

- [54] **SNAP INTERLOCK DECK STRUCTURE
WITH IMPROVED INTERLOCKING
ENGAGEMENT**
- [75] **Inventor: William A. Roberts, Hartsdale, N.Y.**
- [73] **Assignee: Burnham Corporation, Irvington on
Hudson, N.Y.**
- [22] **Filed: July 25, 1974**
- [21] **Appl. No.: 491,734**
- [52] **U.S. Cl. 52/483; 52/579**
- [51] **Int. Cl.² E04B 5/02**
- [58] **Field of Search 52/483, 588, 482, 480,
52/579**

[56] **References Cited**
UNITED STATES PATENTS

3,046,852	7/1962	Graham	52/588 X
3,528,391	9/1970	Johnson	52/588 X
3,675,594	7/1972	Kritske.....	52/588 X

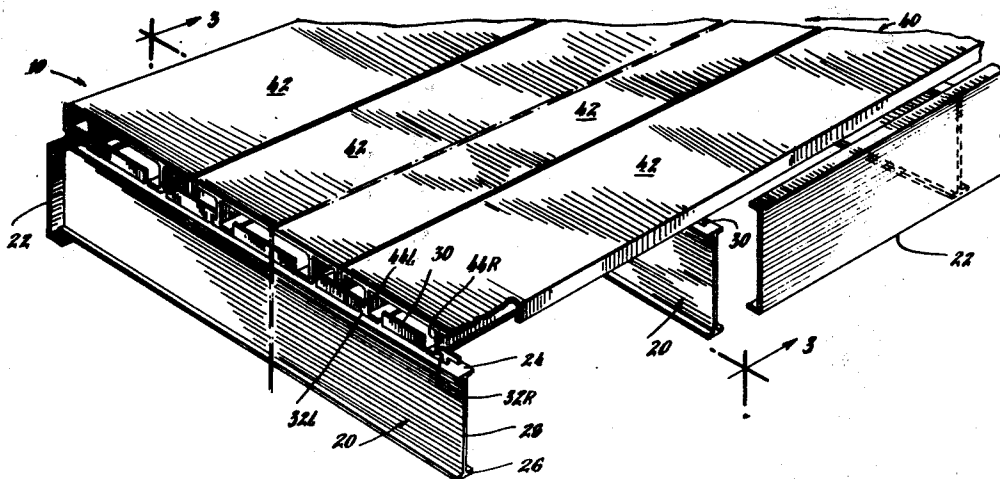
Primary Examiner—Ernest R. Purser
Assistant Examiner—Carl D. Friedman
Attorney, Agent, or Firm—Haynes N. Johnson

