Aug. 26, 1952 J. H. JACOBSON 2,608,141

LOAD TRANSFER DEVICE FOR CONCRETE PAVEMENTS

Filed April 26, 1947 2 SHEETS—SHEET 1

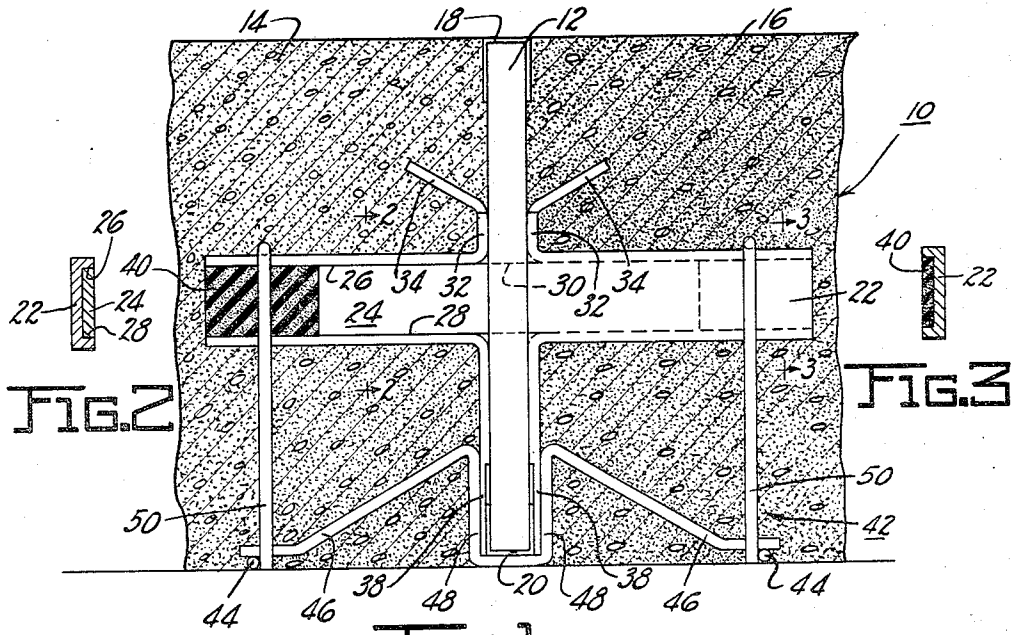

FIG. 2

FIG. 3

FIG. 1

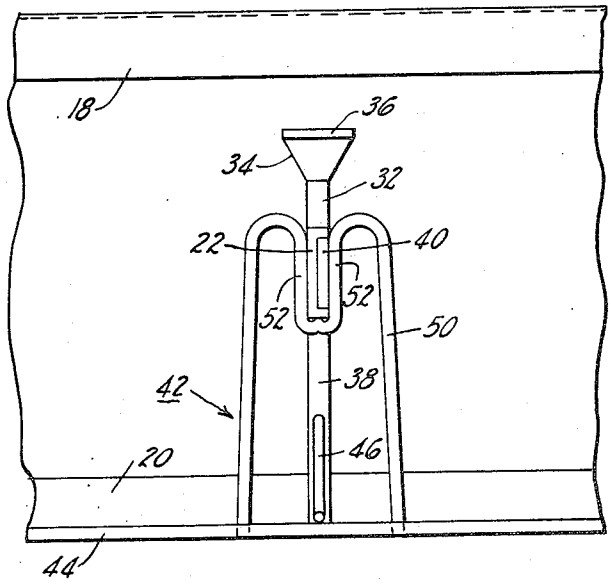

FIG. 4

INVENTOR
JAMES H. JACOBSON
BY
Richard C. Lindberg
ATTORNEY

Aug. 26, 1952 J. H. JACOBSON 2,608,141

LOAD TRANSFER DEVICE FOR CONCRETE PAVEMENTS

Filed April 26, 1947 2 SHEETS—SHEET 2

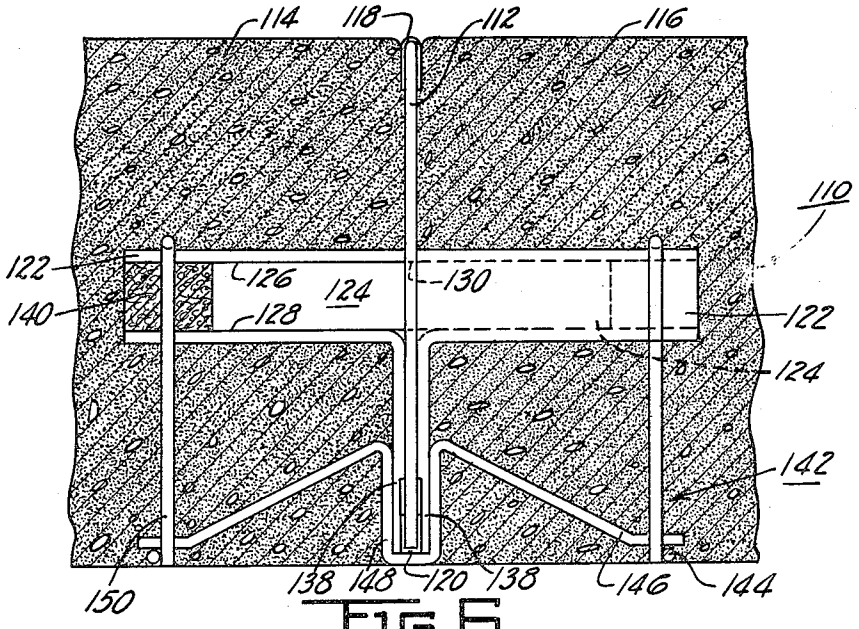

FIG. 6

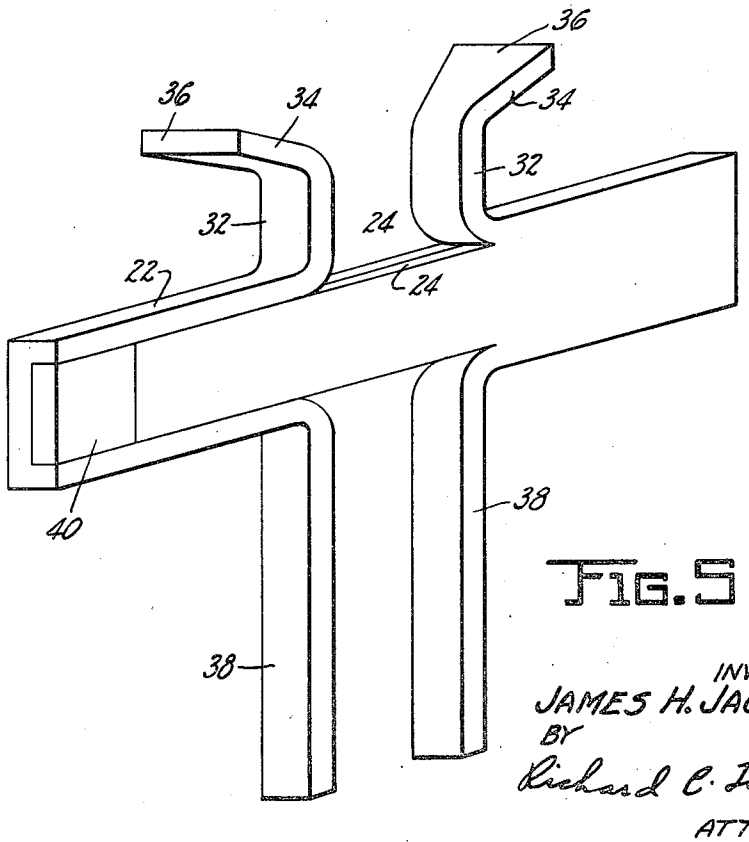

FIG. 5

INVENTOR
JAMES H. JACOBSON
BY
Richard C. Lindberg
ATTORNEY

Patented Aug. 26, 1952 2,608,141

UNITED STATES PATENT OFFICE

2,608,141

LOAD TRANSFER DEVICE FOR CONCRETE PAVEMENTS

James H. Jacobson, Chicago, Ill.

Application April 26, 1947, Serial No. 744,242

8 Claims. (Cl. 94—8)

1

This invention relates to improvements in Portland cement concrete pavement construction and relates particularly to improvements in devices for transferring loads across a joint separating adjacent pavement panels.

In modern concrete pavement construction it is the practice to provide at regularly spaced intervals means for permitting contraction or expansion of the pavement slabs, and the presence of such separators or spacer members between the adjacent slabs requires the use of means for transmitting loads on one pavement panel into an adjacent pavement panel across such a joint, to the end that such loads may be properly distributed across such a joint and that the pavement slabs will not be misaligned vertically.

