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PESONEN(10) **Pub. No.: US 2016/0097180 A1**(43) **Pub. Date: Apr. 7, 2016**(54) **MANHOLE AND A METHOD FOR
PROVIDING A MANHOLE**(71) Applicant: **Ruskon Betoni Oy**, Hollola (FI)(72) Inventor: **Arto PESONEN**, Hameenlinna (FI)(21) Appl. No.: **14/822,922**(22) Filed: **Aug. 11, 2015****Related U.S. Application Data**

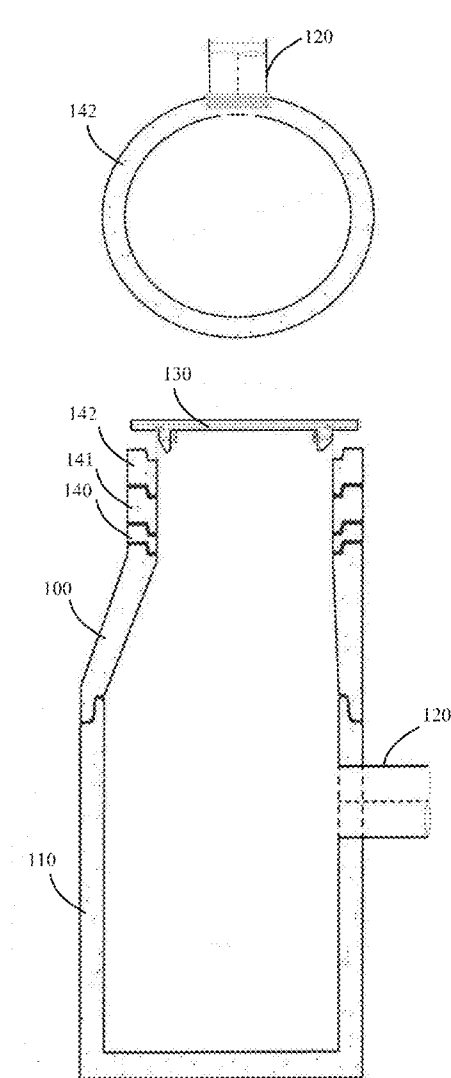
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(57)

ABSTRACT

A manhole (40) for desert environments where temperatures can be very high and environmental conditions such as erosion exert different challenges on sewage infrastructure, the manhole including a steel pipe telescope (450) matched to two circular heat resistant sealing rings (460, 461) in a concrete cone (400). The concrete cone is attached to a concrete manhole (410) with a heat resistant seal (462). The position of the concrete cone is stabilised by a large concrete slab (470) at the bottom of the manhole. The cover (430) of the manhole rests on the steel pipe telescope (450), and when the ground level changes, the steel pipe telescope can simply be repositioned within the concrete cone to match the changed ground level. All concrete parts (400, 410, 470) can be casted on-site, which means that preferably both the construction and the maintenance of the manhole happen at the installation site.



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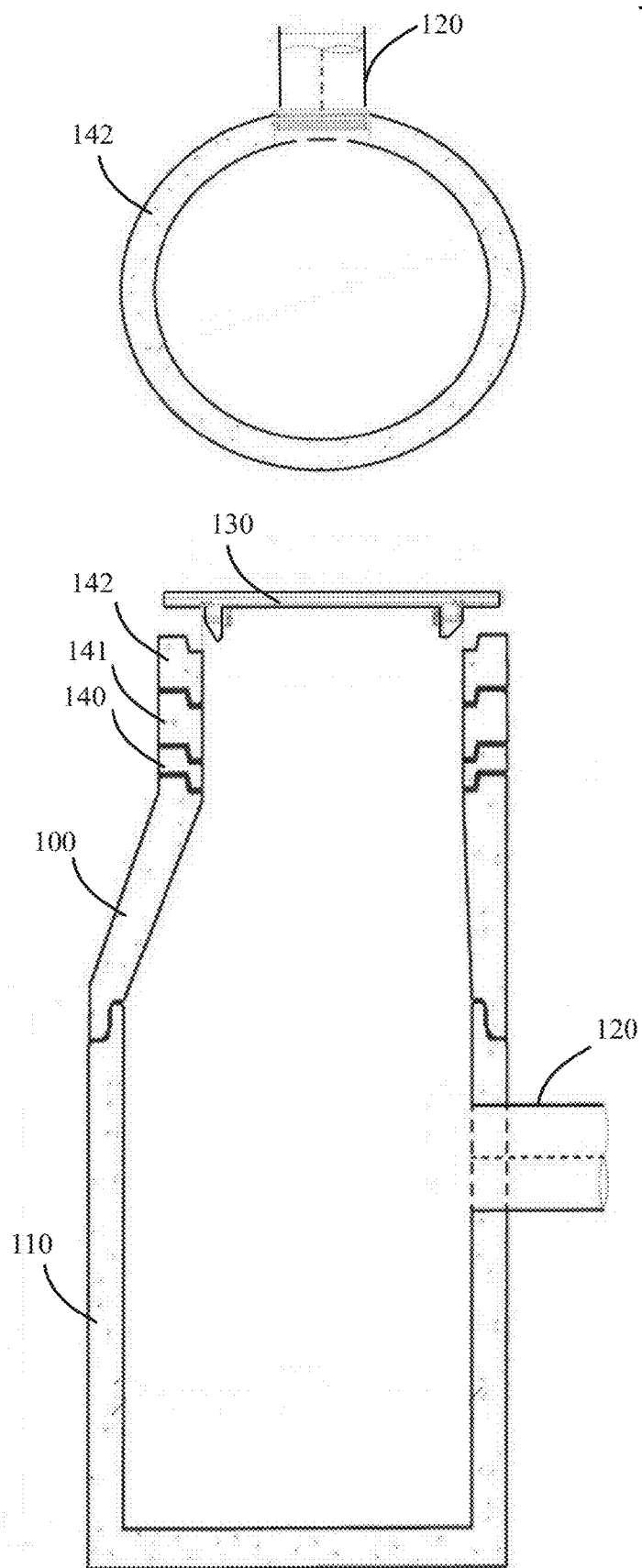


FIG 1.

