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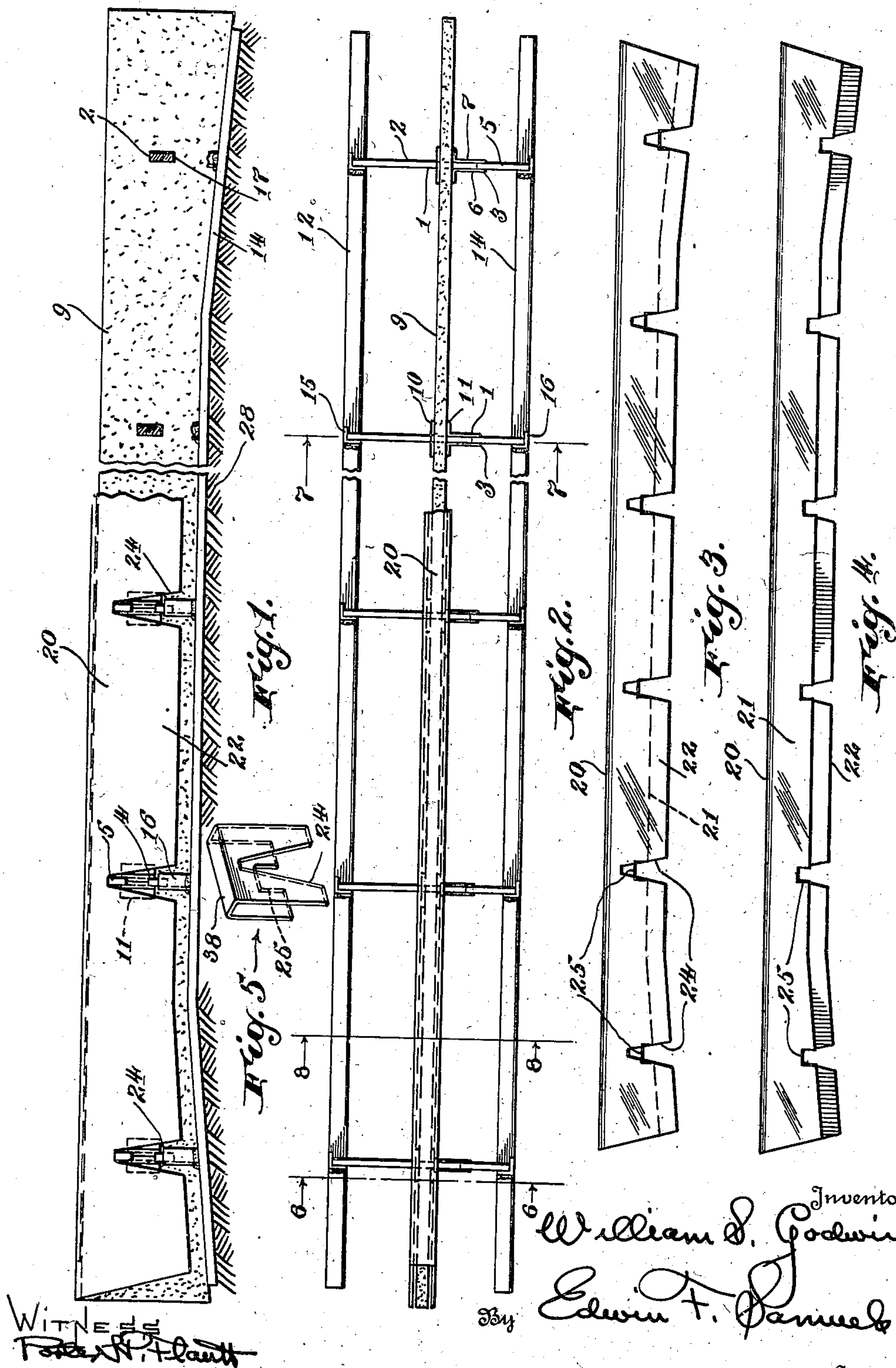
W. S. GODWIN

