Nov. 1, 1932. W. B. THOMPSON ET AL 1,885,391

EXPANSION JOINT

Filed April 2, 1931

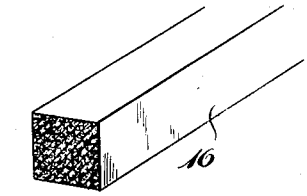


Fig-1

Fig-2

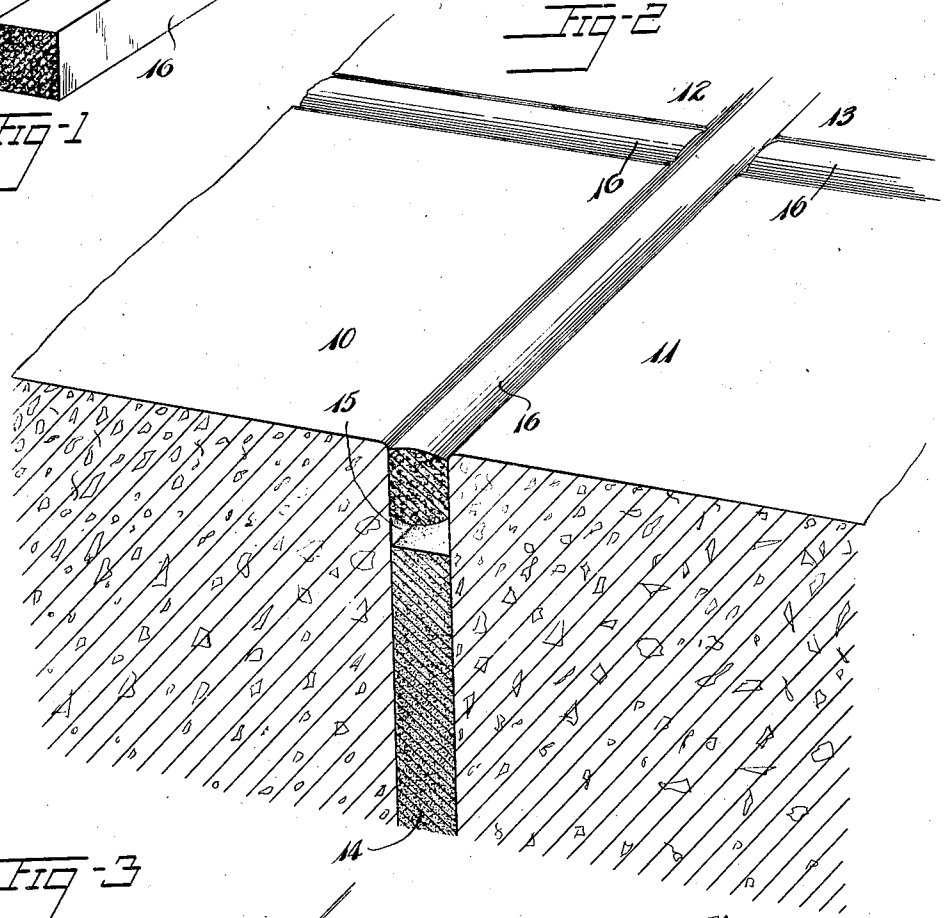
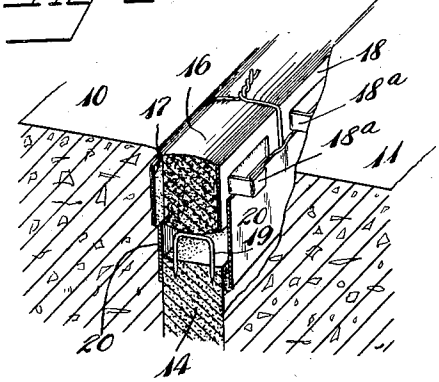


Fig-3



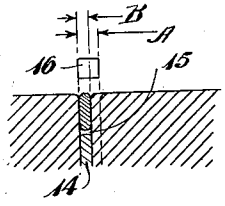


Fig-4

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UNITED STATES PATENT OFFICE

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EXPANSION JOINT

Application filed April 2, 1931. Serial No. 527,200.

Our invention relates to expansion joints such as are employed between the sections of concrete pavements, for example.

Although many kinds of filling material for expansion joints have been proposed, probably the most satisfactory materials heretofore used have been materials of a plastic character, but the imcompressibility of such materials has resulted in their being squeezed out of the joint by the heat-expansion of the concrete and their lack of resilience has resulted in their failure to keep the joint space full in the enlarging of the space by contraction of the concrete. Thus dirt and foreign materials have been allowed to enter the space and to become packed in the subsequent expansion of the concrete, with damage to the latter as a result. The opening of the joints also has allowed water to find its way under the concrete or into the joint space and to cause damage by reason of its expansion upon being frozen.

Our chief objects are to provide an improved expansion joint in which these undesirable effects will be avoided and to provide economy and convenience in the production of such joints.

We attain these objects by providing a joint in which such plastic material as is used is afforded space into which it can flow without being extruded from the joint, and in which the expansion space of the joint is closed at all times against the entrance of water or dirt by a member adapted to be compressed without being excessively extruded from the joint and of such resilience as to continue to close the expansion space as the latter is enlarged by contraction of the concrete.

For convenience and economy the space-closing member preferably is of such character that it can be preformed and mounted in its final position either before or after the placing of the concrete or other slabs which embrace it.

Referring to the drawing:

Fig. 1 is a perspective view of a sponge rubber strip employed in the practice of our invention in its preferred form.

Fig. 2 is a sectional perspective view of a pavement showing the preferred form of our expansion joint.

