

July 21, 1959

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COATINGS FOR THE TRAFFIC BEARING SURFACES OF GRATING

Filed Sept. 16 1954

2 Sheets-Sheet 1

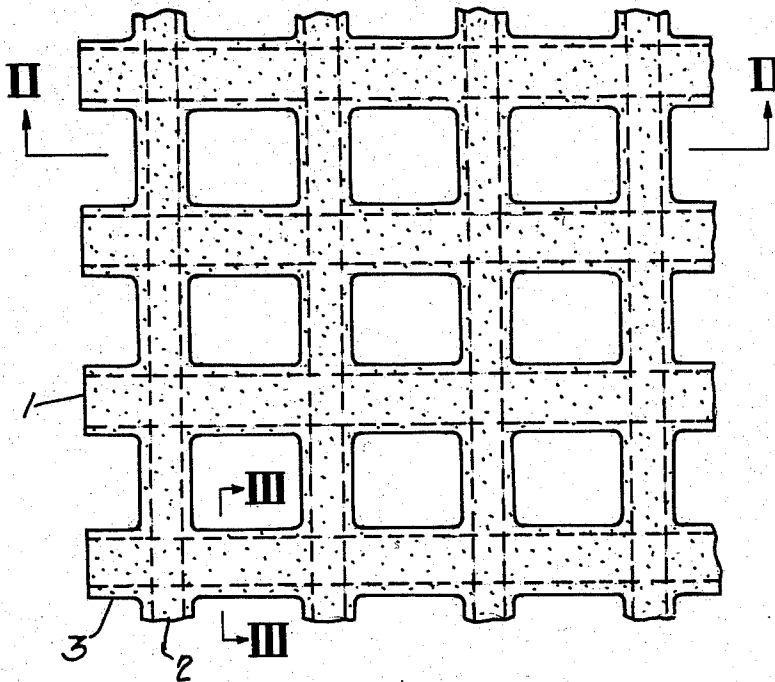


FIG. 1

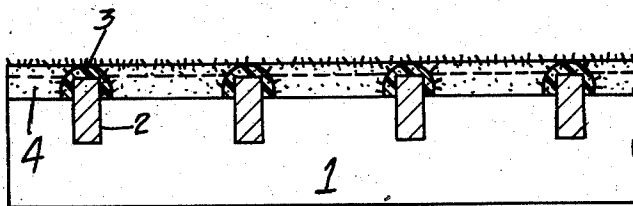


FIG. 2

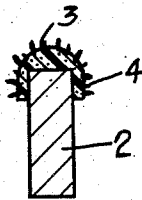


FIG. 3

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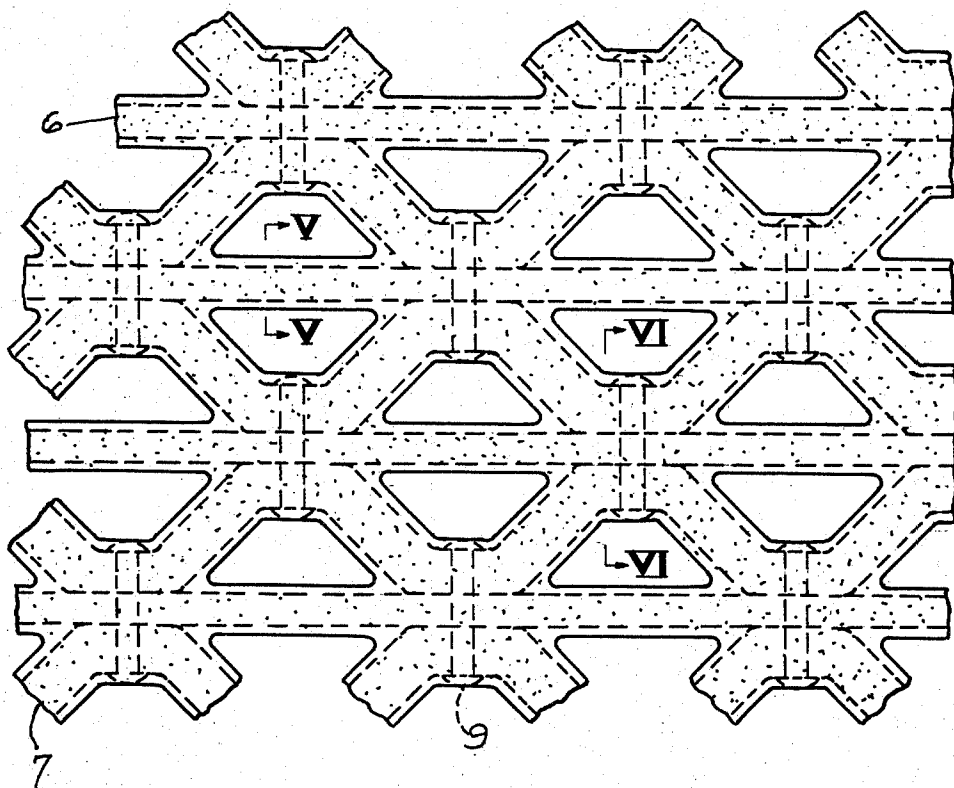


