March 24, 1959 P. A. FANNER 2,878,904

FLOOR OR DECK CONSTRUCTION

Filed March 10, 1953

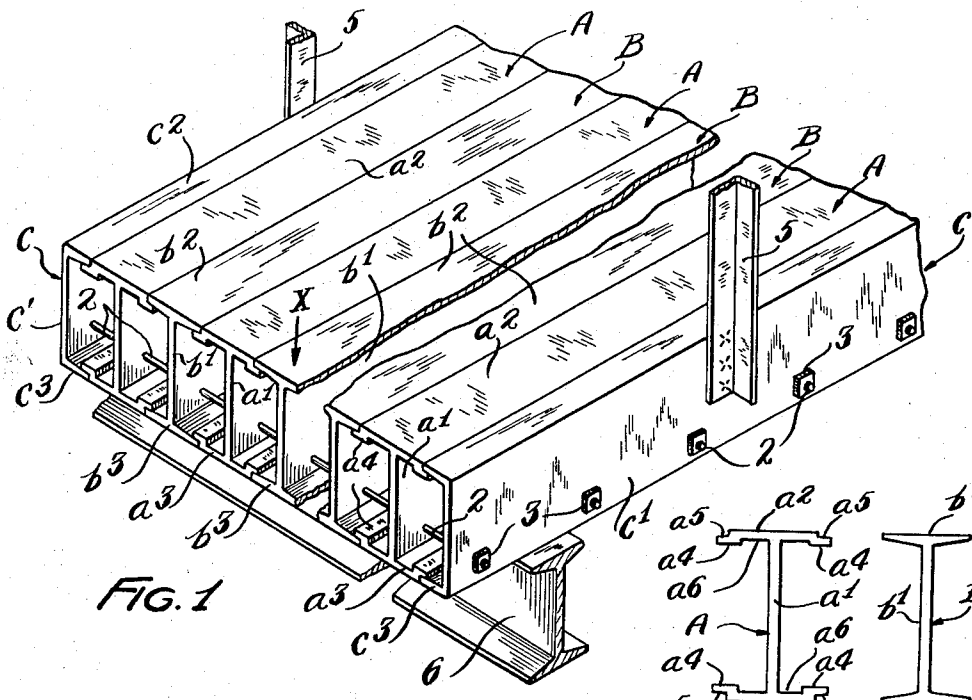


FIG. 1

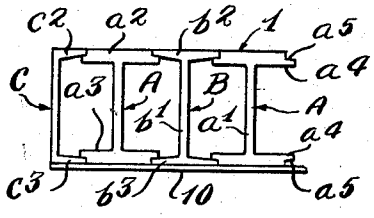


FIG. 2



FIG. 3

FIG. 4



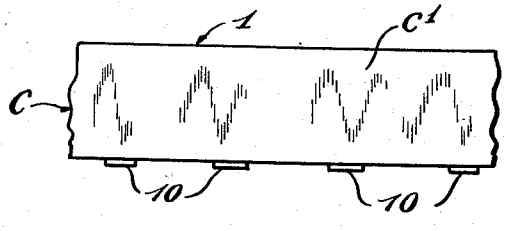


FIG. 5

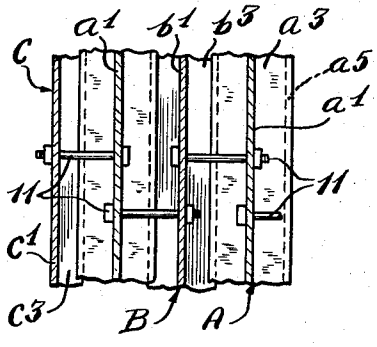


FIG. 6

INVENTOR.
PERCIVAL A. FANNER
BY
Brennan B. West
ATTORNEY

United States Patent Office 2,878,904
Patented Mar. 24, 1959



2,878,904

# FLOOR OR DECK CONSTRUCTION

Percival A. Fanner, Detroit, Mich.

Application March 10, 1953, Serial No. 341,437

2 Claims. (Cl. 189—34)

This invention relates to the class of constructions providing load-bearing surfaces.

The invention is applicable to floors, decks, or the like, and it is especially adapted to circumstances where light weight floors or decks are required, such as in aircraft freight carriers, railway freight cars, automotive trucks and trailers, bridges, etc.

The primary object of my invention is to provide a construction of the class aforesaid made up of many comparatively small size beams or elongated elements that intermesh with one another in a lateral direction, and throughout their lengths, and in such fashion as to effectively distribute a concentrated load throughout the entire width of the structure—or, in fact, throughout the whole area thereof inasmuch as the elements overlap laterally throughout their lengths—in contradistinction to prior constructions composed of large size relatively heavy units, each capable of independently supporting the concentrated load.

Another object of my invention is to provide a floor or deck construction of the above described character having a smooth top surface so that objects may readily be slid around thereon.

Another object of my invention is to provide a floor or deck construction affording the maximum degree of strength relative to the weight of the material used in the construction.