In the past it has been the practice to employ round dowels made of hot rolled steel, the dowels extending across the joint and being bonded in one pavement panel and free of bond in the adjacent pavement panel, a cap being provided at the end of the unbonded portion of the dowels, to provide for expansion of the concrete slab. More recent practice has been to encircle such dowels with a sleeve or other means to diminish the bearing stresses on the concrete caused by the load transferred by the dowels, particularly at the vertical faces of the concrete adjacent the joint.

An object of the present invention is to provide for concrete pavement construction a load transfer device which is made of two co-operating similar and symmetrical complementary members or portions, each of which is positioned in the concrete mass on each side of a joint or spacer member, the two complementary members or portions interlocking with each other and being in mutual bearing, each of the complementary members or portions preferably having an arm which is struck back into the concrete mass to anchor each portion of the load transfer device firmly into the concrete.

A yet further object is to provide a load transfer device which is unusually rigid and which comprises a pair of co-operating symmetrical complementary members or portions, each member or portion including a channel in which a tenon of the other member or portion fits and has firm bearing engagement with the channel, the channel distributing the stress transmitted by the tenon into the concrete and reducing the unit stress thereon.

Another object is to provide a load transfer device which is formed of two symmetrical complementary members or portions which can be

2

manufactured by forging, punching, or casting.

Other objects of the invention will be apparent from a study of the description hereinafter taken together with the drawings in which:

Figure 1 is a side elevation view of a load transfer device according to the present invention, showing the device positioned in a concrete slab which is shown in section;

Figure 2 is a section taken along the lines 2—2 of Figure 1;

Figure 3 is a section taken along the lines 3—3 of Figure 1;

Figure 4 is an end view of the load transfer device shown in Figure 1;

Figure 5 is an isometric view showing in detail how the co-operating symmetrical complementary members or portions of the load transfer device of Figure 1 are fitted together; and

Figure 6 is an elevation view of another form of the invention.

Referring now to Figures 1 to 5, the load transfer device according to the present invention is indicated generally by the ordinal 10, and is shown in conjunction with a spacer member 12 which separates two adjacent concrete panels 14 and 16. The spacer member 12 may be protected along its upper edge by means of a U-channel 18 and along its lower edge by a similar U-channel 20.

The load transfer device 10 also comprises two similar co-operating symmetrical complementary members or portions, each member or portion including a channel portion 22 which co-operates with a tenon 24 of the opposite, like and symmetrical member or portion. Each channel portion 22 is provided with bearing surfaces 26 and 28 upon which the tenon 24 is afforded mutual sliding bearing support with the channel portion 22. The channel portion is composed of a web and upper and lower flanges and the channel thereof is open throughout its entire length to permit lateral assembly movement of the complementary members or portions. As shown in Figure 1, the tenons 24 pass through openings 30 in the spacer member 12.

Each co-operating symmetrical portion of the load transfer device 10 is provided with an arm 32 which extends from each channel 22 and lies in the exposed faces of the concrete panels or slabs 14 and 16, and each is continuous with portions 34 struck back into the concrete panels 14 and 16. The portions 34 may be flared, see Figures 4 and 5, as at 36 to provide more area for bond with its contiguous pavement panel. Each channel 22 is provided with a downwardly di-

rected extension 38 which lies in the faces of the concrete panels 14 and 16 when poured and adjacent the spacer member 12.

It will be apparent that the device thus far described can be anchored firmly into a concrete pavement and can be employed to transfer a load on one concrete panel, as for example panel 14 into the adjacent panel 16. The device thus far described will also operate to permit expansion and contraction of the panels 14 and 16 since the tenons 24 have a sliding bearing fit with the channel 22. In order to permit movement of the tenons 24 with respect to the channel 22 a portion of the channel 22 not having the tenons 24 slidable therein is provided with a plug of easily deformable material 40, see Figure 3 also, which may be made of sponge rubber, fibrous material made from bagasse, or other suitable similar material.

