Sept. 28, 1943. J. N. HELTZEL 2,330,213

CONCRETE ROAD CONSTRUCTION

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FIG. 1

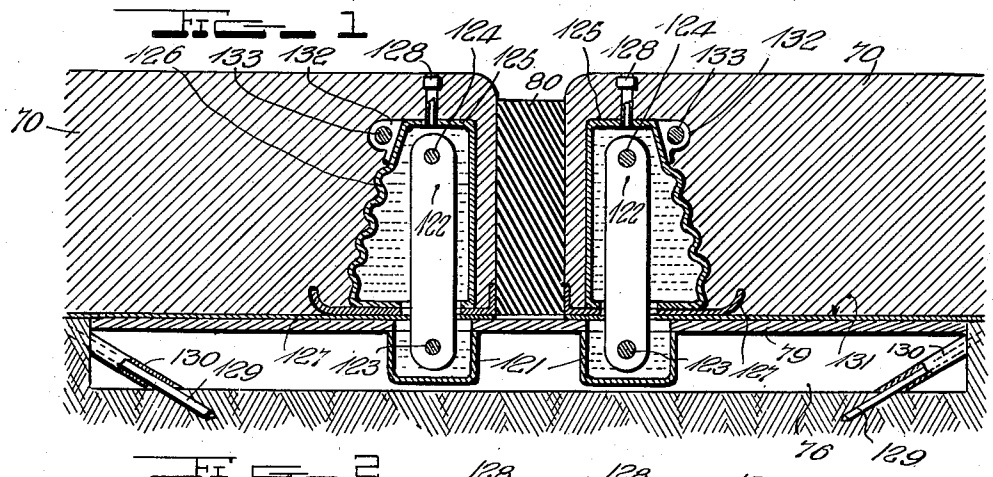


FIG. 2

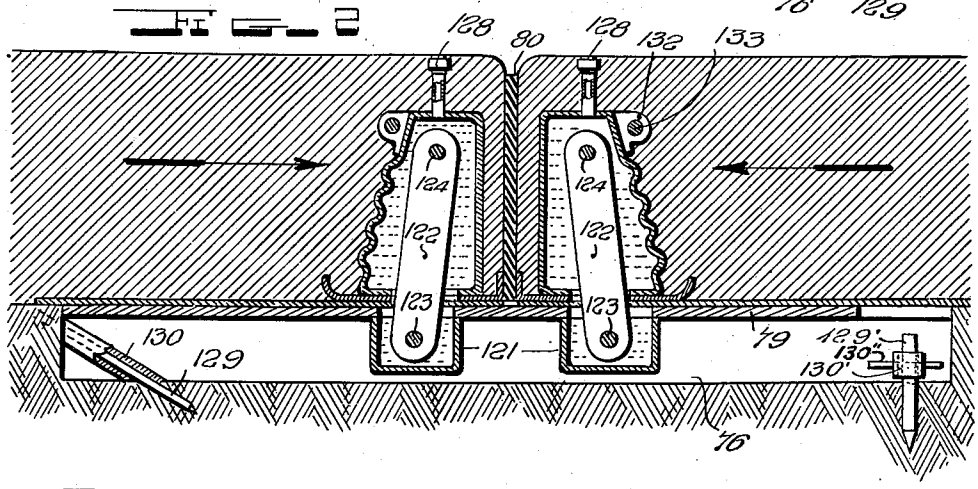


FIG. 3

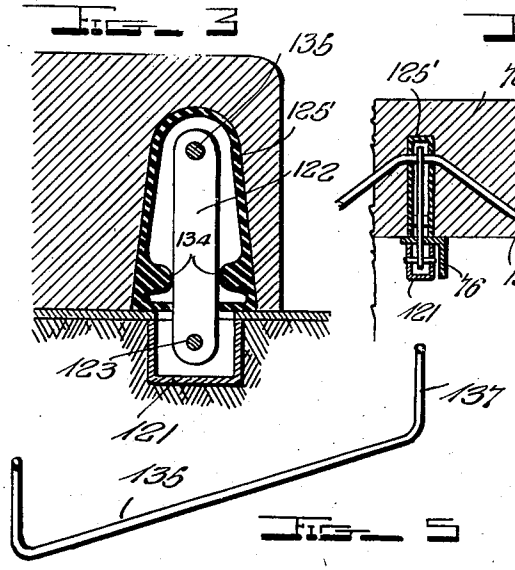


FIG. 4

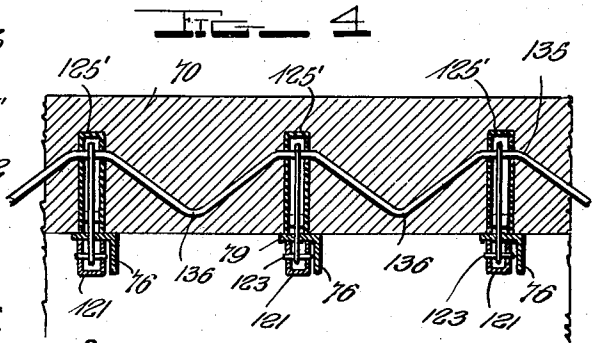


FIG. 5

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FIG. 6

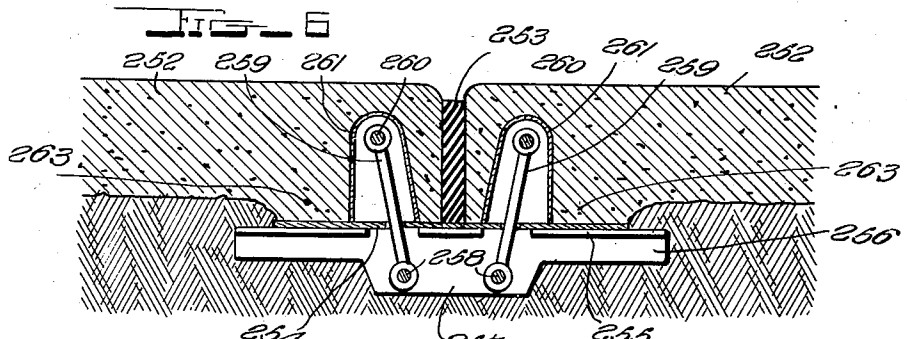


FIG. 7

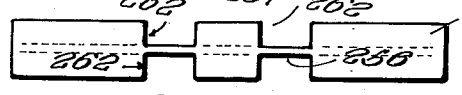


FIG. 8

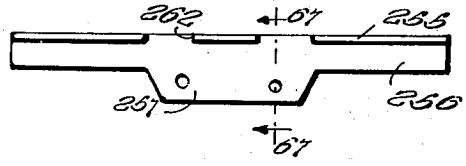
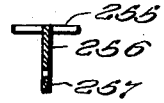


FIG. 9



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Patented Sept. 28, 1943 2,330,213

UNITED STATES PATENT OFFICE

2,330,213

CONCRETE ROAD CONSTRUCTION

John N. Heltzel, Warren, Ohio

Application May 8, 1940, Serial No. 334,051

9 Claims. (Cl. 94—18)

This invention relates to concrete road construction and to means for connecting road sections across the joints therebetween.

An object of the invention is to provide in sectional concrete road construction, improved load transfer means bridging the joints between adjacent sections in engagement with the bottom faces of the sections in a manner preventing relative vertical displacement between adjacent sections, while at the same time permitting freedom of movement of the sections longitudinally to provide for expansion and contraction.

Still another object is to provide improved doweling means for the joints of concrete road sections, which means is so disposed in relation to the concrete sections of the road bed as to be protected against temperature conditions to which the sections themselves are subjected, and which is protected against the deleterious action of moisture and earth contamination.

A further object is to provide, in sectional road joint construction, load transfer means having slidable bearing engagement with the bottom faces of adjacent joint sections and secured to the sections by anchor means embedded in the material from which the sections are formed.

Other objects will be readily apparent to those skilled in the art. The matter herein disclosed constitutes various embodiments by which the invention is reduced to practice. It is to be understood that, within the scope of the invention as claimed, any desired variations and substitutions in respect of structural detail and arrangement may be made.