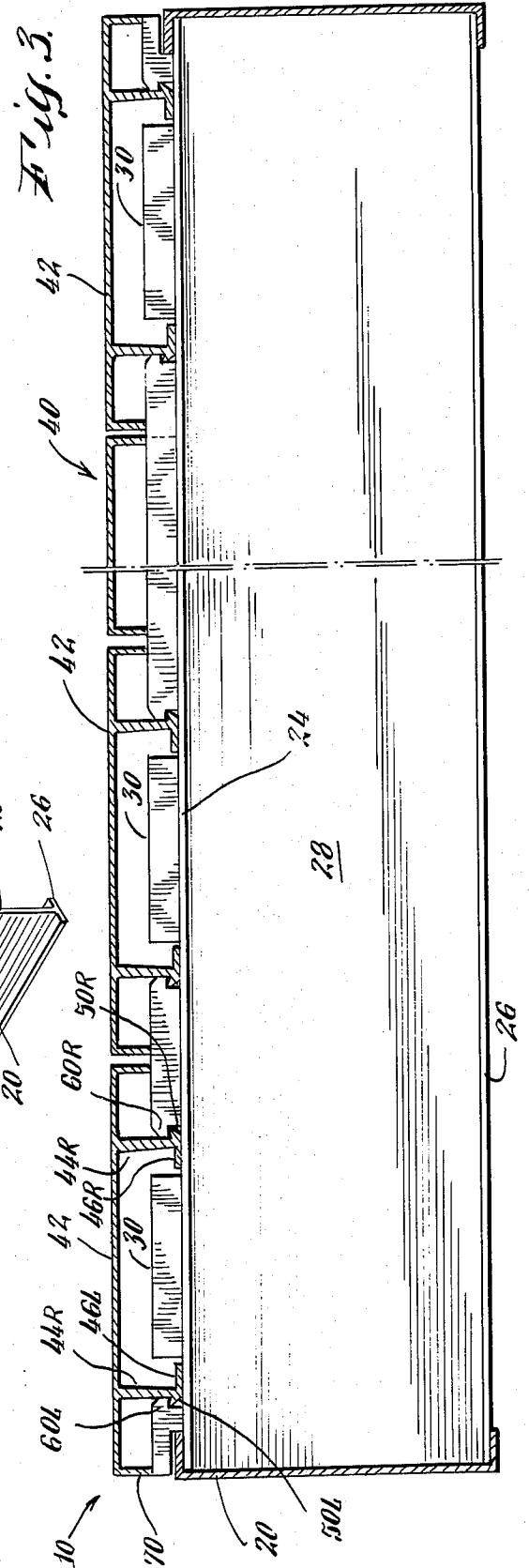
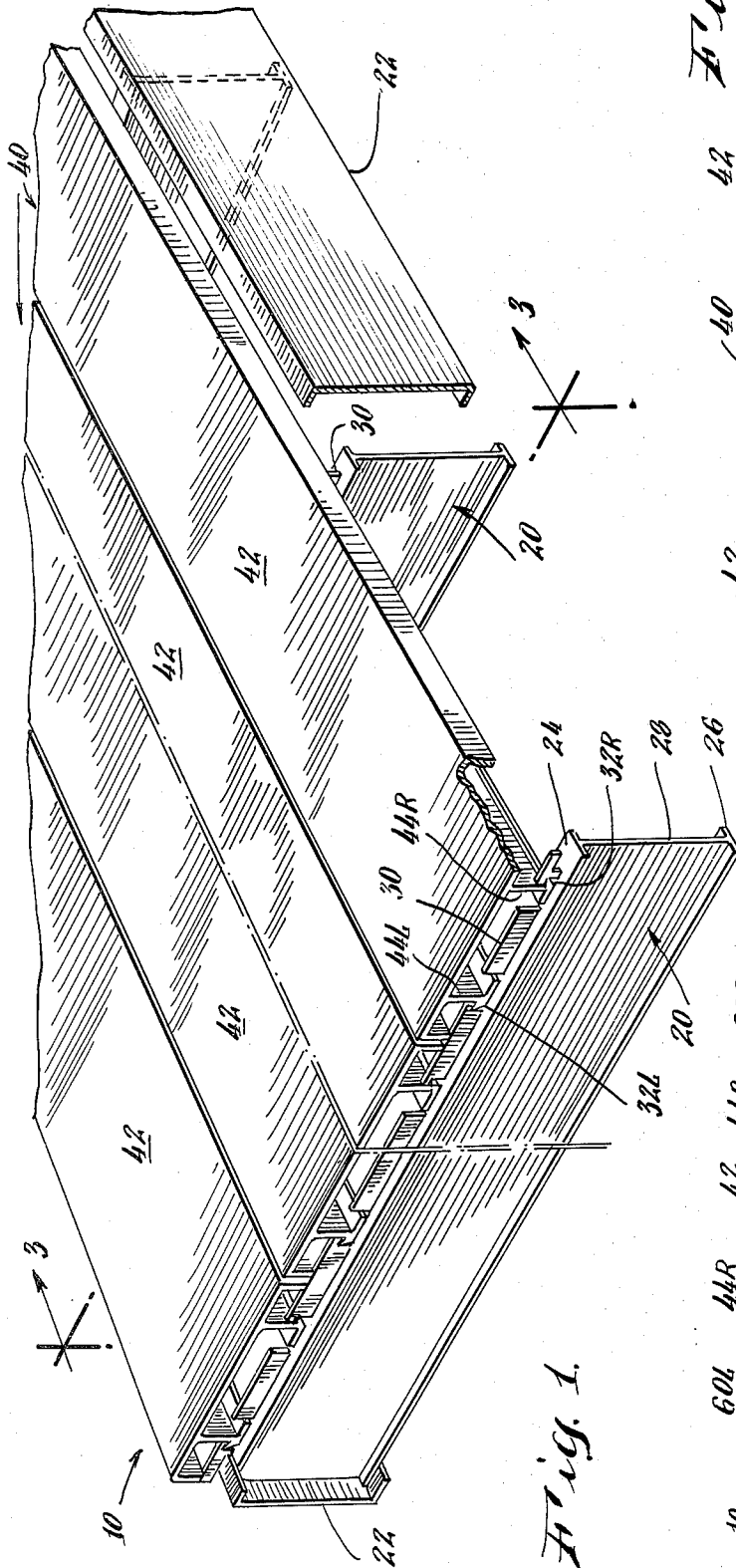
[57] **ABSTRACT**

