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EXPANSION JOINT

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Fig. 1.

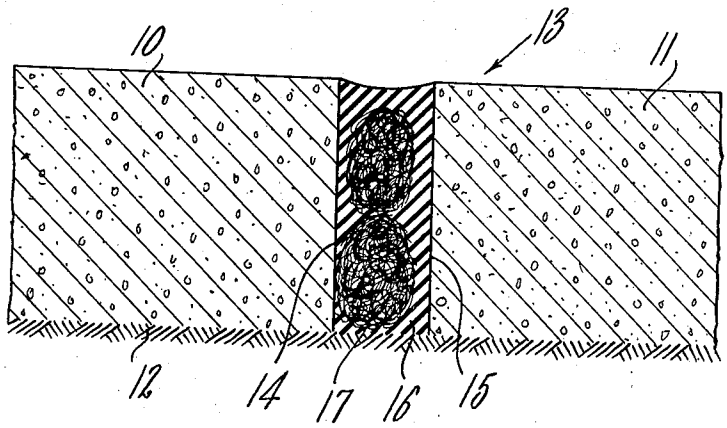
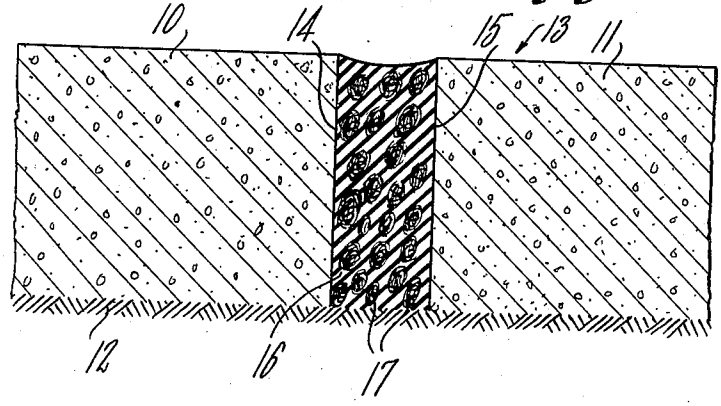


Fig. 2.



INVENTORS
SVEN G. GISSLANDER
ROBERT R. STERRETT
BY Gourley & Budlong
ATTORNEYS

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EXPANSION JOINT

Sven Gustav Gisslander and Robert R. Sterrett, Naugatuck, Conn., assignors, by mesne assignments, to United States Rubber Company, New York, N. Y., a corporation of New Jersey

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4 Claims. (Cl. 94—18)

This invention relates to expansion joints such as are employed between concrete paving slabs, and more particularly to expansion joints comprising fibrous material and rubber.

Concrete roads are commonly made in sections or slabs with an expansion space between the faces at the ends of the slabs to allow for expansion of the concrete due to temperature changes. It is necessary to have the expansion space filled with some waterproofing seal to prevent water from flowing underneath the concrete, and in cold weather, freezing and causing the concrete to crack. Commonly, these joints are filled by pouring in an asphalt composition, or by inserting a preformed strip of fibrous or other material, sometimes impregnated with asphalt, and, if desired, sealing the preformed strip into place by pouring in asphalt around the edges. There are numerous disadvantages of thus using asphalt. When the joint is made wholly of asphalt, the asphalt is extruded out of the joint by expansion of the concrete slabs in warm weather and forms objectionable ribs which must be removed. In cold weather when the concrete slabs contract, the asphalt cracks away from the concrete. When preformed strips are used as the expansion joint material and the spaces between the sides of the strips and the faces of the paving slabs are filled with asphalt, the asphalt being essentially inelastic, does not follow the movement of the concrete in its expansion and contraction, and there results a separation of the asphalt from the concrete which allows water to seep through to beneath the concrete, and in cold weather freeze and cause cracking of the road. There have been various suggestions for using preformed strips, which are sometimes rubber covered, for filling the spaces between the paving slabs without using asphalt by inserting the strips in the expansion space between the paving slabs under compression, but the insertion of a necessarily long strip under compression appears to have its difficulties.

