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Sequaris

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[54] **PACKING PIECE FOR CIVIL ENGINEERING WORKS**

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[51] **Int. Cl.** **E01c 11/10,** E04f 15/14

[58] **Field of Search** 94/18, 51, 18.2; 52/396, 470, 52/471; 248/22, 350

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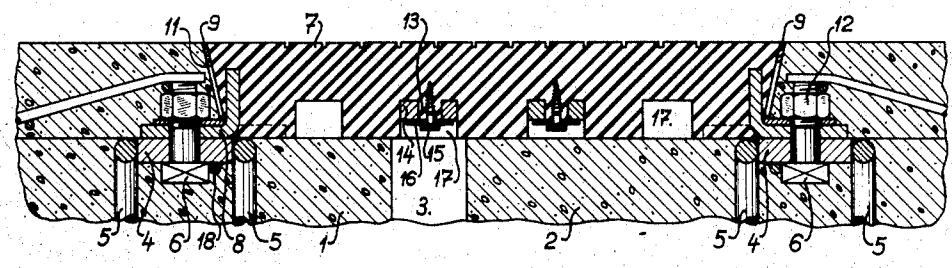
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[57] **ABSTRACT**

A packing piece of elastomeric material for civil engineering constructions has integrally moulded thereto, a plurality of projecting members each of which is surrounded by a rigid metal member to prevent, or reduce the deformation of the packing piece during compression in a direction at right angles to the force applying the compression. The rigid metal members are maintained in position around the projections by means of washers and wood screws which are threaded into the free ends of the projections.

