

June 28, 1960

W. B. SPANGLER

2,942,535

CONNECTOR STRUCTURE FOR SECTIONAL MATERIAL

Filed Aug. 29, 1957

5 Sheets-Sheet 1

Fig. 1.

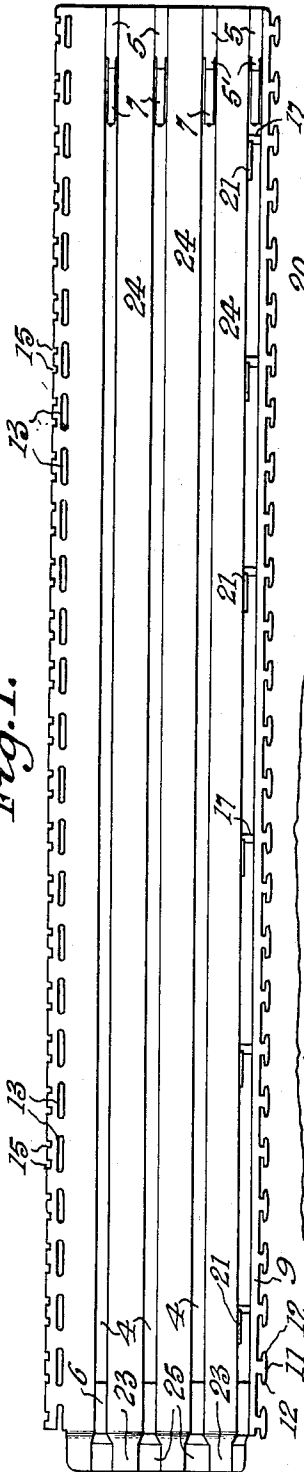
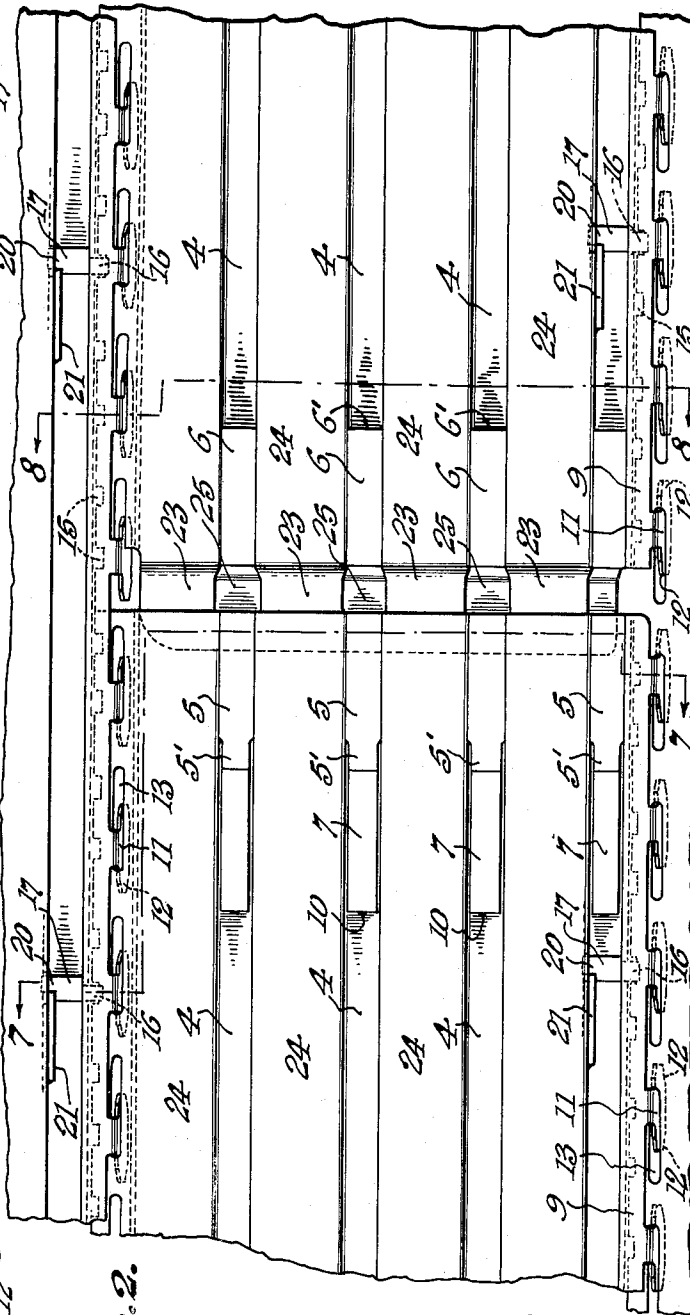


Fig. 2.



