Jan. 7, 1969 N. J. COSTANZO, JR 3,420,015

METAL GRATING

Filed April 12, 1967 Sheet 1 of 2

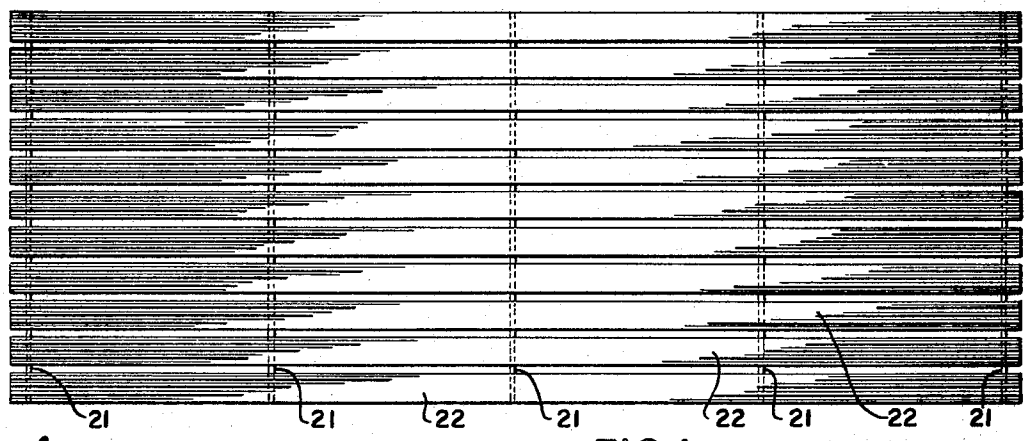


FIG. 1.

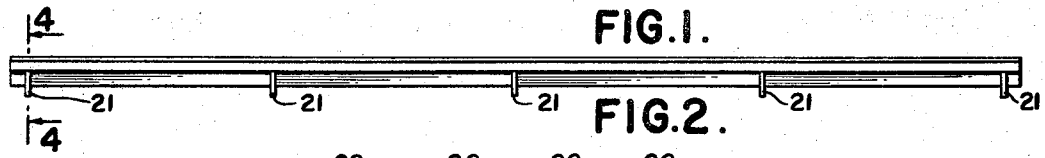


FIG. 2.



FIG. 3.

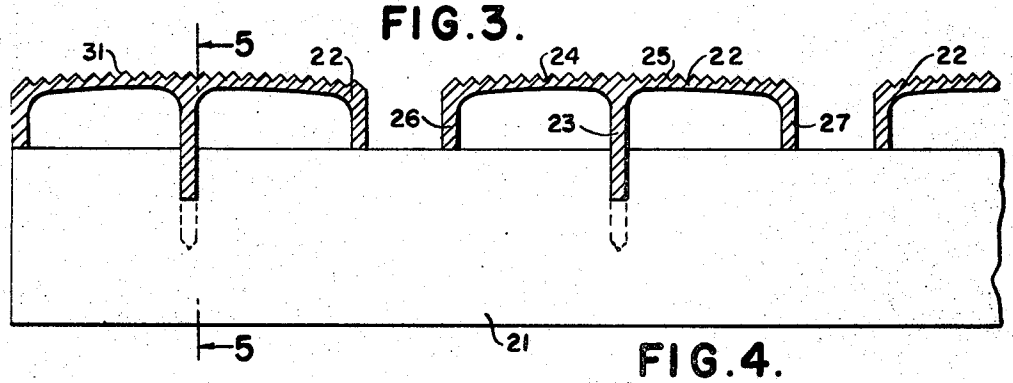


FIG. 4.

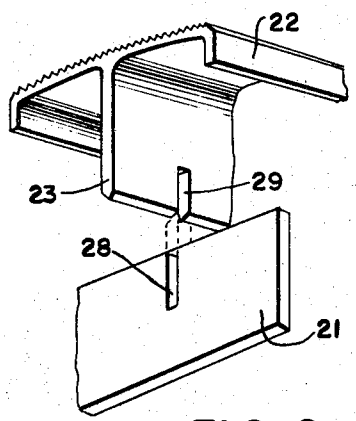


FIG. 6.

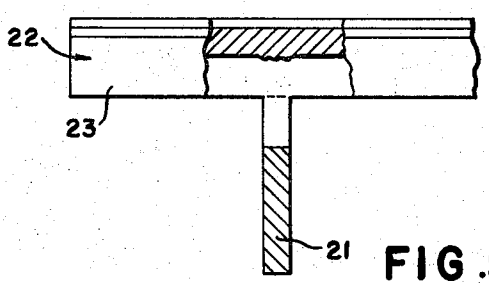


FIG. 5.

