Aug. 13, 1940. H. NAGIN 2,211,513

REINFORCED STRUCTURE

Filed Oct. 21, 1938

Fig. 1.

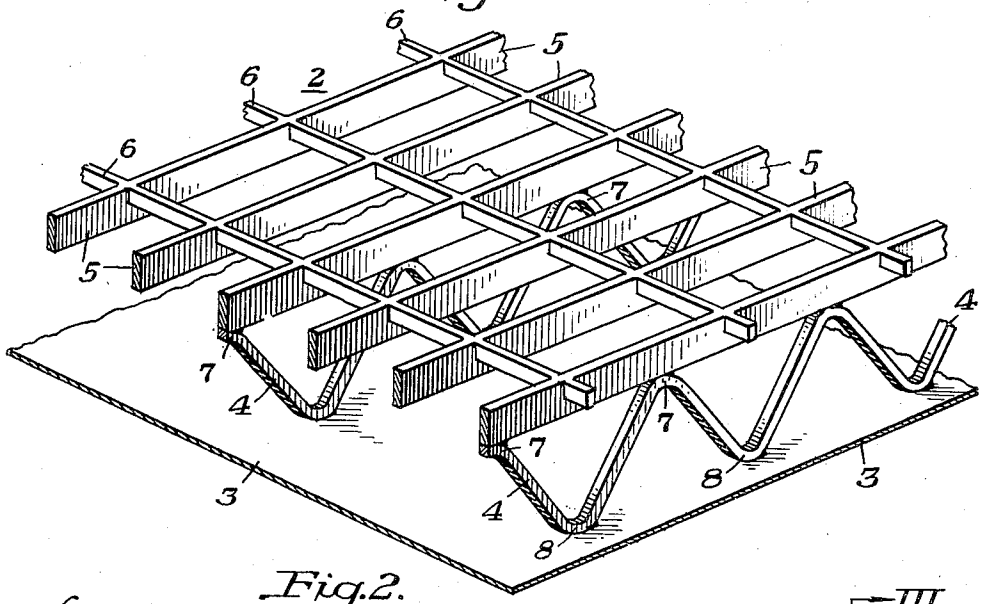


Fig. 2.

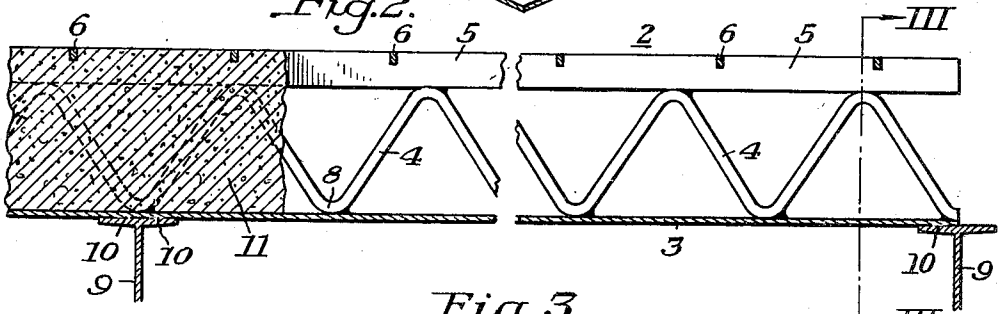
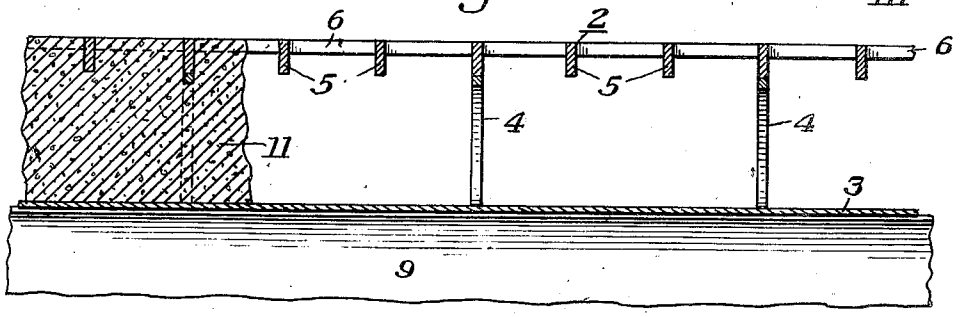


Fig. 3.



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REINFORCED STRUCTURE

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3 Claims. (Cl. 14—73)

This invention relates to a reinforced structure and more particularly to grating structures, such as are used for bridges, buildings, loading platforms, subway or vault covers, and the like.

It is customary practice to make the grating in units or slabs of metal elements which are assembled at the fabricating plant. The units are later placed in position over the desired structure, fastened together, and to the supports and the spaces in the slabs or units are filled with concrete or other filling material. Such structures are frequently subjected to severe stresses which are not easily calculated and difficulties have arisen in some instances in determining how the different stresses and strains which appear in the various structures should be provided for.

In some instances, due to the limited space available for the depth of the structure, it is essential that the depth or thickness be kept at a minimum, and at the same time the structure must be a unified one which is capable of resisting stresses in all directions. In some locations the structure may be subjected to corrosive fumes and this means that as the lowermost part of the reinforcing structure will be thus exposed, it must, in addition to being capable of resisting stresses of many kinds applied in various directions, also be corrosive resistant.

