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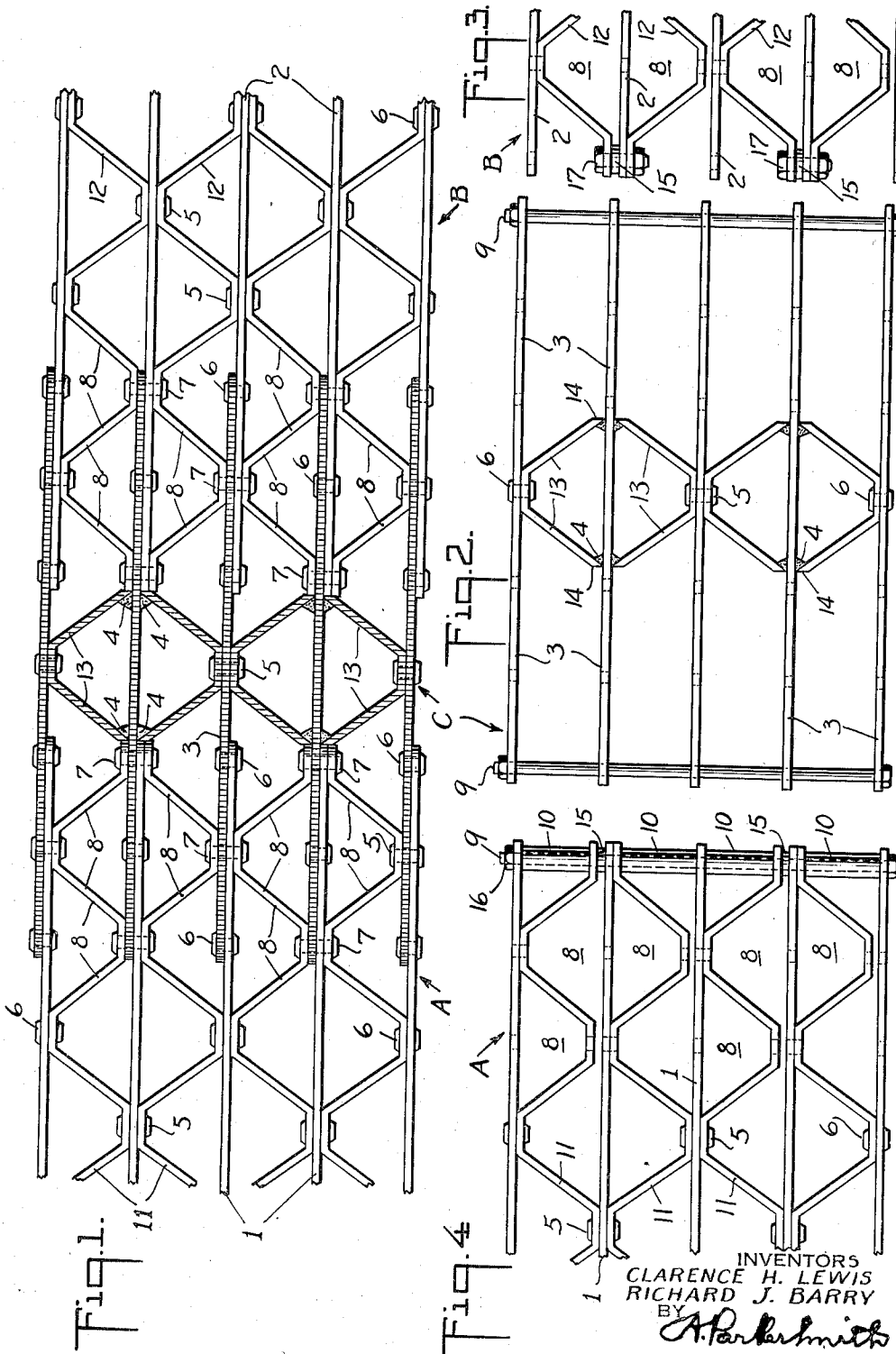
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2,193,287

COUPLING FOR GRATING PANELS

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2 Sheets-Sheet 1



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Fig. 5.