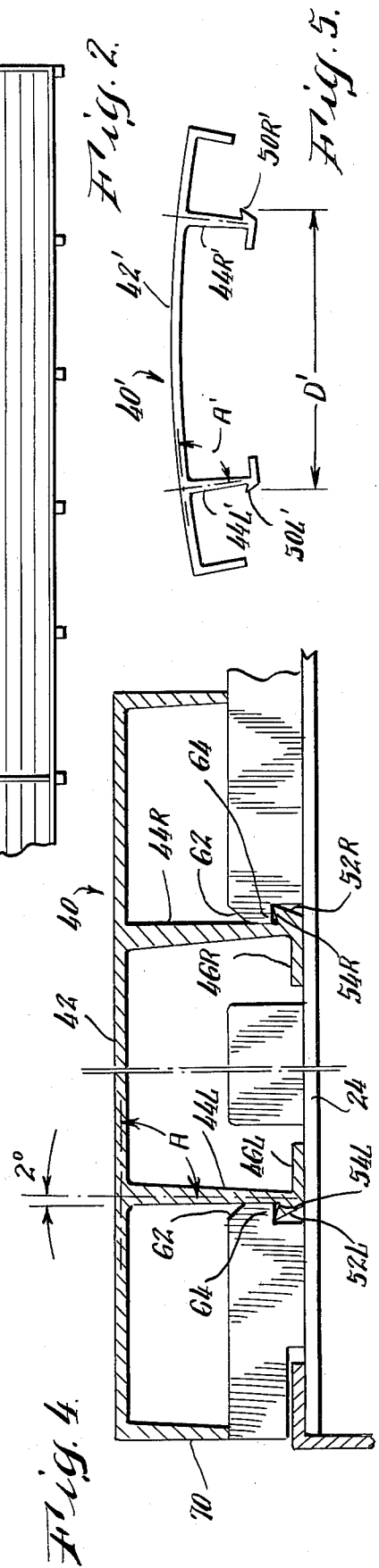
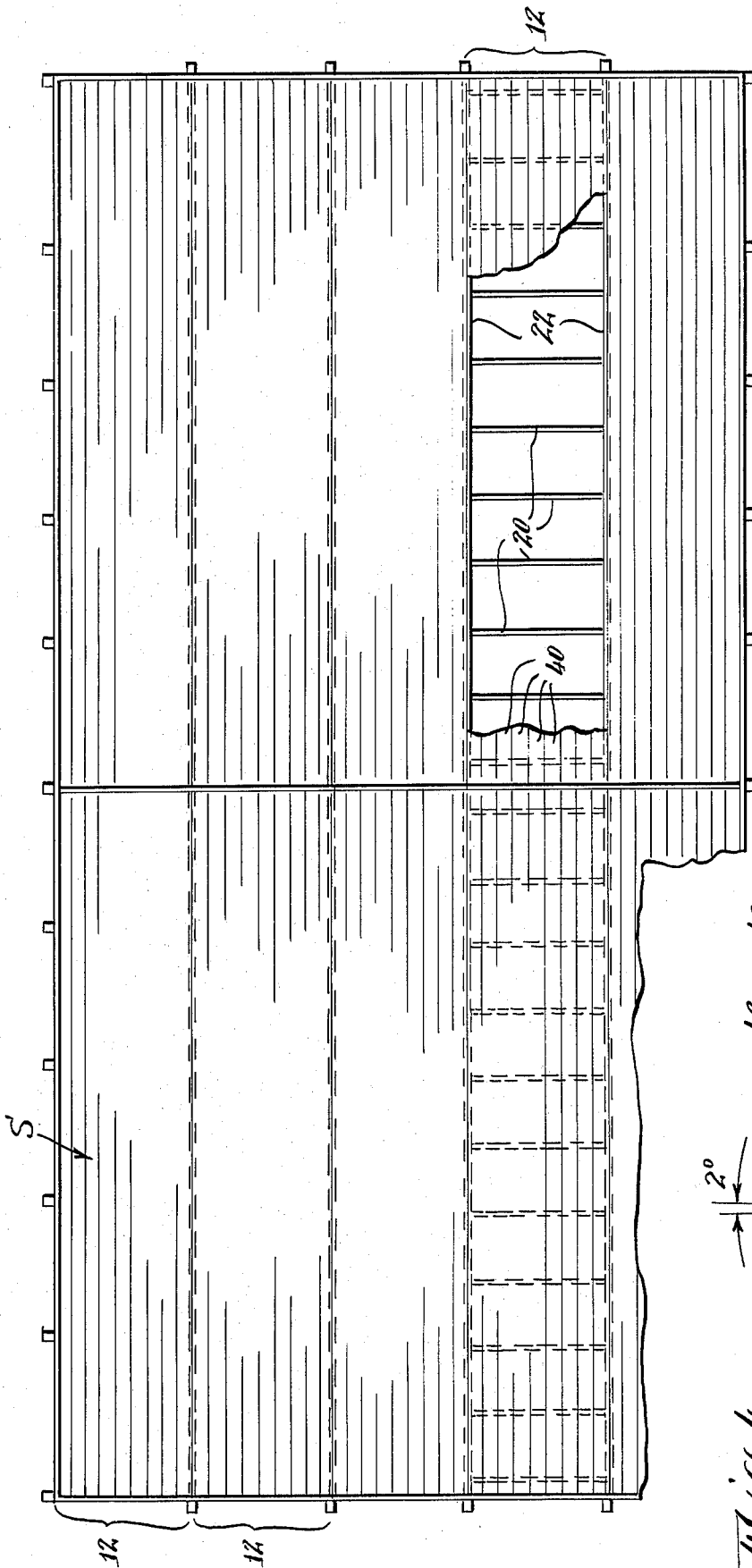
An extruded aluminum deck structure, of the general