17 Claims, 3 Drawing Figures



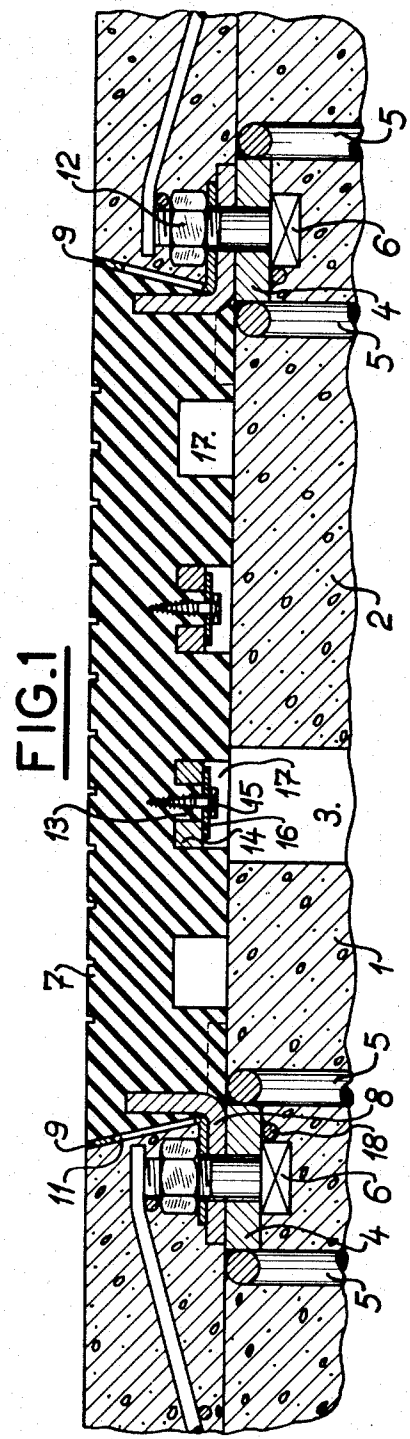

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FIG.1

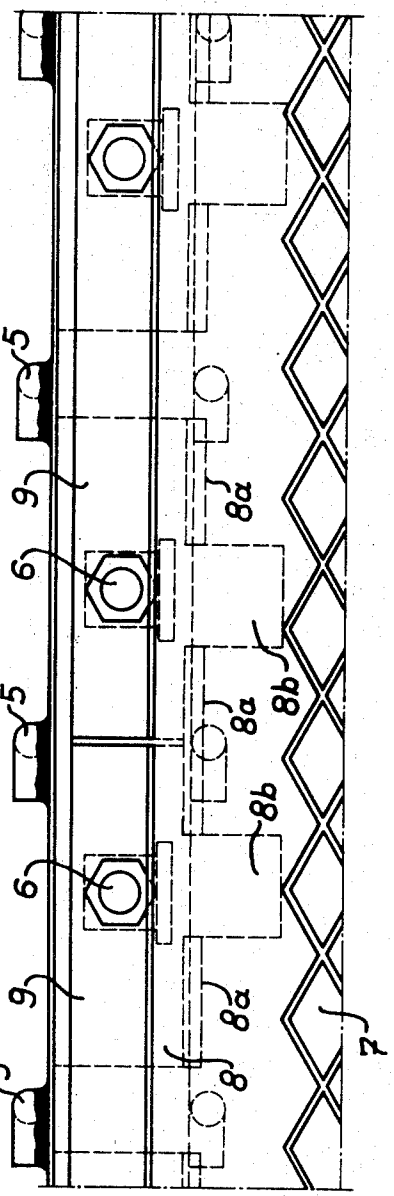

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8a
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8b
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8a
8b
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FIG.2

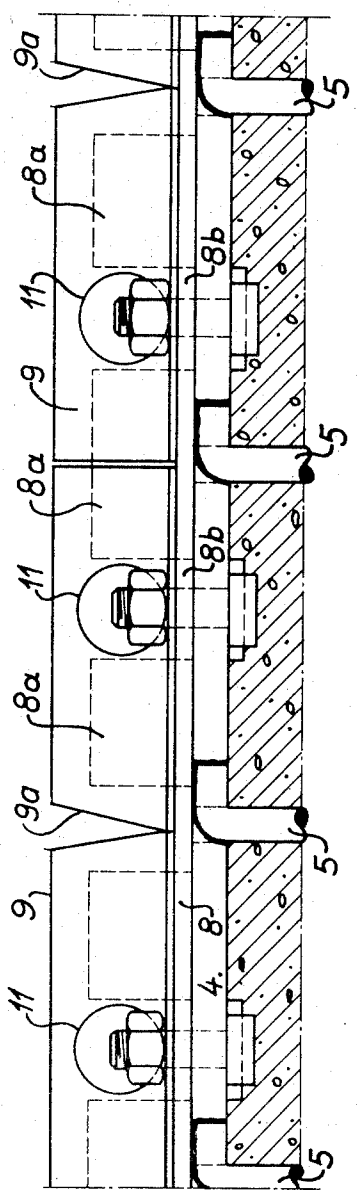


FIG.3

PACKING PIECE FOR CIVIL ENGINEERING WORKS

BACKGROUND OF THE INVENTION

This invention relates to packing pieces used in civil engineering constructions for an expansion joint particularly, for road bridges.

Packing pieces are known which consist of a piece of plastic material having a trapezoidal section the small base of which is intended to face downwards. The packing piece is provided with spaced side parts embedded in an elastic material near its edges, in order to increase the longitudinal flexibility of the packing. The side parts have apertures for receiving fixing bolts.

The metal side parts, embedded in the elastic material, are intended to be partially or totally notched according to the needs of the longitudinal section and have spaced apertures to receive fasteners. Advantageously, the packing has variations in section so as to facilitate lengthening and contraction in the transversal direction.

The advantages of this known packing piece are on the one hand, the supple joint so formed is flexible in the longitudinal direction and, on the other hand, the joint, being all in one and strongly pressed on its foundations, ensures a perfect seal. The material of the packing piece can be carried on a drum and compensates for variations of shapes of the flooring of a bridge, for example, or cambering the faces of road traffic routes, water conduits, pavements, and the like.