According to the present invention, loose fibrous material is inserted into the expansion space and a latex composition is introduced in an amount sufficient to surround the fibrous material and form a continuous top surface over the fibers. The loose fibers may be in the form of a long wad and one or more of these wads may be packed into the expansion space prior to pouring the latex in the space, or the latex poured into the expansion space and the wad or wads subsequently packed in. In either case, the wad may first be dipped in or sprayed with latex, if desired. The wad or wads should be placed far enough down in the expansion space so that sufficient room is left above for the formation of a continuous layer of rubber on drying of the latex to prevent the entrance of water into the fibrous material. When latex is poured into a space containing such fibrous material, the latex tends to penetrate the fibrous material somewhat, but largely flows around it, making when dry, a tight waterproof seal. After the fibrous material has been packed into the expansion space, as discussed above, the latex composition may be poured in so that it is flush with the surface of the road. Another method of introducing the loose fibrous materials is to add the fibrous material in small clusters as the latex is being poured into the space to be filled.

In the accompanying drawing which illustrates the two preferred embodiments of the invention discussed above:

Fig. 1 is a fragmentary view in cross section of the expansion joint made by packing wads of the fibrous material in the expansion space; and

Fig. 2 is a cross sectional view of an expansion joint where the fibrous material has been added in small clusters.

The fibrous material used is preferably curled hair, and this may be readily formed into long wads for insertion into the expansion space, or may readily be formed into small clusters to be added with the latex. Other fibrous material, such as cotton, glass wool, steel wool, or the like, may also be used. The latex is preferably compounded to produce delayed coagulation, so that after being poured into the expansion space, it will gel on standing and thus by being set to a more or less rigid condition before drying, prevent any undue flowing into the interstices between the fibers of the fibrous material after being poured. It is also desirable that the latex contain a low temperature accelerator so that under atmospheric conditions the rubber which is formed on drying of the latex will vulcanize in place to form a joint having the best physical properties. As is well known, the latex may readily be compounded, as in the example below, so that adequate adhesion to a concrete surface will be assured. In that the faces of the concrete slabs are rough it may be somewhat difficult to get an adequate bond between the poured latex and the concrete due to air pockets persisting between the concrete surface and the poured latex by virtue of the rough concrete wall. It may thus be desirable to first apply a film of the latex composition to the faces of the slabs as by spreading or spraying, or if desired, a film of some other adhesive, such as a rubber cement, or a latex of different composition. The latex composition may then be poured into the expansion joint and will adhere to the continuous film previously applied to the rough face of the concrete slab. The latex may be poured so that it does not completely fill the expansion space, and after drying a surface of asphalt may be applied on top. The latex should, for best results, however, cover the top of

the fibrous material in the expansion space. The fibrous material embedded in the in situ formed strip of rubber readily permits expansion and compression of the joint on contraction and expansion of the paving slabs without placing an undue strain on the adhesion between the rubber and the concrete. Due to the relatively high modulus of rubber, sufficiently high stresses are developed in a solid rubber joint so that it is difficult to maintain adhesion between the rubber and the concrete.

The following is an example of a latex composition which may be employed in carrying out the present invention:

	Dry basis	Wet basis
Centrifuged latex	100	160
Potassium hydroxide solution	.25	.5
Sulphur paste	2	3.3
Diamyl ammonium diamyl dithiocarbamate emulsion	1	3
Casein solution	2.5	15
Sodium silicate	6	12
"Suprex" clay aqueous dispersion	30	50
Aluminous cement (dry)	40	
Zinc oxide paste	2	5

