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(54) Joint seal with resilient cap

(57) A joint seal includes a body (2) of expanding impregnated foam, and a resilient cap (1) having an upper surface and side walls depending downwardly therefrom. The cap may also take the form of a T, with or without longitudinally extending grooves (8) in its upper surface.

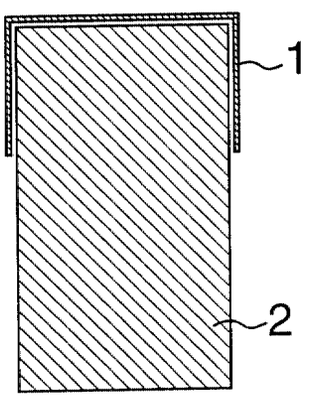

FIG. 1

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Description

Field of the Invention

[0001] The present invention relates to the field of joint sealants, and provides an expanding foam sealant with a resilient cap.

Background of the Invention

[0002] Impregnated expanding foam sealants are sealants made from an open celled foam that has been impregnated with an adhesive, an acrylic, an asphalt or the like. Examples of expanding foam sealants are GREYFLEX™, 25V™ and 20H™, each of which is sold by Emseal Corporation. These products are precompressed and sold in shrink-wrapped batts or on reels, and are cut-to-length, and inserted into a joint, wherein they expand tightly against the sides of the joint, to seal it. Additional adhesive may be applied to the joint sides, or to the sides of the expanding foam sealant before it is placed. Typically, the foam is precompressed to one-third to one fifth of its original volume, and only allowed to expand slightly when emplaced, to ensure a tight fit in a joint.

[0003] The present invention provides an improved form of expanding foam joint seal, that is provided with a resilient cap to protect the foam portion of the seal.

[0004] In a broad aspect, the present invention relates to a joint seal including a body of expanding impregnated foam, and a resilient cap having an upper surface and side walls depending downwardly therefrom.

Brief Description of the Drawings

[0005] In drawings that illustrate the present invention by way of example:

Figure 1 is an end view of a first embodiment of the present invention;
Figure 2 is a cross-sectional view of a cap for use in the present invention;
Figure 3 is a perspective view of another form of cap for use in the present invention;
Figure 4 is a cross-sectional view of a joint seal according to the present invention, using the cap of Figure 3;
Figure 5 is a cross-sectional view of a further form of joint seal according to the present invention;
Figure 6, which comprises Figures 6A, 6B and 6C, is a cross-sectional view of a further form of joint seal and caps according to the present invention;
Figure 7 is a perspective view of a cap similar to that shown in Figure 3, illustrating effect of overlengthening of cap side wall;
Figure 8 is a cross-sectional view of a further form of seal according to the present invention;
Figure 9 is a cross-sectional view of an alternative form of cap for use with the seal of Figure 8;
Figure 10 is a cross-sectional view of a further form of seal according to the present invention; and
Figure 11 is a cross-sectional view of a further form of seal according to the present invention.

Detailed Description

[0006] Figure **1** illustrates the simplest form of the present invention which essentially comprises a cap 1 which can be placed over an expanding foam sealant **2**. The cap can be either extremely elastic or of a more plastic nature. The cap, if extruded or formed from a relatively elastic (low modulus) material, may have the ability to accept sideways movement as a result of the expansion of the foam encapsulated by it. Thus, pre-compressed impregnated expanding foam sealant will tend to want to expand and utilize this expansion to increase the width across the top of the cap. The cap is, however, initially independent of the impregnated expanding foam sealant core, and thus has to be retained in position. This may be achieved by the use of a ribbed inner surface **3**, as shown in Figure 2.

[0007] Moreover, the cap may be extruded directly onto the precompressed foam sealant, for instance using a UV curable silicone, the selection of which will be a matter of choice to one skilled in the art. Such a cap will adhere strongly to the expanding foam core (made, in each case, of GREYFLEX, 25V or 20H) because it will tend to flow into the cells of the foam and form a mechanical anchor thereto when cured.

