

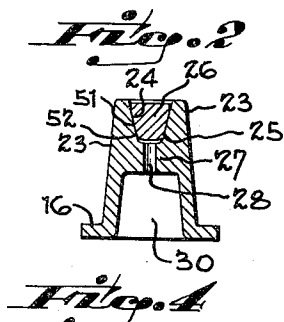
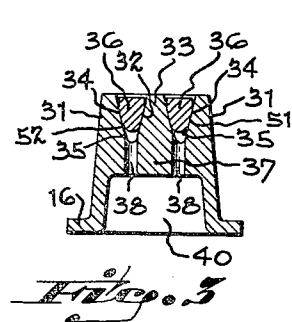
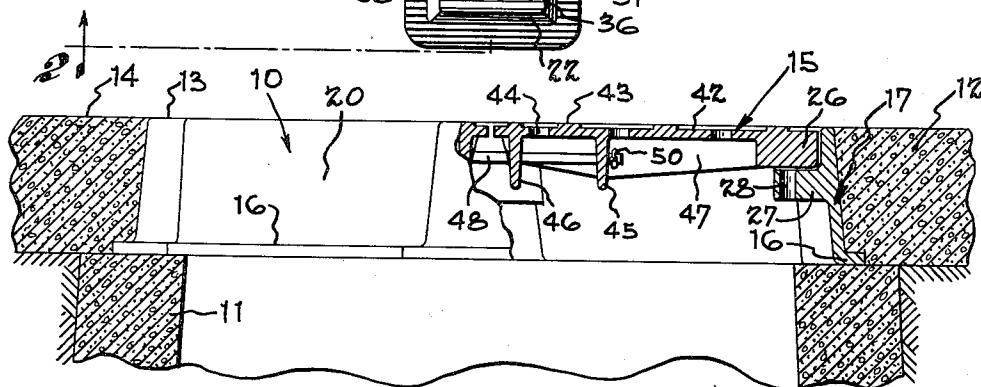
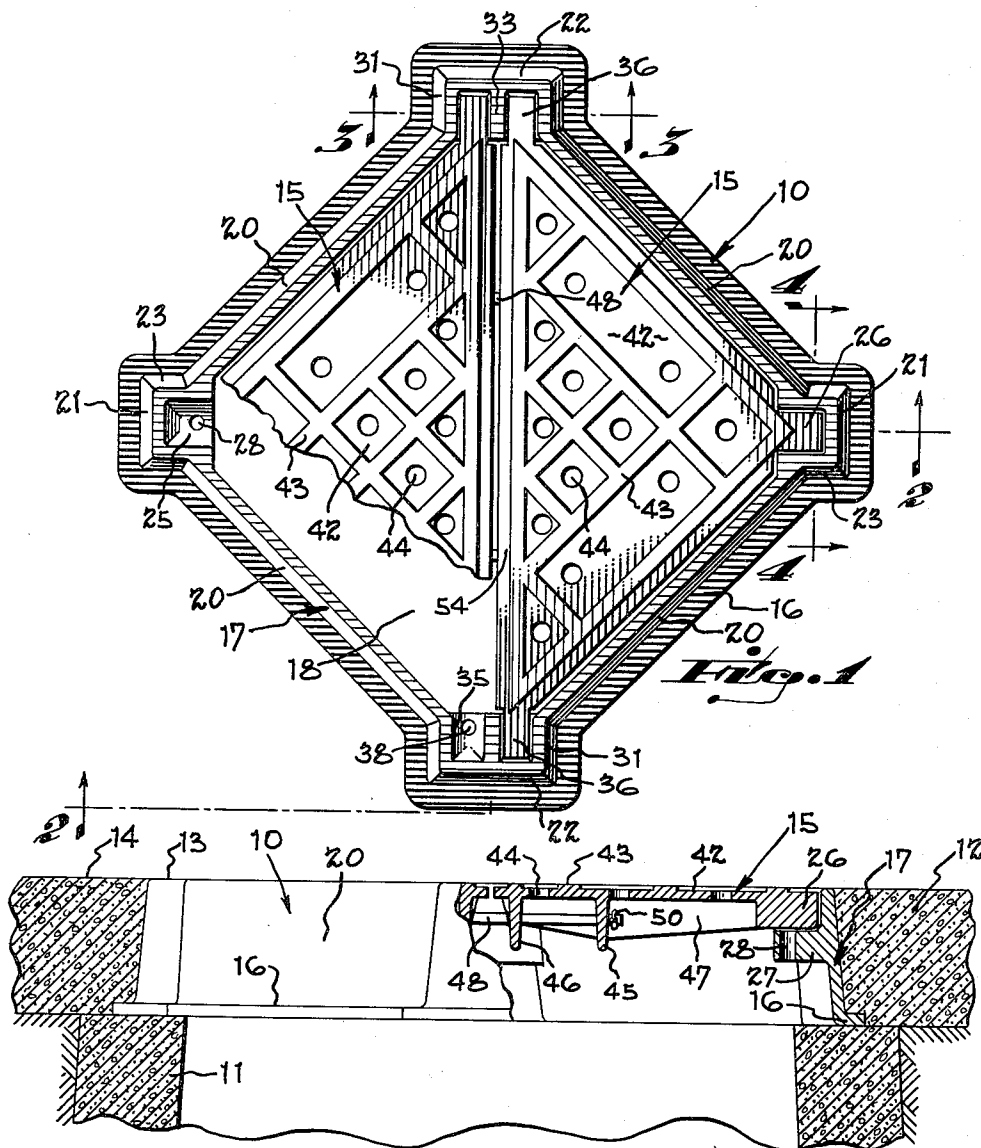
Aug. 29, 1961