2,267,024

SHIELD AND DOWEL ASSEMBLY

Filed Dec 27, 1938

2 Sheets-Sheet 1





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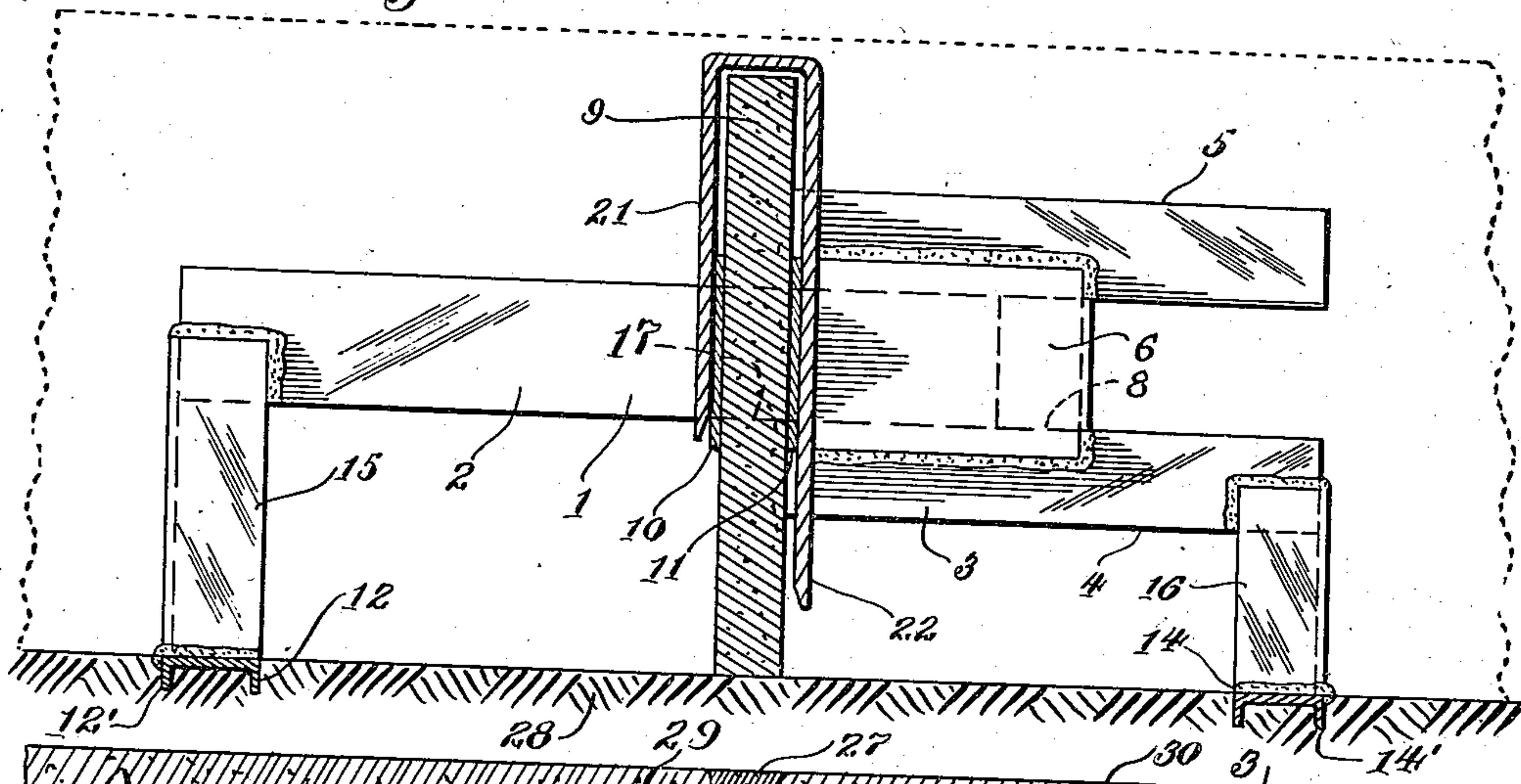
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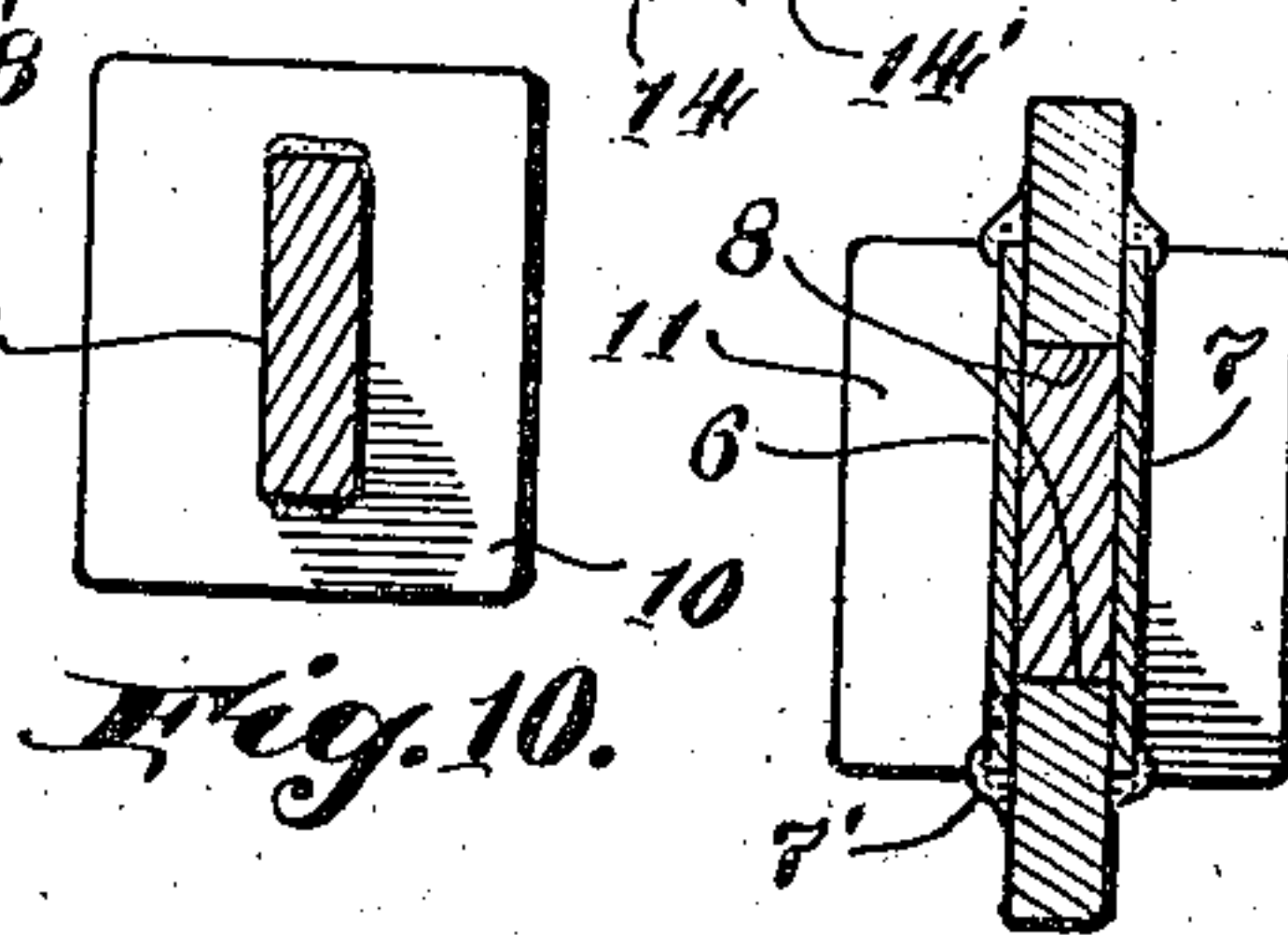