Another object of my invention is to provide a floor or deck construction that is composed of a plurality of beams or elongated elements of which a minimum number are dissimilar and which are of simple, practical cross sectional shape suited to economical commercial production by rolling or extruding the same in units of considerable length, and from materials especially suited to the use to which the structure is to be put.

A further and related object is to provide beams or elements of the aforesaid character that are capable of assembly in floors or decks of a wide variety of sizes and proportions; and that are of such shape, and that intermesh in such manner, as to facilitate fabrication of a floor or deck.

Another object of my invention is the provision of a floor or deck construction that is very substantial and durable and of such character that it may easily be built into the primary supporting structure.

Another object of my invention is to provide a floor or deck construction that may readily be covered with a surfacing material to take the wear of objects slid or rolled over its surface, or that may be covered with insulating material.

Other objects and advantages of my invention will become apparent as this description proceeds, reference being had to the accompanying drawings in which

Fig. 1 is a fragmentary perspective view of a floor or deck construction embodying the invention;

Figs. 2 and 3 are end elevational views of the two dissimilar beams or elongated elements that constitute the principal parts of the floor or deck construction;



Fig. 4 is a fragmentary end elevational view, and Fig. 5 a similar side elevational view, of a floor or deck construction showing a slightly modified form of the rabbeted beams and a modified form of means for tying the successive laterally spaced beams or elements together, and

Fig. 6 is a further modification of such means.

Like parts are designated by like reference characters throughout the several views of the drawings.

In general, my improved floor or deck construction comprises a plurality of overlapping and underlapping elements substantially in the form of I beams. The floor or deck is designated, generally, by the reference character 1, and it is shown as made up principally of alternating beams or elongated elements A and B. As best shown in Fig. 3, each element B approximates a conventional I beam. It consists of a web $b'$, and top and bottom flanges $b^2$ and $b^3$, respectively, that are at right angles to the web. Each beam or element A is generally I-shaped in cross section, being composed of a web $a'$ and top and bottom flanges $a^2$ and $a^3$, respectively, that occupy planes normal to that of the web. The lateral edge portions of each of said flanges are offset to form steps $a^4$ and provide outwardly facing grooves or rabbets $a^5$ that are shaped to receive, with a practical fit, the edge portions of the top and bottom flanges $b^2$ and $b^3$, respectively, of the beams or elements B. Where the method of production permits, as in the extruding process, the inner sides of the top and bottom flanges of the beams or elements A are sunken inwardly of the steps $a^4$, as shown at $a^6$, so as to reduce the thickness of the flanges and, accordingly, reduce the weight of the beam or element.

Material from which the floors or decks are constructed is chosen according to the requirements of the particular use to which the structure is to be put, and such use, in a measure, dictates the size of the beams. For instance, for use on aircraft, the beams or elements are relatively small in cross section, and are produced from aluminum or other light metal; while, for bridge decks, the beams may be relatively large in cross section, and of a metal best suited to the purpose.

In the laying of a floor or deck, the beams or elements A and B are alternately placed, one after another, in substantially parallel relation, and each beam or element as it is emplaced is slid laterally until the contiguous edges of its top and bottom flanges are intermeshed with those of the preceding beam or element, the resultant assembly being shown in Figs. 1 and 4. In the illustrated embodiment of the invention, inwardly facing channel beams or elements C are applied to the sides of the structure with their top and bottom flanges $c^2$ and $c^3$, respectively, intermeshed with the top and bottom flanges $a^2$ and $a^3$ of the adjacent beams A.

The beams are desirably connected together adjacent their lower sides by suitable tie means, for a reason presently to be explained. Such means consist of the rods or bolts 2 in the construction illustrated in Fig. 1, and these rods or bolts are extended through aligned holes in the webs $a'$ and $b'$ of the respective beams or elements A and B, and in the webs $c'$ of the beams C. The ends of the bolts or rods 2, beyond the webs of the beams C are held fixed with respect to said beams as, for example, by nuts applied to both ends of the bolts or rods, the nuts appearing in Fig. 1 being designated 3. Obviously, a head may be formed on one end of the rod or bolt and a nut applied to the other. In lieu of either of the foregoing, the ends of the rods may be welded to the webs of the terminal beams.

By way of illustration, the floor or deck is shown in Fig. 1 as supported by hangers 5, which may consist of

angle bars that have their lower ends welded to the beams C. The floor or deck may be further supported by cross beams or structural members, one of which is designated **6** in Fig. 1, and in some instances the latter supporting means may be employed to the exclusion of hangers **5**.

In the construction illustrated in Figs. 4 and 5, the beams are tied together along their lower sides by bars **10** that are welded to the bottom flanges of the beams; and in some instances the tie means may be provided by welding the edges of adjacent beams together continuously therealong or at intervals, such an expedient being so obvious as not to require specific illustration. In Fig. 4, the inner sides of the top and bottom flanges of the beams A are not sunken inwardly of the steps $a^4$, as in the previously described form, thus adapting the beam to production by the rolling method, as well as by the extruding process.

In Fig. 6, the webs of adjacent beams are fastened together by bolts **11** that constitute the tie means, the bolts being shown as in staggered relation transversely of the floor or deck.