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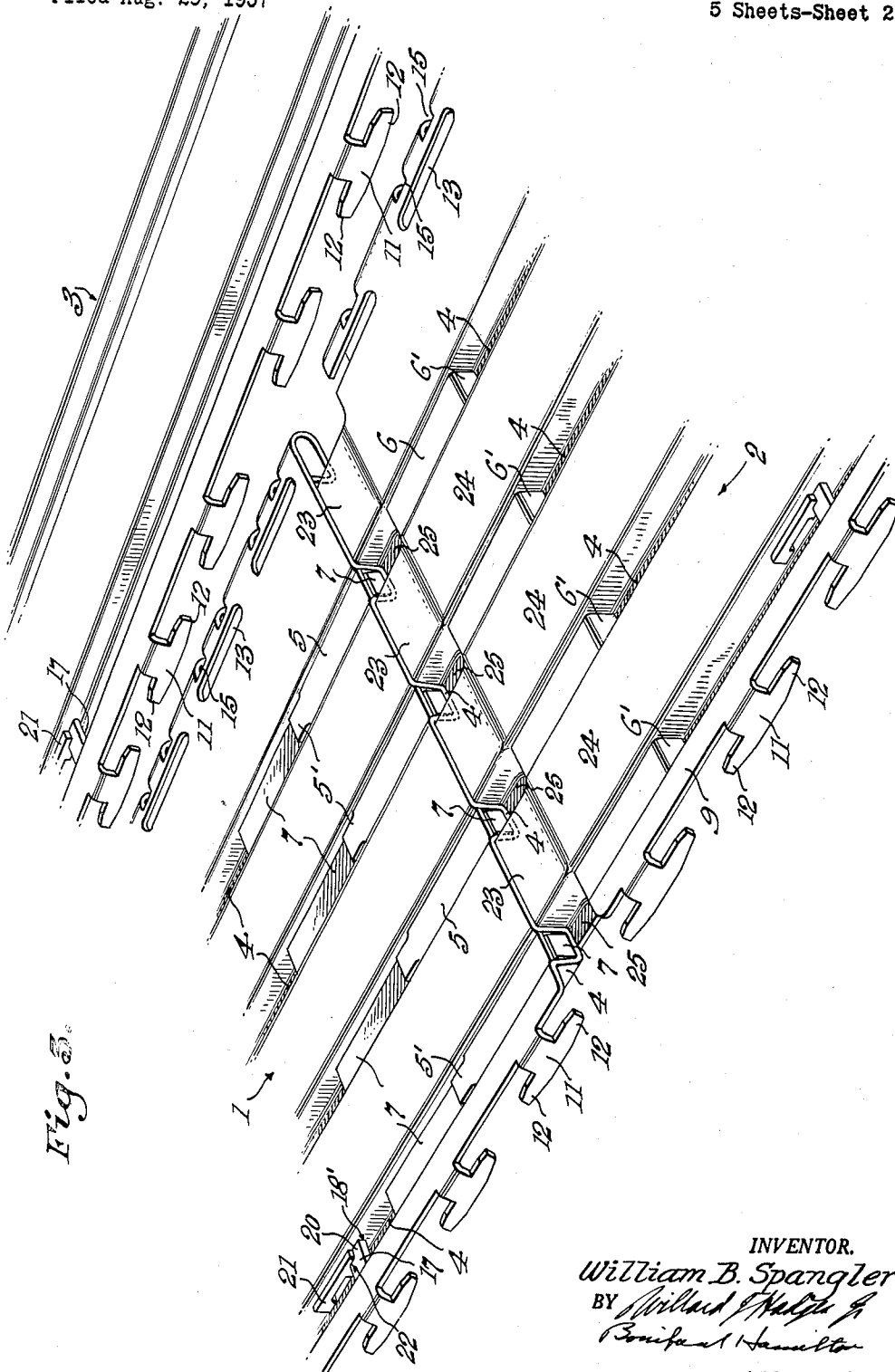


