Sept. 5, 1950 E. S. MATHERS 2,521,643

LOAD TRANSFER ASSEMBLY

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FIG. 1.

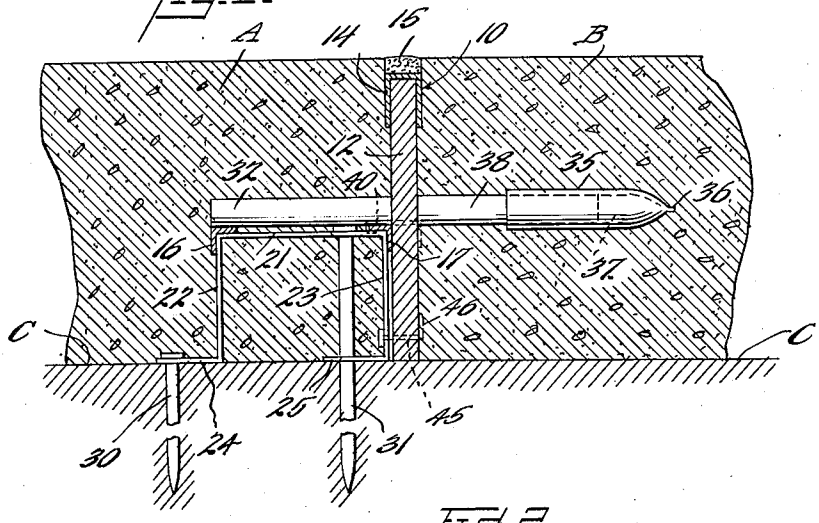


FIG. 2.

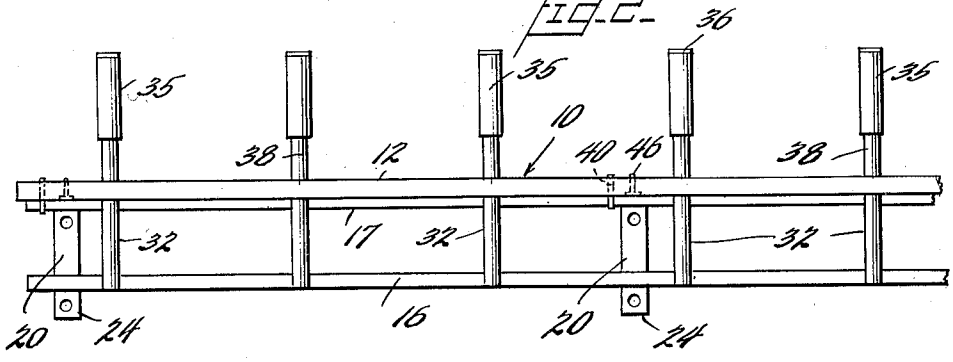
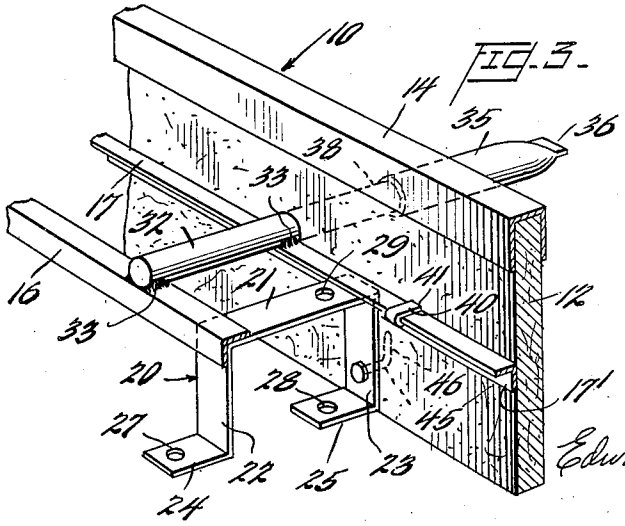


FIG. 3.



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FIG. 4.