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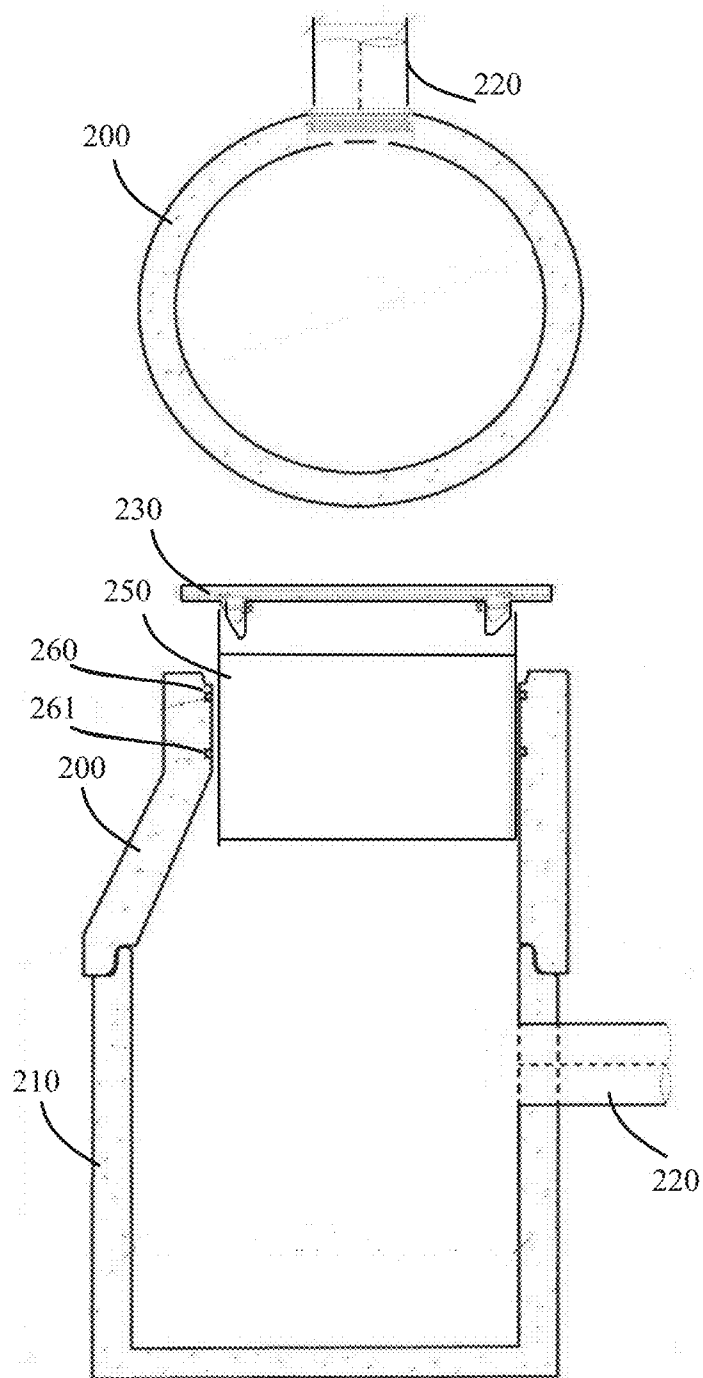


FIG 2.