Fig. 5

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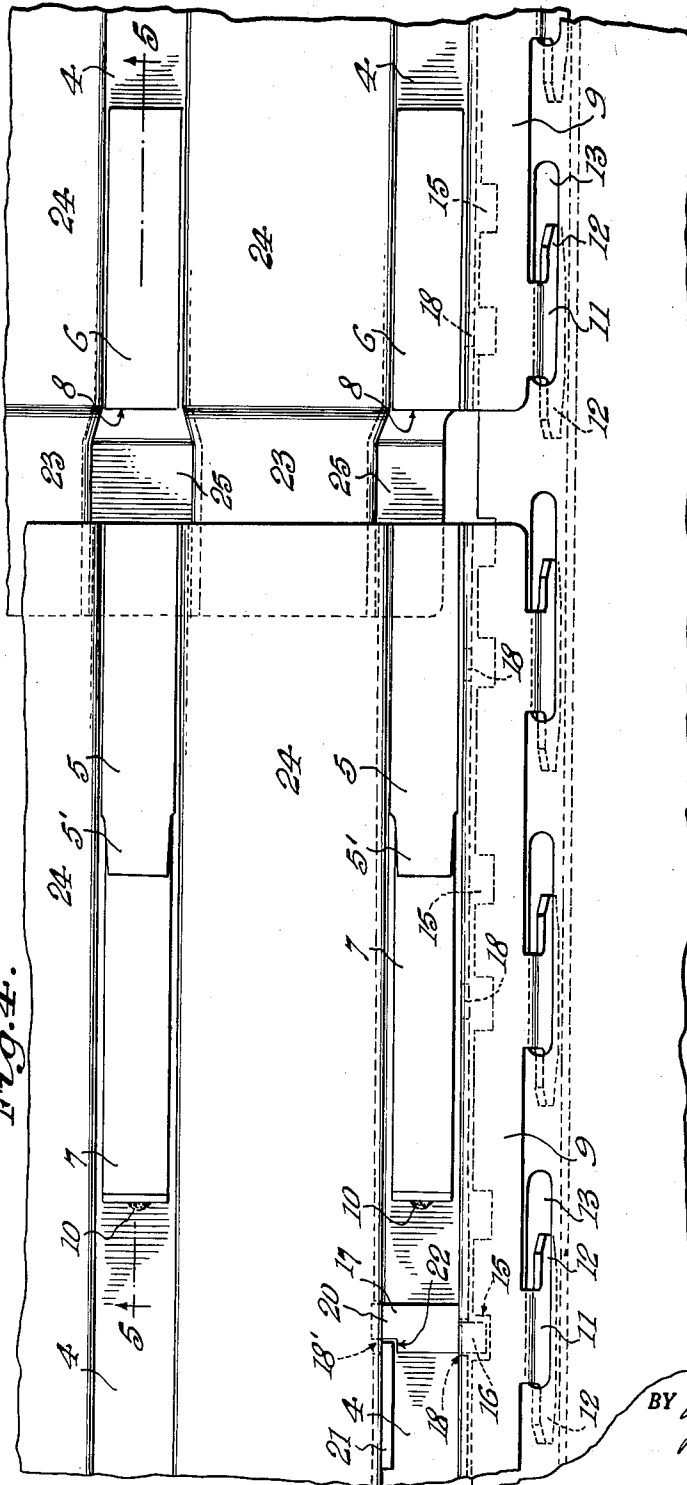
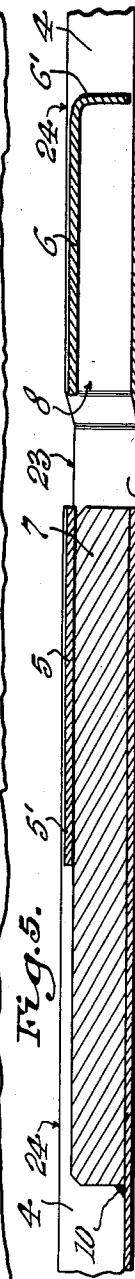
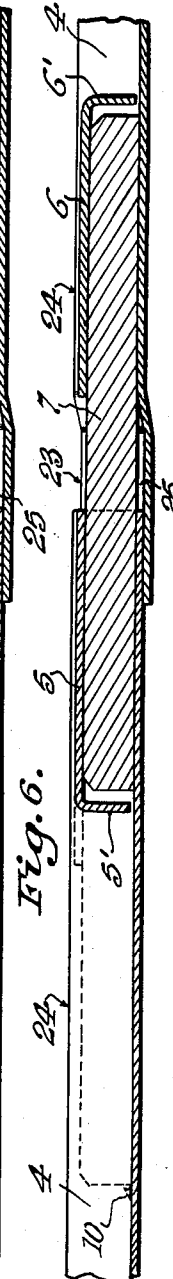
2,942,535