The diamyl ammonium diamyl dithiocarbamate is an example of a low temperature accelerator which will permit vulcanization of the dry deposit to take place at ordinary temperatures so that a vulcanized rubber joint will be formed. The casein is solubilized by the addition of small amounts of sodium fluoride and borax as is well known. Such a latex compound is stable and may readily be transported to the place of use. A rubber joint formed from such a latex composition will readily adhere to the portions of the faces of the slabs which define the expansion space. Before pouring this compound into the expansion joint, it is preferable to add 12 parts (wet) of a 33⅓% dispersion of sodium silico fluoride Na_2SiF_6. The sodium silico fluoride acts as a delayed coagulant and the latex which is readily poured into the expansion space gels after a short rest period due to the coagulating action of the sodium silico fluoride. Various other delayed coagulants than sodium silico fluoride may be used for gelling the latex after pouring. For example, a watery emulsion of pine tar is known to produce a gellation of latex on standing. Likewise the latex, as is known, may be compounded with a polyvalent metal salt to produce delayed coagulation at ordinary temperatures. If desired, the latex compound may be made heat sensitive by the addition of polyvalent metal salts or disubstituted guanidines, or an ammonium salt of a strong acid and zinc oxide, as is well known in the art. In cases where a heat sensitive latex which is not coagulable on standing at normal temperatures is used, it is necessary to heat the latex to produce more or less immediate gelling. A heating of the latex may readily be accomplished by playing live steam on the poured joint or otherwise heating it.

Referring more particularly to the drawing, concrete slabs 10 and 11 are shown on a conventional pavement bed 12. The expansion space which is left below the road surface 13 between the faces 14 and 15 of the paving slabs 10 and 11 when they are formed is shown filled with an in situ formed strip of rubber 16 in which is embedded the loose fibrous material 17. The loose fibrous material 17 as shown in Fig. 1 was inserted into the expansion space in the form of two long wads before pouring in the latex which when dried formed the rubber part 16 of the expansion joint surrounding the fibrous material. In Fig. 2 small clusters of the loose fibrous material 17 were added as the latex was poured into the joint to form when dried the rubber part 16. The drawing is merely illustrative of one type of concrete paving construction. In other paving constructions the concrete slabs may be relatively deep and part of the space between the slabs above the pavement bed filled in with a filler material, which may be premolded, and which may be topped with a metal cap as well known in expansion joint constructions. In such constructions, however, there is an expansion space left below the road surface between the paving slabs in which may be formed the expansion joint of the present invention. The expansion joint of the present invention is likewise applicable to the filling of expansion spaces between the faces of other constructional members, as in bridge or other structural work.

The term "latex" in the description and claims is used to designate broadly coagulable aqueous dispersions of elastic materials, including artificial dispersions of rubber or rubber-like materials as well as natural latex, which may be preserved or compounded or otherwise treated as desired, as by vulcanization, and which may be in a normal, diluted, concentrated or purified condition produced by methods well known in the art.

As various modifications will occur to those skilled in the art, it is not intended to limit the invention other than as set forth in the appended claims.

Having thus described our invention, what we claim and desire to protect by Letters Patent is:

1. The method of forming an expansion joint in an expansion space between spaced constructional members which comprises inserting masses of loose fibrous material in said expansion space and introducing a latex composition in said space in amount sufficient to surround said fibers and form a continuous top surface over the fibers in said space.

2. The method of forming an expansion joint in an expansion space between spaced constructional members which comprises inserting masses of loose fibrous material in said expansion space and introducing a latex composition which will set to a gel on standing, in said space in amount sufficient to surround said fibers and form a continuous top surface over the fibers in said space.

3. The method of forming an expansion joint in an expansion space between spaced paving slabs which comprises packing wads of loose fibrous material in said expansion space and then pouring an amount of a latex composition in said space sufficient to surround said fibers and cover them to form a continuous top surface in said space.

4. The method of forming an expansion joint in an expansion space between spaced paving slabs which comprises packing wads of loose fibrous material in said expansion space and then pouring an amount of a latex composition which contains a low temperature accelerator and which will set to a gel on standing, in said space sufficient to surround said fibers and cover them to form a continuous top surface in said space.

SVEN GUSTAV GISSLANDER.
ROBERT R. STERRETT.