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D. L. WYATT

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ADJUSTABLE UNDERGROUND SHELL

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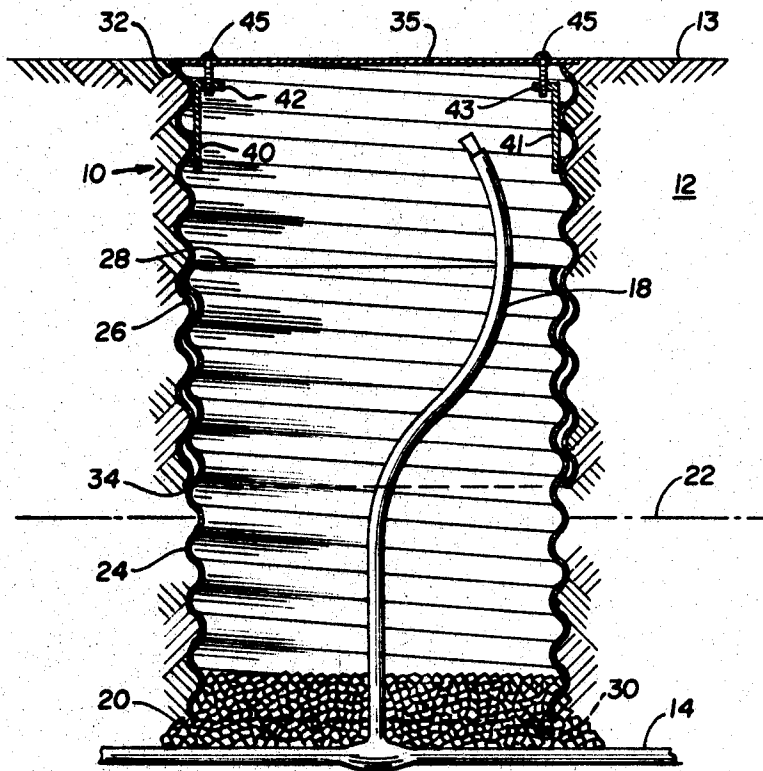


Fig. 1

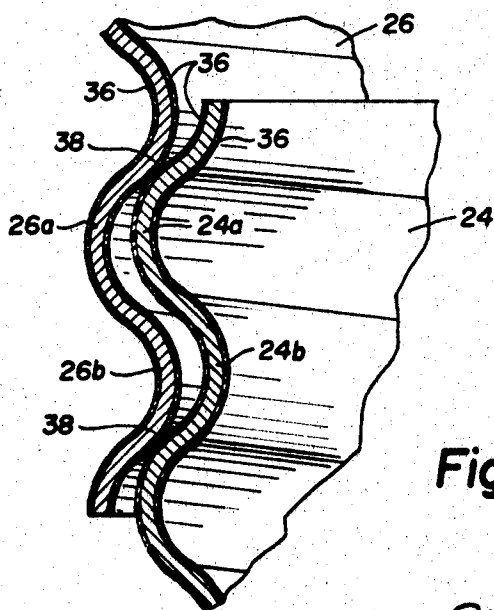


Fig. 2

INVENTOR.  
DAVID L. WYATT

BY  
*Watts, Hoffmann, Fisher & Heinke*  
ATTORNEYS.

1

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**ADJUSTABLE UNDERGROUND SHELL**  
David L. Wyatt, Akron, Ohio, assignor, by mesne assignments, to New England Realty Co., Barberton, Ohio, a corporation of Ohio

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**ABSTRACT OF THE DISCLOSURE**

An underground shell or container of two parts formed of helically corrugated tubular walls that interengage in threaded fashion for vertical adjustment through relative rotation to change the height of the shell.

This invention relates to an underground shell or vault, and more particularly to a two-piece underground shell that is adjustable in height.

The trend in present day construction practices is to locate electrical lines beneath the ground. For this purpose, utility ditches are dug adjacent construction sites to provide for the electrical cables necessary to service the buildings or other facilities being built. Typically, ditches are dug in the early stages of construction and waterproof, direct burial cables are laid in the ditches. Various terminals or junctions are provided along the main cables, and terminal shells or vaults are located in the ground above the main cable to receive a junction box where minor runs are spliced to the main cable to carry electricity to individual buildings. These shells are of fixed dimensions and provide a chamber beneath the ground to provide future access to the junction box. The shells are installed before final grading, and an attempt is made to locate the terminal shells so they will be at the proper level, flush with the intended grade line after final grading.

Difficulties have been experienced in properly locating the terminal shells so that they in fact do extend to the level of the final grade. Initially the depth of the ditch for the buried cable may be improper. Subsequently, the final grade may be finished higher or lower than anticipated when the shell was installed. Settling of the shell or ground subsequent to installation can also change the height of the shell relative to the surrounding grade. Any or all of these possibilities result in an improperly placed shell.