W. W. TAYLOR
MANHOLE STRUCTURE

2,997,932

Filed Aug. 6, 1957

2 Sheets-Sheet 1



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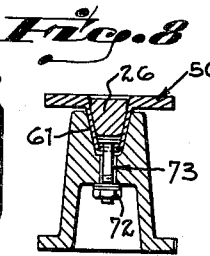
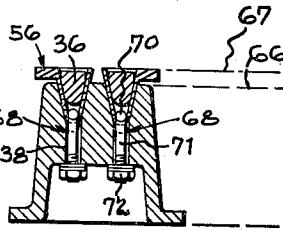
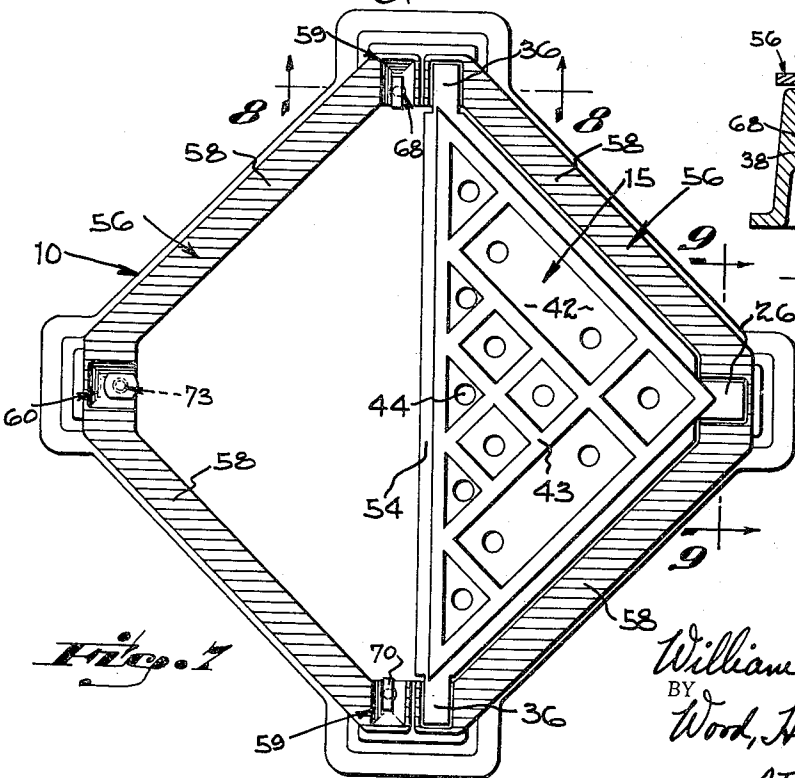
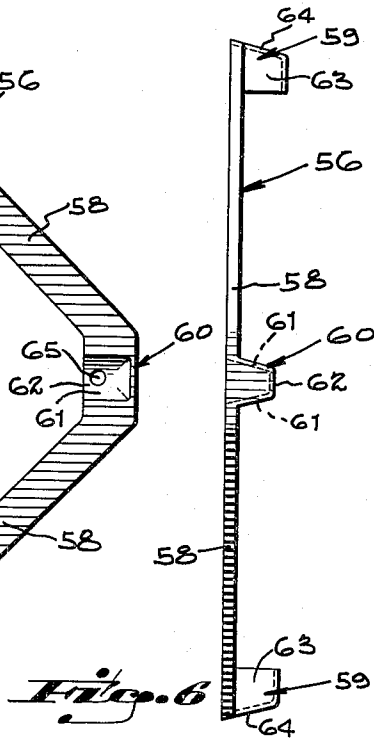
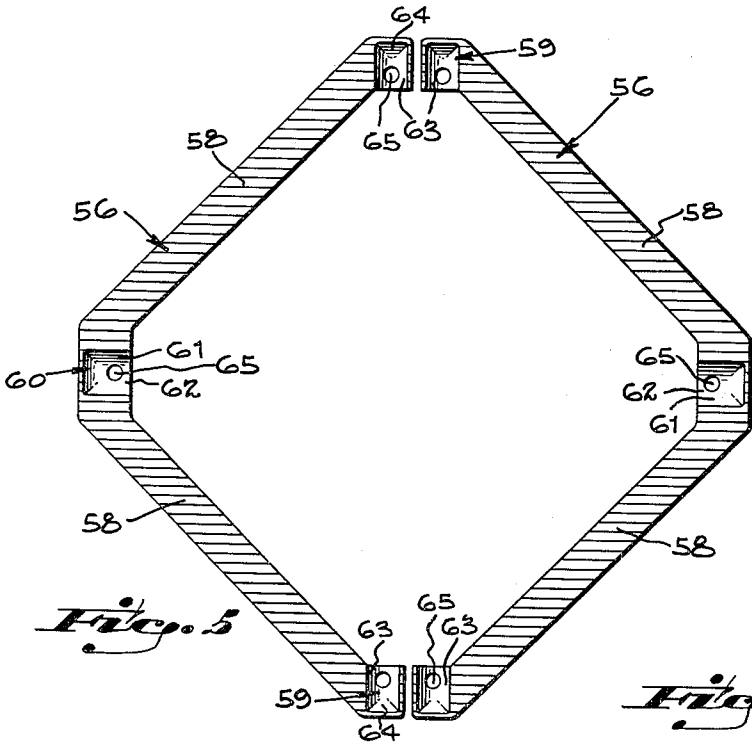
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2 Sheets-Sheet 2



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MANHOLE STRUCTURE

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Filed Aug. 6, 1957, Ser. No. 676,656

6 Claims. (Cl. 94—34)

The present invention relates to manholes, through which access may be obtained to sewers, drains, conduits and the like, and is more particularly directed to a movable manhole cover and frame which cooperate to prevent any relative movement between the manhole and frame.

Manhole covers are conventionally used to cover entrances to sewers and other underground conduits. These covers are removably supported on frames which are embedded in the pavement or ground over the conduit. Appreciable space must be provided between the manhole cover and its surrounding frame to accommodate inaccuracies in casting the manhole cover and frame as well as to provide clearance for thermal expansion of the manhole cover.

Many of these covers are placed in roadways where large numbers of vehicles pass over them daily. As a result of the vehicular traffic, particularly where an automobile or truck is accelerating or decelerating as it passes over the lid, the lid is shifted relative to its frame. This shifting is objectionable particularly in residential neighborhoods because it leads to uneven wear between the lid and frame giving rise to a rocking motion of the lid on the frame under traffic loads causing excessive noise. In fact, even a medium size city will spend many thousands of dollars annually installing strips of packing material between manhole lids and frames to prevent excessive rattling. Moreover, as a lid shifts over its seat in the frame, the wear on the lid and frame is greatly accelerated. This wear in turn permits even greater movement which still further increases the rate of wear on the lid and frame.

