March 6, 1945. A. C. FISCHER 2,370,647

POROUS BODY EXPANSION JOINT

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Fig. 1.

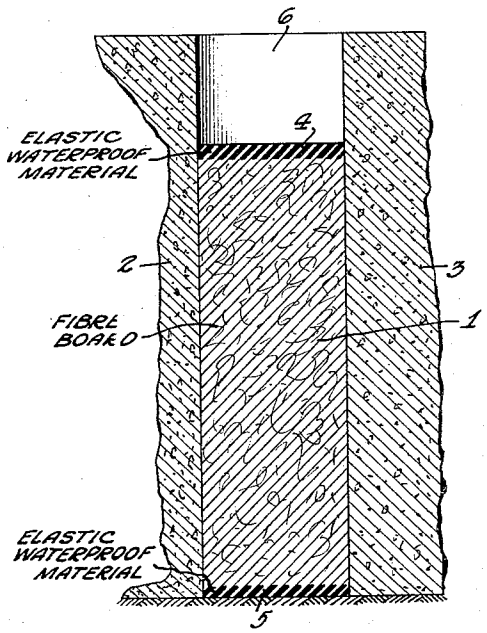


Fig. 2.

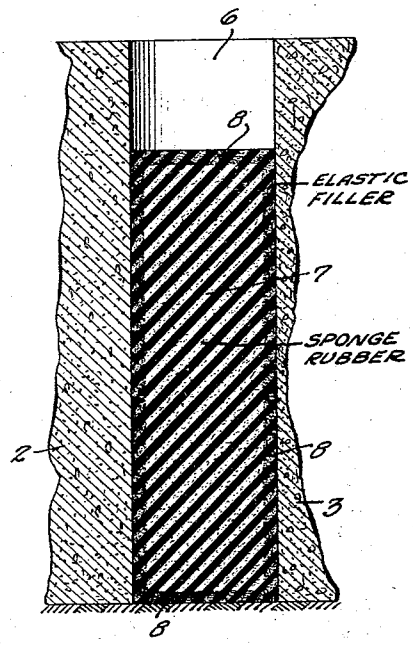


Fig. 3.

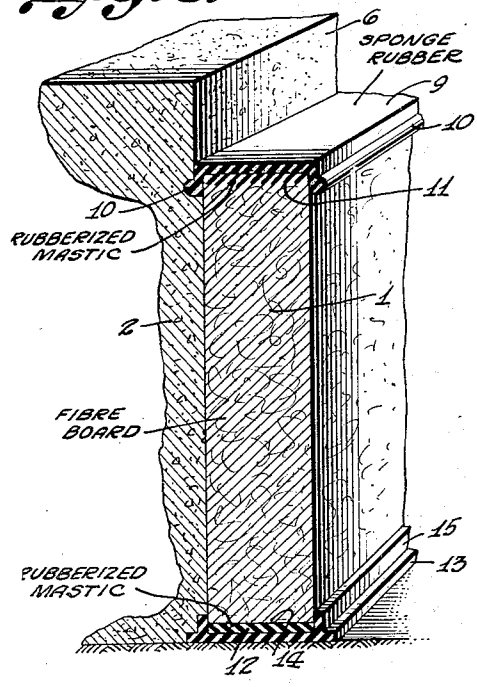
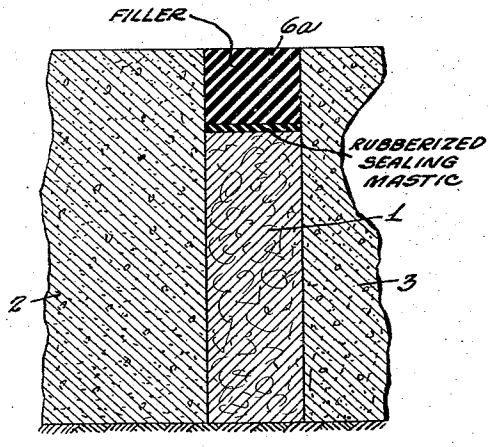


Fig. 4.



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Fig. 5.

