

**March 5, 1963**

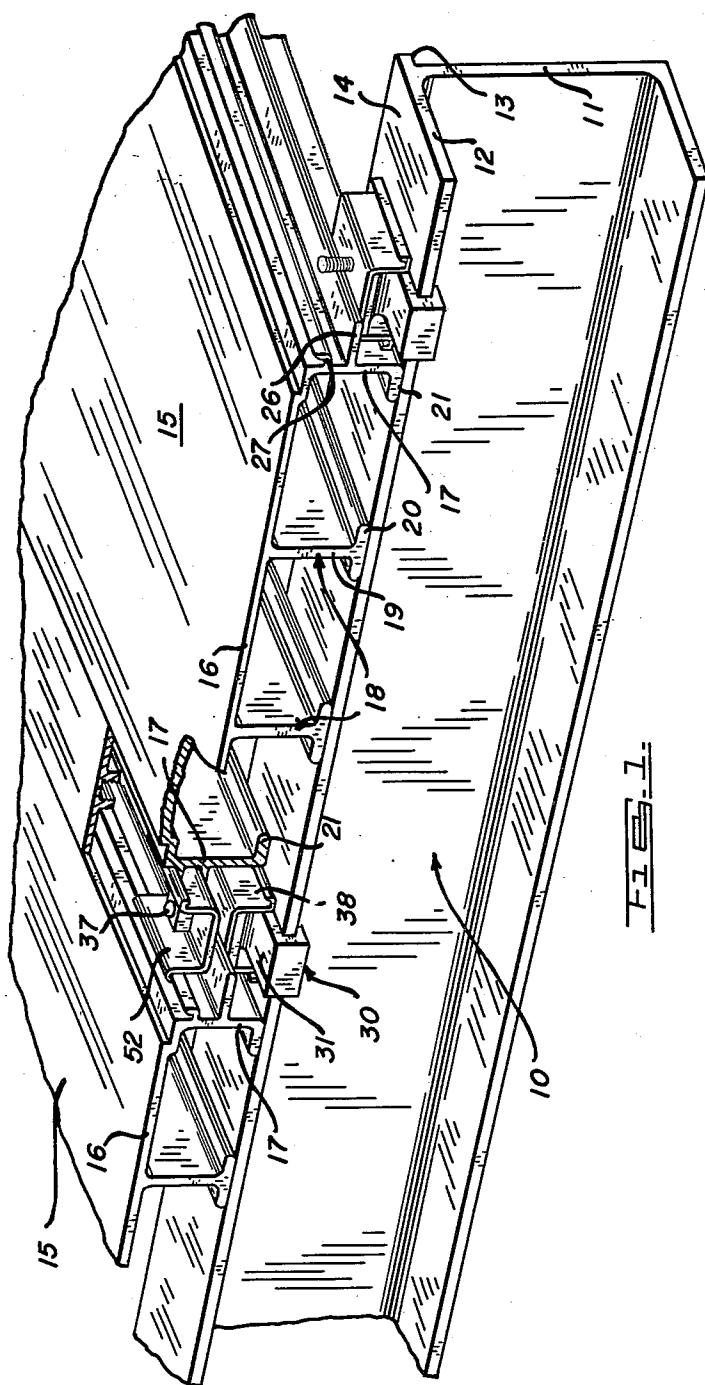
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**3,080,021**

## FLOOR STRUCTURE

Filed June 20, 1960

4 Sheets-Sheet 1



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4 Sheets-Sheet 2

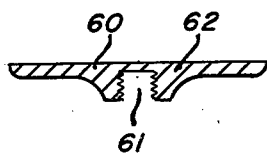
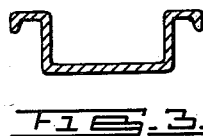
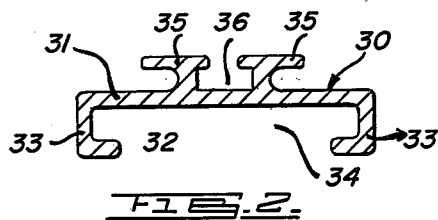


FIG. 4.

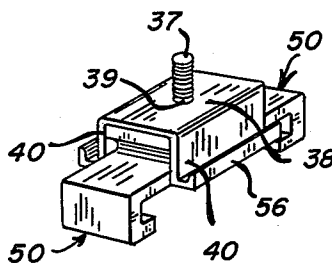


FIG. 5.

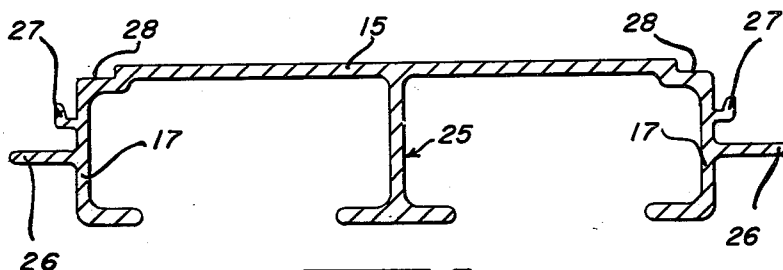


FIG. 6.