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METAL GRATING

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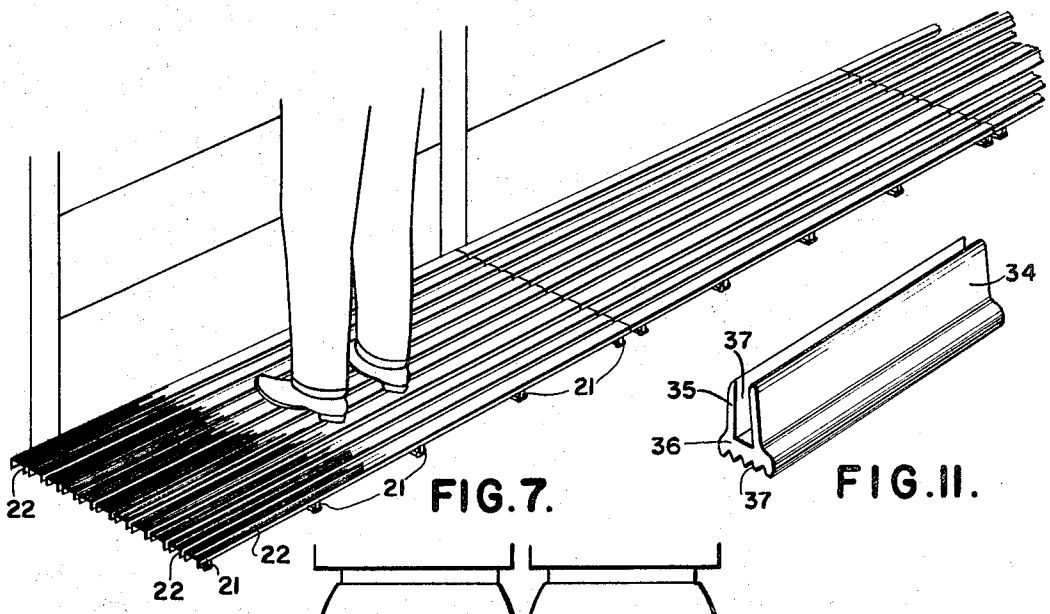


FIG. 7.

FIG. 11.

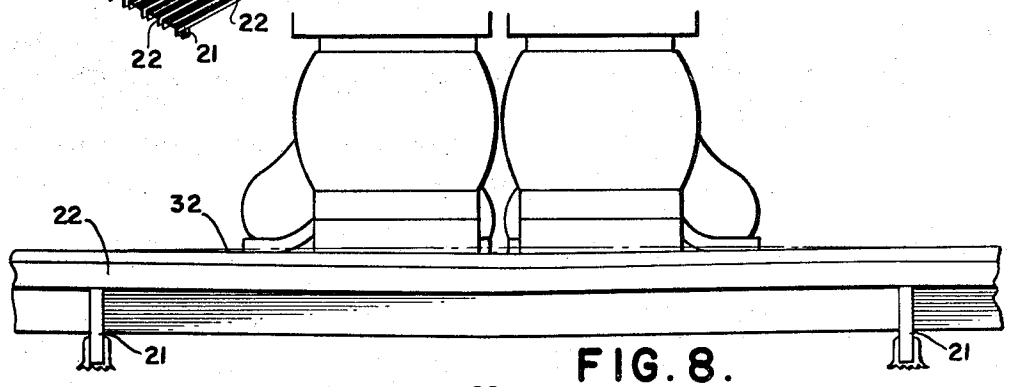


FIG. 8.

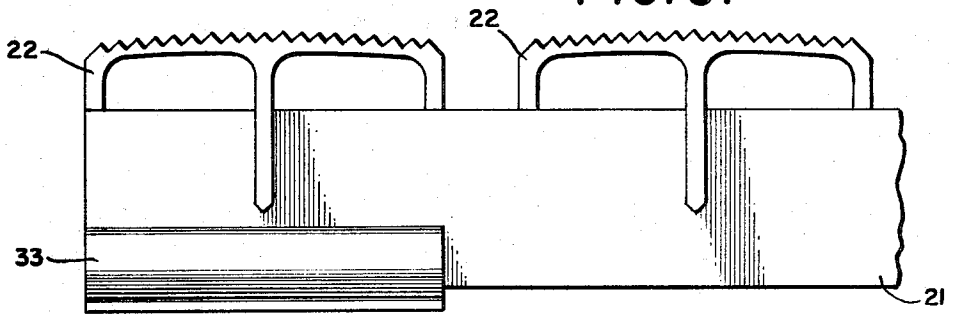


FIG. 9.

