United States Patent

[11] 3,629,981

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Continuation of application Ser. No. 671,012, Sept. 27, 1967, now abandoned. This application Oct. 6, 1969, Ser. No. 867,117

[54] **ADJUSTABLE HEIGHT STRUCTURE COVER FOR MANHOLES AND THE LIKE**
7 Claims, 5 Drawing Figs.

[52] **U.S. Cl.** **52/19,** 52/20, 94/34
[51] **Int. Cl.** **E02d 29/14**
[50] **Field of Search** ..... 52/19–21; 94/33–35; 85/1 SS; 151/70

[56] **References Cited**

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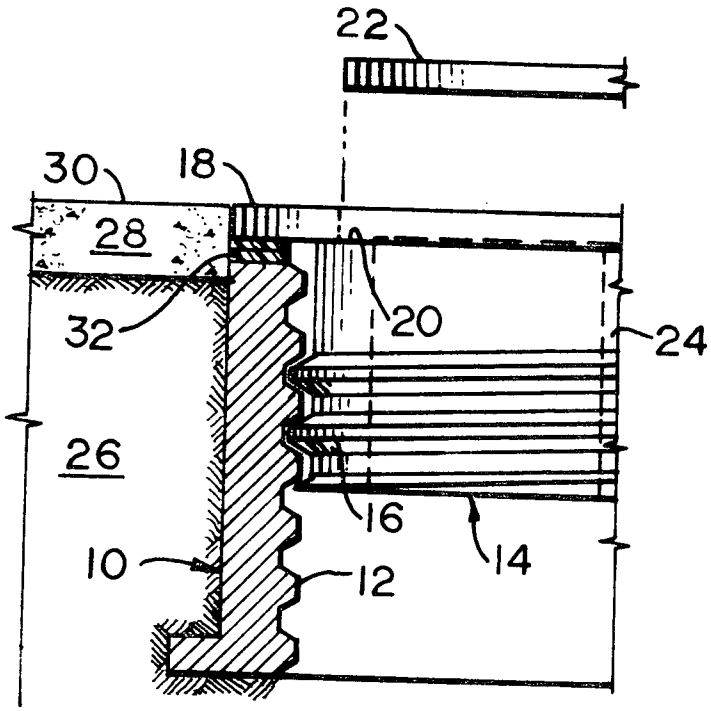
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ABSTRACT: An adjustable height assembly for supporting a cover over a subterranean access opening wherein a cylindrical frame structure having interior coaxial acme threads is adapted to be permanently located in nonrotatable submerged position. An inner sleeve, having a conformingly shaped acme thread about the outer surface thereof, is provided to be received in threaded engagement with the cylindrical frame structure, the inner sleeve being adjustable in height by rotation and designed to support a load-bearing disc-shaped cover flush with the surface surrounding the access opening. The threaded portions of the frame structure and inner sleeve are effectively sealed from the surrounding earth and pavement so that height adjustment may be relatively easily accomplished even after a prolonged period of installation and use.



