Jan. 24, 1967 A. M. JAMES 3,299,785

GRATING FOR WASTE TRENCHES

Filed April 20, 1964

Fig. 1.

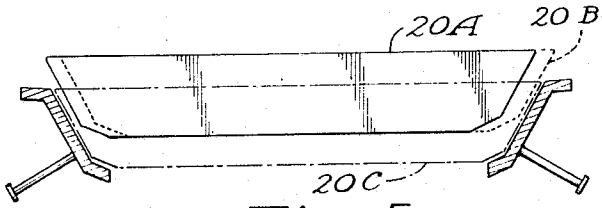
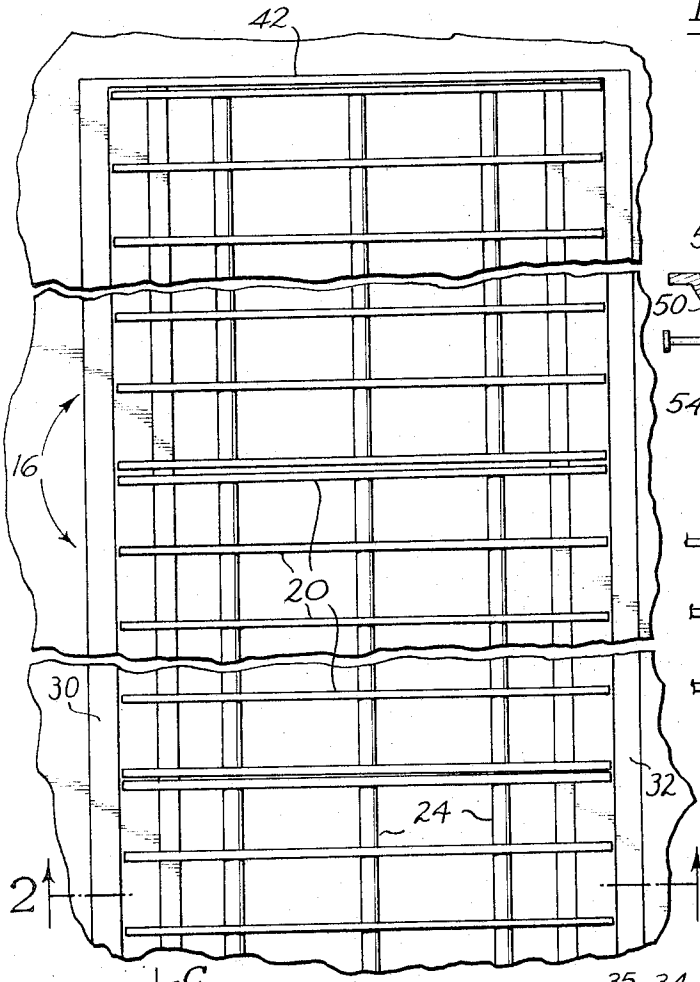


Fig. 5.



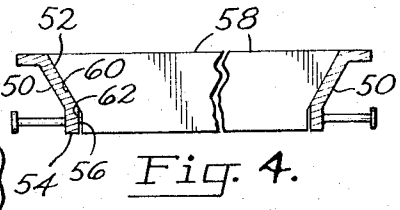


Fig. 4.

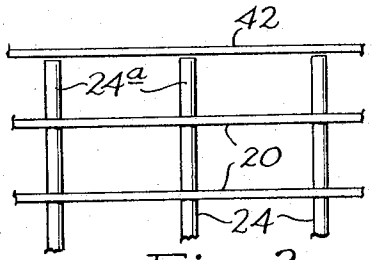


Fig. 3.

