Nov. 25, 1969 F. K. HALL 3,479,933

ELONGATED, HOLLOW, ELASTOMER SEALING STRIP WITH ELONGATED, LATERALLY DEFORMABLE SPRING

Filed Jan. 11, 1968

FIG. 1

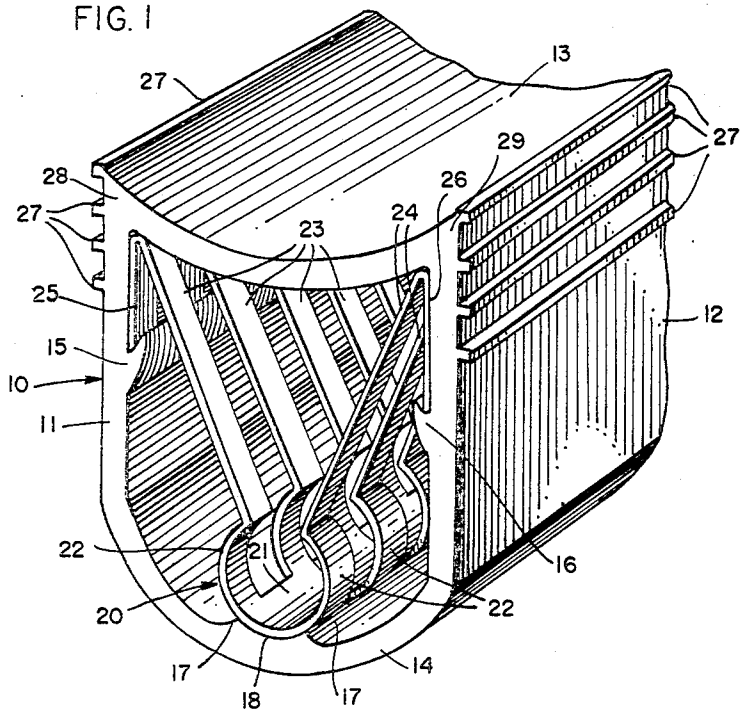
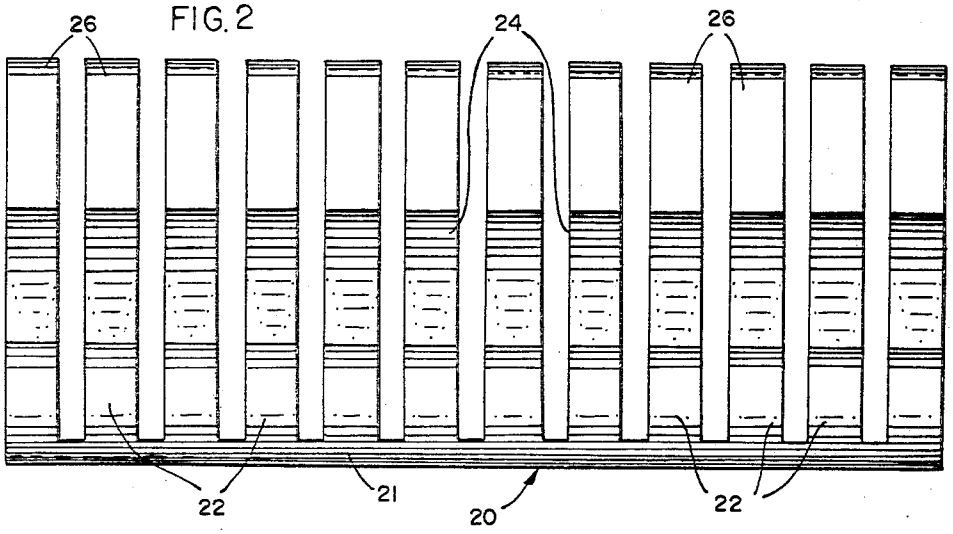


FIG. 2



INVENTOR:

FRANK KENNETH HALL

BY

Marzall, Johnston, Cook & Root

ATT'YS

United States Patent Office

3,479,933
Patented Nov. 25, 1969

3,479,933

ELONGATED, HOLLOW, ELASTOMER SEALING STRIP WITH ELONGATED, LATERALLY DEFORMABLE SPRING

Frank K. Hall, Findlay, Ohio, assignor to The D. S. Brown Company, North Baltimore, Ohio, a corporation of Ohio

