

July 17, 1962

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3,044,586

FLOOR-LIKE STRUCTURE CONSTRUCTION

Filed May 27, 1960

5 Sheets-Sheet 1

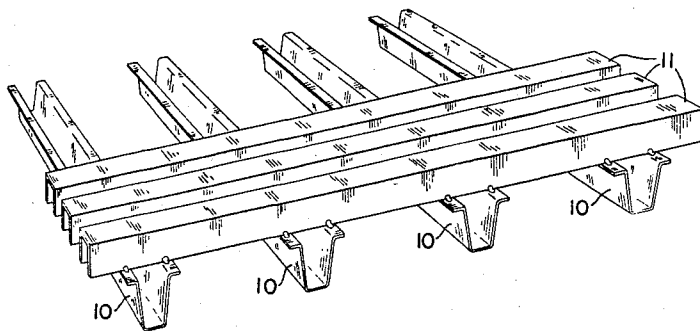


FIG. 1
PRIOR ART

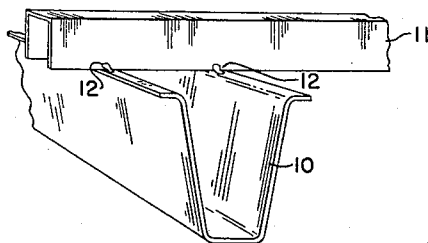


FIG. 2
PRIOR ART

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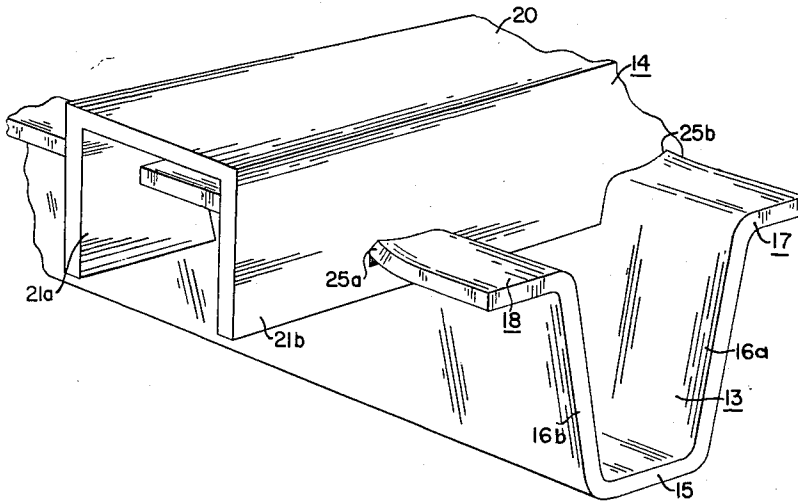


FIG. 5

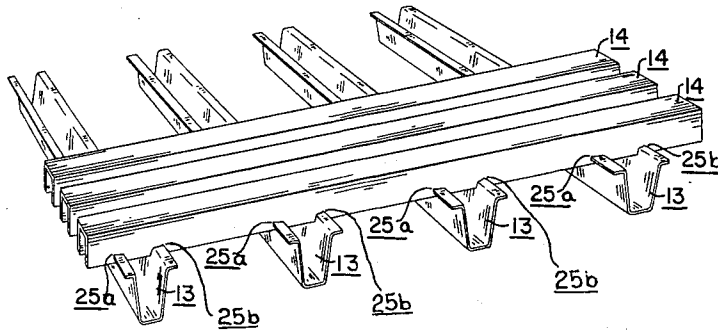


FIG. 6

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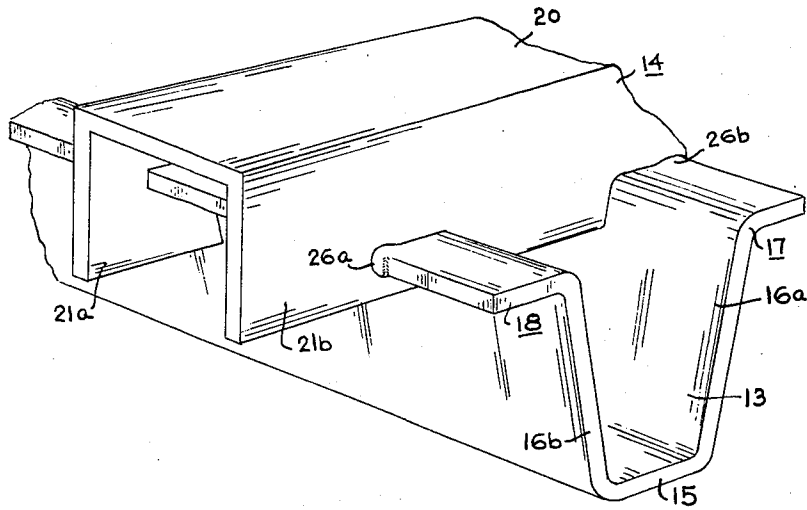


