July 4, 1944. G. G. GREULICH 2,352,892

PORTABLE DECK

Filed Aug. 26, 1942 4 Sheets-Sheet 1

Fig. 1.

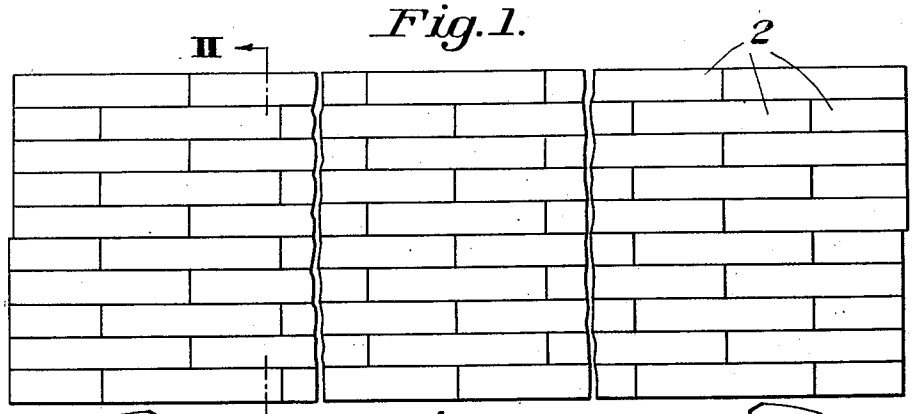


Fig. 2.

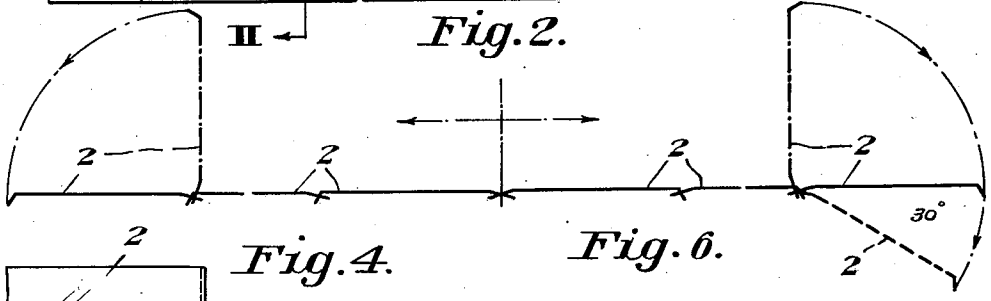


Fig. 4.

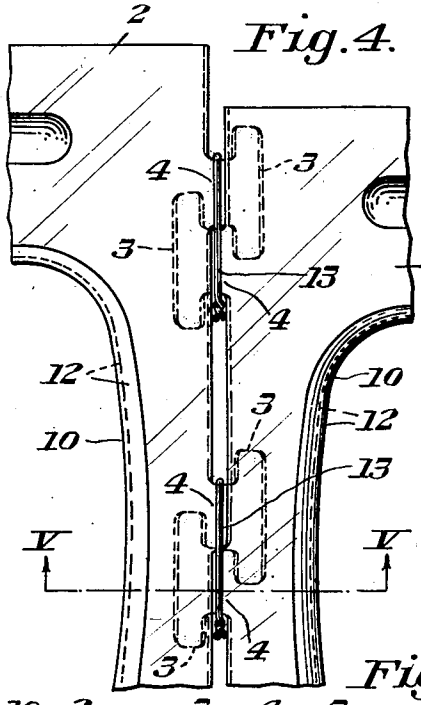


Fig. 6.

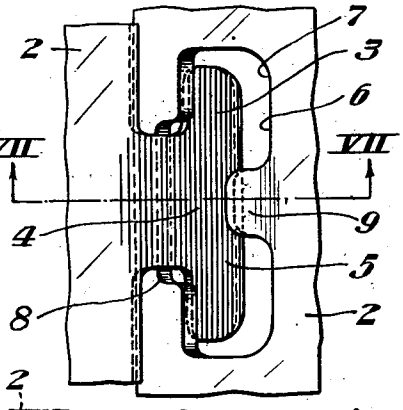


Fig. 7.