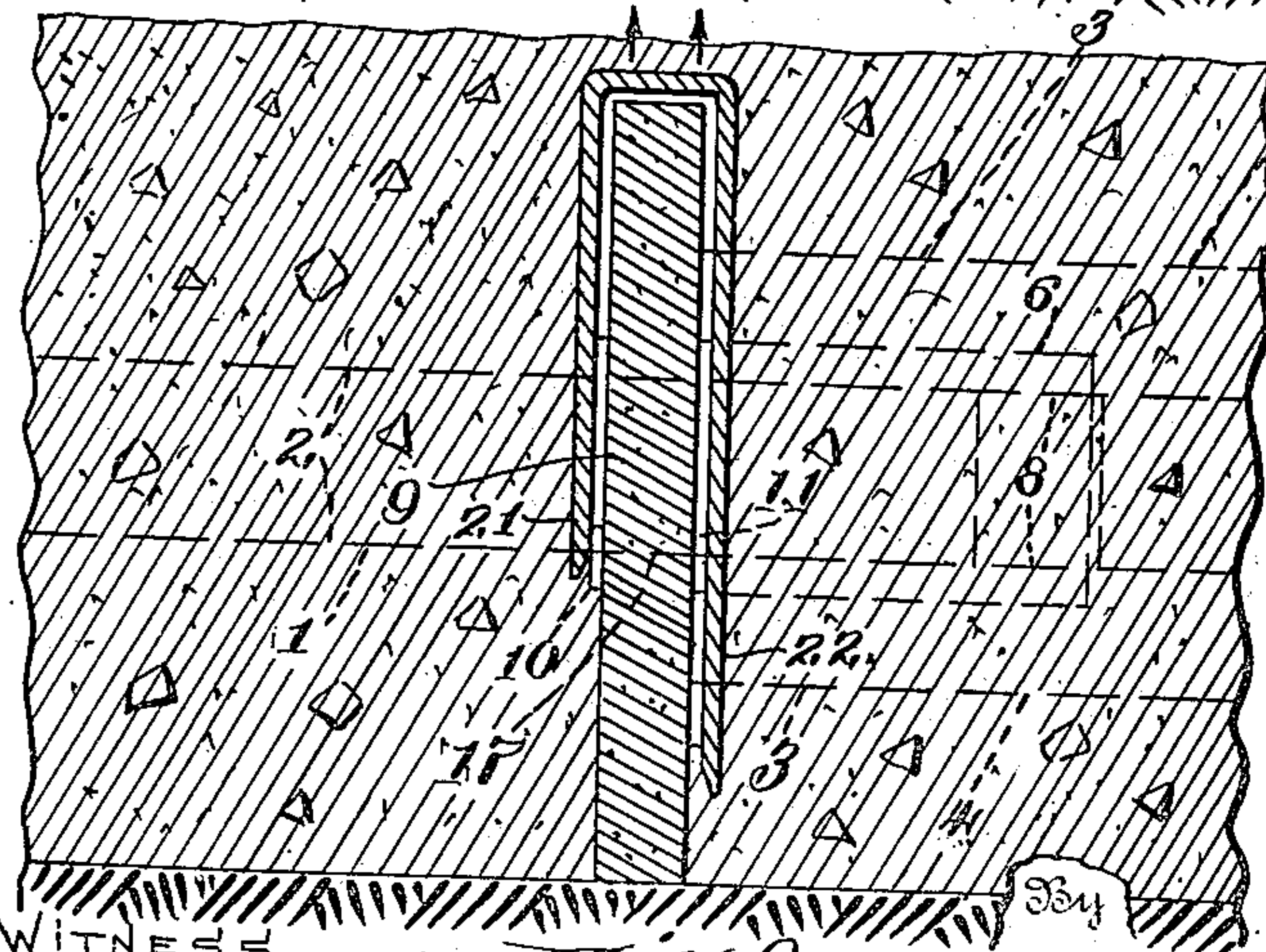
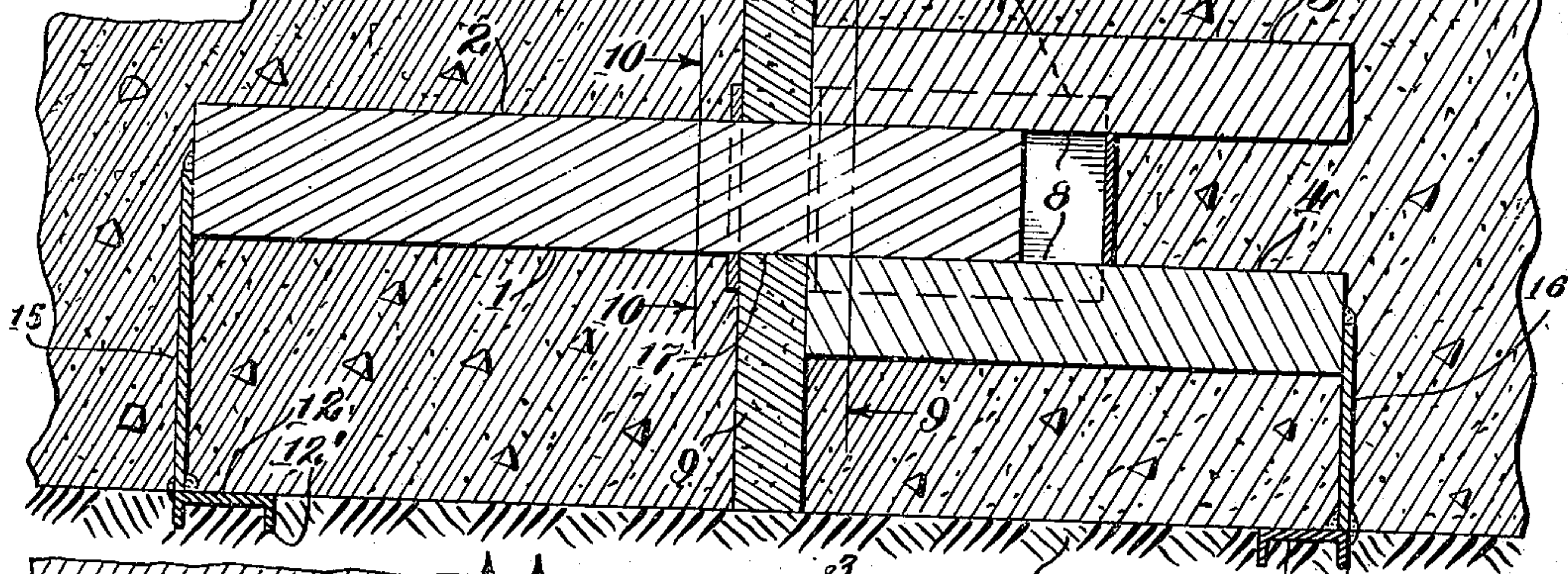
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2 Sheets-Sheet 2