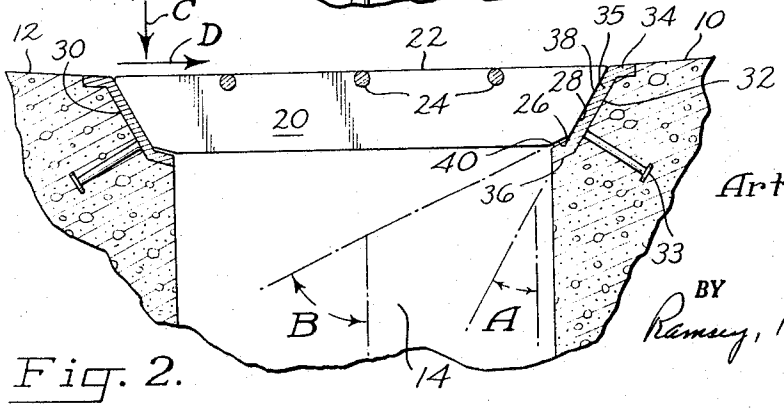


Fig. 2.

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GRATING FOR WASTE TRENCHES

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This invention relates to a grating, for covering a trench, or other recessed space. More particularly, the invention concerns a novel grate, which may form part of a floor and provide the necessary support for pedestrian or vehicular traffic thereover, while accommodating the flow of fluids through the grate and into the space it covers, the grate featuring a construction whereby it is readily kept cleaned.

Further explaining the invention, in certain industrial plants it is common to provide trenches in the floors, into which waste material may be washed. In this way, cleaning of the floors is facilitated. These trenches are covered by grates, for safety reasons, and so that traffic may pass over the trenches. In plants such as food processing plants, it is important that the grates and the structure supporting them be maintained sanitarily clean, whereby bacterial counts may be kept down to permissible levels. For this reason, in the past it has been usually necessary periodically to remove all grating, and thoroughly wash it, as well as the structure that supports it. This is time consuming and can materially increase labor costs.

A general object of this invention is to provide an improved grate for covering trenches and the like, which may be kept far cleaner than conventional grates, using simple washing procedures, and without the necessity of lifting the grate from its mounting.

A related object is to provide such a grate, which is easily removed from its mounting when such is necessary, and then returned, with the grate then providing stable support for any traffic that passes thereover.

A further object is to provide a grate which, when mounted, has considerable strength in relation to its mass. A mounted grate according to the invention can be subjected to substantial loads without bending or becoming otherwise deformed.

A more specific object and feature of this invention is the provision of a grate for covering trenches and the like, which comprises multiple load-bearing bars or rails spaced laterally from each other. These rails having free, unjoined ends which define the side margins of the grate, formed in a novel way whereby the grate when mounted is held securely, and even made stronger than when the grate is separated from its mounting.

Another object and feature is to provide a novel grate, to be installed as part of a floor, and means for mounting the grate, where the entire structure in operative position is self-draining, and devoid of open crevices and the like where dirt may collect.

Other objects and advantages will become more fully apparent, as the following description is read in conjunction with the following drawings, wherein:

FIG. 1 is a top plan view, illustrating a grate according to an embodiment of the invention installed over a trench;

FIG. 2 is a cross sectional view, taken along the line 2—2 in FIG. 1;

FIG. 3 illustrates, in a plan view, portions of a modified form of grate;

FIG. 4 is a cross sectional view, corresponding to portions of FIG. 2, showing part of a grate according to still another modification; and

FIG. 5 is a diagrammatic view, showing in an exaggerated way, features of the grate contemplated which make it easy to mount in place.

Referring now to the drawings, at 10 and 12 are indicated portions of floor, disposed on either side of a trench 14. The floor is shown made of concrete, and as seen in FIG. 2, the top surfaces of floor portions 10, 12 slope downwardly at a slight angle toward trench 14. In this way, when the floor is washed, the water used in washing will flow down the floor portions and into the trench, carrying with it any material formerly lodged on the floor removed by the water. Such a floor and trench is typical of what may be found in a cannery, where it is the usual practice periodically to clean a floor area and rid it of food scraps by washing the floor.

Covering the top of trench 14 are a series of elongated grates 16, disposed end to end. In trenches which are quite short, one continuous grate may be employed to cover the trench, however, with the usual trenches of considerable length, it is preferable to employ plural, separate grates disposed end to end for the trench covering. This enables individual grates to be shorter, and greater manageability is obtained.