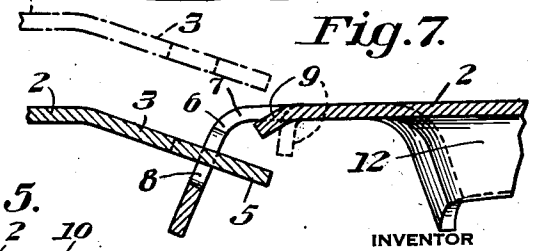
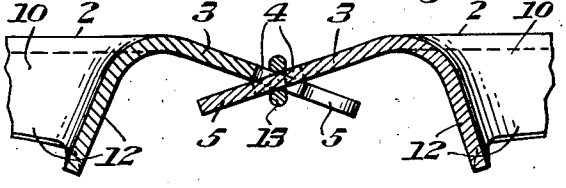


Fig. 5.



INVENTOR

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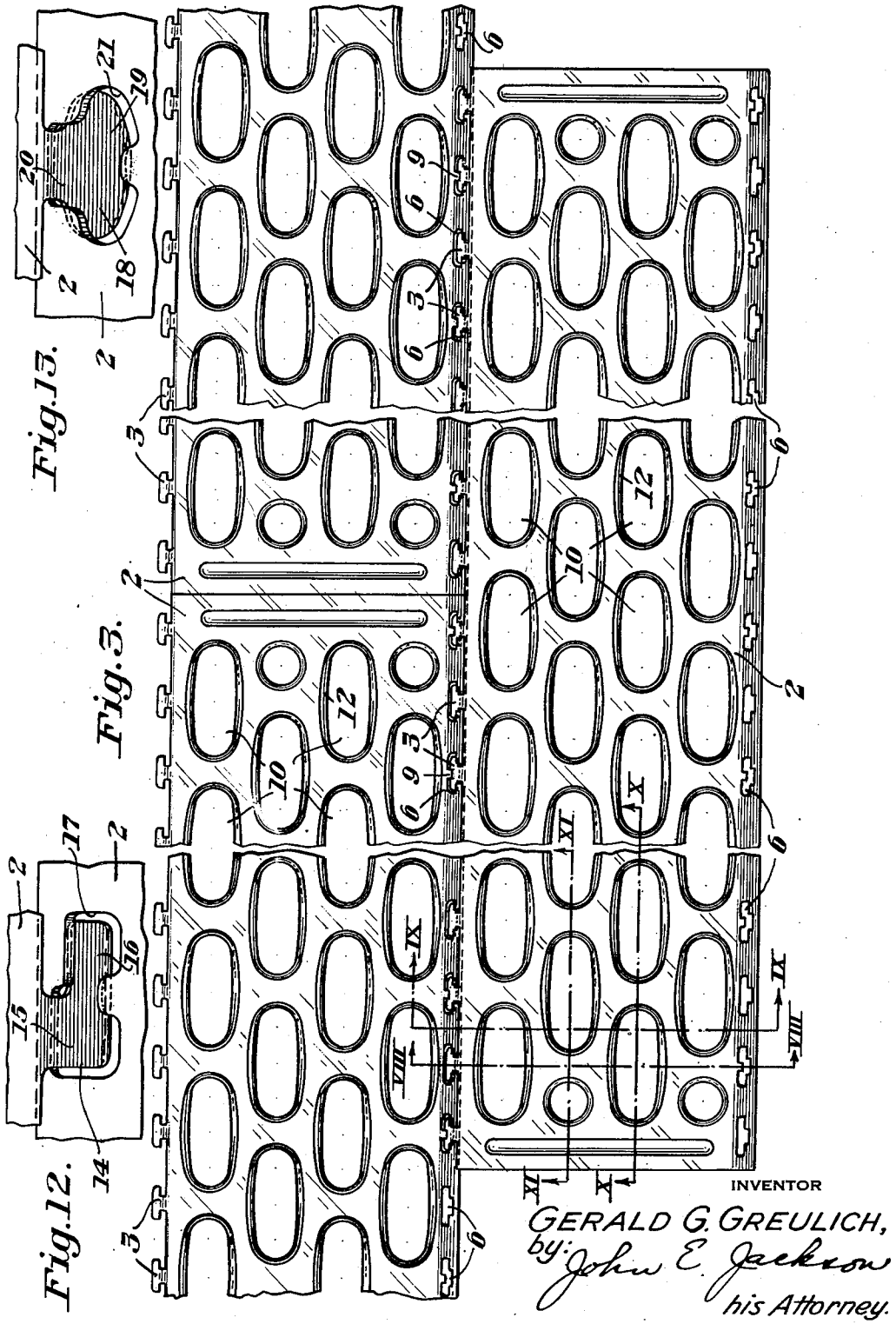
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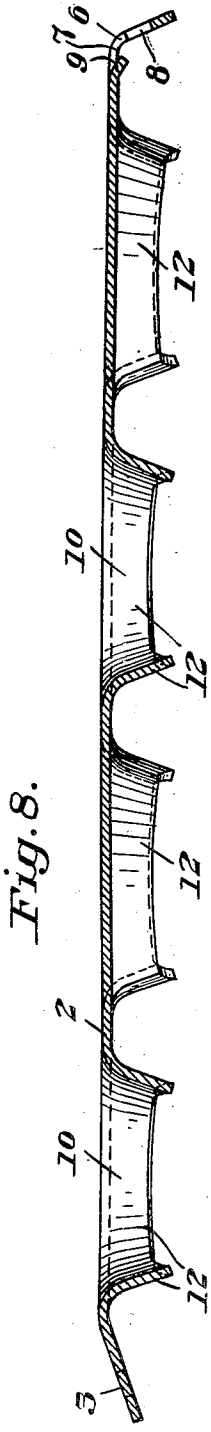


