

Nov. 30, 1965

I. W. STEIL

3,220,433

MANHOLE STRUCTURE

Filed Aug. 31, 1962

2 Sheets-Sheet 1

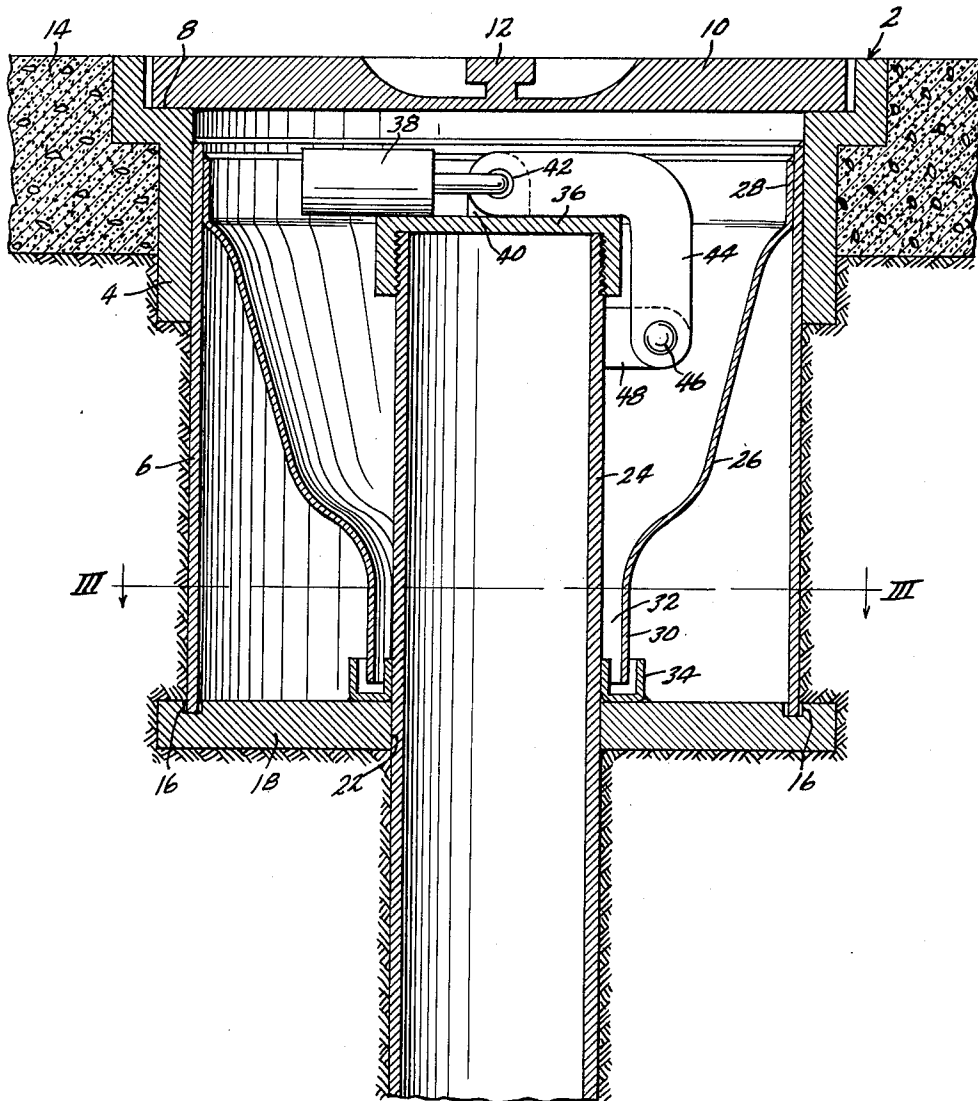


Fig. 1

INVENTOR

Irvin W. Steil

BY

John A. Hamilton
Attorney.

