

Feb. 20, 1945.

G. G. GREULICH

2,369,733

PORTABLE DECK

Original Filed Aug. 26, 1942

3 Sheets-Sheet 1

Fig. 1.

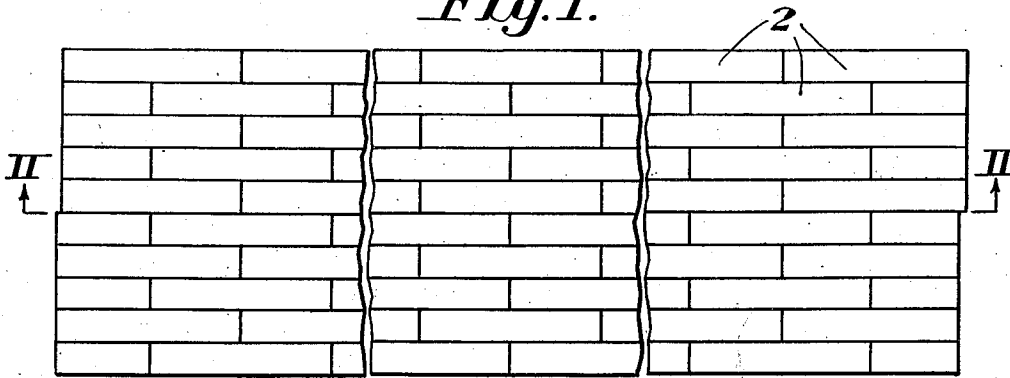


Fig. 2.

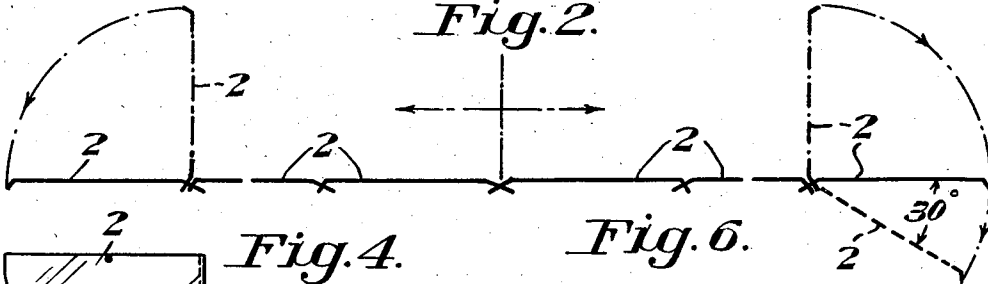


Fig. 4.

Fig. 6.

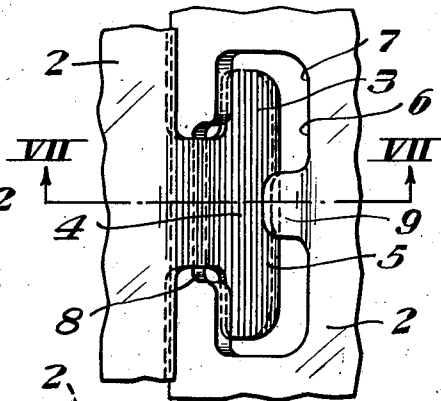
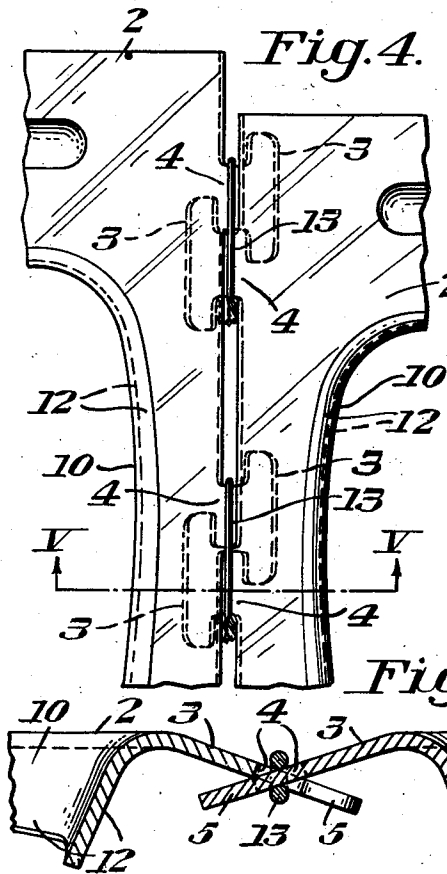


Fig. 7.

