

PATENT SPECIFICATION (11)

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(54) EXPANSION JOINT

(71) We, L'INDUSTRIELLE DU BETON, a Societe Anonyme organised under the laws of France, of Boran-sur-Oise, 60530 Neuilly-en-Thelle, France do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention relates to an expansion joint, particularly for road structures and which is intended to be placed between different parts of a structure, such as the floor of a bridge, a motorway or the like.

Numerous types of expansion joints already exist.

In particular there are expansion joints having two long metal sections, each carried by one of the parts of the structure facing one another and an expandable strip extending over the entire length of the joint between two parts of the structure, whilst being locked against one of the said metal sections in the vicinity of each of its lateral edges.

Such a strip, which is in particular made from elastomeric material, serves to bring about the sealing of the opening of the joint between the structure parts and prevent the penetration of foreign bodies and water into the same.

However in the known expansion joints the strip is not satisfactorily held in place over its entire length in the respective parts of the structure and there is a danger of it becoming detached from one of said parts during use, which leads to the disassembly of the joint and possibly a long interruption to the traffic flow.

Moreover in the known expansion joints the members which maintain the strip against the long metal sections often comprise complex structures of considerable length which make difficult the dismantling of the joint when it becomes necessary to replace a damaged strip.

The present invention proposes an expansion joint which is easy to lay over considerable length in which the strip is excellently maintained in place in the respective parts of the structure and in which in addition

it is possible to replace the strip in a relatively simple and speedy manner.

According to the present invention an expansion joint for a road structure has two long (as defined below) metal sections, each carried by one of the facing edges of the structure and a flexible strip extending over the entire length of the joint between the two edges of the road structure, whilst being engaged with the said metal sections within the vicinity of each of its lateral edges, in which joint, the strip is pressed against each of the said metal sections by a plurality of elastomeric sections placed end to end over the length of the joint, each of the elastomeric sections being placed under controlled compression.

The term 'long metal sections' is to be understood to mean sections which extend over the entire length of the joint between the two separate parts of the structure.

In order to facilitate transporation to the site it is possible to use metal sections of reduced length for example of the order of 3 to 6m, whereby said sections are welded end to end to form sections to extend over the entire length of the joint.

Preferably each of the long metal sections has a main flange extending throughout its length and the elastomeric sections are each reinforced by a further metal section having a web extending parallel to the main flange of the long metal section, and spacing sleeves spaced between the main flange of the long metal section and the web of the further metal section.

The long metal section may have an I, T or C-shaped cross-section, but could also be given some other cross-section if desired.

In one arrangement the long metal sections have a substantially C-shaped cross-section, whose main flange rests of the corresponding part of the structure and the flange elements, which are of unequal width, rise upwards in the direction of the roadway, and in which the elastomeric sections engage within the said long metal sections.

Preferably the shorter flange element of each of the long metal sections is placed on the side of the joint opening nearest the other part of the road structure, the

strip engaging in each of the long metal sections around the end of its shorter flange element.

According to another embodiment each of the long metal sections has a substantially L-shaped cross-section, one flange element of which rests on the corresponding part of the structure and constitutes the main flange and the other flange element which is positioned furthest from the joint opening rises upwards towards the roadway, the strip engaging between the further metal section and the long metal section in contact with the web and one flange of the further metal section, which advantageously has an I, T or C-shaped cross-section.

Thus, the elements which maintain the strip in the long metal sections, namely the elastomeric sections, which may have further metal sections and spacing rings can be constructed in the form of elements of a given length, for example one or two metres so that they can be prefabricated easy to install and easy to dismantle.

The controlled compression of the elastomeric sections may be brought about by tightening fixing members engaging successively in holes which pass through the elastomeric sections, the further metal section, the spacing sleeves and the long metal sections.

According to a special embodiment the fixing elements can be pins for anchoring the joint in the structure of the roadway each of the said pins being anchored at its lower end in the material of the roadway.

In this case a nut screwed to the upper part of each anchoring pin is tightened to create a permanent state of tension in the pin in order to provide in a known manner prestressed concrete in the corresponding part of the structure bringing about the controlled compression of the elastomeric section, thus ensuring that the expandable strip is maintained excellently in place in between the elastomeric section and the long metal sections. The sealing of the joint in the connecting zones between the elastomeric sections can advantageously be ensured by a thin sheet placed between the long metal sections and the elastomeric sections, thus forming a gasket constituting a protection for the long metal section.

If it is desired that the long metal sections supported reinforcement, at least some of the members of the reinforcement may be welded to said long metal sections.

As a variant in certain types of roadways, for example metal roadways the long metal sections may be welded to the roadway.

To provide a better understanding of the invention a specific embodiment will now be described in greater detail hereinafter with reference to the accompanying drawings in which:

Figure 1 shows in section the first embodiment of an expansion joint according to the invention.

Figure 2 shows a second embodiment of the expansion joint of the invention.

Figure 3 shows a third embodiment of the expansion joint of the invention.

The joint shown in Figure 1 comprises two long metal sections, each mounted on part of a roadway, the sections being identical and having a C-shaped cross-section which flanges of unequal length, the shorter flange 1a on each section being placed on the side of the opening of joint nearest the opposite part of the roadway so that the two flanges face one another. The metal sections 1 are advantageously welded to reinforcement 2.

An elastomeric strip 3, for example Neoprene is engaged by its respective edges in the metal sections 1, one side of the strip abutting against the inner side of the flange 1a and the strip 3 being maintained in each of the sections by means of elastomeric sections 4 for example of Neoprene, having a cross-section which permits them to engage in the metal section 1 and a given length, one or two metres.

These elastomeric sections are placed end to end over the length of the metal sections 1, a sheet of flexible sealing material (not shown) can be placed between said elastomeric sections 4 and the metal sections level with the connection zones between said elastomeric sections 4.