FIG. 7

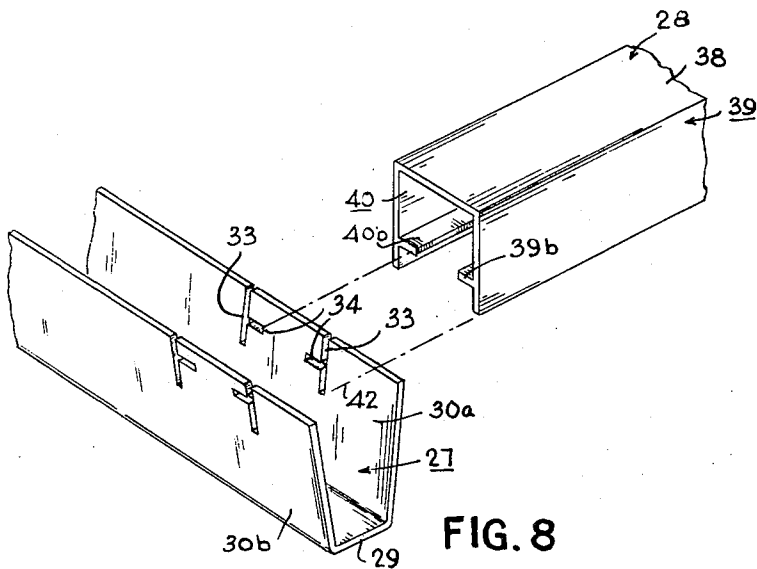


FIG. 8

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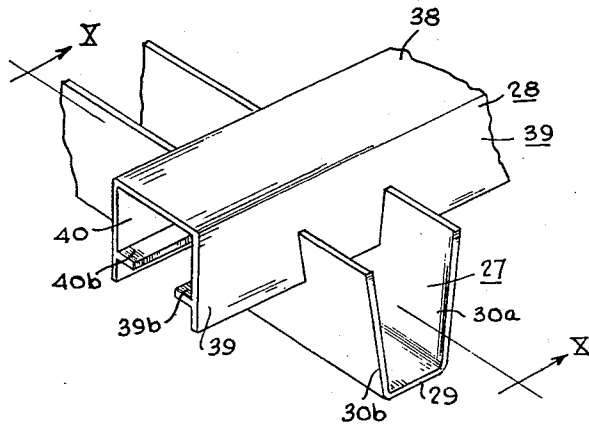


FIG. 9

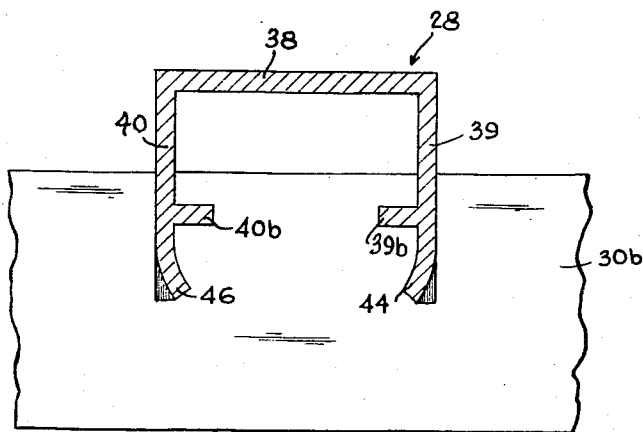


FIG. 10

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FLOOR-LIKE STRUCTURE CONSTRUCTION
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 Filed May 27, 1960, Ser. No. 32,420
 2 Claims. (Cl. 189-82)

This invention relates to an improved floor-like structure formed of a plurality of members arranged to extend in two generally transverse directions, and to the method of making such a structure.

There are many floor structures that are composed of transversely arranged sets of mutually parallel members, and in the past many techniques have been used in the formation thereof. One example of an important use of such a structure is as a refrigeration car floor rack. Railway refrigeration car floor racks are usually composed of mutually parallel stringers whose cross-section is generally trough-like. The stringers are designed to carry and distribute the load and to form the chassis of the structure. Disposed transversely to the stringers and resting thereon are slats, usually of inverted U-shaped cross-section, which are designed to form a flooring of interrupted surface through which cold air may circulate freely.

A known method of forming this type of unitary structure is shown in FIGURES 1 and 2.

