Aug. 11, 1936. G. L. DRESSER 2,050,935

METALLIC FLOORING

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FIG. 1.

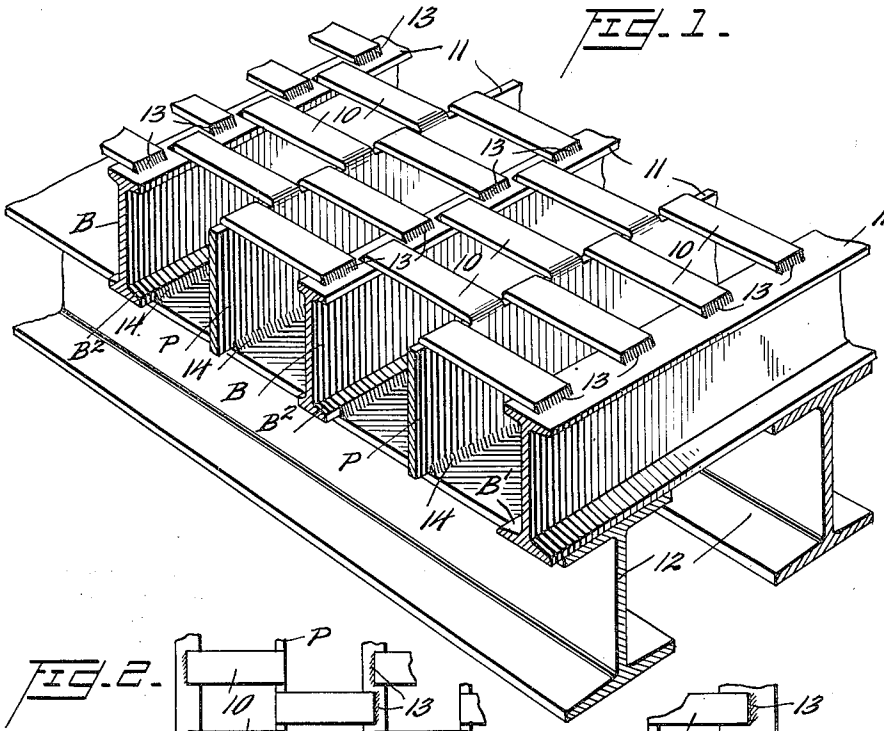


FIG. 2.

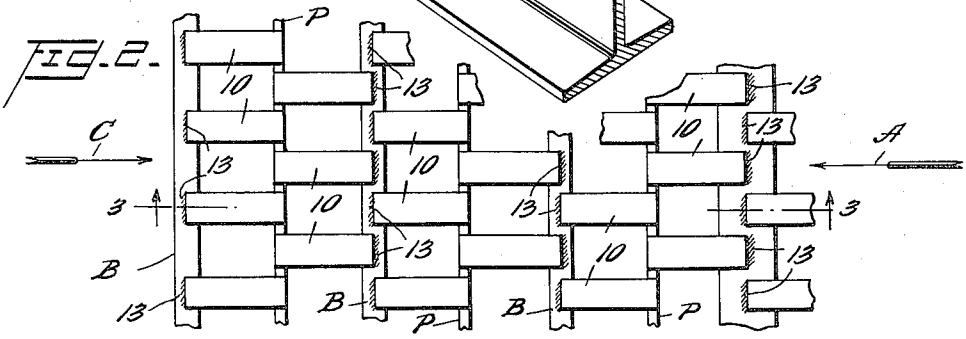


FIG. 3.

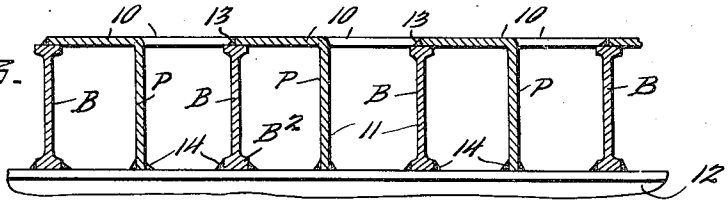
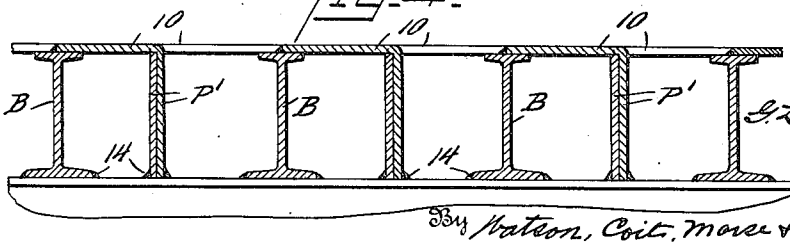


FIG. 4.