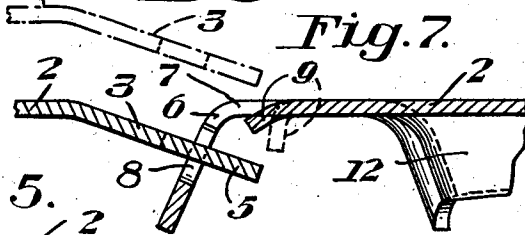
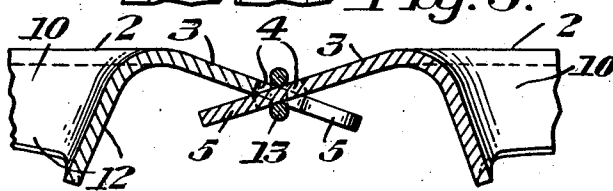


Fig. 5.



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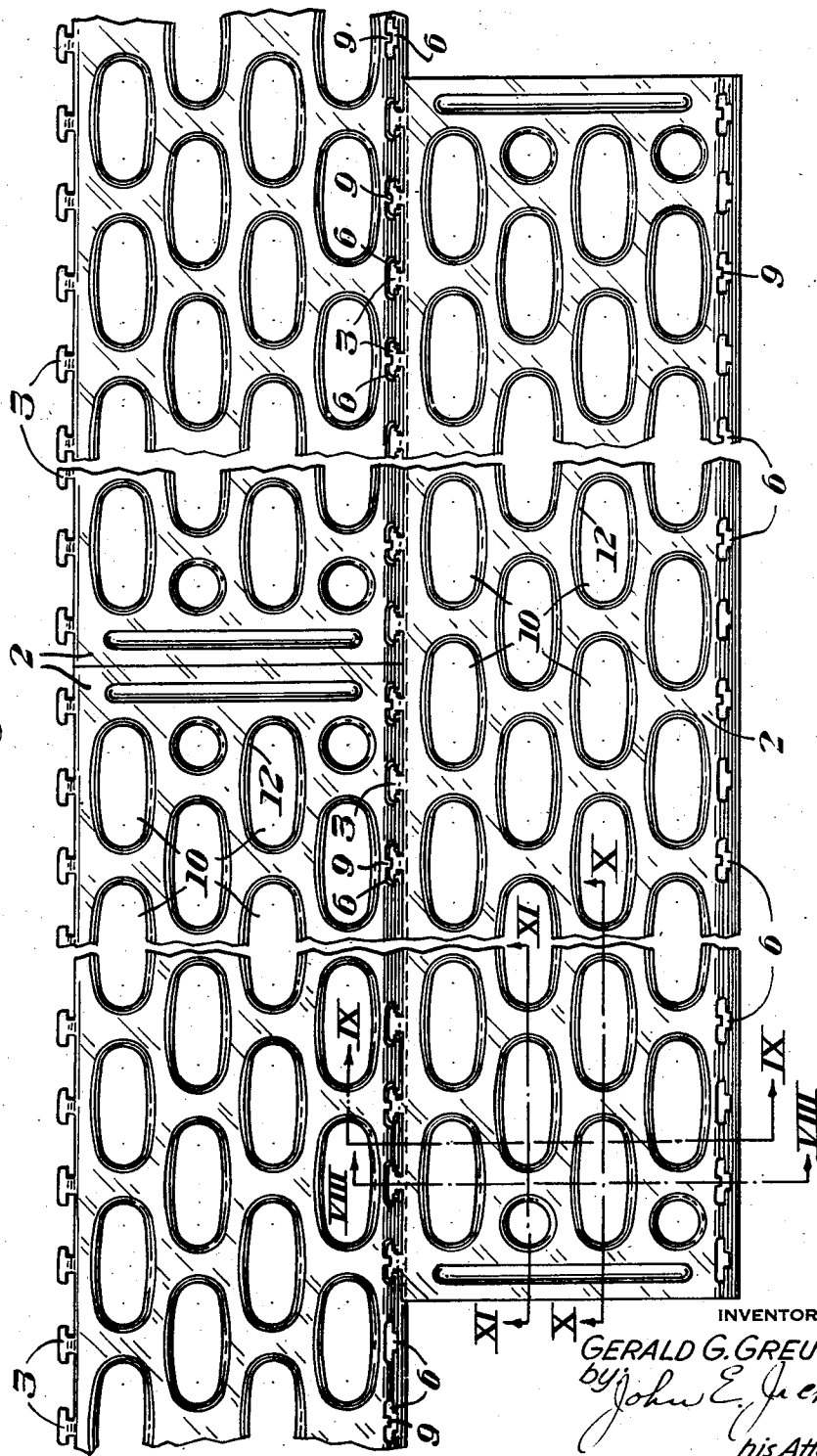
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Fig. 3.