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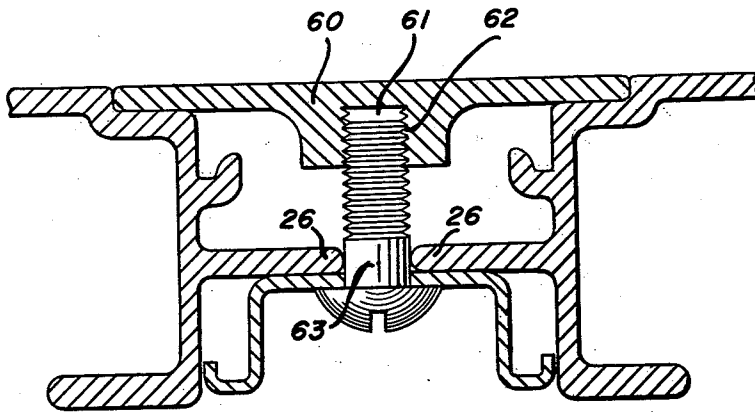


FIG. 7.

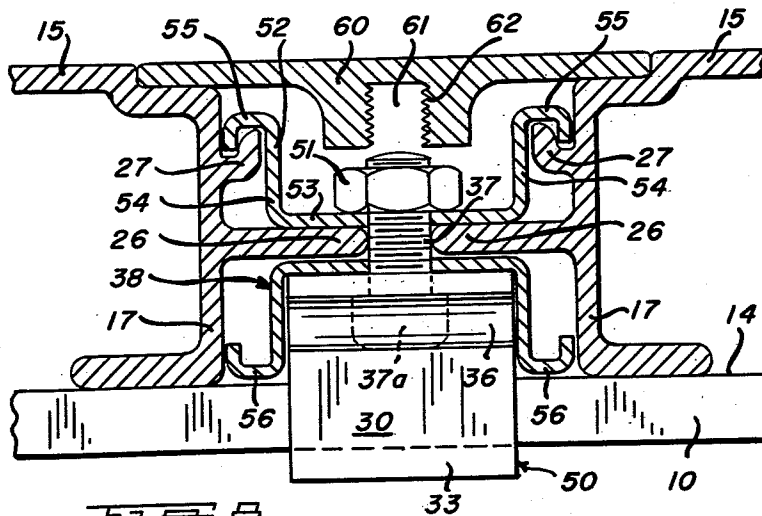


FIG. 8.

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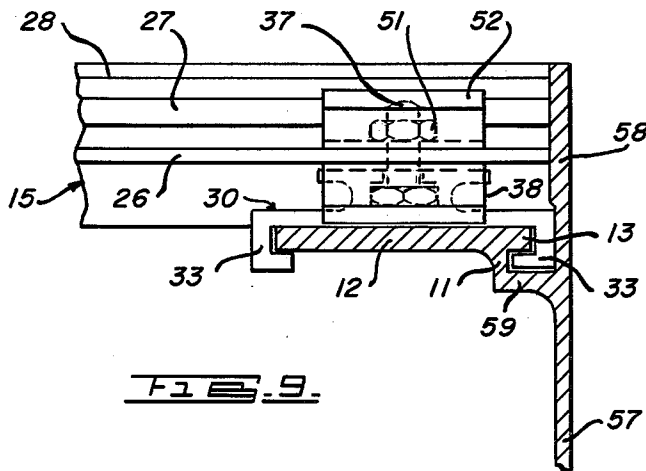


FIG. 9.

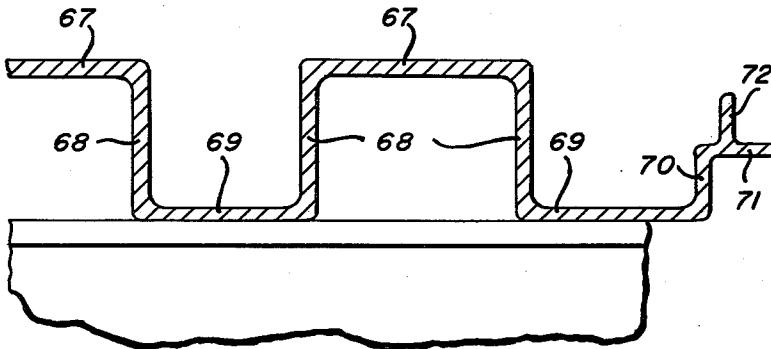


FIG. 10.