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FIG. 5.

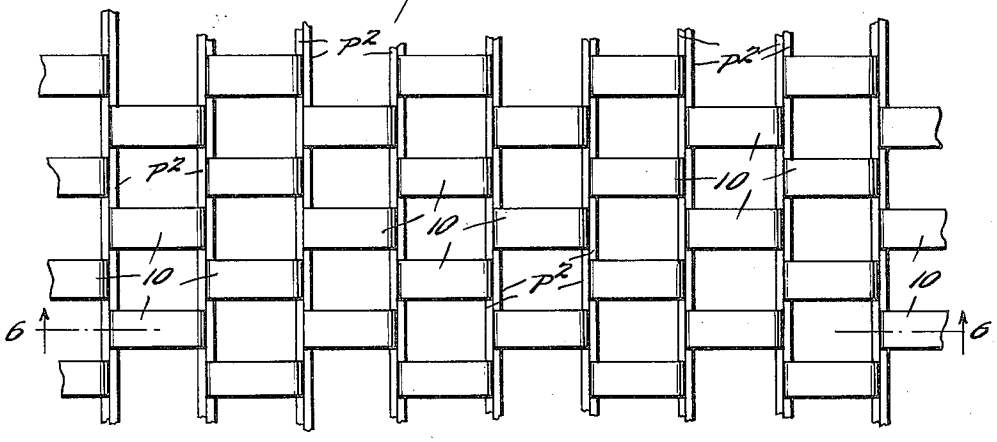


FIG. 6.

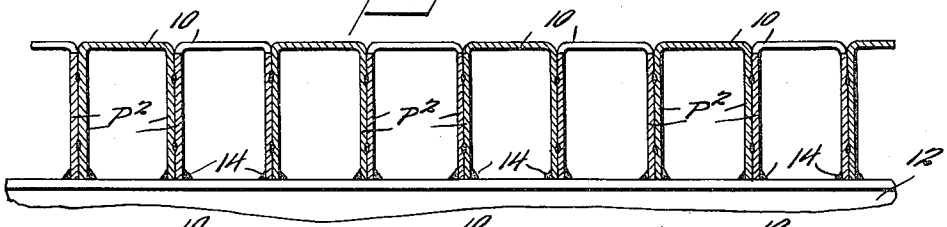


FIG. 7.

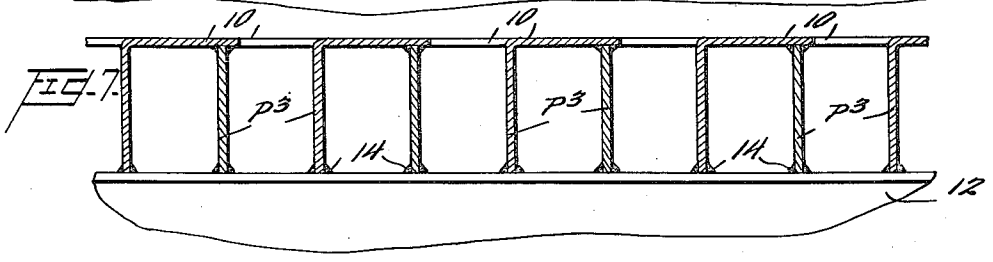
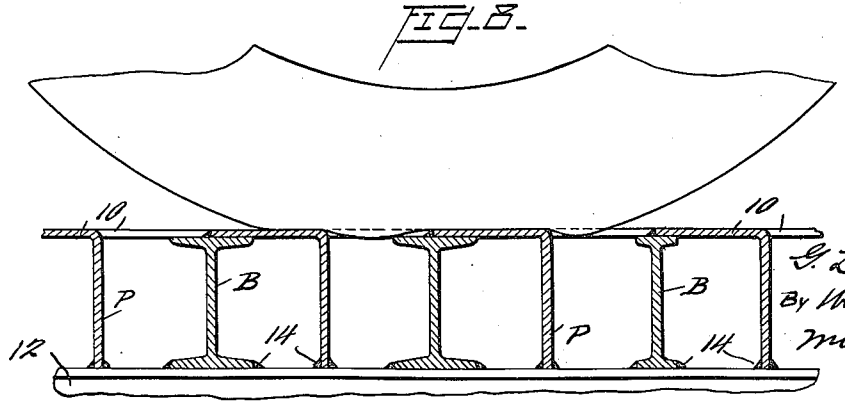