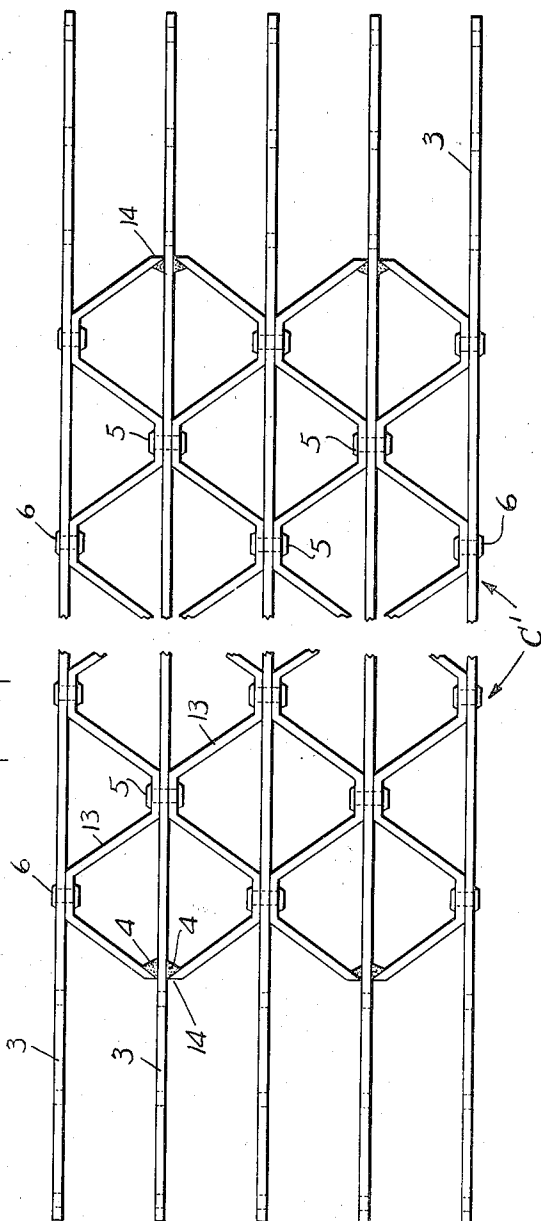
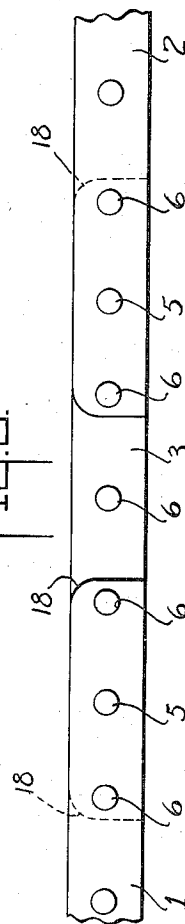


Fig. 6.



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COUPLING FOR GRATING PANELS

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15 Claims. (Cl. 189—82)

This invention relates to continuous ventilating floorings or open mesh grating decking for bridges such as shown in Patent No. 1,991,154 granted Feb. 12, 1935, to Walter E. Irving.

temporarily connect them together so that they can support one another and be to that extent protected from this tendency to distortion during rough handling.

5 More specifically it presents a novel form of joint or coupling adapted to connect together constituent panels of grating so as to form such Irving Decking, as it is now generally known in the art; and is primarily designed as a possible substitute for the type of continuous grating flooring or decking described and shown in Patent No. 1,629,134 to Van Hoffen dated May 17, 1927, now known under the trade name of "Continuity."

Our present invention is designed to overcome or avoid the above outlined difficulties but without sacrificing any of the features of strength and apparently perfect uniformity of mesh so characteristic of grating structures of the continuous type built according to the Van Hoffen design.

15 By "continuous grating" is meant a grating structure of uniform mesh extending beyond the length of any one panel of grating which can be built up in the shop out of standard rolled steel bars and strips,—which of course have standard lengths, usually not exceeding 40 feet and commonly half that or less.

These objects we accomplish by using grating panels of standard length and any given type of mesh but having the ends of all bars and crimped strips at either extremity thereof lying in a straight line extending perpendicularly (i. e. at right angles) to the bars, though free from rivets, and then providing short coupling panels having the ends of their straight bars projecting about one mesh length beyond the ends of their crimped strips, so that such projecting bar ends can be interleaved with the end portions of the bars and strips of the adjacent standard panels which are not permanently fastened together in the shop but are left slightly spaced apart to permit such interleaving with the properly designed coupling panels or units when both are assembled on the job.