[0008] Moreover, to enhance the attachment of the cap to the impregnated expanding foam sealant, the cap may be provided with holes or voids **4** created or punched along both sidewalls thereof **5**, as shown in Figure 3. The voids, or holes, may be of different shapes or configurations. The purpose of the voids is to provide a mechanism whereby the impregnated expanding foam sealant may attach itself, through the voids, to the joint substrate and thus more securely attach the cap to the complete assembly. Alternatively, impregnated exapanding foam sealant, or other suitable flexible material such as closed cell foam, may be placed on the outer face of the punched walls as a 'substrate' for the internal material pushing through the holes to bond to. This outer material may then be subsequently bonded to the substrate forming the walls of the joint. In other words, the impregnated expanding foam sealant may not be required to be attached primarily immediately to the joint substrate. The addition of another layer **6** on the outer surface of the cap side walls (closest to the joint substrate) would ensure that the cap is retained in position more firmly. See Figure 4. The above illustrates a method or methods of more securely attaching the cap to the underlying internal cellular mechanism. Other methods will be a matter of choice to one skilled in the art.

[0009] Alternatively, as shown in Figure 5, the cap **1** may be extruded or formed from the silicone group. In

such a case, a silicone sealant **7** may be applied to the inner walls of the capping which is then place over the impregnated expanding foam sealant **2**. This will ensure that an adhesive bond is created between the silicone cap extrusion and the impregnated expanding foam sealant.

[0010] The above configurations essentially are provided to ensure that the cap remains in place during movement cycles of the joint and that the cap and the impregnated expanding foam sealant which it encapsulates do not separate from one another. However, the configuration thus formed is limited by the elasticity of the base material forming the cap. To increase the movement capability of the total configuration, the cap may be provided with grooves **8** as shown in Figures 6A, 6B and 6C. The depth of the groove **8** (multiple grooves may be used) will then determine the extent of movement possible.

[0011] The side returns or walls of the cap should not be allowed to extend the full depth of the impregnated expanding foam sealant in the joint. This configuration may inhibit correct attachment of the assembly to the walls of the joint and allow the migration of water or air between dissimilar materials that are not intimately attached to one another, as illustrated in Figure 7. This is particularly the case for larger joints that require a greater depth of impregnated expanding foam sealant to provide support for the capping in the event of pedestrian or vehicular traffic passing over the joint. In these cases, the external capping provided is optimally that of a T-section. The central spline **9** of the T will have impregnated expanding foam sealant on either side immediately adjacent the top **10** of the T, thus providing the necessary support (Figure 8). The T-piece may in addition be provided with flanges **11** on the lower portion of the central spline to more securely hold and position the impregnated expanding foam sealant (Figure 9).

[0012] From the above configurations, and especially from Figures 3, 6 and 8, it can be seen that the T-section, illustrated in Figures 8, and cap sections illustrated in Figure 6, may be combined to provide a configuration that meets the criteria of joint stability, transition support, joint movement, and waterproofing integrity, as shown in Figure 10. In this case, the central spline **12** of the T-piece is split into an elongated groove terminating in an end flange **11**. A cap **10** and side wall returns **5** are incorporated into the format.

[0013] For smaller joints existing, for instance in building facades and between panelized systems, the available depth of final seal configuration is limited. However, thermal movement considerations may be large in relation to joint size. In such circumstances, the depth of groove or split spline will determine the joint movement capability.

[0014] For larger movement joints such as trafficable expansion joints in parking garages, multiple grooves may require to be utilized, as illustrated in Figure 11.

[0015] Thus, a range of profiles may be created based on the present invention that can cater for different sealant and movement joint configurations ranging from vertical applications (with small to extremely large joints) to horizontal applications (with small to extremely large joints) that must accept pedestrian or vehicular traffic.

[0016] Again, the support and recovery mechanism for the profiles is provided by the choice of impregnated expanding foam sealant. The impregnated expanding foam sealant acts as the return or recovery force for the profile - while the profile acts as the main water or air barrier to the system. The impregnated expanding foam sealant may be interleaved where necessary with a closed cell flexible foam or other flexible rigid material that is compressible and will reinforce the resilience and recovery of the internal mechanism.

[0017] The cap for the joint seal of the present invention can be made of any suitable material, including polyethylene, polypropylene, natural or synthetic rubber such as SANTOPRENE™, silicone, or the like.

[0018] It is to be understood that the examples described above are not meant to limit the scope of the present invention, it is expected that the numerous variants will be obvious to one skilled in the field of joint seal design without any departure from the spirit of the invention. The intended claims, properly construed, form the only limitation on the scope of the invention.