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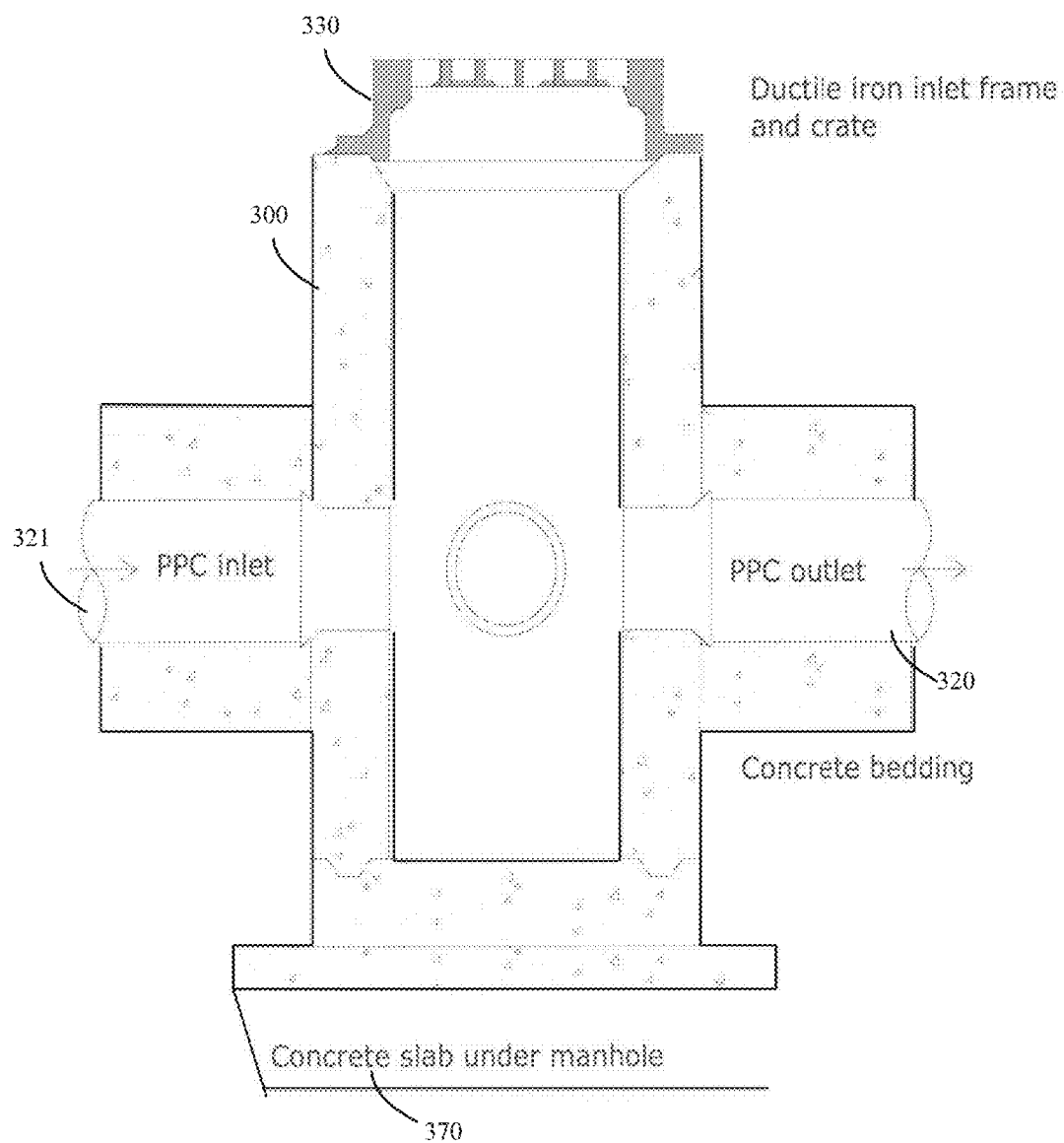


FIG. 3.

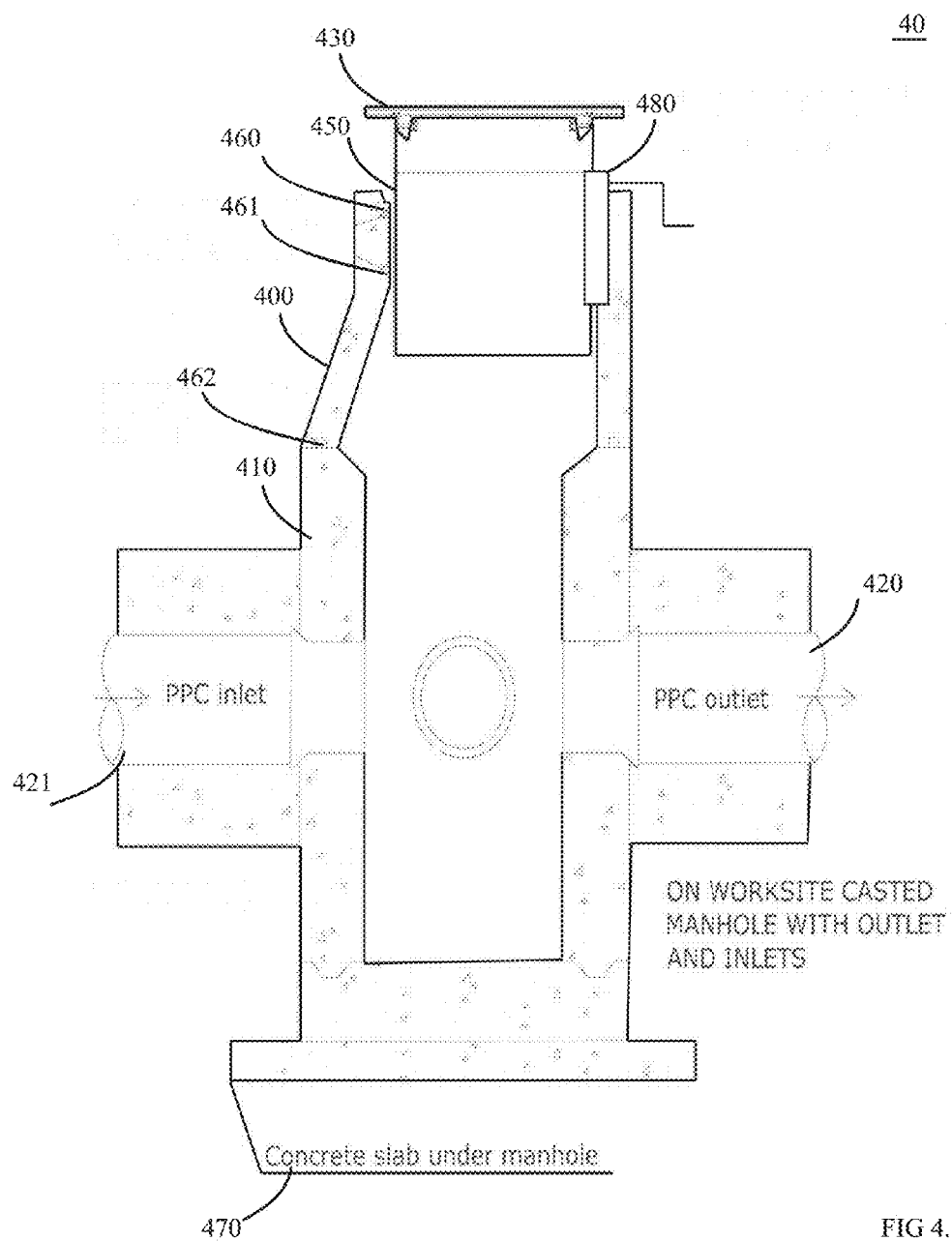


FIG. 4.

