

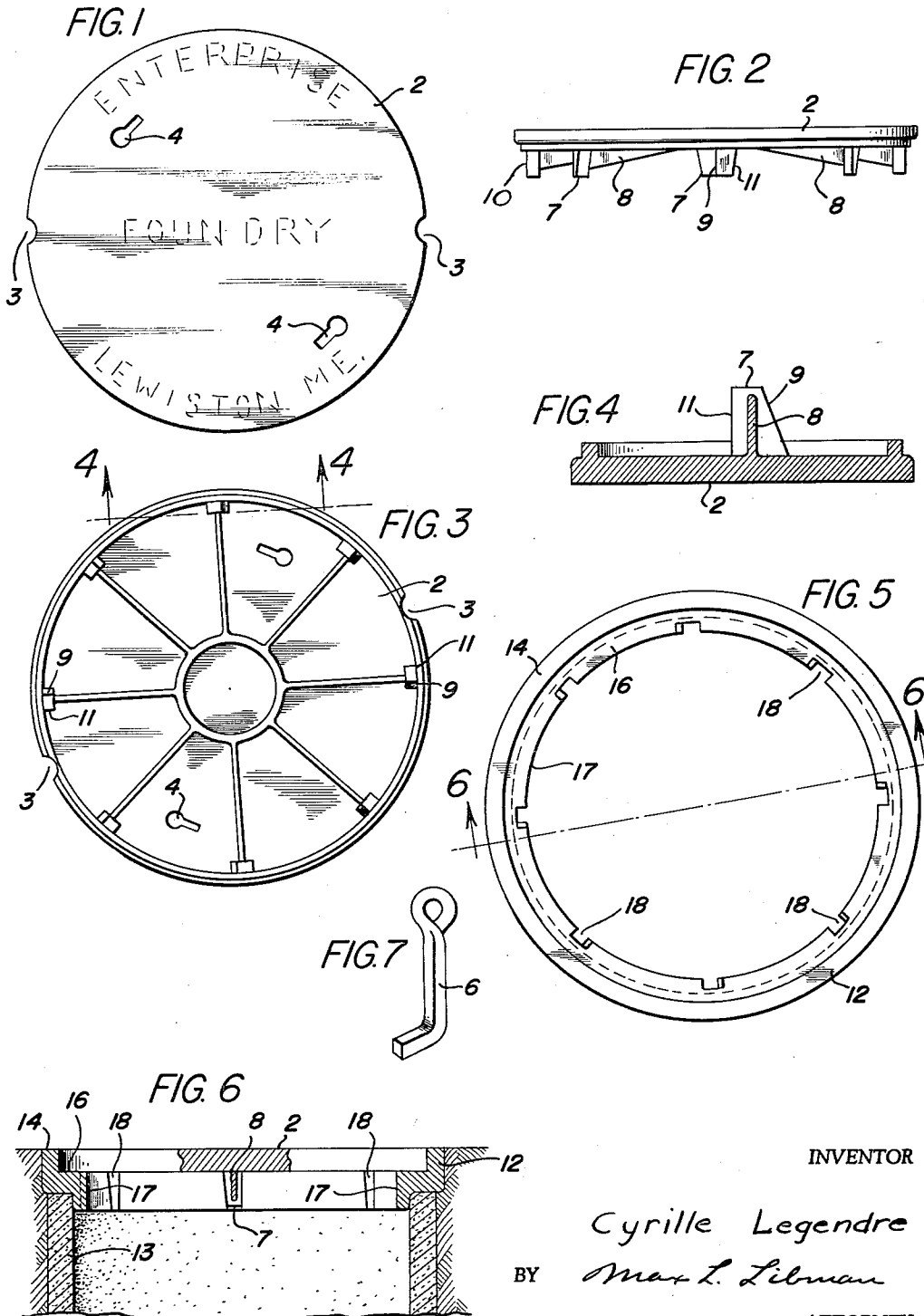
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MANHOLE CLOSURE

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MANHOLE CLOSURE

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This invention relates to a closure for manholes and similar access apertures for underground service spaces, tunnels, cable and pipe conduits, etc.

The ordinary manhole cover is made of cast iron or a combination of cast metal and cement or bituminous road surfacing material, and fits into a mating seat flush with the road or other surface to permit the passage of vehicular traffic thereover. Unless the fit is perfect, which is seldom the case, the cover does not rest uniformly on its seat and therefore tends to rattle noisily when vehicular traffic passes over it; also, initially well-fitting covers tend to wear unevenly with time and become loose and shaky; sometimes a cover will fit well in one position, but will be replaced in another position in which it can rattle. In order to obviate this difficulty, some manhole covers have been made with latches which are locked after the cover is in place; however, such constructions are expensive to fabricate and more readily subject to breakage, rusting and misalignment or jamming than a one-piece cover.