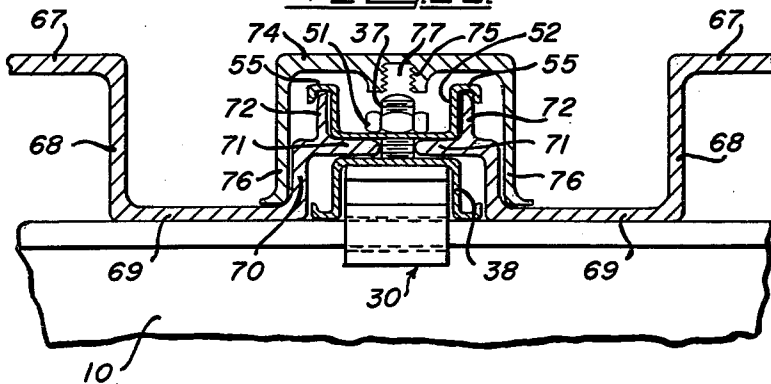


FIG. 11.

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3,080,021

## FLOOR STRUCTURE

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Claims priority, application Canada June 25, 1959

15 Claims. (Cl. 189—34)

This invention relates to a novel combination of shaped sections which is particularly advantageous for use as a floor structure which may be used in connection with the cargo-carrying space of a transportation vehicle such as a truck or the like.

There are a number of characteristics which it is advantageous to obtain when designing such a flooring structure. One criterion which, if possible, should be satisfied is that of allowing replacement of individual floor planks, when such become damaged without dismantling the whole floor structure. Another is that of so designing the elements that a major portion of the work of assembly can take place from the upper surface of the floor and, preferably under conditions wherein it is possible to assemble substantially the whole of the floor prior to its being placed in position on the truck chassis. It is also important to provide an arrangement such that the various floor elements can quickly, and accurately, be fastened together by more or less unskilled labour. An important factor in obtaining the last-mentioned desirable characteristics is so to design the plank-holding elements as to require only the minimum number of holes to be drilled for fastening devices such as bolts, through either the planks themselves or the cross bearers upon which the planks rest; this latter characteristic is in itself desirable because of the stronger structure it yields due to the absence of holes in the flanges, webs etc. of the various structural floor elements. Due to the substantial amounts of water, corrosion-producing dirt and chemicals which are splashed upwardly from the road surface onto the bottom of the truck floor structure, it is most desirable to provide an arrangement in which the fastening elements maintaining the floor planks in position can be substantially wholly shielded and thus protected from contact with corrosion-producing substances and the cargo protected from damage in wet weather. At the same time it is in many cases important to provide a substantially smooth floor surface on which the cargo will rest unimpeded by projecting, or exposed fastening elements such as nuts or bolt heads. Finally, it is desirable to arrange a flooring system which is sufficiently flexible so that planks of different cross-section, such as for example those designed to give a flat surface for dry cargo, and others which give a corrugated surface particularly adapted for refrigerated space, can be used interchangeably not only when the floor is originally assembled but afterwards as well so that if desired the floor surface can be changed so as to be more suitable for a different purpose.

A number of prior attempts have been made to devise a system of extruded or otherwise shaped elements which would produce a truck floor meeting certain specified design criteria. While many of these yield one or more of the desirable characteristics mentioned above none, so far as I am aware, are adapted to possess them all and still be reasonably economical and flexible enough to use on any substantial commercial scale. Many of these prior designs involve the drilling of holes for fastening elements through either the extruded floor sections themselves, the cross bearers on which they rest, or both. Moreover, such fastening elements are usually so positioned as to require them to be manipulated from both the upper and lower surfaces of the floor and at least one part of the elements

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is often exposed on the bottom side of the truck and therefore subjected to the corrosive action of dirt and chemicals splashed upwardly from the road. In other designs it is difficult, if not impossible, to remove and replace one damaged plank without dismantling substantially the whole of the floor structure and at the same time being forced to conduct a great deal of the work on the underside of the truck. Finally, many of the prior designs of which I am aware are of such a nature as to result in a single, specialised type of truck floor and the construction is such that it cannot be applied to a range of different floor types designed for a variety of purposes but which have sufficient structure in common to permit interchangeability of planks and similar, if not identical, fastening elements. So far as I am aware none of these prior designs have, for instance, permitted use of a variety of non-skid surfaces (which are added after the basic extrusion or similar shaping has been made) without at the same time failing to give one or more of the desirable characteristics mentioned above.

