Nov. 3, 1942. A. MUSALL 2,301,137

MEANS FOR RESILIENTLY INTERLOCKING CONCRETE ROAD SLABS

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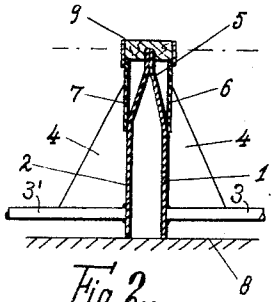


Fig. 2.

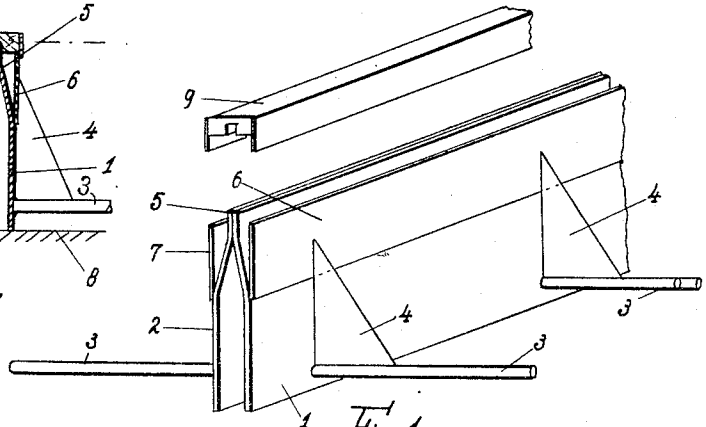


Fig. 1.

Fig. 3.

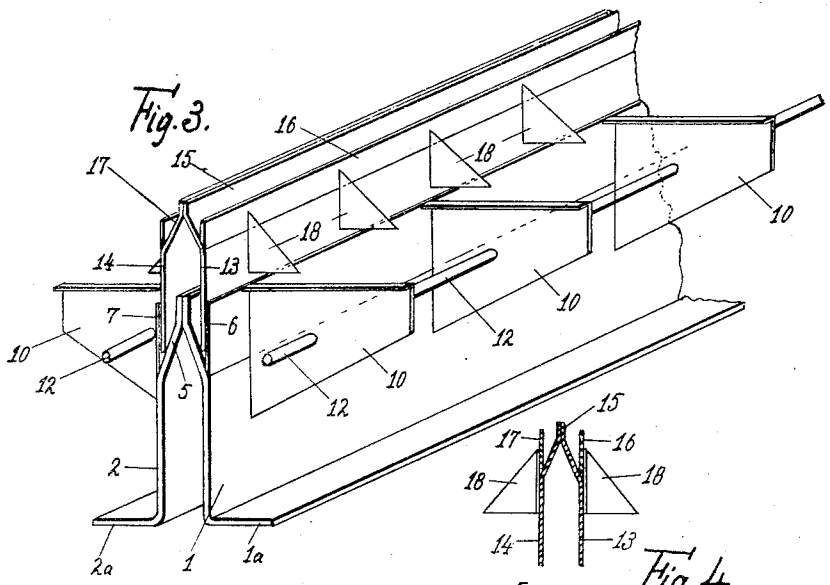
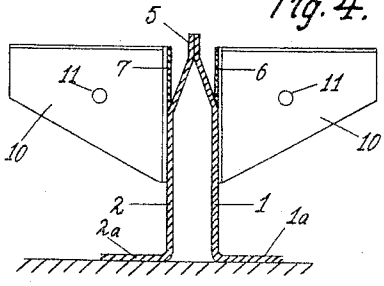


Fig. 4.



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By [signature] his Atty.

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MEANS FOR RESILIENTLY INTERLOCKING CONCRETE ROAD SLABS

Alexander Musall, Berlin, Germany; vested in the Alien Property Custodian

Application December 13, 1938, Serial No. 245,439
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4 Claims. (Cl. 94—18)

This invention relates to means for resiliently interlocking concrete road slabs, which means constitute the transverse joints between the slabs and remain permanently between the slabs after the joints have been formed.