Claims

1. A joint seal including a body of expanding impregnated foam, and a resilient cap having an upper surface and side walls depending downwardly therefrom.

2. A seal as claimed in claim 1, wherein said side walls are apertured.

3. A seal as claimed in claim 1 or 2, wherein said cap is provided with a groove therein parallel to said side walls.

4. A joint seal including a body of expanding impregnated foam, and a resilient cap having an upper surface and a lower surface, and a downward, longitudinally extending spine extending from said lower surface.

5. A joint seal as claimed in any preceding claim, having a V-shaped groove in the upper surface thereof, with said foam provided on each side of said groove.

6. A joint seal as claimed in claim 5, including a plurality of said grooves.

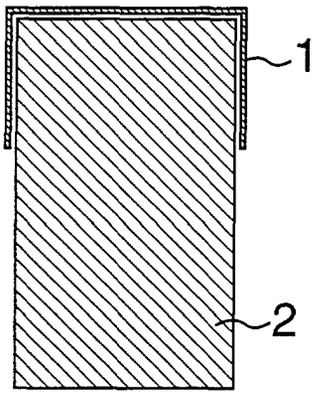

FIG. 1

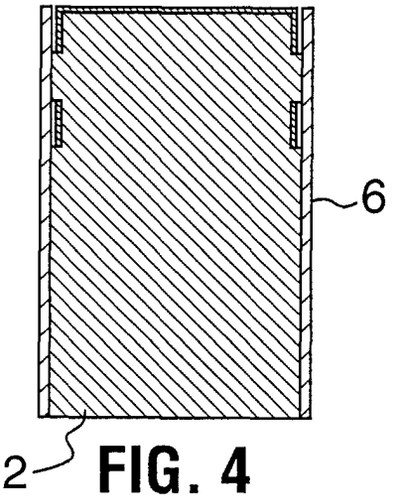

FIG. 4

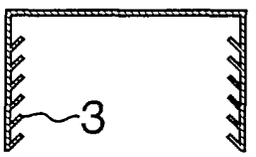

FIG. 2

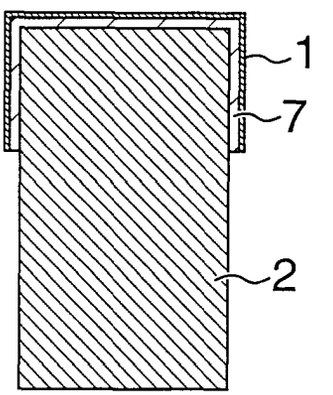

FIG. 5

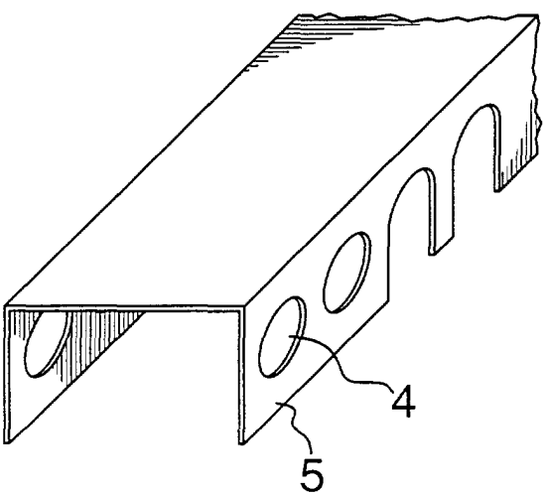

FIG. 3

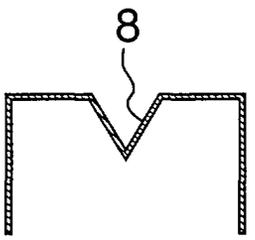

FIG. 6B

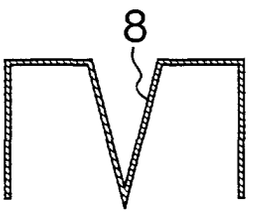