Fig. 3 is a similar illustration showing a modified form of the invention with a portion of the concrete broken away, and

Fig. 4 is a diagram of a pavement or similar structure in section illustrating the method of placing the sponge rubber strip in the joint.

Referring particularly to Fig. 2, the numerals 10, 11, 12, and 13 designate slabs of concrete between which spaces 15 have been provided to allow for expansion and contraction of the slabs when subjected to changes in temperature. The numeral 14 designates a plastic or distortable, non-compressible filling material, preferably of the usual bituminous character, which fills the lower portion of space 15 between the slabs. The upper portion of the space 15 is closed but only partially filled by a strip 16 of compressible, vulcanized sponge rubber, a space being left between the plastic filling and the rubber. The sponge rubber strip 16 is molded in rectangular shape as shown in Fig. 1, and is placed in the space 15 under compression. The placing of the strip 16 is illustrated in Fig. 4, in which the strip 16 is shown as having a width A before being placed in the joint and a width B when compressed to be inserted in the joint.

The sponge rubber strip is preferable to other materials because it is unaffected by moisture and may be compressed with a decrease in volume. Its susceptibility to being compressed with a corresponding change in volume permits the slabs to approach each other as they are expanded by heat, without flow of the strip from the space between the slabs. In this respect the material has great advantages over a plastic material which is extruded from between the slabs when the latter are expanded and forms a bump in the pavement.

On contraction of the paving slabs the sponge-rubber strip, which is originally of greater thickness than the greatest width of the space, expands and continues to keep the space closed as the space is enlarged by the

contraction of the slabs, thereby preventing the entrance of foreign materials.

The sponge rubber strip may be attached to the paving material by means of rubber cement if desired. Where such cementing is employed the strip may be cemented and forced into place while the rubber cement is wet, the cement acting as a lubricant to assist the insertion of the strip.

If desired the entire space 15 between the slabs may be filled with the sponge rubber strip and the plastic filling entirely eliminated. We find certain advantages, however, in filling the lower part of the space with the plastic material where sufficient space is provided between the sponge rubber and the plastic material to allow for the flow of the latter under compression. With such a construction the plastic material is protected from radiated heat by the insluating properties of the sponge rubber and in turn seals the base of the joint against entrance of water from below. In such a construction a softer plastic material may be used than when the entire joint is filled therewith, and the softer material is the better adapted to re-shape itself under the force of gravity to keep the expanding space closed at the bottom and thus insure against seepage of moisture. The plastic material may either be melted and poured into the joint or a premolded slab of it may be inserted either before or after the concrete is poured.

In the form of the invention shown in Fig. 3 the sponge rubber strip 16 is vulcanized to a pair of sheet metal strips 17, 18 which may be provided with stamped out anchorage members 18*a*, 18*a* adapted to be embedded in the concrete slabs 10 and 11. In this form of the invention the sponge rubber strip may or may not be inserted while under compression as the strong adhesion of the rubber to the metal will permit the rubber strip to be expanded by tension on contraction of the slabs.

In the construction of this form of joint the plastic material 14 is preferably premolded and may be provided with wire loops such as the loop 19 or with other means for supporting the sponge rubber strip at the proper spaced distance therefrom at the time the concrete is formed and strips of cardboard 20 or similar material may be used to prevent forcing of the wet concrete into the space 15. When such strips are used they may be cemented to the slab 14 and the metal strips 17 by use of asphalt cement to hold the parts in the proper relative position.

When it is desired to place the sponge rubber in place under compression the rubber strip may be compressed between the metal strips 17, 18 and temporary windings of wire or other material placed around the composite strip to hold the rubber under compression until the concrete has set, when the wires may be cut and withdrawn.

While we have found sponge rubber to be the best material for the purpose it is within the scope of our invention to utilize strips of molded rubber material having cellular spaces molded therein to allow compression of the strip without a corresponding increase in width. Where sponge rubber is used for the purpose we prefer a small celled type having a volume increase of about 100% during vulcanization.

We claim:

1. In an expansion joint the combination of two spaced-apart slab members and a preformed, compressible strip of vulcanized sponge rubber mounted under compression between the slabs.

2. In an expansion joint the combination of two spaced-apart slab members, and a of plastic material and a compressible strip of vulcanized rubber mounted between the slabs, the strip of rubber being spaced from the plastic material to allow for flow of the latter under compression.

3. In an expansion joint the combination of a two spaced-apart slab members, and a slab of plastic material and a compressible strip of vulcanized sponge rubber mounted between the slabs, the strip of rubber being spaced from the plastic material to allow for flow of the latter under compression.

4. In an expansion joint the combination of two spaced-apart slab members, and a slab of plastic material and a strip of vulcanized sponge rubber mounted between the slabs, the strip of sponge rubber being spaced from the plastic material to allow for flow of the latter under compression, and means including a pair of metal strips adhered to the sponge rubber strip for anchoring the sponge rubber strip to the slabs.

5. In an expansion joint the combination of a pair of spaced-apart slabs of paving material, a strip of sponge rubber closing the top of and partially filling the space between the slabs, a pair of metal strips vulcanized to said sponge rubber strip, and anchorage devices extending from said metal strips and embedded in the paving material.

6. In an expansion joint the combination of a pair of spaced-apart slabs of paving material, plastic material filling the lower portion of the space therebetween, and a strip of sponge rubber spaced from the plastic material in said space and adapted to expand or contract laterally with the movement of said slabs.

7. In an expansion joint a combination as defined by claim 6 including means for attaching the sponge rubber strip to the slabs.

In witness whereof we have hereunto set our hands this 30th day of March, 1931.

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ALLAN B. MERRILL.