It is accordingly an object of this invention to provide a combination of shaped elements which can be formed into an economical, easily assembled floor structure wherein any one of a variety of types of plank members can be used interchangeably. It is also an object of my invention to provide a quickly assembled floor structure resulting in a substantial saving of labour over prior structures and requiring only a minimum number of holes to be drilled when the floor is being assembled and placed in position on the truck chassis. It is a further object of my invention to provide a substantially weather-proof floor structure for protection of a cargo and wherein the fastening elements are shielded from contact with corrosion-producing substances splashed upwardly from the road. It is a further object of my invention to provide a floor structure which in at least one embodiment thereof can be arranged so that no fastening elements whatever are exposed on the upper, cargo-supporting surface of the floor.

I have found that a floor structure having the advantageous characteristics listed above can be obtained by providing cross bearer members having a vertical web and flanges extending outwardly therefrom on each side of the web at its top, these flanges providing an upper horizontal bearing surface on which the shaped plank members rest. These plank members extend between the cross bearers, and have vertical side members located along each edge (longitudinal) thereof.

In the side members of each plank, located intermediate the top and bottom of each plank, are outwardly extending horizontal flanges so positioned that when two planks are resting on the bearing surface, the horizontal flanges on mutually facing side members of adjacent planks extend toward, and are in registry with each other. My invention also requires the use of clamping pieces which have a central horizontal part adapted to extend transversely of, and engage with, the bearing surface. The clamping pieces have lower and upper channels adapted (when the clamps are loose) for slidable, non-rotatable engagement with the flanges of the cross bearers and one end of a fastening element, respectively. The fastening element may conveniently be a square or hexagonal headed bolt, the head sliding in the upper channel of the clamping piece. The body of the fastening element extends upwardly from the clamping piece between the mutually facing horizontal flanges of adjacent planks. Means cooperating with the other end of the fastening element, such as for example a washer and nut, bear against the upper surface of the horizontal flanges so that the planks are drawn downwardly into tight engagement with the bearing surface, and the clamping pieces

are simultaneously drawn upward so that the lower channel thereof securely grips the flanges of the cross bearers. A cover plate may be so arranged on the upper surface of the floor as to extend between adjacent plank pieces so as completely to enclose the channel formed between adjacent planks by the horizontal flanges along each edge thereof, within which channel the fastening elements are exposed. The shaped elements such as the plank members, cover plate and cross bearer members are preferably extruded members, although any suitable shaping or forming process such as rolling, may be used within the scope of the present invention to produce the required (structural) floor elements.

The preferred form of said plank members comprises an upper horizontal load carrying surface having supporting leg members extending from said load carrying surface to the horizontal bearing surface of the cross-bearer members. A further preferred shape of plank member especially suitable for refrigerated freight flooring comprises a corrugated cross-section of square-wave shape.

The invention will now be described with reference to the attached figures of drawings in which

FIGURE 1 is a sectional view, partly broken away, of the complete flooring assembly made in accordance with the invention;

FIGURE 2 is a cross-sectional view of a clamping piece;

FIGURE 3 is a cross-sectional view of an auxiliary clamping plate, which can conveniently also serve as a retainer clip;

FIGURE 4 is a cross-sectional view of a cover plate which can be used in constructing conventional flat floors;

FIGURE 5 is a perspective view of a clamp assembly comprising a clamping piece, a bolt inserted in the upper channel thereof, and a retaining clip slipped over the bolt and the clamping piece so as to maintain the former in position therein;

FIGURE 6 is a cross-sectional view of one particular type of plank member which, when used with a cover plate such as is shown in FIGURE 4, yields a flat floor free from exposed fastening elements;

FIGURE 7 is a cross-section through the floor assembly, taken between cross bearer members;

FIGURE 8 is a cross-section through the floor assembly taken at a cross bearer member;

FIGURE 9 is a cross-sectional end view illustrating a terminal cross-bearer member having an elongated web adapted to cover the open ends of the plank members;

FIGURE 10 is a cross-sectional view of a further type of plank member useful in refrigerated flooring systems; and

FIGURE 11 is a cross-section through a floor assembly composed of the plank members of FIGURE 10.

Referring now to FIGURE 1, the floor structure according to the invention comprises cross bearer member 10 having a vertical web 11 and transversely extending flanges 12 and 13 extending outwardly, in a horizontal direction, at the top of the web 11. The upper surface of the flanges 12 and 13 provides a bearing surface generally indicated at 14. In the embodiment of the invention shown in the drawings the major part of the floor surface comprises plank members 15 having a horizontal portion 16 and downwardly extending side members 17 along each edge thereof. Depending upon the width of the particular plank 15 adopted it may be necessary to have additional leg members 18 extending downwardly from the horizontal portion 16 intermediate the side members 17, as shown. The leg members 18 themselves preferably comprise a vertical flange 19 and feet 20, but may comprise any suitable shape consistent with good structural design. Similarly, the side members 17 may conveniently be given inwardly extending feet members

21 so as to provide a larger area for engagement on bearing surface 14, which supports the planks.