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Fig. 4.



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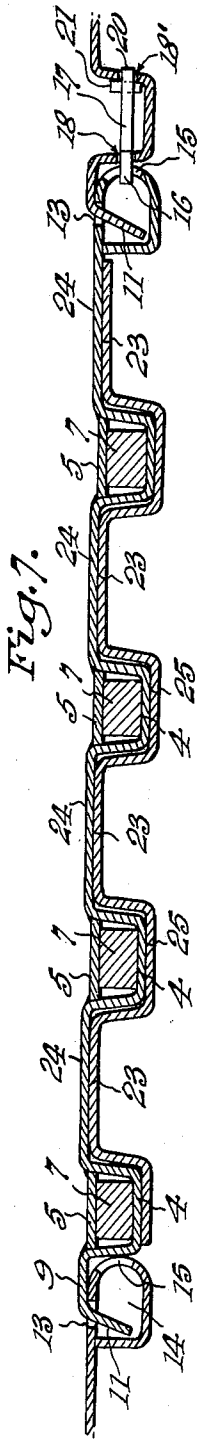
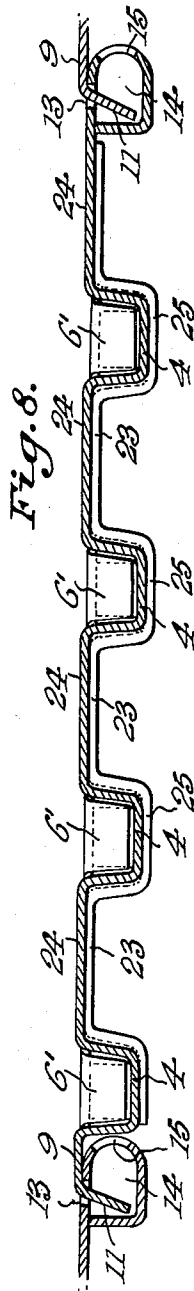
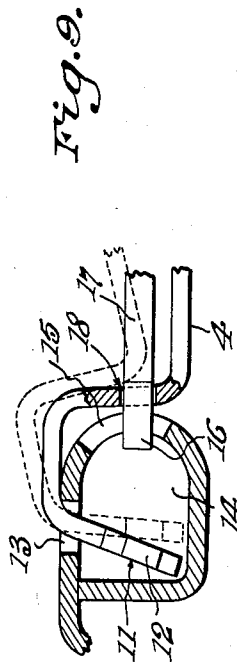
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**2,942,535**

## CONNECTOR STRUCTURE FOR SECTIONAL MATERIAL

Filed Aug. 29, 1957

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2,942,535

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Fig. 10.