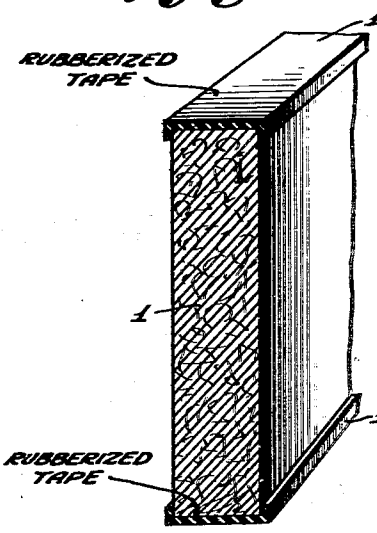


Fig. 6.

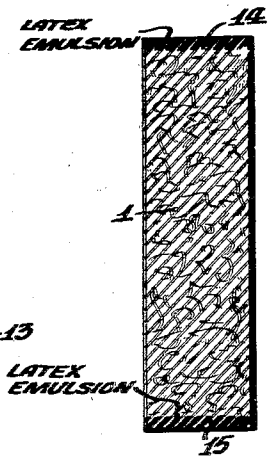


Fig. 7.

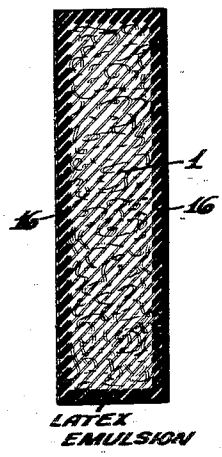


Fig. 8.

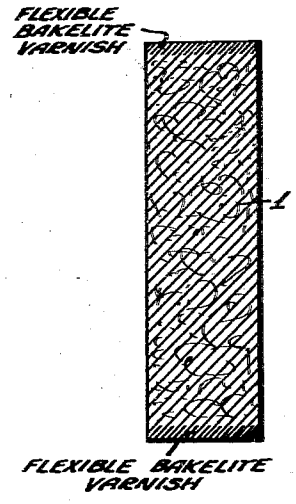


Fig. 9.

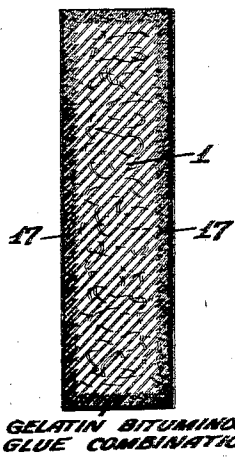
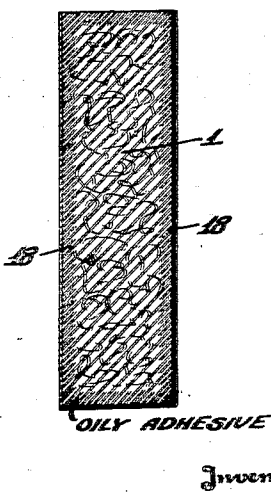


Fig. 10.



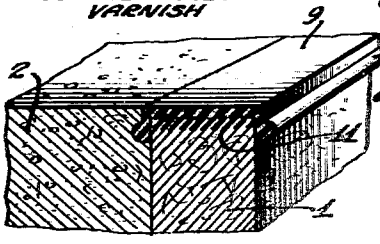


Fig. 11.

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Patented Mar. 6, 1945 2,370,647

UNITED STATES PATENT OFFICE

2,370,647

POROUS BODY EXPANSION JOINT

Albert C. Fischer, Chicago, Ill.

Application April 20, 1940, Serial No. 330,770

1 Claim. (Cl. 94—18)

This invention constitutes a structural improvement upon the flat slab-like strips of material commonly used for the purpose (among other purposes) of defining the lines of subdivision in the pouring of cement pavements, and which, being made of deformable material, remain permanently in position in the finished pavement to serve as weather-proof fillers, conventionally called "expansion joints" in the spaces that must be left between the sections of pavement to permit thermal expansion of the sections while in use.

There are a number of different types of expansion joints made to serve the purpose of yieldingly filling the spaces referred to and varying, structurally, from material formed in situ by pouring hot asphaltic or equivalent material into the spaces, to slab-like strips extruded or otherwise preformed at the place of production. Most of these types, while readily yielding to the cement pavement sections in the direction of thermal expansion, will not react satisfactorily in the sense of keeping the spaces filled and weather-proof as the spaces are enlarged by contraction of the pavement sections under falling temperatures.