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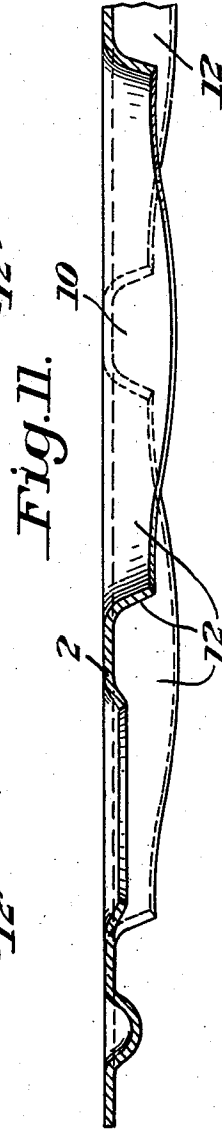
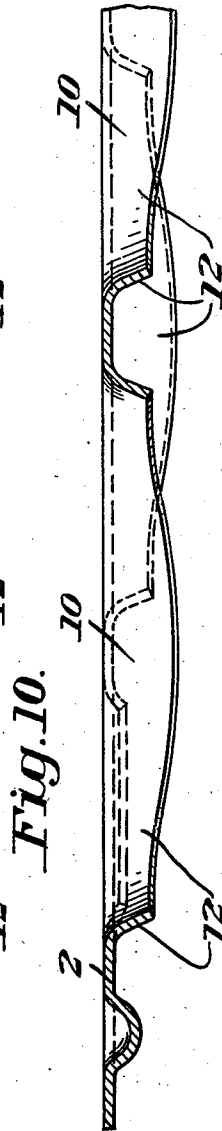
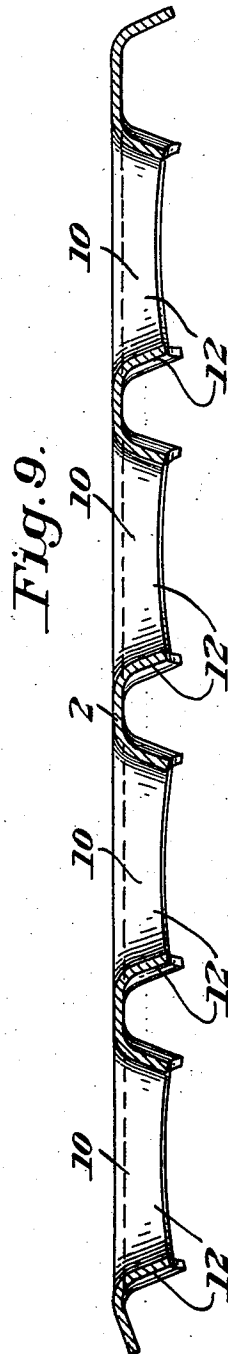
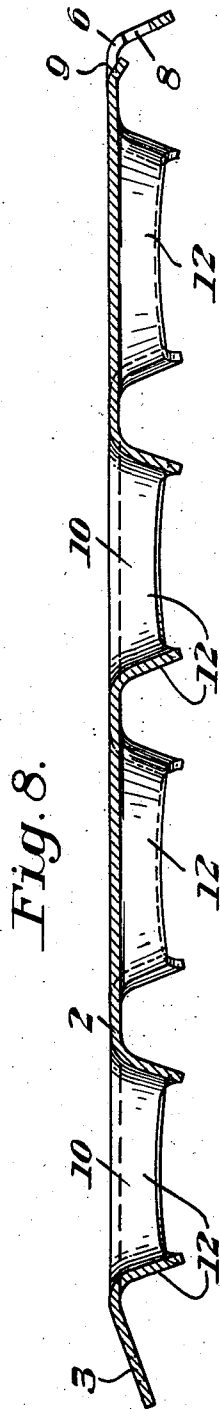
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3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE