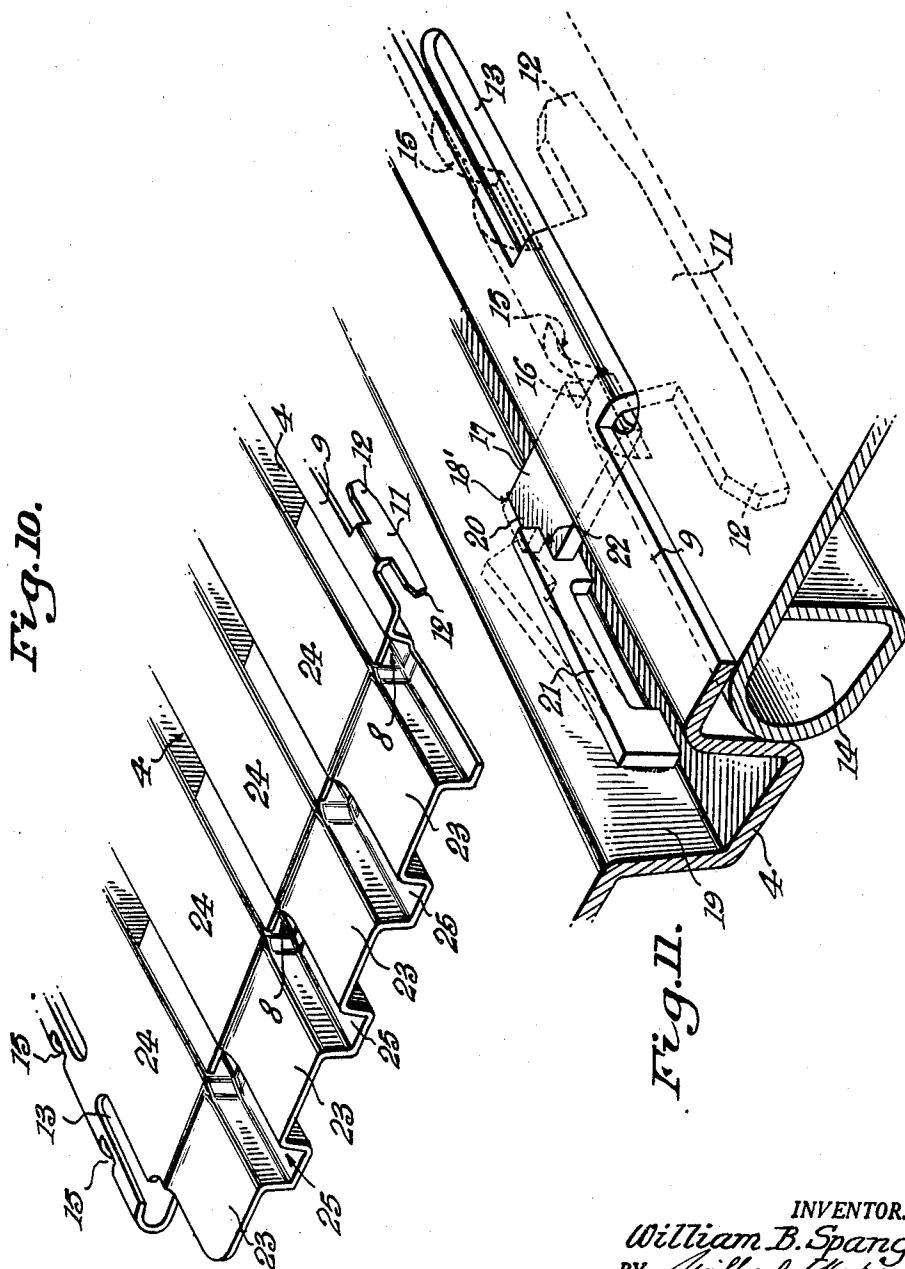


Fig. 11.

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## CONNECTOR STRUCTURE FOR SECTIONAL MATERIAL

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Filed Aug. 29, 1957, Ser. No. 681,142

1 Claim. (Cl. 94—13)

(Granted under Title 35, U.S. Code (1952), sec. 266)

The invention described herein may be manufactured and used by or for the Government for governmental purposes without the payment of any royalty thereon.

This invention relates to an improvement in sheet metal panels, generally referred to as the plank type, and used particularly for temporary road and runway surfacing and more particularly to an end and side connector construction for joining and transferring moment between contiguous sections of such panels when in interlocking relationship.