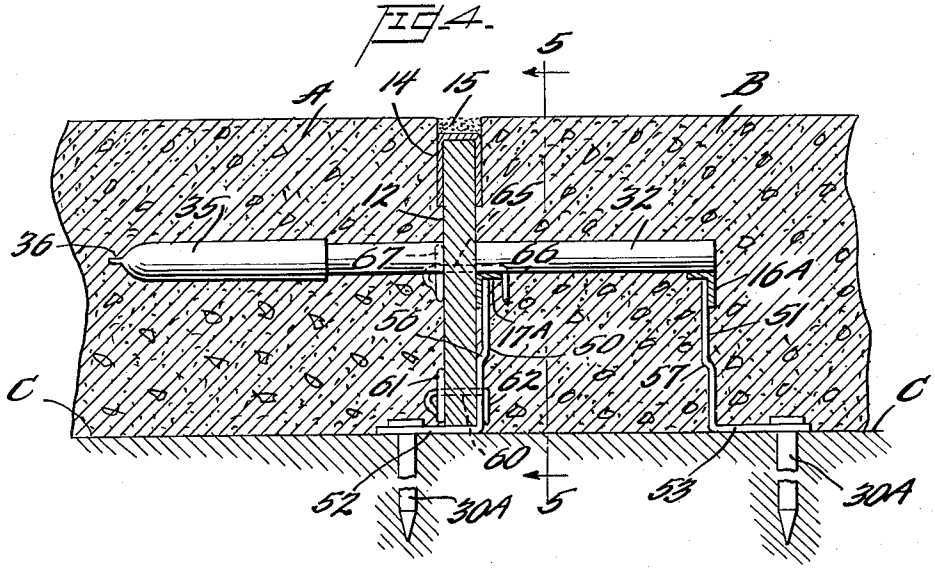
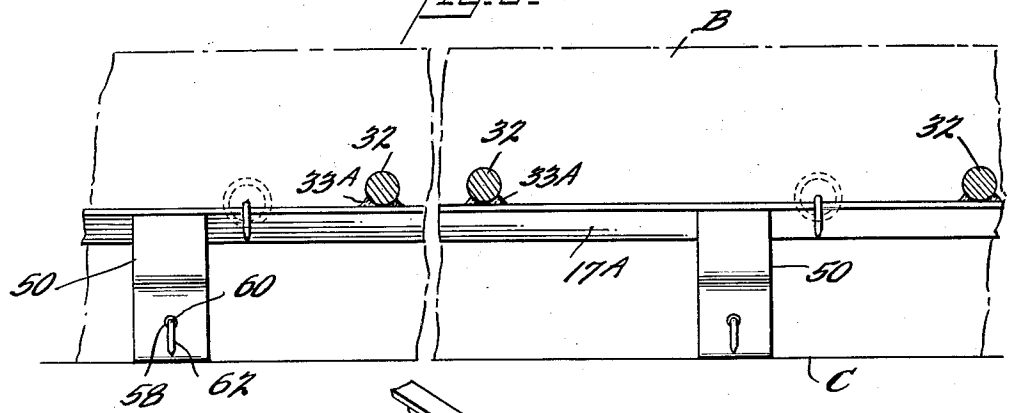


FIG. 5.



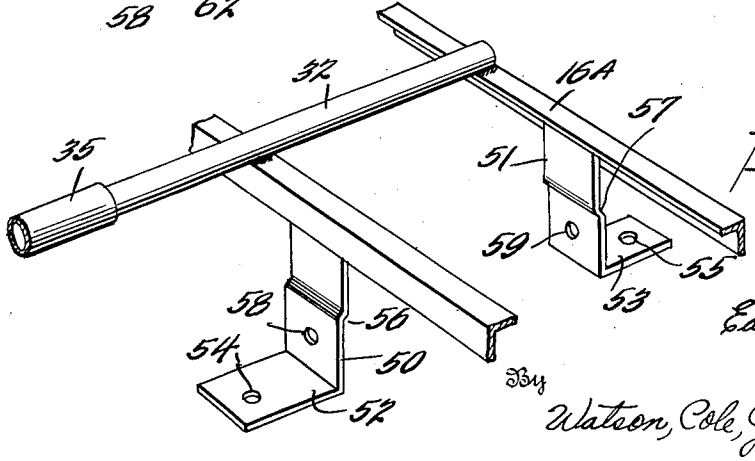


FIG. 6.