2,369,733

PORTABLE DECK

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Original application August 26, 1942, Serial No. 456,233. Divided and this application November 29, 1943, Serial No. 512,225

6 Claims. (Cl. 94—13)

This invention relates to portable decks or mats which are adapted for rapid assembly and dismantling, and particularly to an improved portable deck especially adaptable as a landing field or decking for airplane runways, or for paved areas for other vehicular traffic.

This is a division of my application entitled "Portable deck," filed August 26, 1942, Serial No. 456,233, Patent No. 2,352,892.

In my copending applications, Serial Nos. 345,218 and 358,180, filed July 12, 1940, and September 24, 1940, respectively, Patents Nos. 2,294,549 and 2,294,550, respectively, each of which is entitled "Portable deck," I have shown and described a deck or mat similar to that disclosed in the present application, but the present deck is deemed to be an improvement thereover. In the prior applications there is provided plates having interlocking means arranged along their adjacent edges so that an interlock is effected between each of the plates. The overlapping portions of the interlock in constructions shown therein require a considerable amount of stock extending beyond the center line of the intersection of the plates and in addition a series of separate locking devices, such as spring clips or the like, are required to hold the interlocking portions of the plates in position so as to prevent relative movement or displacement thereof.

Also in the decks shown and described in my earlier applications, there is provided stiffening ribs which extend parallel to the length of the plate. Such ribs require a considerable width of stock when folded to their projecting outline.

In the present invention there is provided a portable mat consisting of a plurality of units or plates with each of the plates having the interlocking means arranged along the outermost edges thereof which interlock without the use of separate locking means. The plates are strengthened by means of a series of overlapping flanges struck up from the body of the plates without the requirement of additional stock for projecting ribs. Such a construction provides not only a saving in the width of the stock in the forming of the interlocking means but also provides a saving through the elimination of the strengthening ribs and permits a reduction of about 14 per cent in the amount of metal required. Furthermore, the elimination of the ribs permits approximately an 8 per cent to 10 per cent reduction in the finished weight of the decking without sacrificing thickness of material or strength of the finished units or plates. Such a reduction in weight is extremely desirable as it makes for easier handling

and reduces the total shipping weight of the decking, thus relieving the tremendous burden on transportation facilities, which is a vital factor in providing such a deck.

Accordingly, it is the general object of the present invention to provide an improved portable deck made of plates or units which are strong and rugged, and, at the same time, which are relatively light in weight and convenient to handle and transport.

It is another object of the invention to provide an improved portable deck consisting of a plurality of units or plates having a simple interlocking means arranged along their edges wherein each plate or unit is identical with very other plate or unit, thereby eliminating excessive fabricating costs and providing plates which are simple and inexpensive in their construction and which can be easily and quickly assembled into a deck, or dismantled.

It is a further object of this invention to provide an improved portable deck consisting of a plurality of units or plates with each of the units or plates having a substantially constant section moduli throughout the length and width thereof.

Various other objects and advantages of this invention will become more apparent during the course of the following specification and will be particularly pointed out in the appended claims.

In the accompanying drawings there are shown, for the purpose of illustration several embodiments which my invention may assume in practice.

In these drawings:

Figure 1 is a plan view of the improved portable deck or mat of my invention showing the general arrangement of the plates or units therein;

Figure 2 is a sectional view taken on line II—II of Figure 1 showing the method of assembling the plates or units;

Figure 3 is an enlarged view showing several plates made in accordance with my invention in their interlocked position and more fully showing the details of the plates;

Figure 4 is a plan view showing details of the interlocked edges of the plates at the starting point of assembling the plates into the deck;

Figure 5 is a sectional view taken on line V—V of Figure 4;

Figure 6 is a plan view showing details of the preferred form of interlocking means of my invention arranged along the edges of the plates;

Figure 7 is a sectional view taken on line VII—VII of Figure 6 showing how the interlock of the plates is effected;

Figure 8 is an enlarged sectional view taken on line VIII—VIII of Figure 3;

Figure 9 is an enlarged sectional view taken on line IX—IX of Figure 3;

Figure 10 is an enlarged sectional view taken on line X—X of Figure 3; and

Figure 11 is an enlarged sectional view taken on line XI—XI of Figure 3.