One of the principal objects of the present invention is to provide a manhole lid and frame construction in which no relative movement can occur between the lid and frame. Thus, the present lid is not only noiseless, but in addition will outwear previous lids by a substantial margin.

More particularly, the present invention is predicated upon the concept of providing a lid formed in two triangular sections, the sections being nested in and supported by a frame member of generally square outline. Each of the lid sections is provided with three lugs extending outwardly from the vertices of the triangle. These lugs are received within tapered seats provided in the frame and cooperate with the seats to permit outward expansion of the sections while preventing any shifting of the lid. The lugs and seats are effective to provide a stable three-point support for the lid section and since the lugs are spaced outwardly from the perimeter of the lid, the lid cannot be rocked. Furthermore, the lugs are angulated with respect to one another and will bind against these seats to prevent the lid from pivoting or from sliding in the frame. One advantage of this present lid and frame construction is that it is economical to produce. In the first place, the lid and frame require no machining; even the lugs and seats can be cast. Furthermore, the present lid is substantially lighter in weight than a conventional round or triangular lid.

A further advantage of the present lid and frame is that the lid cannot rattle even after extended periods of use. Consequently, the lid remains completely silent and the need to periodically pack the frame with strips of material is eliminated.

A still further object of the present invention is to pro-

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vide a shim member adapted to be used in connection with the present lid and frame for raising the level of the lid to maintain it flush with the surface of the roadway when the roadway is resurfaced or the like.

In the past it has been necessary when resurfacing a street to dig up the old frame and raise it by an amount equal to the thickness of the new pavement. This is a relatively costly operation and is further disadvantageous since the raised frames present a hazard to motorists if the street is kept open to traffic after frames have been raised.

One preferred form of shim of this invention comprises an angulated member adapted to overlie one half the frame and including three depending sockets disposed for reception within tapered seats formed in the frame member. These sockets have relatively thin walls so that when the shim is in place and the sockets are nested in the frame seats, the lugs of the triangular lid section can be placed within the sockets so that the lid section is seated within the shim in the same manner in which it was previously supported by the frame proper. It will be understood that for each manhole, two shims are employed, one for supporting each triangular lid section.

One advantage of the present shim is that it is extremely simple to install. Moreover, it facilitates the raising of the lid without disturbing the position of the frame member. Furthermore, when a lid is mounted in a shim it is supported in exactly the same manner as by the original frame so that the lid remains quiet and wears at a minimum rate.

These and other objects and advantages of the present invention will be more readily apparent from a consideration of the following detailed description of a preferred embodiment of the invention.

In the drawings:

FIGURE 1 is a top plan view of a manhole cover and frame constructed in accordance with the present invention, a portion of the cover being broken away to show details of construction;

FIGURE 2 is a cross-sectional view taken along line 2—2 of FIGURE 1;

FIGURE 3 is a cross-sectional view taken along line 3—3 of FIGURE 1;

FIGURE 4 is a cross-sectional view taken along line 3—3 of FIGURE 1;

FIGURE 5 is a top elevational view of a pair of mating shims of the present invention;

FIGURE 6 is a side elevational view of a shim;

FIGURE 7 is a top plan view of a frame having two shims and one lid section fitted thereon;

FIGURE 8 is a cross-sectional view taken along line 8—8 of FIGURE 7;

FIGURE 9 is a cross-sectional view taken along line 9—9 of FIGURE 7.

As best shown in FIGURES 1 and 2, a manhole frame 10 constructed in accordance with the present invention is adapted to be placed over and supported upon a manhole wall 11 formed of concrete, bricks, or the like. Wall 11 extends downwardly from a roadway 12 or the like to a sewer or a conduit running beneath the roadway. Frame 10 is embedded in roadway 12 with the upper edge 13 of the frame lying flush with the upper surface 14 of the pavement. Frame 10 carries two triangular lid sections 15—15 which extend across the frame flush with the pavement surface and function to enclose the manhole opening.

More particularly, frame 10 is formed of a suitable material such as cast iron and comprises a base 16 adapted to rest upon the upper edge of supporting wall 11. The frame further includes an upstanding peripheral

flange 17 having a central opening 18. Peripheral flange, or upstanding wall 17 is of a generally square outline configuration comprising four wall sections 20, interconnected by generally U shaped seat forming sections 21 and 22.