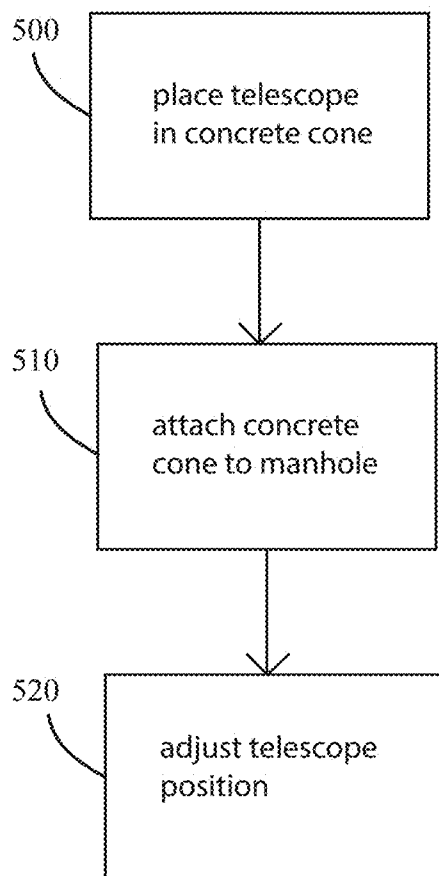
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FIG 5.

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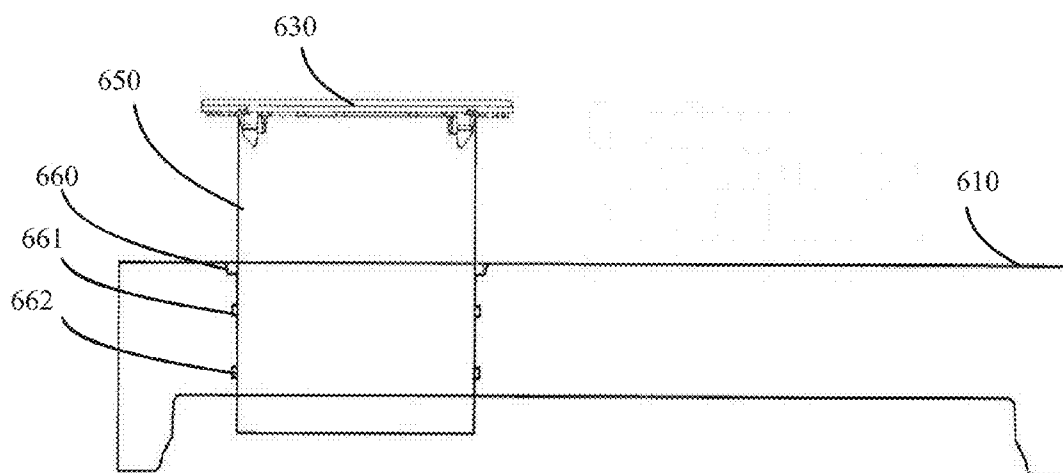


FIG 6.

MANHOLE AND A METHOD FOR PROVIDING A MANHOLE

TECHNICAL FIELD OF INVENTION

[0001] The invention relates to the infrastructure field, more specifically to sewage technologies. Even more particularly, the invention relates to providing a manhole for desert environments where temperatures can be very high and environmental conditions such as erosion exert different challenges on sewage infrastructure.

BACKGROUND

[0002] Urbanisation requires sewage systems, and to accommodate this need, various technologies related to manholes have been devised.

[0003] A traditional manhole used in Finland is shown in FIG. 1 in accordance with the prior art. FIG. 1 shows the top view at the top of the page and side view at the bottom of the page. Traditionally the parts of concrete manholes below ground surface are in size 80 cm or 1 m for the diameter and are made of concrete cones **100**, typically of height 50 cm or 75 cm. Traditionally a manhole is built of several parts: bottom ring **110**, cone **100** and several adjusting rings **140**, **141** and **142**. The outlet pipe **120** leads the water to the rest of the sewage system.

[0004] For adjusting the height of the manhole separate adjusting rings **140**, **141** and **142** on the top of the concrete cone **100** have been used. In most cases there has been a need for several adjusting rings, as is also shown in FIG. 1 where three adjusting rings **140**, **141** and **142** are exhibited. The height of the adjusting rings typically varies between 5 cm and 25 cm, and the number of rings used varies also. Typically sealing tape is used between the adjusting rings. Occasionally elastomeric sealing rings are also used. The manhole cover **130** is typically a cast iron solid cover, which also acts as a rainwater cover.

[0005] The concrete cone **100** is typically of 80 cm or 60 cm or 1 m diameter. The height of the cone **100** is typically 50 cm or 75 cm. The concrete bottom ring **110** typically has a diameter of 80 cm-1 m. The concrete in both the cone **100** and the bottom ring **110** is made of sulfate resistant cement.

[0006] One problem with the traditional solution of adjusting rings is that the joint between the adjusting rings **140**, **141**, **142**, or an adjusting ring **140** and the cone **100** is occasionally not water and soil proof. Further the adjusting rings may get easily broken during the building of manholes, and over operational lifetime of the manhole. In many cases there has been a need for replacing broken adjusting rings **140**, **141** and **142** during yearly repairs of the concrete manholes.