25 To produce the type of "continuity" above referred to the constituent panels of grating must be so connected together end to end that the composite structure will present substantially the same resistance to flexure at each joint as at any point in any panel length between joints, and this must be accomplished without any very noticeable interruption in the uniformity of the mesh of the composite structure at any such joint.

30 The invention of the Van Hoffen patent fulfilled these requirements by an ingenious interlocking of the straight bars and crimped strips of the adjacent panel ends which were fastened together by rivets only a little longer than others in the panels and similarly uniformly spaced apart, and such continuous grating has given the utmost satisfaction in use, but it is a little confusing to the unskilled iron workers when called upon to assemble it on the job and the many bar and strip ends protruding to various distances from both ends of every panel render said panels somewhat difficult to handle, as they are usually 25 feet long and weigh up to a ton or more each. Also when such panels are carelessly dropped or thrown about by freight handlers, the long, loose, projecting ends of their numerous constituent strips and bars are liable to become so badly bent that considerable time and effort must be expended in straightening them out on the job before they can be installed and connected properly one with another. Furthermore since these loose ends extend to different distances from the main body of the panel it is difficult to

35 In this way we produce panels of standard size which have no single, bendable constituent members sticking out at either end to catch on obstructions and acquire a permanent set in some twisted shape as the result of collision with some rigid object while in transportation. Also, the small, light-weight coupling units (which do have loose straight bar ends projecting at their extremities) have no projecting, more easily bent, crimped strips, and they are so light in weight that they can easily be carried in one hand without danger of their projecting bar ends catching on some obstruction in shop, truck, freight house or car. Also, they may be made so short as to permit packing in a barrel, box, or cheap wooden crate while in the shop before shipment to the job, thus avoiding all possibility of being found distorted when received on the job.

Thus, for use with standard panels of 25 inches in width having a 5-inch, substantially square mesh, these coupling units can be reduced to over-all dimensions of about 15 by 25 inches so that several of them could be packed together in a good sized suitcase.

The best form of apparatus at present known to us embodying our invention is illustrated in the accompanying two sheets of drawings in which

Fig. 1 is a plan view of the ends of two panels of grating with our coupling unit in operative position and riveted thereto, the unit being cross-hatched to visually distinguish it more clearly from the adjacent ends of the standard panels.

Fig. 2 is a plan view of the coupling member detached and prepared for shipment by having the ends of its projecting bars temporarily fastened together.

Fig. 3 is a similar view of an end portion of the right hand standard panel prepared in another way for shipment.

Fig. 4 is a similar view of an end portion of the lefthand standard panel which has been still more carefully prepared to withstand distorting forces, while being handled.

Fig. 5 shows a modified, enlarged form of the coupling unit which may have a length such that straight bars of standard dimensions may be used in its construction, and

Fig. 6 illustrates a slightly modified end contour for the grating bars.

Throughout the drawings like reference characters indicate like parts. Referring to Figs. 1 to 4, A indicates generally the end of the lefthand standard panel, B that of the similar right hand panel, and C the coupling element or unit. 1, 1, indicate the straight bars of the lefthand panel, 2 those of the right hand panel, and 3 those of the coupling unit. 11, 11, indicate the crimped strips in the left hand panel, and 12, 12, those in the right hand panel, all of which latter bars and strips are of the uniform standard length so that their ends lie along one straight line perpendicular to the straight bars.

4, 4 indicate welded joints fastening the extremities of the crimped strips 13 (each of a little less than one mesh length) to an adjacent straight bar in the coupling unit C. The metal forming each such welded joint is confined to the inner surfaces of a crimped strip, the ends of which have been cut as indicated at 14, 14, so as to form exterior faces lying in planes at right angles to the straight bars 3. Standard rivets of length proper for fastening the crimped strips and straight bars of a standard panel together are indicated at 5, 5, each such fastening including three thicknesses of metal as usual. 6, 6, indicate shorter rivets for fastening the outside straight bars of each standard panel and coupling unit to the adjacent crimped strips.

As shown, the sets of crimps 8, 8, nearest the ends of the standard panels A and B are made slightly shallower than the others in the manner shown and described in Patent No. 1,817,463 granted Aug. 4, 1931 to Paul L. Price for Continuous grating structure. This is for the purpose, as explained in said patent, of permitting the ends of straight bars of intervening panels of grating to be interleaved with said shallow crimps without distorting them. When the straight bars 3, 3, of the coupling unit are thus interleaved, as shown in Fig. 1, and riveted to the straight bars 1, 1, and 2, 2, of the adjacent panels by any desired number of short rivets 6, 6, the interleaved crimps 8, 8, can also be fastened to said straight bars by means of the long rivets 7, 7, which will form therewith a four-ply joint. The term "crimp" as used in the art means generally the section of a bent strip from the center of any one rivet hole to the center of the second one therefrom.