type in which floor joists support and are secured to transverse decking members, is characterized by an improved decking member capable of secure snap interlocking installation on floor joists despite extrusion shape distortions in the decking members. In the deck structure, the floor joists have longitudinal ribs along their top supporting surfaces with pairs of notches in the ribs forming horizontally opposed latching members. The extruded decking members are formed with a floor plate and two depending vertical legs with opposed latching members at their lower ends which meet and then snap into interlocking engagement with the rib latching members as the legs descend into the rib notches. To provide secure interlocking, vertical outrigger flanges depend from the outer edges of the floor plate with a length arranged to rest upon the longitudinal rib when the latching members are in proper engagement, thereby compelling the decking member to assume a shape urging the latching members toward one another for secure engagement. The vertical legs are angled outwardly, and the latching members on the vertical legs have barbs with upwardly canted latching surfaces to maintain latching engagement during distortion of the decking member.

11 Claims, 5 Drawing Figures







SNAP INTERLOCK DECK STRUCTURE WITH IMPROVED INTERLOCKING ENGAGEMENT

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to deck, platform, or other surface structures of the general type in which supports are fastened to transverse decking or surface members or planks by means of a snap interlocking arrangement. The present invention particularly relates to an aluminum deck structure adapted for recreational purposes encountering lateral stresses, such as the playing surface of a platform tennis court.

2. Description of the Prior Art

Metal deck structures assembling extruded joists and transverse decking members by means of a snap interlocking construction are disclosed in the patent application of George C. Fetherston, Ser. No. 375,178 filed June 29, 1973. This assembly technique, in which opposed latching members on the decking member meet and then snap into interlocking engagement with latching members on a rib provided on the floor joists, permit rapid and inexpensive installation of decking members on floor joists without tools or fasteners. In such deck structures, the extrusion process by which the members are formed introduces a certain amount of variation in dimension and shape, causing deviation from the intended mating engagement of latching members. When the decking members are subject to strong lateral forces, as on a platform tennis court, manufacturing deviations from uniformity can permit latching members to disengage.

SUMMARY OF THE INVENTION

It is a principal object of the present invention to provide an improved deck or surface structure, of the type using joists and decking members united with a snap interlocking arrangement, which can be united securely despite normal manufacturing deviations from uniformity in dimension and shape, and which remains united securely despite imposition of strong lateral forces. It is a further object of the invention to provide a deck or surface structure which is capable of becoming and remaining firmly united while still being economical to produce in extruded form.