Fig. 8.

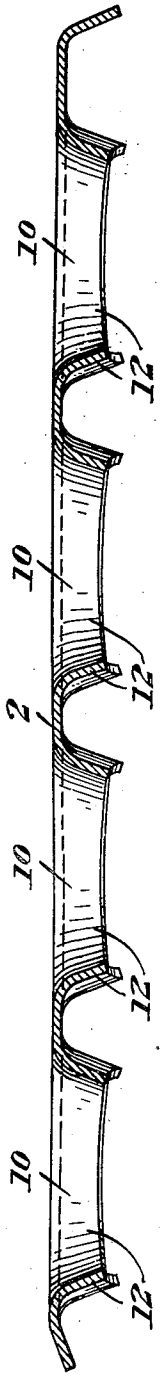


Fig. 9.

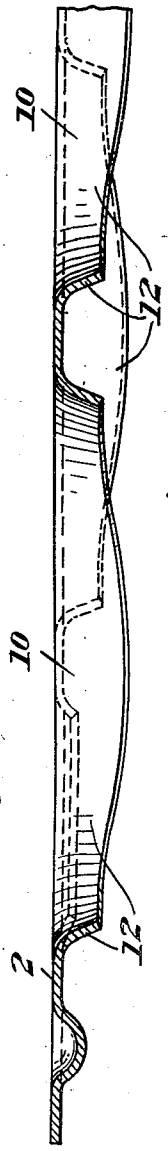


Fig. 10.

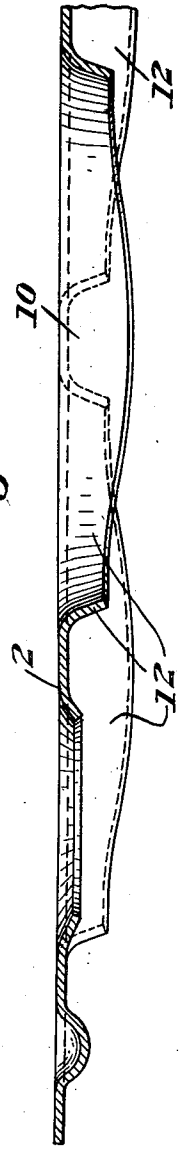


Fig. 11.