Means are provided for holding the device thus far described together as a unit with the spacer member 12, to the end that the entire assembly may be placed on the subgrade prior to the concreting operation. There is provided a basket indicated generally by the ordinal 42 which comprises a pair of stringers 44 resting on the subgrade, as shown, and extending longitudinally of the spacer member 12. The stringers 44 are connected by a stirrup 46 in the general form of an inverted W, the stirrup 46 having a pair of vertical legs 48 which springably engage the downwardly directed extensions 38 with the spacer member 12 and the channel member 20 held therebetween. Secured to each of the stringers 44 and on each side of the spacer member 12 is a saddle 50 having a pair of central legs 52 which springably engage the channel 22 and the material 40.

Referring now to Figure 6, another embodiment of the invention is shown. As shown in Figure 6 the load transfer device, according to this embodiment of the invention, is indicated generally by the ordinal 110 and is shown as being used in conjunction with the spacer member 112 which may be made of thin bituminous impregnated material, or of a steel plate, such being generally employed where joints for contraction are needed. The spacer member 112 separates adjoining pavement panels 114 and 116. The upper edge of the spacer member 112 may be protected by a cap channel 118, and the lower edge of the member 112 may also be protected by a channel member 120. The load transfer device 110 comprises a pair of similar co-operating symmetrical portions, each portion having a channel 122 into which extends a tenon 124 of the opposite symmetrical portion, the tenon 124 being in close sliding bearing fit on surfaces 126 and 128 of the channel member 122. The tenons 124 are adapted to pass through a rectangular opening 130 spaced in the spacer member 112. Each channel portion 122 has a downwardly directed extension 138 which lies in the faces of the concrete panels 114 and 116 when poured and on each side of the spacer member 112. The tenons 124 do not extend in the channels 122 for the full length thereof, and the portions of the channel 122 not occupied by the tenons 124 are filled with readily deformable material 140 in order to provide for unimpeded movement of the tenons 124 with respect to the channels 122 upon contraction or expansion of the concrete panels 114 and 116, and to prevent the entrance of concrete to the channels 122 during the paving operation.

The device described with reference to Figure 6 may be held together as a unit with the spacer member 112 by means of a basket assembly indicated generally by the ordinal 142 and which, as with reference to Figure 4, comprises stringers 144 and stirrups 146 having upstanding portions 148 which engage the extension 138 with the spacer member 112 of the channel 120 therebetween. The ends of the channel 122 are held in saddles 150 in a manner exactly like that shown in Figure 4.

The load transfer devices described above consist essentially of two similar co-operating symmetrical portions which may be readily formed by one or more processes or methods. For example, each portion may be cast, and the channels milled to provide a bearing surface for the tenon which is milled to a size to obtain a sliding bearing fit with the channel. In order to obtain the necessary ductility for the co-operating symmetrical portions, and in order to take the impact stress caused by loads upon the concrete panels, the parts are malleableized. The load transfer device disclosed in Figures 1 to 6 inclusive may alternatively be forged, the present date forging processes permitting the holding of tolerances which enable the tenons to have a close sliding bearing fit with the channel of the opposing symmetrical portion. The device may also be made by a punching operation which would give channels held to such close dimensions that they would readily provide a sliding bearing fit with a tenon also made in the punching operation.

While the invention has been described in terms of a preferred embodiment thereon, its scope is not limited in terms of the embodiment shown nor otherwise by the terms here appended.

I claim:

1. A load transfer device for use in concrete slab construction including two cooperating symmetrical complementary members each comprising a channel portion and a tenon consisting of an extension of the web of the channel portion and the tenon of each channel portion being received within and fitting the channel of the other channel portion and supported by the same to maintain said members in mutual supporting relation, each of said channel portions being provided at its inner end with an extension of the upper flange of the channel member extending upwardly and outwardly therefrom and arranged to extend into an adjacent concrete slab when poured.

2. A load transfer device for use in concrete slab construction including two cooperating symmetrical complementary members each comprising a channel portion and a tenon consisting of an extension of the web of the channel portion and the tenon of each channel portion being received within and fitting the channel of the other channel portion and supported by the same to maintain said members in mutual supporting relation, each of said channel portions being provided at its inner end with an arm consisting of an extension of the upper flange of the channel member and extending upwardly therefrom and having its upper portion bent back and arranged to extend into an adjacent concrete slab when poured.

3. A load transfer device for use in concrete slab construction including two cooperating symmetrical complementary members each comprising a channel portion and a tenon consisting of an extension of the web of the channel portion and the tenon of each channel portion being received within and fitting the channel of

the other channel portion and supported by the same to maintain said members in mutual supporting relation, each channel portion having at its inner end a downwardly directed extension of the adjacent flange of said channel portion arranged to lie in the joint face of a contiguous concrete slab when poured.