As best shown in FIGURE 6, the planks 15 have along each edge thereof an outwardly extending horizontal flange 26, positioned between the top and bottom of the plank such that, when the planks are resting on the bearing surface 14, the horizontal flanges 26 of two adjacent planks extend toward, and are coplanar with, each other as illustrated. As will be explained in more detail below, in accordance with a preferred embodiment of the invention additional upwardly turned flanges 27 may be located on each of the side members 17 of the plank 15. Moreover, to facilitate a tight and neat fit of the cover plate which is designed to bridge the gap between adjacent planks, the upper surface of the latter, along each edge thereof, is recessed as shown at 28. Although only a single intermediate leg member 25 has been shown in FIGURE 6 for the sake of clarity, it will be understood that any number of leg members of a suitable structural shape are contemplated within the scope of this invention depending on the intended use of the plank members. Similarly the metal thickness of the cross bearer members 10 and planks 15 may vary depending on the intended load requirement, especially if extruded elements are used.

As best shown in FIGURES 1 and 8, a clamping piece 30, having a cross section such as is shown in FIGURE 2, is positioned on the flanges 12 and 13 of the cross bearer 10. Clamping piece 30 itself comprises a central horizontal portion 31 the bottom side 32 of which is designed to be in contact with the bearing surface 14. At each edge of the clamping piece 30 are located L-shaped flanges 33 which extend downwardly and thence inwardly to define a lower channel generally represented at 34. On the upper surface of the clamping piece are located further flange members 35 which serve to define an upper channel 36. As is apparent from FIGURE 1, the lower channel accommodates the flanges 12 and 13 of the cross bearer and permits clamping piece 30 to have slidable but non-rotatable engagement therewith. The upper channel is adapted to accommodate slidably, but not rotatably, one end of a fastening element, such as for example a square or hexagonal bolt head. After the bolt 37 is inserted so that its head 37a is accommodated in the channel 36 and the shank of the bolt extends upwardly from the clamping piece 30, a retaining clip generally indicated at 38, having a centrally located aperture 39, may be slipped down over the shank of the bolt 37 so that the sides 40 of the retaining clip grip the ends of the clamping piece longitudinally of the upper channel 36. To facilitate this operation the sides of the U-shaped retaining clip may be designed that they taper inwardly towards each other by a very slight amount with the result that when they are initially spread and slipped over the clamping piece 30, they will tend to "snap" into position and remain there during further handling. The clamping assembly thus formed, shown in FIGURE 5 and therein generally represented at 50, consists of three parts, the clamping piece 30, the bolt 37 and the retaining clip 38. This assembly is designed to be placed on the cross bearers 10 and moved along the bearing surface 14 to the required position, as will be explained in more detail below. The bolt shank 37 may also serve as a location gauge for spacing planks 15 while the floor structure is being assembled.

Referring now to FIGURE 8 the details of the joint between two adjacent planks will be described. As there shown, the planks 15 are positioned on the cross bearer 10 so that the mutually facing ends of the horizontal flanges 26 are spaced apart a distance just sufficient to permit the shank of bolt 37 to extend upwardly therebetween. When the clamping assemblies 50 on each of the cross bearers 10 supporting the adjacent planks 15 have been positioned in this way, a lock nut 51, or similar suitable fastener, preferably in conjunction with

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some type of a washer or other pressure-distributing plate, is screwed onto the shank of the bolt 37 and tightened downwardly so as to raise the clamping piece 30 in such a way that the flanges 12 and 13 of the cross bearer are securely gripped within the lower channel 34 and, at the same time, the action of the nut on the horizontal flanges 26 forces the planks 15 downwardly into tight engagement with the bearing surface 14. As is apparent from FIGURES 1 and 8 this whole particular operation can be completed from the top surface of the floor and no part of it requires manipulation of fastening elements from beneath the cross bearers 10.

In the preferred embodiment of the invention shown in the drawings, the planks 15 are provided with upwardly turned flanges 27, in addition to the horizontal flanges 26. Interposed between the nut 51 and the upper surface of the horizontal flanges 26 is an auxiliary clamping plate 52 having a generally U-shaped cross-section comprising a flat lower portion 53, side members 54 and downwardly turned flanges 55 at the top of each of the side members. These flanges are so positioned as to engage with the upwardly turned flanges 27 of the planks 15. As a result, when the nut 51 is tightened, the downward pressure on the plank 15 is transmitted through both the horizontal flanges 26 and the upwardly turned flanges 27. As best shown in FIGURE 8 I have also found it advantageous from the point of view of economy and ease in assembly, to use a member of the same cross section for both the auxiliary clamping plate 52 and the retaining clip 38. When this is done, the retaining clip 38 is provided with upwardly turned flanges 56 at each side on the bottom thereof identical with the downwardly turned flanges 55 at each side of the top of the auxiliary clamping plate.