As the ends of the crimped strips 13 in the coupling unit are cut at the point where they first make contact with the straight bars 3, 3,

and the ends of the crimped strips 11 and 12 of the standard panels A and B are as before described in line with the ends of the straight bars 1 and 2, perfect uniformity of mesh throughout the connected panels and the coupling unit results when the straight bars 3, 3, of the latter are interleaved far enough with the standard panels to bring the ends of some of the bars and crimped strips of the latter snugly against the opposite end faces 14, 14, of said crimped strips 13 of the coupling unit, as shown in Fig. 1.

In using our invention it is obvious that inasmuch as the standard panels A and B have all their bar and strip ends in one and the same line, there is much less chance of any of them striking against an obstruction while being handled. Also this arrangement makes possible the use of any one of various forms of temporary fastening means for rigidly connecting all these ends together. Thus in Fig. 4 we have shown a long bolt 9 which can be inserted through all the rivet perforations in the panel ends and also through a series of perforated spacing elements such as the short sections of pipe 10, 10, and washers 15 which have been placed between the ends of adjacent straight bars and crimped strips. When the parts are properly proportioned the screwing up of the nut 16 on the end of the bolt 9 will rigidly hold the elements of the grating ends together so that it is possible to even drop them out of a motor truck on a pavement without distorting them.

A simpler method of fastening some of the bar and strip ends together is indicated in Fig. 3 where ordinary stove bolts 17 and washers 15 are indicated in position to fasten the free ends of the crimped bars to the intervening straight bars.

Temporary fastening bolts 9, 9, also may be used to keep the ends of the straight bars 3, 3, of the coupling units from being bent during handling and transportation, as indicated in Fig. 2.

While making the coupling unit very short as described is necessary to realize all the advantages of the invention hereinbefore recited, some of them may still be realized if the coupling unit is made longer, since the standard panels A and B will not be changed. Also, if coupling units like C' shown in Fig. 5 are made even long enough so that their straight bars will be of full standard length many of the advantages will still be retained and, in addition, the number of riveted or bolted joints that would have to be finished by workmen on the job would be reduced nearly one half.

Moreover, the welding operations at 4, 4, would then be simplified, since the standard riveted joints at 5, 5, would hold the parts in exact correct position for such welding, while the parts have to be held in some kind of a special jig while being welded in making the short coupling C shown in Fig. 2. Furthermore the number of welded joints for any given number of lineal feet of finished decking would be reduced nearly one half by using the long coupling unit shown in Fig. 5.

On the other hand, the long unit C' could not be easily packed for shipment and would be nearly as heavy to handle as the standard panels A and B. Still, they would have no projecting strip ends and their projecting bar ends could easily be temporarily interbraced and fastened together so as to present their combined resistance to any shock tending to distort one of

them,—these projecting bar ends lying all in a straight line at each panel extremity running at right angles to the straight bars.

In all cases the interleaved members could be bolted or welded together if desired instead of being riveted.

If the theoretical objection to spliced jobs, that the upper corners of the splice bar ends may cut tires, be made, even the possibility of this may be avoided if the upper corners of bars 1, 2 and 3 are rounded or beveled off slightly, as indicated at 18 in Fig. 6.

The arrangement above described produces the utmost uniformity of mesh throughout the completed structures, but if it is deemed advisable to depart to some extent from such absolute uniformity of mesh for the sake of bringing certain of the riveted panel connections directly over the particular transverse sills on which these bridge deckings usually rest, this may be done by slightly shortening or elongating certain of the end crimps in the so-called "reticulate" strips,—either in the main panels or in the coupling panels.