The construction presently employed to connect sections of such matting involves the use of hook-shaped sliding pins which pass through registering slots when the ends of adjacent sections are overlapped and interlocking elements along the sides which have longitudinal projections in one direction only but along both sides of the section or panel. While this type of construction maintains the individual sections in proper alignment, the moment produced adjacent the longitudinal ends by loads normal to the surface of the sections is not transmitted to the adjacent section to provide uniform loading normal to the surface of the matting. Further, the integral side interlocking construction must be duplicated on both sides of the section to allow removal of a single section remote from the edges of an assembled mat thus increasing panel weight and fabrication costs.

In order to overcome the defects and difficulties inherent in the constructions as above described, it is a principal object of the present invention to provide an end connector construction which will permit transferring moments from section to section produced by loads normal to the surface of the matting thus providing uniform loading of the mat structure.

It is a further object of the present invention to provide an integral side connector construction for portable mat sections which will permit the quick removal of an individual section remote from the edges of a mat assembly and prevent relative longitudinal movement of the mat sections without duplicating both interlocking elements on both sides of the section.

It is a further object of the instant invention to provide an end connector construction for joining sections of the plank type of surfacing material which will not become separated from the sections during transportation, rough handling, and storage.

It is a further object of the present invention to provide a moment transmitting end connector construction for sections of plank type mat material which, when in interconnecting relation with an adjacent section, will not be dislodged by vibration of load impacts and will maintain the sections in accurate alignment.

These and other objects will become apparent as the description proceeds wherein:

Fig. 1 is a plan view of a mat section modified in accordance with the instant invention;

Fig. 2 is an enlarged fragmentary plan view showing the manner of interconnecting a plurality of longitudinal runs of matting;

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Fig. 3 is an enlarged fragmentary perspective view showing sections of matting in position prior to connection;

Fig. 4 is an enlarged fragmentary top plan view of two sections of matting in position for connection prior to driving the moment transmitting end connector pins into connected position;

Fig. 5 is a longitudinal vertical section taken on the line 5—5 of Fig. 4;

Fig. 6 is a longitudinal vertical section similar to Fig. 5 but with the locking pin driven to connected position;

Fig. 7 is a transverse sectional view taken on the line 7—7 of Fig. 2;

Fig. 8 is a transverse section taken on the line 8—8 of Fig. 2;

Fig. 9 is a fragmentary detailed vertical section showing the manner of engagement of side connectors of the instant invention with an adjacent mat section;

Fig. 10 is a perspective view of the reduced end of each of the sections to permit overlapping the sections adjacent the ends thereof; and

Fig. 11 is an enlarged perspective view showing the manner of releasing the locking lugs so they may be shifted away from the side of the panel to unlock the connection and allow removal of a single section remote from the edges of an assembled mat.

Reference is now made to Fig. 3 wherein two panels are shown generally by 1 and 2 placed in end-to-end relation and a fragment of a panel 3, which is similar to panels 1 and 2, placed adjacent to the longitudinal sides of panels 1 and 2 and in overlapping relation therewith. The panels such as 1, 2, and 3 are made of sheet metal and provided with deep, longitudinal, U-shaped stiffening ribs 4. Metal cover plates 5 and 6 are welded over the open side of ribs 4 for a short length at both ends of each panel or section, as represented by 1, 2, and 3, to form tubes 8. The cover plates 5 at one end of panel 1 are flush with the panel end whereas the cover plates 6 at the opposite end are set back in the channel formed by ribs 4 to provide for overlapping of the panel ends. Each of the cover plates 5 is provided with a tongue 5', the purpose of which will be hereinafter described. Cover plates 6 have turned down ends as at 6' to close the tubes 8 and limit the travel of pins 7 when in a connected position. Pins or bolts 7, which are shown as being generally square in cross-section, are placed in the channel formed by the ribs 4 at one end of each panel and project into the tubes 8 with the ends of the pins or bolts 7 flush with the panel ends. During fabrication, the bolts or pins 7 are tack welded as at 10 to hold them in place during shipment and storage. A flange 9 extends horizontally along one side and has integrally formed therewith downturned lugs 11 provided with opposed projections 12. Lugs 11 are bent outwardly from the vertical as shown in Fig. 9.