Nov. 30, 1965

I. W. STEIL
MANHOLE STRUCTURE

3,220,433

Filed Aug. 31, 1962

2 Sheets-Sheet 2

Fig. 2

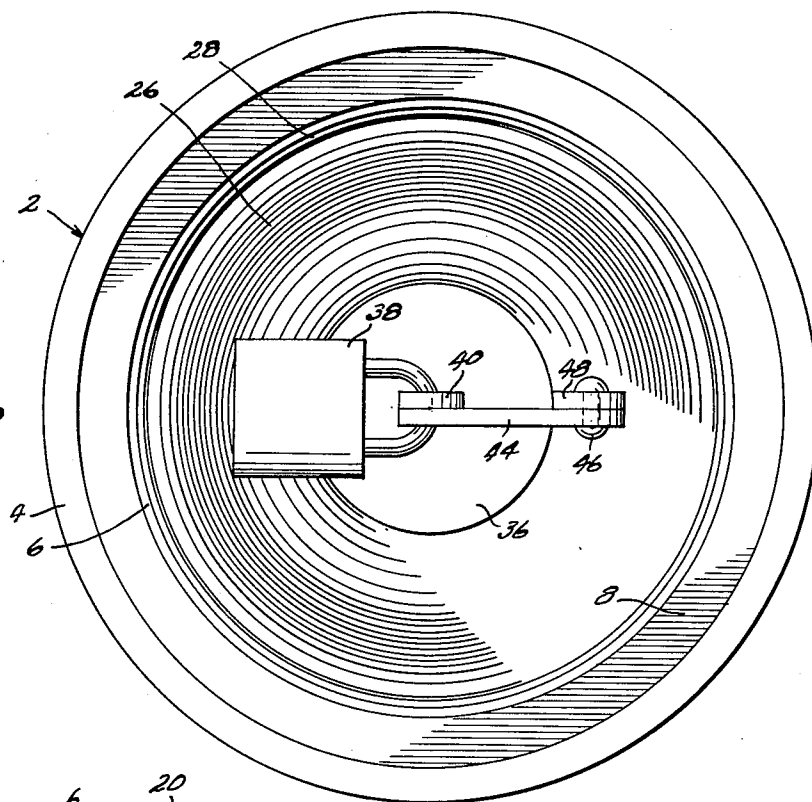
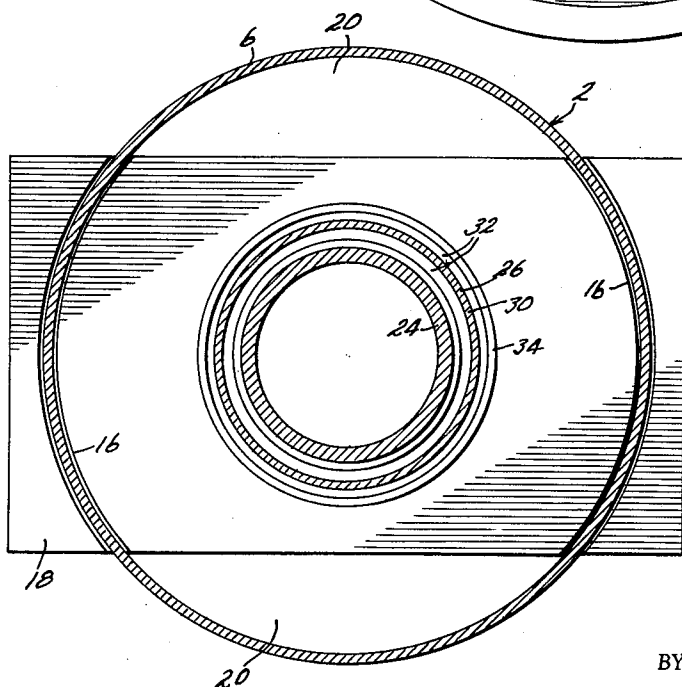


Fig. 3

INVENTOR.
Irvin W. Steil
BY John A. Hamilton
Attorney.

1

3,220,433

MANHOLE STRUCTURE

Irvin W. Steil, 4622 Forest, Kansas City, Mo.

Filed Aug. 31, 1962, Ser. No. 220,752

4 Claims. (Cl. 137—363)

This invention relates to new and useful improvements in manhole structures, and has particular reference to manhole structures such as are commonly employed at service stations to enclose and conceal the upper end portions of pipes communicating with underground gasoline tanks. Such pipes may constitute means for filling such tanks, in which case the pipe is provided with a lockable cap within the manhole, or may contain gauge mechanism for indicating the quantity of gasoline in the tank, in which case the pipe is provided at its upper end with a cap having a transparent window through which the gauge may be read. It will be understood that the manhole structure provides an underground cavity in which the upper ends of the pipe or pipes are disposed, and which is normally closed by a manhole cover. The lower end of the cavity must be left open, to permit rain and other water entering the cavity to drain away.

In the past, considerable difficulty has arisen in manhole structures of this type due to the condensation of moisture therein. This condensation occurs in both hot and cold weather. In cold weather, the relatively warm ground vapors rising through the open lower end of the manhole body contact parts therein which are relatively cold because of cold atmospheric conditions, especially the lower side of the manhole cover, and moisture is consequently condensed therefrom. The condensate then drips onto the fill-cap locks or gauge windows, and may freeze thereon. The resulting ice often so fouls the locks of fill-caps to such an extent that the locks must be broken to remove the fill-caps, or they must be thawed, and necessitates scraping the ice from gauge windows before the gauges may be read. In hot weather, the relatively hot, moisture-laden atmospheric air may enter under the manhole cover, which seldom if ever has an air-tight fit, and contact relatively cool parts within the manhole, with resulting condensation of moisture. This moisture will, even in summer when no freezing can occur, cause rapid corrosion and deterioration of fill-cap locks and other parts, or cause dirt, grit and the like to enter and foul lock mechanisms and the like.

