Aug. 11, 1936. J. P. GROWDON 2,050,313

FLOOR CONSTRUCTION FOR BRIDGES AND THE LIKE

Filed May 18, 1933

Fig. 1.

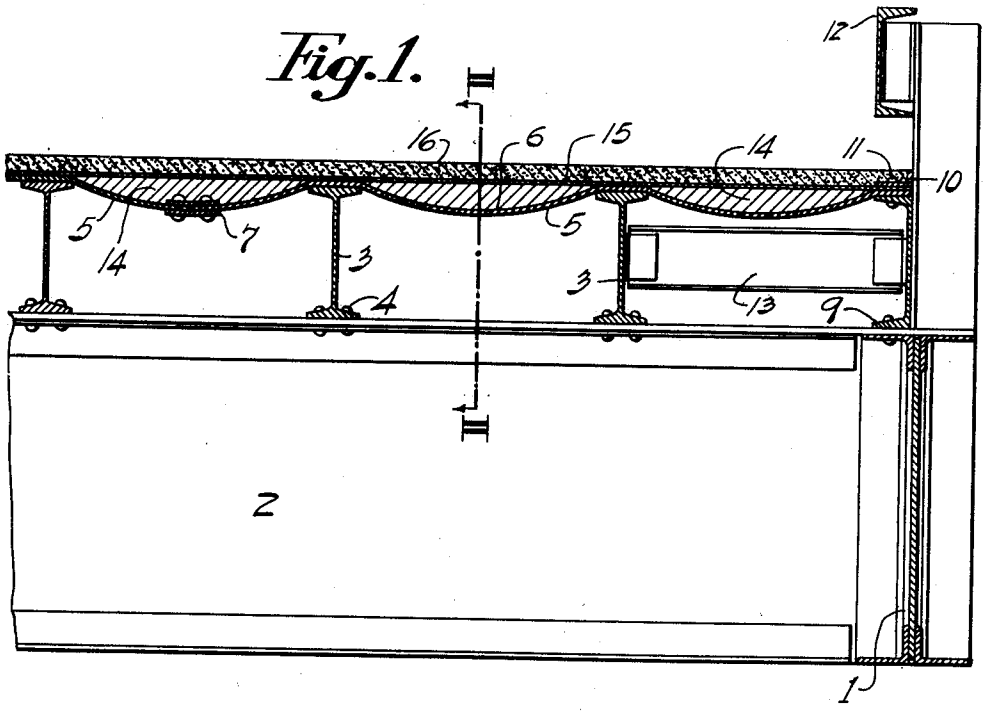


Fig. 2.

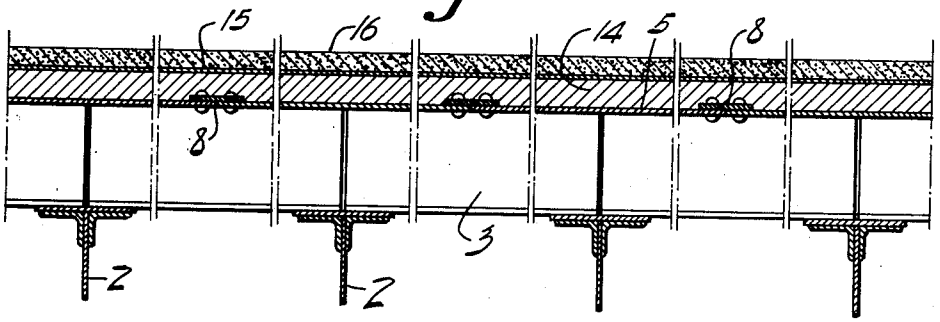
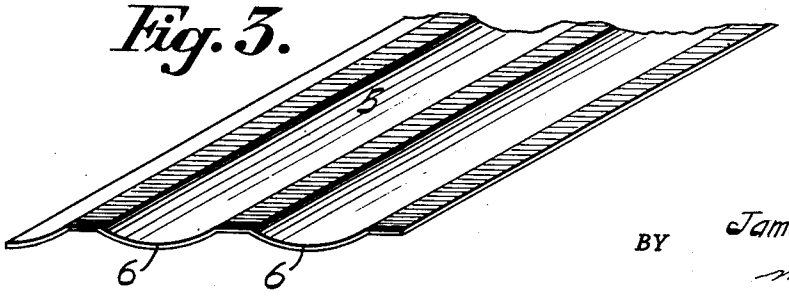


Fig. 3.