After the nuts 51 have been tightened so that the planks 15 are held firmly in position on the cross bearers 10 there will, of course, be an exposed channel between each of the planks within which the fastening elements are located. In most cases it is, of course, desirable that this channel be covered and that a substantially flat smooth surface be provided. For this purpose a cover plate 60 having a cross section such as is shown in FIGURE 4 is placed in the channel so that it traverses the gap between the mutually facing edges of adjacent planks 15. If, as is the case with the plank cross section shown in FIGURES 1 and 6, the upper corners of the planks 15 are recessed as at 28, the ends of the cover plate may be designed to fit down into the recess so that the top surface of the plate is parallel with the top surface of the plank 15. As shown in FIGURES 4, 7 and 8, the cover plate 60 is preferably provided with a centrally located channel 61 on the bottom thereof. The interior mutually facing sides of the channel are provided with grooves 62. These grooves can be designed so as to grip the threads of a bolt, as shown in FIGURE 7. In regions of the floor between the cross bearers 10 bolts 63, preferably in conjunction with some type of a washer or other pressure-distributing plate, are inserted upwardly between the horizontal flanges 26, and rotated so that the threads of the bolts 63 engage with the corrugated channel 61. A suitable locking device (not shown) may be operatively associated with bolts 63 to ensure proper engagement with cover plate 60. In the embodiment shown in FIGURE 7 the washer is merely another length of the same cross section as is used for both the auxiliary clamping plate and retaining clip. As the bolt 63 is rotated the cover plate 60 is drawn down into position and retained there.

Assembly of a complete floor structure in accordance with the invention is as follows. After the cross bearers 10 are placed in position, the plank 15 located at either of the extreme outer sides of the floor is attached to the cross bearers by conventional fastening means, such as for example bolts and nuts, extending through the feet 21 and the flanges at the top of the cross bearers.

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This operation requires drilling and will usually involve some manipulation of fastening elements on the underside of the floor. Work of this type is, however, reduced to a minimum since it is only the "outside" planks at each edge of the floor that are fastened to the cross bearers in this manner. Having placed one of the edge planks in position, the required number of clamping assemblies 50 shown in FIGURE 5 can then be placed on each of the cross bearers and moved therealong to their appropriate final position which, of course, depends on the width of the particular planks being used. The first clamping assembly on each of the cross bearers is moved into position adjacent the side of the edge plank. The second plank which is to be immediately adjacent to it is then laid across the cross bearers and moved transversely into clamping position. A washer, or alternatively an auxiliary clamping plate 52, is then placed over the bolt so that it rests on the upper surface of the horizontal flanges 26. A nut is then screwed onto the bolt and driven tight. This operation may be repeated for each succeeding plank and, following the positioning of the edge plank at the other extreme edge of the floor, further conventional fastening elements may be used to attach the plank to the cross bearers in a manner similar to that of the opposite edge plank. A further preferred method of assembling the floor structure of the present invention is to first arrange and hold all of the planks and clamping assemblies in position and then tighten all of nuts at the same time. Following these operations the cover plates 60 may be laid in each of the channels between the planks and fastened there securely, such as for example by bolts 63 engaging with the grooves 62 of the channel 61, shown in FIGURE 7. These nuts are, of course, positioned along the planks at points between the cross bearers 10 and this particular operation must be completed from the underside of the floor.

It will be noted that a flooring arrangement has been provided in which the only drilling operation required is that in which the planks at the extreme edges of the floor are attached to the cross bearers; even this amount of drilling would be avoided where vertical side members along the edge of the floor structure are designed to engage with the edge planks and maintain them rigidly in position against the cross bearers. The intermediate planks are securely clamped to the cross bearers by a clamping assembly to which access is possible from the top of the floor and for which no bolt holes must be drilled through either the planks or the cross bearers. Moreover, the major part of the floor assembly operations can be completed from the top surface of the floor and it is only the fastening, by conventional means, of the edge planks, and the cover plates, that requires access to the bottom surface of the floor.

Variations in the design of the outer plank members or outer cross-bearer members may be necessary in order to provide a completed floor assembly unit. FIGURE 9 illustrates such a variation in the design of the terminal cross-bearer members 10, which will cover up the open front and rear ends of plank members 15. The cross-bearer member of this embodiment includes side member 57 and an upper extension 58 which is adopted to cover up the open ends of plank 15, thus providing a more finished and substantially weather-proof front and/or rear end of the flooring system. The horizontal bearing flanges 12 and 13 extend outwardly on each side of web 11 which is connected by connecting member 59 to side member 57 intermediate the top and bottom thereof. The planks 15 and clamping members 30 rest upon the upper surface of flanges 12 and 13, and the L-shaped flanges 33 of clamping piece 30 engage the terminal edges of flanges 12 and 13 as illustrated in FIGURE 9. Retaining clip 38 and clamping plate 52 are arranged with bolt 37 and nut 51 so as to securely grip and hold the horizontal flanges 26 of plank members 15 in position as described in detail hereinabove.