Attempts made to render expansion joints properly reactive to contraction of pavement sections and the resultant enlargement of the spaces between them, have been either along the line of complicating the joint structure in a manner to set up counterflow of ductile asphalt during contraction, from spaces into which the asphalt escaped during expansion, or incorporating fibrous or other organic materials in the joint structure either as filler materials or as a fabricated body of fiber impregnated with asphalt; both of which are failures and do not render the joint body reactive because the fibrous matter was saturated beyond the possibility of resiliency.

The present invention solves the problem by constructing the preformed expansion joint slab or strip with not only sufficient mass integrity to permit it to be manipulated in a manner conventional in the art of pouring cement pavements, but with the novel condition of having a degree of inherent mass resiliency that permits it to yield by compression as distinguished from flowing under the pressure of the thermally expanding pavement sections; and by such compression, storing in the resilient expansion joint body, energy that causes said body to return by expansion to approximately its original dimension, as distinguished from back flow, in order to fill the enlarging space between sections when the pavement sections contract under lowering temperatures, these phenomena being achieved, according to the invention, by incorporating in the expansion joint a slab or strip formed of material having a highly porous or cellular structure and inherent body resiliency; for instance, the qualities possessed by a body of sponge rubber (preferably with its cells ruptured), or by an inherently resilient body of fibers, felted or otherwise fabricated into a form with mass integrity and inherent body resiliency; or some material equivalent to these; said bodies being rendered proof against seepage of water on any or all of its faces that are liable to encounter moisture in service; their moisture proofing elements being applied as a shallow surface infiltrate entering into and anchoring itself to and capable of sealing the outer pores of the body, but leaving unfilled and unobstructed the pores of the main mass of body material, of which the joint is made; and leaving the individual elements that define the pores of the main portion of the body without inter-adhesion and free exercise of their individual resiliency; and the said moisture-proofing element having when set, an inherent elasticity that prevents its rupture or impairment of its pore-sealing and moisture-proofing capacity when it partakes of the alternate compression and distention of the porous body in service.

In the accompanying drawings;

Figure 1 is a fragmentary view in vertical transverse section, of opposed ends of two pavement sections and the porous fiber-board body of an interposed expansion joint; said fiber-board body being proofed against water seepage at top and bottom and the tread surface filler used above the joint being omitted;

Figure 2 is a view similar to Figure 1 in which the main body portion of the expansion joint is made of sponge rubber and the seepage proofing element is applied as an elastic surface filler completely around said body;

Figure 3 is a fragmentary view in perspective, showing a body portion of an expansion joint similar to that of Figure 1, with seepage proofing elements of special materials at top and bottom, fashioned at the sides to cause them to be embedded in the paving sections;

Figure 4 is a view similar to Figure 1, on a somewhat smaller scale, showing the tread-surface filler element in position;

Figure 5 is a view partly in vertical transverse section and partly in perspective showing the

expansion joint body with still another embodiment of the seepage proofing element;

Figures 6 and 8 are vertical transverse sections of fiber-board expansion joint bodies, rendered seepage-proof by shallow surface fillers of special materials at the ends thereof;

Figures 7, 9 and 10, are vertical transverse sections of fiber board expansion joint bodies rendered seepage proof by shallow surface fillers of special materials on all four surfaces of the body; and

Figure 11 is a fragmentary view in perspective of one paving section and the adjacent fiber board body of the expansion joint having a seepage proofing cap similar to that of Figure 3, but located to also serve as the expansion joint tread surface flush with the wheel surface of the pavement.

Referring to the drawings, 1 represents highly cellular or porous and inherently resilient bodies of fiber board or like material (of which there are several different makes upon the market) usually made for heat insulating purposes but here used to constitute the principal body masses of expansion joints.

Bodies 1 are installed between opposed ends 2, 3 of adjacent paving sections, in conventional manner, and having sufficient resiliency to not only enable them to yield and assume reduced transverse dimension and increased density under pressure of the ends 2, 3, when the pavement sections expand under rising temperatures, but to store up sufficient energy in so doing, to cause the bodies to expand toward their original transverse dimensions and continue to fill the enlarging space between the sections when the sections contract under falling temperatures.

In Figure 1, the top and bottom edges of body 1 have their adjacent cells filled with an elastic compressible material 4, 5, water-proof at least to the extent that it will cause the porous body to resist seepage of water when its outer cells are filled with said material. By shallow impregnation of pores or cells of body 1 near its outer surfaces, the waterproofing material is anchored to the cellular body; and when set its elasticity enables it to partake of alternate compression and distension that occur in the resilient body under expansion and contraction of the paving sections, without impairment of its water-proofing relation to the body. 6 in Figure 1 indicates a space left for introduction of a filling (6a, Figure 4) such as asphalt or the like, conventionally introduced by pouring in molten state for providing tread surface on the expansion joint flush with the wheel surface of the pavement.