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Patented Aug. 11, 1936

2,050,313

UNITED STATES PATENT OFFICE

2,050,313

FLOOR CONSTRUCTION FOR BRIDGES AND THE LIKE

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Application May 18, 1933, Serial No. 671,600

6 Claims. (Cl. 14—73)

This invention relates to floor construction, and particularly to an improved construction for bridge flooring and the like.

It is well known that a large portion of the dead-load of a highway bridge structure is the weight of the floor and it is also known that in long spans this weight may be the controlling factor in the design of the supporting structure. It is thus apparent that the maximum span length possible with given construction materials is materially increased by a decrease in floor weight. Past experience has shown that it is difficult to reduce the usual floor weight appreciably and still obtain a road surface which is resistant to the stresses incident to heavy traffic movement or otherwise suited to the requirements of a satisfactory flooring surface.

It is an object of my invention to obtain a floor construction suitable for heavy traffic, substantially lighter in weight than present forms of construction and highly resistant to stresses which tend to deteriorate the surface of the floor. Another object is the provision of a floor construction which is convenient to assemble in position on the structure and which can be readily substituted in existing structures for present flooring. Other objects will be apparent from the following description and drawing in which;

Fig 1 shows a partial transverse section of a bridge structure embodying my invention;

Fig. 2 is a partial longitudinal section through the same bridge structure and is taken along the line II—II;

Fig. 3 is a perspective view of a portion of one of the supporting plates used in the bridge structure.

Referring to the drawing, 1 and 2 are the main longitudinal and transverse stringers respectively of a typical highway bridge and are framed into the remainder of the bridge structure according to the usual structural practice. Mounted on the transverse stringers and parallel to the longitudinal stringers are a plurality of floor stringers or sleepers 3. Preferably, the sleepers are suitable beam sections as shown and are attached to the transverse stringers by any suitable means such as rivets 4. A supporting plate 5 is mounted on the sleepers 3 and by itself or in cooperation with other similar plates is continuous across the bridge floor. Each plate 5 is provided with a plurality of longitudinal depressions 6 parallel to the sleepers and continued for the full length of the bridge span. If desired, the plate can be attached to the sleepers in any convenient manner, as by riveting, but such attachment is unnecessary in some instances.

Because of limitations imposed by the sizes of plates commercially available, it is usually necessary to splice two or more widths of plate to cover large widths of roadway. Such splicing is preferably effected by the use of a longitudinal butt and double-strap joint 7 placed centrally in one of the depressed portions of the plate. The lengths of plate longitudinal to the bridge floor may also be conveniently spliced by means of a butt and strap-joint 8 when necessary.

To attain the full advantage of my improved structure it is necessary that the edges of the plate 5 be rigidly fixed to the bridge structure. This may be done as shown in the drawing, for example, by fixing the end sleeper 9, which is preferably a channel section, to the longitudinal stringer 1. The edge of the plate 5 is then placed intermediate the upper flange of the channel 9 and an angle section 10 located above and extending parallel to the channel, and the three members are secured by rivets 11 placed at intervals along the span. A bumper bar 12 or some other convenient form of rail may be provided by framing from the channel 9 or the longitudinal stringer 1. Added rigidity can be obtained if desired by the provision of spacers 13 between some or all of the sleepers.

The plate 5 serves to support the floor material used on the bridge. By the provision of the depressions this plate carries the loads imposed on it both in moment and in tension. The proportion of the load carried in moment to the proportion of the load carried in tension may be varied by increasing or decreasing the depth of the depressions, while the distance between adjacent sleepers remains fixed. By carrying a large proportion of the load on the plate in tension, the deflection of the plate between sleepers due to traffic loading is considerably decreased.