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LOAD TRANSFER ASSEMBLY

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Application June 24, 1947, Serial No. 756,607

9 Claims. (Cl. 94—8)

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This invention relates to load transfer assemblies and more particularly to devices of this class which are adapted to reinforce concrete structures, such as roads, pavements, and flooring, and to transfer load stresses from one portion of such a structure to an adjacent one. These devices may be utilized in a variety of different associations in the concrete art, but they are usually related to and used in conjunction with joints between adjacent slabs or other units of the structure, more especially in connection with expansion joints which embody strips of material which are designed to allow for contraction and expansion of the slabs under changing conditions of temperature and moisture content both during setting and subsequent thereto.

This application is a continuation-in-part of my copending application Serial No. 581,765, filed March 9, 1945, since abandoned.

The general object of the invention is to provide a novel and improved load transfer device of the class described, which is of simple and light-weight construction, easy and economical to manufacture, transport, and install, while at the same time sufficiently sturdy to afford the necessary rigidity transversely of the roadway during pouring and setting of the concrete, and to transfer the load efficiently from one portion to the other during subsequent use.

When used at joints between separate units of concrete construction, the chief function of structures of this type is to transfer the superposed load between the units during use so that the strength and rigidity of the support at the joint approaches that of the intermediate portions of the units, thus affording a substantially continuous beam longitudinally of the roadway or other construction. The assembly also serves to support the joint strip or filler when such strips are used.

To effectuate these purposes, the invention in its preferred embodiment contemplates the provision of a pair of structural shapes, for example, angle irons, supported in spaced parallel relationship at a level intermediate the thickness of the concrete, by means of a plurality of chairs or pedestals which are suitably anchored in place upon the sub-grade. At suitable intervals along the frame thus provided are rigidly secured a series of dowels having outwardly projecting ends fitted with slip sleeves of conventional construction. In an expansion joint arrangement, the dowels pass through openings provided in a vertically disposed strip or plate of suitable joint material such as asphalt-impregnated felt or the like.

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The joint plate or strip is preferably disposed against the forward legs of the supporting chairs and retained in position by means of bendable or frangible clips during transportation, assembly, and pouring.

Other objects and features of novelty will be apparent from the following specification when read in connection with the accompanying drawings in which one embodiment of the invention is illustrated by way of example.

In the drawings,

Figure 1 is a transverse vertical sectional view through a joint construction in a concrete roadway, embodying the principles of the invention;

Figure 2 is a fragmentary plan view of the joint construction and load transfer assembly itself before installation in the roadway, this figure being upon a somewhat smaller scale;

Figure 3 is a perspective view of an intermediate portion of the joint construction;

Figure 4 is a vertical sectional view similar to Figure 1 in which is illustrated an alternative embodiment of the invention;

Figure 5 is a transverse vertical sectional view of the load transfer and reinforcing structure, taken on line 5—5 of Figure 4; and

Figure 6 is a fragmentary view in perspective of certain essential elements of the modified joint.

In Figure 1 of the drawings, a joint between two concrete slabs designated A and B is shown, these slabs being a part of a roadway or pavement resting upon the sub-grade C. As a partition between the slabs, there may be provided a vertically disposed elongated plate or strip 12, this strip serving primarily as means for allowing contraction and expansion longitudinally of the roadway between the slabs A and B, and also serving during pouring of the slabs as part of the form. The expansion strip 12 is preferably surmounted by a protective cap 14 which may be made of sheet metal, plastic, or other suitable material. The height of the joint strip 12 is ordinarily somewhat less than the thickness of the slabs, and ultimately the space remaining at the top of the strip may be filled in with cementitious, flexible, or other material 15 if desired.

As a supporting means for the joint strip 12 and the other operative parts of the load transfer structure, there are provided two parallel angle irons 16 and 17 of standard shape and dimensions, the vertically disposed flanges of the angle irons being at remote sides thereof, with the horizontal flanges directed toward each other. The vertical flange 17' of the angle iron 17 is disposed against one side wall of the strip 12.

In this embodiment, the angle irons are supported in spaced position by a plurality of chairs or pedestals 20 disposed at intervals across the roadway. These chairs are formed of strip metal and are bent so as to provide a horizontal body portion 21, two spaced vertical legs 22 and 23, and rearwardly directed horizontal feet 24 and 25 which are adapted to rest upon the sub-surface or road bed C. The angle irons 16 and 17 are secured to the corners of the chairs at the junction of the body portion 21 with the legs 22 and 23, this attachment being preferably made by welding. The feet 24 and 25 are each provided with openings 27 and 28, and the body portion 21 is provided with a similar opening 29 for the reception of the pins or spikes 30 and 31, the pin 30 passing through the opening 27 only, but the preferably longer pin 31 passing through the aligned openings 28 and 29.

