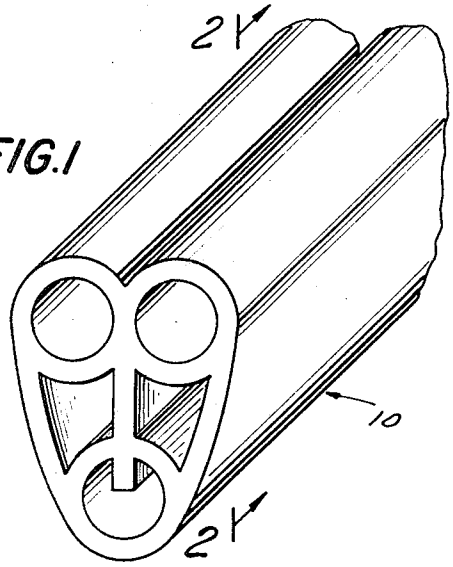
June 18, 1968 E. J. WEBB 3,388,643

SEALING STRIP

Filed June 13, 1966

FIG. 1



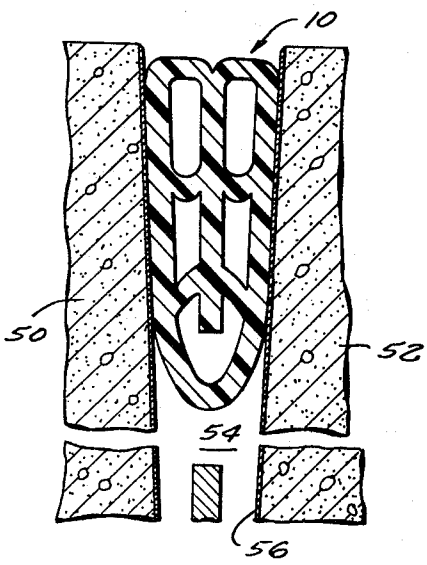


FIG. 3

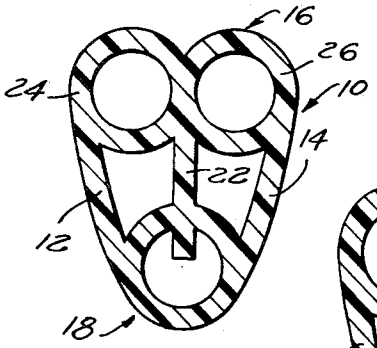


FIG. 2

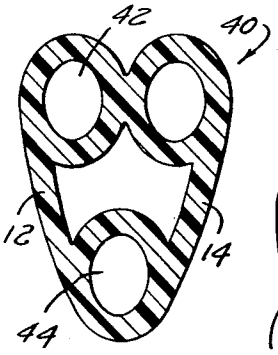
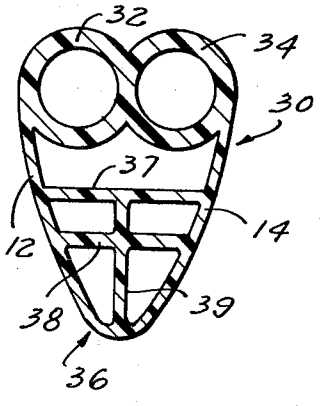


FIG. 6

FIG. 5



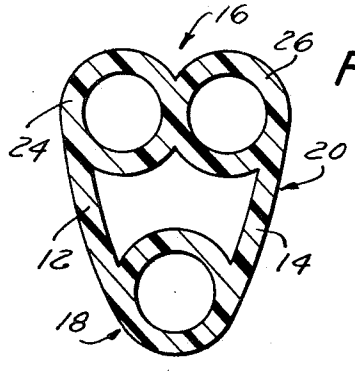


FIG. 4

INVENTOR.
ELMER J. WEBB
BY
Kane, Dalsimer, Kane, Sullivan & Kurucz
ATTORNEYS

United States Patent Office

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SEALING STRIP

Elmer J. Webb, Syracuse, N.Y., assignor to The Brewer-Titchener Corporation, Cortland, N.Y., a corporation of New York

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3 Claims. (Cl. 94—18)

ABSTRACT OF THE DISCLOSURE

A strip of elastomeric material used in concrete highway construction for sealing the predetermined spaced transverse contraction joints. The strip is in the form of an integral body and generally heart-shaped in configuration having a pair of outwardly convex side walls joined at both top and bottom and a plurality of internal substantially tubular truss members to provide, when the strip is compressed, increased outward force to form a tight seal between the concrete fascia and the strip walls.

