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(54) MODULAR RISER BASE

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(57) **ABSTRACT**

A modular riser base suitable for use in a lift pump station, a sump pump station, a drainage holding unit and the like. The riser base can include a top side with a substantially flat surface for supporting a pump. The modular riser base includes a bottom side having reinforcing support structure for strengthening the riser base. The modular riser base further includes a raised perimeter edge extending from a top surface of the top side. The edge forms a connecting member for interconnecting with a mating edge of an associated riser component. The height of the riser base is preferably less than the diameter of an inlet pipe delivering effluent to the station.

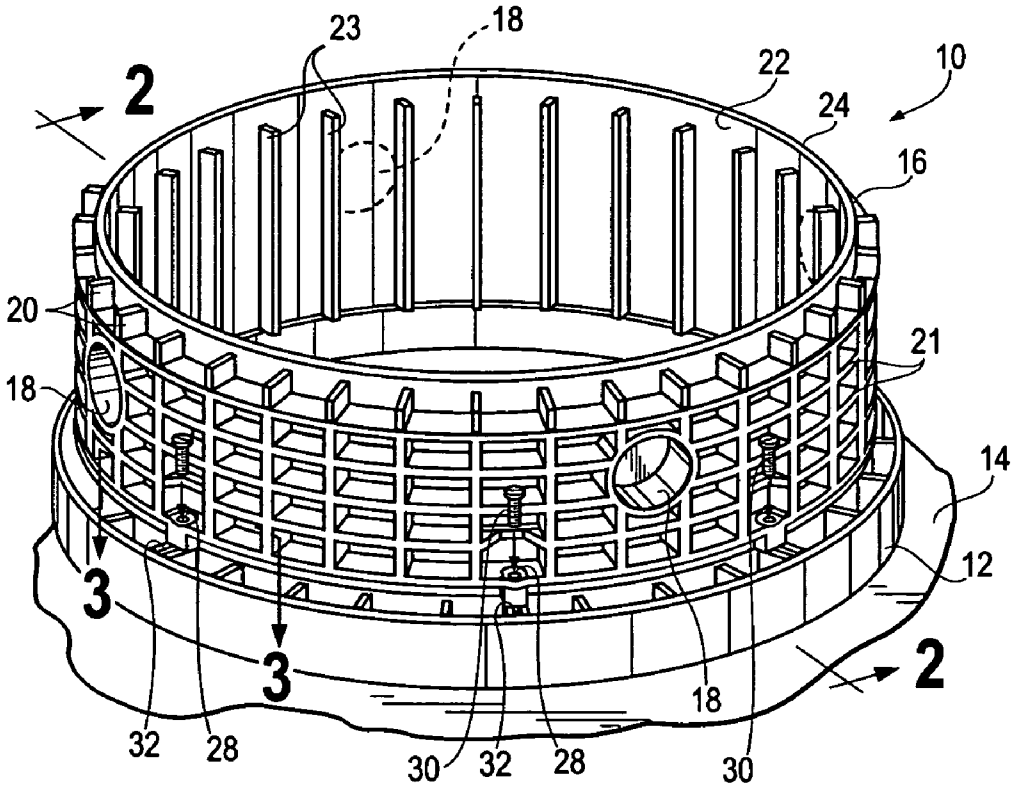


Fig. 1

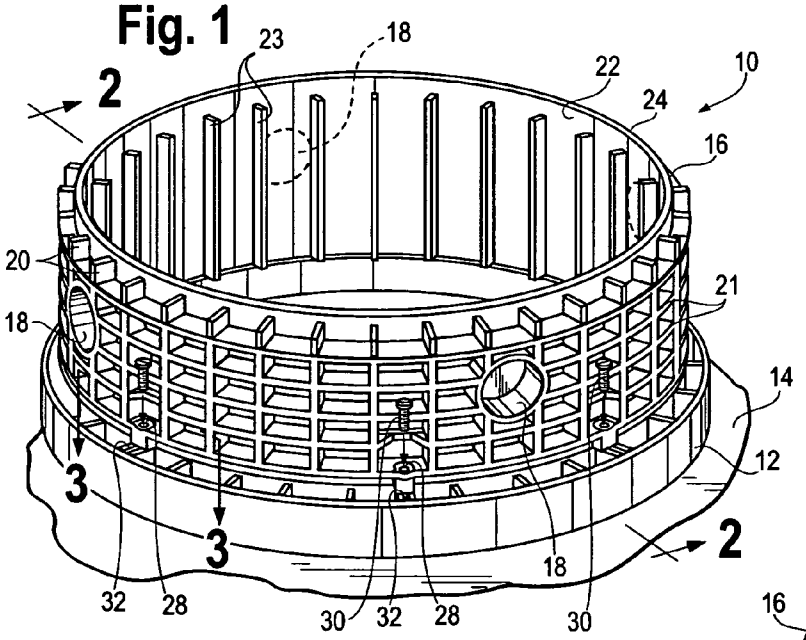


Fig. 3