At intervals along the supporting structure provided by the strips 16 and 17 and the chairs 20, are secured the dowel pins 32, preferably by welding as indicated at the points 33 in Figure 3. These dowels are of regulation size, figured to the particular load to be sustained, and are provided at their outwardly projecting ends with slip sleeves 35, the ends of these sleeves being crimped as at 36 to seal off the interior. Beyond the end of the dowels within the sleeves 35 are the air spaces 37 which provide for expansion and contraction of the slabs adjacent the dowels. In order to further provide for relative movement between the slab B and the dowels 32 which are anchored in the slab A, the intermediate exposed portions 28 of the dowels are preferably painted.

The joint strip or plate 12, when such elements are to be used, is preferably not rigidly secured to the supporting structure and for this purpose temporary bendable or frangible clips are provided. A series of such clips 40 comprise strips of sheet metal passing through slits 41 in the plate 12 and having one end bent around the horizontal flange of the angle iron 17 and the other turned downwardly on the outer face of the plate 12. Preferably, the forward legs 23 of each of the chairs are also clipped to the plate or strip 12 by means of the nail-like fastening elements 45 which pass through openings in the legs 23 and in the plate 12 and have their outer ends 46 bent back against the face of the strip 12.

In Figures 4, 5, and 6 of the drawings there is illustrated a modification of the load transfer structure which is of somewhat simpler construction and which effects certain economies of manufacture, in that certain standardized elements may be used for supporting the dowels or load transfer elements.

In illustrating and describing this embodiment of the invention, the same reference characters are employed in designating the principal parts of the structure including the dowels, with comparable parts of the supporting structure designated with the same reference characters with the addition of the letter A, while the distinctive elements and portions of the modified form of support are given new reference characters.

The dowels 32, as in the earlier described embodiment may pass through openings in the optional expansion strip 12, at intervals across the road bed, and are ultimately embedded in the slabs A and B. The dowels 32 are welded as at 33A to the upper horizontal flanges of the angle irons 16A and 17A.

Instead of the two-legged chairs or pedestals

20 employed in the earlier described embodiment, two identical pedestals 50 and 51 are employed which correspond in purpose and function to the respective forward and rear legs 23 and 22 of the first described device. The upper ends of each of the pedestals 50 and 51 lie flat against the inner surfaces of the vertical flanges of the angle pieces 16A and 17A, and their ends abut the lower surface of the horizontal flanges of these angle pieces. Each of the pedestals 50 and 51 have horizontal feet 52 and 53 formed thereon, the feet 52 of the forward pedestals resting on the subgrade C and extending forwardly beneath the joint strip or plate 12. The feet 53 of the rearward pedestals 51 are rearwardly directed and also rest upon the sub-surface C. The feet are provided with openings 54 and 55 through which the spikes or pins 30A pass into the sub-grade.

The vertical portions of the pedestals 50 and 51 are offset at their intermediate points as at 56 and 57. This insures that the lower portion of the forward pedestal lies snugly against the rear face of the expansion strip 12 directly beneath the vertical flange of the angle iron 17A. The lower portions of the vertical parts of the pedestals 50 and 51 are provided with openings 58 and 59. This is to accommodate the cap nail 60 which passes through a registering opening in the expansion strip 12 and the opening 58 in the forward pedestal. The head 61 of the cap nail lies against the forward face of the expansion joint strip and the joint 62 of the nail is clenched against the rear face of the pedestal. The angle iron 17A is secured to the strip 12 in similar fashion by the cap nail 65 passing through an opening in the strip 12 and having its point bent over the horizontal flange of the bar 17A as at 66. The head 67 of the cap nail 65 is disposed against the forward face of the expansion strip 12.

One advantage of the latter embodiment lies in the fact that the pedestals used as forward supports 50 or rearward supports 51 are identical and interchangeable, and may be manufactured in quantity regardless of the position in which they are to be used in the joint support.

It will be seen that by means of the devices described, load transfer structures have been provided which are sturdy and rigid enough to provide adequate support for the dowels, but are of light construction rendering them readily transportable and economical to manufacture. It will also be perceived that these assemblies may be used in a wide variety of installation, whether or not a joint is contemplated at the point of use, but they are of particular utility when such joints are provided, especially in connection with the provision of means allowing expansion and contraction between slabs.

