July 1, 1941. W. M. BISHOP 2,247,936

APPARATUS CASING

Filed Oct. 31, 1939 3 Sheets-Sheet 1

FIG. 1

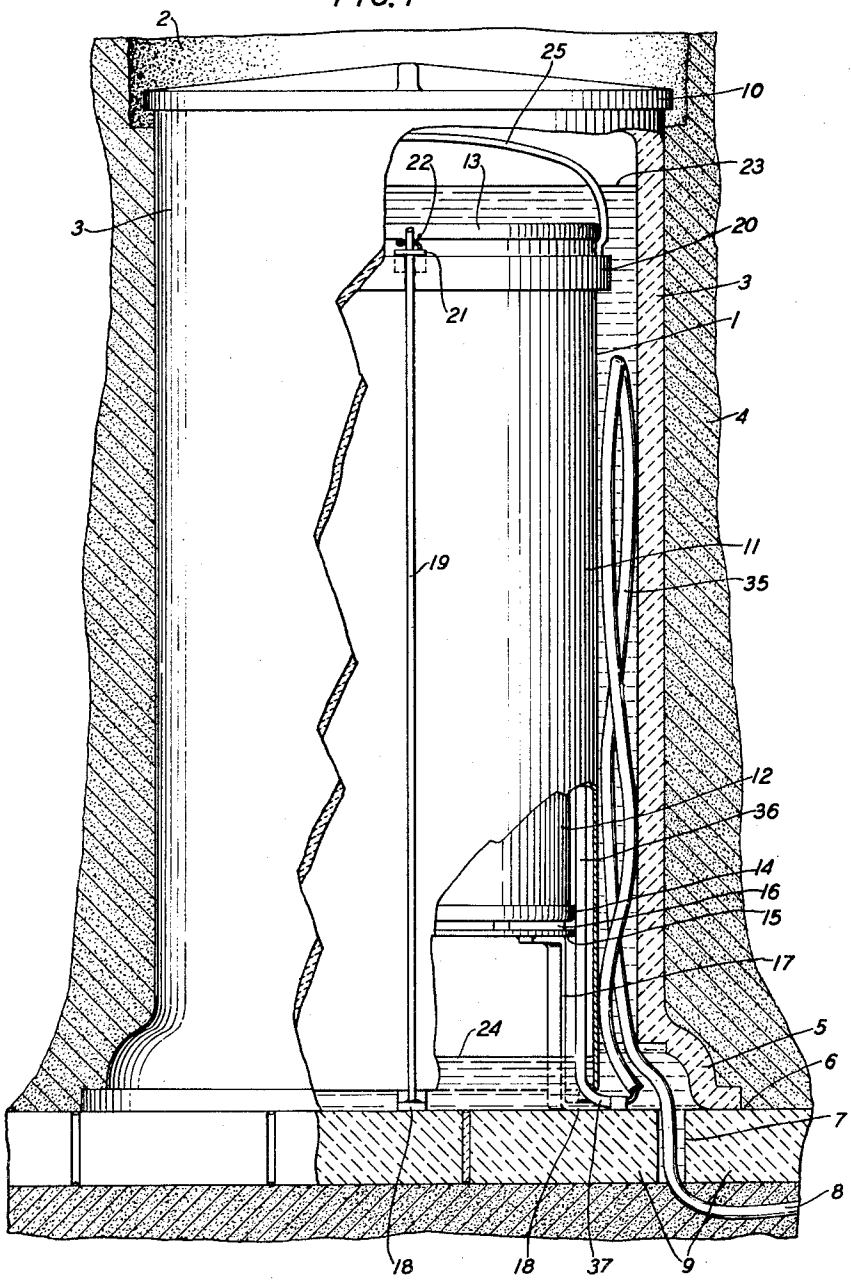

