Aug. 4, 1931. P. L. PRICE 1,817,463

CONTINUOUS GRATING STRUCTURE

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FIG. 1.

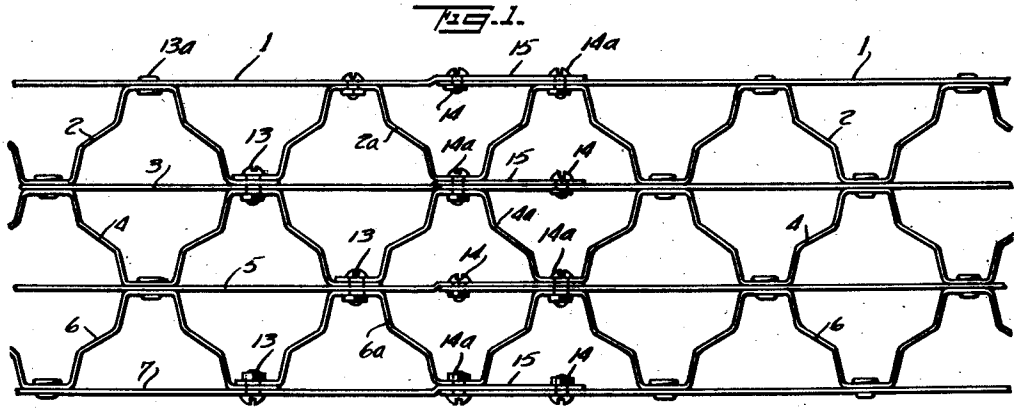


FIG 2

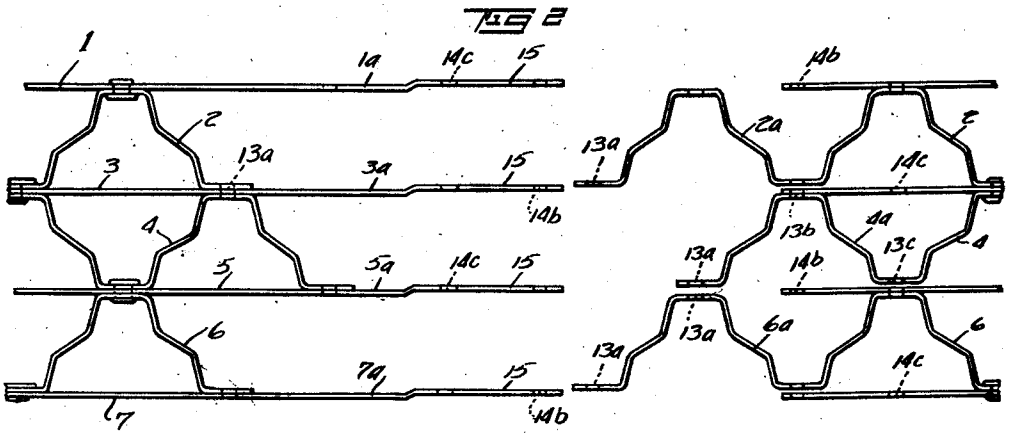
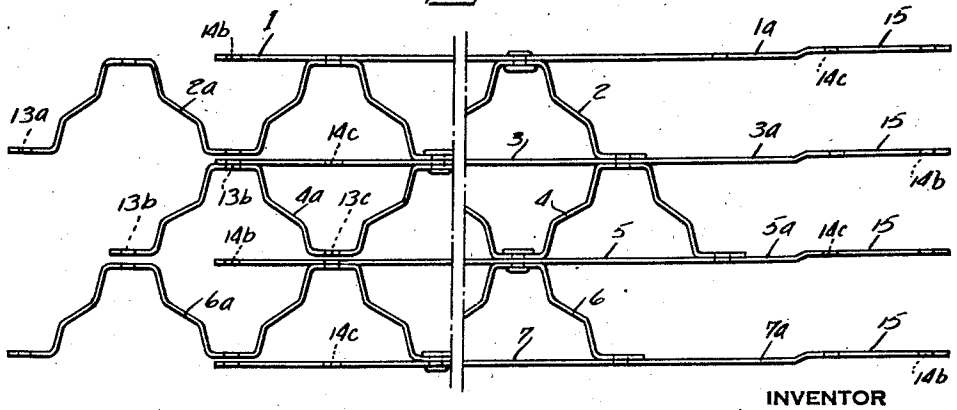


FIG. 3.