*Fig. 6.*



*Fig. 7.*



*Fig. 10.*

*Fig. 9.*

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*Fig. 8.*



## UNITED STATES PATENT OFFICE

2,267,024

## SHIELD AND DOWEL ASSEMBLY

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Application December 27, 1938, Serial No. 247,789

8 Claims. (Cl. 94—51)

The invention relates to load transfer devices for supporting the adjacent edges of the slabs into which concrete pavements, particularly road or highway pavements are divided by transverse and longitudinal joints, the present application being in part a continuation of my co-pending application, Serial No. 173,785, filed November 10, 1937.

In constructing concrete paving joints, it is necessary to rigidly hold both the load transfer devices and the preformed joint filler to line and grade during the placing and working of the concrete around the joints and, particularly, around the filler and transfer devices. The present invention provides, in addition to other improvements, a rigid removable shield, and a multiple dowel and dowel support assembly, for this purpose.

During setting, the concrete shrinks, this makes it necessary that each side of the load transfer assembly be free to move relatively to the concrete slab on the other side of the joint. Any fastening sufficiently strong to hold together the two sides of the load transfer device in opposition to this tendency will cause the concrete at the joint to check or crack.

In accordance with the present invention, any and all fastening between the two members of the load transfer device on the opposite side of the joint which might tend to prevent sliding of the members of each pair of dowels, one relatively to the other in the direction of the length and transversely to the point is eliminated, and the two sides of the respective load transfer units are, in accordance with the improvement, held in position during the placing of the concrete by a removable shield which also protects the preformed filler during the operation of placing and working the concrete, the provision of this shield being an important feature of the invention. This device serves to hold the two sides of the load transfer assembly in close and rigid contact with the joint filler during the concrete casting operation, i. e., while the concrete is being placed and worked.

This shield is removed as soon as the concrete is properly placed and before it has set so that thereafter the respective sides or ends of the load transfer device on the opposite sides of the joint are free to move in the direction of their length and transversely to the joint, i. e., in opposite directions relatively to each other as the concrete shrinks and swells.

The shield, as already pointed out, also serves an important function in protecting the rela-

tively soft and partially plastic preformed asphalt or similar filler during the pouring and working of the concrete. As soon as the concrete is placed, the shield is removed permitting the concrete to occupy the slight space thus left vacant and in due course the joint is sealed with hot asphalt above the filler.

In addition to (1) the shield and (2) the method of assembling the load transfer device and sealing the joint, the invention includes (3) as an article or manufacture, a complete load transfer and filler assembly adapted to be shipped in assembled form to be placed on and fastened relatively to the road bed with the filler in the position which it is to occupy in the finished pavement and the shield being placed in its operative relation to lock the load transfer unit in the desired relation, the load transfer units are ready for the pouring and working of the concrete.

Each such unit includes a suitable length of preformed filler or filler plate and a corresponding number of load transfer units, and two supporting bars, which may be of channel or angle iron and of a length equal to the length of the filler and preferably having downwardly disposed flanges or equivalent members to enter the soil and thus prevent displacement of the assembly. The load transfer devices or dowel are supported at their respective ends remote from the joint, on these longitudinal bars, one being on each side of the joint and beneath the corresponding ends of the dowel. The outer or remote ends of the dowels are maintained in the desired horizontal alignment by means of uprights or other suitable means connected to the dowels and to the bars respectively. The dowel members are frequently provided with flanges or other engaging means for the shield one on each dowel member, the flanges, or the like, of each dowel are shown on the opposite sides of the filler. As the shields are removable, there are only a few shields to proportion to the number of joints and the assembled units for purposes of shipment are fastened together by means of a cord or wire which can be cut or removed as deemed best as the assembled load transfer device or dowel filler and support assembly is placed in position on the road bed.

In the accompanying drawings, I have illustrated an assembled concrete road joint transfer device and filler and I have also shown the shield in connection therewith, the illustration being in accordance with the preferred form of the invention and capable of considerable variation



without departure from the spirit of the invention.

In the drawings:

Fig. 1 is a side elevation of the load transfer unit assembly placed on the road bed ready for the pouring and working of the concrete, the shield being in position to hold the dowel flanges in contact with the opposite sides of the filler and in the desired assembled relation. The shield being broken away at one end for convenience of illustration.

Fig. 2 is a top plan view of the same.

Fig. 3 is a side elevation of the shield removed.

Fig. 4 is a side elevation of the same looking from the opposite side from that which is nearest the observer in Fig. 3.

Fig. 5 is a perspective view of a modified form of the shield for use with wood and similar filler strip which do not require protection.

Fig. 6 is a sectional elevation taken on and from the line 6—6 in Fig. 2, looking to the left.

Fig. 7 is a section on the line 7—7 in Fig. 2.

Fig. 8 is a section on the line 8—8 in Fig. 2, looking to the left in said figure.

Fig. 9 is a section on the line 9—9 in Fig. 7, looking in the direction of the arrows.