The present invention relates to a new and improved sealing strip. More particularly the invention relates to a sealing strip adapted for use in road construction to provide an expandible-contractible seal for regularly spaced contraction joints between pre-formed concrete pavement sections. The sealing strip of the present invention will maintain a seal between adjacent walls of the concrete fascia even during those periods when the sections are undergoing linear expansion or contraction due to ambient temperature conditions.

In concrete highways spacings or joints, lying both transverse to and longitudinal with the traffic flow, compensate for linear expansion or contraction of the section and effectively control the random cracking and warping that the unsectioned pavement might otherwise undergo. Thus, the continuous concrete highway is provided with a pattern of straight transverse cracks effectively to provide lines of weakness whereby internal stresses which tend to break the section will act along the line of weakness rather than at random locations within the section. As can be appreciated, any necessary repair to the section will be more easily carried out along this line than at other points within outer confines of the section.

While it is necessary to provide the continuous concrete pavement with predeterminedly spaced joints it is also necessary and in fact imperative to seal these cracks to prevent the intrusion of foreign matter in the form of, for example, dirt, abrasives, chemical products and other non-compressible material to the internal portion of the joint and the concrete fascia. It is the foreign material that causes or aids in the deterioration of the pavement itself.

Today, with highways being subjected to increased loads and greater use, together with the use of salts and other abrasive non-compressible thawing substances, the sealing of these cracks has become a major problem in concrete highway construction.

In the past it has always been thought that water entering the joint from the plane of the road was the major cause of such deterioration at the joint and that it was most imperative to exclude water. While, of course, water should be prevented from entering the crack from the top it is relatively impossible or commercially impractical to eliminate the water since the most significant portion thereof enters the joint from the subgrade of the road. To seal this entrance to the joint from the subgrade would render the cost of road construction prohibitive.

Actually, water does not provide the deleterious effects on the joint as does the uncompressible foreign matter which, without an adequate seal, enters the joint in the

concrete from the top or road surface. The uncompressible material causes a shearing or spalling of the concrete at the joint when the concrete sections are undergoing expansion. Therefore, upon expansion, upper portions of the concrete are broken away causing ruts and holes at the joint.

Transverse cracks have been generally provided at various predetermined intervals depending on the type of pavement slab and loads to be encountered and usually between fifteen and one hundred feet to compensate for the stresses the pavement section undergoes. Up to the time of the present invention no entirely adequate sealing means has been developed to provide a permanent seal for the joint. Sealing substances in the form of tars, which were initially used, have now given way to forms of compressible sealing strips but none of these have proved entirely satisfactory. The known strips have not been properly stabilized for uniform expansion and contraction. In following the expansion and contraction of the concrete sections, for example, some of the strips tend to collapse. Other strips have been provided with excessive internal structure or angularly diagonal trusses which upon expansion and contraction tend to crystallize the sealing material and crack or otherwise render it unsuitable. Also such prior art strips have been found to provide what can be likened to only a knife edge seal with the concrete fascia. Therefore, the latter strips provide only a relatively small working or sealing area in relation to the length of the side walls which might abut the fascia. Some sealing strips do not properly follow concrete expansion and contraction and others tend to crystallize, necessitating replacement. Further, the smaller the working area, the greater the likelihood that foreign abrasive and uncompressible material will enter the internal portion of the crack and hasten the deterioration of the pavement itself by the shearing or spalling action as mentioned, thereby reducing the rated life of the section.

It is therefore an object of this invention to provide an improved sealing strip for road construction and particularly a strip that provides a greater working and sealing engagement with the concrete fascia of the crack. It is a further object to provide a sealing strip which provides greater compressive strength when in sealing relation to prevent entrance to the joint of abrasive and uncompressible foreign matter and due to its novel formation overcomes the possibility of collapse from said sealing relation and the tendency to crystallize due to excessive internal truss structure.