Various changes and modifications may be made in the embodiments illustrated and described without departing from the scope of the invention as defined in the sub-joined claims.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is:

1. An expansion joint and load transfer construction for concrete roadways or the like comprising, in combination, a vertically disposed joint forming strip adapted to extend across the roadway between adjacent slabs, openings in said strip at intervals therealong, a plurality of dowel pins extending through said openings and having their opposite ends projecting upon the respective sides of the strip, a pair of parallel elon-

gated members of standard rolled structural shape spaced apart horizontally, extending along said strip on one side thereof and transversely of said dowel pins, one of said members being disposed closely adjacent said strip, means securing said dowel pins to said members, a plurality of leg elements disposed beneath said elongated members at intervals therealong and adapted to rest upon the sub-grade, and a foot on each of said leg elements, the feet on the leg elements supporting the member adjacent the strip extending beneath said strip and directed so as to extend along the sub-grade.

2. An expansion joint and load transfer construction for concrete roadways or the like comprising, in combination, a vertically disposed joint forming strip adapted to extend across the roadway between adjacent slabs, openings in said strip at intervals therealong, a plurality of dowel pins extending through said openings and having their opposite ends projecting upon the respective sides of the strip, a pair of parallel elongated members of standard rolled structural shape spaced apart horizontally, extending along said strip on one side thereof and transversely of said dowel pins, one of said members being disposed closely adjacent said strip, means securing said dowel pins to said members, a plurality of supporting leg elements disposed beneath said elongated members at intervals therealong, each of said leg elements being generally L-shaped in configuration having feet adapted to rest upon the sub-grade, the feet of the leg elements which support the elongated member adjacent the strip extending beneath the strip, and the feet of the leg elements supporting the other elongated member extending in the opposite direction.

3. An expansion joint and load transfer construction for concrete roadways or the like comprising, in combination, a vertically disposed joint forming strip adapted to extend across the roadway between adjacent slabs, openings in said strip at intervals therealong, a plurality of dowel pins extending through said openings and having their opposite ends projecting upon the respective sides of the strip, a pair of parallel elongated members of standard rolled structural shape spaced apart horizontally, extending along said strip on one side thereof and transversely of said dowel pins, one of said members being disposed closely adjacent said strip, means securing said dowel pins to said members, a plurality of supporting leg elements disposed beneath said elongated members at intervals therealong, each of said leg elements being generally L-shaped in configuration having feet adapted to rest upon the sub-grade, the feet of the leg elements which support the elongated member adjacent the strip extending beneath the strip, and the feet of the leg elements supporting the other elongated member extending in the opposite direction, and clip elements tying said strip element to parallel member and leg element assembly.

4. An expansion joint and load transfer construction for concrete roadways or the like comprising, in combination, a vertically disposed joint forming strip adapted to extend across the roadway between adjacent slabs, openings in said strip at intervals therealong, a plurality of dowel pins extending through said openings and having their opposite ends projecting upon the respective sides of the strip, a pair of parallel elongated angle members spaced apart horizontally, extending along said strip on one side thereof and transversely of said dowel pins, one of said members being disposed closely adjacent said strip, with a horizontal flange and a depending flange, the latter lying snugly against said strip, means securing said dowel pins to said members, a plurality of supporting leg elements disposed beneath said elongated members at intervals therealong, each of said leg elements being generally L-shaped in configuration having feet adapted to rest upon the sub-grade, the feet of the leg elements which support the elongated member adjacent the strip extending beneath the strip, and the feet of the leg elements supporting the other elongated member extending in the opposite direction, the upper ends of the leg elements abutting the horizontal flanges of the angle members and lying against the inner faces of the depending flanges, the upper and lower portions of the vertical part of each of said leg elements being offset from each other, whereby the lower portions are coplanar with the depending flanges and may also lie snugly against the joint forming strip, and means tying said strip element to parallel member and leg element assembly.