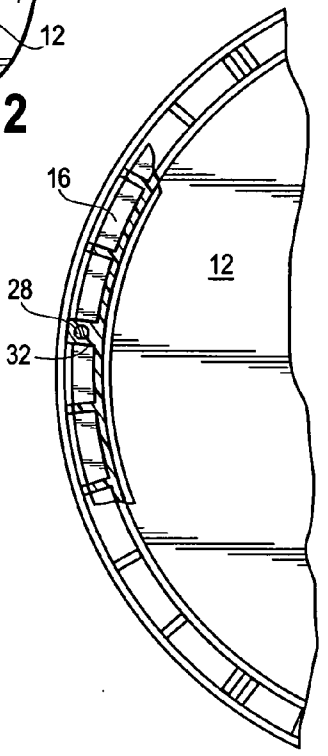


Fig. 2

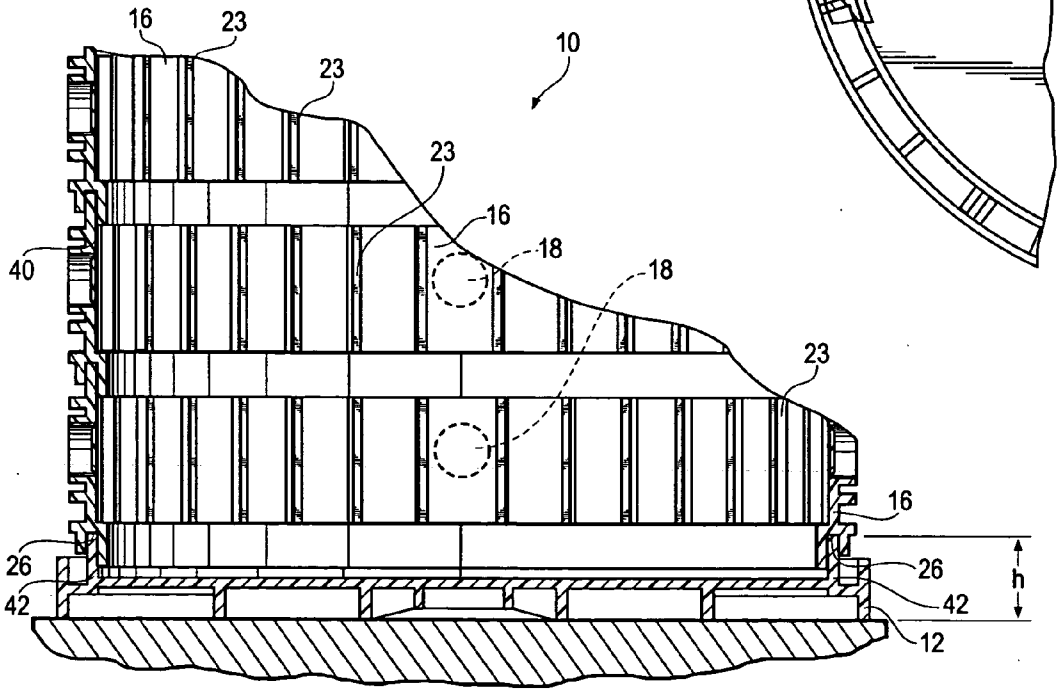


Fig. 4

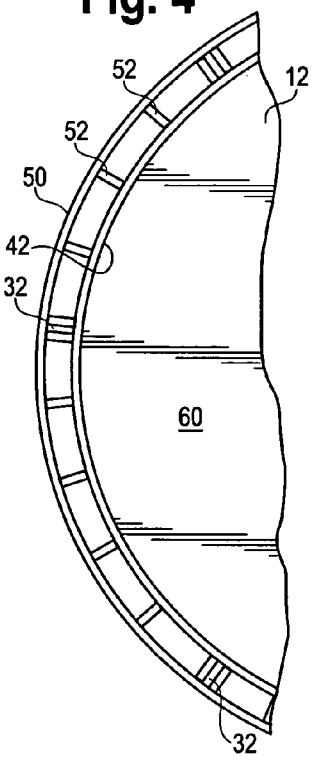


Fig. 5

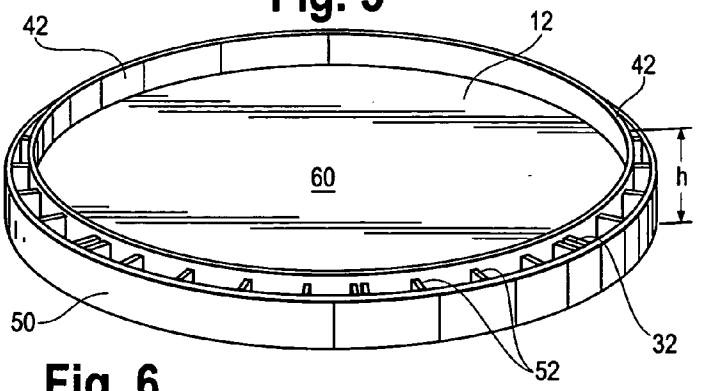


Fig. 6

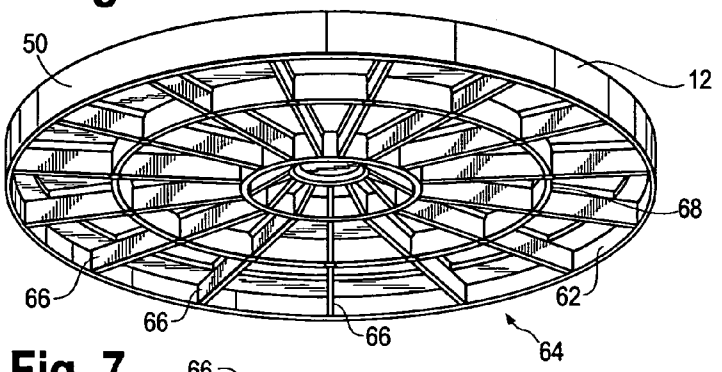


Fig. 7

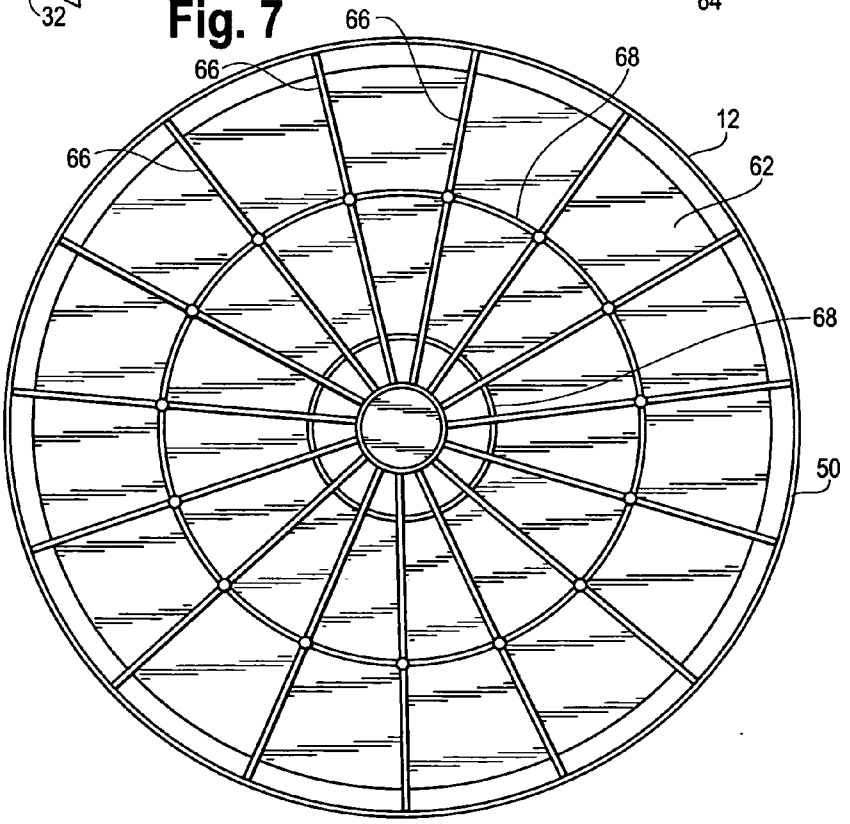
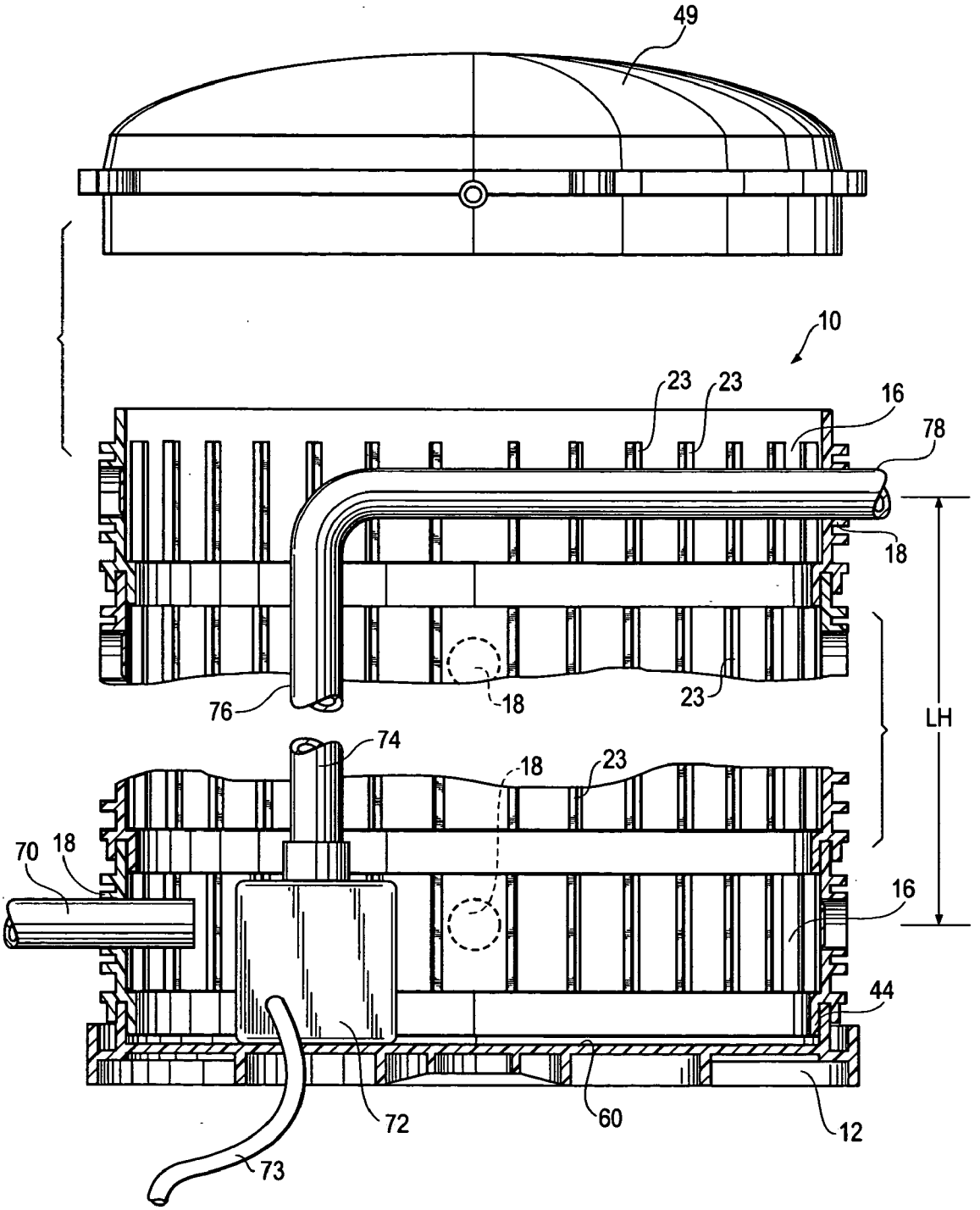


Fig. 8



MODULAR RISER BASE

FIELD OF THE DISCLOSURE

[0001] A modular base appropriate for use with a riser in an on-site waste system, such as for use as a sewage or effluent pump station.

BACKGROUND OF THE DISCLOSURE

[0002] On-site waste systems can include septic tanks that drain or leach sewage effluent into leach fields. Sometimes leach fields are positioned at a higher location than the septic tank and, therefore, the septic effluent needs to be pumped to the higher elevation. The septic effluent can be pumped to a distribution box then discharged by gravity feed to a leach field or the like.