Filed Jan. 11, 1968, Ser. No. 697,187
Int. Cl. E01c 11/12
U.S. Cl. 94—18 3 Claims

ABSTRACT OF THE DISCLOSURE

Elongated sealing strips for sealing concrete joints and the like composed of hollow, elongated, elastomer member and an internal spring member having longitudinally spaced spring arms. The spring member has a base composed of an elongated strip with curved strips of relatively small radii positioned in a seat in the midportion of the inner side of the bottom wall and diverging spring arms with downwardly extending free ends seated respectively in the upper corners of the hollow elastomer member with an elastomer rib immediately below the free ends of the spring arms.

This invention in general relates to elongated, elastomer seals particularly adapted for use in joints in concrete roadways, concrete air strips, concrete floors and the like, and more particularly relates to elongated, elastomer seal strips comprising an elongated, hollow, elastomer member having oppositely spaced, elongated, elastomer side, bottom, and top walls defining an elongated hollow space in which is mounted an elongated, laterally deformable spring member. The spring member is characterized by a plurality of longitudinally spaced spring arms individually resiliently pressing laterally outwardly against the inner sides of the side walls of the hollow, elastomer seal strip.

In recent years, hollow, elongated, elastomer strips have been developed for use as seals in concrete joints such as expansion and contraction joints in concerete roadways, air strips, and the like. These joint seals are inserted in a laterally compressed state into the joints to seal them against intrusion by water, solids and the like. The sides of the joint seal strips are in tight, sealing contact with the side walls of the slots or grooves forming the joint.

Joints of the aforesaid character are used in concrete pavement or similar concrete structures to accommodate expansion and contraction of a given length of the concrete under varying temperature conditions. These joints extend transversely across a roadway at predetermined intervals. The joints are usually formed by a spacer member which is inserted between adjacent pavement sections before the sections are poured, or by sawing a groove in a continuous strip of pavement, usually after the concrete has permanently set.

These grooves are provided in connection with expansion joints which are formed crosswise of a pavement or highway for compensating for expansion of longitudinally extending pavement sections, or in connection with contraction joints also between such longitudinally extending pavement sections which compensate mainly for the contraction of the pavement sections in which the compression strength of the paving material is relied upon to prevent damage to the pavement due to expansion of the pavement sections. In both of these types of joints an important function is to prevent irregular breaking of the pavement due to expansion or contraction of the pavement since such irregular breakers are difficult to repair. The grooves for expansion and contraction joints serve mainly the purpose of providing lines of weakness extending crosswise of the pavement.

Pavement grooves or joints are also formed between longitudinal strips of pavement, for example, of a two lane highway, to receive seals which prevent foreign material from entering the joints or grooves between these adjacent longitudinal strips or lanes of pavement. The sealing elements herein described may be used in connection with any of these joints.

These grooves must be sealed in order to prevent accumulation of unwanted particles such as sand or gravel or other incompressible debris, and to prevent infiltration of water, which in cold weather would lead to heaving and cracking of the pavement adjacent the joint or wash out the subgrade. It has been standard practice for many years to fill such grooves with an asphalt or similar type of filler which would yield during warm weather when the width of the joint becomes smaller due to expansion of the adjacent pavement lengths. Joints having such filling materials must be repaired and replaced periodically and normally require inspection and repairs at six month intervals.

Hollow, elongated, elastomer sealing strips with elongated, laterally compressible, metal springs therein are known in general. See, for example, U.S. Patents Nos. 2,198,084 and 2,315,588. This invention relates to improvements in the structures of the elongated metal springs and the coaction thereof with the elongated, hollow, elastomer sealing strips in achieving improved sealing contact with the side walls of grooves or slots such as concrete joints.

