Aug. 28, 1956 W. A. BATES, SR., ET AL 2,760,416

GRATE CONSTRUCTION

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Fig. 1.

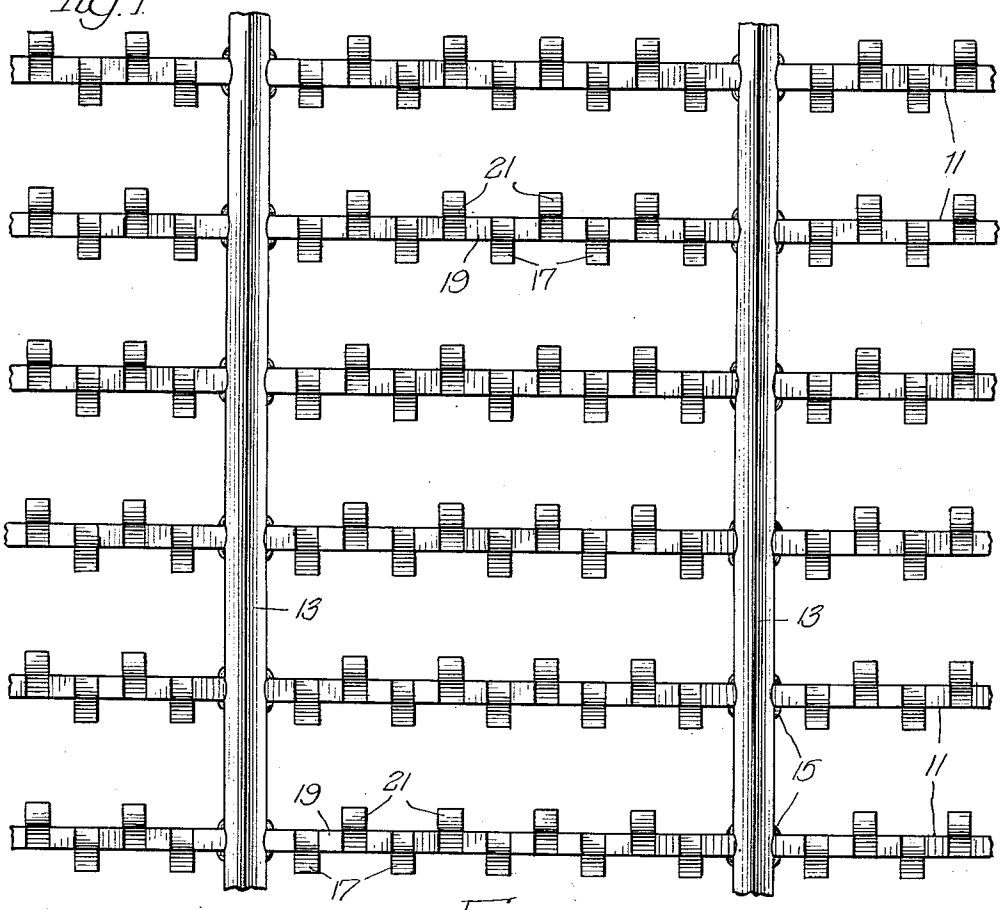


Fig. 2

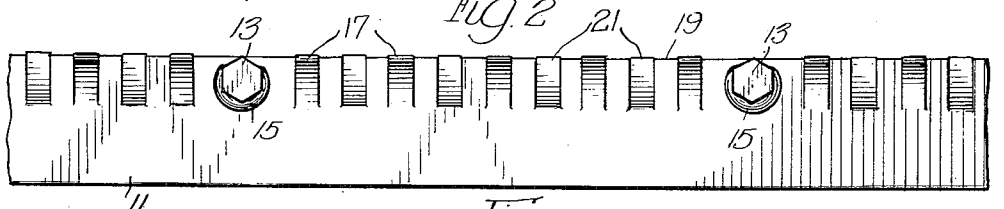
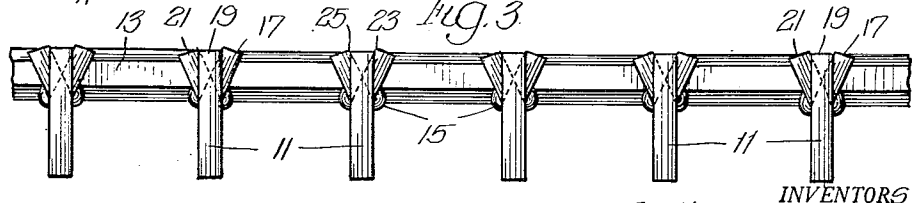