The known packing pieces have, basically, the aims of rationalizing the design of the joint, simplifying the fabrication and to enable the packing to work efficiently, not only with traction and compression, but also in torsion and shear while maintaining its waterproof qualities.

According to the present invention a packing piece of elastomeric material for civil engineering constructions, comprises a projection on the elastomeric material, a rigid member surrounding the projection and means for maintaining the rigid member in position surrounding the projection, the rigid member substantially reducing the deformation of the packing piece during compression in a direction at right angles to the force applying the compression.

AIMS OF THE INVENTION

An object of the present invention is to provide a packing piece which is easy to handle, simple to manufacture, and is substantially non-deformable in a direction at right angles to a force applying compression to the sides of the packing piece.

The transversal as well as the longitudinal stability of the joint can thus be assured without the packing being provided with, buried inside it or on the outside, metal plates or others, continuous or broken, used for support as is the case in known packing, the insertion of which has the effect of preventing the joint from undergoing torsion or shearing stresses if these should be brought about, accidentally or not.

DESCRIPTION OF THE DRAWINGS

An embodiment of the invention will now be described, by way of example, reference being made to the Figures of the accompanying drawings in which:

FIG. 1 is a cross-section of a packing piece in position between two members;

FIG. 2 is a top plan view of one side of the packing piece of FIG. 1; and

FIG. 3 is a side view of the packing piece of FIG. 1.

DESCRIPTION OF A PREFERRED EMBODIMENT

As shown in the Figures, a packing piece **7** of elastomeric material, for example rubber, is arranged to extend over an expansion space **3** between flooring **1** and an abutment **2**. Steel plates **4** having anchoring rods **5** are embedded in the concrete forming the flooring **1** and abutment **2**. Each plate **4** has a through hole to permit the passage therethrough of the shank of a bolt **6**. The bolts **6** have square heads and one side of each head extends alongside a projection **18** welded to the corresponding plate **4** to prevent rotation of the head. The bolts **6** extend through holes in metal edge members **8**, which edge members are embedded in the side surfaces of the packing piece **7**. Nuts **12** engaging the bolts **6** clamp the edge members **8** against the upper surface of each plate **4**.

Each edge members **8** has two flanges at right angles to each other to define an L-shape in cross-section, One flange **8*a*** has two flaps **8*b*** cut and bent parallel to the other flange (see FIG. 2) which flaps **8*b*** are embedded in the side surfaces of the packing piece **7**. Each edge member **8** on one side of the packing piece **7** forms part of a series of spaced edge members **8** which are inter-connected by a side member **9**. Each side member **9** has two flanges joined along one side, one flange having holes through which the shanks of bolts **6** pass. The side members **9** ensure that the elastomeric packing piece **7** is rigidly held on the plates **4** but preserve the flexibility required in the longitudinal direction of the packing piece. In fact, it is to advantage to fit the packing piece **7** to the shape of the cross-section of the bridge. In order to do this, if necessary, the upright flange of each side member **9** (as seen in FIG. **1**) can be cut off so that it has a V-shaped vertical notch **9*a*** the point of which reaches the base of the upright flange and thus enables the horizontal flange to be distorted, to constitute a broken line and to conform to the shape of the bridge, to the maximum.

In order to facilitate the placing of nuts **12** and their tightening to fixing bolts **6**, also to enable, as required, the use of bolts having a very much larger diameter and thus nuts of a greater size, each side member **9** has apertures **11** placed in relation to nuts **12** and located adjacent the bottom position in the upright flange. Side members **9** are of generally right angled shape, but are flexed to an angle of less than 90° as seen in FIG. **1** to form an area of pre-compression in the upper sides of packing piece **7**, this being very useful when the joint is subject to traction stress. As a result, the upper edges of the packing piece **7** remain always firmly pressed on the vertical outer faces of the side members **9** and thus produce a supplementary sealing factor for the joint.