The principal object of the present invention is, therefore, the provision of a manhole structure which is "sweatless" and "frostless," that is, in which the portion thereof containing parts which may be adversely affected by condensation is preserved dry and free from condensation at all times, in both hot and cold weather.

Other objects are simplicity and economy of construction, efficiency and dependability of operation, and adaptability for use in a wide variety of manhole applications other than those specifically heretofore enumerated.

With these objects in view, as well as other objects which will appear in the course of the specification, reference will be had to the drawing, wherein:

FIG. 1 is a vertical sectional view of a manhole structure embodying the present invention, shown in connection with the fill-pipe of an underground tank,

FIG. 2 is a top plan view of the manhole structure shown in FIG. 1, with the cover removed, and

FIG. 3 is a sectional view taken on line III—III of FIG. 1.

Like reference numerals apply to similar parts throughout the several views, and the numeral 2 applies generally to the body member of the manhole structure, said body member comprising a cylindrical ring 4 disposed with its axis vertical, and a cylindrical sheet metal ex-

2

tension 6 telescoped into and welded or otherwise securely affixed at its upper end in ring 4, and depending therefrom. The extension is open at both its upper and lower ends. Obviously ring 4 and extension 6 could be formed integrally. However, the use of a separate extension 6 provides that pre-existing manhole structures, most of which include a member corresponding to ring 4, may be easily adapted for use in the present invention.

Ring 4 is flanged outwardly adjacent its upper end to provide a downwardly recessed, upwardly facing horizontal shoulder 8 which supports a manhole cover 10 for closing the upper end of the body member. Said cover may be provided with a finger-gripping member 12 whereby said cover may be grasped and lifted.

As shown in FIG. 1, body member 2 is installed in the ground with its upper end flush with the ground surface, or flush with the surface of a concrete apron 14 which may be poured thereabout. The lower edge of body extension 6 rests in a pair of arcuate grooves 16 formed in the upper surface of a baffle plate 18 which is rectangular in form and narrower than the diameter of the extension, so that the bottom of the extension has segmental openings 20 to the surrounding earth or sand at each side of plate 18 (see FIG. 3). The bottom of the body must not be completely obstructed, but must be at least partially open, to permit rain water or water used to hose down apron 14, and which may enter body member 2, to soak away into the ground. Cover 10 seldom if ever fits so tightly as to prevent such water from entering body member 2 to some extent. Baffle plate 18 serves to support body member 2 while earth or sand is filled in thereabout, and while concrete apron 14 is being poured. Its function as a baffle plate will be described presently.

Baffle plate 18 may be formed of metal, wood or other suitable material, and has a circular hole 22 formed centrally therein which fits snugly about, for example, the fill-pipe 24 of an underground gasoline tank, not shown, said pipe extending axially upwardly into body member 2. Fitted into the body member is a condenser plate 26 having a generally frusto-conical form coaxially with the body member, with its larger end opening upwardly. Said condenser plate cone is provided at its upper end with a cylindrical portion 28 which fits snugly in the upper portion of extension 6 and is welded or otherwise affixed therein. At its lower end, the condenser plate cone is provided with a depending cylindrical extension 30 which is of larger diameter than pipe 24, so as to define a narrow annular space 32 therebetween. Extension 30 depends into annular sheet metal cup member 34 which surrounds pipe 24 and which may be affixed either to baffle plate 18 as shown, or to extension 30 by spaced apart webs. The internal diameter of the cup is such that it engages pipe 24 snugly, but the side walls of the cup are spaced apart from cone extension 30, and the lower end of the extension is spaced above the bottom of the cup, whereby to form an unbroken passage from the interior to the exterior of cone 26.

Fill-pipe 24 may be provided at its upper end with a fill-cap 36 threaded thereon, and secured releasably against removal by a padlock 38 the hasp of which passes through a perforated lug 40 affixed to the cap, and through a perforation 42 formed in one end portion of an angled lock lever 44, the opposite end of said lever being pivoted at 46 to a lug 48 affixed to the pipe below the cup. The structure shown necessitates that lug 48 be affixed to the pipe after body member 2, baffle plate 18 cup 34 and cone 26 have been positioned about the pipe.