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Fig.14.

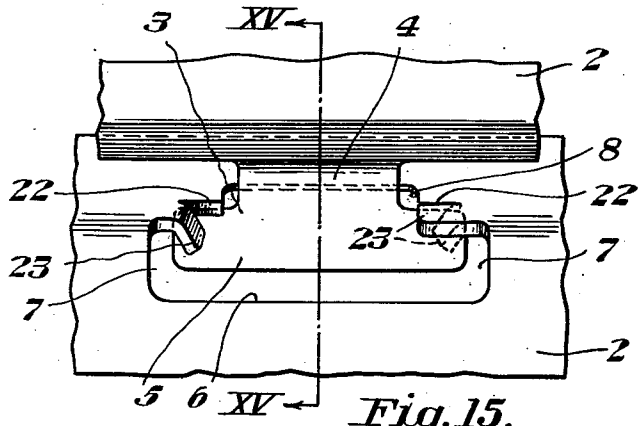


Fig.15.

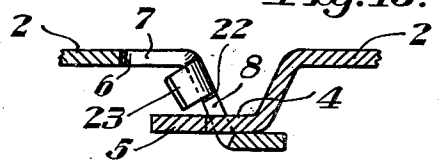


Fig.16.

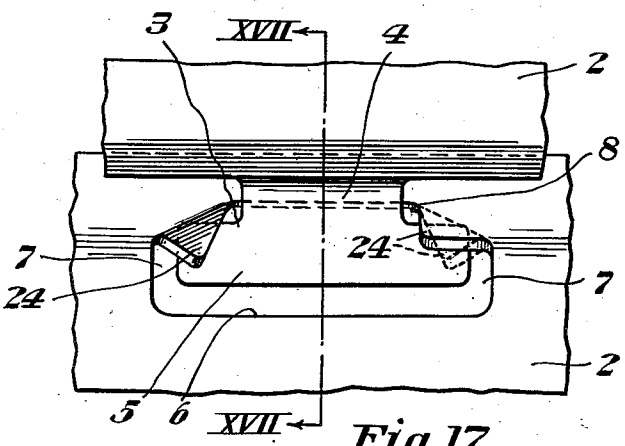
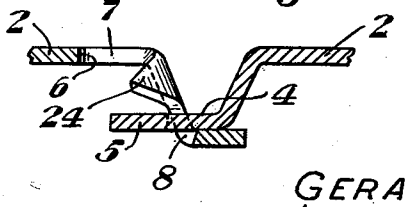


Fig.17.



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Patented July 4, 1944

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UNITED STATES PATENT OFFICE

2,352,892

PORTABLE DECK

Gerald G. Greulich, Mount Lebanon, Pa., assignor to Carnegie-Illinois Steel Corporation, a corporation of New Jersey

Application August 26, 1942, Serial No. 456,233

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.

In my co-pending applications, Serial Nos. 345,218 and 358,180, filed July 12, 1940, and September 24, 1940, respectively, now 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 every 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.

It is still another object of the present invention to provide a portable deck consisting of a plurality of units or plates having an improved interlocking means arranged along their edges integral therewith which will efficiently and effectively hold the plates or units securely in engagement with each other and prevent any shifting or displacement thereof and at the same time, eliminating the necessity of any extraneous locking means, such as bolts, clips, etc.

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 start-

ing 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;

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

Figure 12 is a detail view of a modified form of interlocking means arranged along the edges of the plates in accordance with my invention;

Figure 13 is a detail view of another modified form of interlocking means arranged along the edges of the plates in accordance with the present invention;

Figure 14 is a plan view of the interlock of my invention showing a modified means of maintaining the same in interlocked position;

Figure 15 is a sectional view taken on line XV—XV of Figure 14;

Figure 16 is a similar plan view showing another modification for maintaining the interlocking parts in their locked position; and

Figure 17 is a sectional view taken on line XVII—XVII of Figure 16.