[0007] FIG. 2 shows another manhole in accordance with the prior art. FIG. 2 shows the top view at the top of the page and side view at the bottom of the page. In one alternative way of building a manhole, traditional concrete cone **100** is replaced with a concrete cone **200** and a telescope pipe **250**. The telescope pipe **250** is made of PEH (High density polyethylene). Clear opening of the telescope pipe **250** and cast iron cover **230** is about 60 cm, i.e. the same as in traditional concrete cone **100** of FIG. 1. Benefits of using the telescope pipe **250** are variable height adjustment and tightness against leaking water from the ground and soil.

[0008] Further, in Finland roads are not paved with asphalt directly after installing water pipes and manholes. The heights of the manholes need to be adjusted during the build-

ing of the pavement, and telescope makes it easier and faster to adjust the height. Building of manhole with several parts i.e. a bottom ring **110**, cone **100** and several adjusting rings **140**, **141** and **142** is slower than with telescope cone **250**. In many cases there has been a need for replacing broken adjusting rings **140**, **141**, **142** during yearly repairs of concrete manholes **10**. Telescope **250** and concrete cone **200** reduces also the amount of repairs needed. Lifting the heavy concrete cone **200** has also been made safer with lifting wire instead of traditional lifting grabs.

[0009] The concrete cone **200** is typically 80 cm or 60 cm or 1 m in diameter and has a matching PEH-pipe telescope and two circular ring seals **260** and **261**.

[0010] The telescope **250** is used to set the cover **230** so that it matches the final ground level. The concrete in both the cone **200** and the bottom ring **210** is made of sulfate resistant cement. The outlet pipe **220** leads the water to the rest of the sewage system.

[0011] FIG. 3 demonstrates a typical concrete manhole **30** in Arabia, from the United Arab Emirates. In the UEA manholes are casted on worksite. This is in contrast to Europe where most of the manholes are casted in concrete mills and are then transported to worksites for assembling. A typical problem with manholes in the UAE is that the soil sinks around manhole and the manhole becomes too high. The cover **330**, which is typically a ductile iron inlet frame and crate, is then elevated and the concrete sides **300** of the manhole are exposed. A concrete slab **370** has been sometimes placed under the manhole to try and stabilize it. The outlet **330** and the inlet **331** connect the manhole to the rest of the sewage system.

[0012] In the Middle East cities of millions of people are being built on sandy deserts, and in the United States many states such as Texas and Arizona are experiencing rapid growth in urbanisation. These areas are so hot that the PEH with a melting point of 120 Celsius is suboptimal for sewage applications, because PEH at a temperature of 40-50 Celsius degrees begins to be closer to the physical parameters where it behaves like a fluid, which of course is harmful in these sewage applications.

[0013] Building sewage systems in these areas is challenging because temperature variations can be quite high and the ground is not always of a stable composition, i.e. many times the ground is composed of sand that can be quite mobile over long time periods.

[0014] It is also known in the prior art that manholes have been protected against earthquakes, e.g. in JP2000291034A which is cited here as reference.

[0015] Clearly what is needed is a manhole solution that can be casted on work site and the on-site casted manhole should still be resistant to environmental change such as erosion and temperature changes over long time periods in a desert environment.

SUMMARY

[0016] The invention under study is directed towards a system and a method for effectively providing a manhole for very hot desert conditions that can be casted on site and has an extended, long stable operational lifetime in a desert environment.

[0017] A further object of the invention is to present a manhole that is cheap to construct and easy to maintain in desert conditions.

[0018] One aspect of the invention involves a manhole with a metal telescopic pipe arranged into a concrete cone, which is attached to a concrete manhole that has a concrete slab of large area underneath it. Inlets and outlets are connected to the concrete manhole. The concrete cone, manhole and slab can all be casted on the worksite, or only some of them may be casted on the worksite. The metal telescopic pipe has a diameter that matches the diameter of the concrete cone, and the interface between the concrete cone and the metal pipe telescope is sealed with heat resistant sealing rings. The metal telescopic pipe can be moved within the concrete cone so that the position of the cover of the manhole is matched to the ground level.

[0019] Therefore, whenever a sand storm, desert wind or other form of erosion causes a change in the ground level, a maintenance engineer can quite simply adjust the manhole so that the cover does not protrude or fall short from the ground, but matches the ground level.

[0020] Further, in desert environments the ground is more fluid, as the ground is more sand based than in those regions where it is rock based. Therefore in one aspect of the invention the soil sinks around the manhole just because the sand moves, e.g. underneath the concrete or asphalt that surrounds the manhole. This causes the manhole to protrude and create torsion or shear into the asphalt or concrete surrounding the manhole, as the asphalt or concrete is going down due to the escape of sand underneath and gravity, and the manhole cover is going up relatively, as the concrete cone is unaffected by the movement of the sand. In these situations, the inventive manhole can be easily realigned to have the cover of the manhole match the (now lowered) surface level of the ground in accordance with the invention by moving the telescopic pipe.

[0021] A manhole in accordance with the invention comprises a telescope and a cover, wherein the telescope is arranged to adjust the height of the manhole cover from the ground and is characterized in that,

[0022] said telescope is a metal pipe within a concrete cone with at least one seal arranged to seal the interface between the pipe and the concrete cone,

[0023] said concrete cone is arranged to be attached to the manhole, and

[0024] said metal pipe telescope is arranged to be moved within said concrete cone vertically to adjust the cover position to ground level.