FIGURE 1 is a perspective view showing several slats and stringers making up the structure; and

FIGURE 2 is an enlarged perspective view showing the manner most often used in the past for fastening the slats to the stringers.

In assembling the floor rack of FIGURE 1 the stringers 10 are usually placed in a jig and the slats 11 are then placed on the stringers at right angles thereto while being spaced apart the required distance. The slats are then permanently attached to the stringers by welding 12 at all the points of contact to form a unitary structure. Such method of assembly requires an extensive amount of welding, which is both slow and expensive. Other methods which have been used to assemble similar mutually transverse members are riveting and bolting.

It is an object of the present invention to provide a manner of assembling such a structure whereby the necessity for a welding, riveting or bolting can be substantially reduced.

It is a further object of this invention to provide a method of assembling a unitary structure which is both quick and inexpensive in relation to prior known methods.

These objects of the invention are achieved in a floor-like structure comprising a first set of mutually parallel structural members and a second set of mutually parallel structural members, said second set extending generally transverse to the first set, wherein the members of one set are formed with keyways through which extend key-forming parts of the members of the other set whereby to interlock said members against relative motion other than in the direction of said keyways, deformations then being formed on said key-forming parts to prevent longitudinal movement of said parts in said keyways in the direction of said keyways.

The invention also includes the method of constructing such a structure comprising arranging a first set of structural members in mutually parallel relationship, providing said members with aligned slots whereby to form a plurality of keyways, engaging said first set of members with a second set of structural members by sliding key-forming parts of the members of said second set along said keyways whereby to interlock said members against relative movement other than in the direction of said keyways, and finally deforming sections of said key-forming parts out of alignment with said keyways whereby to

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prevent longitudinal withdrawal of said parts from said keyways in the direction of said keyways.

In FIGURES 3 to 10 of the drawings, which illustrate embodiments of the invention:

5 FIGURE 3 is an exploded perspective view illustrating a manner of assembling slats and stringers according to the present invention;

FIGURE 4 is a perspective enlarged view of the stringer and slat combination of FIGURE 3 when partially assembled;

10 FIGURE 5 is a view of the stringer-slat combination of FIGURE 4 when fully assembled;

FIGURE 6 is a general perspective view of a series of stringer-slat combinations;

15 FIGURE 7 is a perspective view of an alternative method of assembling a stringer-slat combination;

FIGURE 8 is an exploded perspective view of another embodiment of the invention showing the manner in which the stringer-slat combination may be assembled;

20 FIGURE 9 is a view of the stringer-slat combination of FIGURE 8 when partially assembled; and

FIGURE 10 is a vertical cross-section taken in the direction X—X of FIGURE 9, demonstrating the manner of completing the assembly.

25 Referring now to FIGURE 3 it is seen that the stringer is designated generally by reference numeral 13 and the slat is designated generally by reference numeral 14. The stringer 13 is composed of a flat base 15 and a pair of gradually outwardly sloping side walls 16a and 16b. Side wall 16a terminates in outwardly protruding flange 17 and side wall 16b terminates in outwardly protruding flange 18.

30 Slat 14 is composed of an upper portion 20 and a pair of substantially perpendicular side walls 21a and 21b. Side walls 21a and 21b are provided with a plurality of pairs of slots designated generally as 22a and 22b, and seen only in side wall 21b. Slot 22a is composed of a generally vertical portion 23a designed to accommodate the upper end of side wall 16a of stringer 13, and a generally horizontal portion 24a designed to accommodate flange 17. Similarly, slot 22b is composed of a generally vertical portion 23b designed to accommodate the upper end of side wall 16b of stringer 13, and a generally horizontal portion 24b designed to accommodate flange 18.

35 In assembling the stringer-slat combination shown in exploded view in FIGURE 3, the slat 14 is moved into registry with the end face of stringer 13, walls 16a and 16b and flanges 17 and 18 entering the slots in wall 21a and then the slots in wall 21b. Thus the slots in the slats form keyways to receive and hold in place the key-forming portions (flanges 17 and 18 and the upper parts of side walls 16a and 16b) of the stringers. Continued movement of slat 14 along stringer 13 in this manner results in the formation of the partially assembled stringer-slat combination shown in FIGURE 4. The completely assembled combination is shown in FIGURE 5. The edge of flange 18 at its point of contact with the outside surface of side wall 21b has been upwardly displaced as a deformation 25a. This effect is achieved by striking the metal a hard blow at this point with a chisel-like tool to shear this portion away from remainder of such flange. Similarly, the edge of flange 17 adjacent side wall 21b has been deformed at 25b. Deformations 25a and 25b prevent slat 14 from moving back along stringer 13 in a direction opposite to that in which it was originally moved. To prevent movement of slat 14 along stringer 13 in the opposite direction further similar deformations (not visible) are formed on flanges 17 and 18 on the side of wall 21a remote from wall 21b.