FIG. 6C

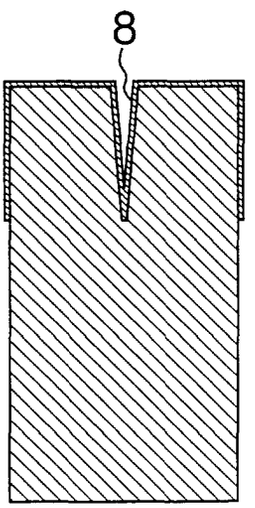

FIG. 6A

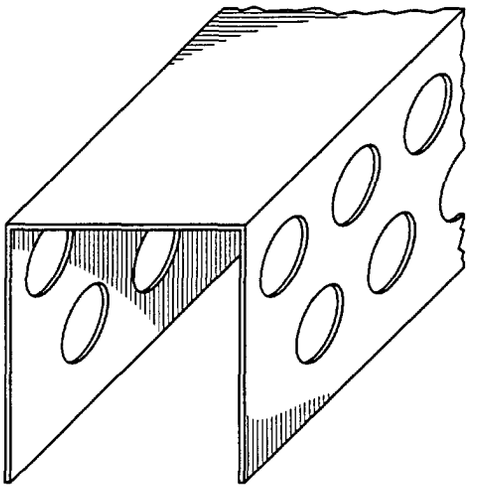

FIG. 7

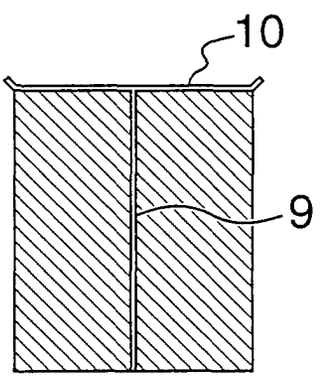

FIG. 8

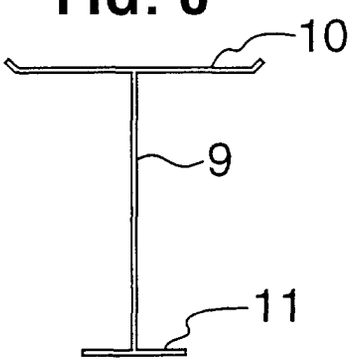

FIG. 9

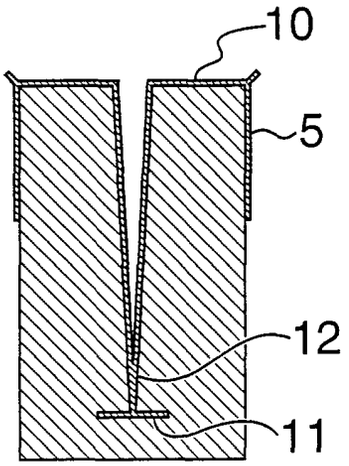

FIG. 10

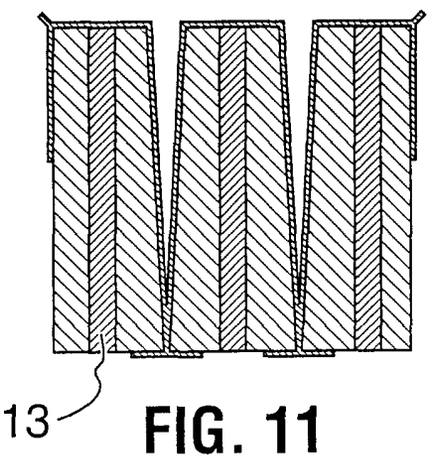

FIG. 11

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 01 10 0176

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A	* column 1, line 47 - column 2, line 68; figures *	2,4	
X	FR 2 038 478 A (MULLEN) 8 January 1971 (1971-01-08) * page 5, line 36 - page 6, line 20; figures 2,3 * * page 7, line 13 - line 31; figures 6,7 *	1,4	
X	GB 1 291 248 A (ARMOUR) 4 October 1972 (1972-10-04)	1,2	
A	* page 2, line 14 - page 3, line 31; figures *	3-6	
A	US 5 130 176 A (BAERVELDT) 14 July 1992 (1992-07-14) * column 3, last paragraph - column 4, line 29; figures *	1	
A	US 1 730 066 A (FISCHER) 1 October 1929 (1929-10-01) * page 1, line 39 - line 55; figures *	2	TECHNICAL FIELDS SEARCHED (Int.Cl.7) E04B E01C E01D
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	16 March 2001	Righetti, R

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