Referring more particularly to the drawings, the improved portable deck or mat of my invention comprises a plurality of rectangular-shaped metallic plates 2 which are laid side by side in rows with the plates of adjacent rows being staggered relative to each other in a manner similar to that in which brickwork is laid so as to provide a continuous unitary deck or mat as shown in Figures 1, 2 and 3. Along one of the sides or longitudinally extending edges of each of the plates 2, there is arranged a plurality of spaced apart lugs 3 which are preferably T-shaped and which extend outwardly and downwardly from the edge of the plate so as to be disposed angularly relative thereto. As more clearly shown in Figures 4 through 7 of the drawings, each of the lugs 3 consists of a shank or stem portion 4 and an enlarged head portion 5. Along the opposite side or longitudinal edge of each of the plates 2 and inwardly of the extreme edge thereof, there is arranged a plurality of similarly spaced apart openings or slots 6 which are shaped similarly to the lugs 3 but have slightly larger dimensions so as to provide a slightly larger portion 7 for receiving the head portion of a lug and a slightly larger stem portion 8 for receiving the shank or stem portion thereof. The portion 7 of each of the openings adapted to receive the head portion of the lug is disposed preferably substantially in the plane of the plate as shown in Figure 7 with the stem portion 8 adapted to receive the shank portion of the lug arranged downwardly and outwardly so as to be disposed angularly relative thereto. The lugs 3 of one plate are adapted to be inserted in the openings 6 of an adjacently disposed plate so as to effect an interlock therebetween in a manner hereinafter to be described.

On the inner side of at least some of the openings or slots 6, preferably every other one, as shown in Figures 3, 6 and 7 of the drawings, there is arranged preferably an outwardly and downwardly extending lip or lug portion 9, which projects into the area of the enlarged portion 7 of the opening or slot 6 for a purpose hereinafter to be described.

In accordance with the present invention, in each of the plates 2, there is arranged a plurality of rows of openings or apertures 10 which are preferably elliptical in shape, with the apertures in adjacent rows arranged in staggered relation so that the end portions of the apertures in adjacent rows overlap, as shown in Figure 3 of the drawings. Around the edges of each of the apertures, as shown in Figures 8 through 11 of the drawings, there is disposed an inwardly and downwardly extending flange portion 12 so that the apertures converge toward the bottom of the flanges. The flanges 12 are preferably struck up and formed from material punched from the elliptical-shaped apertures in the plates 2 and are preferably variable in height with the flanges having their greatest height at a section transversely of the apertures and gradually diminishing in size toward each end thereof. In other words, the flanges 12 around the apertures 10 are deeper in the center than at the ends thereof.

By providing such a construction, it will be seen that on a cross section through the middle of the apertures 10, as shown in Figure 8 of the drawings, a certain number of deep flanges attached to relatively wide portions at the top of the plates will be provided; whereas on a cross section through the overlapping ends of the openings, as shown in Figure 9 of the drawings, twice the number of shallow flanges attached to relatively narrow portions at the top of the plate will be provided. Such an arrangement permits the developing of approximately equal beam strength or section modulus at any transverse cross section through the plate or unit. Also the section modulus on the line X—X of Figure 3 is approximately the same as the section modulus on a parallel line through a solid portion of the unit. In other words, the variable depths of the flanges 12 around the apertures 10 and the arrangement of the same in overlapping relationship provide constant transverse section moduli throughout each of the plates and also a constant longitudinal section moduli which differs from the transverse section moduli. From a practical standpoint the section moduli may vary as much as 10% plus or minus from a theoretical constant value and still be considered approximately equal. Where the greater number of flanges overlap they can naturally be made shallower for equivalent strength. This feature permits punching out more material at the points where only shallow flanges are needed and the elimination of such excessive metal at these points naturally permits a reduction in weight of the finished plate without sacrificing strength which is a decided advantage. Thus, it will be seen that the flanges 12, together with the punched apertures 10, are constructed and arranged so as to provide a beam strength equivalent to the ribbed plate as heretofore suggested with the elimination of such ribs.