It may also be necessary to provide supplementary plank elements at the two outermost longitudinal edges of the plank members so as to provide a means of securing the floor assembly in its required location. For example, if the floor assembly of the present invention is to be used with a flat platform and stake type of truck, an outer supplementary plank member could usefully be employed which would engage with the vertical side member of the outermost plank member in a manner described hereinabove, and then extend downwardly across the end of the cross-bearer members and extends inwardly to engage with the lower portions of the cross-bearer members. A similar supplementary plank member could be employed in floor constructions of van body type trucks with the exception that the supplementary plank member instead of wrapping around the end of the side bearer members, would be secured to the side walls of the truck by conventional means.

FIGURES 1 to 9 of the drawings show only one general type of plank cross-section and cover plate, i.e. that giving a flat conventional floor surface commonly used for dry cargo. It will be apparent to those skilled in the art that numerous plank sections could be used. For example, plank members having a corrugated cross-section of "square-wave" shape would be particularly useful for a floor in a refrigerated storage or freight space. Such an embodiment is illustrated in FIGURES 10 and 11 of the drawings. The cross-section of the plank members is illustrated in FIGURE 10 and is composed of a series of rectangular or square components with components 67 providing the upper load carrying surface and components 69 engaging with the upper horizontal bearing surface of cross-bearer members 10. Components 67 and 69 are connected together by vertical supporting components 68. The longitudinal edges of this plank member consists of an upwardly extending side member 70 having a flange 71 extending outwardly at the top thereof, with a flange 72 extending upwardly from flange 71, as illustrated. Horizontal flange 71 corresponds to the horizontal flange 26 of the plank members illustrated in FIGURES 1 to 9, and are to be placed in an adjacent co-planar relationship as shown in FIGURE 11. Clamping piece 30, retaining clip 38, clamping plate 52, bolt 37 and nut 51 are then arranged as described hereinbefore, with the exception that the downwardly turned flange 55 of clamping plate 52 engage vertical flanges 72, thus securing the plank members to each other and to cross-bearer 10. A cover-plate 74 may be secured over the fastening elements, as shown in FIGURE 11, and is preferably of such a design as to present an uninterrupted corrugated floor surface appearance. The cover-plate 74 should therefore be of an inverted U-shape having side portions 76 adapted to fit over the upwardly extending side members 70 of adjacent planks, and the lower ends of side portions 76 may be slightly turned outwardly to provide a better fit at the junction of components 69 and 70. The cover-plate 74 is preferably provided with a centrally located channel 77 on the bottom thereof. The interior mutually facing sides of channel 77 are provided with grooves 75 designed so as to receive and grip the threads of a bolt. Cover-plate 74 may therefore be secured in position by means of a bolt and retaining clip positioned in-between cross-bearer members 10 in a manner similar to that shown in FIGURE 7. The present invention therefore provides an easily assembled, substantially weather proof floor structure which can be manufactured in different structural shapes and dimensions, useful for supporting and carrying a variety of loads or cargoes. For example, a trucker could keep a supply of floor structures of the present invention on hand and alternately use them for carrying different types of cargoes. A further application of the present invention would be the provision of portable floorings for temporary shelters and the like. Further possibilities of variation within

the scope of the invention are made possible by use of the cover plates 69 which can be provided with any one of various types of non-skid surfaces well known in the art.

What I claim as my invention is:

1. A floor structure comprising: cross bearer members having a vertical web and flanges extending outwardly therefrom on each side of the web at the top thereof, said flanges providing an upper horizontal bearing surface; plank members extending between the cross bearer members, said plank members having vertical side members located along each edge thereof, the bottom of the side members being adapted to engage with said bearing surface, and horizontal flanges extending outwardly from each of said side members intermediate the top and bottom of the plank, whereby, when the planks are resting on the cross bearers the horizontal flanges on the mutually facing side members of adjacent planks extend toward, and are coplanar with, each other; clamping pieces having a central horizontal part adapted to extend transversely of, and engage with, the bearing surface and also having lower and upper channels for slidable, non-rotatable engagement with the flanges of the cross bearers and one end of a fastening element, respectively, said fastening element extending upwardly from the clamping piece between the mutually facing horizontal flanges of adjacent planks; means cooperating with the other end of said fastening element, said means bearing against the upper surface of the said horizontal flanges whereby the planks are drawn downwardly into tight engagement with the bearing surface, and the clamping pieces are drawn upwardly so that the lower channel thereof grips securely the flanges of the cross bearers.