5. A load transfer construction for concrete roadways or the like comprising, in combination, a plurality of substantially parallel horizontally extending dowel pins, a pair of parallel elongated standard rolled angle members spaced apart horizontally and extending transversely of said dowel pins, said parallel angle members having horizontal flanges extending toward each other and vertical flanges extending downwardly at remote edges of the two members, welds securing said dowel pins to the upper surfaces of said horizontal flanges, a plurality of supporting leg elements disposed beneath said longitudinal members and secured thereto at intervals therealong, each of said leg elements being generally L-shaped in configuration having feet adapted to rest upon the sub-grade, the upper ends of the leg elements abutting the horizontal flanges of the angle members and lying against and welded to the inner faces of the depending flanges thereof.

6. An expansion joint construction for concrete roadways or the like comprising, in combination, a supporting structure including a series of spaced parallel chairs, said chairs being of an inverted rectangular U-shape, having a horizontal body portion and two depending leg portions, a pair of elongated angle members extending transversely of said chairs and each secured at intervals along their lengths to said chairs, one at the junction of one leg with the body portion and one at the junction of the other leg with the body portion of each chair, the lower ends of said legs being bent in the same direction to provide horizontal feet adapted to rest on the sub-grade, one of said feet underlying and extending parallel with said body portion, registering openings in said last named foot and said body portion, an anchoring spike passing through said registering openings and adapted to enter the sub-grade, and an opening through the other of said feet through which another anchoring spike passes; a compressible joint-forming strip disposed alongside of one of said angle members and adjacent one of the legs of each of said chairs; and clips attaching said strip to said legs.

7. A load transfer assembly for concrete roadways or the like comprising, in combination, a supporting structure including a series of spaced parallel chairs, said chairs being of an inverted rectangular U-shape, having a horizontal body portion and two depending leg portions, a pair

of elongated angle members extending transversely of said chairs and secured at intervals along their lengths to said chairs, one at the junction of one leg with the body portion and one at the junction of the other leg with the body portion of each chair, the lower ends of said legs being bent in the same direction to provide horizontal feet adapted to rest upon the sub-grade, one of said feet underlying and extending parallel with said body portion, registering openings in said last named foot and said body portion, an anchoring spike passing through said registering openings and adapted to enter the sub-grade, and an opening through the other of said feet through which another anchoring spike passes; and a series of dowel pins disposed transversely of and secured to said parallel angle pieces at intervals along said supporting structure, the ends of said dowel pins upon one side of said structure projecting beyond the angle piece upon that side; the supporting structure proper adapted to be embedded within one slab of the paving material and the projecting ends of the dowel pins within the adjacent slab.

8. An expansion joint construction for concrete roadways or the like comprising, in combination, a supporting structure including a series of chairs spaced, said chairs being of an inverted rectangular U-shape, having a horizontal body portion and two depending leg portions, a pair of elongated angle members extending transversely of said chairs and secured at intervals along their lengths to said chairs, one at the junction of one leg with the body portion and one at the junction of the other leg with the body portion of each chair, the lower ends of said legs being bent in the same direction to provide horizontal feet adapted to rest on the sub-grade, one of said feet underlying and extending parallel with said body portion, registering openings in said last named foot and said body portion, an anchoring spike passing through said registering openings and adapted to enter the sub-grade, and an opening through the other of said feet through which another anchoring spike passes; a compressible joint-forming strip disposed alongside of one of said angle members and adajacent one of the legs of each of said chairs, clips for attaching said strip to said supporting structure;

and a series of dowel pins disposed transversely of and secured to said parallel angle pieces at intervals along said supporting structure, the ends of said dowel pins upon one side of said structure projecting through openings in the joint-forming strip and adapted to be embedded in a slab beyond the latter.

9. A load transfer construction for concrete roadways or the like comprising, in combination, a plurality of substantially parallel horizontally extending dowel pins, a pair of parallel elongated standard rolled angle members spaced apart horizontally and extending transversely of said dowel pins, said parallel angle members having horizontal flanges extending toward each other and vertical flanges extending downwardly at remote edges of the two members, means securing said dowel pins to the upper surfaces of said horizontal flanges, a plurality of supporting leg elements disposed beneath said longitudinal members and secured thereto at intervals therealong, each of said leg elements being of identical construction and being generally L-shaped in configuration having feet adapted to rest upon the sub-grade and extend in opposite directions, the upper ends of the leg elements abutting the horizontal flanges of the angle members and lying against and secured to the inner faces of the depending flanges thereof, the upper and lower portions of the vertical part of each of said leg elements being offset from each other whereby the lower portions are co-planar with the depending flanges of the angle members.

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