FIG. 8.



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METALLIC FLOORING

George L. Dresser, Albany, N. Y.

Application February 19, 1935, Serial No. 7,260

14 Claims. (Cl. 189—34)

This invention relates to metallic flooring and particularly to metallic flooring or gratings suitable for use on bridges, both highway and railroad bridges, as railroad crossovers at grades, and in the formation of pavements and roadways subjected to heavy traffic. The present application constitutes a continuation in part of my application, Serial No. 709,033, filed January 30, 1934.

It is the object of the invention to provide a metallic flooring construction having numerous advantages over those heretofore designed, suggested, or actually used, of which there are a very considerable number of different types. More specifically stated, it is an object of the invention to provide a stiff, strong, and durable flooring which is at the same time relatively light in weight and inexpensive to fabricate and install. The flooring is so designed as to have the greatest strength for a given metal used in its fabrication, thus not only reducing to a minimum its original cost, but providing a flooring which may be utilized in many places where metallic grating structures of different types, but of equal strength, could not be used owing to the great weight of such floorings. For instance, in resurfacing existing bridges, it is not possible to use a flooring of greater weight than that which the bridge was intended originally to support, at least without making extensive and costly repairs, thus making it impossible to use most, if not all, of the types of metallic floorings now in use.

The flooring, while having the general nature of an open gridwork or grating, requires no filling of concrete or other material and the entire weight of the flooring is only that of the combined weights of the metallic members which enter into its construction, together with the materials used in securing these members together, such as bolts, rivets, or welds, preferably welds. It will be understood, however, that a filler of concrete or bituminous or other materials may be readily applied should it not be necessary to minimize the weight of the structure.

A further object of the invention is to provide a flooring of such character as to eliminate all possibility of skidding of the vehicles passing over the same. It is frequently found that with most types of bridge floorings now used that, at least in certain seasons of the year, traffic is greatly impeded due to the likelihood of skidding of the vehicles passing over the same. This is true not only of non-metallic floorings, such as wood block floorings, but also of floorings of steel and concrete, in fact, any floorings which present traffic surfaces of continuous and unbroken nature.

A flooring constructed in accordance with the present invention provides an ideal traffic surface for various reasons. In the first place, the traffic surface comprises a multitude of traffic supporting metallic elements arranged in a common plane but wholly, or substantially entirely, disconnected and spaced from each other in this plane. Each such element therefore has its edges acccessible to the wheels of the vehicles passing over the flooring, the spaces between the elements not being filled in with concrete or other material, even if a filler is added, there being no filling material placed in the plane of the traffic surface. Preferably, each individual traffic supporting element has edges disposed normally to the direction of traffic and also edges disposed generally parallel to the direction of traffic. With the traffic supporting elements so designed, skidding of vehicles both in the direction of traffic and laterally of the direction of traffic is prevented and the improved traffic surface is one over which wheeled vehicles may pass at any speed, while at the same time they are never out of control of the drivers.

