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ADJUSTABLE MANHOLE CONSTRUCTION

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FIG. 2

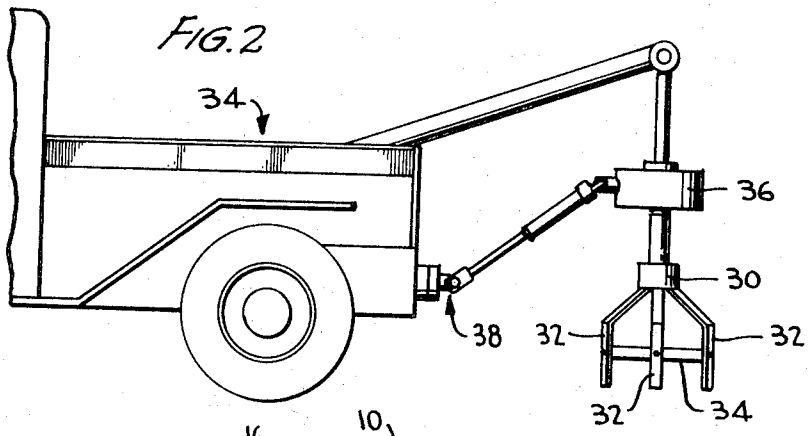


FIG. 3

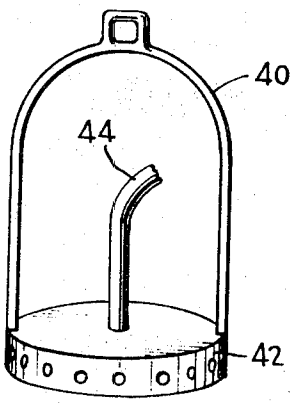
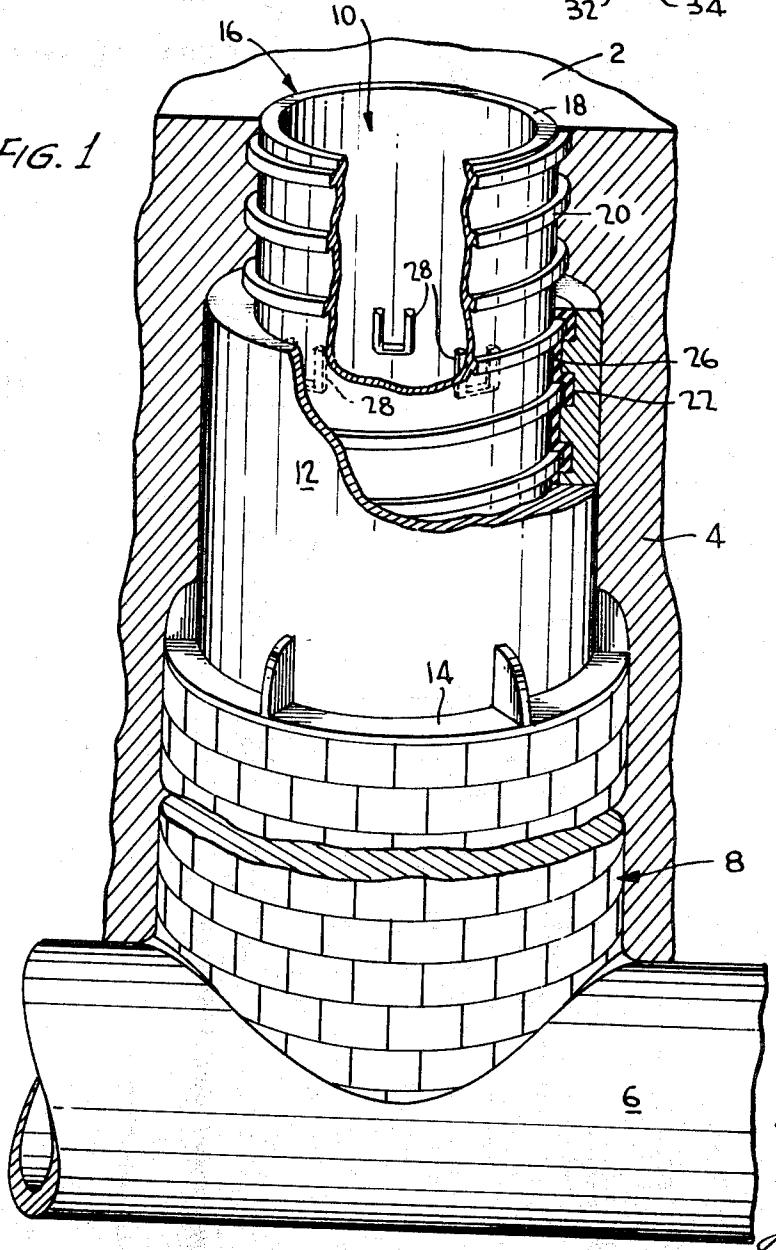