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FIG 4.

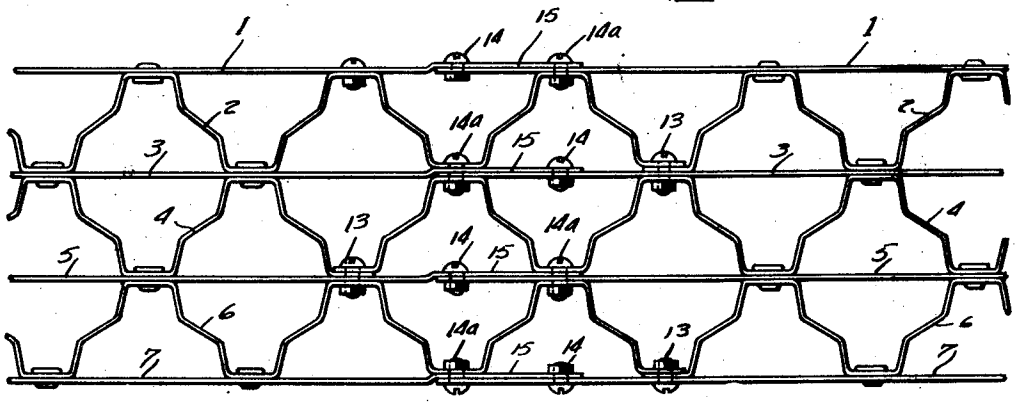


FIG 5.

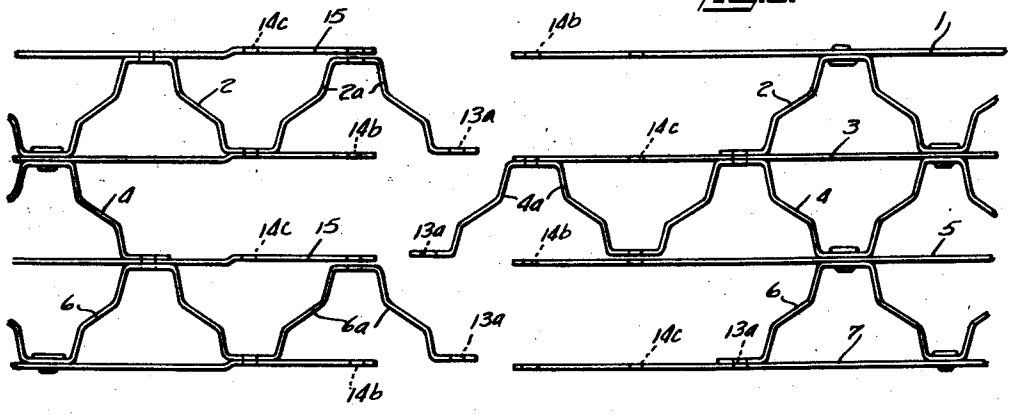
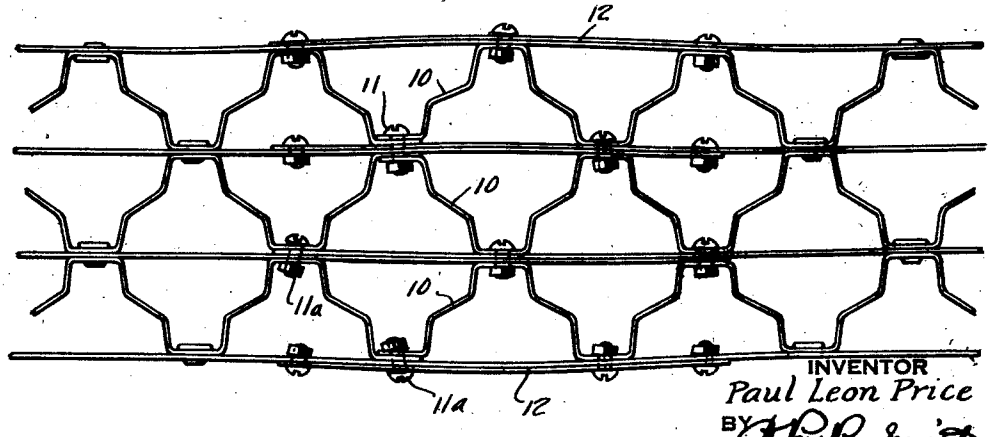