As preferably no concrete or other filling material is utilized in connection with the flooring, and the flooring is merely supported upon spaced metallic supporting beams, snow, ice, and rain cannot collect upon the uppermost or traffic bearing surface, but passes downwardly through the spaces intermediate the traffic supporting elements. Even under the worst conditions, as in the winter seasons, when snow, ice, fog, and rain are prevalent, the flooring will be kept clear so long as there is any traffic and the anti-skidding features of the flooring fully realized. While designed particularly as a flooring for supporting the passage of motor vehicles employing pneumatic tires, which vehicles generally proceed at relatively high speeds and have a tendency to slide or skid in bad weather, the flooring is entirely suitable for solid tire wagons and horse drawn vehicles. It is durable and may be repaired with ease at any time, all portions of the metallic flooring being accessible for this purpose.

Referring now to the drawings, in which one embodiment of the invention is set forth by way of example.

In the drawings:

Figure 1 illustrates in perspective view a supporting structure upon which one form of the novel flooring is mounted;

Figure 2 is a plan view of the flooring illustrated in Figure 1;

Figure 3 is a section on line 3—3 of Figure 2;

Figure 4 is a similar section but taken through an alternative form of the flooring;

Figure 5 is a plan view of portion of a flooring generally similar to that shown in Figure 1 but constructed in a slightly different manner;

Figure 6 is a section on line 6—6 of Figure 5;

Figure 7 is a section through a further modified form of flooring; and

Figure 8 is a section through a still further form of flooring, the tread of a heavy vehicle tire being shown thereon to indicate the manner in which such a tire cooperates with the traffic surface of the flooring in passing over the same.

The flooring comprises traffic engaging and supporting elements 10, arranged in a common and generally horizontal plane, and web members 11 which support the traffic elements 10 and which transfer the weights of these elements, together with the weights of any vehicles superposed thereon, to a supporting structure of any available type. In Figure 1 portions of the supporting structure are indicated at 12 and are seen to comprise two spaced parallel I-beams such as, for instance, are usually employed to support bridge floors. Any other suitable or available supporting structure may of course be employed provided it has the necessary carrying capacity and rigidity. Preferably the traffic engaging and supporting elements 10 are formed as shown in the drawings, comprising metallic plates rectangular in form, the upper surfaces of which are arranged in a common plane so that these elements present, in the aggregate, a suitable traffic surface. As may be seen, the elements are spaced or disconnected in the plane of the traffic surface so that the wheels of vehicles cannot slide or skid from one element to another over a continuous or unbroken metallic surface, as is generally the case with the gridlike metallic floorings now in common use. As viewed in plan, the elements 10 are disposed in checkerboard relationship and in area comprise, in the aggregate, approximately fifty per cent of the projected area of the roadway. In other words, the flooring presents to the wheels of the vehicles passing over it a surface only approximately fifty per cent of which is actually wheel supporting surface, the other approximate fifty per cent being voids or spaces intermediate said elements. It will also be noticed that each element has voids or spaces at its ends and voids or spaces at its sides. The directions of traffic are indicated by the arrows A and C in Figure 2, the wheels of the vehicles passing lengthwise over the several supporting elements 10 although this arrangement may be reversed if desired.

In the form of the invention shown in Figure 1 the traffic elements 10 have their ends supported respectively upon the upper edges of parallel supporting web members 11, arranged in vertical planes, the lower edges of these web members resting upon the upper surfaces of the supporting beams 12. Also it will be perceived that the supporting webs 11 vary in character, certain of these members comprising flat sheet metal plates P, and others rolled sections, such as I-beams B, the plates P and I-beams B alternating throughout the structure. Furthermore, in this form of the invention, the elements 10 comprise integral flange-like portions of plates P, being disposed at right angles to these web plates, alternating elements 10, however, extending in opposite directions from the upper edges of the plates. The end of each element 10 remote from the plate 11, of which it comprises an integral part, is welded to the upper surface of one of the I-beams B, these welds being indicated at 13. The lower edges of the plates P and the I-beams B are also welded to the upper surfaces of the supporting structure 12, these welds being indicated at 14. Other means for securing the several portions of the structure together may be utilized if desired, but I have found in actual practice that by welding, the cost of assembly is minimized and assembly of the several parts of the structure in the field facilitated. The resulting structure is also made very strong and rigid by welding.