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FIG. 2

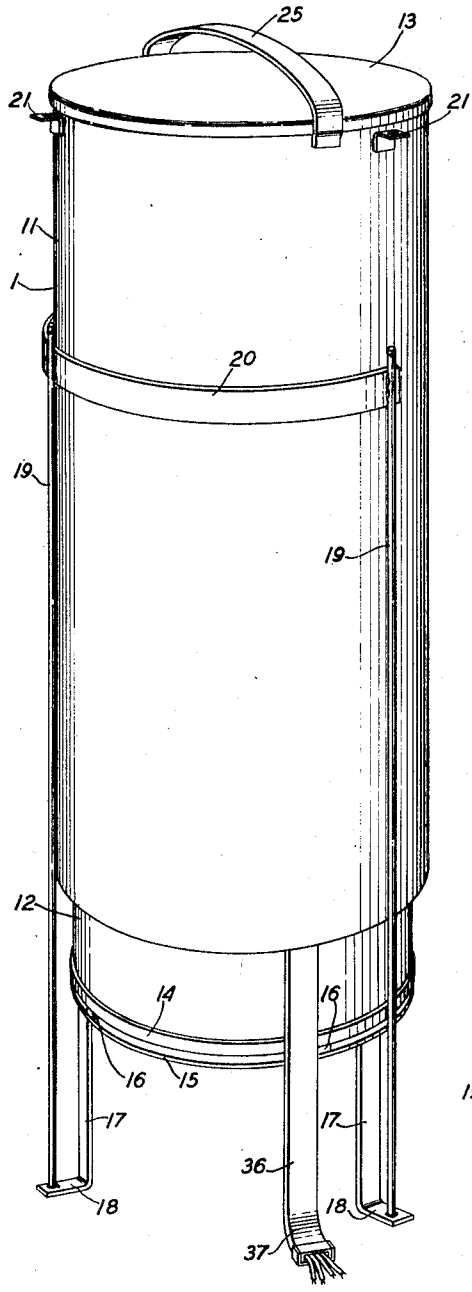
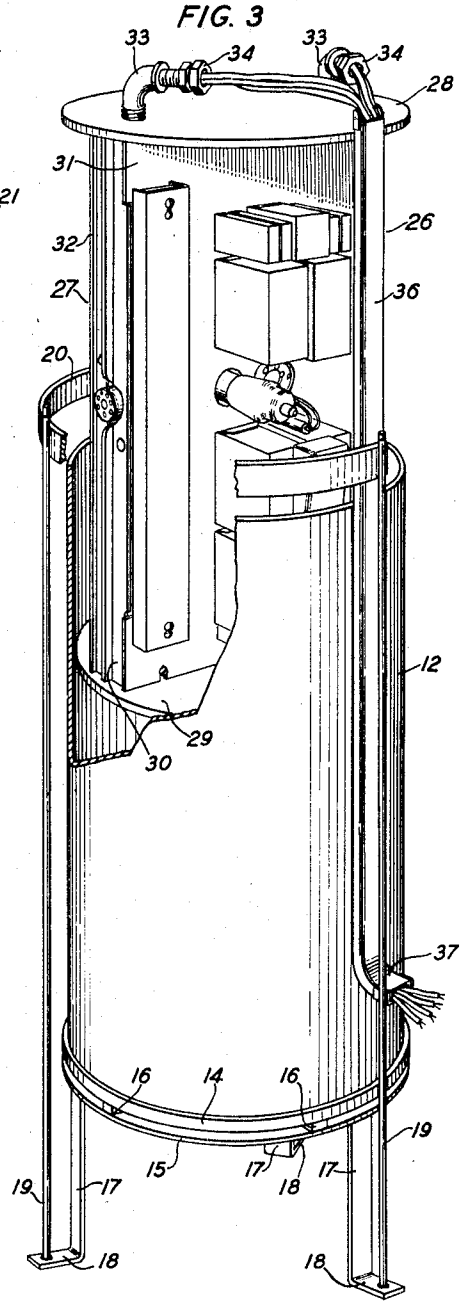