Briefly, the sealing strips of the instant invention comprise an elongated, hollow, elastomer member defined by elongated, elastomer side, top and bottom walls, and characterized by an elongated, laterally deformable spring member mounted in the elongated, hollow space defined by said walls, said spring member having a plurality of longitudinally spaced spring arms individually resiliently pressing laterally outwardly against the inner sides of the upper portions of said side walls. In the preferred form thereof, the spring member comprises an elongated base and a plurality of longitudinally spaced spring arms extending upwardly and outwardly from opposite sides of said base with the free ends of said spring arms resiliently bearing against the inner sides of the upper portions of the side walls of the hollow elastomer sealing strip. In the most preferred form of the invention the spring arms extend upwardly and outwardly to the respective corners of the top wall and the side walls of the hollow elastomer strip, and the free ends of the spring arms extend downwardly from said corners on the upper portions of the respective side walls.

The elastomer sealing strip may have on the inner side of each side wall an elongated, elastomer rib projecting inwardly therefrom and extending longitudinally threalong immediately below the lower edges of the downwardly extending ends of the spring arms to provide a retaining rim for the lower edges of the free ends of the spring arms.

A preferred form for the base member of the elongated,

laterally deformable spring member comprises an elongated strip extending along the mid portion of the bottom wall of the hollow, elastomer sealing strip and curved strips of relatively small radii of curvature projecting from opposite sides of said strip and forming the bases of the respective spring arms. Furthermore, the base member may be seated on the inner side of the bottom wall in an elongated, longitudinally extending seat formed in the mid-portion of the inner side of the bottom wall for purposes of retaining the base member against lateral movement relative to the bottom wall during lateral compression of the sealing strip. If desired, the outer faces of the side walls of the hollow, elastomer sealing strip may have a plurality of longitudinally extending, elastomer ribs along the upper portion, preferably opposite the side wall contacting portion of the spring arms, at vertically spaced intervals to form pressure ridges or ribs for effecting better sealing contact between the side walls of the hollow, elastomer sealing strip and the side walls of the slot or groove in which it is mounted in a laterally compressed state.

The invention herein is further explained with reference to a preferred embodiment of the invention, which is illustrated in the drawing, wherein:

FIG. 1 is a perspective view of an end fragment of an elongated, hollow, elastomer sealin gstrip constituting the preferred embodiment; and

FIG. 2 is a side elevation of the section of the elongated, laterally compressible spring member positioned in the elongated hollow, elastomer sealing strip as shown in FIG. 1.

Referring to the drawings, the hollow, elongated, elastomer sealing strip **10** comprises an elongated, hollow body defined by elongated, elastomer walls, i.e., the side walls **11** and **12**, the concave top wall **13**, and the concave bottom wall **14**. The elastomer from which the hollow strip **10** is made may be any suitable elastomer formulation which is extrudable, and which, upon vulcanization, will be resistant to deterioration and/or loss of resilience after exposure to hot and cold weather conditions, sunlight, and like elements of nature in the use thereof in joints of pavement, air strips, and the like. The preferred elastomer composition comprises neoprene formulations containing substantially proportions of neoprene characterized by low crystallization values at low temperatures, e.g. 0° to —20° F.

The hollow strip **10** preferably has integrally formed, elastomer, elongated ribs **15** and **16** projecting upwardly and inwardly from the respective inner sides of the side walls **11** and **12** and extending longitudinally therealong. It also preferably has integrally formed, elongated, horizontally spaced ribs **17** projecting from the inner face of the bottom wall **14** and extending longitudinally therealong. The ribs **15** and **16** form elongated lips or ribs for end portions of the elongated, laterally compressible spring member, as hereinafter described. The ribs **17** form an elongated, concave, upwardly facing seat **18** in an upper face of bottom wall **14**.

The elongated sealing strips of the invention are characterized by an elongated, laterally deformable spring member **20** mounted in the elonagted, hollow space defined by the walls **11–14**. The base of the spring member preferably comprises an elongated, metal strip **21** extending along the mid-portion of the bottom wall **14** in seat **18** and curved strips **22** of relatively small radii of curvature projecting from opposite sides of the strip **21** and forming the bases of the upwardly and outwardly extending spring arms **23** and **24**. The spring arms **23** and **24** have free ends which bear resiliently against the inner sides of the upper portions of the side walls **11** and **12** to form longitudinally spaced, pressure members resiliently urging the upper portions of said side walls laterally outwardly. The spring arms **23** and **24** collapse inwardly under lateral compression forces against the side walls **11** and **12**.