FIG. 4



FIG. 5

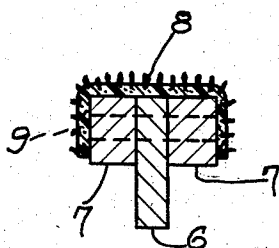


FIG. 6

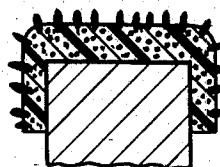


FIG. 7

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## COATINGS FOR THE TRAFFIC BEARING SURFACES OF GRATING

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2 Claims. (Cl. 94—5)

This invention pertains to traffic bearing gratings used interiorly and exteriorly and more specifically to a method of treating such gratings to provide the traffic bearing surfaces with a wear resistant anti-skid surface.

Metal gratings of various designs and strength are now commonly used on roadways, bridges, steps, walk ways of all sorts and for many other diverse purposes. The metal wears smooth and when wet or coated with ice or snow becomes hazardous for both vehicular and pedestrian traffic. The present invention overcomes in large degree the tendency of ice to adhere to and wear smooth on the traffic bearing surfaces of the grating. The wear resistant abrasive surface provided by the invention is effective to provide better traction under all weather conditions.

An object of the present invention is to provide a wear resistant coating to the traffic bearing surfaces of grating and in such a manner as to resist displacement of the coating from such grating surfaces.

Another object of the invention is to provide such a coating to the traffic bearing surfaces of grating as will present an abrasive surface to the traffic such as to reduce slipping of the traffic moving thereover.

Another object of the invention is to provide such a coating for the traffic bearing grating surfaces and to apply the coating in such manner as to also resist corrosion.

Another object of the invention is to provide an economical method for applying such coatings so as to provide for uniformity in the coating and a strong bond between both the coating and the metal and between the coating and abrasive material imbedded therein.

In the drawing forming part of this disclosure, Fig. 1 shows a plan view of a portion of one form of grating with the coating applied thereto;

Figs. 2 and 3 show sections through the grating of Fig. 1 taken on lines II—II and III—III;

Fig. 4 shows a portion of another form of grating with the coating applied thereto;

Figs. 5 and 6 show sections through the grating of Fig. 4 taken on lines V—V and VI—VI thereof; and

Fig. 7 shows an enlarged section through one of the grating members illustrating the coating and bonded abrasives.

In practicing the present invention the specific form of the grating and the method of securing the grating members together forms no part of the invention. Any form of welded or riveted grating may have the coating of the invention applied thereto. Since only the traffic bearing surfaces of the grating cause slipping of the ve-

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hicular or pedestrian traffic moving thereover, the full effectiveness of the coating may be obtained by merely placing the coating on and adjacent such traffic bearing surfaces of the grating. By continuing the coating across the traffic bearing surfaces and along the adjacent surfaces of the grating I have found that the coating is better enabled to resist displacement from the traffic bearing surfaces and assists in clearing the grating traffic bearing surfaces of skim ice. In the case of riveted grating the most vulnerable portion of the grating as regards corrosion is found around the area where the rivet passes through the grating members. I have found it advantageous in the case of rivet grating to continue the coating down the sides of the grating members to cover the rivet heads.