FIG. 1



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ADJUSTABLE MANHOLE CONSTRUCTION

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ABSTRACT OF THE DISCLOSURE

A novel manhole construction is disclosed for providing access to an underground structure such as a sewer line from the ground surface, the total longitudinal length of the manhole construction being easily adjustable to compensate for variations in grade of the ground surface. The manhole construction of the subject invention comprises a first substantially cylindrical frame member adapted to be disposed underground in communication with the underground structure and a second substantially cylindrical frame member adjustably and telescopically disposed with respect to the first frame member adapted to extend upwardly an adjustable distance to the surface of the ground. In a preferred embodiment of the subject invention, thread means are provided between the first and second frame members whereby, by rotation of the second frame member with respect to the first frame member, the total longitudinal length of the manhole construction can be varied. Organic or mineral scealing means such as asphalt are preferably provided between the first and second frame members and cooperate in a novel fashion with the thread means. When heated, the sealing means forms a lubricant facilitating rotation of the second frame member and when cooled, solidifies to firmly hold the first and second frame members in their relative positions.

This invention generally relates to manhole constructions for providing access to an underground structure such as a sewer line from the ground surface and particularly concerns a manhole construction having an adjustable total longitudinal length to compenste for variations in surface grade.

Virtually all underground systems and structures such as sewer lines or the like are provided with manhole constructions enabling access of maintenance men from the ground surface to the underground structure. Manholes of prior art constructions generally comprise but a single tubular or cylindrical frame of cast iron, for example, which is placed upon a brick or concrete base extending upwardly from the underground structure toward the ground surface. The signal frame is generally of a fixed longitudinal length and the underlying concrete or brick base is normally constructed high enough such that the top of the manhole frame is level with a given ground surface grade.

Quite obviously, it is necessary for the top of the manhole frame to be level with the ground surface grade and such is particularly true when one considers that underground structures such as swear lines oftentimes run beneath streets and highways with the associated manholes communicating with the roadway surface. If the level of the manhole frame were not equal to the grade of the street or highway surface, then dangerous protrusions of depressions would result. Thus, when a new roadway and a new sewer line running therebeneath are constructed, cooperation and care is required by and between the highway crew and the manhole crew. The manhole crew, in particular, must necessarily construct the underlying brick or concrete base for the sewer frame to a predetermined height within a small tolerance level such

that the prior-art sewer or manhole frame having a fixed longitudinal length and which is placed on top of the base will just reach the proposed top surface grade of the new roadway.

If, at some future date, the level or grade of the roadway surface is to be changed such as would be the case if the roadway were repaved, then it is necessary for the manhole maintenance crew to actually dig out the previously placed manhole frame and either add to or subtract from the underlying level of the brick or concrete base so as to readjust the top level of the manhole frame to again correspond with the grade of the repaved road. As should be apparent, the readjustment of the height of a manhole frame as described above is a very time-consuming process requiring, in many cases, major construction equipment, and such readjustment involves many man-hours of work per manhole frame. In addition to this consumption of time, a corresponding increase in cost to the municipality undertaking the road re-surfacing task would accrue.

The above-described difficulties and/or disadvantages are the direct result of utilizing prior-art manhole frames which have a fixed length. Because of this fixed length, any adjustment in the grade of the manhole frame must be undertaken at the underlying concrete or brick base, a major construction job in itself. If a manhole construction could be provided which would have an easily adjustable longitudinal length by itself, then these disadvantages would be eliminated. It is thus the primary object of the subject invention to provide a novel manhole construction which, by having an adjustable longitudinal length, eliminates the prior-art problems.