According to the invention two parallel dowel plates so spaced as to constitute a form for a joint between two contiguous slabs, and preferably of the same length as this joint, have inwardly inclined upper portions rigidly united at their upper edge in the manner of a hip-roof, and are provided on their outer sides with anchoring elements consisting of pieces of sheet metal or rods welded onto the plates and disposed at right angles to the upper edge of the plates. The result achieved by this arrangement is that the vertical transverse forces set up between any two of the slabs forming part of a road surface are taken up in the simplest manner by the dowel plates equipped with anchoring elements, owing to the peculiar behaviour of the roof-shaped part of the assembly, this roof-shaped part being at the same time capable of yielding to longitudinal expansions and contractions of the slabs and consequent narrowing and widening of the joints due to temperature fluctuations. At the same time the dowel plates constitute a form for the formation of the expansion joints during the production of the concrete road slabs, and remain permanently between the slabs, so that the making of the joints is very considerably simplified.

The joint-forming interlocking means according to the invention afford the further advantage that, when the road is built in two superposed layers, two similar assemblies may be fitted together one vertically above the other, the lower of said assemblies corresponding in height to the thickness of the lower layer of the concrete slabs, while the upper assembly corresponds in height to the thickness of the upper concrete layer. In this case the lower assembly is destined to take up the vertical transverse forces between the slabs while the upper assembly serves primarily to form the upper part of the joint and takes up only a small part of the transverse forces so as not to allow the concrete to break away at the upper edges of the slabs.

Two embodiments of the invention are shown by way of example in the accompanying drawing, in which—

Fig. 1 is a perspective view of one embodiment,

Fig. 2 is a transverse section of the assembly shown in Fig. 1,

Fig. 3 is a perspective view of a second embodiment for use in conjunction with concrete slabs comprising two layers, and

Fig. 4 is a cross-section of the assembly shown in Fig. 3, with the upper and lower parts shown separated from each other.

Referring first to Figs. 1 and 2, the interlocking means for incorporation in the transverse joints of concrete road surfaces consists of two parallel sheet metal dowel plates 1 and 2 to the outer sides of which anchoring rods 3 are butt-welded with struts in the form of welded-on vertical sheet metal angle pieces 4. The length of the dowel plates 1 and 2 corresponds to the breadth of the individual slabs of which the road surface is composed. The dowel plates 1 and 2 have their upper portions inwardly inclined in the form of a hip-roof, as at 5, and they are welded together at the apex. The dowel plates 1 and 2 may alternatively consist of a single piece of material and be formed integrally with the hip-roof portion 5 by bending. The hip-roof portion 5 is encased between two welded-on side plates 6 and 7, the struts 4 being preferably arranged to support these side plates also. The assembly thus formed is set up on the road bed 8 transversely thereof, after which the concrete is poured and rammed, so that the upper surface of the plates 1, 6 and 2, 7 delimits the transverse joint. In order to prevent the concrete from finding its way into the hollow space between the plates 6 and 7 and the hip-roof portion 5 when the concrete is being poured and rammed, a coping 9 is placed on the assembly and removed after the slabs have set. The joints between the slabs may then be filled with any known joint filling composition. If for any reason the road bed 8 subsides the described interlocking means prevent the slabs from knocking together at the edges since the vertical transverse forces are taken up by the anchoring elements 3, dowel plates 1 and 2 and hip-roof portion 5, while the hip-roof portion 5 at the same time allows of relative movement between the dowel plates 1 and 2 in response to longitudinal expansions and contractions of the slabs due to temperature fluctuations.

The embodiment shown in Figs. 3 and 4 is intended for use in conjunction with concrete road slabs which are poured and rammed in two layers. Referring to these figures, the dowel plates 1 and 2, which are rigidly interconnected by means of a hip-roof portion 5 as in the previously described embodiment, are provided on the outside with anchoring sheet metal elements 10 disposed at right angles to the road surface, so that the jointing means do not impede the work

of pouring and ramming the concrete used in making the lower layer, and no hollow spaces are formed. The sheet metal anchoring elements 10 are provided with drilled holes 11 through which may be passed anchoring rods 12 disposed parallel to the plates 1 and 2. In this case, as before, the hip-roof portion 5 of the dowel plates 1 and 2 is encased between side plates 6 and 7. The height of the plates 1 and 2 with the hip-roof portion 5 is equal to the thickness of the bottom layer of the concrete road slabs.