In the accompanying drawings:

Fig. 1 is a vertical longitudinal section through still another alternative embodiment of the invention.

Fig. 2 is a section similar to Fig. 1 and illustrates the position of the parts when both sections have moved together under expansion. The view also illustrates an alternative form of securing stake.

Fig. 3 is a vertical section through a joint installation utilizing an alternative embodiment of the structural detail illustrated in Figs. 1 and 2.

Fig. 4 is a transverse vertical section through road joint sections equipped with a rocking link connection and illustrating the manner of pivoting the link elements.

Fig. 5 is a perspective view of a link pivot bar employed in the assembly.

Fig. 6 is substantially a vertical section through another embodiment of installation in which the road sections have a pivoted link support with the underlying bridge member.

Fig. 7 is a top plan view of the bridge member employed in the embodiment of Figure 6.

Fig. 8 is a side elevation of the bridge member.

Fig. 9 is a section on the line 67—67 of Figure 8.

For a number of years an accepted practice in sectional concrete road construction has been that of connecting adjacent sections by dowel bars which bridge the joint space and extend into the opposed sections being embedded therein and thus firmly bonded to the sections. It has been found that temperature changes to which the sections are subjected inevitably bring about a warping or curling of the section ends at each joint. In other words, the ends or opposed face portions of adjacent sections are distorted vertically with the inevitable result that the dowel bars bridging the section joint are bent. Where the distortion is upward, the dowel bars are bent upwardly and where the distortion is downward, the bars are bent downwardly.

When the section ends curl upwardly the dowel bars become bent at their middle portions so that as the slabs expand they are wedged against the opposed faces thereof with such force as to cause fracture of the slabs inwardly of the joints. Furthermore the strains set up will bring about the breaking off of the concrete at the upper corners of the sections. When the distortion of the slabs occurs downwardly at the joints, the action of the slab end tends to create a cavity in the subgrade immediately underlying the joint space, with the consequent displacement and weakening of the subgrade support for the slab ends. The live loads passing over the joint then bring about slab fracture.

I have discovered that the tendency of the slab sections to curl or warp can be entirely eliminated by the provision of means underlying the sections and bridging the joints therebetween in a manner which prohibits mutual or relative vertical movement of the end portions of the sections.

Figs. 1 and 2 show the details of an embodiment of the invention, in which a rocking link support is established between the opposed ends of the slabs 70 at opposite sides of the joint and the submerged dowel or bridging member 76. In this embodiment the horizontal or bearing flange 79 of the bridge member is provided at opposite sides of the joint space with depending sockets 121 to form lubricant containing wells. The flange 79 is slotted above the wells to permit

rocking play of the link 122. Each link is pivoted at its lower end on a pivot pin 123 extending transversely between the walls of the associated socket 121, and is pivoted at its upper end to a pivot pin 124 supported between the side walls of a relatively heavy metal housing 125 that is imbedded in each section 70 slightly inwardly from its joint face. The housings 125 are filled with suitable lubricating material and are flared toward their base portions to accommodate the rocking movement of the links. It is preferred that the rear wall of each housing be fluted or corrugated as at 126 to provide for firm anchorage in the concrete in which it is imbedded. The housings 125 are secured at their bottoms to base plates 127 that are slidable on the flanges 79 of the bridging members. These base plates underlie the bottoms of the respective sections 70 and are provided at their ends with upturned terminals to provide an anchorage for engaging in the material from which the sections are formed. It will be understood that the base plates 127 are welded or otherwise rigidly connected to the bottom of the housings 125. Filler means 128 are provided at the top of each housing for furnishing the supply of lubricants. The filler means may be of any desired type but it is preferred that it shall be of the general arrangement of the alemite fittings. In this embodiment, due to the rocking of the links 122 in vertical planes, adjustable anchorage means is necessary at the ends of the bridging member 76. I provide such means by employing inwardly and downwardly inclined anchor stakes 129 disposed through suitably arranged sockets 130 attached to or formed integral with the vertical flange of the bridging member 76. Fig. 1 illustrates the position of the parts when the sections 70 are contracted, and Fig. 2 illustrates the position assumed by the parts when the sections are expanded to compress the joint strip 80 therebetween. From Fig. 2 it will be seen that as the sections expand and move toward one another the links 122 will rock on their respective pivots. In this arrangement the links provide direct means for transferring vertical loads to the bridging member 76. Also, in this installation the base plates 127 move on the flange 79 of the bridging member with little or no friction, such friction as might be present being further reduced by the preferential use of a covering strip 131 of asphalt or metal applied over the top of the flanges 79. The housings 125 are provided with lateral lugs 132 which receive and support in attached relation marginally extended reinforcing rods 133, which may be bent to form trusses as at 136 in Fig. 4.