Further, more specific, though equally important, objects of the subject invention are:

(a) The provision of a manhole construction having a longitudinal length that can easily be varied without necessitating the utilization of complex construction equipment;

(b) The provision of a manhole construction having an adjustable longitudinal length whereby the adjustment of the length can be effected by a single man and in an extremely short time, if so desired;

(c) The provision of a manhole construction having an adjustable longitudinal length wherein the length, once adjusted, can be strictly maintained until further adjustments are desired;

(d) The provision of a manhole construction having an adjustable length and including a seal therein whereby ground water cannot seep into the underground structure or sewer line associated therewith;

(e) The provision of a manhole construction having an adjustment length wherein the sealing medium, when heated, functions as a lubricant to facilitate adjustment of the longitudinal length of the manhole frame.

The above as well as other objects that will become apparent as the description proceeds are implemented by the subject invention in that a novel manhole construction having an adjustable longitudinal length is provided, the manhole construction comprising a first substantially cylindrical frame member adapted to be disposed underground in communication with the underground structure and a second substantially cylindrical frame member adjustably and telescopically disposed with respect to the first frame member and adapted to extend upwardly an adjustable distance to the surface of the ground. In a preferred embodiment of the invention, the second frame member is disposed to telescopically extend into the first frame member a predetermined and adjustable distance, the adjustment of this distance being effected by the provision of external thread means on the outer surface of the second frame member and cooperating internal thread means on the inside surface of the first frame member.

Through simple rotation of the second frame member, the height of the combined manhole frame can be raised or lowered as desired.

The subject invention, in a preferred form thereof, further contemplates the provision of a sealing means between the external and internal threads of the two cooperating frame members. Such sealing means is contemplated to comprise an organic or mineral base material, such as pitch, having a melting point of at least 100°. When adjustment of the height of the combined manhole frame is desired, the frame would initially be heated to soften the asphalt base material effecting the seal, the softened asphalt base material then operating as a lubricant. In this manner, rotation of the second or upper frame member with respect to the first or lower frame member can easily be effected through use of a suitable tool lowered into the upper frame member from the surface and preferably driven by a power take-off on the maintenance truck, although rotation can be effected manually, if so desired. After the upper or second frame member has been rotated such that the combined sewer frame assumes the new desired level or grade, the asphalt base material comprising the seal will cool and solidify to thus prevent any further, undesired rotation of the upper or second frame member and to effectively eliminate the problem of ground water seepage into the underlying sewer line.

The invention will be better understood and additional features and advantages thereof will become apparent when attention is directed to the following detailed description of preferred embodiments thereof, such detailed description making reference to the appended drawings wherein:

FIG. 1 is a partially broken-away, partially in elevational section, prospective view of the novel manhole construction of the subject invention;

FIG. 2 is a diagrammatic illustration of a suitable external tool utilized to adjust the height of the novel manhole construction by rotating the upper frame member with respect to the lower frame member depicted in FIG. 1, the adjustment tool being driven by a power take-off on a maintenance truck; and,

FIG. 3 is a perspective illustration of a suitable heating tool or member utilized to heat the sealing material between the first and second frame members of the manhole construction of FIG. 1 whereby the sealing means effectively forms a lubricant between the first and second frame members enabling easy rotation.

Referring now to FIG. 1, a manhole is illustrated constructed in accordance with the principles of the instant invention. The novel manhole construction is illustrated as providing access between the surface **2** of the surrounding ground **4** and an underlying, underground structure such as the illustrated sewer line **6**.

In accordance with standard procedure, a cylindrical base designated **8** constructed of brick or concrete may be provided extending upwardly a predetermined distance from the underground sewer line **6**. The base **8** is open at both its top and bottom ends thereof, the bottom end communicating directly with the sewer line **6**, to effectively provide an upwardly extending tubular extension of the sewer line **6**.