FIG. 3



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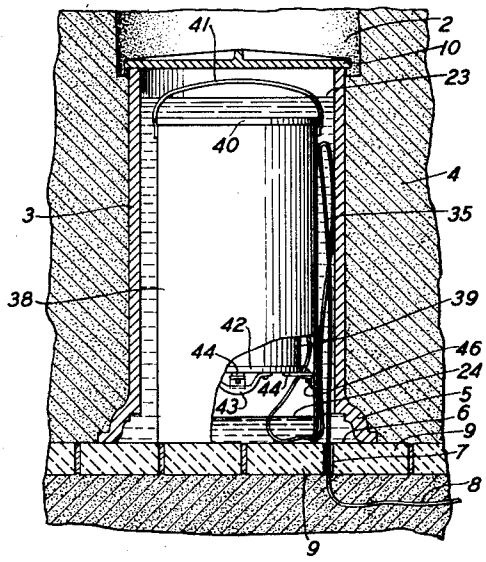

FIG. 4

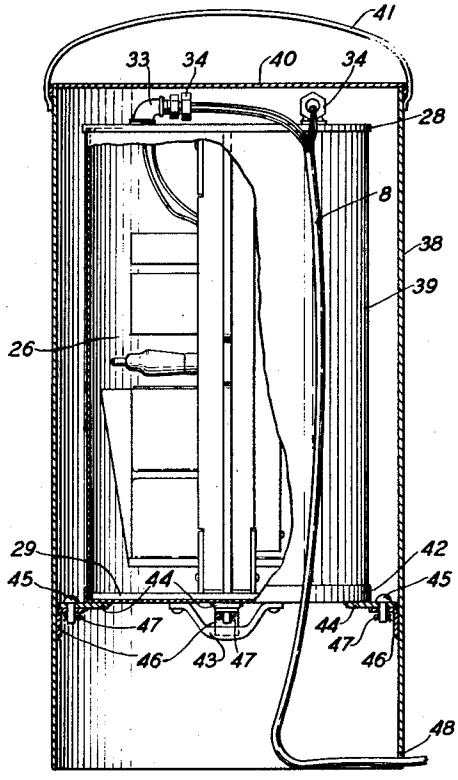

FIG. 5

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UNITED STATES PATENT OFFICE

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APPARATUS CASING

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Application October 31, 1939, Serial No. 302,099

4 Claims. (Cl. 220—8)

This invention relates to apparatus containers and more particularly to containers for housing and protecting apparatus in places where water is likely to accumulate.

The object of the invention is to provide suitable means for housing and supporting electrical apparatus in a manhole of an underground wire electrical system.

A feature of the invention resides in a casing structure for supporting and covering electrical apparatus located in the manhole.

Other features reside in the structure and arrangement of the parts.

In the drawings:

Fig. 1 is a side view, partly in section, of a manhole and the casing located in the manhole;

Fig. 2 is a side view, in perspective, of the casing shown in Fig. 1 and with one of the casing parts lifted relative to another;

Fig. 3 is a view, in perspective and partly in section, of an inner member of the casing shown in Figs. 1 and 2 and with an electrical apparatus unit partly lifted from the casing;

Fig. 4 is a side view, partly in section, of a manhole and a casing located in the manhole, the casing being a modification of the one shown in Figs. 1, 2 and 3. Fig. 4 is drawn to a reduced scale relative to Figs. 1, 2, 3 and 5; and

Fig. 5 is a side view, partly in section, of the casing shown in Fig. 4.

In some underground telephone line systems, repeater apparatus is located at various points along the system. Manholes are provided at the points required and the repeater apparatus is located in the manholes. The manholes sometimes become filled or partly filled with surface water, the result being impairment of the repeater apparatus. To prevent such impairment of the repeater apparatus, I have devised a casing to protect the repeater apparatus from the surface water. The casing is adaptable for placement in the manhole and is so constructed and arranged that when water is present in the manhole the water is prevented from rising within the casing to a sufficient height to reach electrical apparatus located within the casing.