Seat forming sections 21 are disposed on opposite corners of the frame as best shown in FIGURES 1, 2, and 4. Each of these sections includes upstanding walls 23 having tapered inner surfaces 24 which form a tapered seat 25 adapted to receive a lug 26 formed at the vertex of triangular lid section 15. Seat 25 is preferably somewhat elongated and extends along an axis directed toward the center of frame 10. A cross flange 27 extends between walls 23, and forms a bottom wall of the seat. This cross flange is preferably provided with a vertical bore 28 adapted to receive a shim anchoring bolt as explained below. Additionally, the lower surface of transverse flange 27 is preferably spaced upwardly from base 16 so that a recessed space 30 is formed between the transverse flange and walls 23 for receiving the end of the anchoring bolt and the nut secured thereto.

Seat forming sections 22 are formed at the opposite corners of frame 10. Each of the sections 22 comprises upstanding walls 31 and a center wall 33. Each of the walls 31—31 has a tapered inner surface 34, while the center wall has two sloping surfaces 32 facing surfaces 34 and defining with those surfaces two tapered seats 35 spaced from one another by center wall 33. Seats 35 are adapted to receive and support lugs 36 formed on lid section 15.

Each of the seats 35 is preferably elongated and aligned with a line passing through the center of frame 10. A transverse flange 37 extends between walls 31—31 to form the bottom of the seat. As best shown in FIGURE 3 this flange is preferably formed with bores 38 respectively interconnecting seat 35 and a recessed portion 40 formed between side walls 31 beneath flange 37. These openings are adapted to receive the arms of shim anchoring bolts as explained below.

Each of the cover sections 15 is generally triangular in shape to conform with one half of the opening 18 in the manhole frame. In the preferred embodiment, each of the lid sections is in the form of an isosceles right triangle, so that the two lid sections are identical and interchangeable. As is best shown in FIGURE 1, the edges of the triangular lid are spaced from upstanding wall 17 of the frame. Each of the lid sections comprises a surface plate 42 which is preferably provided with a plurality of projections such as ridges 43 for providing greater traction between the surface plate and vehicle tires passing over it. Each lid section is further provided with a plurality of openings 44 and suitable stiffening ribs 45, 46, and 47 formed on the undersurface of the lid.

The two lid sections are preferably loosely joined together by means of elongated tie rods 48 which pass through aligned apertures formed in flanges 45 and 46 of each lid section. The tie rods and lids are held in assembled relationship in any suitable manner such as by means of cotter pins 50 fitted in suitable openings in the ends of the tie rods.

Each of the lid sections 15 is further provided with three outwardly extending lugs such as lugs 36, 26, and 36 on the right hand lid section shown in FIGURE 1. Each of these lugs is preferably a prism of trapezoidal cross section including tapered walls 51 or substantially the same taper as the tapered walls of the seats. Each of the lugs also includes a bottom surface 52 which is spaced above transverse flange 27 of the seat. Consequently, when one of the lugs is inserted within a seat the only engagement between the lug and seat is along the tapered side walls. The frictional force between the walls is greater than the frictional force between a car and the lid so that the lugs provide a lock which is effective to prevent the lid from being shifted within the

frame but does not interfere with the removal of the lid by lifting it from the frame. In the embodiment shown, each of the lugs lies along or closely adjacent to a line extending outwardly from the midpoint of the long side, or hypotenuse, 54 of the triangular lid section, this mid-point substantially coinciding with the center of the frame when the lid section is in place. It is to be understood that the engagement of the lugs and their mating seats provides the only support for the lid section, the lids being spaced from the frame in all areas except at the lugs.

In addition to the lid and frame construction, another feature of the present invention is the provision of novel shims for raising the level of the lid when a street is resurfaced. Details of the shim construction are shown in FIGURES 5-9. As is shown, two identical shim sections 56 are provided for use in connection with each frame and lid. Each of the shim sections comprises two flat arms 58 disposed at right angles to one another. The arms are joined by means of a depending socket, or shim seat 60, which has relatively thin sloping walls 61 and a bottom wall 62 of substantially the same cross-sectional size as the corresponding lug 26 formed on lid sections 15. The inner surfaces of these walls form a recess adapted to receive the lug 26 of a lid section.