The manhole generally designated **10** constructed in accordance with the principles of the present invention is placed on top of the base **8** and desirably extends to the surface **2** of the surrounding ground **4**. The manhole construction **10** is seen to comprise a first substantially cylindrical frame member **12**, preferably constructed of cast iron or the like, and provided with a bottom flange **14** adapted to rest upon the top of the underlying base **8**. A second substantially cylindrical frame member **16** is adjustably and telescopically disposed with respect to the first frame member **12** and, as illustrated, the top flange **18** of the second frame member **16** desirably extends just to the surface **2** of the surrounding ground **4**. The second

or upper substantially cylindrical frame member **16** is preferably likewise constructed of cast iron or the like and, in the preferred embodiment of the subject invention illustrated in FIG. 1, the second frame member **16** is adapted to telescopically extend into the first or lower frame member **12**.

Adjusting means are associated with both the first and second frame members **12** and **16**, respectively, for adjusting the distance that the second or upper frame member extends into the first or lower frame member **12**. In the illustrated embodiment, such adjusting means take the form of external threads **20** provided on the outside surface of the upper or second frame member **16** and cooperating internal threads **22** provided on the inside surface of the lower or first frame member **12**, although other equivalent adjusting mechanisms may be provided. The pitch of threads **20** and **22** preferably is within the range of 1½ to 3 inches per 360°, this range having been found particularly suitable. As should be apparent, since the first or lower frame member **12** is generally fixedly attached to the underlying base **8**, mere rotation of the second or upper frame member **16** would effect a change in the overall longitudinal length of the manhole construction. Preferably, as shown in FIG. 1, the respective threads of the first and second frame members substantially complement each other and contact each other along substantially their entire axial contour. In this manner, the weight of the second or upper frame member is supported upon a much greater surface area of the first or lower frame member than has been previously known, thus effecting a considerable reduction in wear and tear upon the lower frame member.

Protection against the leakage of ground water from the adjacent ground **4** into the underlying sewer line **6** is provided by the novel manhole construction of the subject invention through the use of a sealing means designated **26** placed between the external and internal threads **20** and **22**, respectively, of the second and the first frame members **16** and **12**, respectively. Such sealing means, in a preferred embodiment of the subject invention is contemplated to comprise any asphalt base material having a melting point of 100° or higher for the reasons to be described below and pitch has been found particularly suitable for this purpose.

As discussed above, the pitch of the thread means **20** and **22** preferably, though not necessarily, falls within the range of 1½ to 3 inches per 360°. Such selection of range is merely to ensure that rotation of the upper or second frame member **16** with respect to the lower or first frame member **12** can be easily effected through the use of an external tool preferably inserted into the substantially U-shaped receptacles **28** disposed on the inside surface of the upper or second frame member **16**. Yet, the pitch of the threads **20** and **22** are such that impact with the upper flange **18** of the second frame member **16** by passing vehicles, for example, will not produce vibrations which might cause undesired additional rotation of the second frame member **16**. The sealing means **26** provided between the thread means **20** and **22** further provides for this safety function since the asphalt base material contemplated for use generally solidifies below 100° F. and, in addition to providing a seal between the first and second frame members **12** and **16**, respectively, prevents unwanted and undesired rotation of the second frame member **16**. By merely heating the inside surface of the second frame member **16**, such heating being contemplated to be carried out through the use of an external heater or tool to be discussed below, the asphalt base material essentially liquifies and provides a lubricant between the first and second frame members when rotation is desired. Thus, as has been seen, the sealing means **26** of the subject invention perform a unique multi-purpose function.

Referring now to FIG. 2, a suitable external turning tool for rotating the second frame member **16** and thus altering the total longitudinal length of the manhole con-

struction is illustrated. Such rotational tool is contemplated to comprise an upper support structure **30** having a plurality of downwardly extending prongs **32** depending therefrom. A lower support frame **34** connected between the downwardly extending prongs **32** can be provided, if desired, to increase the structural strength of the rotational tool. The downwardly extending prongs **32** are contemplated to be placed into the corresponding receptacles **28** provided on the inside surface of the upper or second frame member **16** of the novel manhole construction depicted in FIG. 1.

The rotational tool of FIG. 2 preferably is contemplated to be both supported and operated by a maintenance truck generally designated **34**, rotation of the tool being effected through the use of generally illustrated reduction gearing **36** driven by the power take-off **38** of the maintenance truck **34**.