Figs. 3 and 4 illustrate a construction in which the link support principle is maintained in the presence of the links 122 pivoted on the pins 123 at their lower ends in the lubricant wells 121. In this embodiment, however, the upstanding housings 125' are made of rubber or asphaltic material to provide sealing enclosures for the links, and carry on their inner walls resilient cushion means 134 which bear oppositely against the sides of the associated link. Fig. 4 shows that a plurality of such insulations are employed at spaced intervals longitudinally of the joint and the upper ends of the respective links 122 are pivoted to a truss rod 135 which is passed through the links and the side walls of the respective housings 125' and which rod intermediate the housings is bent downwardly after the straight bar is inserted through the links 122, to provide stress relieving portions 136, it being understood that the rod is embedded in the concrete of the associated section 70 throughout its entirety. Fig. 5 illustrates the configuration of the rod 135 prior to bending to provide the portions 136. It will be noted that the rod may be provided with laterally directed terminal portions 137 which assist in maintaining the rod against longitudinal shifting when imbedded in the material of the section.

With respect to the link structure as embodied in Figs. 1 through 4, as the sections 70 move together there will be a slight shortening of the vertical distance between the pivot points of the link ends. In the assembly illustrated the links are relatively long, and by using long links the shortening of the arc is reduced to a minimum; in fact, it is hardly appreciable. A feature of the installation, however, is that the covering strip 131 of Fig. 1, or the rubber base of the rubber casing 125' in Fig. 3, provides a compressible means which permits compensation for any shortening of the arc, so that the ends of the sections will not be lifted or depressed as the links pivot during movement of the sections.

Figure 6 discloses the details of an installation generally similar to the type illustrated in Figures 1 to 3. In the embodiment of Figure 6 the sections 252 are separated at the joint space by a filler strip 253 which is seated at its bottom on a combined lubricating and sealing strip 254 that is positioned flatly over the horizontal edge flange 255 of a T-beam 256 that is anchored in the subgrade transversely across the joint space and which extends at its ends rearwardly well beneath the slab sections 252.

Immediately beneath the joint space the vertical flange of the T-beam is vertically extended to provide a bearing section 257 to which are pivotally connected, by means of studs 258 carried by the beam, the lower ends of upwardly extended links 259 which have their upper ends pivotally connected to pivot pins 260 extended transversely between the side walls of housings 261 adjacent their upper ends. The housings 261 are open at their bottom ends, being somewhat flared outwardly from their upper ends to their bottoms, and are seated over the strip 254, being embedded in the concrete of their associated slab sections 252. In order to permit the necessary rocking movement of the links which occurs when the slabs 252 move laterally under expansion or contraction, the horizontal flange 255 of the bridging beam 256 is laterally apertured to provide the recesses 262 in which the links play during their movement.

Figure 6 further shows an expedient by which the joint installation is strengthened. It has been found that in a sectional concrete road construction the weakest points usually occur at the joints. In order to eliminate this objectionable characteristic, I provide the sections immediately adjacent the joint space with vertically thickened portions 263. These thickened end portions 263 provide substantial reinforcements in their added material, and compensate for the removal of material necessary to the embedding of the housings 261. It will be noted that the ends of the T-bar bridging member 256 extend rearwardly beneath the sections 252 beyond the rearward limits of the thickened portions 263. By this arrangement there can be no possibility of the slab section portions 263 becoming jammed against the top flange of the bridge member 256. The lateral sliding movement of the sections 252 under expansion or contraction

is never sufficient to carry the portions 263 beyond the ends of the T-beam 256.