Fig. 3



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Fig. 4

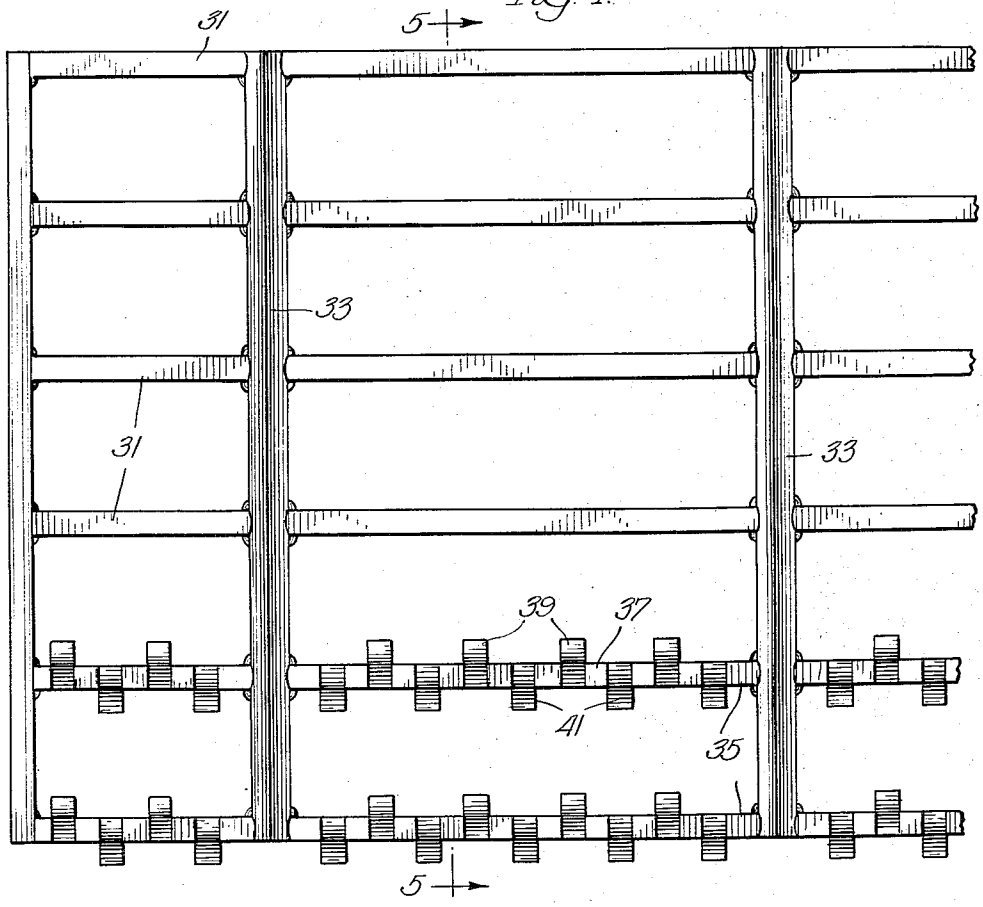
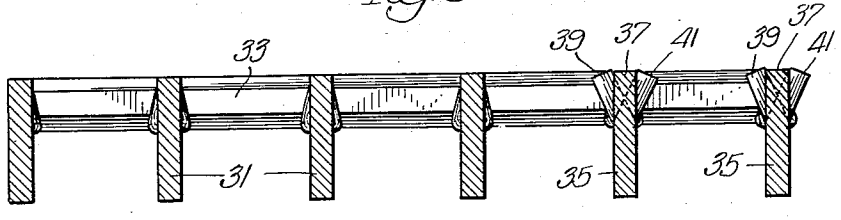


Fig. 5



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GRATE CONSTRUCTION

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Application May 4, 1953, Serial No. 352,926

4 Claims. (Cl. 94—5)

This invention relates to a new and improved grate construction and more particularly to metal grates used as flooring, stairways, platforms and the like.

An important requirement of flooring grates for many uses is that the surface be provided with anti-slip means so as to minimize or elminate the hazards of slipping by persons walking on the grates. One method has been to serrate or notch the upper edge of the grate bars. This works effectively insofar as the anti-slip feature is concerned, but it seriously weakens the bars in that the entire depth of the serrations is ineffective in compression. Thus the neutral axis of the bar is lowered and the bar is not only weakened but rendered substantially less stiff and rigid.

Another requirement for grates in locations such as sidewalks, is that the grate bars be so closely spaced as to prevent the small ends of women's shoe heels from passing down between the bars with consequence damage to shoes together with danger of tripping the wearer. With usual types of grates this requirement can only be met by more closely spacing the bars which adds to the cost and results in substantially greater weight of metal per square foot. This close spacing also reduces the spaces available for passage of light and air.