Fig. 10 is a section on the line 10—10 in said figure looking in the direction of the arrows.

Referring to the drawings by numerals, each of which is used to indicate the same or similar parts in the different figures.

The construction shown comprises, dowels 1, a filler 9, supporting means 12, 14, 15, 16, and shield 20. The type of dowel shown is similar disclosed in my co-pending application, except that the bolt 11, and the nut 12 in said application are omitted, the dowels 1, or each of them in the preferred form shown, the details not being essential to the present invention, the said details being claimed in my co-pending application, which consists of a bar or dowel member 2, which is preferably a solid rollable bar of rectangular cross section, said section being elongated in a vertical direction as best shown in Fig. 10. The dowel 1 also includes as an essential feature, a second dowel member or socket 3, which in the form shown consists of two bars 4 and 5, which are preferably of rectangular cross section elongated in a vertical direction and of the same thickness laterally as the bar 2. The socket bars 4 and 5 are shown as placed one over the other with their corresponding side surface in the same vertical planes and these bars are connected together by side plates 6 and 7 welded or otherwise secured to the side surfaces of both bars 4 and 5 and extending from one to the other. The welding is indicated as 7'.

This arrangement provides a socket proper 8 of substantially the same cross section as the bar 2 in which the said bar 2 is adapted to slide there being sufficient clearance to provide a satisfactory sliding relation.

Both of the dowel members, i. e., the bar 2 and the socket 3, as shown, are provided at the forward end of the socket 3 adjacent the joint and on the bar 2 at an intermediate point with laterally projecting flanges 10 and 11, respectively. These are secured to the socket member 3 and the bar member 2 in any suitable manner, as by welding, or the flange 10 may be formed by turning the ends of plates 7 and 8 to the side, i. e., outwardly at right angles, the latter being the construction shown and the flange 10 being welded directly at its inner edges to the bar or first dowel member 2 at a distance from its socket

end which permits a sufficient length to enter the socket.

The filler plate or strip 9, is the well known preformed filler of asphalt or the like which is more or less plastic, or it may be of wood or equivalent material in which case the alternative form of the shield is used. In the preferred form of the invention as shown the load transfer assembly which is an article of commerce, as already pointed out, also comprises supporting bars 12 and 14, shown as in the form of channel bars with their flanges disposed downwardly and adapted to enter the material of the road-bed. These are adapted to be placed on and seated in the road bed as shown in Figs. 6 and 7, these flanges serve to hold the filler and the dowels against displacement during pouring and working the concrete. As assembled, i. e., in the article of commerce as described, each bar or first dowel member 2 is provided with an upright support 15 which is welded at one end, i. e., its upper end, to the rear end of the bar 2, remote from the joint and at the other end to the supporting bar shown as channel 12. This upright 15 may be of any suitable type or shape, i. e., an angle iron, or channel bar or any suitable support for holding the bar 2 or the outer end thereof in the desired relation to the supporting bar 12, i. e., the bottom supporting bar. In the construction shown, the socket member 3 is supported on the corresponding bottom supporting bar 14 by means of an upright 16 which is welded at its opposite bottom and top ends to the bottom supporting bar 14 and to the socket member 3. The upright supporting bars 15 and 16 are of suitable length to hold the respective members of each dowel, i. e., the bar member 2 and the socket member 3 in alignment at right angles to the plane of the joint so that they may slide freely, one relatively to the other as the pavement contracts and expands due to change of temperature and the like.

The preformed filler, or filler strips, or plates 9 are slotted at 17 to admit the bars 2.

The load transfer units 1, as shown in Figs. 6 and 7 and as thus described are suitably spaced and the assembly including the bottom bars 12 and 14, a sufficient number of load transfer units 1, and a satisfactory length of preformed filler plate 9, equal in length to the bars 12 and 14, are assembled as a single article of manufacture or article of commerce, the bars 2 being passed through the slots 17, bringing the flanges 10 and 11 in contact with the sides of the preformed filler which the bar member 2 is sufficiently far entered into the socket 3 as shown. For shipment, this assembly is fastened together in any suitable manner in the relation in which they are shown in Figs. 1, 2, 6 and 7, and tied or wired or otherwise fastened to prevent the dowel members 2 and 3 from sliding apart and breaking down the assembly.

When received at the place of construction, they are placed in the desired positions to be occupied by the corresponding pavement joints and a corresponding shield 20, now to be described is placed in position to protect the filler plate and lock the members 2 and 3 of the dowel load transfer devices 1 in the assembled relation with the preformed filler plate 9, as shown in Figs. 6 and 7 held between flanges 10 and 11.

This shield 20 which as shown in cross section in Figs. 6 and 8, and in side elevation in Figs. 1, 3 and 4, is of inverted U shaped cross section, having two legs, 21 and 22 in the form of depending flanges or webs, the web 22, as shown, is the



longer on account of the excess vertical width of the socket member 3 as compared to bar 2. This particular detail is desirable but not essential.