Each grate 16 comprises a series of transversely extending, load-bearing bars or rails, indicated at 20. The rails are parallel, and laterally spaced from each other. Preferably each bar or rail comprises a member having substantially greater width than thickness, which is positioned on edge in the grate. Top edges 22 of the rails define a horizontal plane, and this plane is substantially flush with the top surfaces of floor portions 10, 12 along the sides of trench 14.

Joining the rails together are cross bars 24 which are secured to rails 20 and which extend across the rails or longitudinally of the grate. In the embodiment illustrated, these bars are cylindrical in shape, and have diameters which represent only a minor fraction of the width of each rail. Bars 24 have top surfaces that lie in the horizontal plane defined by top edges 22.

The bars and rails thus provide a supporting surface for pedestrian and/or vehicular traffic passing between floor portions 10 and 12. The spacing between the rails and bars is such as to support the usual vehicle wheel with the base of the wheel substantially at the plane defined by edges 22, with such a wheel traveling in any direction over the grate.

As already indicated, an important part of the invention is the provision of a grate which is easily cleaned. Also important in the invention is the provision of a grate which is easily mounted in place, and the provision of a grate having, when mounted, considerable strength and ruggedness. These results flow from a novel construction for the side margins of the grate, and a novel construction for the mounting which seats the grate between floor portions 10 and 12.

It will be noted that bars 24 joining the rails are located inwardly of the ends of the rails. The ends of the rails are free, or unjoined. These free ends define the side margins of the grate. Defining opposite free ends of each rail are a pair of edges, illustrated in FIG. 2 at 26 and 28.

Top or upper edge 28 is inclined somewhat from a vertical plane and defines an acute angle with respect to the top of the grate. In FIG. 2, the angle of inward incline of upper edge 28 is indicated at A. Lower edge 26 also inclines inwardly, defining an acute angle with respect to the top of the grate, and the angle of inward incline of lower edge 28 is indicated at B. The inclination of the lower edge is somewhat greater than the inclination of the upper edge. The two edges themselves define an obtuse angle.

Seating the grate in covering relation over the top of trench 14 are elongated ledge or seating elements 30, 32 disposed along opposite sides of the trench. These ledge elements are anchored in place in floor portions 10 and 12. As best shown in FIG. 2, studs such as stud 33

joined to the backsides of the ledge elements are provided at intervals along the length of each element. These studs project outwardly and are imbedded in the concrete of the floor.

Each ledge element includes a top flange 34, a web 35, and a bottom flange 36. Web 35 is bounded along the inner side thereof by an upper sloping surface 38, which inclines inwardly from a vertical plane at an angle which is substantially the same as the angle of incline for upper edge 28 of a rail (angle A). Flange 36 is bounded along the inner side thereof by a lower sloping surface 40. This surface is inclined inwardly from a vertical plane at an angle which substantially corresponds to angle B (in the usual instance the angle of incline of surface 40 may slightly exceed, by two or three degrees, angle B). Thus, both surfaces slope downwardly and inwardly progressing downwardly from the top of the trench.

While the sides of the trench are bounded by ledge elements with sloping surfaces as described, the ends of the trench, as shown in FIG. 1, may be bounded by a beam or plate with a vertical, flat inner side, such as the plate indicated at 42. This plate may be suitably joined at its ends to the ends of the ledge elements.

With grates 16 mounted in place, and over trench 14, a wedge fit is produced between upper edges 28 presented by opposite free ends of the various rails, and sloping surface 38 of the opposed ledge elements. Tight contact thus results between the ends of the rails and those portions of the ledge elements that mount these rail ends. This is important, as it eliminates crevices where dirt and other foreign matter may collect.

Normally a slight clearance exists between lower edges 26 of the rails, and lower sloping surfaces 40 of the ledge elements. These lower sloping surfaces 40 and lower edges 26 are included to prevent one margin of the grate from being forced upwardly and outwardly of the mounting therefor under cetrain types of load conditions.