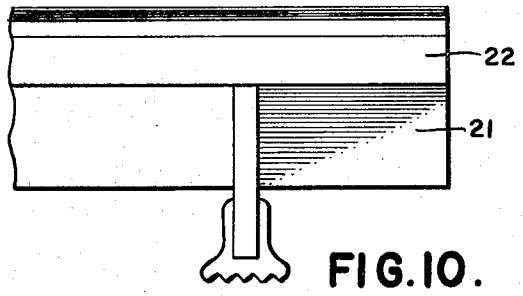


FIG. 10.

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3,420,015

METAL GRATING

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Filed Apr. 12, 1967, Ser. No. 630,416
U.S. Cl. 52—180 10 Claims
Int. Cl. E04f 11/16

ABSTRACT OF THE DISCLOSURE

Disclosed is a grating including a number of slats extending in a first direction and a number of tread carrying T sections extending in a second direction, at right angles to the direction of the slats. The T sections are connected frictionally with the slats by grooves in the slats and in legs of the T. Forces imparted to the arms of the T section are transmitted to the slats by ears at the ends of the T arms and through the T legs. The T arms are crowned to provide water run-off and are grooved to prevent slippage of a person or object placed thereon. The slats have resilient rubber feet mounted on the bottoms thereof at spaced locations.

The present invention relates generally to metal gratings and more particularly to a metal grating having a load-bearing surface comprising the arms of a T.

Briefly described, the present invention is a metal grating comprising a plurality of first elongated bars and a second plurality of bars, each having a T cross-section, wherein the second bars intersect the first bars and upper arms of the T are substantially coplanar to define a load bearing surface. The first and second bars are interconnected solely by a frictional fit between slots formed in the T legs and in the first bars. Strength, for structural purposes, is added to the construction by providing downwardly depending ears at the ends of the T arms, which ears intersect the T arms at a substantial angle. The ears extend to the upper edge of the first bars so that the load exerted on the T arms is transmitted to the first bars.

One of the primary, although not the exclusive, functions of the grating of the present invention, is as a false flooring, frequently referred to in the art as a duck board. Duck boards are extensively utilized in commercial retail establishments where personnel stand for prolonged time periods. In particular, duck boards are extensively utilized in bars, at supermarket checkout counters and behind meat market cases.

In the past, duck boards have generally been fabricated as wooden gratings or as rubber mats. While wood and rubber provide the resiliency required for comfort to the feet of a person standing for long time intervals, each suffers from several different disadvantages. In particular, rubber mats are relatively expensive if a large area is to be covered, such as behind a bar or behind a meat market case. Also, rubber mats are not practical in areas where appreciable liquid drops to the floor because of the absorbing properties of the rubber material. While wooden duck boards are inexpensive, they also absorb a great deal of liquid.

Liquids absorbed by the prior art duck boards and rubber mats cause the duck boards to become odoriferously offensive. A wooden duck board can be cleaned by spraying water thereon, with only moderate success, but a rubber mat can never have the odor from a meat counter or tavern bar removed therefrom. To remove odors from a wooden duck board, the duck board must be moved physically from the location where it is usually located to an outdoor area where it can be sprayed readily. Wooden duck boards, however, are very heavy and require two

relatively strong men to move them from the area of utilization to the area of cleaning, whereby periodic, daily cleaning of a duck board, as required for cleanliness, is expensive, troublesome and perhaps injurious to health.

Being fabricated from extruded aluminum, the grating of the present invention is not heavy, nor does it become odoriferously offensive after prolonged time periods of liquid exposure. In addition, the T arms of the present invention have sufficient resiliency to be deflected under the weight of a human so that a person standing on the grating for prolonged time periods does not suffer from fatigue any more than a person standing on a rubber mat or wooden duck board.

As an added feature to the present invention, the T arms are crowned slightly to enable water to run off of them and the arms are grooved to prevent a person from slipping as he walks across the grating.

Another feature of the present invention relates to means for preventing possible slippage of the metal duck board, while reducing the noise level introduced thereby virtually to zero. These two features are accomplished by placing slotted, pliable rubber feet at spaced portions on the bottom of the first or lower bars.