[0025] A method of constructing a manhole is in accordance with the invention and the said manhole comprises a telescope and a cover, wherein the telescope adjusts the height of the manhole cover from the ground and is characterized by the following steps,

[0026] said telescope is a metal pipe and is placed within a concrete cone with at least one seal, sealing the interface between the pipe and the concrete cone,

[0027] said concrete cone is attached to the manhole, and

[0028] said metal pipe telescope is moved within said concrete cone vertically to adjust the cover position to ground level.

[0029] If the inventive manhole has a very wide diameter, e.g. larger than 1 m or the manhole is very low in height or shallow in depth, the concrete cone is removed and the telescope is attached to the manhole directly.

[0030] The inventive manhole has numerous advantages over the prior art. The inventive manhole is very resistant to environmental changes such as erosion and temperature changes over long time periods, thereby providing a good

return on infrastructure investment by providing sewage service to populations in these environmentally challenged locations. The inventive manhole can be constructed on site from the elements, i.e. its parts can be casted on the worksite, and it can be maintained very easily on its site. If the ground level changes, it will take just five minutes for a maintenance engineer to fix the manhole to match the current ground level by simply moving the telescopic pipe in the manhole.

[0031] In addition and with reference to the aforementioned advantage accruing embodiments, the best mode of the invention is considered to be a steel pipe telescope matched to two circular heat resistant sealing rings in a concrete cone. The concrete cone is attached to a concrete manhole with a heat resistant seal. The position of the concrete cone is stabilised by a large concrete slab at the bottom of the manhole. The cover of the manhole rests on the steel pipe telescope, and when the ground level changes, the steel pipe telescope can simply be repositioned within the concrete cone to match the changed ground level. There is a mechanical system for moving the telescope for example by turning a handle or a lever that makes it possible to adjust the telescope height without actually dismantling the manhole during yearly repairs. All concrete parts can be casted on-site, which means that preferably both the construction and the maintenance of the manhole happen at the installation site in the best mode.

BRIEF DESCRIPTION OF THE DRAWINGS

[0032] In the following the invention will be described in greater detail with reference to exemplary embodiments in accordance with the accompanying drawings, in which

[0033] FIG. 1 demonstrates an embodiment of a prior art traditional manhole 10.

[0034] FIG. 2 demonstrates an embodiment of a prior art telescopic manhole 20.

[0035] FIG. 3 demonstrates an embodiment 30 of a prior art work site casted manhole currently used in desert conditions.

[0036] FIG. 4 demonstrates an embodiment 40 of the inventive manhole.

[0037] FIG. 5 demonstrates an embodiment 50 of the inventive method of constructing the manhole of the invention in desert conditions.

[0038] FIG. 6 demonstrates an embodiment 60 of the inventive manhole where the manhole is low and/or flat or large in diameter.

[0039] Some of the embodiments are described in the dependent claims.

DETAILED DESCRIPTION OF EMBODIMENTS

[0040] FIGS. 1, 2 and 3 that depicted prior art were already discussed in the background section.

[0041] FIG. 4 displays an inventive manhole 40 with a concrete cone 400 with a telescope pipe 450 for hot climate regions. The on worksite casted manhole 410 has both an outlet 420 and an inlet 421 in some embodiments, but may also have only one or the other of the inlet 421 or outlet 420.

[0042] The concrete cone 400, or any other concrete parts of the manhole 40, may either be precast at a concrete mill before bringing it to the worksite, or it may be casted at the worksite. When a concrete cone 400 is precast in a concrete mill, it is faster to assemble the manhole 40 on the worksite. However, casting the concrete cone 400 at the worksite may save transportation costs substantially in some embodiments. In some embodiments the concrete may be made from poly-

mer concrete. This is preferable especially in desert conditions where the salt content of the ground/soil is higher than in rocky ground/soil. In some embodiments polymer and cement are mixed together in different compositions to make up a polymer-cement concrete in accordance with the invention.

[0043] The concrete cone 400 is arranged to host a telescope pipe 450 made of metal, preferably steel in some embodiments of the invention. The concrete cone 400 with the steel telescope 450 is surprisingly suitable for hot climate regions, and is designed to solve the problem of flexible height adjustment on demand for the manhole, in case ground level sinks or rises. The manholes typically become too high while the soil sinks around them. The main benefit of concrete cone 400 with the telescope 450 is that the height of the manhole can be made to follow the ground level, if ground sinks around the manhole.

[0044] During repairs a technician will simply just move the telescope 450 to a new position in the concrete cone 400 to provide a different height for the telescope 450 and the cover 430. The movement of the telescope 450 can take place preferably vertically with the telescope 450 in the concrete cone 400. Even with this relative movement of the ground and the manhole, the inventive manhole stays still tightly sealed and does not leak. In some embodiments where the concrete cone is detached or not yet mounted onto the manhole, the movement can of course take place in any direction, depending on how the concrete cone 400 is positioned at that time.

[0045] In the inventive concrete cone 400 the telescope 450 material is chosen for the hot climate, and also the joining of the concrete cone 400 to the on worksite casted manhole 410 is different, and in some embodiments utilizes a heat resistant seal 462, which is e.g. circumferential along the entire interface of the concrete cone 400 and the on worksite casted manhole 410. Also, in some embodiments it is preferable to have the bottom slabs of the manholes, i.e. the concrete slab 470 casted on the worksite in accordance with the invention, which saves transportation effort and cost. In other embodiments of the invention the concrete slab 470 may be precasted at a concrete mill for quick installation at the worksite.