Further explaining, and referring to FIG. 2, the arrow C indicates a force exerted downwardly on one margin of the grate, such as would be produced by the weight of a lift truck positioned with the rear wheels of the truck resting on the grate. If these wheels were then rotated under power, an additional force would be exerted on the grate, as indicated by the arrow D. With such a condition and were the free ends of the various rails not absolutely snugly received within sloping surfaces 38, a tendency might be noted for the left margin of the grate in FIG. 2 to drop downwardly and to the right, and for the right margin of the grate to shift upwardly and to the right of the ledge element supporting this right margin. This tendency is inhibited by including sloping surfaces 40, as these surfaces in effect bottom the grate by defining a level on either side of the grate below which the grate margins may not drop.

In constructing the trench, it is important that the ledge elements described be placed accurately, whereby a suitable snug fit is produced with the free ends of the rails. It is contemplated that the two opposed ledge elements may be temporarily joined together before being anchored in the floor by welding spacers to the elements extending between the elements. The spacers serve to hold the ledge elements the prescribed distance apart during preparation of the trench and mounting of the ledge elements. With the floor completed, and the concrete hardened, the spacers would then be removed, to leave the ledge elements in condition to reecive the grate. Instead of spacers, the ledge elements may be temporarily welded to the grates during the preparation of the trench and floor, with the grates then serving to position properly the ledge elements relative to each other. On completion of the floor, the grate may then be disconnected from the ledge elements.

The construction contemplated for the ends of the load-bearing bars or rails in the grate of the invention facilitates mounting of the grate in place with the snug fit above described. If there is some misalignment in the respective rails of the grate, such is eliminated upon the grate being moved into place. Referring to FIG. 5, two rails 20A and 20B are illustrated in full and dotted outline. These rails have the same length, but are not in exact transverse alignment. (Ordinarily any misalignment of respective rails is substantially less than that illustrated in FIG. 5. An exaggeration has been made in FIG. 5 to illustrate more clearly the aligning action now to be described.)

When a grate with misaligned rails, as shown in FIG. 5, is lowered into place, because of the inwardly sloping edges at the ends of the rails, and because of the sloping surfaces 38 presented by the ledge elements, the lower edges of the rails initially fit easily between the opposed ledge elements. On the grate being shifted downwardly into its final seated position, because of the wedging action described, the rails are shifted into alignment. Thus, in FIG. 5, all rails ultimately are shifted to the position indicated at 20C, with the grate finally in place.

With the construction described, and upon washing down the floor, the water used in the washing flows downwardly over the sloping floor portions and thence into the trench 14. This water carries with it any dirt and other material washed from the floor. The water on moving over the ledge elements flows downwardly through the grate. Surfaces of the ledge elements exposed between the rail ends have a downward and inward slope, and thus these are self-draining.

Since the side margins of the grate are defined by unjoined rail ends, major portions of surfaces 38 and 40 are uncovered, with the grate in place. Thus, these surfaces are readily kept clean. Because of the wedge fit of the rail ends between surfaces 38, little opportunity is afforded for material to become lodged between the rail ends and surfaces 38.

The grate is easily removed from its position between the opposed ledge elements. With the grate removed, it sometimes may be desirable to clean the grate separately. This is facilitated if the grate is turned with its bottom-side up, as this places bars 24 in a position where they offer the least encumberance to cleaning the sides of the rails.

In grates of known design, a tendency has been noted for a grate after a period of use to bend, as by the ends of the grate bending upwardly. Other deformations are possible. Thus, in certain grates, particularly if they have in use supported considerably heavy vehicle traffic, the load-bearing bars or rails tend to be pushed together along top edges, so that the grates fold somewhat as does an accordion. With the construction of the invention, where the rail ends are wedged into place, a grate, through the act of mounting it, is strengthened appreciably. Each rail is held in place by friction at its ends, and thus bending and other deflections in the grate are prevented.

In FIG. 3, the end of a grate according to a modified form of the invention is illustrated. In this modification of the invention, bar portions 24A extending longitudinally of the grate project outwardly from the side of rail 20 at the end of the grate. These bar portions constitute spacers, and function to space the end of the grate from the side of beam 42 defining the end of the trench. These bar portions also serve to space adjacent grates where multiple grates are mounted end to end.