In the past, an improperly placed shell was either dug up and repositioned or else left at an improper height and the top buried or left protruding from the ground. Sometimes the final grade would be varied from that desired to accommodate the shell. None of these alternates are particularly satisfactory. It is expensive and time consuming to dig up a terminal shell after it has been partially or fully buried. If the top protrudes from the ground level, it is unsightly, dangerous, and subjects the shell to damage. If the shell is beneath the level desired, it becomes covered and subsequently difficult to locate. Where the grade is changed to accommodate a low shell, the resulting depression causes ground water to collect at the shell.

The terminal shell of the present invention overcomes the above problems in a convenient and inexpensive manner by utilizing two helically corrugated tubular members that are overlapped and longitudinally adjustable. At the same time, the construction is such that longitudinal adjustment of the two pieces can be accomplished only through relative rotational movement so that forces applied axially will not vary the adjusted height.

The present shell consists of a lower tubular member that is positioned with its upper end substantially below the final grade line, and an upper tubular member sur-

2

rounding an upper part of the lower member and adjustable to the final grade level. Both members are formed of standard helically corrugated galvanized steel tubes of different diameter, with overlapping portions threadedly engaged with each other. Such construction provides an effective seal between the two members and facilitates vertical adjustment through relative rotation while resisting changes in height from forces applied axially, as might be experienced during use. In addition, the corrugations provide an irregular surface that resists any tendencies of the shell to move axially as a unit within the ground.

Accordingly, it is an object of this invention to provide an improved underground shell that is inexpensive to fabricate, that can be adjusted to grade after installation, and that resists movement from axially applied forces.

This and other objects, features, and advantages of this invention will become more apparent as the invention becomes better understood by reference to the following detailed description, when considered in connection with the accompanying drawing, in which:

FIGURE 1 is a longitudinal sectional view of a vertically oriented underground shell constructed in accordance with the present invention; and,

FIGURE 2 is a fragmentary sectional view, on an enlarged scale, of the shell shown in FIGURE 1, illustrating the manner in which the corrugated tubular walls interengage.

Referring now to the drawings, an underground shell constructed in accordance with this invention is indicated generally by reference numeral 10. The surrounding ground is shown at 12 with the surface or final grade indicated at 13. The shell 10 is vertically oriented in the ground 12 and located directly above a waterproof, direct burial, cable 14 that extends horizontally in the ground a substantial distance beneath a final grade line 13. A tie-out or lead 18 extends upward from the main cable 14 and into the shell. Typically, four minor runs or lines are connected to the tie-out 18 and extend to four different houses or other buildings served by the terminal shell 10.

As shown in FIGURE 1, the shell 10 rests on a layer of gravel 20 and is flush at the upper end with the grade line 13. A standard burial depth of, for example, two feet is indicated by the location of an imaginary reference line 22 in FIGURE 1. This line establishes a reference plane during installation for initially locating the shell 10. With one-piece shells, this imaginary line determines the exact vertical location of the shell with respect to the intended grade. With the present shell 10, the reference line 22 serves only as a guide since subsequent adjustments in height can easily be made.

The shell 10 is formed of a first tubular member 24 and a second tubular member 26 which are in part overlapped and axially adjustable to vary the overall height of the shell. The first tubular member 24 is open at both a top end 28 and a bottom end 30. The bottom end 30 rests upon the layer of gravel 20.

The second tubular member 26 has a top end 32 and a bottom end 34. The top end 32 is covered by a lid 35 intended to be positioned flush with the final grade line 13. The bottom end 34 is open and located midway along the first tubular member 24. Preferably, the lower portion of second tubular member 26 surrounds the upper end of the first tubular member 24.

Both tubular members 24, 26 are constructed of helically corrugated galvanized steel, the corrugations of each being formed by alternately outwardly curved portions 24a and 26a, and inwardly curved portions 24b and 26b. Preferably, both members 24 and 26 are coated on the outside and inside surfaces by an asphalt mastic composition 36 (FIGURE 2).

As best shown in FIGURE 2, the maximum outside diameter of the inner tubular member 24 is at the portions 24a. This diameter is greater than the inside diameter of tubular member 26 at the portions 26b. Also, the diameter at 24a is smaller than the inside diameter of member 26 at portions 26a. This permits the corrugations of each tubular member to be intermeshed in thread-like fashion. When so arranged, the thread angle of the helical corrugations and the friction between the two members 24, 26 resist relative longitudinal movement when an axial force is applied, yet the members are relatively rotatable to permit purposeful longitudinal adjustment of one along the other.

Ease of relative rotation between the members 24, 26 is best assured by providing substantial clearance between the overlapping surfaces. This low tolerance construction also reduces the cost of manufacturing the shell because commercially available corrugated tubing of different standard diameters can be used for each of the members 24, 26. Notwithstanding the substantial clearance between the members, a relatively tight and continuous circumferential helical seal 38 is formed between the overlapping portions. This seal is formed along each corrugation where the inside surface of the outer tubular member 26 contacts the outside surface of the inside tubular member 24. The weight of the upper tubular member 26 creates sufficient pressure at the seal 38 to prevent the entrance of dirt and inhibits the entrance of ground water. The effectiveness of the seal is enhanced by the mastic coating, which deforms under pressure, and by positioning the larger diameter tubular member at the top, so that the opening at end 34 faces down rather than up.