The road surfacing material, such as asphalt or the like, can be placed directly on the plate 5, or arcuate filler pieces 14 of asphaltic board, wood or the like can be provided which serve to distribute an applied traffic load more uniformly over the span between the sleepers. A third and preferred modification includes the use of the arcuate filler pieces 14 above which is placed a plate 15 substantially coextensive with the supporting plates 5. This plate, together with the filler pieces, serves to distribute the traffic load more uniformly over the supporting structure and thereby aids in protecting the road surfacing material 16. Where a metal road surface is not ob-

jectionable, the surfacing material 16 may be omitted and the plate 15 may be provided with projections or the like commonly used on tread plates. A highly satisfactory lightweight structure will thus be provided.

The supporting plate 5, due to its form, can be loaded considerably higher without excessive deflection than the flat plates commonly used, because a major portion of the load is carried in tension rather than in moment. This results in economy in weight, because a lighter plate can be used than that required if a flat plate were used. Further, by minimizing deflection between the supports, the road surfacing material is less apt to check or crack, these being faults common to road surfacing material supported on flat plates.

By so forming and positioning the plates that the arcuate depressions extend substantially parallel to the movement of traffic, as shown, such cracking is further minimized as no relatively unyielding supporting structure is presented across the movement of traffic. By avoiding abrupt changes of rigidity in the supporting structure across the movement of traffic, a much more durable and satisfactory floor surface is obtained. It has also been found that the surface is less inclined to roughness and unevenness, and that the so-called "wash-board" effect generally found in bridge floors which have been subjected to heavy traffic is entirely eliminated.

In Fig. 3 a plate is shown having its edges parallel to the depressions 6 in two different forms. One edge is shown terminating in the bottom of a depression for splicing, as shown at 7 in Fig. 1, and the other as terminating in a horizontal section such as is employed for attaching to the supporting structure by the rivet 11 in Fig. 1. It is obvious that any individual plate can be provided with one or both edges of either type and that, if desired, the plate can be made of a width corresponding to a single span.

While I have illustrated and described a specific and, at present, preferred form of my invention, it is to be understood that my invention is not limited thereto. Various other modifications and changes may be made without departing from the spirit and scope of my invention as defined in the appended claims.

I claim:

1. A bridge floor structure having longitudinal stringers, transverse stringers, a plurality of spaced sleepers parallel to said longitudinal stringers, a road supporting plate substantially continuous across said sleepers, said plate having a single longitudinally continuous preformed arcuate depression in the span between each pair of adjacent sleepers, filler blocks substantially filling said depressions, a secondary plate covering said blocks and said supporting plate, and a road surfacing material on said secondary plate.

2. A bridge floor structure having longitudinal stringers, transverse stringers, a plurality of spaced sleepers parallel to said longitudinal stringers, a road supporting plate substantially continuous across said sleepers, said plate having a longitudinally continuous preformed arcuate depression in the span between each pair of adjacent sleepers, filler blocks substantially filling said depressions, and a floor plate covering said blocks and said supporting plate.

3. A bridge floor structure having longitudinal stringers, transverse stringers, a plurality of spaced sleepers parallel to said longitudinal stringers, a road supporting plate substantially continuous across said sleepers, said plate having a single longitudinally continuous preformed arcuate depression in the span between each pair of adjacent sleepers, separable filler blocks substantially filling said depressions and a road surfacing material above said blocks and said supporting plate.

4. In a bridge floor structure, a plurality of longitudinal sleepers, a road supporting plate substantially continuous across said sleepers and having a single longitudinally continuous preformed arcuate depression in the span between each pair of adjacent sleepers, and preformed filler blocks substantially filling said depressions.

5. In a bridge floor structure, a plurality of parallel sleepers, a road-supporting plate substantially continuous across said sleepers and having a single, continuous, preformed, arcuate depression in the span between each pair of adjacent sleepers, and preformed filler blocks substantially filling said depressions.

6. In a bridge floor structure, a plurality of parallel sleepers, a road-supporting plate substantially continuous across said sleepers and having a single, continuous, preformed, arcuate depression in the span between each pair of adjacent sleepers and having an intervening portion contacting the top of each sleeper, said portions extending parallel with said arcuate depressions and adjoining said depressions at the upper edges of said sleepers, filler blocks substantially filling said depressions, and a road-surfacing material above said blocks and said supporting plate.

JAMES P. GROWDON.