As discussed above, heating of the manhole construction is a preferred prerequisite to the adjustment of the total longitudinal length thereof since such heating serves to liquify the sealing means **26** provided between the first and second frame members and to thus provide a lubricant therebetween. To this end, a suitable heating tool is depicted in FIG. 3 and is seen to comprise a frame member **40** adapted to be supported by the maintenance truck **34** and attached to a gas heater **42**, for example, fed by gas through the extending hose **44**.

Now, assume that the grade of the ground surface **2** is to be changed necessitating a corresponding change in the grade of the manhole construction. As stated above, if prior-art manhole constructions were utilized, a maintenance crew comprising many men and much construction equipment would be sent to the scene whereby the area surrounding the prior-art manhole construction would be excavated to afford access to the underlying brick or concrete base **8**. The prior-art manhole frame itself would be removed from the underlying base **8** and a level or more of bricks, for example, would either be removed from or added to the base **8**. After reconstruction of the base **8**, the prior-art manhole frame would again be lowered onto the base **8** and, hopefully, the level of the manhole frame would now correspond with the new surface ground grade.

With the manhole construction of the subject invention, however, this time-consuming and expensive constructional process necessary with prior-art manhole configurations is eliminated. Rather, and in an obviously simple fashion, a single operator would first lower the heating tool disclosed in FIG. 3 into the manhole construction so as to heat the sealant **26** between the first and second frame members **12** and **16**, respectively. The sealing means **26** would then "melt" and, in its liquified form, would serve as a lubricant. Now, the single maintenance man would then lower the rotational tool depicted in FIG. 2 into the manhole construction such that the depending prongs **32** thereof would fit into the receptacles **28** provided on the inner surface of the upper or second frame member **16**. Through actuation of the power take-off **38** on the maintenance truck **34**, force would be transmitted to the reduction gearing **36** causing rotation of the tool and rotation of the upper or second frame member **16** with respect to the lower or first frame member **12**. Thus, the level of the top flange portion **18** of the second frame member **16** could be raised or lowered as desired to correspond to the new grade of the ground surface **2**. Rotation of the upper frame member **16** would then cease and, by this time, the sealing means **26** between the first and second frame members would again solidify securely preventing further undesired rotation between the respective

frame members. Thus, with the novel manhole construction of the subject invention, no excavation whatsoever is required, no rebuilding of the underlying manhole base **8** is required, and, of course, a complete maintenance crew is unnecessary. As should be apparent, a large number of manholes constructed in accordance with the present invention can be raised or lowered in the time that it previously took to raise or lower but a single manhole of prior-art construction.

It should now be apparent that all the objects set forth at the outset of the specification have been successfully achieved.

What is claimed is:

1. A manhole construction for providing access to an underground structure such as a sewer line from the ground surface, said manhole construction comprising: a first substantially cylindrical frame member adapted to be disposed underground in communication with the underground structure; a second substantially cylindrical frame member adjustably and telescopically disposed with respect to said first frame member adapted to extend upwardly an adjustable distance to the surface of the ground, said second frame member telescopically extending into said first frame member a predetermined distance; adjusting means associated with said first and second frame members for adjusting said predetermined distance of extension of said second frame member into said first frame member; and sealing means for effecting a seal between said first and second frame members; said adjusting means comprising external thread means disposed on the outer surface of said second frame member and cooperating internal thread means disposed on the inside surface of said first frame member, said second frame member being rotatable with respect to said first frame member, said external and internal thread means substantially complementing each other and contacting each other along substantially their entire axial contour.

2. A manhole construction as defined in claim **1**, wherein said sealing means comprises an asphalt base material disposed between said internal and external thread means.

3. A manhole construction as defined in claim **2**, wherein said asphalt base material has a melting point in excess of 100° F., said asphalt base material forming a lubricant between said first and second frame members when heated.

4. A manhole construction as defined in claim **2**, wherein said internal and external thread means have a pitch 1½ to 3 inches in 360° of revolution.

5. A manhole construction as defined in claim **4**, further including receptacle means fixedly disposed on said second frame member for receiving a tool therein whereby said second frame member can be rotated.

6. A manhole construction as defined in claim **5**, wherein said receptacle means are substantially U-shaped.

7. A manhole construction as defined in claim **1**, wherein said first frame member comprises a bottom flange member adapted to rest upon the underground structure.

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94—34