It is a primary object of the present invention to provide a closure for a manhole or similar aperture which has a lid of simple one-piece construction cooperating with a seat or manhole frame of one-piece construction, the two parts being so made that they can only be assembled in the correct manner, and when so assembled there is no possibility of relative movement between them, thus obviating wear between the two members and preventing any possibility of rattling.

Another object is to provide a manhole cover having downwardly extending wedge means fitting into similarly shaped apertures in a seat member whereby a tight, non-rattling fit is obtained which is nevertheless easily removable by conventional means such as a pickax or a lifting tool.

The specific nature of the invention, as well as other objects and advantages thereof, will clearly appear from a description of a preferred embodiment as shown in the accompanying drawings, in which:

FIG. 1 is a top plan view of a manhole cover according to the invention;

FIG. 2 is a side view of the cover shown in FIG. 1;

FIG. 3 is a bottom view of the same cover;

FIG. 4 is a sectional view on an enlarged scale taken on line 4-4 of FIG. 3;

FIG. 5 is a top plan view of the seat for the cover shown in the preceding figures;

FIG. 6 is a sectional view taken on line 6-6 of FIG. 5, with an added sectional detail showing the manner in which the cover fits on the seat; and

FIG. 7 is a view of a lifting tool for removing the cover from its seat.

Referring to FIG. 1, the cover 2 is shown as having a conventional round top, although it will be understood that it may also be square or any other convenient shape. Nicks or recesses 3, 3 are provided at the outer edge of the cover for the convenient insertion of a pickax or similar tool to pry the cover loose when removing it, and keyhole slots 4, 4 are shown for insertion of a lifting tool 6, shown in FIG. 7, whereby the cover may be readily handled.

As will be apparent from FIGS. 2 and 3, the cover is of one-piece construction, preferably of cast iron, and can be cast as a single unit. Extending from the underside or bottom of the cover 2 are a series of wedge-shaped mem-

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bers 7, shown by way of example as eight in number, although any number from one up could be employed to advantage. In order to strengthen the cover and enable a smaller thickness of metal to be used for the lid, a series of strengthening ribs 8 are formed on the underside, preferably terminating at the respective wedge-shaped members 7 for simplicity of construction and casting, although the ribs may also be formed as a grid of criss-crossed members or a series of concentric circular rib members if desired.

It will be noted that each wedge member 7 has one side 11 substantially perpendicular to the lid and one sloping side 9 sloping from the lid toward side 11. This configuration has been found to be useful in preventing the cover from working loose by tilting and facilitates ready removal of the cover as compared with the use of two sloping sides, although the latter construction is also useful. The manner in which the perpendicular side acts to prevent tilting-out of the cover can be understood by considering the seat of FIG. 5. If a cover on this seat is tilted about the lowest point (with reference to FIG. 5) on its rim, so that the cover edge at the top of FIG. 5 tends to come up out of the plane of the drawing, then the wedge at the top will easily come out, but considering the left-hand wedge recess (nearest reference character 17), it will be seen that the perpendicular side of the wedge in this recess, bearing against the corresponding side of the wedge recess, will interfere and be unable to clear the recess, so that the cover cannot be tilted out of place, but must be lifted more or less straight up. This construction thus provides the advantages of both a straight-sided slot and a wedge-shape. All of the sloping sides are preferably, but not necessarily oriented in the same direction with respect to the center of the lid, i.e., any two adjacent wedges face the same way, and the wedge members 7 are preferably uniformly spaced so that no particular orientation of the cover is required. However, in situations where a particular orientation of the cover is desired to be maintained, a non-uniform spacing of the wedges around the perimeter of the cover may be employed, so that the cover can be reinserted only in one given orientation with respect to the seat. The back surface 10 of each wedge is shown substantially perpendicular to the cover surface; however, in practice, there is preferably a slight inward taper to all of these back surfaces; i.e., the lower part of each surface 10 is nearer to the center than the upper part, which facilitates casting and also tends to make it easier to seat the cover. This, however, is a normal casting taper, and does not have any appreciable wedging action.

FIGS. 5 and 6 show the seat member 12 into which the cover 2 fits; this seat member is ordinarily mounted on a casing 13 forming the lining of the manhole, which casing is usually of masonry, but may also be a metal casing. Seat member 12 is mounted on casing 13 so that its upper rim 14 is flush with the surface, usually a road surface, into which the manhole extends, and is bolted and cemented or otherwise fastened firmly in place. A seating surface 16 is provided of a shape generally corresponding to the shape of the cover 2, at a level below the upper rim 14 sufficient to accommodate the thickness of the edge of cover 2 so that the cover, when seated, is flush with the road surface. The inner surface 17 of the seat member is provided with a plurality of wedge-shaped recesses 18 of a shape and contour complementary to the shape of wedge members 7 so that members 7 will seat in these recesses 18 with a wedging action which firmly and positively retains the cover. The weight of vehicular traffic on the cover 2 tends only to further seat the wedges 7 in their recesses or sockets 18 and prevents any possibility of relative movement, thus reducing to a minimum any tend-

ency to rock or to permit wear due to movement of the cover on its seat member. Although a wedge angle of 10°-75° can be used with some advantage, with wedge angles of approximately 30° with the vertical, it has been found particularly easy to remove the lid by simply rapping the cover sharply, then inserting a pick or similar tool into the recess 3 to pry the cover loose, after which it can readily be removed with the aid of a lifting tool 6, as previously described; for this reason, an angle of approximately 30° is preferred.