The casing 1, as shown in Fig. 1, is located in a manhole 2. The manhole may be of any desired construction but is shown merely for the purpose of illustration as comprising an upstanding pipe section 3 set in an excavation in the ground and surrounded by concrete 4. The bell end 5 of the pipe section 3 is preferably placed at the bottom of the manhole and rests on a floor 6 which is apertured at 7 to permit entrance into the manhole of a telephone line 8. It is common practice in the construction of a manhole to make the floor of brick and this type of construction lends itself well to the practice of my invention since the aperture 7 may be readily provided by simply spacing two adjacent bricks 9—9 a little wider apart than in the rest of the floor and because a brick floor will allow surface water to drain out of as well as enter the manhole. The particular type of material used in the floor 6, however, is a matter of choice since my invention will operate even when the side walls and floor of the manhole are made water-tight. A removable cover plate 10 is provided on the top of the pipe section 3 to prevent stones and dirt from falling into the space defined by the pipe section 3. A conventional type of manhole cover, not shown, may be provided at the top of the manhole.

The casing 1, shown in Figs. 1 and 2 and part of which is shown in Fig. 3, comprises an outer casing 11 and an inner casing 12. The casings 11 and 12 are in general of like form since each comprises a tubular portion closed at one end. The outer casing 11, however, is longer and much larger in diameter than the inner casing 12 and the closed end 13 is at the top while the closed end 14 of the casing 12 is at the bottom. The outer casing 11 is loosely telescoped about the inner casing 12 to serve as a cover therefor. The casings 11 and 12, except for the open end of each, are so constructed as to be water- and air-tight. The lower end of the casing 12 is fastened to a stand comprising a ring 15, spaced blocks 16 on the upper surface of the ring and legs 17. The legs 17 are about equally spaced apart and extend downwardly from the under surface of the ring 15 and are bent at their lower ends to provide outwardly extending foot portions 18. The foot portions 18 rest on the floor 6 of the manhole and are of such length as to extend beyond the periphery of the tubular portion of the outer casing 11. Each foot portion 18 is equipped with an upwardly extending rod 19, the rod 19 being fastened to the foot portion 18 and extending upwardly in parallel spaced relation with the outer surface of the tubular portion of the outer casing 11. A band 20 is secured to the upper portions of the rods 19 to hold these portions of the rods 19 in required spaced relation and to serve in some measure as a guide to the outer casing 11 when the casing 11 is being removed or applied. The band 20 extends transversely between the upper portions of the rods 19 and may be made of either complete or in-

complete hoop form. The upper ends of the rods 19 extend slightly above the upper edge of the band 20 to permit passing of these upper ends through apertured L-shaped brackets 21 secured to the outer surface of the upper portion of the outer casing 11. It is preferable to provide some means for holding the outer casing 11 down about the inner casing 12 and not simply depend upon the weight of the outer casing 11 to hold it in required position. I have, therefore, shown the upper end of each rod 19 as being transversely bored and equipped with a cotter pin 22 bearing against the upper surface of the apertured portion of the bracket 21. It is obvious, however, that the same result could be accomplished in other ways such, for instance, as providing screw-threaded ends on the rods 19 and having a nut on each rod.