FIG 7.



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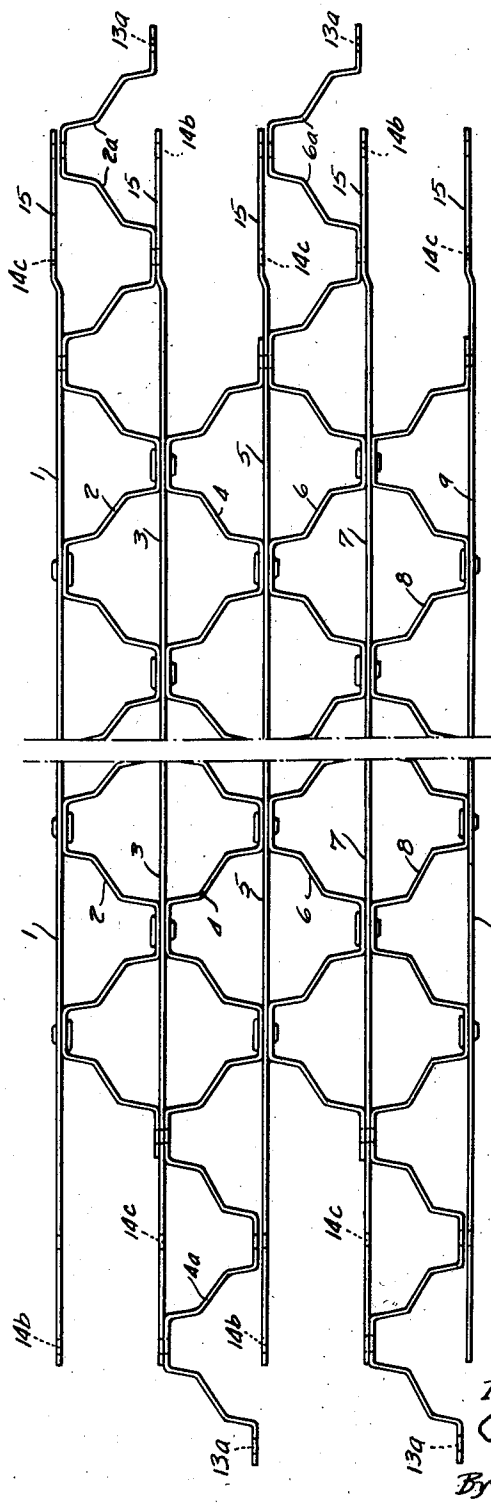


FIG. 6.

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Patented Aug. 4, 1931 1,817,463

UNITED STATES PATENT OFFICE

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CONTINUOUS GRATING STRUCTURE

Application filed September 6, 1929. Serial No. 390,671.

This invention relates to the formation of spliced joints between successive standardized units of grating structure to produce a continuous ventilated floor or runway, or a skeleton armoring for such floor or runway, which continuous structure shall not be distorted by the interleaving of the elements of the adjacent grating unit ends to form said joint, and shall have registering accurately one with another all holes which have been previously punched in the overlapping portions of the grating elements.