The improved portable deck or mat of my invention is assembled in the following manner. The plates are preferably assembled from the center of the area upon which the deck is adapted to be disposed and outwardly in opposite directions therefrom, as shown in Figures 1 and 2. To start the laying of the plates, the heads 5 of the lugs arranged along the edge of one of the plates are interlocked with the heads of the lugs of the adjacently disposed plate as shown in Figures 4 and 5 of the drawings with the plates disposed in substantially a horizontal position on the ground. In order to hold the lugs in engagement with each other so as to prevent longitudinal movement of the plates relative to each other and the disengagement of the lugs, there is disposed around the shank portions 4 of the interlocked lugs 3 preferably a wire binding member, but it will be understood that any other suitable means may be provided for holding these lugs in interlocked relation. By starting the laying of the deck in such a manner, it will be seen that the edges of these plates which are disposed in substantially the center of the area will have their openings or slots 6 disposed to each side thereof and will be free to receive the lugs 3 of the plate to be assembled and adjacently disposed in each direction from the center plates.

The succeeding plates are assembled into position in the following manner in each direction from these center plates. The plate to be positioned is disposed at an angle with the horizontal, with such angle being between approximately 40° and 100°. The head portions 5 of each of the lugs 3 along the edges of the plate are then

inserted into the enlarged part 7 of the openings 6 arranged along the edge of the horizontally disposed center plate which has already been laid in position on the ground. After the heads 5 of the lugs have been inserted in their respective openings 6, that plate is moved to a substantially horizontal and to the position it will assume upon the ground. The remaining plates of the deck are assembled in a similar manner until the desired size deck is obtained.

Upon movement of the plates to their substantially horizontal position after the lugs 3 have been inserted in the openings 6, it will be seen that the shank or stem portions 4 of the lugs move downwardly into place and rest in the enlarged stem portions 8 of their respective openings due to the angular arrangement thereof. In such position it will be seen that the lugs 3 are disposed in the openings 6 beneath the bottom of the adjacently disposed plate, with the inner edges of the lugs being disposed beneath the outer edges of the enlarged part 7 of the openings 6. In other words, the stem portions of the slots permit the neck behind the projecting head of the adjacent plate to enter and lie below the top surface of the deck. It will be seen that the component or vertical edge or edges on either side of the slots restrain the inner sides or edges of the projecting heads from sidewise movement or disengagement and they also restrain the necks from lengthwise movement. It will be understood that each of the slots or openings 6 has enough of its area in a horizontal plane to accommodate and permit entry of the head portion of the lugs. Also, if desired, the depth of the enlarged part 7 of each of the openings may be just slightly greater than the thickness of the head of the lugs so as to permit entry of the lugs only when they are disposed substantially perpendicular thereto or in a vertical plane. In such an arrangement, the outer edges of the lugs would be disposed beneath the inner edges of the openings or slots 6 when the plates are moved to a horizontal position thereby preventing vertical movement of the lugs through the openings.

The outwardly projecting lip portions 9 which extend over the heads of the lugs after assembling are provided so as to prevent the vertical movement of the heads 5 of the lugs 3 from their position below the plate and through the openings 6. In other words, the head portions 5 of the lugs 3, do not extend in under the edges of the slots 7 but are maintained in place vertically solely by the lip portions 9. Such a construction possesses the advantage that any particular plate in the deck may be removed in case of damage for repairs or replacement without moving or disturbing the remainder of the plates therearound. If it is desired at any time to remove any particular plate from the deck, the projecting lug or lip portions 9 are bent inwardly, as shown in the broken lines of Figure 7 of the drawings, so as to permit the passage of the heads 5 of the lugs 3 up through the enlarged parts 7 of the openings 6 with little or no pivoting movement. The new plate to be assembled therein is engaged with the adjacent plate in a manner hereinbefore described and moved to its horizontal position with the lugs thereof positioned in the openings of the adjacent plate. After such plate has been moved to its horizontal position, the lugs 9 are again bent outwardly and upwardly as shown in the full lines of Figure 7, so as to prevent upward movement of the heads of the

lugs through the openings with the lip portion performing its original function of locking the projecting head in position.