When the outer casing 11 is fitted in place over the inner casing 12 as shown in Fig. 1, the lower open end of the outer casting 11 rests on the foot portions 18 of the legs 17 and is thus slightly spaced from the floor 6 of the manhole. If water collects in the manhole, some of the water will enter the outer casing 11 through its lower open end. When the water reaches the level of the open end of the outer casing 11 it will trap the air in the casing structure. Upon further rising of the water the air in the casing structure will be compressed to such an extent as to keep the water in the casing structure at a relatively low level. The water may freely rise, however, in the manhole, exterior of the outer casing 11. I have found that even when the water level in the manhole reaches the line 23 the water level within the outer casing 11 will not be above the line 24 and that the water level in the manhole may even reach the top of the manhole without causing the water level within the outer casing 11 to rise to the bottom of the inner casing 12. The air pressure built up within the outer casing 11 cannot lift the outer casing 11 relative to the inner casing 12 because such movement is prevented by the cooperation of the rods 19, the cotter pins 22 and the brackets 21. The whole casing structure may be manually lifted from the manhole by means of the handle 25 which is secured to the upper portion of the outer casing 11. When the casing structure has been lifted from the manhole the outer casing 11 may be released simply by removing the cotter pins 22 from the rods 19.

The telephone repeater apparatus, and which is herein identified by the general number 26 in Fig. 3, is mounted on a support 27 comprising spaced end flanges 28, 29 and spaced upright wall members 30—30, only one of which is shown. The wall members 30—30 also serve as supports for upright panels 31 and 32 on which are suitably mounted the various electrical parts and elements of the repeater apparatus. The panels 31 and 32 are arranged with their backs facing each other and are held in parallel spaced relation by the wall members 30—30. The space between the backs of the panels 31 and 32 may serve as a space for running wires leading to and from terminals of the electrical apparatus parts mounted on the panels. The end flange 28 and which is at the top of the support 27 is apertured at spaced points to permit wires to be led through the flange 28. In order to protect the wires at the points of passage through the end flange 28 "street" elbows 33 are mounted on the upper face of the flange 28, the flange 28 being suitably tapped at each apertured point to receive the male threaded end of the "street" elbow. A stuffing box 34 is mounted in the female end of the street elbow 33 to protect the wires at the point of entrance to the elbow.

The telephone line 8, as shown in Fig. 1, is buried in the ground and is extended through the aperture 7 in the floor 6 of the manhole. It will be understood that this telephone line 8 may comprise any number of conductors required and may include both incoming and outgoing lines for the repeater apparatus. To permit lifting of the casing apparatus entirely from the manhole a sufficient length of the telephone line 8 is left slack in the manhole. I have shown this slack portion 35 disposed between the pipe section 3 and the outer casing 11. The slack portion 35, however, may be located in any other space found convenient in the manhole. The conductors extend from the slack portion 35 under the lower open end of the outer casing 11 and between the outer casing 11 and the inner casing 12 to the top of the repeater apparatus 26. A protective sheath 36 is provided for the conductors in the portion extending under the lower end of the outer casing 11 and between the outer casing 11 and the inner casing 12. The protective sheath 36 is a tube and may be made of metal or any other material found suitable for the purpose. The lower end of the sheath 36 is curved in the form of an elbow 37 to pass under the lower end of the outer casing 11. The sheath 36 is made of sufficient length to have the upper end extend slightly above the flange 28 of the repeater apparatus 26 when the elbow 37 is resting on the floor 6 of the manhole. The conductors of the telephone line are divided into pairs or groups near the upper end of the sheath 36 and are led through the stuffing boxes 34 and "street" elbows 33 and then downward to the required parts in the repeater apparatus 26.

The repeater apparatus 26 is not normally in the position shown in Fig. 3 but is located, except for the flange 28, entirely within the inner casing 12 with the flange 29 resting on the bottom of the casing 12 and the flange 28 resting on the upper open end of the casing 12. The flange 28 is larger in diameter than the inner casing 12 and is annularly grooved on its under surface to receive the open end of the inner casing 12 and slightly overhangs the upper end of the inner casing 12 to insure that any condensation on the flange 28 will drip outside of the inner casing 12. The flange 29 is of slightly smaller diameter than the internal diameter of the inner casing 12. When the repeater apparatus 26 is in normal position the outer casing 11 may be placed about the inner casing 12 as shown in Fig. 2, and may be moved downward from the position shown in this figure to the normal position shown in Fig. 1. It will be seen that in this normal position the outer casing 11 forms in effect an air bell about the inner casing 12 and that the outer casing 11 is locked against upward movement relative to the inner casing 12 by means of the rods 19, the brackets 21 and the cotter pins 22. The air bell effect provided by the casing structure as previously pointed out prevents water from rising within the outer casing 11 to a point where it could pass over the upper open end of the inner casing 12 and to the repeater apparatus.