In use, it will be understood that cup 34 is normally full of water, so as to form an air seal between the interior and exterior of cone 26. In cold weather, the relatively

3

warm, moisture laden ground vapors rising into body member 2 through openings 20 at its lower end strike the outer surface of condenser cone 26, which is maintained relatively cold by atmospheric air leaking under cover 10, and the moisture therein is thereby condensed to liquid form. This moisture flows downwardly along the outer surface of the cone to cup 34, filling said cup if it is not already full, then overflowing said cup to soak into the ground. The ground vapors are prevented from reaching the inner surface of cover 10, or the threads of cap 36 or the working parts of padlock 38, both by the disposition of cone 26, and by the seal provided by water in cup 24. Thus no condensate is deposited on these parts, and the object of the invention is accomplished. It has been found that if cup 34 is disposed about 10 inches below the ground surface and the manhole is kept covered, the water in said cup will be prevented from freezing except in the most extreme winter weather, by ground warmth. In normal winter weather, any frost forming on cone 26 is confined to about the upper half of the outer surface of the cone. However, if the water should freeze in the cup in extreme weather, this is not considered to be a disadvantage. The effectiveness of the cup as an air seal is not affected by freezing of the water therein, and it is extremely unlikely that in such weather any external water such as rain or wash water would enter the manhole and necessitate draining thereof through the cup. Such external water normally flows downwardly through said cup and drains into the ground.

In fact, it has been found that in many installations, cup 34 may be dispensed with entirely while still maintaining reasonable efficiency of operation, and the device is therefore believed to be inventive even in the absence of said cup. Ground vapor rising from the bottom of the body member would then be prevented by baffle plate 18 from rising directly into the interior of cone 26 through annular passage 32, being deflected away from said passage by said baffle to continue its upward movement to engage the outer surface of the cone. While not as highly efficient as with the cup, the device has been thoroughly tested and found to be quite serviceable in most conditions without the cup.

In hot weather, moisture-laden atmospheric air leaks under cover 10, and moisture therein is in most manholes condensed by contact with the fill-cap, its lock 38 and other parts, which are maintained relatively cool by the close proximity of the surrounding earth which is much colder than said atmospheric air. In the present structure, however, a dead-air space is formed between cone 26 and body member 6, which insulates cap 36 and its related parts from the ground, and prevents loss of heat therefrom by radiation. Therefore, with the exception of heat lost by conduction from pipe 24 to the ground, which is minimal at the zone of cap 36, the cap, padlock and related parts are maintained substantially at the same temperature as the surrounding air, and substantially no condensation occurs thereon. Cone 26 is relatively cool, and condensation therefore forms on the inner surface thereof rather than on cap 36 or the padlock. This condensate drains downwardly into cup 34, and overflows said cup to drain into the ground.

While I have shown and described a specific embodiment

4

of my invention, it will be readily apparent that many minor changes of structure and operation could be made without departing from the spirit of the invention as defined by the scope of the appended claims.

What I claim as new and desire to protect by Letters Patent is:

1. In combination with the vertically extending upper portion of an underground pipe communicating at its lower end with an underground tank, a manhole structure comprising:

(a) a hollow cylindrical body member of larger diameter than said pipe adapted to be buried in the ground with its axis disposed vertically and with its upper end substantially flush with the ground surface, said body member concentrically enclosing the upper end portion of said pipe and being open at its upper and lower ends,

(b) a manhole cover adapted to close the upper end of said body member, and

(c) a sheet metal condenser member of generally frusto-conical form disposed in said body member coaxially therewith, the upper end of said condenser member being fitted snugly around its entire periphery in the upper portion of said body member, and the lower end of said condenser member being of reduced diameter and having a circular aperture admitting said pipe, said aperture being of such diameter as to provide a restricted narrow annular space between said condenser member and said pipe at said aperture.

2. A manhole structure as recited in claim 1 with the addition of:

(a) a horizontal baffle plate disposed at the lower end of said body member in closely spaced apart relation below the lower end of said condenser member, said baffle plate having an aperture formed therein fitting snugly about said pipe, and extending horizontally from said pipe sufficiently to underlie all portions of said annular space.

3. A manhole structure as recited in claim 1 with the addition of:

(a) an upwardly opening annular cup fixed in the lower portion of said body member and into which the lower end of said condenser member extends, said cup having an internal diameter fitting snugly about said pipe.

4. A manhole structure as defined in claim 3 wherein all portions of said condenser member slope downwardly toward the bottom aperture thereof, whereby any condensate formed on either the inner or outer surfaces of said cone will drain into said cup.

References Cited by the Examiner

UNITED STATES PATENTS

57,742	9/1866	Marquis	-----	137—247.33 X
1,507,531	9/1924	Vaudell	-----	137—247.33
1,526,637	2/1925	Hess	-----	137—247.33 X
1,566,052	12/1925	Dabrowski	-----	137—247.33

ISADOR WEIL, *Primary Examiner*.

MARTIN SCHWADRON, *Examiner*.