Other objects and advantages of this invention will readily come to mind during the discussion which follows.

In a broad sense the invention is directed to an elongated substantially hollow sealing body adapted for use in sealing transverse and longitudinal cracks formed between concrete sections in highway construction. The body comprises a pair of generally outwardly convex side walls defining a working surface and adapted to be retained in abutting sealing engagement with the concrete facing of the concrete joint in a substantially uncollapsed condition for practically the entire length of the wall. The walls of the body are joined at one end by an outwardly convex arcuate bottom portion and at the other end by a pair of interconnected closed curved, tubular members providing an upper internal truss structure which compressively yields to the expansion of the facing. The body further comprises truss means internally of the lower wall portion to provide for increased stabilization and offer greater compressive force against the facing whereby increased sealing engagement will be obtained over a major portion of the concrete side wall.

In the accompanying drawing which illustrates several embodiments of the sealing strip and forms a part of the application:

FIG. 1 is a perspective view of a sealing strip;

FIG. 2 is a side view in vertical section of the sealing strip of FIG. 1 as seen along the line 2—2;

FIG. 3 is a view similar to FIG. 2 but showing the sealing strip partially compressed and in sealing relation to two adjacent walls of a preformed concrete contraction joint;

FIG. 4 is a view similar to FIG. 2 showing a modification of the sealing strip;

FIG. 5 is a view similar to FIG. 2 showing a further modification of the sealing strip; and

FIG. 6 is a view similar to FIG. 2 showing an additional modification of the sealing strip.

Several embodiments of the sealing strip that make up the present invention are shown in the drawing and noted by the numerals **10**, **20**, **30** and **40** in FIGS. 2, 4, 5 and 6, respectively. The sealing strips of the type shown and described herein are of an extended elongated length and may be carried on suitable apparatus thereby being cut to appropriate length segments at the road construction site in accordance with the width of the highway and the total length of the concrete pavement section.

The strips are formed in one piece, as by extrusion, from a suitable elastomeric material. The material should be both abrasive and wear resistant and not adversely affected by extreme fluctuations in atmospheric temperature such as encountered when installed in a highway pavement joint. The material should also be unaffected by hydrocarbon products and other chemicals, such as salt, calcium chloride, etc., which might be deposited on the highway. For this purpose, a suitable synthetic rubber such as neoprene, butadiene, polychloroprene or the like may be employed. Further, a synthetic plastic such as PVC or polyethylene may be employed. It has been found that satisfactory results are obtained using neoprene, and this material is preferred. Such strips are extremely flexible and have good return memory.

Referring to the individual embodiments it is to be pointed out that similar numbers refer to like structure and, therefore, such structure will not be discussed in each and every embodiment.

The sealing strip, as shown in all embodiments, comprises a pair of outwardly convex side wall portions **12** and **14** to provide compressive forces on the concrete fascia **50** and **52** over and above the compressive forces that could be developed by a strip of a flat side wall construction. Strips of the latter type tend to collapse and loose their return memory thereby substantially reducing the amount of compressive force that may be developed on the fascia. To overcome the tendency of collapse in flat side wall strips, excessive internal truss structure is provided, but as discussed above the excessive structure prevents the strip from being uniformly compressed, increases the internal stress and aids in or hastens the crystallization of the material.

By providing the strip of the present invention with outwardly directed walls, the strip when placed in the sealing position between opposing faces of the concrete fascia **50** and **52** (FIG. 3), tends to flatten, thereby conforming with the opposing faces. The strip, however, does not collapse.

Additional compressive forces are developed by the internal truss structure, to be discussed. These forces added to the forces developed by the walls cause the strip to maintain a tight seal between the strip and the fascia to prevent the entrance of non-compressible, abrasive and other foreign matter from entering the joint **54**. Thus, the strip provides increased lateral pressure on the concrete to both seal and maintain the strip in fixed position.

The walls **12** and **14** are joined at both the top and bottom by internal truss members **16** and **18**, respectively, in FIGS. 2 and 4. The upper truss structure is formed by a pair of substantially circular interconnected truss members **24** and **26**. The members are hollow throughout their longitudinal length and join the walls **12** and **14** at the upper extremes. By providing truss structure that is of substantially circular construction increased lateral forces are developed when the sealing strip is in the sealing relation as in FIG. 3. This is due to the tendency to return to the shape. Further, this construction provides additional stability. In FIGS. 2 and 4, the lower truss structure is formed of a single circular member that connects the lower portion of walls **12** and **14**, and functions in a manner similar to that of the upper structure **16**.