It is well known that when telephone repeater apparatus is brought into operation, it raises the temperature of its surrounding atmosphere. The repeater apparatus 26 will therefore dry the air

in the casing and maintain the air in a substantially dry condition.

When it is desired to inspect or to gain access to the repeater apparatus for any other purpose the cover plate 10 may be removed from the top of the pipe section 3. The entire casing structure may then be manually lifted entirely from the manhole by means of the handle 25. Upon removal of the outer casing 11 from the inner casing 12 the repeater apparatus 26 may be lifted out of the inner casing 12.

In the modification shown in Figs. 4 and 5 the same air bell principle is employed as in the structure shown in Figs. 1, 2 and 3. The casing structure shown in Figs. 4 and 5, however, is different from the one previously described. Since the manhole structure shown in Fig. 4 is the same as the one shown in Fig. 1 the parts of the manhole shown in Fig. 4 are designated by the same numerals as in Fig. 1 and no further description is herein made of these parts.

The casing structure shown in Figs. 4 and 5 comprises an outer casing 38 and an inner casing 39. The outer casing 38 is a tubular member closed at the top 40 and provided with a handle 41. The inner casing 39 is a tubular member shorter than and of much smaller diameter than the casing 38 and is closed at the bottom 42. A downwardly extending handle 43 is provided on the under surface of the bottom 42. Spaced lugs 44 are attached to the under surface of the bottom 42 and extend radially of the inner casing 39. The outer end of each lug 44 is apertured and a downwardly extending pin 45 is supported therein. L-shaped brackets 46 are secured to the inner face of the outer casing 38 to serve as rests for the lugs 44, the brackets 46 being apertured to receive the pins 45. The position of the brackets 46 is such that the inner casing 39 is held elevated from the lower open end of the casing 38. Each pin 45 is transversely apertured on its lower end to receive a cotter pin 47. The inner casing 39 is normally disposed within the outer casing 38 with the lugs 44 resting on the brackets 46 and with the pins 45 and cotter pins 47 operating to maintain the casing 39 in this position. The repeater apparatus 26 sets down within the inner casing 39 and so that the flange 29 rests on the bottom 42. The upper flange 28 of the repeater apparatus 26 is slightly larger in diameter than the inner casing 39 and rests on the upper open end of the inner casing 39. The outer casing 38 is disposed in the manhole 2 so that the lower open end of the casing rests on the floor 6 of the manhole. A notch is provided at 48 in the lower edge of the outer casing 38 to permit extension of the telephone line 8 into the outer casing. A slack portion 35 of the telephone line 8 is disposed between the outer casing 38 and the inner surface of the pipe section 3 of the manhole structure. The telephone line 8 is extended upwardly within the outer casing 38 and between the outer casing 38 and the inner casing 39 and is divided at the upper end to pass through the stuffing boxes 34 and the elbows 33 to the repeater apparatus.

When water enters the manhole 2 and comes into the outer casing 38, the air in the casing is trapped to prevent any great rising of the water within the outer casing 38. Due to the compressing of the trapped air within the casing 38 by water entering at the lower open end of the outer casing 38, the water level within the casing 38 will be maintained at about the point 24 even when the water level in the manhole and exterior of the casing 38 reaches the point 23 or the top of the manhole. Water entering the manhole is therefore prevented from rising within the outer casing 38 to a point where it might flow over the top of the inner casing 39 and reach the repeater apparatus 26.