Elongated openings 13 are arranged longitudinally adjacent the opposite longitudinal edge of each panel or section to receive the lugs 11 when the sections are assembled. A longitudinal strip of each panel between the elongated openings 13 and the proximate bounding edge is turned down and bent upon itself to form a generally oval-shaped passage 14. Openings 15 in the outer curved edge of the oval-shaped passage receive one of the offset projections 16 and 20 on each of the locking lugs 17, the functions of which will be hereinafter described. Opposed apertures 18 and 18', as shown in Figs. 4 and 7, are provided in the side walls 19 of the U-shaped ribs 4 which, when the sections such as 1 and 2 are properly aligned, will be registry with one of the openings 15. The apertures 18' which are remote from the panel edge must be greater in width than apertures 18 nearer the

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panel edge to permit the greatest width of the locking lugs 17 to pass therethrough in disassembly and reassembly operations when panels are removed for repairs from an area remote from the edges of an assembled mat. Offset projections 16 and 20 on each locking lug 17 extend through apertures 18 in opposite walls 19 of ribs 4 and when locked in position by the key 21 prevent relative longitudinal movement of the assembled sections forming a mat. During fabrication of the individual panels or sections the locking lugs 17 and keys 21 are secured in position as shown in Fig. 11.

Reference is now made to Fig. 10 which shows the configuration of the end of each panel which permits one panel to be interfitted lengthwise with the end of an adjacent panel. The horizontal portion 23 between the ribs 4 at the reduced ends is of lesser height than the portion of the horizontal surface 24 which extends beyond the overlapping portions of the joined panels and the ribs 4 at this end are expanded as at 25 to receive the ribs of an adjacent panel in interfitting relationship.

A mat of panels or sections, as shown in Fig. 2, embodying the improvements of the instant invention is assembled by first placing a series of such sections in end-to-end relation so that the end of one section, such as 1 in Fig. 3, carrying the pins or bolts 7 overlaps the reduced horizontal end portion 23 of an adjacent panel or section, such as 2 in Fig. 3. When so arranged, the ribs 4 of one section are seated in the expanded portions 25 of the channels of the longitudinally adjacent section or panel. The sections are laid with the long dimension of the sections normal to the longitudinal centerline of the road, runway, etc. To extend the mat in length, additional sections are located with respect to the joined sections so that the added sections overlap these sections thus staggering the transverse joints in the assembled mat. In joining the sections, the latter section 3 must be tilted to the horizontal as shown by dashed lines in Fig. 9 so projections 16 of locking lugs 17 will clear the rounded outer edge of oval-shaped passage 14 as the lugs 11 are inserted in the elongated openings 13. When the lugs 11 have been inserted in the openings 13, the added panel is shifted longitudinally to the right or left to move one of the opposed projections 12 to be out of registry with the openings 13. This shifting movement will also cause the projections 16 of locking lugs 17 to register with one of the sets of openings 15, when the section is rotated back to the horizontal, and will lock the connection and prevent relative longitudinal movement of the section with sections 1 and 2. The succeeding longitudinal row is shifted in the opposite direction from the preceding row so that the longitudinal runs in assembled mats are alternately shifted to right or left as shown in Fig. 2, thus shifting the projections 12 on alternate rows to the right or left relative to the openings 13. The tack welds 10 holding the pins or bolts 7 are then broken and the pins 7 driven from the position shown in Fig. 5 into the aligned tubes 8 in the adjacent sections 2 to a final position as shown in Fig. 6. The tongues 5' on cover plates 5 are then turned down as shown in Fig. 6 to limit the longitudinal movement of the pins 7.