40 FIGURE 6 illustrates a fragment of an assembled refrigerator car floor rack, showing three parallel slats 14 connected to four parallel stringers 13 in this manner.

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It will be seen that slats 14 are disposed along stringers 13 at right angles thereto, this being the preferred manner of assembly. However, if preferred, slats 14 can be placed at an angle to stringers 13 and such construction is intended to be within the scope of the present invention. The shape and positioning of the slots in the slats 14 will then require consequential minor modification.

An alternative way of preventing slats 14 from moving along stringers 13 is shown in FIGURE 7. In this case, deformations 26a and 26b are formed by upsetting the metal of flanges 18 and 17 respectively towards side wall 21b. Similar deformations are formed on these flanges on the far side of wall 21a.

The slot arrangement is reversed in another embodiment of the invention shown in FIGURES 8 to 10, where the stringers are formed with the slots in which the slats engage. Stringer 27 has a flat base 29 and a pair of upwardly and outwardly sloping side walls 30a and 30b. No flanges are formed at the upper edges of these walls. In walls 30a and 30b there are formed pairs of correspondingly spaced and shaped slots 33, each of which has a transverse portion 34. The general shape of slots 33 which now form the keyways is such as to accommodate the key-forming portions of each slat 28 which is composed of an upper portion 38 and a pair of side walls 39 and 40. Side wall 39 has an inwardly extending flange 39b, while side wall 40 has an inwardly extending flange 40b. These parts are slid together in the direction indicated by lines 42 to bring the key-forming portions of walls 39 and 40 into the keyways and hence bring the structure to the partially assembled condition shown in FIGURE 9.

One manner of weldlessly attaching slat 28 to stringer 27 is shown in FIGURE 10, the lower vertical portions 44 and 46 of vertical walls 39 and 40 having been sheared inwardly adjacent wall 30b. In a similar manner the corresponding portions of vertical walls 39 and 40 will be sheared just beyond the other wall 30a of the stringer 27 thereby to prevent any further relative movement between stringer and slat. Alternatively, the bottom edges of walls 39 and 40 or the inner edges of flanges 39b and 40b can be upset in the manner of deformations 26a and 26b in FIGURE 7.

Preferably, for additional strength, the structure assembled according to FIGURE 6 or 7 or FIGURES 9 and 10 is welded, bolted or riveted at a few distributed points. By contrast with the prior art, however, such points can be comparatively widely spaced, since little additional securing measures are necessary.

It will be observed that in both embodiments of the invention illustrated, the slots are formed in parts which do not have outwardly projecting flanges, e.g. sides 21a and 21b of slats 14 or sides 30a and 30b of stringers 27. This manner of construction permits the slots to be formed readily in a punch press, which is the most economical manner of forming these slots. The invention

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is thus especially applicable to the formation of structures from channel or like shaped members having portions extending perpendicularly or substantially perpendicularly to the plane that the structure as a whole defines, and moreover to the formation of structures from such members when these perpendicular portions of the members of at least one of the sets of members (the set in which the keyways are to be formed) have no externally projecting flanges so that the keyways (the slots) can be readily formed in a punch press.

I claim:

1. A floor-like structure comprising:

- (a) first and second sets of mutually parallel interlocking structural members, which sets extend transversely to one another;
- (b) said first set of structural members each including a flat base with upwardly diverging side walls extending therefrom, and terminating at their upper ends with an outwardly protruding flange;
- (c) said second set of interlocking structural members including a flat base portion with opposed generally parallel depending side walls, said side walls having aligned slots communicating with the bottom ends thereof corresponding to the configuration of said protruding flanges and the adjacent upper ends of the diverging side walls of said first set of structural members;
- (d) and deformations in the protruding flanges of said first set of structural members maintaining the sets in locked engagement.

2. A floor-like structure comprising:

- (a) first and second sets of mutually parallel interlocking structural members, which sets extend transversely to one another;
- (b) said first set of structural members each including a flat base with opposed extending side walls extending therefrom, flange portions extending transversely of said side walls;
- (c) said second set of interlocking structural members including a flat base portion with opposed extending side walls, said side walls having aligned slots communicating with the free ends thereof opposite said base portion, corresponding to the extending flanges and the free ends of the side walls of said first set of structural members;
- (d) and deformations in the extending flanges of said first set of structural members maintaining the sets in locked engagement.

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