In a preferred embodiment of the invention to be described hereinbelow in detail, the deck or other surface structure comprises a floor joist or other support formed with a vertical rib. The rib is provided with pairs of openings or notches which form opposed latching members. The transverse decking or surface members, extruded for example from aluminum, are formed with a floor plate and two vertically depending legs with horizontally opposed latching members at their lower ends which meet and then snap into interlocking engagement with the rib latching members as the vertical legs are urged into the rib notches. Assembly of decking to floor joists is accomplished by positioning the decking and then applying a downward force, as by stepping on it, to cause the legs to flex inwardly and then snap outwardly to bring their latching members into engagement with the mating latching members on the ribs. In order to assure secure interlocking despite distortion in the cross sectional shape of the extruded decking member, the decking member is formed with vertical outrigger flanges depending from the floor plate and arranged to rest upon the longitudinal rib of

the floor joist when the latching members are in proper interlocking engagement. The outrigger flanges compel the decking member to assume a shape which urges the latching members on the vertical legs outwardly into engagement with the rib latching members.

In another aspect of the invention, the vertical legs depending from the floor plate are angled outwardly, for example, two degrees from vertical, to compensate for sidewise distortion or flexing of the legs under stress or during manufacturing. The latching members at the lower ends of the vertical legs are in the form of outwardly extending barbs having upper latching surfaces which are canted upwardly to maintain latching engagement with corresponding rib latching surfaces during lateral distortion of a vertical leg.

Other objects, aspects and advantages of the invention will be pointed out in, or apparent from, the detailed description hereinbelow, considered together with the following drawings.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view, with portions broken away and in section, of a deck structure according to the present invention;

FIG. 2 is a plan view of the playing surface of a platform tennis court constructed with the deck structure of the present invention;

FIG. 3 is a section on line 3—3 of FIG. 1; and

FIG. 4 is a partial detailed section similar to FIG. 3 but drawn with enlarged scale; and

FIG. 5 is a cross section of a decking member showing, in exaggerated form, distortion of the type cured by the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

FIG. 1 illustrates a deck or surface structure 10 constructed in accordance with the present invention and arranged to form one of ten surface sections 12 making up the playing surface S of a platform tennis court (FIG. 2). As shown in FIG. 1, the deck structure 10 includes parallel floor joists 20 supported, for example, at their ends by channels 22. The floor joists 20 are typically of extruded aluminum I-beam construction having top and bottom flanges 24 and 26 joined by a central web 28.

Extending upwardly from top flange 24, in alignment with web 28, each floor joist 20 has a vertical rib 30 containing pairs of openings or notches 32L and 32R formed as described below. Preferably, rib 30 is extruded along with the remainder of joist 20, and notches 32L and 32R are formed in rib 30 with a press brake. In the embodiment illustrated in the drawings, rib 30 has a thickness of one-eighth inch and a height above top flange 24 of one-half inch.

The floor joists 20 connect to and support an array of transverse decking members 40 which together form the deck surface S. Each decking member 40, typically made of extruded aluminum, has a floor plate 42 with two vertical legs 44L and 44R depending from floor plate 42 and terminating in inwardly extending supporting flanges 46L and 46R which rest in rib notches 32L and 32R upon top flange 24 of floor joist 20 to provide vertical support for the decking members 40.

Decking members 40 interlock with floor joists 20 by means of horizontally opposed latching members 50L and 50R located at the lower ends of vertical legs 44L

and 44R and arranged to snap into engagement with corresponding horizontally opposed latching members 60L and 60R formed in notches 32L and 32R of the floor joists 20. (See FIGS. 3 and 4.)

As shown for example in FIG. 4, the decking latching members 50L and 50R are in the form of outwardly extending barbs with a lower inclined surface 52 ending in an upper latching surface 54. The joist latching members 60L and 60R are in the form of inwardly extending barbs with an upper inclined surface 62 and a lower latching surface 64.