The shield 20 is notched upwardly from the bottom edges of its respective webs or legs 21 and 22 providing a series of upright notches 24 on one side and 25 on the other side, these are open at the bottom edges of the webs or flanges 21 and 22 and, as shown, the notches 24 are relatively elongated and they are also tapered being of greatest width at the bottom, as shown, notches 25 are rectangular and relatively shallow, and the notches 24 and 25 are in pairs in alignment with each other transversely to the length of the shield.

The inside of the U is of just sufficient width to enclose the preformed filler 9 and the flanges 10 and 11, preferably fitting so tightly as to press these flanges against the filler. The respective pairs of slots 24 and 25 are spaced along the length of the shield in accordance with the desired spacing of the load transfer unit 1.

The aforementioned article of commerce consisting of the described assembly of a series of dowels or load transfer units 1, and a corresponding length of preformed filler 9, with the bottom supporting bars 12 and 14 and the upright support 15 and 16, being placed in position where the joint is to be formed a member of the shields 20 of length corresponding to the length are passed downwardly over the corresponding filler plates of each of a plurality of these assemblies; the notches 24 and 25 straddling the socket 3 and the bar 2 respectively of the corresponding dowels. The legs 21 and 22 of the U shaped shield 20 also pass outside of and enclose the flanges 10 and 11, whereby the corresponding members of each dowel, i. e. bar 2, and socket 3, of each dowel or load transfer unit 1 are locked in the desired assembled relation and the assembly being accurately positioned the flanges 12', 14' of the bars 12 and 14 being forced into the ground to hold the assembly against displacement.

The concrete is then poured and worked to form the slabs and the edges adjacent the joints. The shields 20 are then removed before the concrete has set which causes the concrete to contact the preformed filler plate 9; and the space between the edges of the concrete above the filler plate is sealed with hot asphalt at 27 in Fig. 7.

The shields are only sufficient in number to provide for the number of assemblies employed in each pouring and for the load transfer unit assemblies which are being set up elsewhere during the pouring operation.

It will be noted that the road-bed 28 is crowned as shown in Fig. 1 mainly for drainage purposes and the filler 9 and shield 20 are correspondingly staked. The cement pavement 29 being normally substantially flat as to its top surface 30.

Fig. 5 shows in perspective an alternative form of shield or lock, the same being indicated by reference character 38. This is a short length shield having a single pair of notches 24 and 25, for engagement with the load transfer unit or dowel 1, may be either used as a lock only where wood and equivalent preformed fillers are employed.

The construction having been fully specially described, and the advantages and method of operation having been fully set forth in connection with the drawings, and in the preamble, it being obvious that various changes can be

made without departure from the spirit of the invention, in order that the invention and the manner of constructing, applying, operating, and using the same may be fully understood, the specific terms herein are used descriptively rather than in a limiting sense, the scope of the invention being defined in the claims.

What I claim and desire to secure by Letters Patent is:

1. As an article of commerce, a load transfer assembly for a concrete road joint, comprising a series of dowel units, each consisting of a bar member adapted to be seated in the concrete on one side of the joint and a socket member adapted to be seated in the concrete on the other side of the joint, both said members being in alignment, the bar entering the socket in sliding relation; a pair of bottom supporting bars extending parallel to the joint beneath the bars and the sockets respectively and adapted to rest on the subgrade, and upright supports secured to said sockets and bar members remotely from said joint at the upper ends of said supports, the lower ends of said supports being rigidly secured to said bottom supporting bars whereby the individual bars and sockets are supported from said supporting bars in horizontal position with each dowel bar in alignment with its socket; said assembly also comprising a preformed filler through which the bars extend, the bars and sockets having stop surfaces bearing against said filler plate on its opposite sides, and cover means co-operating with said filler plates and adapted to protect the preformed filler during the pouring and to hold the series of load transfer devices in assembled relation for pouring; comprising a pair of spaced webs adapted to cover the filler plate from the top downwardly, said shield being apertured to pass the bar and socket members and adapted to take over the flanges and enclose the same to hold the socket and bar members of each dowel in assembled relation.

2. The combination in a clamp for a bar and socket dowel to hold the dowel in assembled relation with a preformed filler in the formation of a concrete paving joint, the clamp comprising an elongated member of inverted U shape, having two legs spaced by a distance slightly in excess of the thickness of the filler and connected at the top, said legs having spaced openings adapted to admit the dowel bars on one side of the filler and to admit the sockets on the other side of the filler, a plurality of said openings being spaced longitudinally of the joint according to the desired spacing of the dowels, the alignment of the sockets and dowels being at right angles to said filler, the bars and sockets being provided each with a plate adapted to bear on the opposite sides of the filler in the assembled position of the dowel, the U shaped member being mounted to straddle the filler and engaging the plates oppositely to the filler, holding the sockets and dowels in their assembled relation during the pouring of the concrete.

