March 26, 1935. E. W. BURGESS 1,995,496

FLOOR STRUCTURE

Filed June 24, 1933

FIG. 1.

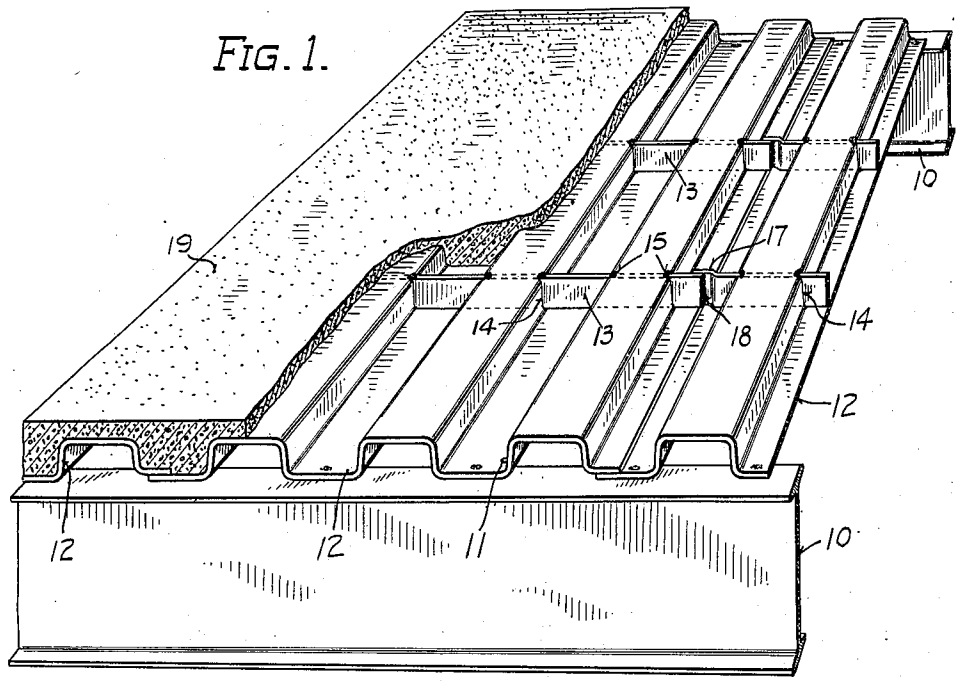



FIG. 2.

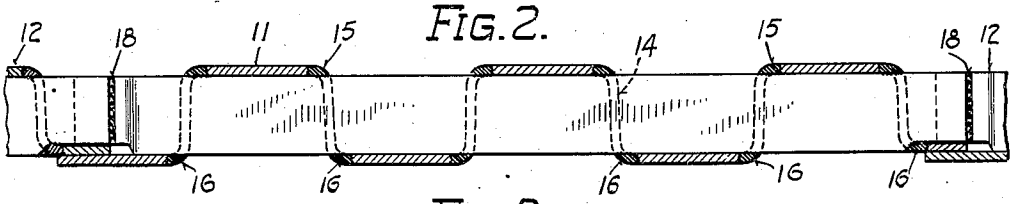



FIG. 3.

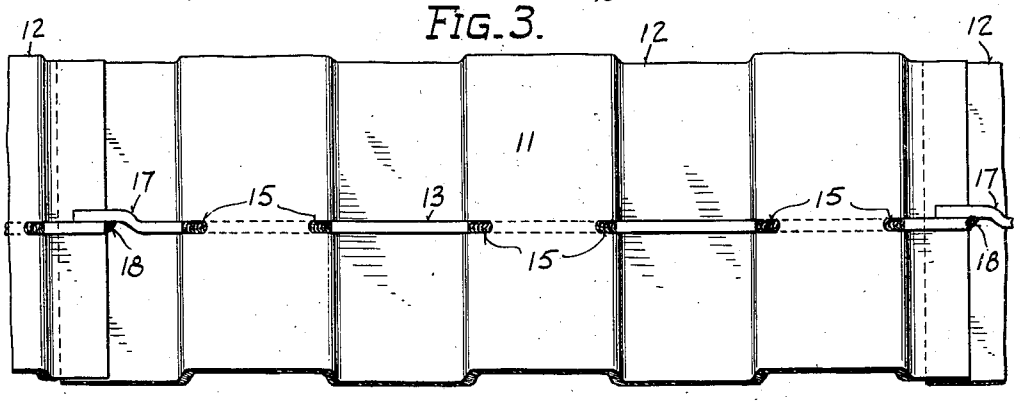



FIG. 4.

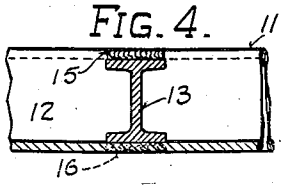
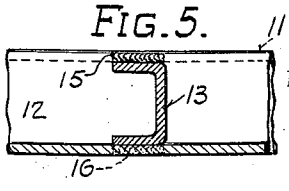



FIG. 5.




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## FLOOR STRUCTURE

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Application June 24, 1933, Serial No. 677,360

3 Claims. (Cl. 189—34)

The invention relates generally to floor structures and more particularly to floor structures suitable for bridges.

An object of the invention is to provide for distributing concentrated loads imposed on floor structures to obtain efficiency in the use of the metal employed in fabricating the floor structure.

It is also an object of the invention to provide for distributing concentrated loads imposed on bridge floors to limit the deflection to protect the wearing surface.