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 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 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 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 cross section through the plate or 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 section moduli throughout each of the plates. Where the greater number of flanges overlap they can naturally be made shallower for equivalent strength. This feature permits punching out more materal 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 13, 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.

However, in the preferred construction 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 such a construction, the head portions 5 of the lugs 3 need not extend in under the outer edge portions of the slots 7 so as to be positioned thereinunder, but may be arranged so that they are free for upward movement therethrough by bending back the lip portion 9 when it is desired to remove any particular plate. 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 thereabout. 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 oepnings 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.

In Figure 12 of the drawings, there is shown a slight modification of the interlocking means in accordance with the teaching of the present invention. In this construction the lugs arranged along the longitudinal edges of each of the plates are preferably L-shaped, as shown at 14, so as to provide a shank portion 15 and a head portion 16. Along the opposite edge of each of the plates there is arranged a plurality of similarly spaced apart L-shaped openings or slots 17 having dimensions slightly larger than the dimensions of the lugs 14 into which the lugs are adapted to be inserted for locking the plates together in a manner hereinbefore described.

Another modification of the present invention is shown in Figure 13 of the drawings. This construction is similar to the preferred form but differs slightly in that the projecting lugs have the shape of a doll's head, as shown at 18, so as to provide a head portion 19 and a shank portion 20. The openings 21 arranged along the opposite longitudinal edge of each of the plates are similarly spaced and shaped but, as before, have slightly larger dimensions than the lugs 18 and are interlocked in a manner similar to that of the preferred form.

There is shown in Figures 14 through 17 modified means for maintaining the lugs 3 in their interlocked position within the openings or slots 6. It will be seen that in these constructions the lip portions 9 have been eliminated. In the construction shown in Figures 14 and 15 the plate is slit as at 22 on either side of some of the openings 6 at a spaced distance from the outer side of the larger portion 7 of the openings so as to provide lug-like portions 23. These lug-like portions are positioned in the angularly disposed portion of the plate just below the bend therein as shown in Figure 15. After the T-shaped lugs 3 have been positioned in their respective openings 6 so that the stem or shank portions 4 are positioned in the stem portions 8 of the openings as has been explained, the lug-like portions 23 are bent downwardly and inwardly so as to be disposed below the bottom of the plate. In such position, these lug-like portions extend into the area of the enlarged portions 7 of the openings 6 through which the head portions 5 are adapted to pass, thereby preventing the head portions from passing therethrough so as to eliminate any danger of displacement of the plates from their assembled positions. In case it is desired to remove any particular plate the lug-like portions are bent upwardly again

into the plane of the plate and the plate removed as before and a new plate reassembled in position.

In the construction shown in Figures 16 and 17 of the drawings, the outer edge of the larger portion 7 of some of the openings 6 to either side of the stem portions 8 thereof are bent inwardly and downwardly as at 24 below the bottom of the plates. These bent portions are disposed as before in the angularly disposed edge portion of the plates just below the bend therein as shown in Figure 17. It will be seen that when these portions 24 are bent to such position they extend into the area of the enlarged part 7 of the openings, thereby restricting the area of the same. The bent portions 24 will then prevent the head portions 5 of the lugs 3 from passing through the openings and maintain the plates in engagement with each other. To remove any particular plate, the bent portions 24 are bent again into the plane of the sheet so as to permit the passage of the heads of the lugs through the openings.

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 metallic plates, each of said plates having a plurality of spaced apart lugs arranged along one edge thereof, a plurality of similarly spaced apart openings arranged along the opposite edge thereof into which lugs of an adjacently disposed plate extend, each of said lugs comprising a shank and a head portion, each of the openings in said plates being similarly shaped so as to provide a portion for receiving the head portion of the lugs and a portion for receiving the shank portion thereof, with the portion of each of the openings adapted to receive the head portion of the lugs disposed substantially in the plane of the plate and the portion adapted to receive the shank portion disposed angularly relative thereto whereby upon disposing the lugs in said openings and moving the plates to a horizontal position, the head portions of the lugs of each of said plates will be disposed below the plane of said plates and rearwardly of the side portions of the shank receiving portions of said openings so as to effect an interlock therebetween, the head of each of said openings being larger than the head of its mating lug in plan view, and means carried by said plates projecting into the area of at least some of said openings to prevent vertical movement of the lugs therethrough, said means being movable to permit vertical movement of the lugs through the openings.