The grate construction of the present invention is also adapted for use at the forward edge of stair treads which are formed of grates. With such treads it is considered necessary to provide a heavier nose piece or to more closely space the bars adjacent the forward edge in order to prevent persons using the stairs from becoming confused as to the location of the forward edge as may happen if the entire tread is uniformly spaced. Various types of special nosings have heretofore been provided to make the edge visible and prevent slipping and tripping.

It is an object of the present invention to provide a new and improved type of metal floor and stair grate.

It is a further object to provide grates of this character in which the grate bars are so formed as to provide non-slip action without seriously weakening the bars.

It is an additional object to provide such grates in which the open spaces between bars are reduced without the necessity for more closely spacing the bars.

It is also an object to provide a grate bar construction having a greater visual width as seen from above whereby it is adapted for use adjacent the nose of step treads.

It is another object to provide a grate bar and grate construction which may be formed from standard metal shapes.

It is a further object to provide a grate which is simple in design and manufacture and adapted for commercial construction and use.

Other and further objects will appear as the description proceeds.

Certain preferred embodiments of our invention are shown in the accompanying drawings, in which—

Figure 1 is a plan view of a section of grate,

Figure 2 is an elevation of the grate of Figure 1 as seen from the lower edge of Figure 1,

Figure 3 is an elevation of the grate of Figure 1 as seen from the left edge of Figure 1,

Figure 4 is a view of a grate adapted for use as a stair tread, and

Figure 5 is a section taken on line 5—5 of Figure 4.

In Figures 1 to 3 there is shown a standard type of grate which has been modified according to the present invention. The main bars **11** are connected in their upper portions by means of the hex cross bars **13**. These bars **13** are electrically welded under pressure to the main bars **11** to form a fillet weld. The fillet **15** of the metal of the main bar **11** being forced downwardly by pressure applied to the cross bar **13** during the welding operation. This type of grate as so far described is of standard commercial construction now on the market. It will be understood that the present invention is applicable to other forms of grates such as those in which the bars are mechanically interlocked.

According to the present invention, the upper edges of the main bars **11** are cut transversely for a depth corresponding to not more than approximately three eighths of the depth of the bar. This transverse shearing action is carried out in such manner that portions **17**, as seen in Figures 1 and 3, are flared to one side of the normal plane of the bar **11**, an intermediate section **19** of a similar area is not disturbed and a succeeding portion **21** is flared in the opposite direction. This arrangement causes the upper corners **23** and **25** of portions **17** and **21** respectively, to lie in approximately the plane of the upper edges of the bar and have an anti-slip effect. It will be noted also that the metal of the several consecutive sections **17**, **19** and **21** is maintained in compressive contact over approximately one half of the area of the upper portion of the bar. This is indicated by the broken lines of Figure 3 which show the overlapping character of the several adjacent sections.

With a normal grate constructed as shown, without the deformation and flaring of the upper edge of the bars **11**, the open area between the bars **11** is the full equivalent of the bar spacing. By way of example, but not by limitation, one particular standard construction would involve the use of bars **11** having a vertical dimension of one inch and a transverse dimension of 3/16 of an inch. These bars would be spaced to provide intermediate clearances of one inch or, stated otherwise, would be located one and 3/16 of an inch between centers of adjacent bars. The cross bracing bars **13** would be spaced four inches apart on centers.

A standard construction for the purpose of providing a non-slip surface includes spaced semi-circular notches in the upper edges of the bars similar to bars **11**, which notches or serrations are cut approximately ¼ of an inch deep. The strength of the bar is thus reduced and it becomes approximately the equivalent in strength of a ¾ inch bar. With the present construction, the reduction in strength is very much less as there is some metal in continuous contact in the upper compression side of the bar throughout its depth. This metal varies in area, as indicated by the broken lines of Figure 3, and is substantially the equivalent of half the area of the sheared portion of the bar. A portion of this contact, however, extends for the full depth of the bar and, consequently, is more effective as it is further spaced from the neutral axis of the bar.

A further important advantage of the construction lies in the fact that the clear space between the upper edges of the bars **11** is very substantially reduced. Instead of a clear space of approximately the full inch with normal bars, the maximum dimension is reduced to approximately 5/8 inch. This is important in many forms of construction and especially where gratings are used for sidewalk

openings. In such use of gratings, it is normally required that the grating bars be sufficiently closely spaced so as to prevent the very small heels of women's shoes passing down between the bars. Such heels may be formed with dimensions as small as ¾ of an inch. The present grating, when made to dimensions given above, adequately takes care of this contingency.