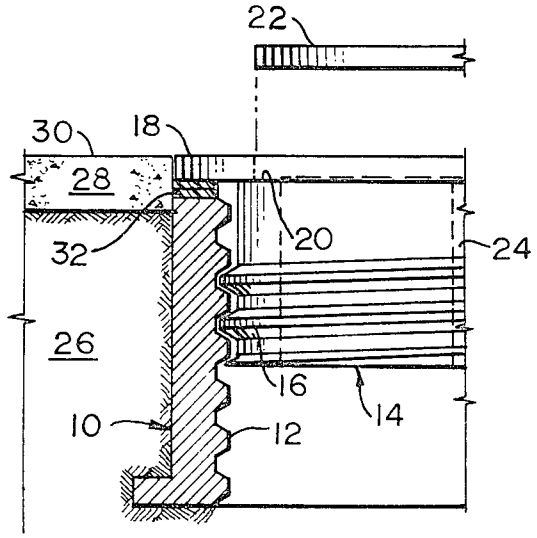


FIG. 1

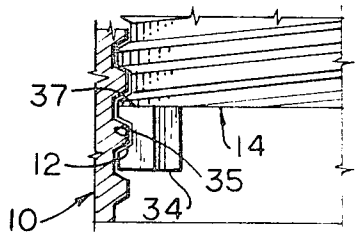


FIG. 3

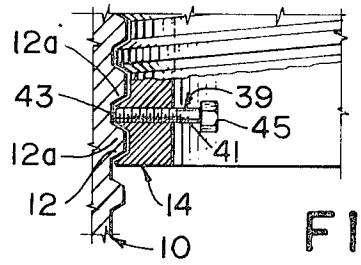


FIG. 5

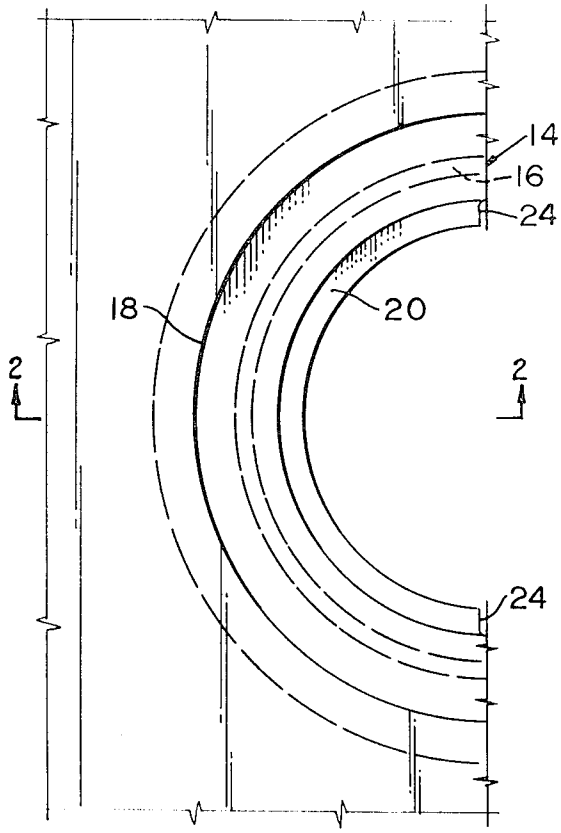


FIG. 2

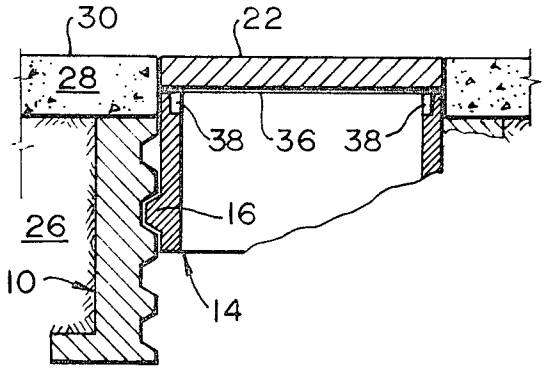


FIG. 4

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ADJUSTABLE HEIGHT STRUCTURE COVER FOR MANHOLES AND THE LIKE

This is a continuation of my earlier patent application for ADJUSTABLE HEIGHT STRUCTURE COVER FOR MANHOLES AND THE LIKE, Ser. No. 671,012, filed Sept. 27, 1967, and now abandoned.

This invention relates to an adjustable height cover assembly for installation within manholes or the like; and, more particularly, a cover assembly that provides a continuum of precise height settings by a simple rotational adjustment which is protected from the surrounding earth and pavement so that such adjustment may be relatively easily accomplished after a prolonged period of installation and use.

A number of adjustable height manhole cover assemblies have been developed in the art to provide for alterations in the pavement level and to circumvent the costly excavation and resetting procedure necessitated by nonadjustable cover support structures. However, these adjustable assemblies have not found the widespread use which might be expected primarily due either to the cost of manufacture or the impracticality and difficulty of the adjustment exhibited thereby. Such manhole cover assemblies are exemplified by the U.S. Pats. to Calhoun, No. 1,408,982, issued Mar. 7, 1922; Lincoln No. 1,447,256, issued Mar. 6, 1923; Banwell, No. 638,692, issued Dec. 12, 1899, and Gschwind, No. 1,673,145, issued June 12, 1928; and the British Pats. to Gilmour, No. 527,582, accepted Oct. 11, 1940, and Chatwin, No. 443,634, accepted Feb. 28, 1936.