The jointing assembly is stood upright across the road with its bottom flanges 1a and 2a resting on the road bed 8, and the lower layer of the road surface is then poured and rammed, the plates 1, 6 and 2, 7 delimiting the joints, as before, and being anchored in the concrete by the sheet metal elements 10. During the pouring and ramming of the bottom concrete layer, the interlocking assembly is closed at the top by any suitable form of coping or cap which is removed after this layer has been rammed. Into the longitudinal hollow spaces formed between the plates 6 and 7 and the hip-roof portion 5 there are then inserted the lower ends of the sheet metal members 13 and 14 of a superstructure, these members being arranged to fit snugly against the side plates 6 and 7 and being likewise inwardly bent and united at 15, after the manner of a hip-roof. This hip-roof portion 15 is again encased between side plates 16 and 17 which in their turn are welded to the plates 13 and 14. Adjoining the outer surfaces of the plates 13 and 14, e. g., welded thereto, are sheet metal anchoring elements 18 disposed at right angles to the road surface and serving to anchor the superstructure in the upper layer of the concrete. During the pouring and ramming of the upper layer of the concrete the hollow space at the top of the superstructure between the hip-roof portion 15 and the side plates 16 and 17 is closed by means of a suitable coping which is removed after the concrete has set to allow the open joint to be filled with a jointing composition. The purpose of the described superstructure is, broadly, to continue the joint out to the upper surface of the composite concrete slabs, the hip-roof portion 15 allowing the plates 13, 16 and 14, 17 to yield to the expansion and contraction of the concrete slabs.

Owing to the peculiar features and construction of the described assembly the sheet metal anchoring elements 10 are completely embedded in the material of the slabs, so that the vertical transverse forces set up between any two contiguous slabs are taken up effectively by the lower portion of the assembly. Since the superstructure takes up vertical transverse forces only to a slight extent, there is no danger of the concrete breaking away at the upper edges of the slabs.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:

1. Dowel means for resiliently interlocking concrete road slabs so as to form permanent joints therebetween, said means comprising two dowel supporting plates of a length equal to the width of the slabs, said plates having substantially vertical parallel lower portions adapted to be placed on the road bed on their lower edges and defining between them a free unobstructed space and integral upper portions inclined towards each other and rigidly united at their upper edges to form a hip-roof constituting the only connection between said plates, anchoring elements secured to the outer sides of said parallel plate portions and projecting therefrom in outward direction only, and parallel side plates secured to and projecting upwardly from the parallel portions of said dowel supporting plates and encasing the hip-roof portions of the latter.

2. Dowel means for resiliently interlocking concrete road slabs so as to form permanent joints therebetween, said means comprising two dowel supporting plates of a length equal to the width of the slabs, said plates having substantially vertical parallel lower portions adapted to be placed on the road bed on their lower edges and defining between them a free, unobstructed space and integral upper portions inclined towards one another and rigidly united at their upper edges to form a hip roof constituting the only connection between said plates, parallel side plates secured to and projecting upwardly from the parallel portions of said dowel supporting plates and encasing the hip-roof portions of the latter, and angular sheet metal struts secured to said parallel plate portions and side plates and projecting at right angles therefrom in outward direction only.

3. Dowel means for resiliently interlocking concrete road slabs so as to form permanent joints therebetween, said means comprising two dowel supporting plates of a length equal to the width of the slabs, said plates having parallel lower portions adapted to be placed on the road bed on their lower edges and being spaced to constitute a form for a joint between two contiguous slabs, and integral upper portions inclined towards one another and rigidly united at their upper edges to form a hip-roof, and anchoring elements including sheet metal struts secured to the outer sides of said parallel plate portions and projecting at right angles therefrom, all the struts secured to one and the same plate being provided with aligned holes, and anchoring rods passing through said holes and being disposed parallel to said plates.

4. Dowel means for resiliently interlocking concrete road slabs and forming permanent joints therebetween in concrete roads which are manufactured in several layers, said means comprising a base member and an upper member, said base member including two dowel supporting plates of a length equal to the width of the slabs and of a height corresponding to that of the lowest cement layer, said plates having substantially vertical parallel lower portions adapted to be placed on the roadbed on their lower edges and defining between them a free, unobstructed space, and integral upper portions inclined towards one another and rigidly united at their upper edges to form a hip-roof constituting the only connection between said plates, anchoring elements secured to the outer sides of said parallel plate portions and projecting therefrom in outward direction only, and parallel side plates secured to and projecting upwardly from said parallel portions to encase said hip-roof, said upper member including two plates having parallel spaced lower portions adapted to fit between the hip-roof and vertical side plates of said base member, and upper portions integral with said parallel portions, said upper portions being inwardly inclined towards one another and rigidly united at their upper edges to form a second hip-roof constituting the only connection between said plates and the upper member.

ALEXANDER MUSALL.