2. A portable deck of the class described, as defined in claim 1, wherein each of the lugs and openings in each of the plates is T-shaped.

3. A portable deck of the class described, as defined in claim 1, wherein each of the lugs extends downwardly and outwardly at an angle relative to the plane of the plate.

4. A portable deck of the class described comprising a plurality of metallic plates, each of said plates having a plurality of spaced apart downwardly and outwardly extending lugs arranged along one edge thereof so as to be disposed angularly relative to the plane of the plate, a plurality of similarly spaced apart openings arranged along the opposite edge thereof with said edge extending downwardly and outwardly so as to be disposed angularly relative to the remaining portion of the plate whereby the inner portion of each of said openings is disposed in substantially a horizontal plane with the outer portion thereof disposed angularly relative thereto, each of said lugs comprising a shank and an enlarged head portion, each of the openings in said plates being shaped similarly to said lugs and constructed so as to provide a portion for receiving the head portion of the lugs and a portion for receiving the shank portion thereof whereby upon disposing the lugs in said openings and moving the plates to a horizontal position, the head portions of the lugs of each of said plates will be disposed below the plane of said plates and rearwardly of the side portions of the shank receiving portions of said openings so as to effect an interlock therebetween, the head of each of said openings being larger than the head of its mating lug in plan view, and means carried by said plates projecting into the area of at least some of said openings to prevent vertical movement of the lugs therethrough, said means being movable to permit vertical movement of the lugs through the openings.

5. A portable deck of the class described comprising a plurality of metallic plates, each of said plates having a plurality of spaced apart downwardly and outwardly extending lugs arranged along one edge thereof so as to be disposed angularly relative to the plane of said plate, a plurality of similarly spaced apart openings arranged along the opposite edge thereof with said edge extending downwardly and outwardly so as to be disposed angularly relative to the remaining portion of the plate whereby the inner portion of each of said openings is disposed in substantially a horizontal plane with the outer portion thereof disposed angularly relative thereto, each of said lugs comprising a shank and an enlarged head portion, each of the openings in said plates being shaped similarly to said lugs and constructed so as to provide a portion for receiving the head portion of the lugs and a portion for receiving the shank portion thereof the head of each of said openings being larger than the head of its mating lug in plan view, and a lip portion arranged on the inner side of at least some of said openings and projecting into the area of the opening to prevent vertical movement of the lugs therethrough, said lip portions being movable to permit vertical movement of the lugs through the openings.

6. A portable deck of the class described comprising a plurality of metallic plates, each of said plates having a plurality of spaced apart downwardly and outwardly extending lugs arranged along one edge thereof so as to be disposed angularly relative to the plane of the plate, and a plurality of similarly spaced apart openings arranged along the opposite edge thereof with said edge extending downwardly and outwardly so as to be disposed angularly relative to the remaining portion of the plate whereby the inner portion of each of said openings is disposed in substantially a horizontal plane with the outer portion thereof disposed angularly relative thereto, each of said lugs comprising a shank and an enlarged head portion, each of the openings in said plates being shaped similarly to said lugs and constructed so as to provide a portion for receiving the head portion of

the lugs and a portion for receiving the shank portion thereof whereby upon disposing the lugs in said openings and moving the plates to a horizontal position, the head portions of the lugs of each of said plates will be disposed below the plane of said plates and rearwardly of the side portions of the shank receiving portions of said openings so as to effect an interlock therebetween, the head of each of said openings being larger than the head of its mating lug in plan view, a portion of the metal around the larger portion of at least some of the openings in such plates being bent downwardly and extending below the plates so as to decrease the area of the respective openings whereby the head portions of said lugs are prevented from passing through said larger portions of the openings, said metal portion being movable to permit vertical movement of the lugs through the opening.

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