It will be observed that the beams or elements whereof the floor or deck is constructed are of precisely the same height. Consequently the fabricated structure will possess a perfectly smooth load supporting surface, over which objects may be rolled or slid in any direction without interference.

When a load is imposed upon the floor or platform at any point or region within the area thereof, it will be distributed laterally to all beams throughout the width of the structure by reason of the overlapping and underlapping flanges of the series of beams or elements. For example, a concentrated load imposed upon the floor or deck in the region designated by the arrow X in Fig. 1, will be transmitted right and left, so to speak, first through the top flange of the beam or element B wherewith said arrow is associated, through the contiguous portions of the corresponding flanges of the adjacent beams or elements A and thence through the webs $a'$ thereof and the remote portions of the bottom flanges $a^3$, to the near sides of the bottom flanges $b^3$ of the next adjacent beams or elements B. These latter beams or elements will then transmit load through the remote sides of their top flanges, to the contiguous edge portions of the top flanges of the next adjacent beams or elements A, and so on to the extreme sides of the structure. At the same time the weight will be distributed longitudinally of the beams or elements because of the fact that the intermeshing of the beams is coextensive with the lengths thereof.

This lateral transmission of a vertically applied force through the successive beams or elements to the right and left of the region of the concentrated load, effected through the diagonally opposed portions of the top and bottom flanges of the successive beams or elements, tends to twist the beams or elements on the left side of the applied load in a clockwise direction, and those on the right side in a counterclockwise direction, with the effect of forcing the top flanges of all beams more firmly together and separating their bottom flanges. Contact of the vertical edges of the top flanges of the beams or elements B with the vertical walls of the grooves or rabbets $a^5$ of the beams or elements A resist the forcing of the top flanges together. Separation of the bottom flanges is opposed by the tie means already described, and which consist of the bolts or rods **2** of the embodiment illustrated in Fig. 1; the bars **10** in the form disclosed in Figs. 4 and 5, and the bolts **11** in the construction illustrated in Fig. 6.

When a relatively short floor or deck construction is sustained adjacent its ends by such structural members as the one designated **6** in Fig. 1, or, in the case of



longer structures, are supported at relatively brief intervals by such structural members, the tie means may be dispensed with since contact of the beams or elements with said members will resist the torque or twisting tendency set up in the beams or elements.

Having thus described my invention, what I claim is:

1. In a construction of the class set forth, a series of considerable number of metal beams of two different types, all beams having flat top and bottom surfaces spaced the same distances apart in a vertical direction, the first type being in the form of an I beam characterized by steps along both lateral edges of its top and bottom flanges inset, respectively, from the aforesaid top and bottom surfaces thereby providing outwardly facing rabbets, each rabbet being defined by a plane vertical surface and a plane substantially horizontal surface, and the second type corresponding substantially to the conventional I beam, each beam being symmetrical about its vertical and horizontal axes, the beams of the two types being arranged side by side and alternating and having the edge portions of the top and bottom flanges of the beams of the second type engaged in the rabbets of the beams of the first type, said edge portions being complementary to and of substantially the same cross sectional area as the rabbets wherein they are engaged, the assembly of beams when arranged as aforesaid presenting a continuous, relatively broad and absolutely smooth load supporting top surface, and tension means applied to the series of beams adjacent the lower side thereof for restraining the beams against lateral separation in the region of their bottom flanges.

2. In a construction of the class set forth, a series of considerable number of metal beams of two different types, all beams having flat top and bottom surfaces spaced the same distances apart in a vertical direction, the first type being in the form of an I beam characterized by steps along both lateral edges of its top and bottom flanges inset, respectively, from the aforesaid top and bottom surfaces thereby providing outwardly facing rabbets, each rabbet being defined by a plane vertical surface and a plane substantially horizontal surface, and the second type correspondlng substantially to the conventional I beam, each beam being symmetrical about its vertical and horizontal axes, the beams of the two types being arranged side by side and alternating and having the edge portions of the top and bottom flanges of the beams of the second type engaged in the rabbets of the beams of the first type, said edge portions being complementary to and of substantially the same cross sectional area as the rabbets wherein they are engaged, the assembly of beams when arranged as aforesaid presenting a continuous, relatively broad and absolutely smooth load supporting top surface, tie bars underlying and engaged with the bottom flanges of the beams, and means securing the tie bars to a number of the beams for holding all beams of the series against lateral separation through the medium of the tie bars.


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

UNITED STATES PATENTS

| | | |
|---|---|---|
| 83,196 | Montgomery | Oct. 20, 1868 |
| 132,087 | Latrobe | Oct. 8, 1872 |
| 2,050,935 | Dresser | Aug. 11, 1936 |
| 2,078,117 | Auryansen | Apr. 20, 1937 |
| 2,307,869 | Tench | Jan. 12, 1943 |

FOREIGN PATENTS

| | | |
|---|---|---|
| 13,979 | France | July 3, 1855 |
| 2,102 | Great Britain | of 1861 |
| 337,636 | France | Apr. 18, 1904 |
| 57,468 | Switzerland | 1911 |
| 39,429 | Sweden | Sept. 22, 1915 |