Epoxy resins are known to adhere tenaciously to steel and when a suitable catalyst is added thereto will cure in situ on the metal at room temperature in about one hour. Such resins are the reaction products of epichlorohydrin and diphenylolpropane and are available as liquids, semi-liquids and solids. In the practice of the present invention I prefer to use an epoxy resin having a light syrupy consistency at room temperatures. Commercially suitable resins having suitable viscosities for my purposes are available under the trade names "Epon" Nos. VI and 828. These are typical and not exclusive examples.

To cure these resins it is necessary to use a catalyst which is introduced at the time the resin is used, and which remains in the cured resin. These catalysts are in the class of polyamines, such as diethylene triamine, ethylene diamine, dimethylamino-propyl amine, diethylamino-propyl amine, piperidine, and pyridine. Different catalysts may affect the curing time or temperature required to cure the resin, and the amount of catalyst will also vary the curing time. I have found diethylene triamine to be satisfactory and about 10% by weight of catalyst to resin in the mix is satisfactory.

Some resiliency, without loss of adhesive qualities, may be imparted to the epoxy resins by adding thereto natural or synthetic rubber which may be in granular or latex form. Thus polyvinyl acetate latex, natural rubber latex, latex forms of synthetic rubbers or granular forms of natural or synthetic rubber may be added to the epoxy resins to produce a resin when cured having the characteristics of both. Thus a mixture in the approximate proportions by weight of 1 lb. of Epon VI to 2.5 oz. of catalyst to 3.5 oz. of rubber of the forms noted produces a satisfactory base coating for use with a second coating of wear-resistant epoxy resin, catalyst and abrasive material. For this second coat a mixture of one part by volume of Epon 828 plus 10% by weight of a catalyst, with 10 parts by volume of sand and the whole thoroughly mixed, proved satisfactory. The proportions of sand may be greatly reduced if desired, but preferably to not less than equal volumes of sand and resin plus catalyst. When the sand is reduced below this point, the coating tends to lose its abrasive qualities as the sand tends to become wholly embedded in the resin. On the other hand where the sand is in excess of a proportion of 1 to 1 with the resin, the excess sand provides an abrasive coating with the individual grains of said coated with the resin and adhered together. In this latter case, a more wear-resistant abrasive coating may be provided by pressing granular gritty material

on to the said coating before the resin cures. Thus aluminum oxide, spent grit blast shot, etc. may be pressed into engagement with the resin coated sand and becomes embedded therein when the resin cures.

The herein disclosed manner of applying the coating has many advantages. The epoxy resins are quite expensive and therefore should be applied only to the areas of the grating where they will be effective for the intended purposes. The coating material is applicable by spraying methods but this is wasteful of the material. Should the coating be applied only to the surfaces in the plane of engagement by traffic moving over the grating, relatively sharp edges might cause destruction of the coating by vehicles striking these corners or edges. By lapping the coating a short distance over the sides of the grating members, a better wearing bond between the coating and the metal is provided. The coating has a distinct advantage in that it is water-repellant after the material is cured so that water does not readily wet its surface. This improves its traction qualities, and ice forming on the surface readily breaks away.

The surface of the metal is suitably prepared before applying the coating. This may be done by shot or grit blasting, use of solvents, pickling, etc. While the resin will adhere tightly to clean metal, the presence of scale, grease and other foreign matter will impair the bonding of the resin to the metal. Grit blasting imparts a slight roughness to the surface of the metal and improves the effectiveness of the bond. Since the resin will also bond very rapidly to its self, the entire grating may be made corrosion proof by applying thereto any of the commercially available paints containing such resins and sold as an Epon paint. The presence of the resin causes the paint coat to adhere tenaciously to the metal and being water repellent, the corrosion resistant qualities of the paint are greatly increased.

After preparing the grating in the manner described, the grating may be inverted to face its traffic bearing surface downward and is pressed into the coating medium previously described. The coating material may be maintained in any suitable container large enough to receive the section of grating to be coated. Under some conditions some of the resins may need heating so that the container should be so constructed to permit applying heat to the coating when necessary. The downwardly facing traffic bearing surfaces of the grating are then pressed into the coating material so that the material flows upwardly along the vertical faces of the grating members about one half inch so as to lap the coating around the edges of the members as shown in the accompanying drawings. Where a double coating is applied as hereinbefore described, the first coat is permitted to cure before the second coating is applied.