In Figure 2, the cellular or porous body 7 is sponge rubber, and its shallow impregnation of moisture proofing is an elastic filler 8 preferably applied to all four faces of the body in substantially the same relation as described in connection with the fillers 4 and 5 of Figure 1.

In Figure 3 the porous or cellular body 1 of fabricated fiber has a crowning strip 9 of rubber, fashioned with longitudinal beads 10 at its sides, which become embedded in the pavement sections 2, 3 so that the rubber strip cannot be drawn away from its place by disturbances of traffic, whether exerted through the medium of the filler to be poured into space 6 (Figure 3) or exerted upon the crowning strip direct, when, as shown in Figure 11, this rubber crowning strip is flush with the wheel surface of the pavement. Beneath the rubber crowning strip in both Figure 3 and Figure 11 there is a rubberized mastic water-proofing member 11, prepared so as to retain its elasticity and expansibility and applied to the edge of the cellular body 1 by shallow impregnation, filling of outer cells and anchorage as described in connection with Figure 1. As shown in Figure 3, when the expansion joint is set upon damp subsoil, the rubberized mastic waterproofing element 14 and latterally beaded rubber apron 12, 13, substantial duplicates of elements 9, 10 and 11, are preferably used at the bottom of the joint. Rubber apron 12, 13 may include a facing flange 15.

In Figures 5 to 10, inclusive, the basic ideas of Figures 1 to 4 are substantially repeated though with varied detail. Figure 5 substitutes upper preformed flanged rubberized capping tapes 12, 13 as the upper and lower water-proofing elements. When this material is used it should be prepared with a surplus of sluggishly fluent rubberized cement that will enable it to partake of compression and distension of the expansion joint.

Figure 6 substitutes for the elastic water-proofing material 4 and 5 at top and bottom of Figure 1, top and bottom impregnations of latex emulsion. Figure 7 applies the same latex emulsion as impregnations 16 on all four sides of the cellular body. Latex emulsion may, with advantage, be subjected to vulcanization, especially when not protected by sealing compounds. It is preferably forced by pressure to flow into outer pores of or impregnate the desired distance into the porous or cellular body.

Figure 8, in a construction otherwise similar to Figure 1, uses flexible Bakelite varnish as the top and bottom water-proofing impregnation.

Figures 9 and 10 both show water-proofing impregnation on all four faces of the porous or cellular body; Figure 9 using a gelatin-bituminous glue combination 17; and Figure 10 an oily adhesive 18.

Generally from $\frac{1}{16}$ to $\frac{1}{8}$ inch will be found a sufficient depth of impregnation. Impregnation may be superinduced, in any instance, by either pressure over the fluid being applied, or by suction at the face of the porous body opposite that being impregnated.

Materials used herein, such as asphaltic material; rubberized tape, rubberized cement; latex emulsion, with or without heat treatment or vulcanization; asphaltic gelatinized mixture; asphaltic glue mixture; flexible Bakelite varnish; toughened sponge rubber capping; ruptured cell sponge rubber; are all terms well known in the art, identifying materials purchasable in the open market.

It is to be understood that the formulae of construction and types of joint mentioned in this specification, are only a few of the many in which the identifying structural and operative principles of the invention may be employed; and therefore, I do not wish to be limited to the particular forms shown, since they are selected for purposes of illustration rather than limitation.

I claim:

In an expansion joint the combination of a compressible body of inherently resilient fibers, said body being formed to conform with an expansion space between two sections of masonry; said body having pores defined by its constituent fibers; said fibers, excepting those constituting outer surfaces of the body being non-adhering and freely movable one upon another and leaving the body freely deformable under the influence of dimensional changes in the expansion space; and a sealing apron deformable with said

body in said expansion space and having anchoring margins constructed for inter-engagement with the masonry sections and holding the apron in place in said expansion space, said margins that interengage with the masonry sections being presented in position to become embedded in the masonry sections when the latter are produced by the conventional method of pouring plastic against the body of fibers, and the said margins being formed with enlargements that become embedded in said masonry sections when so introduced into use.

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