[0046] The concrete cones 400 with steel telescopes 450 can be manufactured in concrete mills in some embodiments, but also on the worksite in other embodiments. The cover 430 is typically made of solid iron, and is a rainwater cover, in some embodiments of the invention. The concrete cone 400 is interfaced to the metal telescope 450 with two O-ring seals 460, 461 which are preferably heat resistant in accordance with the invention in some embodiments. Other types of seals may also be used in accordance with the invention.

[0047] The telescope 450 is used to match the cover 430 level to the ground level and thereby establish the goals of the invention. In one preferred embodiment there is a mechanical system 480 for adjusting the position of the metal pipe telescope 450 within the concrete cone 400, for example by turning a lever or handle mechanically. This way the technician can adjust the position of the metal pipe telescope and the cover anytime he wants, simply by using the mechanical system 480, and there is no need to dismantle any part of the manhole or use complicated tools to move the metal pipe telescope 450. For example, a chain and a lever and/or a gearwheel, gear, cogwheel and/or a cog with a lever or handle can be utilized to transmit the mechanical energy provided by the technician to move the metal pipe telescope in some embodiments of the invention. For example in one embodi-

ment, the technician rotates a handle, which rotates a gearwheel, which pulls or pushes a chain or a rope or a structure on the metal pipe telescope 450, thereby moving the telescope 450 within the concrete cone 400 up or down.

[0048] In some embodiments of the invention the metal pipe telescope 450 is coupled to the surrounding tarmac, asphalt, or other surface material surrounding the manhole cover. As the soil sinks, the surface material will also start to sink, thereby moving the metal pipe telescope 450, which is coupled to the surface material. This way, there is no need to adjust the metal pipe telescope 450 by a repair technician, because the metal pipe telescope 450 dynamically adjusts its position to the demands of the environment.

[0049] Naturally all aspects of the described manhole system 40 can be combined with the method 50 of constructing the inventive manhole in accordance with the invention.

[0050] Quite clearly any feature or phase of the embodiment 40 may be readily combined with any feature or phase of any of the subsequent embodiments 50 and 60.

[0051] FIG. 5 shows the method of constructing the inventive manhole as a flow diagram. The concrete parts needed in the construction, for example the concrete cone 400, or any other concrete parts of the manhole 40, may either be precasted at a concrete mill before bringing it to the worksite, or it may be casted at the worksite. When a concrete cone 400 is precasted in a concrete mill, it is faster to assemble the manhole 40 on the worksite. However, casting the concrete cone 400 at the worksite may save transportation costs substantially in some embodiments. In some embodiments the concrete may be made from polymer concrete. This is preferable especially in desert conditions where the salt content of the ground/soil is higher than in rocky ground/soil. In some embodiments polymer and cement are mixed together in different compositions to make up a polymer-cement concrete in accordance with the invention.

[0052] In phase 500 the metal pipe telescope 450 is placed into the concrete cone 400 that forms the throat of the manhole. The sealing between the concrete cone 400 and the metal pipe telescope is made tight enough that the metal pipe does not move unless considerable external force is applied to it, (e.g. a man pushing on it very hard.) This is to make sure that the pipe does not mechanically drift due to gravity over long time periods. The heat resistant seals 460, 461 are applied and adjusted so that the interface between the concrete cone and the metal pipe is established in this way in phase 500.

[0053] In phase 510 the concrete cone 400 is attached to the manhole 410. If the concrete cone is precasted, it is simply placed over the manhole, mason over the manhole, or attached with the sealing element 462, which is designed to make the interface between the concrete cone 400 and the manhole 410 water- and soil-proof.

[0054] In phase 520 the metal pipe telescope position is adjusted so that the cover of the manhole is at the same level to the ground. This is achieved by just mechanically moving the metal pipe telescope to a new position. In some embodiments of the invention the metal pipe telescope 450 is attached with screws and/or bolts to the concrete cone 400 or some other adhesive structure or method that is easy to dismantle or detach during the time of repairs when the telescope needs to be moved.

[0055] In some embodiments of the invention in phase 520 the metal pipe telescope 450 is coupled to the surrounding tarmac, asphalt, or other surface material surrounding the

manhole cover. As the soil sinks, the surface material will also start to sink, thereby moving the metal pipe telescope 450, which is coupled to the surface material. This way, there is no need to adjust the metal pipe telescope 450 by a repair technician, because the metal pipe telescope 450 dynamically adjusts its position to the demands of the environment.

[0056] Quite clearly any feature or phase of the embodiment 50 may be readily combined with any feature or phase of any of the other embodiments 40 and 60.

[0057] FIG. 6 shows an embodiment 60 of a low or a wide manhole, where there is no need for a concrete cone. This embodiment is typically used in situations where the diameter of the manhole is more than one meter, or the manhole is so low that the concrete cone does not fit into the manhole. The telescope pipe 650 is attached to a manhole 610 as shown in FIG. 6. The telescope pipe 650 is preferably a metal pipe telescope, for example a steel pipe telescope. The seals 661, 662 are typically O-ring seals, and are also arranged to lubricate and/or reduce friction similarly to ball bearings between the manhole 610 and the telescope pipe 650 when the telescope pipe is being moved. The seal 660 is typically a slightly larger seal, for example 2 cm*2 cm in size. The purpose of the seal 660 is specifically to block the entry of soil or water into the manhole 610.

[0058] Quite clearly any feature or phase of the embodiment 50 may be readily combined with any feature or phase of any of the other embodiments 40 and 60.