In the manufacture of grating in large quantity for the numerous uses to which it is now applied, it becomes necessary to standardize the shop processes to the highest degree, and to this end it has for some time been customary to punch the required rivet holes in the strips, which are subsequently to be crimped, before they are subjected to the crimping operation, all such holes being then spaced apart exactly a uniform distance in accurately gauged punching machines, said distance between punchings being such that when any strip has been crimped to standard form the distances along a straight line between the holes therein shall then be exactly the same as the distance between the holes in the straight bars. When, however, the manufacture of standard units which could have their ends spliced together on the job to form continuous grating with splices long enough to resist flexure at the joints was introduced, it was found that the interleaving of the elements as above preformed produced a distortion thereof which prevented such rivet holes from registering correctly when the splice was formed. This caused great difficulty in inserting the connecting bolts or rivets and in a permanent distortion of the grating elements at such joints, if the fastening means could ultimately be forced into position.

The present invention presents a method of avoiding this difficulty and results in the production of standardized grating unit panels which can still be rapidly manufactured in the shop and readily assembled and fastened together on the job without distortion. Concisely stated it consists in crimping one end portion of each strip, to be inserted between the straight bars, to a depth less than that of the remainder of said strip by an amount equal to the thickness of a straight bar, using said ends for the interleaving sections of the completed grating structure, and punching the rivet or bolt holes in these portions of the originally straight strips such a lesser distance apart that when so given the modified crimp the said holes will thereafter still be the same distance apart along a straight line as are those in the remaining portion of said strip, and in the straight bars.

The best form of structure embodying my invention, at present known to me together with one modification thereof, are illustrated in the accompanying two sheets of drawings, in which

Fig. 1 is a plan view of a grating joint illustrating one embodiment of the invention, parts being broken away.

Fig. 2 is a similar view with the two units forming the joint separated slightly.

Fig. 3 is a plan view of one of said units, parts being broken away.

Fig. 4 is a plan view of a modified joint.

Fig. 5 shows the ends of the units forming the joint illustrated in Fig. 4 when slightly separated.

Fig. 6 shows one of the units employed to form the joint shown in Figs. 4 and 5, parts being broken out at the middle, and

Fig. 7 illustrates an ordinary spliced grating joint formed without the use of my invention, and showing the distortion of parts then produced.

Throughout the drawings like reference characters indicate like parts.

Both forms herein illustrated are designed to produce a joint in which the straight bars 1, 3, 5, 7, 9, etc. in adjoining units may be overlapped a distance at least equal to a half mesh length of the grating and bolted together at two or more points, as indicated at 14 and 14*a*, to form a splice of the requisite stiffness against transverse bending, one end of each straight bar being offset in a common direction along the splicing zone a distance equal to the uniform thickness of said bars,

as indicated at 15, 15. Preferably this offset portion extends for a distance at least equal to one half a mesh length of the grating, as shown. This results in a standardized form of straight bar, all such bars being cut to the same length and having rivet holes punched therein at uniform distances apart, except the extra splicing hole 14*b* in one end of each of the bars, and the intermediate splicing holes 14*c* near the other end of each of such straight bars. In both the illustrated forms of the invention a standardized crimped strip, such as shown at 2, 4, 6, 8, &c. is similarly employed, one end of each such strip being crimped as shown at 2*a*, 4*a*, 6*a*, &c. to a depth less than that of the remaining crimps of said strip by an amount equal to the thickness of the straight bar. Preferably this shallower crimp extends throughout a distance at least equal to one mesh length of the grating.