The embodiment shown in FIG. 5 is generally similar to those previously discussed except that the internal truss has been modified. Therefore, the upper truss structure is defined by a pair of elongated interconnected circular truss members **32** and **34**, which react and function as the upper truss structure **16** (FIGS. 2 and 4). The lower truss structure **36** generally comprises a pair of substantially horizontal members **37** and **38** and a vertical member **39**. The vertical members **39** and **22** (FIG. 2) provide longitudinal stability of the strip.

The sealing strip (FIG. 6) is generally similar to the strip shown in FIG. 4 except that upper and lower truss structure **42** and **44** is formed of substantially oval truss members, which similarly function to increase the developed compressive force of the walls and stabilize the strip.

The sealing strip as discussed above may be easily introduced between the faces of adjoining concrete sections. It may be cut to appropriate lengths at the construction site in accordance with side dimensions of the sections. Generally, it is desirable to apply a thin coating of a lubricating adhesive **56** to either the concrete wall or the strip so that the strip will not be scarred or grooved by the rough concrete, thereby to create passages for foreign material to enter the joint. Thus, the strip may be disposed in the working position as shown in FIG. 3, wherein the upper truss portion of the strip is spaced from the plane of the roadway, to provide a tight seal for the joint. By provision of the spacing the strips will not be subjected to a downward force caused by vehicle tires thereby to sealingly remain as shown in the figure.

From the foregoing discussion it is apparent that the various embodiments of the sealing strip of the present invention carry out the objects and advantages as well as other objects and advantages that may be apparent to one skilled in the art. While this discussion has been limited to a description of the figures, the discussion is meant to be of a limiting nature for changes in configuration are within the scope of the invention whose limits are defined by the scope of the appended claims.

Having described the invention what is claimed is:

1. A sealing strip for sealing predeterminedly spaced pavement contraction joints in a concrete highway construction and to compensate for an expansion and contraction of the sections due to ambient temperature changes comprising a substantially hollow, integral and elongated heart-shaped member made of a flexible elastomeric material, said member having a pair of side walls which when said member is relaxed are outwardly convex, said member adapted to be partially compressed thereby to be disposed in said joint so that substantially the entire length of said walls lie in abutting juxtaposed sealing engagement with the opposed concrete facings of said contraction joint in an uncollapsed condition with the recovery tendency of said elastomeric material causing said walls to attempt a return to the relaxed position thus to provide a lateral sealing force, a generally arcuate outwardly convex bottom portion joining the lower end of said side walls, a top wall joining the upper end of said side walls and defined by a pair of upwardly curved transversely convex sections joined adjacent the top wall center at a recessed portion in said top wall, said convex sections forming the upper walls of a pair of substantially tubular truss members whose outer continuously curved walls form part of said member side walls and whose inner

continuously curved walls are connected directly to each other so as to develop additional lateral sealing forces on the opposed concrete facings, said tubular truss members being disposed in substantially the top half of said sealing member, and means formed substantially within the lower half of said sealing member and connected between the side walls so as to provide additional truss structure for stabilization and provide additional lateral sealing force against the opposed facings whereby increased sealing engagement will be obtained over a major portion of the normally convex sealing member walls.

2. The sealing strip of claim 1 wherein said means formed within the lower half of said sealing member is a closed curved member of substantially tubular cross-section.

3. The sealing strip of claim 2 further comprising a substantially vertical supporting means within said substantially hollow sealing member and interconnecting said upper and lower truss structure.

References Cited

UNITED STATES PATENTS

2,908,949	10/1959	Frehse.	
3,124,047	3/1964	Graham	94—18
3,179,026	4/1965	Crone	94—18.2
3,276,336	10/1966	Crone	94—18.2

FOREIGN PATENTS

1,225,028	2/1960	France.
562,035	3/1957	Italy.

JACOB L. NACKENOFF, *Primary Examiner.*