Similar tapered sockets 59 having relatively thin walls corresponding in outline to lugs 36 are formed at the ends of arms 58. More particularly, side walls 63 and 64 of the sockets 59 slope downwardly and inwardly to define a tapered recess adapted to receive lugs 36 of a lid section. The bottom wall of each of these sockets is provided with an opening 65 for receiving an anchor bolt as explained below.

When installing shims to raise the level of a lid, for example from the level denoted by line 66 in FIGURE 8 to the level of line 67 in that figure, the two lid sections are first removed from the frame by lifting or prying the sections upwardly. The frame is not shifted or disturbed in any manner. Two shim sections 56 are then placed over the frame, the end sockets 59 of one shim being inserted into seats 35 of the frame while socket 60 is seated within seat 25 of the frame. Preferably but not necessarily the shim is secured in place by passing a T bolt or other suitable anchoring member downwardly through opening 65 in the seats. Each of the anchor bolts 68 comprises a cross head 70 lying within the lowermost portion of the flange socket and an elongated shank 71 which passes downwardly through the socket 60, an opening 38 in the frame seat and is secured in place by means of a nut 72 threadably engaging the end of the shank. Socket 60 is secured to seat 25 in a similar manner by means of an anchor bolt 73. After both shim sections have been secured in place, lid sections 15 are mounted on the shims by inserting lugs 36 in sockets 59 and lugs 26 in sockets 60.

As is best shown in FIGURE 7 when the lid sections are in place, they are supported by the shim in exactly the same manner that they were originally supported by the frame. That is, the periphery of the lid is spaced from arms 58 of the shim as well as from any portion of the frame, and the only contact between the lid and shim is through prismatic lugs 26 and 36 as was explained in detail above.

When the two lid sections are in place within the shims, no relative movement can occur between either the lid and shims or shims and frame member. Consequently, the unit remains as quiet as the original assembly and moreover the lids, shims, and frame are subjected to a minimum amount of wear.

Having described my invention, I claim:

1. In combination, a manhole cover and supporting frame therefor, said frame comprising a base and an upstanding peripheral flange defining an opening of generally square cross section, a first pair of recessed seats

carried by said flange on the opposite corners of said square opening lying along a first diagonal of said opening, a second pair of recessed seats carried by said flange adjacent to the opposite corners of a second diagonal of said square opening, and a third pair of recessed seats carried by said flange and disposed closely adjacent to the second pair of seats, each of said recessed seats being of tapered configuration and having a wide portion adjacent to the top of the seat and a narrow portion adjacent to the bottom of the seat, said cover comprising two triangular sections, each of said sections including a surface plate of substantially triangular outline having three vertices and three lugs, one of said lugs being located at each of said vertices, each of said lugs being formed integral with said surface plate and extending outwardly from the associated vertex of the triangular surface plate, each of the said lugs being in the form of an elongated prism, having a narrowed portion adjacent to the lower edge of said lug, each of said lugs being disposed in engagement with one of said recessed seats, the remaining portions of said manhole cover being spaced from said frame whereby said lugs and seats constitute the sole points of engagement between the manhole cover and frame.

2. In combination, a manhole cover and supporting frame therefor, said frame comprising a base and an upstanding peripheral flange defining an opening of generally square cross section, a first pair of recessed seats carried by said flange on the opposite corners of said square opening lying along a first diagonal of said opening, a second pair of recessed seats carried by said flange adjacent to the opposite corners of a second diagonal of said square opening, and a third pair of recessed seats carried by said flange and disposed closely adjacent to the second pair of seats, each of said recessed seats being of tapered configuration and having a wide portion adjacent to the top of the seat and a narrow portion adjacent to the bottom of the seat, said cover comprising two triangular sections, each of said sections including a surface plate of substantially triangular outline having three vertices and three lugs, one of said lugs being disposed at each of said vertices, each of said lugs being formed integral with said surface plate and extending outwardly from the associated vertex of the triangular surface plate, each of the said lugs being in the form of an elongated prism, having a narrowed portion adjacent to the lower edge of said lug, said tapered seats and said lugs lying along axes which pass closely adjacent to the center of said square, each of said lugs being disposed within one of said seats, the remaining portions of said cover being spaced from said frame whereby said lugs and said seats constitute the sole points of engagement between said cover and said frame.