Assembly of decking members 40 and floor joists 20 is done simply by positioning decking members 40 with vertical legs 44L and 44R at the tops of notches 32L and 32R. In this position, the inclined surfaces 52 and 62 are in engagement. A downward force is applied to decking member 40, as by stepping on it, and the inclined surface 52 and 62 act as cams forcing the vertical legs 44L and 44R to flex inwardly, i.e., toward one another, until the inclined surfaces 52 and 62 pass one another. Further downward movement of decking member 40 brings latching surfaces 54 and 64 into alignment, allowing vertical legs 44L and 44R to snap outwardly to bring the latching surfaces 54 and 64 into engagement to interlock the decking member 40 and floor joist 20 together with supporting flanges 46L and 46R resting on joist top flange 24.

As indicated above, existing extrusion techniques for forming decking members 40 sometimes produce distortions in the shape of the decking member cross section. An exaggerated example is illustrated in FIG. 5, which shows a decking member 40' having a floor plate 42' which is bowed upwardly in the middle, and which has the centerline of its vertical legs 44L' and 44R' located at an angle A' in relation to the plane of floor plate 42' which is less than intended. Both of these deviations tend to reduce the distance D' separating latching members 50L' and 50R', and consequently these latching members are urged less strongly, or not at all, into engagement with rib latching members 60L and 60R. Lateral forces on the decking member 40 tend also to lessen the angle A'.

In accordance with the present invention, deviations in shape of decking member 40 are compensated for and corrected through several different means.

To compensate and correct for upward bowing of the floor plates 42, each decking member is formed with vertical outrigger flanges 70 depending from the outer edges of the floor plate 42 on the sides of the vertical legs carrying latching members 50L and 50R and being arranged in length to rest upon the longitudinal rib 30 of the floor joist 20 when the latching members 50L, 60L and 50R, 60R are in proper interlocking engagement. As can be seen in FIG. 4, for example, the outrigger flanges 70 thus form a fulcrum supporting the outer edges of floor plate 42 and causing any upward bow in the floor plate to be straightened out when a downward force is applied to the decking member 40 during installation. By flattening the floor plate 42 in this manner, the latching members 50L and 50R are urged outwardly into firm engagement with latching members 60L and 60R. Besides correcting bow in floor plate 42, the outrigger flanges provide additional vertical support for floor plate 42, allowing vertical legs 44L and 44R to be made shorter or with a smaller cross-section. Because of the outrigger flanges 70 are located at the outer edges of floor plate 42, vertical forces applied to

floor plate 42 at its outer edges do not produce large twisting moments about vertical legs 44L and 44R tending to raise or disengage the latching members.

In addition, decking member 40 has vertical legs 44L and 44R formed with a tapered cross section, the upper ends of legs 44L and 44R being thicker than the lower ends to make the legs stiffer and more difficult to bend at the upper ends. Moreover, the vertical legs 44L and 44R are inclined outwardly by a small angle so that any inward bending of the legs will have less tendency to disengage the respective latching members. As shown in FIG. 4, the angle of inclination of vertical legs 44L and 44R is such that the center line of the tapered legs is at an angle A to floor plate 42 of about 92°.

In addition, the latching surfaces 54 of latching members 50L and 50R cant upwardly at an angle of approximately 50° so that latching engagement between latching surface 54 and latching surface 64 will be maintained securely even if a vertical leg 44L or 44R is bent inwardly. Moreover, the upwardly canted latching surface 54 tends to lock the latching members into firmer engagement whenever any upward pull is exerted on a vertical leg 44L or 44R.

Decking members 40 constructed as described above can be united with floor joists 20 quickly and reliably with a snap interlocking engagement, and the engagement will be secure despite distortions in shape caused by manufacturing variances or stress during use. These advantages are achieved economically, since they do not add measurably to the weight and hence the cost of the decking members 40.

In the particular embodiment of the invention illustrated, the decking members 40 are symmetrical about a vertical center line and are dimensioned, approximately, to provide: floor plates 42 with a width of 8 inches; vertical legs 44L and 44R with a spacing of 4½ inches apart and a length of 1.275 inches; outrigger flanges 70 with a length of 0.775 inches to reach the top of rib 30; supporting flanges 46L and 46R with a width of about 0.35 inches; and latching members 50L and 50R with a latching surface 64 with a width of about one-tenth inch and an inclined surface 52 of approximately two-tenth inches in width. The vertical legs taper from a wall thickness of 0.090 inches at the top, to 0.076 inches at the bottom. Outrigger flanges 70 similarly taper from a wall thickness of 0.090 inches at the top to 0.076 inches at the bottom. Floor plates 42 have a thickness of 0.090 inches at the vertical legs tapering to 0.076 inches at outrigger flanges 70, and tapering to 0.078 inches at the center line of the floor plate. Notches 32L and 32R have a latching surface 64 with a width of one-eighth inch and an inclined surface 62 with a vertical height of about one-tenth inches and lying at an angle of 36½ to the vertical.