In the modification shown in Figs. 4, 5 and 6, however, these bars and strips are assembled in a relation one to another slightly different from that shown in the modification illustrated in Figs. 1, 2 and 3. In both forms the straight bars are so located that their ends all lie in the same straight line extending transversely of the grating, while in both forms also the alternate crimped strips are placed in staggered relation one to another, but in Figs. 1, 2 and 3 the extent of such staggering amounts only to a half length of the grating lengths, while in Figs. 4, 5 and 6, it amounts to a mesh and a half length. In the latter form, however, the uniform extent of the unsupported projection of the strip ends beyond the transverse line in which the bar ends of each unit lie amounts to only a half mesh length, while in Figs. 1, 2 and 3, it amounts to a full mesh length. For this reason, among others, I prefer the forms shown in Figs. 4, 5 and 6. Another difference is that in Fig. 3 all the crimps of less depth are at one end of the panel, while in Fig. 6 they appear alternately at opposite ends.

When a series of units of either type are interleaved, as shown in Figs. 4 or 6, to form a continuous grating structure, bolts or rivets 14, 14*a*, are passed through the holes 14*b* and 14*c* in the overlapping portions of the straight bars to form a strong splice, the larger bolts 14*a* passing through three or four thicknesses of bars and strips, and other bolts or rivets 13 are passed through the holes 13*a* in the overlapping free end of the crimped strips, and through the straight bars or portions of other crimped strips at these points of overlap, to complete the joint.

To concretely illustrate the advantages of my invention I have also shown in Fig. 7 an ordinary splice joint made between grating units which do not have the shallower crimps at the points of interleaving of the elements of the adjacent units. Each leg of the end crimp, as 10, is then normally too long to easily accommodate itself to the somewhat contracted space into which it must be crowded, and therefore it must be distorted as shown. Also the rivet or bolt holes in it are necessarily thrown out of line, and register, with the corresponding holes in the interleaving elements after these legs have been swung away from the latter to produce this interleaving arrangement, and as a result it is difficult to insert the connecting bolts or rivets such as shown at 11, 11*a*, and these are left in twisted positions when finally forced into place, as there indicated. Moreover this crowding of excess material into the normally, necessarily limited spaces produces a bulging out of line of certain of the original straight bars, as shown at 12, 12, and elsewhere in Fig. 7. Such a joint can only be made with great difficulty and after the forcible prying apart of the interleaving element with a chisel or other tool, and after a wedging or hammering of the bolts into position.

As contradistinguished from the foregoing, grating units made in the shop according to my invention, as shown in any of the other figures of drawings, slip easily into interleaved relation when assembled on the job, the connecting bolts can be easily inserted, and the completed joint conforms in appearance so nearly to that of the intermediate, previously riveted portions of the grating that it is barely noticeable to the eye.

Another advantage of my invention results from the avoidance of joints including five thicknesses of interleaved elements, such as shown at 11 in Fig. 7. Many standard gratings have such a close mesh that there is not enough open space wherein to permit the insertion of the long bolt required for such a thick assembly of parts. In my invention, on the other hand, no more than four thicknesses of material are assembled at any one point.

The preferred method of manufacturing standard grating units such as embody my above described invention is as follows: A series of straight bars of uniform thickness are cut to a uniform length and holes punched therein for the rivets or bolts at a uniform distance apart, together with the supplemental splicing holes 14*c*. A series of metal strips are cut to a uniform but greater length such that, when crimped as before described, they will then have slightly less length than said straight bars. One end of each such strip is marked for identification, by the cutting apparatus or otherwise, and thereafter has holes punched in the unmarked portion thereof a uniform distance apart such that when said portion has been given the standard crimping the holes therein will be spaced apart the same distance