Although the wedge-shaped member 7 is shown as having straight sides and this has certain advantages in ease of fabrication and operation, it is not essential that the wedge sides be perfectly straight, as one or both sides could be curved, preferably with a convex curvature, so that the contact between each wedge and its socket is made at one point along the curve, rather than along the entire line of the wedge angle, and this also has some advantages in making it easier to pry off the lid.

It will be apparent that the embodiments shown are only exemplary and that various modifications can be made in construction and arrangement within the scope of my invention as defined in the appended claims.

I claim:

1. Closure means for manholes and similar apertures in a substantially horizontal surface comprising a circular one-piece seat member defining the surface opening of the aperture and a one-piece cover seated in said seat member; said cover having a relatively smooth upper surface lying substantially flush with the horizontal surface when it is seated in said seat member, and a plurality of wedges, more than three in number, integral with said cover and extending downwardly therefrom, said wedges being spaced from each other near the outer edge of the cover, said seat member being formed with a plurality of recesses of corresponding shape located to receive said wedges in wedging relationship, said wedges and recesses constituting the sole supporting and retaining means for the cover in said seat member, each of said wedges having one wedge side lying in a plane perpendicular to the bottom of the cover and extending substantially through the central axis of the cover, the other wedge side sloping from its junction with the bottom of said cover toward said one wedge side at an angle of approximately 30°, the sloping side of all of said wedge-shaped members being similarly oriented with respect to the center of said cover so that they all face the same way circumferentially.

2. Closure means for manhole and similar apertures in a substantially horizontal surface comprising a one-piece seat member defining the surface opening of the aperture and a one-piece cover seated in said seat member; said cover having a relatively smooth upper surface lying substantially flush with the horizontal surface when it is seated in said seat member, and a plurality of downwardly extending wedge-shaped members protruding from the under side of said cover near the rim thereof, each of said wedge-shaped members having two wedge sides converging toward each other from parallel lines of junction with the base; said seat member being formed with a plurality of wedge-shaped recesses of corresponding shape located to receive said wedge-shaped members in wedging relationship to prevent relative movement between said cover and seat member when the cover is seated; each of said wedge-shaped members having one wedge side

substantially perpendicular to the bottom and to the rim of the cover and lying substantially in a vertical radial plane, and the other wedge side sloping from its line of junction with the bottom of the cover toward said one wedge side at an angle between 10° and 75° with the vertical, the relationship between at least two spaced ones of said wedges and their respective recesses being such that the perpendicular side of one wedge prevents tilting dislodgement of the cover about a point near the other wedge, the sloping side of all of said wedge-shaped members being similarly oriented with respect to the center of said cover so that they all face the same way circumferentially.

3. The invention according to claim 2, each of said wedge-shaped members having two further sides respectively abutting and joining said wedge sides, said last two sides being substantially parallel to each other and perpendicular to the bottom of the cover and to said one wedge side.

4. The invention according to claim 3, each of said wedge-shaped members being symmetrically located with respect to the others so that the cover can be seated in different orientations on said seat member.

5. Closure means for manhole and similar apertures in a substantially horizontal surface comprising a one-piece seat member defining the surface opening of the aperture and a one-piece cover seated in said seat member; said cover having a relatively smooth upper surface lying substantially flush with the horizontal surface when it is seated in said seat member, and a plurality of downwardly extending wedge-shaped members protruding from the under side of said cover adjacent the rim thereof, each of said wedge-shaped members having two wedge sides converging toward each other from parallel lines of junction with the base; each of said wedge-shaped members having a leading wedge side lying substantially in a vertical radial plane of the cover, and the other wedge side sloping from its line of junction with the bottom of the cover toward said one wedge side at an angle between 10° and 75° with the vertical; said seat member being formed with a plurality of wedge-shaped recesses shaped similarly to said wedge sides to receive said wedge-shaped members in wedging relationship when the cover is seated; said leading wedge sides being of sufficient length, and there being a sufficient number of them, so that at least one of them engages its mating slot side when the cover is tilted upwardly from its seated position about any point on its rim, to prevent tilting dislodgement of the cover about a point near its rim.

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