While deck structure 10 has been described with reference to use as a playing surface, it will be apparent that the construction described as applicable to other arrangements wherein supports fasten to transverse decking or other surface or planking members, such as walls, ramps or the like. Similarly, while metal extrusions have been described, other materials and forming processes are suitable to the construction described.

Although a specific embodiment of the invention has been disclosed herein in detail, it is to be understood that this is for the purpose of illustrating the invention, and should not be construed as necessarily limiting the scope of the invention, since it is apparent that many

changes can be made to the disclosed structure by those skilled in the art to suit particular applications.

I claim:

1. A deck or other support structure comprising a support member formed with an upper longitudinal rib provided with pairs of notches forming horizontally opposed latching members on the rib; and a decking or surface member formed with a horizontal plate, two vertical legs depending from the plate and spaced apart to correspond to the spacing between the notches, and horizontally opposed latching members at the lower ends of said vertical legs for meeting and interlocking with the latching members on the ribs as the vertical legs are received within said notches, said structure being characterized by:

the decking or surface member being formed with vertical outrigger flanges depending from the plate a spaced horizontal distance from the vertical legs on the sides of the vertical legs carrying the latching members, the vertical outrigger flanges being arranged to rest upon the longitudinal rib when the latching members are in interlocking engagement. whereby the plates are supported by the outrigger flanges upon the rib and the latching members on the vertical legs are urged into engagement with the rib latching members, thereby to hold the support member and decking member in interlocking engagement.

2. A deck or other surface structure as claimed in claim 1 wherein the outrigger flanges are formed at the outer edges of the horizontal plate, the two vertical legs being interior of the outrigger flanges and having outwardly extending latching members at their lower ends.

3. A deck or other surface structure as claimed in claim 2 wherein the vertical legs depending from the floor plate are angled outwardly.

4. A deck or other surface structure as claimed in claim 3 wherein the vertical legs are angled outwardly approximately two degrees from vertical.

5. A deck or other surface structure as claimed in claim 1 wherein the vertical legs depending from the floor plate are tapered, being thinner at their lower ends.

6. A deck structure as claimed in claim 1 wherein the latching members at the lower ends of the vertical legs each are in the form of an outwardly extending barb with a lower inclined surface and an upper latching sur-

face canted upwardly and arranged to engage a corresponding latching surface on the rib, whereby the upwardly canted latching surface maintains engagement with the rib latching surface even if a vertical leg flexes inwardly, thereby to maintain interlocking engagement of the deck members and floor joists.

7. A deck structure as claimed in claim 6 wherein the two vertical legs are angled outwardly, whereby upon being flexed inwardly they are capable of maintaining the latching surfaces in engagement.

8. A deck or other surface structure comprising a support member formed with an upper longitudinal rib provided with pairs of notches forming horizontally opposed latching members on the rib; and a decking or surface member formed with a horizontal plate, two vertical legs depending from the plate and spaced apart to correspond to the spacing between the notches, and horizontally opposed latching members at the lower ends of the vertical legs for meeting and interlocking with the latching members on the ribs as the vertical legs are received within said notches, said structure being characterized by:

the horizontally opposed latching members at the lower ends of said vertical legs extending outwardly, and

the vertical legs depending from the floor plate being angled outwardly so as to direct the latching members into engagement.

9. A deck or other surface structure as claimed in claim 8 wherein the vertical legs are angled outwardly approximately two degrees from vertical.

10. A deck or other surface structure as claimed in claim 8 wherein the vertical legs depending from the floor plate are tapered, being thinner at their lower ends.

11. A deck or other surface structure as claimed in claim 8 wherein the latching members at the lower ends of the vertical legs each are in the form of an outwardly extending barb with a lower inclined surface and an upper latching surface canted upwardly and arranged to engage a corresponding latching surface on the rib, whereby the upwardly canted latching surface maintains engagement with the rib latching surface even if a vertical leg flexes inwardly, thereby to maintain interlocking engagement of the deck members and floor joists.

* * * * *

50

55

60

65