The beams B intermediate the plates P may have wide or narrow flanges, the flanges of a wide flanged beam being illustrated by way of example at B' and the flanges of a narrow flanged beam B being indicated at B². The exact design of the beams may be varied considerably in designing the structure to provide the requisite strength, having in view the nature of the traffic which the flooring is intended to support and also the nature of the lower supporting structure.

As previously pointed out, each series of traffic supporting elements 10 are preferably formed integral with the associated web P. This result can be conveniently achieved by fabricating a wide thin plate having the necessary length. The plate is first subjected to suitable cutting or stamping operations whereby long narrow strips of metal are removed, narrow parallel slots being formed beginning at one edge and extending downwardly to approximately the center line of the plate, thus leaving a plurality of tongues or elements 10 disposed in a common plane, which is the plane of the original plate. Next, by means of suitable machines, the elements 10 are bent or turned into a common plane normal to the plane of the remaining portion or web of the plate P, alternate elements 10 being turned in different directions. In this manner flooring members, such as illustrated in Figures 1, 2, and 3 are cheaply and conveniently fabricated from flat elongated steel plates.

The beams B are commercial beams which require no special fabricating operations and hence it is clear that the flooring comprises commercial shapes of the simplest kind and that a minimum of expense is met with in the fabrication of its component members. The thickness of the plates P will vary with the nature of the particular flooring under construction and may be made greater in the case of wide floorings adapted to carry heavy loads and less in the case of narrower floorings or floorings intended to carry relatively light loads. The lengths of the elements 10 and the distances between each beam B and adjacent plates P may likewise be varied in accordance with structural requirements.

In Figure 4 of the drawings a generally similar type of flooring is illustrated, but in this case the single plates P of the form of the invention just described are replaced by two parallel plates P' in contiguous relationship and suitably secured together. Each web or plate has but a single series of elements 10 integral with its upper edge and preferably the elements of each plate extend horizontally over the upper edge of the adjacent plate so that these plates are in a sense interlocked.

In the form of the invention shown in Figures 5 and 6 the intermediate beams are omitted and each element 10 has both of its ends formed integrally with the upper edge of a plate P^2, adjacent plates being preferably welded together. This forms a very light but very strong structure of identical units and, in some cases, is to be preferred to the two forms of the invention just above described.

A further alternative form of the invention is illustrated in Figure 7 in which the intermediate beams are omitted, each plate P^3 having a series of elements 10 integral with its upper edge and the outer or free end of each such element being welded to the upper edge of the next adjacent plate P^3. Naturally, in this form of the invention, each plate has but a single series of elements 10 integral therewith and all of the elements of this series extend in the same direction from the associated plate. The lower end of each plate is welded to the supporting structure, as in the other forms of the invention.

In Figure 8 is rather diagrammatically illustrated a portion of the tread of a large pneumatic tire, this tire resting upon the upper surface of the flooring. It will be seen that minor areas of the tire surface will project downwardly into the spaces or voids between the elements 10 so that the tire will firmly engage at a number of places with the edges of these elements. The elements are not so far spaced apart, however, as to permit any substantial area of the tire to remain unsupported so that excessive pressure between the tire tread and the corner of the elements would result, thus leading to the cutting of the tire surface. I have found that a very satisfactory bridge flooring, for instance, is provided when the plates P are spaced four inches from the intermediate beams B, measuring from center to center, the elements 10 being therefore approximately four inches long. The spaces between adjacent elements 10, measured transversely of the direction of traffic or longitudinally of the plates and beams were in this instance 2¼ inches and the elements themselves were approximately 1½ inches wide. As has been before explained, however, the invention is not limited to particular dimensions but the various parts of the flooring may be designed, within limits, to suit existing conditions.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is:

1. Metallic flooring comprising a supporting structure and a plurality of flat metallic elements arranged in a plane parallel to the plane of the supporting structure, said elements being spaced apart and together comprising the main traffic supporting surfaces of a grid-like grating, and a plurality of webs disposed normally to the plane of said elements and extending to the supporting structure, a plurality of said elements being secured to and supported by each of said web members.