In FIG. 4, yet another modification of the invention is illustrated. In this modification of the invention, ledge elements, such as ledge elements 50 are provided, which include an upper sloping surface 52 similar to sloping surface 38 already described in connection with the first modification of the invention discussed. Each ledge element differs, however, in having a lower flange 54 that

extends vertically downwardly, and which is bounded on its inner side by a vertical face or surface **56**.

The rails of the grate, shown at **58**, have free ends, each of which is defined by an upper edge **60** that is inclined inwardly and defines an acute angle with respect to the top of the grate, as in the first modification of the invention. Joining with this upper edge is a lower edge **62**, which is substantially vertical.

With the grate described mounted in place, upper edges **60** of the various rails in the grate become wedged between sloping surfaces **52** of the opposed ledge elements. Displacement of the grate, whereby one of its side margins shifts downwardly with the other of its side margins shifting upwardly and out of the trench, is prevented by faces **56**, which by engaging edges **62** of the rails prevent the rails from turning within the trench. Normally with the grate in place, while surfaces **60** are wedged into place, some clearance exists between edges **62** and lower surfaces **56**. In this modification of the invention, there are no ledge surfaces bottoming the grate as described in connection with the first modification of the invention discussed.

While the various embodiments of the invention have been described, it should be obvious that changes and variations are possible without departing from the invention. It is desired to cover all modifications and variations as would be apparent to one skilled in the art, and that come within the scope of the appended claims.

It is claimed and desired to secure by Letters Patent:

1. The combination of

a trench,

a grate in covering relation over the top of said trench having opposed side margins,

rails in said grate extending between said side margins of the grate having free unjoined ends defining said side margins of the grate,

means separable from the grate and mounted along opposite sides of the trench seating said side margins by directly suporting said free rail ends with the grate positioned in covering relation over said trench,

said last-mentioned means presenting opposed sloping surfaces that support said rail ends which converge toward each other progressing downwardly from the top of the trench,

said free ends of said rails being defined by a first set of sloping edges that have a slope complementing the slope of said surfaces and that produce a wedge fit between said surfaces with said grate in place,

said free ends of said rails being further defined by a second set of edges that function to prevent lifting of one side margin of the grate when downward and lateral forces are exerted on the grate.

2. The combination of

a trench,

a grate in covering relation over the top of said trench having opposed side margins,

plural, substantially parallel rails in said grate spaced laterally from each other having free, unjoined ends defining said opposed side margins of the grate,

bars in said grate joining said rails at points disposed inwardly from the free ends of said rails,

sloping edges defining the free ends of said rails on opposite side margins of the grate that incline inwardly toward each other progressing from the top to the bottom of the grate, and

opposed ledge elements separable from the grate mounted along opposite sides of the trench,

said ledge elements being anchored in place and including oppositely disposed sloping seating surfaces that have a slope complementing the slope of the inclined seating edges defining the free ends of said rails,

said seating surface seating said side margins of the grate by directly supporting the free ends of the rails with said free ends wedged into place.

3. The combination of

a trench,

a grate in covering relation over said trench,

plural, substantially parallel rails in said grate spaced laterally from each other having free, unjoined ends defining opposed side margins of the grate,

bars in said grate joining said rails at points disposed inwardly from the free ends of said rails,

multiple edges defining the free end of each of said rails,

said multiple edges including an upper edge that inclines from a vertical plane inwardly toward the middle of the grate progressing downwardly from the top of the grate, and a lower edge joining with the base of said upper edge which inclines from a vertical plane inwardly toward the middle of the grate progressing in a downward direction at a greater angle than does said upper edge, and

opposed ledge elements separable from the grate mounted along opposite sides of the trench,

said ledge elements being anchored in place,

each of said ledge elements including an upper seating surface that has an incline complementing the incline of said upper edge defining the free end of a rail, and a lower seating surface that has an incline complementing the incline of said lower edge defining the free end of a rail,

said upper seating surfaces of the opposed ledge elements seating by directly supporting the free ends of said rails with said free ends wedged into place.

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