While I have shown and described several embodiments of my invention, it will be understood that these embodiments are merely for the purpose of illustration and description and that various other forms may be devised within the scope of my invention, as defined in the appended claims.

I claim:

1. A portable deck of the class described comprising a plurality of connected plates for rapid attachment to and detachment from each other, each of said plates consisting of a substantially rectangular-shaped body portion of rolled metal having a plurality of rows of openings arranged therethrough throughout the length thereof with the openings in one row staggered relative to the openings of an adjacent row so that the end portions of the openings in adjacent rows overlap, a downwardly extending flange portion extending completely around each of said openings, said flange portions having varying amounts of material with the greatest amount at a section transversely through the center of the openings and gradually diminishing toward each end thereof so that the section moduli of all transverse sections are approximately equal to each other.

2. A portable deck of the class described comprising a plurality of connected plates for rapid attachment to and detachment from each other, each of said plates consisting of a substantially rectangular-shaped body portion of rolled metal having a plurality of rows of openings arranged therethrough throughout the length thereof with the openings in one row staggered relative to the openings of an adjacent row so that the end portions of the openings in adjacent rows overlap, a downwardly extending flange portion extending completely around each of said openings, said flange portions having varying amounts of material with the greatest amount at a section transversely through the center of the openings and gradually diminishing toward each end thereof so that the section moduli of all longitudinal sections are approximately equal to each other.

3. A portable deck of the class described comprising a plurality of connected plates for rapid attachment to and detachment from each other, each of said plates consisting of a substantially rectangular-shaped body portion of rolled metal having a plurality of rows of openings arranged therethrough throughout the length thereof with the openings in one row staggered relative to the openings of an adjacent row so that the end portions of the openings in adjacent rows overlap, a downwardly extending flange portion extending completely around each of said openings, said flange portions having varying amounts of material with the greatest amount at a section transversely through the center of the openings and gradually diminishing toward each end thereof so that the section moduli of all transverse sections are approximately equal to each other and the section moduli of all longitudinal sections are approximately equal to each other.

4. A portable deck of the class described comprising a plurality of connected plates for rapid attachment to and detachment from each other, each of said plates consisting of a substantially rectangular-shaped body portion of rolled metal having a plurality of rows of substantially elliptical-shaped openings arranged therethrough throughout the length thereof with the openings

in one row staggered relative to the openings of an adjacent row so that the end portions of the openings in adjacent rows overlap, a downwardly extending flange portion extending completely around each of said openings, said flange portions having their greatest height at a section transversely through the center of the openings and gradually diminishing in height toward each end thereof so that the section moduli of all transverse sections are approximately equal to each other.

5. A portable deck of the class described comprising a plurality of connected plates for rapid attachment to and detachment from each other, each of said plates consisting of a substantially rectangular-shaped body portion of rolled metal having a plurality of rows of substantially elliptical-shaped openings arranged therethrough throughout the length thereof with the openings in one row staggered relative to the openings of an adjacent row so that the end portions of the openings in adjacent rows overlap, a downwardly extending flange portion extending completely around each of said openings, said flange portions having their greatest height at a section transversely through the center of the openings and

gradually diminishing in height toward each end thereof so that the section moduli of all longitudinal sections are approximately equal to each other.

5 6. A portable deck of the class described comprising a plurality of connected plates for rapid attachment to and detachment from each other, each of said plates consisting of a substantially rectangular-shaped body portion of rolled metal
10 having a plurality of rows of substantially elliptical-shaped openings arranged therethrough throughout the length thereof with the openings in one row staggered relative to the openings of an adjacent row so that the end portions of the
15 openings in adjacent rows overlap, a downwardly extending flange portion extending completely around each of said openings, said flange portions having their greatest height at a section transversely through the center of the openings and
20 gradually diminishing in height toward each end thereof so that the section moduli of all transverse sections are approximately equal to each other, and the section moduli of all longitudinal sections are approximately equal to each other.

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