2. Metallic flooring comprising a plurality of individual metallic elements disposed in a plane to provide a grid-like traffic surface, and a plurality of webs disposed normally to said plane, a plurality of said elements being rigidly fixed to the upper edge of each of said webs and each element being only sufficient in length to overlie two adjacent webs.

3. Metallic flooring comprising a plurality of flat metallic individual elements disposed in a plane and arranged in parallel rows, the elements of each row being spaced apart and alternating with the elements of adjacent rows, a plurality of webs, to the upper edge of each of which is secured the elements of a single row of elements, and supporting means for the webs.

4. Metallic flooring comprising a plurality of flat metallic elements disposed in a plane and arranged in parallel rows, the elements of each row being spaced apart and alternating with the elements of adjacent rows, and a plurality of vertically disposed webs extending from said plane to a supporting structure, each element resting upon and being rigidly secured to two of said webs.

5. Metallic flooring comprising a plurality of flat metallic elements disposed in a plane and arranged in parallel rows, the elements of each row being spaced apart and alternating with the elements of adjacent rows, and a plurality of vertically disposed webs extending from said plane to a supporting structure, each element comprising an integral portion of one web and being rigidly secured to a second.

6. Metallic flooring comprising a supporting structure, a plurality of substantially parallel members supported thereby, each such member having a web portion disposed in a vertical plane and two series of spaced integral flange elements projecting in opposite directions from the upper edge of said web portion, and means positioned intermediate each pair of webs for supporting the free ends of the flange elements projecting from each such web toward the other.

7. Metallic flooring comprising a supporting structure, a plurality of substantially parallel members supported thereby, each such member having a web portion disposed in a vertical plane and two series of spaced integral flange elements projecting in opposite directions from the upper edge of said web portion, and a vertically disposed plate positioned intermediate each pair of webs for supporting upon its upper surface the free ends of the flange elements projecting from each such web toward the other.

8. Metallic flooring comprising a supporting structure, a plurality of substantially parallel members supported thereby, each such member having a web portion disposed in a vertical plane and two series of spaced integral flange elements projecting in opposite directions from the upper edge of said web portion, and means positioned intermediate each pair of webs for supporting the free ends of the flange elements projecting from each such web toward the other, the free ends of the flange elements being welded to said means.

9. Metallic flooring comprising a supporting structure, a plurality of substantially parallel members supported thereby, each such member having a web portion disposed in a vertical plane and two series of spaced integral flange elements projecting in opposite directions from the upper edge of said web portion, and a vertically disposed beam positioned intermediate each pair of webs for supporting upon its upper surface the free ends of the flange elements projecting from each such web toward the other, the free ends of the flange elements being welded to the flat horizontal upper surface of said beam, and the lower edge of said beam resting upon the supporting structure.

10. Metallic flooring comprising a supporting structure, a plurality of substantially parallel members supported thereby, each such member

having a web portion disposed in a vertical plane and a series of spaced flange elements projecting in one direction from the upper edge thereof, the free ends of the members projecting from the upper edge of one such web overlying and resting upon the upper edge of the next adjacent web.

11. Metallic flooring comprising a supporting structure, a plurality of substantially parallel members supported thereby, each such member having a web portion disposed in a vertical plane and a series of spaced flange elements projecting in one direction from the upper edge thereof, the free end of each element projecting from the upper edge of one such web lying in the space between two such elements of the next adjacent web and directly upon the upper edge of such web.

12. The combination set forth in claim 11 in which the free ends of the elements projecting from one web are welded to the top of the next adjacent web.

13. The combination set forth in claim 8 in which the intermediate supporting means comprise webs provided with flanges at both top and bottom edges thereof.

14. Metallic flooring comprising a plurality of flat horizontally disposed metallic elements the upper surfaces of which, respectively, terminate in well defined vertical wheel engaging edges, each element having one edge disposed transversely to the direction of traffic and another edge substantially parallel to the direction of traffic, such upper surfaces, taken together, forming a traffic supporting surface and said elements being spaced apart in the plane of the traffic surface to provide open spaces therebetween and to permit a vehicle wheel to engage said edges and to be thereby prevented from skidding, and metallic means supporting said elements.

GEORGE L. DRESSER.