Another feature of the grating of the present invention, which is also true of wooden duck boards but not of rubber mats, is that liquids can pass through the grid arrangement of the first and second bars to the floor and be easily drained across the floor without impeding liquid flow.

While one of the primary purposes of the grating of the present invention is as a substitute for wooden duck boards or rubber mats in retail establishments, it is to be understood that the grating can be utilized for other purposes. For instance, the grating of the present invention is ideally suited as a false flooring at installations where complex electronic equipment is located. At such installations, wires from the equipment run beneath the false flooring from one console to another. With the light weight grating sections of the present invention, the wires can pass between adjacent ones of said first bars, and, in the event of cable malfunction, a floor section is easily removed.

It is, accordingly, an object of the present invention to provide a new and improved metal grating.

Another object of the present invention is to provide a new and improved light weight metal grating, particularly adapted for use as flooring.

A further object of the present invention is to provide a new and improved false flooring that is relatively light and easy to move, is not porous, whereby it does not become offensively odoriferous and has sufficient resiliency to enable a person to stand on it for prolonged time periods without undue fatigue.

Still another object of the present invention is to provide a new and improved metal grating, particularly adapted for use as a false flooring, but which is not subject to slip or high noise level.

The above and still further objects, features and advantages of the present invention will become apparent upon consideration of the following detailed description of one specific embodiment thereof, especially when taken in conjunction with the accompanying drawings, wherein:

FIGURE 1 is a top view of a preferred embodiment of the grating of the present invention;

FIGURE 2 is a side view of the grating illustrated by FIGURE 1;

FIGURE 3 is an end view of the grating illustrated by FIGURE 1;

FIGURE 4 is an enlarged cross-sectional view of a portion of the grating, taken through the lines 4—4 of FIGURE 2;

FIGURE 5 is a cross-sectional view taken through the lines 5—5, FIGURE 4;

FIGURE 6 is an exploded perspective view illustrating the manner by which a pair of slats mate;

FIGURE 7 is a perspective view illustrating a plurality of the gratings of FIGURE 1 and illustrating one preferred use for the gratings;

FIGURE 8 is an enlarged view of the grating illustrated by FIGURE 7, specifically showing the manner in which the grating is deflected in response to a load;

FIGURE 9 is an enlarged detail view illustrating the connection of a foot to the bottom of one of the slats;

FIGURE 10 is a further view illustrating a foot attached to one of the slats, which view is at right angles to the view illustrated by FIGURE 9; and

FIGURE 11 is a perspective view of a preferred embodiment of one of the feet specifically illustrated on the slats of FIGURES 9 and 10.

Reference is now made to FIGURES 1–4 of the drawings, wherein there is illustrated a first plurality of extruded aluminum longitudinally extending slats or bars **21**, each having its longitudinal axis parallel to the remaining slats. Extending at right angles to bars **21** is a second plurality of extruded aluminum slats or bars **22**, each having substantially parallel longitudinal axes. Each of bars **21** and **22** is interconnected with each other, with the lower ends of bars **22** being connected to the upper edges of each of bars **21** to form thereby a grid or grating.

As indicated by FIGURES 3, 4 and 6, each of bars **22** has a T cross-section taken transversely to the bar longitudinal axis. Each T includes a downwardly depending leg **23** having arms **24** and **25** extending outwardly at substantially right angles to the leg of the T. Downwardly depending ears **26** and **27** are respectively provided at the ends of arms **24** and **25**, whereby the arms and ears intersect each other at a substantial angle, as shown on the drawing. Leg **23** of each bar **22** is connected frictionally to each of bars **21**, while ears **26** and **27** extend downwardly from arms **24** and **25** to engage the upper edges of bars **21**.

Frictional engagement between leg **23** of each of bars **22** and each of slats **21** is accomplished by providing slots **28** and **29** in bars **21** and **22**, respectively. Each of slots **28** and **29** is approximately the same length, in a preferred embodiment 0.281 inch, with slot **28** extending downwardly from the upper edge of slat **21** while slot **29** extends upwardly from the lower edge of leg **23**. The width of slot **29** is slightly less than the thickness of slat **21**, while the width of slot **28** is slightly less than the thickness of leg **23**. In a particular embodiment of the invention, the thickness of bar **21** is 175 mils, while slot **29** has a width of 172 mils. Leg **23** has a thickness of 55 mils and slot **28** a width of 52 mils, whereby each of the slots **28** and **29** has a width of 3 mils less than its mating bar thickness. As illustrated by FIGURES 4 and 5, leg **23** is wedged into bar **21** so that the roots of slots **28** and **29** engage each other. By providing equal length slots in bar **21** and leg **23** and mating the two slot roots in contact with each other, there is in excess of a half-inch contact area between bars **21** and legs **23**.