The packing piece **7** has a plurality of spaced, parallel longitudinally extending grooves **17** of generally rectangular cross-section, on its bottom surface. Cylindrical projections **13** molded with the packing piece **7** extent outwardly from the bases of the grooves **17**. Surrounding each projection **13** is a parallelepiped block **14** having a central through hole, through which hole,

the projection 13 extends. Each block 14 has the same width as the grooves 17 so that there is no clearance between the sides of the block 14 and the sides of the grooves when the packing piece 7 is not in compression. Washers 16 and wood screws 15 maintaining the blocks 14 in position around their respective projections 13. Tightening of the screws 15 eliminate any play between the block 14 and its projection 13. The blocks 14 may be applied to the projections 13 after vulcanization of the packing piece 7. The blocks 14 prevent the lifting of the packing piece 7 when subjected to compression in a horizontal transverse direction. Without the blocks 14, the packing piece 7 would tend to bow up when compressed, thereby tending to close the grooves 17. The blocks 14 restrain such closure and thereby restrain the packing piece 7 from bowing up. The better stability and resistance accrued by the packing thus enables covering plates for space provided for the free expansion of the works to be omitted.

This improvement concerns the transversal stability which is carried out herein without the convergence of the metal stiffening parts with turned up edges previously used. In effect, the positioning of this part, due to the fact that it requires the addition of supplementary elements, is formed in quite a complex manner: the part located under a metal plate is incorporated in a boss provided in the packing being fixed onto this plate by means of screw which engages in a tapping made in the latter. In addition, the groove in packing piece 7 in which the stiffening plate works was relatively wide which weakens it and usually necessitates the employment of an auxiliary metal plate for support, outside of the joint as is, and resting on the ends of the elements of the civil engineering work to be joined together in such a way as to ensure the covering surface stabilized by the base.

A similar result to that obtained by this system, namely, the packing held in the horizontal plane when subjected to compression tends to lift itself up, is achieved in the following manner: the packing in elastomer no longer has an alternation of similar and relatively narrow grooves 17, in cross-section, the joint resting directly on the elements of the civil engineering works.

What is claimed is:

1. A packing piece of elastomeric material for civil engineering constructions, comprising a plurality of projections integrally formed with the elastomeric material, a rigid metal member surrounding each projection, and washers and wood screws for maintaining the rigid metal members in position surrounding their respective projections, the wood screws being screwed into the free end of the projections, the rigid metal members substantially reducing the deformation of the packing piece during compression in a direction at right angles to the force applying the compression.

2. A packing piece as claimed in claim 1, wherein the projections are arranged in at least two grooves on one face of the elastomeric material, each groove having a generally rectangular cross-section.

3. A packing piece as claimed in claim 1, wherein the rigid metal members are parallelepiped blocks each having a central through hole through which hole a projection extends, each block engaging within a groove on one face of the elastomeric material, each groove having a generally rectangular cross-section, the width of the groove and the width of the blocks being such that there is no clearance between the sides of the block and the sides of the groove when the packing piece is not in compression.

4. A packing piece as claimed in claim 1, wherein the packing piece is elongate and has embedded in its side surfaces two series of equi-spaced substantially identical edge members for fastening the packing piece to a surface.

5. A packing piece as claimed in claim 1, in which the packing piece is elongate and has embedded in its side surfaces two series of equi-spaced substantially identical edge members, each edge member having two flanges at right angles to each other, one flange having two flaps formed in it, which flaps extend outwardly parallel to the other flange but in the opposite sense to the other flange, the flaps being embedded in the elastomeric material of the packing piece, the other flange having through holes for receiving fastening means.

6. A packing piece as claimed in claim 5, wherein each edge member is regularly and alternatively superimposed by the inside metal part of the packing piece with limited covering of the latter.

7. A packing piece as claimed in claim 5, wherein parts of the edge members are cut-out thereby enabling the packing piece to be wound onto a drum to facilitate transportation as well as to join when placed in position the variations in contour across elements to which the packing piece is to be applied.