3. The combination with a series of bars and a series of corresponding and respectively co-operating sockets, the bars and sockets forming dowels for the joints of concrete roads, the series of bars having supporting and spacing means with which they form a continuous rigid integral structure, the sockets likewise having supporting and spacing means with which they form a continuous rigid integral structure, the bars having abutments bearing on the filler on one side, the sockets having abutments bearing on the



filler on the other side, and removable cover members overlying the filler and having members rigidly supported on opposite sides of the filler and adapted to engage the abutments oppositely to the filler holding the sockets and bars in assembled relation during the pouring of the concrete.

4. As an article of commerce, a load transfer assembly for a concrete road joint, comprising a series of dowel units, each consisting of a bar member adapted to be seated in the concrete on one side of the joint and a socket member adapted to be seated in the concrete on the other side of the joint, both said members being in alignment, the bars entering the sockets in sliding relation; a pair of rigid bottom supporting bars beneath the outer ends of the bars and sockets respectively, and adapted to rest on the sub-grade, and a rigid upright support for each bar and each socket said uprights having their lower ends rigidly secured to said bottom supporting bars, the upper ends of said uprights being respectively secured to the outer ends of said dowel bars, and said sockets whereby the individual bars and sockets over said bottom supporting bars are supported in horizontal position with each bar in alignment with its socket; said assembly also comprising a preformed filler through which the bars extend, the bars and sockets each having a flat abutment bearing on said filler, the bar abutment engaging the filler on one side and the socket abutment engaging it on the other side, the rigid connection of the bottom supporting bars to the dowel bars and sockets and said abutments serving to hold the dowel, bars and sockets respectively in alignment and the respective dowels in parallel and at right angles to the filler.

5. As an article of commerce, a load transfer assembly for a concrete road joint, comprising a series of dowel units, each consisting of a bar member adapted to be seated in the concrete on one side of the joint and a socket member adapted to be seated in the concrete on the other side of the joint, said members being in alignment, the bars entering the sockets in sliding relation; a pair of rigid bottom supporting bars having downwardly projecting portions to enter the sub-grade and located one on each side of the joint and extending parallel to the joint beneath the outer portions of the bars and sockets respectively of the series of dowel units and a rigid upright for each bar and each socket of said dowel unit, said uprights having their lower ends rigidly secured to said bottom supporting bars, the upper ends of said uprights being rigidly secured to the outer ends of the bars and sockets of said dowel units over said bottom supporting bars, whereby the individual bars and sockets are supported in horizontal position with each bar in alignment with its socket; said assembly also

comprising a preformed filler through which the bars extend, and means for locating and securing the bars and sockets relatively to the filler.

6. The method of forming expansion joints in concrete pavements which consists in providing two preformed rigid constructions, one comprising a set of dowel bar members, and the other construction comprising a set of dowel socket members corresponding to the dowel bar members said members in the respective constructions being equally spaced, each rigid construction having a single bottom support in rigid relation with its said members; combining said two rigid constructions, with said bar and socket members respectively in telescoping relation and a joint filler at the center at right angles to the bars and sockets, the bars extending through the filler at right angles thereto, placing the supports of each said rigid construction on the sub-grade, clamping each bar and its corresponding socket and the filler together and pouring the concrete.

7. The combination with a series of bars and a series of corresponding and respectively co-operating sockets, the bars and co-operating sockets comprising dowel units for concrete road joints, the dowel units extending across the joint and being adapted to be imbedded in the concrete on opposite sides of the joint, said series of bars having supporting and spacing means with which they form a continuous rigid integral structure, the sockets likewise having supporting and spacing means with which they form a continuous rigid integral structure, said supporting and spacing means in each instance comprising a substantially flat rectilinear bar adapted to rest on the sub-grade, parallel to the joint and having flanges extending downwardly from said bar and adapted to enter the sub-grade to prevent displacement of the dowel units in horizontal directions, a filler for said joint and means for locking the dowel units in assembled relation to and with said filler.

8. As an article of manufacture a load transfer assembly for concrete road joint, comprising a series of dowel units extending across the joint at right angles thereto and adapted to be seated in the concrete on opposite sides of the joint and a supporting and spacing member for said dowel units on each side of the joint, each said member being rigidly connected to the dowels on the same side of the joint and being in the form of a rectilinear bar parallel to the joint and having a substantially flat portion of a considerable horizontal extent adapted to rest on the sub-grade, each said bar also having a depending portion adapted to enter the sub-grade and serving to prevent yielding of the dowel units in horizontal directions during the placing and tamping of the concrete.

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