Having described our invention, we claim:

1. In a composite grating structure of uniform mesh such as may be used for floors, bridge decking and the like comprising a plurality of series of interconnected members, each of such series being composed of straight bars in line, and each of said series being parallel with all the others, together with a plurality of crimped strips located one between each pair of said parallel bars and fastened thereto at points of contact therewith, the combination of a set of grating panels of the above outlined type each composed of such bars and crimped strips with their extremities at each panel end lying substantially in a straight line perpendicular to the bars, and a second set of panels of similar type but which have their straight bars projecting beyond the ends of their crimped strips and interleaved between the bars and strips at the ends of the adjacent panels of the first set, the straight bars substantially in line one with another having their ends overlapping while the crimped strips of one panel have their ends abutting those of adjacent panels, together with means for fastening together all overlapping bar ends which are in contact one with another.

2. A structure such as defined in claim 1 in which the first mentioned set of panels are all of considerable length involving a multiplicity of grating meshes extending in lines lengthwise thereof, while the panels of the second set are much shorter so as to facilitate their being packed for transportation in a manner that will protect the projecting ends of their straight bars from distortion resulting from careless handling.

3. A structure such as defined in claim 1 in which each crimped strip in the panels of the second set is only about one grating mesh in length.

4. A structure such as defined in claim 1 in which each crimped strip in the panels of the second set is only about one grating mesh in length, while each straight bar thereof has about three times that length.

5. A structure such as defined in claim 1 in which the crimped strips in said second set of panels end at their points of contact with the straight bars and have their end faces lying in planes at right angles to said bars.

6. A structure such as defined in claim 1 in which the crimped strips in said second set of

panels end at their points of contact with the straight bars and have their end faces lying in planes at right angles to said bars and connected thereto by welded joints.

7. A structure such as defined in claim 1 in which the extremities of each of said crimped strips in said second set of panels are located immediately at their points of contact with a straight bar so that they have no portions extending parallel to such bars through which rivets might pass.

8. A coupling member for use in forming a continuous grating structure which shall have a substantially uniform mesh throughout, which said member is composed of parallel straight bars of substantially uniform length, with their ends at either extremity of said member lying in a straight line perpendicular to said bars, and intervening crimped strips fastened thereto with each of their ends spaced away about one mesh length from the nearest straight bar end, thus leaving the latter free to be interleaved with the elements of an adjoining panel of grating of similar mesh.

9. A coupling member for grating such as defined in claim 8 in which all crimped strips end at their points of contact with the straight bars and have their end faces lying in planes perpendicular to said bars.

10. A panel of grating suitable for use in building a composite grating structure which shall have a uniform mesh of given type and size, which said panel is composed of parallel straight bars and intervening crimped strips assembled therewith, the extremities of both bars and strips at each panel end lying substantially in one and the same straight line extending at right angles to said bars, and said crimped strips being permanently fastened to said bars only at points of contact therewith which are distant more than about one mesh length from said panel end.

11. A grating panel such as defined in claim 10 in which all end crimps are shallower than the intermediate ones and are not only free from permanent fastening to the straight bars, but are each spaced away from the adjacent bar on one side thereof.

12. A grating panel such as defined in claim 10 in which all end crimps are shallower than the intermediate ones, are not only free from permanent fastenings to the straight bars, but are each spaced away from the adjacent bar on one side by a distance substantially equal to the thickness thereof; whereby projecting ends of similar bars in a second panel having the same mesh may be inserted in said spaces and fastened to both the bars and strips of the first mentioned panel.

13. A panel such as defined in claim 10 combined with means for holding the free ends of said bars and strips rigidly spaced apart to prevent distortion thereof while said panel is being handled during shipment and transportation.

14. A panel such as defined in claim 10 combined with means for holding the free ends of said bars and strips rigidly spaced apart to prevent distortion thereof while said panel is being handled during shipment and transportation comprising a long screw bolt passing through all the perforations in said bars and strips nearest either end of said panel and through perforated spacing members located between the bar and strip ends which have been strung on said bolts.

15. A panel of grating suitable for use in building a composite grating structure which shall

have throughout a substantially uniform mesh
of given type and size, which said panel is com-
posed of a series of parallel straight bars and a
series of crimped strips intervening therebetween,
5 all said bars and strips having their ends lying
substantially in one and the same straight line
extending at right angles to the bars and being
fastened together at points of contact one with
another, but certain of the end crimps in said
10 strips being shallower than the intermediate ones

in the body of the panel and being severally de-
void of permanent fastening to the bar from
which they are spaced away by reason of such
shallowness; whereby the end portion of any
other straight bar of proper thickness may be 5
inserted in the space so left between such panel
bar and shallow crimp and fastened thereto to
serve as means connecting said panel to another.

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