Two angle pieces 40, 41 are secured, as by welding, inside of the upper tubular member 26. They are located adjacent the top end 32, diametrically opposite from each other. Each angle piece 40, 41 includes a horizontal upper flange 42, 43, respectively. Each upper flange 42, 43 has a threaded bore and receives a screw 45 that extends through the lid 35 and fastens the lid to the shell. As shown in FIGURE 1, the lid 35 extends beyond the upper circumferential edge of the top end 32 of the second tubular member 26 to provide a good seal without requiring an accurate fit.

By way of example, the embodiment shown in FIGURES 1 and 2 illustrates a shell 10 in which the two members 24, 26 are formed of 16 gauge galvanized helically corrugated steel tube and coated with an asphalt mastic protective covering 36. The lower tubular member 24 is 25 inches in height and has an 18 inch inside diameter. The upper tubular member 26 is 18 inches high and has a 19½ inch inside diameter. The overall height of the shell 10 as shown is 34 inches with the bottom end 30 positioned 2 inches above the electrical cable 14. The upper and lower members are shown with 9 inches of overlap and the top member 26 is adjustable for several inches in either vertical direction. The grade line 13 is 3 feet above the cable 14. A standard depth of bury reference line 22 is 24 inches below the final grade line 13.

Installation of the shell 10 is accomplished by placing the bottom end 30 of the shell over a ditch (not shown) that receives the cable 14. Gravel is poured into the shell and allowed to spread below the lower end 30 to form a porous base. The ground is then partially back filled about the lower member 24 to retain the shell in place. Subsequent grading will raise the level of the ground to the final grade at 13 and the entire shell will be buried.

As can be appreciated, with this adjustable construction, the depth at which the bottom end 30 of the shell 10 is placed is not critical, as it would be with a one-piece shell. This is because the bottom end 30 does not establish a fixed location for the top end 32. Thus, it does not matter whether or not the ditch for the cable 14 has been placed at an accurate depth. Similarly, it does not matter whether the top end 32 extends precisely 24 inches above

the reference line 22, as it would with a single piece shell. When the finished grade 13 is established, the level may or may not be the predetermined distance above the reference line 22 used to initially position the shell. Moreover, there may be subsequent settling of the surrounding ground. In any of these situations adjustment of the overall height of the shell 10 is made to locate the top end 32 and cover 35 level with the finished grade 13.

In the event adjustment of the overall height of the shell 10 is required, the cover 35 is removed by removing the screws 45. A suitable spanner bar or wrench is extended between the angle pieces 40, 41 and the second tubular member 26 is rotated relative to the first member. In this connection, it will be appreciated that the ground 12 packed about the shell 10 is also in the form of corrugated helical threads surrounding the second tubular member 26. Thus, adjustment is made without displacing the compacted earth surrounding the shell.

Rotation of the second tubular member 26 relative to the first tubular member 24 causes the second member to move axially relative to the first due to the helical contracting surfaces along the seal line 38 where the two members interengage. At the same time, the interengaging portions resist relative longitudinal movement from axial forces that might be applied to the cover 35 while the shell is in use. For best results, it is preferable to initially install the adjustable shell 10 with the top end 32 at a minimum height and thereafter adjust the overall height by raising the second or top tubular member 26 relative to the lower member.

While a preferred embodiment of this invention has been described with particularity, it will be apparent that numerous modifications or alterations may be made therein without departing from the spirit and scope of the invention as set forth in the appended claims.

What is claimed is:

1. An underground shell for use with electrical conduits or the like and which is adjustable in height within the ground to vary the elevation of the top of the shell with respect to a lower portion and with respect to the ground level, said shell having a tubular shape, circular in transverse cross section, of generally uniform diameter throughout its length but being formed of first and second axially aligned tubular members that differ slightly in diameter, which themselves serve to house equipment within the ground and which are helically corrugated throughout their length, an end portion of the first member being rotatably received in an end portion of the second member with the corrugated walls interengaged in threaded fashion, substantial portions of the members being in non-overlapping relationship, the said members to be located with the tubular axes vertical in the ground with the overlapping second member forming an upper part of the shell and the first member forming a lower base part of the shell with the corrugations of overlapping portions establishing an essentially continuous line of circumferential contact between the two members to provide a seal between the tubular walls of the members, and with the corrugations of the substantial non-overlapped portion of the first member serving to firmly anchor the base part of the shell in the ground so that axial loads will not displace the shell, said first member being open at both ends; and a cover removably fastened to the end of the second member remote from the first member.

2. A shell as set forth in claim 1 including a protective coating on the inside and outside surfaces of the first and second members that inhibits corrosion of the shell, with the coating on the inside of the second member and on the outside of the first member deformed at the line of circumferential contact to enhance the seal between the two members.

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5

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6

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LARAMIE E. ASKIN, *Primary Examiner.*