It has been found that by providing equal length slots **28** and **29**, rather than a single long slot in only one of the extruded aluminum bars **21** or **22**, a problem of bar arcing as the slots are punched is obviated. Arcing of a bar while punching a full slot having a length in excess of a half-inch is very likely to occur with extruded aluminum. If either of bars **21** or **22** arcs during the punching operation to form slots **28** or **29**, alignment problems are likely and the bottom edges of ears **26** and **27** will not contact the upper edges of bars **21**. It is important for the bottom edges of ears **26** and **27** to engage the upper edges of bars **21** to transmit forces applied to the upper surfaces of T arms **24** and **25** to bars **21** by a member other than the leg **23**.

Connecting bars **21** and **22** together by means of the frictional engagement between slots **28** and **29** and the bars provides a construction that is economical from a fabricating standpoint. In addition, the press fit between T leg **23** and bar **21** enables bar **22** to be readily replaced in the event of fracture. Replacement is accomplished in a facile manner by applying pliers to leg **23** in proximity to slot **29** and pulling the leg upwardly so that it clears the upper edge of bar **21**.

In one preferred embodiment, bars **21** are spaced from each other by approximately 12 inches, with the extreme left and right bars **21** being spaced from the extremities of bars **22** by one inch. Slots **28** are punched in bars **21** at spacings of approximately 2¼ inches from each other, and each of bars **21** has a width between ears **26** and **27** of approximately 1¾ inches, leaving a separation between adjacent ones of bars **22** of approximately ½ inch. It has been found that with a grating having these dimensions, bars **22** are sufficiently elastic to deflect approximately ⅛ inch at the points midway between bars **21** for a compressive load of approximately 2 pounds per square inch applied against the upper surface of T arms **24** and **25**, i.e., along the longitudinal axis of T leg **23**. The grating has sufficient strength to withstand, without fracture, a heavy load of 5 pounds per square inch, yet has sufficient give to be comfortable to a human standing on it for prolonged time periods.

One of the contemplated uses of the grating of the present invention is as a duck board, structures on which personnel serving the public stand for prolonged time periods. In particular, duck boards are frequently employed as false flooring in taverns, behind meat counters and the like, where a considerable amount of fluid is constantly descending to a permanent floor.

To enable fluid dropped on the grating of the present invention to be drained to the floor and prevent the fluid from collecting on the upper surface of bars **22**, each of arms **24** and **25** is arched to form a crown having its highest point aligned with T leg **23**. The upper surfaces of arms **24** and **25** have elongated grooves **31** formed therein in alignment with the longitudinal axes of bars **22**. Grooves **31** prevent personnel walking on the grating from slipping but are sufficiently shallow, however, to prevent accumulation of liquid therein, being approximately 20 mils deep.

Reference is now made to FIGURE 7 of the drawings wherein a plurality of gratings of the type illustrated in FIGURE 1 are arranged in modular form with the bottoms of bars **21** placed on a permanent floor. The longitudinal axes of bars **22** are aligned to form a single composite elongated duck board to enable a human to stand behind a bar or the like. From FIGURE 7, it is seen that the foot of a person standing on the grating spans a plurality of bars **22**, whereby the load of the person is distributed over a number of the bars and is transmitted to the floor through a number of transversely extending slats **21** via arms **24**, **25**, ears **26**, **27** and legs **23**.

Reference is now made to FIGURE 8 of the drawings, wherein the manner in which one of bars **22** is deflected in response to a human load of approximately 2 pounds per square inch is illustrated. In FIGURE 8, the unloaded position of bar **22** is indicated by dotted line **32**, while the position of the bar upon being deflected is shown in full lines. It is noted that bar **22** is deflected between adjacent slats **21** in an arc closely resembling a catenary. Deflection of bar **22** from the dotted to the full-line position indicated by FIGURE 8 provides sufficient give in response to the force exerted by a 175 pound man to enable the man to stand comfortably for prolonged time periods.

It is also noted that if the grating of the present invention is placed on an uneven floor or surface, i.e., one which is not exactly flat, the extruded aluminum bars **21** have adequate flexibility to seat into the floor, whereby the load is transmitted to the floor throughout the length of bars **21** and not through only a few portions thereof.