The respective free ends **25** and **26** of spring arms **23** and **24** are formed in a manner whereby the spring arms **23** and **24** extend upwardly and outwardly to the respective corners **28** and **29** of the top wall and the side walls **11** and **12** with the free ends **25** and **26** extending downwardly from the corners along the upper portions of the inner faces of the respective side walls. The lower edges of the free ends **25** and **26** seat in respective grooves formed by the upper sides of the elongated, elastomer ribs **15** and **16** and their respective side walls **11** and **12**, whereby the ribs **15** and **16** function to retain free ends of the spring arm in the upper corner portions of the sealing strip during lateral compression or expansion of the sealing strip.

The hollow, elongated, elastomer sealing strip **10** may have a plurality of longitudinally extending, vertically spaced, elastomer ribs **27** integrally formed on the upper portions of the outer faces of the side walls **11** and **12**. These ribs provide deformable pressure ridges or ribs for effecting tight sealing contact between the upper portions of the side walls **11** and **12** and the side walls of an elongated slot or groove such as the aforedescribed concrete joints when the sealing strip **10** is inserted therein in a laterally compressed state. The longitudinally spaced, individually acting spring arms **23** and **24** and the respective free ends **25** and **26** thereof facilitate the sealing contact of the side walls **11** and **12** and/or the ribs **27** thereon with irregular or non-planar surfaces of the side walls of the slot or groove.

The elongated, internal, metal spring **20** affords certain advantages in elongated, elastomer joint seals over joint seals in present common use and embodying an elastomer web network as the resilient internal structure. The resiliency of the metal spring is essentially uneffected by climatic temperature changes whereas the overall resiliency of the elastomers of said web networks deteriorates under climatic conditions. The metal springs of the invention herein, on the other hand, exert essentially constant pressure against the side walls of the sealing strip **10** at all climatic temperatures and do not suffer losses of resiliency by aging.

The invention is hereby claimed as follows:

1. An elongated sealing strip for sealing concrete joints and the like comprising a hollow, elongated, elastomer member defined by elongated, elastomer side, top, and bottom walls and characterized by an elongated, laterally deformable spring member mounted in the elongated, hollow space defined by said walls, said spring member having a plurality of longitudinally spaced spring arms individually resiliently pressing laterally outwardly against the inner sides of the upper portions of said side walls, said spring member further comprising an elongated base seated on said bottom wall and a plurality of said longitudinally spaced spring arms extending upwardly and outwardly to the respective corners of said top wall and said side walls, the free ends of said arms extending downwardly from said corner along the upper portions of the inner face of the respective side walls and resiliently bearing thereagainst, and an elongated, elastomer rib projecting from the inner side of each side wall and extending longitudinally therealong immediately below the lower edges of said free ends of said spring arms.

2. An elastomer sealing strip as claimed in claim **1**, and a plurality of longitudinally extending, vertically spaced, elastomer ribs on the upper portion of the outer surface of said side walls.

3. An elongated sealing strip for sealing concrete joints and the like comprising a hollow, elongated, elastomer member defined by elongated, elastomer side, top, and bottom walls and characterized by an elongated, laterally deformable spring member mounted in the elongated, hollow space defined by said walls, said spring member having a plurality of longitudinally spaced spring arms individually resiliently pressing laterally outwardly against the inner sides of the upper portions of said side walls, and further comprising an elongated base member and a

plurality of longitudinally spaced, spring arms extending upwardly and outwardly from opposite sides of said base with the free ends of said spring arms resiliently bearing against the inner side of the upper portions of said side walls, said base member including an elongated strip extending along the mid-portion of said bottom wall and curved strips of relatively small radii of curvature projecting from opposite sides of said strip and forming the bases of said spring arms, and an elongated, longitudinally extending seat formed in the mid-portion of the inner side of said bottom wall, said base member being seated in said seat.

References Cited

UNITED STATES PATENTS

2,071,299	2/1937	Gammeter	94—18
2,156,681	5/1939	Dewhirst	94—18
2,315,588	4/1943	Brickman	94—18

U.S. Cl. X.R.

JACOB L. NACKENOFF, Primary Examiner