I provide a structure which properly distributes the loads imposed thereon and which is of small overall depth. The structure is composed of a top grid-like structure or mat and a spaced apart bottom or base plate, connected by a truss bar which may carry shear stresses and also spaces the mat and the bottom plate apart. The metal base plate is continuous and has considerable strength in all horizontal directions. The continuous base plate serves also as a form for pouring the concrete or other filling material and also as a bottom for the finished slab, which bottom makes the structure a unified one capable of resisting stresses in all directions. By fastening the base plate to the underlying stringers or supports, the stringers are firmly connected and laterally braced and this permits wider space of the stringers or floor supports and adds to the general stiffness of the supporting structure. If the base plate is made of non-corrosive material, such as wrought iron or stainless metal or ordinary steel with a resistant coating on the bottom, the structure will be resistant to corrosive conditions.

My improved structure is relatively simple and inexpensive to build, is a unified one and capable of resisting stresses in all directions and may be placed with ease directly on and secured to the supporting structure, and when filled with concrete or other filling material, is very strong and relatively permanent. The openness of the structure permits maximum concrete continuity and therefore permits full utilization of the strength of the concrete and furthermore no bottom forms are required.

In the accompanying drawing I have shown for purposes of illustration only the present preferred form of my invention.

In the drawing:

Figure 1 is a perspective view showing the reinforcing structure;

Figure 2 is a vertical sectional view of an elevation showing a portion of the structure filled with concrete; and

Figure 3 is a vertical sectional view along the line III—III of Figure 2.

The drawing shows a reinforcing slab consisting of a metal upper grid or mat 2, a metal bottom or base plate 3 which is continuous throughout the slab and forms the bottom thereof, and a metal truss bar 4 which is secured to the grid 2 and the bottom plate 3 and serves to space them apart. The upper grid 2 consists of longitudinal or bearer bars 5 which are spaced apart and connected together by transverse crossbars 6 by suitable joints, preferably by electric pressure welding. The top of the bearer bars or compression bars 5 and the cross bars 6 terminate in substantially the same plane. The bearer bars 5 and the cross-bars 6 are spaced so as to provide a grating surface for openings of a desirable size which surface serves as a pavement armoring when the structure is filled with cementitious material. The term "cementitious material" as hereinafter used is intended to include concrete, asphaltic and other materials which are used as filling materials in reinforced traffic bearing structures.

The bottom or base plate 3 is continuous throughout the slab or unit and serves to distribute and resist all horizontal stresses. Where corrosive fumes may be encountered the plate 3 is preferably made of corrosion resistant material such as wrought iron, stainless steel or ordinary steel coated on the lower side with a corrosion resistant material. The plate also serves as a form on which the cementitious material may be poured and lends rigidity to the supporting structure.

The truss bar 4 is formed from ordinary merchant bars and is of zigzag shape. The bars are secured at the upper bends 7 to the bearer bars 5 by welding and at the lower bends 8 to the base plate 3 by welding. It is ordinarily not

necessary to provide truss bars between each bearer bar and the base plate. The number of truss bars employed and the spacing thereof is a matter of calculation, depending upon the desired characteristics of the reinforced structure.

The reinforcing slab structure is preferably preassembled and handled in unit sections which are later placed in the structure desired and the units are later fastened together, preferably by welding. After the assembled slab or unit has been positioned it will overlie a support 9 shown in the drawing as an I-beam. The base plate 3 is then welded to the top flange of the support at intervals 10 or if desired can be edge welded along the adjoining edge of the flange. Each unit is welded to the adjoining unit to form a unitary structure.

After the various units have been secured in position on the underlying supports 9 the units are filled with cementitious material. The top surface of the cementitious material is preferably finished flush with the top surface of the mat 2 in which case the mat 2 provides a pavement armoring. After the cementitious material has hardened or set, it develops to full strength and is effective for receiving and distributing the loads imposed on the structure. It will be observed that due to the openness of the reinforcing structure, the continuity of the cementitious material is at a maximum and the reinforcement and the cementitious materials are firmly interlocked. The slabs may be fabricated and positioned at relatively low cost and when filled with a cementitious material provide a strong and rigid structure of the highest quality and of relatively small depth.

While I have illustrated and described a preferred embodiment of my invention, it will be understood that the same is not limited thereto, since various modifications may be made without departing from the scope of the following claims.

I claim:

1. A reinforced composite slab structure comprising spaced bearer bars, transverse cross-bars of less depth than the bearer bars and electric pressure welded thereto, the upper faces of said bearer bars and said cross-bars lying in substantially the same plane, a continuous base plate below and spaced from the bearer bars, a truss interposed between some of said bearer bars and the base plate and connected to each, the longitudinal axis of the bearer bars and the truss lying in substantially parallel planes, and cementitious material extending upwardly from the base plate and substantially filling the spaces between the several members.

2. A metal structure for reinforcing concrete floors and the like comprising spaced bearer bars, transverse cross-bars welded thereto, the upper faces of said bearer bars and said cross-bars lying in substantially the same plane, a continuous base plate having the lowermost side coated with a corrosion resistant material below and spaced from the bearer bars and a truss interposed between some of said bearer bars and the base plate and connected to each, the longitudinal axis of the bearer bars and the truss lying in substantially parallel planes.

3. A reinforced composite slab structure comprising spaced parallel bearer bars, transverse cross-bars of less depth than the bearer bars and electric pressure welded thereto, the upper faces of said bearer bars and said cross-bars lying in substantially the same plane, a continuous base plate of corrosion resistant material below and spaced from the bearer bars and a truss interposed between some of said bearer bars and the base plate and connected to each, the longitudinal axis of the bearer bars and the truss lying in a substantially parallel plane.

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