#### Example I

The grating after being suitably cleaned and/or painted was dipped into a bath of resin, catalyst and rubber latex. The grating upon being removed from the bath was stored until the resin cured. This curing time was about one hour. After curing the grating was then dipped into a bath of the second coating material comprised of resin, catalyst and sand. The grating after being removed from the bath was then pressed into a bed of granular abrasive material such as aluminum oxide, spent grit blast or other suitable material. This abrasive material is thus forced into the second coating material and becomes imbedded therein. The grating is then stored to permit curing of the coating which takes about one hour. Fig. 7 of the drawings shows a typical section through a grating member illustrating how the abrasive material becomes imbedded in the coating and is bonded therein as the resin cures. The total thickness of the coating resin mixture is preferably about one sixteenth of an inch. The overall thickness of the coating will be increased by the abrasive material.

#### Example II

The grating after being suitably cleaned and/or coated with an Epon paint, was dipped into a bath of resin, catalyst and sand until a coating of about one sixteenth thickness was applied to the traffic bearing surfaces of the grating and around the edges of the grating members as in Fig. 7 of the drawings. The grating was then pressed into the bed of abrasive materials, as before, and the coating allowed to cure. This curing time was about one hour.

#### Example III

The grating after being suitably cleaned as before was dipped into a bath of the resin, catalyst and sand. The proportions of sand to resin being about one to one. The coating was about one sixteenth inch thick and applied as shown in Fig. 7 of the drawings. The coating was then allowed to cure for one hour.

Referring now to the drawings, Figs. 1 to 3 inclusive are intended to show generally a representative type of welded grating having longitudinally extending bars 1 of any desired shape which are joined at spaced intervals by cross bars 2. These cross bars may be of any suitable shape and welded to the longitudinal bars in any suitable manner. The coating shown applied to the grating longitudinal and cross bars comprises the traffic bearing surface 3 and side portions 4 extending down over the sides of the grating members 1 and 2. The abrasive particles 5 are shown by Figs. 7 as embedding in and cured into the resin coating. The resin coating material being water repellent, extension of the coating material over the sides of the grating members helps the grating to dry out quickly and causes ice forming thereon to break away readily.

The grating shown in Figs. 4 to 6 inclusive of the drawings represents a typical form of riveted grating. Here the longitudinal bars 6 may be of any suitable design and are connected at intervals by suitable transverse connecting members 7 which may be of any desired design, the members 6 and 7 being connected by rivets 9. The coating 8 in the figures is applied in the same manner as to Figs. 1 to 3 inclusive. It will be noted however that in Figs. 4 to 6 inclusive the coating 8 seals the joints between the members 6 and 7. The coating may also extend over the rivet heads 9 where desired for corrosion proof these members. However, where as previously described the grating is painted with an Epon paint before applying the coating or coatings, the Epon paint provides a corrosion resistant protection for the rivets.

The invention herein disclosed may be practiced by using an under coat of rubber bearing resin and an outer coat of abrasive bearing resin. The under coat may also have sand or other abrasives added thereto in any desired amount. The examples used herein are therefore by way of illustration and not limitation in the practice of my invention and I do not intend to limit myself to any specific mode of practicing the invention except as made necessary by the scope of the appended claims.

I claim:

1. An open mesh metal grating having anti-slipping traffic bearing surfaces, comprising interconnected metal members having their upper surfaces in substantially the same plane to provide traffic bearing surfaces and side surfaces extending downwardly from the traffic bearing surface, a mixture of one part by volume of liquid epoxy resin plus about 10% by weight of a catalyst and not less than one part by volume of sand-like abrasive particles applied as a continuous coating of substantial thickness over the exposed traffic bearing surfaces, the joints therebetween and a substantial portion of the adjacent exposed side surfaces of the said interconnected metal members.

2. The grating as defined in claim 1 wherein additional larger abrasive particles are partially embedded in the coating material before curing.

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