Even in view of the above-noted seasoned art, the presently prevailing installations of conventional fixed height cover support structures and the inevitable removal and resetting thereof, indicate the desirability of providing a new adjustable height manhole cover assembly achieving one or more of the following objectives.

It is a broad object of the invention to provide an adjustable height manhole cover assembly or the like which retains its ability to be adjusted even after prolonged placement in the ground and attendant use and is economically manufacturable.

It is a more specific object of the invention to provide an inexpensive adjustable manhole cover assembly which may be easily raised or lowered to a continuum of levels.

A further specific object of the invention is to provide an adjustable height manhole cover assembly wherein the adjustment mechanism is protected from loose soil or pavement.

It is a feature and advantage of this invention that the height adjustment coupling may be selected to provide for a wide range of traffic loads.

It is another feature and advantage of the invention that it may be manufactured by a simple casting operation without requiring expensive additional machining.

A still further feature and advantage of the invention is that it may be constructed to provide as large a height variation range as desired.

Further objects, features, and advantages of this invention will become apparent upon a reading of the following specification, and by reference to the accompanying drawings wherein corresponding characters of reference refer to similar components in each of the several views.

Turning now to the drawings:

FIG. 1 is a partial cross-sectional front view taken along line 2—2 of FIG. 2 showing the invention installed within a subterranean access opening;

FIG. 2 is a top view of the invention shown in FIG. 1;

FIG. 3 is an enlarged cross-sectional view showing a preferred component of the invention cooperating with elements of FIG. 1;

FIG. 4 is a cross-sectional view of an additional embodiment of the invention; and

FIG. 5 is a partial cross-sectional view similar to that of FIG. 2 showing an alternate embodiment of the invention.

The invention here is best understood by referring first to FIG. 1 where there is shown a cylindrical casing **10** having an internal integral helical rib **12** for engaging and supporting

sleeve **14** which has an external integral helical rib **16** cooperating with rib **12**. Sleeve **14** includes a radially extending flange **18** wherein the flange is provided with recessed seat **20**, best shown in FIG. **2**, for receiving disc-shaped cover **22**. As shown in FIG. **2**, sleeve **14** has formed therein a pair of opposing key slots **24** each extending longitudinally along the inner surface thereof, such slots being adapted to mateably receive suitable extensions of an appropriate spanner wrench, or similar tool, so that a rotational force may thereby be imparted to sleeve **14**. With casing **10** mounted permanently within a road or walkway, the frictional engagement of soil **26** and in some instances, pavement **28**, maintains the casing in a rigid nonrotatable buried condition; thus, sleeve **14** may be easily rotated with respect thereto by means of a spanner wrench or similar device acting on key slots **24**. It will be appreciated that such rotation of sleeve **14** permits flange **18** and cover **22** to be adjusted to any of a continuum of heights and thus precisely flush with pavement surface **30**. It is understood, of course, that the presence of a pavement is not essential to the practice of my invention; and it may be beneficially utilized even where the surrounding surface is dirt, gravel, or the like.

In a particularly advantageous form of the invention, shown by FIGS. **1** and **2**, a relatively hard neoprene gasket, or as shown in this case a plurality of stacked gaskets **32**, are incorporated between flange **18** and the upper end surface of casing **10**. It has been found that the inclusion of gaskets **32** provides several beneficial results, the principal one of these being the retention of dirt and gravel existing in pavement **28** and soil **26** from drifting into the cooperative engagement of helical ribs **12** and **16**, thereby insuring smooth and easy rotatable movement therebetween even after long static periods.

More specifically, the upper edge surface of casing **10** is shaped to provide a relatively flat planar surface for bearing engagement against the lower most face of gasket **32**. Similarly, the lower circumferential surface of flange **18** is formed to provide a flat surface for engagement against the uppermost surface gaskets **32** when the latter are placed in operable position between flange **18** and the upper edge surface of casing **10**, with sleeve **14** rotatably engaged within the casing at final installation. It is to be noted in this connection, in accordance with the present invention, that the upper edge of casing **10** and the lower surface of flange **18** provide planar confronting and parallel surfaces of substantially the same annular circumference so as to effectively engage gaskets **32**.