2. A structure as claimed in claim 1 comprising a cover plate extending between adjacent planks and additional fastening means extending upwardly between the horizontal flanges and into the bottom surface of the cover plate so as to retain the same in position.

3. A structure as claimed in claim 1, wherein said plank members comprise an upper horizontal load carrying surface having supporting leg members extending from said load carrying surfaces to the horizontal bearing surface of the cross-bearing members, with said horizontal flanges extending outwardly from each of said side members intermediate the top and bottom thereof.

4. A structure as claimed in claim 1, wherein said plank members have a corrugated cross-section of square-wave shape, with said vertical side members extending upwardly from the outer portions of the plank engaging said bearing surface and thence outwardly to form said horizontal flanges.

5. A structure as claimed in claim 4, including a cover plate extending between adjacent planks and additional fastening means extending upwardly between the horizontal flanges and into the bottom surface of the cover plate so as to retain the same in position, said cover plate comprising an inverted U-shaped member adapted to fit over said vertical side members, and having on its bottom surface a channel extending longitudinally thereof with corrugations located on the interior vertical surfaces of the channel adapted to engage bolts extending vertically upward between the horizontal flanges.

6. The structure as claimed in claim 2, wherein the planks are provided with a recessed portion along the top surface at each edge thereof, said cover plate adapted to fit into said recesses so that the top thereof is in registry with the top of the plank, said cover plate having on its bottom surface a channel extending longitudinally thereof; and corrugations located on the interior vertical surface of the channel; bolts extending vertically between the horizontal flanges and engaging with said corrugations.

7. A structure as claimed in claim 1 comprising an inverted U-shaped retainer clip positioned on the clamping piece, the sides of the clip enclosing the ends of the



upper channel, said clip having an aperture in the top thereof through which the shank of the fastening element extends, thereby retaining the same in a predetermined position longitudinally of the upper channel.

8. A structure as claimed in claim 3 comprising upwardly turned flanges located on the side members between the top thereof and the horizontal flanges, and an auxiliary U-shaped clamping plate having a bottom portion provided with an aperture through which the shank of the fastening element extends, said bottom portion adapted to engage with the top of said horizontal flanges and be interposed between said flanges and said cooperating means, the sides of the auxiliary U-shaped clamping plate extending upwardly and having at the ends thereof downwardly turned flanges engaging with said upwardly turned flanges on the side members.

9. A structure as claimed in claim 4, comprising vertical flanges located on said horizontal flanges, and an auxiliary U-shaped clamping plate having a bottom portion provided with an aperture through which the shank of the fastening element extends, said bottom portion adapted to engage with the top of said horizontal flanges and be interposed between said flanges and said cooperating means, the side of the auxiliary U-shaped clamping plate extending upwardly and having at the ends thereof downwardly turned flanges engaging with said vertical flanges.

10. A structure as claimed in claim 1, wherein the terminal cross bearer members include vertical side members which extend upwardly to cover the open ends of said plank members and said vertical webs of the cross bearer members are rigidly connected by connecting means, to said vertical side members intermediate the top and bottom thereof.

11. The structure as claimed in claim 3, wherein the planks are provided with a recessed portion along the top surface at each edge thereof, said cover plate adapted to fit into said recesses so that the top thereof is in registry with the top of the plank, said cover plate having on its bottom surface a channel extending longitudinally

thereof; and corrugations located on the interior vertical surface of the channel; bolts extending vertically between the horizontal flanges and engaging with said corrugations.

12. A structure as claimed in claim 3 comprising an inverted U-shaped retainer clip positioned on the clamping piece, the sides of the clip enclosing the ends of the upper channel, said clip having an aperture in the top thereof through which the shank of the fastening element extends, thereby retaining the same in a predetermined position longitudinally of the upper channel.

13. A structure as claimed in claim 4 comprising an inverted U-shaped retainer clip positioned on the clamping piece, the sides of the clip enclosing the ends of the upper channel, said clip having an aperture in the top thereof through which the shank of the fastening element extends, thereby retaining the same in a predetermined position longitudinally of the upper channel.

14. A structure as claimed in claim 3, wherein the terminal cross bearer members include vertical side members which extend upwardly to cover the open ends of said plank members and said vertical webs of the cross bearer members are rigidly connected by connecting means, to said vertical side members intermediate the top and bottom thereof.

15. A structure as claimed in claim 4, wherein the terminal cross bearer members include vertical side members which extend upwardly to cover the open ends of said plank members and said vertical webs of the cross bearer members are rigidly connected by connecting means, to said vertical side members intermediate the top and bottom thereof.

#### References Cited in the file of this patent

##### FOREIGN PATENTS

662,763	Great Britain	Dec. 12, 1951
739,400	Great Britain	Jan. 25, 1954
742,285	Great Britain	Dec. 21, 1955