along straight lines as that which separates the holes in the straight bars. The punching apparatus used for this purpose has two sets of punching members and dies one beside the other. Cooperating with one such punch member is a graduated stop for the strip so that the holes punched by it will be the above described distance apart. The other punch member has a similar cooperating graduated stop so located that, when the strip is subjected to the action of this portion of the apparatus, the holes thereby punched will be separated a slightly less distance such that when given a crimp of less than the standard depth, by an amount equal to the thickness of a straight bar, the holes so punched will then be similarly distant one from another so as to also register with the holes in the straight bars. In operation the major portion of each strip is punched upon the first described portion of the punching apparatus and its remaining end is then shifted over to be operated upon by the second portion of the punching apparatus, the end so shifted being the one which has been previously marked for identification. Thereafter the strip is run through a double set of crimping dies carried side by side in a crimping press, the first set of dies being of such profile as to produce the standard crimp, while the second set of dies is of such profile as to produce the shallower crimp above described. The major, unmarked portion of each strip is subjected to the action of the first set of dies and the marked end thereof is then shifted over and submitted to the action of the shallower set of dies. The parts so produced are then assembled in the shop and riveted together through the portions in contact, i. e. the portions of the strips having the standard crimp and the adjacent portions of the straight bars when the two sets of elements are assembled in the relation shown in either Figs. 4 or 6, according to whichever modification of my invention is to be produced. The shallower crimps and the extreme end portion of the standard crimped portion of each strip is also left unriveted.

Having described my invention, I claim:

1. As a new article of manufacture a grating unit comprising a series of straight, parallel bars of uniform thickness and a series of intervening, crimped strips also of uniform thickness, said bars and strips each having a plurality of holes for the reception of interfastening means spaced apart an exactly uniform distance lengthwise of the unit and all being held together throughout a major portion of the length of said unit by permanent interfastening means passing through such registering holes in their contacting portions, but the end portions of said bars and strips being free from permanent interfastening means, and one end of each strip being crimped to a depth less than that of the crimps in the remainder of said strip by an amount equal to the thickness of a straight bar; whereby, when a plurality of such units have the free ends of their bars and strips interleaved one with the other, the holes in all said free ends will exactly register one with another so that permanent fastening means may be passed therethrough and a continuous strip of grating so produced free from any distortion of the interleaved elements.

2. An article such as defined in claim 1 in which the extreme portion of one end of each straight bar is offset, all in the same direction, a distance substantially equal to the thickness of said bars.

3. An article such as defined in claim 1 in which the extreme portion of one end of each straight bar is offset, all in the same direction, a distance substantially equal to the thickness of said bars, said offset portion extending a distance at least equal to a one half mesh length of the grating.

4. A structure such as defined in claim 1 in which the portion of each said strip so crimped to a lesser depth includes at least one mesh length of the grating.

5. A structure such as defined in claim 1 in which all the straight bars in such unit have their ends in a straight line extending transversely of the grating, and in which all the crimped strips are of the same length but the alternate crimped strips are staggered one from the other a distance of at least one and one half mesh.

6. A structure such as defined in claim 1 in which all the straight bars in such unit have their ends in a straight line extending transversely of the grating, and in which all the crimped strips are of the same length but the alternate crimped strips are staggered one from the other a distance of at least one and one half mesh with one half a crimp in each strip projecting beyond the end of its adjacent straight bar.

7. A continuous grating structure suitable for flooring and the like purposes, which said structure comprises, in combination, a plurality of standardized grating units with their adjacent ends interleaved, each unit comprising a series of straight, parallel bars of uniform thickness, with intervening strips each crimped to a uniform depth throughout the major portion of its length but having an end portion crimped to a depth less than the standard crimps by an amount equal to the thickness of a straight bar; whereby said interleaving and fastening together of the ends of said unit has been effected without distortion thereof or of the fastening means.

8. A structure such as defined in claim 7 in which the more shallowly crimped portion of said strip each includes at least one mesh length of said grating.

9. A structure such as defined in claim 7 in which the overlapping portions of each set

of aligned straight bars extend for at least about one half of a mesh length of said grating.

Signed at Long Island City, in the county of Queens and State of New York, this 29th day of August A. D. 1929.

PAUL LEON PRICE.