3. In combination, a manhole cover and supporting frame therefor, said frame comprising a base, an upstanding peripheral flange defining an opening of generally square cross section, a first pair of recessed seats carried by said flange on the opposite corners of said square opening lying along a first diagonal of said opening, a second pair of recessed seats carried by said flange adjacent to the opposite corners of a second diagonal of said square and a third pair of recessed seats carried by said flange and disposed closely adjacent to the second pair of seats, each of said recessed seats being of tapered configuration and having a wide portion adjacent to the top of the seat and a narrow portion adjacent to the bottom of the seat, said cover comprising two triangular sections, each of said sections including a surface plate of substantially triangular outline having three vertices and three lugs, one of said lugs being associated with each of said vertices, each of said lugs being formed integral with said surface plate and extending outwardly from the associated vertex of the triangular surface plate, each of the said lugs being in the form of an elongated prism, having a tapered portion adjacent to the lower edge of

said lug, the taper on the lugs being substantially the same as the taper of said seats, each of said lugs being disposed in one of said seats whereby said lugs are supported in said seats with the lower edge of said lugs free from contact with said seats, the remaining portion of said manhole cover being spaced from said frame whereby said lugs form the sole support for said lid section.

4. In combination, a cover for a manhole, a frame, and two shim members engageable with said frame for supporting said lid in elevated position relative to said frame, said frame comprising a base, an upstanding peripheral flange integral with said base and defining an opening of generally square cross section, a first pair of recessed seats carried by said flange on the opposite corners of said square opening lying along a first diagonal of said opening, a second pair of recessed seats carried by said flange adjacent to the opposite corners of a second diagonal of said square opening and a third pair of recessed seats carried by said flange and disposed closely adjacent to the said second pair of seats, said cover comprising two triangular sections, each of said sections including a surface plate of substantially triangular outline and three lugs, each of said lugs extending outwardly from the vertices of the triangular surface plate, each of said shim members comprising two arms disposed at right angles to one another, a first socket formed at the juncture of said arms, second and third sockets formed at the ends of said arms, each of said sockets having a recess formed therein, a lug of said cover being disposed in each of said sockets, each of said sockets including a downwardly projecting portion disposed within a seat in said frame member.

5. In combination, a cover for a manhole, a frame, and shim members engageable with said frame for supporting said cover in elevated position relative to said frame, said frame comprising a base, an upstanding peripheral flange integral with said base and defining an opening of generally square cross section, a first pair of tapered seats carried by said flange on the opposite corners of said square opening lying along a first diagonal of said opening, a second pair of tapered seats carried by said flange at the opposite corners of a second diagonal of said square opening, and a third pair of tapered seats carried by said flange and disposed closely adjacent to the said second pair of seats, said cover comprising two triangular sections, each of said sections including a surface plate of substantially right triangular outline and three tapered lugs adapted for reception within said recessed seats, each of said lugs being integral with said surface plate and extending outwardly from one of the vertices of the triangular surface plate, said shim comprising two arms disposed at right angles to one another, a first socket formed at the juncture of said arms, second and third sockets formed at the ends of said arms, each of said sockets having a tapered recess formed therein, a lug on said cover being disposed in each of said sockets, each of said sockets having a downwardly projecting portion of tapered configuration disposed within a seat in said frame member.

6. A shim for raising the level of a manhole cover section relative to a supporting frame, said shim comprising two flat arms disposed at an angle relative to one another, a first elongated socket portion disposed at the juncture of said arms, a second elongated socket portion formed adjacent to the end of one of said arms, and a third elongated socket portion formed adjacent to the end of the other of said arms, each of said socket portions comprising downwardly converging side walls extending a substantial distance below the lower surface of said flat arms and providing an inner tapered socket for the reception of a tapered lug on a manhole cover, and an outer tapered projection for fitting into a conforming socket in said frame, the axes of the elongated sockets on the ends of the arms being in alignment, and the axis

of said socket at the juncture of said arms being perpendicular to a line through the axes of said end sockets.

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