It is important to note that gaskets **32** are particularly advantageous when the surrounding pavement **28** is asphalt or merely a dirt or gravel surface alone, in which case the gaskets effectively prevent creepage of loose material down into the chamber between casing **10** and sleeve **14**, an obviously undesirable occurrence. Additionally, gaskets **32** when slightly compressed by a downward adjustment of sleeve **14** provide a resilient force between casing **10** and flange **18** thus mitigating against clatter of the assembly in the presence of overhead transient loads. Furthermore, the resilient characteristic of neoprene gaskets **32** creates a clutching force between flange **18** and casing **10** thus helping to prevent spurious rotation of sleeve **14**.

At this point, a further significant aspect of the invention becomes apparent; namely, the universal adjustability of sleeve **14** to compensate for either an increase or decrease in the elevation of surface **30**. Specifically, when the assembly is initially installed within a subterranean access opening, a sufficient number of gaskets **32** are inserted between flange **18** and casing **10** such that a substantial hiatus is provided therebetween allowing for a removal of a desired number of the gaskets when and if it becomes necessary to lower flange **18**. Alternatively, of course, additional gaskets may be added to the initial stack if instead it is desired to raise flange **18** and cover **22**.

In view of the foregoing described structure, and unlike any of the prior art devices with which I am familiar and noted at the beginning of this specification, the present invention pro-

vides an efficient and relatively easily adjusted structure, even after prolonged burial in the ground and/or finished pavement. That is, by merely removing the pavement or ground surface immediately circumjacent to the cover structure to be altered in elevation, such adjustment may be made by rotating inner sleeve **14**, either upwardly or downwardly, to the desired elevation and adjusting the placement and number of gaskets **32**. Note that such pavement or ground removal need only be performed to an elevation just even with the top edge of casing **10**, thereby to liberate flange **18** of inner casing **14** and gaskets **32**; while in the case of all prior art devices with which I am familiar, including the device described in the British Pat. No. 527,582, substantially greater amounts of ground or pavement must be removed. Even then, readjustment is probably not possible due to the exposure of the threaded connection between mating parts to dirt, pavement, etc.

FIG. **3** shows a wedging segment **34** consisting of a small rectangular block having recess **35** centrally located through one face thereof wherein segment **34** provides a means for rigidly securing sleeve **14** with casing **10**. More particularly, wedging segment **34** is slid along rib **12** until upper surface **37** thereof contacts the lower surface of sleeve **14**; and in approximately this position segment **34** is firmly wedged between rib **12** and the bottom of sleeve **14**. The wedging segment is preferably made of soft malleable metal which is conducive to the wedging effect. While a single such segment will for most purposes provide a sufficient securing force between sleeve **14** and casing **10** so as to eliminate rotation and chatter therebetween, it may be desirable to insert more than one of these segments, for example three, at more or less equal angular displacements around the circumference of casing **10** in the event of unusually heavy axial loads.

In FIG. **5**, which is a sectional view similar to that of FIG. **3**, with a portion of sleeve **14** also shown in section, an alternative to wedging segment **34** for securing the sleeve in position within casing **10** is shown. More particularly, such alternative comprises bolt **39** threadably mounted in cooperatively threaded bore **41**. Bore **41** is so located that end **43** of bolt **39** emerges therefrom in abutting relationship against the valley flat formed between adjacent sides **12***a* of helical rib **12**. Upon positioning of sleeve **14** within casing **10**, advancement of bolt **39**, as by turning of head **45** using a wrench or other suitable tool, causes the bolt to firmly and pressurably hold the sleeve within the casing.

As a significant feature of the invention, it is noted that FIGS. **1**, **3**, and **4** show cooperatively engaging acme threads for integral ribs **12** and **16**. The utilization of acme threads and the preferred embodiments of the invention not only allow for simplicity and economy in casting of the component, but also provide a stronger shear strength in comparison with other types of threads. Specifically, it is noted that the obtuse angles of the acme thread will maintain the local stresses developed within the threads within tolerable levels even in view of substantial tonnage exerted on cover **22**.