4. A load transfer device for use in concrete slab construction including two cooperating symmetrical complementary members each comprising a channel portion having horizontal upper and lower flanges and a vertical web and a tenon consisting of an extension of the web of the channel portion and the tenon of each channel portion being received within and fitting between and engaging the flanges of the other channel portion and supported by the same to maintain said members in mutual supporting relation, each channel portion having its upper flange extended upwardly and forming an arm bent back and arranged to extend into an adjacent concrete slab when poured, and each channel portion having its lower flange extended downwardly and forming a downwardly directed extension arranged to lie in the face of said concrete slab when poured.

5. A joint for concrete pavement construction comprising a spacer member, load transfer devices spaced longitudinally of the spacer member and adapted to transfer loads from a concrete panel on one side of the spacer member to a concrete panel on the other side of the spacer member, each load transfer device comprising two cooperating symmetrical complementary members, each member being provided with a channel portion consisting of a web and upper and lower flanges, an a tenon, the tenon of each channel portion being an extension of the web thereof and fitting between and engaged by the flanges of the other channel portion and each channel portion having a downwardly directed extension arranged to lie in the joint face of a contiguous slab when poured and adjacent the spacer member, and means for holding the spacer member and the load transfer devices together as a unit assembly comprising a basket having portions engaging the said channel portions and portions engaging said downwardly directed extensions with the spacer member therebetween.

6. A joint for concrete pavement construction comprising a spacer member, load transfer devices spaced longitudinally of the spacer member and adapted to transfer loads from a concrete panel on one side of the spacer member to a concrete panel on the other side of the spacer member, each load transfer device comprising two cooperating symmetrical complementary members, each member being provided with a channel portion consisting of a web and upper and lower flanges, and a tenon, the tenon of each channel portion being an extension of the web thereof and fitting between and engaged by the flanges of the other channel portion and each channel portion having a downwardly directed extension arranged to lie in the joint face of a contiguous slab when poured and adjacent the spacer member, and means for holding the spacer member and the load transfer devices together as a unit assembly comprising a basket having saddles springably engaging said channels and including stirrups springably engaging said extensions with the spacer therebetween.

7. A joint for concrete pavement construction comprising a spacer member, load transfer devices spaced longitudinally of the spacer member and adapted to transfer loads from a concrete panel on one side of the spacer member to a concrete panel on the other side of the spacer member, each load transfer device comprising two cooperating symmetrical complementary members, each member being provided with a channel portion consisting of a web and upper and lower flanges, and a tenon, the tenon of each channel portion being an extension of the web thereof and fitting between and engaged by the flanges of the other channel portion and each channel portion having a downwardly directed extension arranged to lie in the joint face of a contiguous slab when poured and adjacent the spacer member, plugs arranged within the channel portions at the outer ends thereof adjacent the outer ends of the tenons of the members, and means for holding the spacer member and the load transfer devices together as a unit assembly comprising a basket including a pair of stringers extending one each lengthwise of the spacer member, stirrups connecting said stringers and springably engaging said extensions with the spacer member between, and saddles connected to said stringers and springably engaging said plugs and the channel portions near the ends thereof and retaining the plugs in said channel portions.

8. A load transfer device for use in concrete construction comprising two cooperating symmetrical complementary members, each of said members being provided with a channel portion and a tenon, each channel portion having flanges which form a bearing surface engaging and supporting the cooperating tenon of the other member, each channel portion having its upper flange extended upwardly at its inner end and forming an arm extending upwardly and arranged to lie in the joint face of a concrete slab when poured, said arm having a portion bent back with respect to the joint face of a concrete slab when poured, and each channel portion having its lower flange extended downwardly and forming a downwardly directed extension arranged to lie in the joint face of a concrete slab.

JAMES H. JACOBSON.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
2,133,553	Lord	Oct. 18, 1938
2,152,751	Schulz	Apr. 4, 1939
2,212,492	Brickman et al.	Aug. 27, 1940
2,212,680	Brickman et al.	Aug. 27, 1940
2,261,602	Yeoman	Nov. 4, 1941
2,299,670	Westcott	Oct. 20, 1942
2,355,771	Yeoman	Aug. 15, 1944