The entire casing structure may be lifted from the manhole by means of the handle 41 when it is desired to inspect the repeater apparatus or make replacement of any of the parts. When the casing structure has been removed from the manhole the inner casing 39 with the repeater apparatus 26 therein may be readily removed from the outer casing 38 by placing the whole casing structure on its side or turning it upside down and removing the cotter pins 47 and the pins 45 from the brackets 46, then rotating the inner casing 39 relative to the outer casing 38 so that the lugs 44 will be clear of the brackets 46 and then withdrawing the inner casing 39 from the outer casing 38 by means of the handle 43.

Attention is called to the fact that in my invention I obtain the required protection of electrical apparatus parts from water without employing water-tight gaskets and water-tight cementitious seals in the casing structure and that I have made a definite departure from the common practice of using such gaskets and seals which at the best have limited life and are not altogether reliable. The casing structure I have devised is simple to make and does not require precision assembling and tightening together of the parts. It is also in effect, when used as described, self-drying and may be placed in a damp manhole or in other damp enclosures the physical prior drying out of which would be laborious and expensive.

It is to be understood that the particular structures shown and described are merely illustrative of the invention and practicable applications thereof.

What is claimed is:

1. A container for protecting electrical apparatus from water in a receptacle in which water may accumulate, said container comprising an inner tubular casing closed at the bottom and open at the top and containing the apparatus to be protected, an outer tubular casing closed at the top and open at the bottom and concentrically disposed relative to said inner casing, said outer casing being longer than said inner casing and having a sufficiently large internal diameter to provide an air space between the two casings, a stand comprising a ring attached to the bottom of said inner casing and spaced foot members attached to and extending from said ring and adapted to rest on the floor of the receptacle, said stand holding said inner casing entirely elevated within said outer casing, rods attached to said foot members and extending upwardly therefrom, apertured brackets supported on said outer casing and means on said rods and cooperating with said rods and said brackets to hold said outer and inner casings against relative longitudinal movement and said outer casing operating to hold air entrapped therein by water accumulating in the receptacle and thus prevent the water from reaching the interior of said inner casing.

2. A container comprising an outer tubular casing closed at the top and open at the bottom, an inner tubular casing closed at the bottom and open at the top and disposed concentrically within and in spaced relation with said outer casing,

said inner casing being shorter than said outer casing, spaced leg members secured to and holding said inner casing entirely elevated within said outer casing and said leg members extending below said inner casing, angularly disposed foot portions on said leg members extending beneath said outer casing and beyond the periphery of said outer casing, rod members secured to said foot portions and extending upwardly about said outer casing, means secured to the upper ends of said rod members and holding said rod members in spaced relation, spaced apertured brackets secured on said outer casing and adapted to receive the upper ends of said rods and means supported on said rods and against said brackets to hold said rods in said brackets.

3. A container comprising a tubular casing closed at its upper end and open at its lower end, a second tubular casing closed at its lower end and open at its upper end, said second casing being much shorter and much smaller in diameter than the first casing and being disposed entirely within the first casing, spaced foot members attached to and extending from the lower end of said second casing and maintaining the closed end of said second casing entirely elevated from the lower end of the first casing, apertured brackets supported in spaced relation on the first casing and means carried by said foot members and engaging said brackets to hold said casings against relative movement.

4. A container comprising a tubular casing closed at its upper end and open at its lower end, a second tubular casing closed at its lower end and open at its upper end, said second casing being of smaller dimensions throughout than the first casing and being disposed entirely within the space defined by the first casing, apertured lugs attached to and supported in spaced relation on the lower end of said second casing, apertured brackets secured to the inner surface of the first casing and extending inwardly thereof to form rests for said apertured lugs, said brackets being located above the lower open end of the first casing, pins supported in said lugs and extending through said brackets, means removably supported in said pins to hold said pins in said brackets and a handle on the closed end of each of said casings.

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