With usual flat types of bars, however, it is necessary to space the bars more closely which means a much more expensive and heavier grating. A standard grating, for example, uses twenty-one main bars in a 24 inch width. In order to get the close spacing for sidewalk gratings with standard bars, it is necessary to use twenty-seven bars in a 24 inch width, which is an increase of six bars or 28.5% excess steel over the standard spacing grate. The present grating accomplishes the desired result without the use of any additional bars. It also provides an anti-slip surface without the great loss of strength in the usual types with ¼ of an inch semicircular notches or serrations.

The forms of construction shown in Figures 4 and 5 are similar to those which have been described in connection with Figures 1 to 3, with the exception that certain of the bars do not have their upper portions and edges cut and flared. Figure 4 shows a plan view of a section of grating adapted for use as a stair tread, this including the main bars 31 which, as shown in Figure 5, are rectangular in cross section, and hexagonal cross bars 33 which are similar to the bars 13 of Figures 1 to 3. The lower two main bars 35 are provided with the short undisturbed upper sections 37 between the flared sections 39 and 41 which are alternately inclined in opposite directions. These bars 35 are similar in design and construction to the bars 11 of Figures 1 to 3.

This particular form of construction is adapted for use as a stair tread with the bars 35 located adjacent the front edge of the tread. The flared portions 39 and 41 give a visual appearance of greater heaviness or density at the front edge of the stair treads and thus effectively define these front edges to persons using the stairs. The flared upper sections 39 and 41 also have the very desirable effect of affording a non-slip surface at the outer edge of their stair treads. The main bars 31 afford the necessary walking surface for the remainder of the stair tread area. It will be understood that such stair treads are normally used in power plant and heavy industrial installations where it is not usually necessary to have the spacing of the bars close enough to prevent passage of the smaller types of heels on women's shoes. For that reason the standard spacing of bars 31 may be satisfactory for the main area of the tread. In applications of the treads where standard spacing is not adequate at the rear of the treads, the bars there may be more closely spaced.

It is to be noted that in the main bars which have been shown with flared sections, certain of the upper edges of the flared sections remain in approximately the plane of the upper portion of the main bar and may extend slightly above such plane to assist in the anti-slip action. Also, the preferred degree of flare is such that the upper edges of the inner faces of flared portions remain in approximately the plane of the lateral walls of the bar. Thus, there is a continuous metal contact between the flared and intermediate portions of the bar for the full depth of the bar even though this contact is reduced to a point at the upper face of the bar.

Certain preferred embodiments of the invention have been shown by way of example, but it is capable of variation to meet differing conditions and requirements and we contemplate such modifications as come within the spirit and scope of the appended claims.

We claim:

1. A grade construction in the form of a grid comprising main bars and transverse cross bars connecting the main bars, the main bars being provided with a plurality of spaced cuts extending downwardly from the upper edges thereof into the body of the bar, the metal between certain pairs of cuts being flared outwardly on alternate sides of the main bars, the flared portions being separated by non-flared portions with a substantial portion of the cut edge surfaces of the flared portions being in contact with the cut edge surfaces of the non-flared portions.

2. A grate construction in the form of a grid comprising main bars and transverse cross bars connecting the main bars, the main bars being provided with a plurality of spaced cuts extending downwardly from the upper edges thereof into the body of the bar, the metal between certain pairs of cuts being flared outwardly on alternate sides of the main bars, the flared portions being separated by non-flared portions, the flare being substantially the width of the upper face of the main bars and the cut edge surfaces of the flared portions being in contact with the cut edge surfaces of the non-flared portions for about half the areas of the cut surfaces, the contact decreasing in width toward the top face of the bars.

3. A grate construction in the form of a grid comprising main bars and transverse cross bars connecting the main bars, the main bars being provided with a plurality of spaced cuts extending downwardly from the upper edges thereof into the body of the bar, the metal between certain pairs of cuts being flared outwardly on alternate sides of the main bars, the flared portions being separated by non-flared portions, the flare being substantially the width of the upper face of the main bars and the cut edge surfaces of the flared portions being in contact with the cut edge surfaces of the non-flared portions for about half the areas of the cut surfaces, the contact decreasing in width toward the top face of the bars, the inner corners of the flared portions lying substantially in the plane of the upper surfaces of the non-flared portions of the bars.

4. A grate construction in the form of a grid comprising main bars and transverse cross bars connecting the main bars, the main bars being provided with a plurality of spaced cuts extending downwardly from the upper edges thereof into the body of the bar, the metal between certain pairs of cuts being flared outwardly on alternate sides of the main bars, the flared portions being separated by non-flared portions with a substantial portion of the cut edge surfaces of the flared portions being in contact with the cut edge surfaces of the non-flared portions, the cuts extending downwardly into the bars not more than approximately three-eighths of the depth of the bars.

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