For a fuller understanding of the nature and objects of the invention, reference may be had to the following detailed description taken in conjunction with the accompanying drawing, in which:

Figure 1 is a perspective view of a section of floor constructed in accordance with this invention;

Fig. 2 is a view in section taken transversely of the floor section illustrated in Fig. 1;

Fig. 3 is a top plan view of a portion of the floor section illustrated in Fig. 1 without the fill;

Fig. 4 is a view partly in section and partly in side elevation showing an I-shaped transverse member; and

Fig. 5 is a view partly in section and partly in side elevation showing a channel-shaped transverse member.

Referring now to the drawing, and Fig. 1 in particular, the stringers 10 may be part of a bridge structure, not shown, or any other frame provided for carrying a load. The size and spacing of the stringers will depend upon the load to be carried.

The bridge floor comprises a plurality of crimped plates or pans 11 each having a number of trough sections 12. As illustrated, the trough sections are substantially rectangular. The side walls of the trough sections may be inclined to a line normal to the plane of the pan. The inclination of the sides will not be great. Good results have been obtained by so inclining the side walls of the trough sections that they lie within an angle defined by lines inclined to a line normal to the plane of the pan in the ratio of one in seven.

In a crimped plate or pan of this type the metal is evenly distributed on both sides of the neutral axis to give the same amount of metal to carry the loads in tension and compression. This provides for an efficient use of the metal.

The size of the crimped plate or trough sections will vary with the conditions to be met. Bridge floors have been installed having trough sections which are about six inches wide and three inches deep. In fabricating the pans 11, metal of any required thickness may be employed. For the bridge floors referred to, sheet metal about ¼ inch thick was utilized.

The pans 11 are provided with overlapping flanges which may be welded to one another to provide a unitary structure. These overlapping flanges also permit the adjustment of the pans relative to one another to cover slightly greater or smaller areas to compensate for any slight variations that may occur in the size of the bridge structure.

In order to provide for an even distribution of concentrated loads, plates 13 are mounted transversely of the pans 11. As shown in Fig. 1, in order to mount the plates, openings 14 are provided in the side walls of the trough sections to receive the plates 13. The size of the plates will depend on the design of the pan structure. The plates are driven through the openings 14 and welded to the pan at 15 and 16, as shown in Fig. 2. When the transverse members are mounted in this manner, they cooperate with the bottom members of the trough sections to distribute concentrated loads.

The number of plates 13 mounted in a pan will depend on the weight of the pan, the spacing of the stringers, and many other factors which may be worked out when designing the bridge or other floor structure. In the example illustrated, two plates 13 extend transversely of the pan, but two transverse members are not always required.

The ends of the transverse members 13 are offset as illustrated at 17 to provide for mounting all the transverse members in line and uniting them by welds 18. In this manner transverse members are provided which will extend continuously across a floor structure.

Tests have revealed that with a pan structure and reenforcing transverse members such as illustrated, a concentrated load is distributed substantially radially, greatly increasing the load carrying capacity. The openings cut in the side walls of the trough sections do not weaken the pans to any great extent and the great increase in load carrying capacity resulting from the use of the transverse members renders the loss due to the openings negligible.

Since the transverse members effect efficient distribution of concentrated loads, the bridge floor will carry such loads with only a small deflection. The fills ordinarily used with bridge

floors of this type may be damaged if they are subjected to continual deflections of any considerable extent. Therefore the efficient distribution of the concentrated loads protects the wearing surfaces and increases the life of the structure.

This type of floor structure may be utilized for carrying any kind of a fill 19, but it is highly desirable when fills having a bituminous base such as asphalt are utilized.

In the preferred embodiment of the invention, the transverse members 13 are illustrated as plates. It is to be understood, however, that transverse members of many different cross-sectional shapes may be employed. The transverse members illustrated in Fig. 4 are I-beams, while those illustrated in Fig. 5 are channels.

Since numerous changes may be made in the above described structure and different embodiments of the invention may be made without departing from the spirit and scope thereof, it is intended that all matter contained in the above description or shown in the accompanying drawing shall be interpreted as illustrative and not in a limiting sense.

I claim:

1. In a floor structure, in combination, a plurality of stringers, a pan having a plurality of substantially rectangular trough sections carried by the stringers, the trough sections being alternately inverted and having openings provided in their side walls, a transverse member extending through the openings, the edges of the transverse member being disposed adjacent the bottom members of the trough sections, and welds uniting the transverse members to the pan at the junction of the bottom members and side walls to unite them into a unitary structure cooperative to effect the distribution of the concentrated loads.

2. A floor structure comprising, in combination, a plurality of spaced stringers, pans carried by the spaced stringers, the pans having a plurality of substantially rectangular trough sections alternately inverted, the walls of the trough sections being provided with openings, transverse members extending through the openings in the walls of the trough sections, welds uniting the transverse members to the pans, overlapping flanges provided on the pans for overlapping one another, welds uniting the overlapping flanges, offsets provided on the ends of the transverse members of one pan section to overlap the transverse member of the adjacent pan section, and welds uniting the transverse members, thereby providing a unitary structure.

3. A floor structure unit comprising pans arranged to be carried by spaced floor stringers, the pans having a plurality of substantially rectangular trough sections alternately inverted, the walls of the trough sections being provided with openings, transverse members extending through the openings in the walls of the trough sections, the edges of the transverse members being disposed adjacent the bottom members of the trough sections and welds uniting the transverse members to the pan at the junction of the bottom members and side walls, flanges of unequal height on opposite sides of the unit arranged to overlap in contacting arrangement each with the flange of a similar unit when placed upon the same spaced stringers to facilitate welding the units together at their flanges, and offsets provided on ends of the transverse members of the unit to overlap the transverse members of a similar unit to facilitate joining the same by welding.

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