When a single section is to be removed from a mat constructed in accordance with the teachings of the instant invention, it is first necessary to lift the key 21 out of notch 22 in the locking pins 17 on the sections adjacent the section to be removed. The locking pins 17 are removed by sliding them laterally into the aperture 18' of greatest width. The pins or bolts 7 connecting the section to be removed are driven out of engagement with the adjacent longitudinal sections or panels. The panel to be removed may then be shifted longitudinally so that the lugs 11 and openings 13 on the panel to be removed are in registry with the associated lugs or openings on the adjacent side panels. When the panels were assembled adjacent longitudinal rows were shifted in opposite directions. Upon removal of the single panel, as above, shift-

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ing the panel in one direction will shift the projections 12 on one edge of the panel relative to the openings 13, and the openings 13 relative to the projections 12 on the opposite edge, as may be seen in Fig. 2. It should be noted that the panels in assembled condition overlap at the ends but are not in abutting end relation to permit the shifting, as above, to remove an individual section. With the panel shifted longitudinally the lugs 11 are disengaged from the openings 13 and the panel to be removed is slid longitudinally to remove the associated reduced end from under the overlap of the adjacent longitudinal panel or section. When it is desired to remove a number of sections for repair and replacement or replacement of new panels, additional sections as desired are removed from the same run of panels in the manner described above. The length of removed area may then be increased by removing panels simply by reversing the placing process. Repair panels may then be relaid in the opening as instructed above except when the closing run is placed, the locking lugs which were previously removed must be reinserted to prevent relative longitudinal shifting of the assembled sections. The locking pins 17 are inserted so that one offset projection 20 extends through an aperture 18' in one side wall 19 of the ribs 4 and the opposite offset projection 16 extends through both an opposite aperture 18 and an opening 15 in an adjacent section aligned with an aperture 18' as shown in Fig. 11. Key 21 is then welded in position, or if already welded, bent down so that it projects into the notch 22 which prevents longitudinal movement of the locking lug 17 and in turn prevents relative longitudinal movement of the assembled sections.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

An interlocking panel assembly including a plurality of panels, each panel comprising spaced longitudinal channel depressed ribs, said depressed ribs and intervening portions being reduced in size on one end of each panel and fitted into the opposite end of an adjoining panel, tube means formed by the side walls of said ribs, and cover plates closing the open side of said ribs and extending from each end of each rib inwardly for a short distance, each cover plate including a narrowed terminal tongue capable of being folded, bolt means in the tube means at one end of said panel extending into the tube means on the contiguous end of the adjoining panel, said terminal tongue of said latter tube means being folded downwardly forming a socket for the reception of said bolt, each panel having spaced connector means arranged along a longitudinal edge thereof, said connector means comprising a downturned lug provided with longitudinally disposed opposed projections, and longitudinally spaced openings adjacent to an opposite edge thereof receiving the connector means on an adjacent panel, each said panel intermediate said openings and the adjacent bounding edge being rolled downwardly to form a tubular passage, said longitudinally spaced openings communicating with said tubular passage, apertures formed along the side of said tubular passage, each of said apertures being substantially adjacent to each end of said longitudinally spaced openings, demountable locking means comprising horizontal bars extending transversely of the first depressed rib adjacent the downturned lugs, each bar having opposed offset projections of lesser width than the intervening portion of said bar, the length of said intervening portion of said bar being less than the width of said first depressed rib, transverse openings formed in pairs on the side walls of the first depressed rib of each panel adjacent to the downturned lugs and aligned with the center of each of said downturned lugs, said transverse openings snugly receiving the said opposed offset projections, the opening of each said pair remote from the edge of the panel being larger dimensionally than the intervening portion of the horizontal bars to accommodate said intervening portion therein, the said offset projections extending through the transverse openings, one

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of said offset projections and said intervening portion defining a notch, a key secured to a side wall of said first depressed rib and engaging said notch, whereby said connector means on one panel and said longitudinally spaced openings on an adjoining panel interlocking said panels laterally upon longitudinal shifting of panels in either direction aligning substantially half of each of said apertures with each of said pair of openings in the side wall of said first depressed rib, the opposed projections of said connector means being aligned depending on the direction of the longitudinal shifting, the other of said offset projections passing through one said side wall opening and extending through the aperture of an

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adjacent panel aligned with the said pair of transverse openings, said bolt means transmitting moments induced by loads directed normally to said panel sections longitudinally between panels when in assembled condition.

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