In constructing the assembly described herein, casing **10** and sleeve **14** may be fabricated of cast iron. It has been found that a substantial cost savings can be achieved by specifically designing the castings such that casing **10** and sleeve **14** exhibit a coarse or loose threaded engagement. With this technique, no expensive additional machining of the components is required, yet the sleeve and casing exhibit a substantial coupling together with these in relative rotation.

An additional embodiment of the invention is shown in FIG. **4**, wherein discoidal cover **22** seats directly on the upper peripheral edge **36** of sleeve **14** thereby eliminating the flange shown in FIGS. **1** and **2** (flange **18**). To provide a means in sleeve **14** of FIG. **4**, for receiving a rotating force, a pair of opposing notched recesses **38** are formed in the upper peripheral edge **36** of sleeve **14**. Similar to the embodiment shown in FIGS. **1** and **2**, a spanner wrench or the like may be inserted in recesses **38** for convenience in adjusting sleeve **14** precisely to the desired height. It will be appreciated that the embodiment in FIG. **4** is well suited for situations in which pavement **28** exhibits a high degree of rigidity and cohesive strength. For example, where pavement **28** is concrete and the cohesive strength thereof mitigates against crumbling and the dispersion of loose particles which, in the embodiment of FIG. **4**, would drop down and interfere with the cooperating engagement between casing **10** and sleeve **14**. Where pavement **28** is asphalt, dirt, gravel, or the like, which has less cohesive strength than concrete, it would be preferable to use the embodiment of the invention shown in FIGS. **1** and **2** which includes protective gaskets **32**.

It is noted in comparing FIG. **1** with FIG. **4** that the thread length of helical rib **16** on sleeve **14** may be varied in length; the numerous revolutions of flange **18** in FIG. **1** providing for heavy loads, while the single revolution of rib **16** in FIG. **4** may provide adequately for lighter axial loads.

I claim:

1. An adjustable level assembly for supporting a subterranean access opening cover flush with the surrounding surface of the terrain in which said assembly is installed, the combination comprising:

a casing having interior and exterior surfaces, said interior surface defining an annular aperture having an integral helical rib coaxial therewith and said casing adapted to be received in the terrain in rigid nonrotatable submerged relationship therewith; and

an annular sleeve having an integral annular flange circumferentially disposed about and radially extending from one end of said sleeve and an external integral helical rib coaxial therewith, said sleeve helical rib being formed at the lower portion of said sleeve freely rotatably engaged to said casing helical rib to provide an adjustable level, load-bearing support for said cover; and

sealing means between the underside of said flange and the end of said casing proximate thereto to prevent the entry of foreign material and interference with the free rotatable engagement of said sleeve and casing helical rib.

2. The apparatus defined in claim **1**, wherein said sleeve includes a means for receiving a rotating force.

3. The apparatus recited in claim **1** further including a removable clamping means secured to a portion of said casing helical rib and in contact with a portion of the lower edge of said annular sleeve when the latter is in position in said casing, said clamping means to prevent spurious rotation between said casing and annular sleeve.

4. The device in accordance with claim **1** and wherein further said sealing means comprises at least one resilient gasket having an annular shape with the inside diameter at least as great as the outside diameter of said annular sleeve away from said flange and an outside diameter at least as great as the outside diameter of said flange.

5. The article of manufacture recited in claim **3**, wherein said removable clamping means comprises at least one compressible member having a recess in one portion thereof generally conforming to an arcuate segment of said casing helical rib; said member shaped for wedging between said casing helical rib and the end of said sleeve distal said surrounding surface.

6. The article of manufacture recited in claim **3** wherein said removable clamping means comprises a bolt having a threaded portion; thread means formed in said sleeve to cooperatively receive said threaded portion of the bolt for advancement therethrough and position the bolt to abut one end with a portion of said casing between adjacent segments of said helical rib when the sleeve and casing are cooperatively engaged in final operative position and said bolt is threadedly advanced through said means.

7. The article of claim **1** wherein said helical rib of said casing and sleeve is an acme thread.

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