Referring back to the form shown in Fig. 2, there is illustrated in the lower right hand of the figure an alternative embodiment of means for anchoring the bridge member. In this embodiment the securing stake 129' is received in a vertical socket 130', that is welded or otherwise suitably secured to the adjacent vertical face of the bridge member, and the stake is anchored in position by a transverse pin or key 130''.

Having thus described my invention, what I claim is:

1. In a joint for concrete road sections, a rigid member seated in the subgrade beneath the joint and underlying the sections and adapted to slidably support the same, a link pivoted at its upper end in each section, and each movable link being pivoted at its lower end to said rigid member, each section having therein a chamber recess surrounding the link to permit movement thereof.

2. In a joint for concrete road sections, a rigid member seated in the subgrade beneath the joint and underlying the sections and adapted to slidably support the same, a rod embedded in each section longitudinally of the joint, a movable link in each section pivoted at its upper end to the rod therein, and the lower ends of said links being pivotally connected to said rigid member at opposite sides of the joint, each section having therein a chamber recess surrounding the link to permit movement thereof.

3. In a joint for concrete road sections, a rigid member seated in the subgrade and bridging the joint, said member having a horizontal bearing flange extending beneath and slidably supporting adjacent sections, anchor members movably mounted in the sections and having lower end portions movably engaged with said rigid member, lubricant containing chambers carried by said rigid member and housing the lower extremities of said anchor members, said sections having therein chamber recesses surounding the anchor members.

4. In a joint for concrete road sections, a rigid member seated in the subgrade and bridging the joint, said member having a horizontal bearing flange extending beneath and slidably supporting adjacent sections, anchor members movably mounted in the sections and having lower end portions passed through said flange to engage the member bridging the joint, lubricant holding chambers carried by said bridging member and housing the lower extremities of said anchor members, and the sections having therein chamber recesses surrounding the anchor members.

5. In a joint for concrete road sections, a rigid member in the subgrade beneath the joint and underlying the sections, a link housing embedded in each section and open at its lower end through the section bottom, a vertically arranged link pivoted at its upper end in each housing, and the lower end of each link extending downwardly through its associated section bottom into pivoted engagement with said rigid member.

6. In a joint for concrete road sections, a rigid member in the subgrade beneath the joint and underlying the sections, a link housing in each section and open at its lower end through the section bottom, a vertically arranged link pivoted at its upper end in each housing, the lower end of each link extending downwardly through its associated section bottom into pivoted engagement with said rigid member, and resilient means at the lower end of said housings in bearing contact with said rigid member.

7. In a joint for concrete road sections, a rigid member seated in the subgrade and bridging the joint, said member having a horizontal bearing flange extending beneath and slidably supporting adjacent sections, anchor members movably mounted in the sections and having lower end portions passed through said flange to engage the member bridging the joint, means including said anchors and admitting of relative movement of the sections toward and from said joint, and lubricant holding chambers carried by said bridging member and housing the lower extremities of said anchor members, said sections having therein chamber recesses surrounding the anchor members.

8. In a joint for concrete road sections, a rigid member seated in the subgrade and bridging the joint, said member having a horizontal bearing flange extending beneath and slidably supporting adjacent sections, movable anchor members secured in the sections and having lower end portions slidably interlocked with said bearing flange, and lubricant containing chambers carried by said rigid member and housing the lower extremities of said anchor members, each section having therein recess means surrounding the anchor members and admitting of limited movement of said anchors toward and from the joint.

9. In a joint for concrete road sections, a rigid member seated in the subgrade beneath and bridging the joint, said member extending beneath the sections and slidably supporting the same, movable link means connecting said sections to the member on opposite sides of the joint, each section having therein a chamber recess surrounding the link means, and a compressible member between said rigid member and each section.

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