shell, the ribs transmitting the outwardly directed forces of said core to the outer shell to urge said outer shell into sealing engagement with the spaced sections.

2. The expansion joint seal of claim 1 wherein the outer shell, inner shell, and ribs are formed of neoprene.

3. The expansion joint seal of claim 1 wherein the core is formed of polybutadiene.

4. The expansion joint seal of claim 1 wherein the outer shell, inner shell, and ribs are formed integrally.

5. The expansion joint seal of claim 1 wherein the inner shell is circular in cross-section, the core completely filling the cylindrical chamber formed by said inner shell, compression of the joint seal causing the core to produce radially directed restoring forces

which are transmitted evenly to the inner shell, the inner shell transmitting said forces to the outer shell through the ribs, the ribs extending from the inner shell toward the walls of the outer shell which engage the spaced sections.

6. The expansion joint of claim 5 wherein the outer shell comprises oppositely spaced side walls which are straight-sided and flushly engage the walls of the spaced sections, the forces transmitted from the core to the outer shell being evenly directed against the spaced sections by the side walls of the outer shell.

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