It has been found in typical uses of the grating of the present invention that the one inch spacing between the ends of slats **21** and the extreme left and right bars **22** is usually required to prevent tipping in response to a human load as the person moves to the extreme end of the grating.

A further feature of the invention relates to securing feet **33** to bars **21** so that they extend from the lower edges of those bars. Feet **33** prevent the grating from slipping relative to the floor on which it is located while reducing the noise introduced by the grating virtually to zero. Further, in certain instances, feet **33** maintain the bottom edges of slats **21** above the floor on which the grating is mounted, whereby liquid flowing off of bars **22** onto the floor can be drained.

Each of feet **33** is fabricated from a flexible, relatively soft material, such as polyvinyl. Each foot **33** is approximately **2** inches in length and includes a base **36** from which fingers **34** and **35** extend upwardly. Fingers **34** and **35** are separated from each other by slot **37**, having a width slightly less than the thickness of slat **21**, whereby the fingers frictionally engage the sides of the bars **21**. Bars **21** seat at the root of slot **37**, forcing the bottom surface of base **36** into engagement with the floor on which the grating is placed. The bottom surface of base **36** includes a plurality of grooves **38**, extending longitudinally of foot **33**. Grooves **37** provide a secure grip between foot **33** and floor on which the grating is placed, whereby slippage of the grating on the floor is precluded.

While I have described and illustrated one specific embodiment of my invention, it will be clear that variations of the details of construction which are specifically illustrated and described may be made without departing from the true spirit and scope of the invention as defined in the appended claims.

I claim:

1. A grating comprising a first plurality of elongated metal bars having substantially parallel longitudinal axes, a second plurality of elongated metal bars having substantially parallel longitudinal axes approximately at right angles to said axes of the first plurality, each bar of said first plurality intersecting each bar of said second plurality, each bar of said second plurality having a substantially T shaped cross section including a leg and first and second arms extending substantially at right angles from the top of the leg, each of said arms having a substantial extent away from the leg in a plane substantially at right angles to both said axes, the T leg of each bar of said second plurality being secured to each bar of said first plurality so that the T arms of all the bars in the second plurality are substantially co-planar, ear means on each of said bars in the second plurality, said ear means downwardly depending from each end of the T arm and intersecting said arms at a substantial angle, said ear means extending to and contacting the upper edge of each bar of said first plurality for transmitting loads imparted to the T arms to the bars of said first plurality, the separation between the ears of adjacent ones of said bars of said second plurality being less than the width of both ears of said bars of said second plurality.

2. The grating of claim **1** wherein the bars of said first and second plurality are spaced from each other and the bars of said second plurality are sufficiently elastic in response to compressive forces applied along the longitudinal axis of the T leg to be deflected approximately 0.125 inch when loaded with a pressure of 2 pounds per square inch.

3. The grating of claim **1** wherein said T arms together are crowned from one end to the other, the highest point of the crown being aligned with the T leg.

4. The grating of claim **1** wherein said first and second bars include slots transverse to their longitundial axes, the slots in the first plurality of bars extending downwardly only from the upper edges of the bars, the slots in the second plurality of bars extending upwardly only from the lower edges of the T legs, said slots being mated so that slots in the first and second plurality of bars engage, the slots on one of said plurality of bars being narrower than the thickness of each of the other plurality of bars for securing said bars to each other only by friction.

5. The grating of claim **1** wherein said T arms together are crowned from one end to the other, the highest point of the crown being aligned with the T leg.

6. The grating of claim **5** wherein the upper surface of each T arm is grooved along the longitudinal axis of the second bar.

7. The grating of claim **1** wherein the upper surface of each T arm is grooved along the longitudinal axis of the second bar.

8. The grating of claim **1** wherein said first and second bars include slots transverse to their longitudinal axes, the slots in the first plurality of bars extending downwardly only from the upper edges of the bars, the slots in the second plurality of bars extending upwardly only from the lower edges of the T legs, said slots being mated so that slots in the first and second plurality of bars engage, the slots on one of said plurality of bars being narrower than the thickness of each of the other plurality of bars for securing said bars to each other only by friction.

9. The grating of claim **1** further including a plurality of spaced plastic feet secured to the first plurality of bars, so they extend from the bottoms of the bars of the first plurality.

10. The grating of claim **9** wherein the bottoms of said feet include longitudinally extending grooves.

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