Each of the said elastomeric sections is reinforced with a further metal section 5 having an I-shaped cross-section, a spacing sleeve 6 being positioned between the web of the metal section 5 and the web of long metal section 1.

The elastomeric sections 4, the metal section 5, the spacing sleeve 6 and the webs of metal sections 1 have holes for receiving fixing members permitting the controlled compression of the elastomeric elements 4 for the purpose of securing the strip between each of the elastomeric sections 4 and the metal section 1.

The joint shown in Fig. 2 differs from that of fig. 1 in that the long metal sections 10 have an L-shaped cross-section and strip 3 is pressed against metal sections 10 by elastomeric sections 14, by being brought substantially into contact with the web and one flange of the metal section elements 15.

In the represented embodiments the fixing members are the anchoring pins 7 of the actual joint whereby they have on their upper part a nut 8 and in their lower part an anchoring plate 9. The tightening of the nut brings about a permanent state of compression in the anchor tie and prestresses the concrete of the corresponding part of the structure, as is for example

described in British Patent Specification No. 1,418,792.

The nuts 8 are advantageously covered with a sealing plug 16 which seals the holes in the elastomeric elements.

It is obvious that within the scope of the present invention the tightening of nuts 8 leads to controlled compression of the elastomeric sections 4 due to the co-operating action of the spacing sleeve 6 and the metal section 5 and 15 respectively acting to distribute the load, whilst also having a stiffening action.

For example in the case of anchoring pins with a diameters of 12 mm a compression of approximately 5 to 7 tonnes can be exerted on the pins.

It is clear that the fixing elements need not necessarily be the anchoring pins used for prestressing purposes and may be constituted by fixing elements which are separate from said anchoring pins. An example of such a construction is shown in Fig. 3 where the fixing elements comprise pins 17 having in their upper portion a nut 8 and in their lower portion a nut 18.

Although the invention has been described in conjunction with particular embodiments it is obviously not limited thereto and various modifications are regards shape and material can be made thereto without passin beyond the scope of the invention. In particular the invention is not limited to the special shape of the long metal section shown.

WHAT WE CLAIM IS:—

1. An expansion joint for a road structure having two long (as hereinbefore defined) metal sections, each carried by one of the facing edges of the road structure and a flexible strip extending over the entire length of the joint between two edges of the road structure, whilst being engaged in the said metal sections in the vicinity of each of its lateral edges, in which the strip is pressed against each of the said metal sections by a plurality of elastomeric sections placed end to end over the length of the joint each of the elastomeric sections being placed under controlled compression.

2. A joint as claimed in claim 1 in which each of the long metal sections has a main flange extending throughout its length, the elastomeric sections are each reinforced by a further metal section having a web extending parallel to the main flange of the long metal section, and spacing sleeves placed between the main flange of the long

metal section and the web of the said further metal sections.

3. A joint as claimed in claim 1 or claim 2 in which the long metal sections have a substantially C-shaped cross-section, whose main flange rests on the corresponding part of the structure and the flange elements, which are of unequal width, rise upwards in the direction of the roadway and in which the elastomeric sections engage within the said long metal sections.

4. A joint as claimed in claim 3 in which the shorter flange element in each of the long metal sections is placed on the side of the joint opening nearest the other part of the road structure, the strip engaging in each of the long metal sections around the end of its shorter flange element.

5. A joint as claimed in claim 2 in which the long metal sections have a substantially L-shaped cross-section, one flange element of which rests on the corresponding part of the structure and constitutes the main flange and the other flange element which is positioned farthest from the joint opening rises upwards toward the roadway, the strip engaging between the further metal section and the long metal section in contact with the web and one flange of the further metal section.

6. A joint as claimed in 2, or claims 3 to 5 when dependant upon claim 2 in which the further metal sections have I,T or C-shaped cross-sections.

7. A joint as claimed in claim 2 or claims 3 to 6 when dependent on claim 2 in which the controlled compression of the elastomeric sections is brought about by tightening fixing members engaging successively in holes which pass through the elastomeric sections, the further metal sections, the spacing sleeves and the long metal sections.

8. A joint as claimed in claim 7 in which the fixing members are pins which anchor the joint in the structure, each of the pins being anchored at its lower end in the material of the structure.

9. A joint as claimed in claim 8 in which the nut screwed on the upper part of each of the pins is tightened to create a permanent state of tension in the pin.

10. An expansion joint substantially as described herein with reference to and as shown in the accompanying drawings.

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For example in the case of anchoring pins with a diameters of 12 mm a compression of approximately 5 to 7 tonnes can be exerted on the pins.

It is clear that the fixing elements need not necessarily be the anchoring pins used for prestressing purposes and may be constituted by fixing elements which are separate from said anchoring pins. An example of such a construction is shown in Fig. 3 where the fixing elements comprise pins 17 having in their upper portion a nut 8 and in their lower portion a nut 18.

Although the invention has been described in conjunction with particular embodiments it is obviously not limited thereto and various modifications are regards shape and material can be made thereto without passing beyond the scope of the invention. In particular the invention is not limited to the special shape of the long metal section shown.

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2. A joint as claimed in claim 1 in which each of the long metal sections has a main flange extending throughout its length, the elastomeric sections are each reinforced by a further metal section having a web extending parallel to the main flange of the long metal section, and spacing sleeves placed between the main flange of the long

metal section and the web of the said further metal sections.

3. A joint as claimed in claim 1 or claim 2 in which the long metal sections have a substantially C-shaped cross-section, whose main flange rests on the corresponding part of the structure and the flange elements, which are of unequal width, rise upwards in the direction of the roadway and in which the elastomeric sections engage within the said long metal sections.

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