[0059] The invention has been explained above with reference to the aforementioned embodiments and several commercial and industrial advantages have been demonstrated. The methods and arrangements of the invention allow the manhole to be very resistant to environmental changes such as erosion and temperature changes over long time periods, thereby providing a good return on infrastructure investment by providing sewage service to populations in environmentally challenged locations, such as desert locations. The inventive manhole can be constructed on site from the elements, i.e. its parts can be casted on the worksite, and it can be maintained very easily on its site. If the ground level changes, it will take just five minutes for a maintenance engineer to fix the manhole to match the current ground level by simply moving the telescopic metal pipe in the manhole, preferably with the mechanical system 480, thus avoiding the need to dismantle any part from the manhole.

[0060] Naturally all aspects of the described method 50 of constructing the inventive manhole can be combined with the inventive manhole 40 in accordance with the invention.

[0061] The invention has been explained above with reference to the aforementioned embodiments. However, it is clear that the invention is not only restricted to these embodiments, but comprises all possible embodiments within the spirit and scope of the inventive thought and the following patent claims.

REFERENCES

[0062] JP2000291034A, Ishikawa Takashi, NIPPON MANHOOLE KOGYO KK, 2000

1. A manhole, comprising a telescope (450) and a cover (430), wherein the telescope is arranged to adjust the height of the manhole cover from the ground, characterized in that, said telescope (450) is a metal pipe within a concrete cone (400) with at least one seal (460, 461) arranged to seal the interface between the pipe and the concrete cone (400),

said concrete cone (400) is arranged to be attached to the manhole (410), and

said metal pipe telescope (450) is arranged to be moved within said concrete cone (400) to adjust the cover (430) position to ground level.

2. A manhole as claimed in claim 1, characterized in that, two O-ring seals (460, 461) are arranged into the concrete cone steel pipe interface.

3. A manhole as claimed in claim 1, characterized in that, a concrete slab (470) is arranged to be installed under the bottom of the manhole.

4. A manhole as claimed in claim 3, characterized in that, the concrete slab (470) is arranged to have an area larger than the area of the bottom of the manhole.

5. A manhole as claimed in claim 1, characterized in that, said metal pipe telescope (450) is a steel pipe.

6. A manhole as claimed in claim 1, characterized in that, any or all of the following: concrete slab (470), concrete cone (400), and/or manhole 410 are arranged to be precasted in a concrete mill prior to installation.

7. A manhole as claimed in claim 1, characterized in that, any or all of the following: concrete slab (470), concrete cone (400), and/or manhole (410) are arranged to be casted at the worksite prior to installation.

8. A manhole as claimed in claim 1, characterized in that, a mechanical system (480) is arranged to move metal pipe telescope (450) by a user rotating at least one wheel or turning at least one lever in said mechanical system while maintaining the manhole (400) and the concrete cone (450) sealed.

9. A manhole as claimed in claim 1, characterized in that, any or all of the following: concrete slab (470), concrete cone (400), and/or manhole (410) are arranged to be made from polymer concrete, concrete made with a mix of cement and polymer or normal cement concrete.

10. A manhole as claimed in claim 1, characterized in that, said telescope (450) is arranged to be mechanically coupled to the surface material surrounding the manhole, and the position of the telescope within said concrete cone (400) is arranged to change with the sinking and/or rising of the surface material based on said mechanical coupling.

11. A manhole as claimed in claim 1, characterized in that, the manhole is wider in diameter than one meter or lower in height than 1.2 meters, and

the concrete cone (400) is removed and the metal pipe telescope is attached directly to the manhole (610).

12. A method of constructing a manhole, the manhole comprising a telescope (450) and a cover (430), wherein the telescope adjusts the height of the manhole cover from the ground, characterized by the following steps,

said telescope (450) is a metal pipe and is placed within a concrete cone (400) with at least one seal (460, 461) sealing the interface between the pipe and the concrete cone (400),

said concrete cone (400) is attached to the manhole (410), and

said metal pipe telescope (450) is moved within said concrete cone (400) to adjust the cover (430) position to ground level.

13. A method as claimed in claim 12, characterized in that, two O-ring seals (460, 461) are placed into the concrete cone steel pipe interface.

14. A method as claimed in claim 12, characterized in that, a concrete slab (470) is installed under the bottom of the manhole.

15. A method as claimed in claim **12**, characterized in that, the concrete slab (**470**) has an area larger than the area of the bottom of the manhole.

16. A method as claimed in claim **12**, characterized in that, said metal pipe telescope (**450**) is a steel pipe.

17. A method as claimed in claim **12**, characterized in that, any or all of the following: concrete slab (**470**), concrete cone (**400**), and/or manhole **410** are precasted in a concrete mill prior to installation.

18. A method as claimed in claim **12**, characterized in that, any or all of the following: concrete slab (**470**), concrete cone (**400**), and/or manhole (**410**) are casted at the worksite prior to installation.

19. A method as claimed in claim **12**, characterized in that, a mechanical system (**480**) moves metal pipe telescope (**450**) by a user rotating at least one wheel or turning at least one lever in said mechanical system while maintaining the manhole (**410**) and the concrete cone (**400**) sealed.

20. A method as claimed in claim **12**, characterized in that, any or all of the following: concrete slab (**470**), concrete cone (**400**), and/or manhole (**410**) are made from polymer concrete, concrete made with a mix of cement and polymer or normal cement concrete.

21. A method as claimed in claim **12**, characterized in that, said telescope (**450**) is mechanically coupled to the surface material surrounding the manhole, and the position of the telescope within said concrete cone (**400**) is arranged to change with the sinking and/or rising of the surface material based on said mechanical coupling.

22. A method as claimed in claim **12**, characterized in that, the manhole is wider in diameter than one meter or lower in height than 1.2 meters, and

the concrete cone (**400**) is removed and the metal pipe telescope is attached directly to the manhole (**610**).

* * * * *