8. A packing for an expansion joint between two slabs comprising an elongated packing piece of elastomeric material bridging said joint, said packing piece having in its lower face at least one longitudinally extending groove and a plurality of projections in said groove integrally formed of said elastomeric material, a rigid metal member received in said groove and surrounding each said projection and means for securing said rigid member on each said projection, said rigid members substantially reducing the deformation of the packing piece during compression in a direction at right angles to the force applying the comprission.

9. A packing as claimed in claim 8, wherein said groove and said rigid members are generally rectangular in cross section and are of substantially the same width so that there is no clearance between the sides of said members and the sides of said groove.

10. A packing as claimed in claim 9, wherein there are at least two said longitudinal grooves with projections and said rigid members therein, said grooves being spaced apart and parallel to one another.

11 A packing as claimed in claim 8, wherein a series of metal edge members are embedded in each leteral edge of said packing piece, each edge member having two flanges at right angles to each other, one said flange having flaps forward therein, which flaps extend in the plane of the other flange but in the opposite direction to said other flange, the flaps being embedded in the elastomeric material of the packing piece, said other flange having through holes for receiving fastening means.

12. A packing as claimed in claim 11, wherein successive ones of said edge members are interconnected by flexible metal members of angular cross section with

two flanges one of which has through holes registering with said through holes of said edge members for said fastening means and the other flange extending at an angle to said one flange and with elastomeric material of said packing piece between said other flange of said interconnecting piece and said one flange of said edge members.

13. A packing as claimed in claim 12, wherein said flanges of said interconnecting member are disposed at an angle less than 90° to one another.

14. A packing for an expansion joint between two horizontal slabs, comprising an elongated packing piece of elastomeric material bridging said joint, a series of metal edge members embedded in each lateral edge of said packing piece for securing said packing piece to said slabs respectively, each of said edge members being of angular cross section and having a first flange that is horizontal and extends in a direction outwardly away from said packing piece, said first flange having through holes to receive fastening means for securing said edge member to the respective slab, and a second flange having a first portion extending upwardly at right angles to said first flange and a second portion extending horizontally inwardly of said packing and thus oppositely to said first flange, both of said portions of said second flange being embedded in said elastomeric material of said packing piece, and flexible metal members interconnecting successive ones of said edge members, each of said interconnecting members being of angular cross section with two flanges comprising a first horizontal flange overlying said first flange of said edge members and having through holes registering with said through holes of the edge members and a second flange extending upwardly from said first flange with elastomeric material of said packing piece between said second flange of said interconnecting member and the upwardly extending portions of said second flange of the respective edge members.

15. A packing as claimed in claim 14, wherein the flanges of said interconnecting member are disposed at an angle less than 90° to one another, said second flange of said interconnecting member being disposed at an acute angle to said first portion of said second flange of the respective edge members.

16. A packing as claimed in claim 14, wherein said second flange of said interconnecting member is notched to increase the flexibility of said interconnecting member.

17. A packing for an expansion joint between two horizontal slabs, comprising an elongated packing piece of elastomeric material bridging said joint, a series of metal edge members embedded in each lateral edge of said packing piece for securing said packing piece to said slabs respectively, each of said edge members being of angular cross section and having a first flange that is horizontal and extends in a direction outwardly away from said packing piece, said first flange having through holes to receive fastening means for securing said edge member to the respective slab, and a second flange having a first portion extending upwardly at right angles to said first flange and a second portion extending horizontally inwardly of said packing, and thus oppositely to said first flange, both of said portions of said second flange being embedded in said elastomeric material of said packing piece, said packing piece having in its lower face at least one longitudinally extending groove of rectangular cross section, rigid metal members of rectangular cross section received in said groove, the width of said rigid members being substantially equal to the width of said groove, and means securing said rigid members in said groove, said rigid members substantially reducing the deformation of the packing piece during compression in a direction at right angles to the force applying the compression.

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