[0003] Stackable risers for on-site waste and drainage systems are known. For example, U.S. Pat. Nos. 5,617,679 and 5,852,901 issued to Meyers, and assigned to the assignee of the present disclosure, disclose plastic stackable risers for providing a grade level access for underground components such as septic tanks, distribution boxes, and drop boxes. The '901 patent discloses a riser with a cylindrical side wall having a top free edge and a bottom edge. The top free edge defines a first end opening and the bottom edge is connected to a generally inverted U-shaped connecting member which defines a channel to receive the free edge portion of an adjacent stackable riser. Other known risers have different connecting edge construction designs. In use, a plurality of stackable risers, in the designs taught by the '901 patent, are interlocked together so that the side walls extend along a common vertical axis to the underground component and provide a generally gas tight column above the underground component.

[0004] An improvement to a lift pump station, in the form of converting a stackable riser structure into a lift pump station, is contemplated by the disclosure described in detail below.

SUMMARY OF THE DISCLOSURE

[0005] The present disclosure provides for a modular liquid pump station riser base, or a base for liquid storage structures such as sewage or effluent and the like. The riser base includes a top side having a substantially flat surface for supporting a pump. The modular riser base includes a bottom side having reinforcing support structure for strengthening the riser base. The modular riser base further includes a raised perimeter edge extending from the surface of the top side. The raised perimeter edge forms an edge for being received in a connecting edge member of a riser component, such as in a U-shaped edge or a tongue for a tongue and groove joint.

[0006] In another aspect of the disclosure, a modular liquid lift pump station is provided. The pump station includes a riser base having a top side, a bottom side, and a height defined by a distance between the top side and the bottom side that is less than the diameter of a pipe delivering effluent to the lift pump station. The modular lift pump station includes a pump positioned on the riser base for pumping effluent from the riser base to a predetermined height. At least one riser can be stacked on the riser base. The riser permits the effluent to discharge at the predetermined height through an outlet pipe extending through a side wall of the riser.

[0007] A method for pumping sewage or effluent with a lift pump station is also provided by the present disclosure. A riser base is provided that includes a height that is less than a diameter of an effluent inlet pipe. A pump is positioned on the riser base. At least one riser is stacked on the riser base to a predetermined height required to pump the sewage. At least one outlet pipe is positioned through a side wall of a riser corresponding to the predetermined height required to pump the sewage. The lift pump pumps the effluent from the lift pump station through at least one outlet pipe.

[0008] Other applications of the present invention will become apparent to those skilled in the art when the following description of the best mode contemplated for practicing the invention is read in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWING

[0009] **FIG. 1** is a perspective view of a riser base with a riser stacked thereon;

[0010] **FIG. 2** is a partial cross-sectional view taken along the lines **2-2** in **FIG. 1**;

[0011] **FIG. 3** is a top view, partially cut away, of the riser base shown in **FIG. 1**, with a partial horizontal cross-section taken along lines **3-3** in **FIG. 1** of the stackable riser stacked on the riser base;

[0012] **FIG. 4** is a partial top view of the riser base shown in **FIG. 3**;

[0013] **FIG. 5** is a top perspective view of the riser base;

[0014] **FIG. 6** is a bottom perspective view of the riser base;

[0015] **FIG. 7** is a bottom view of the riser base; and

[0016] **FIG. 8** is a partial cross sectional view of the riser including a base, a plurality of risers, and a pump positioned on the riser base.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0017] Referring now to **FIG. 1**, a modular lift pump station **10** is shown therein. The lift pump station **10** includes a riser base **12**. The riser base **12** is normally positioned below ground level, but is supported by the floor of an excavated hole **14** formed in the ground. A riser **16** can be positioned on top of the riser base **12**. The riser **16** can be formed as a unitary piece of a predetermined height to extend to the ground surface or preferably, a plurality of risers **12** can be stacked to a ground surface level. A riser cover (not shown) can be removably attached to the top of the riser stack and seal the lift pump station **10**.

[0018] Each riser **16** preferably includes one or more cutouts or knockouts **18** operable for forming an aperture to permit an inlet pipe **70** or outlet pipe **74** to extend therethrough (see **FIG. 8**). The outlet pipe **74** connects to a pump **72** having an electrical power line **73**. The lift pump station **10** can be substantially round in cross-section, but can include other geometric shapes such as square or rectangular if desired, which is primarily determined by the design of the riser **16** being used. Each riser **16** can include a plurality of vertically-oriented stiffening rib members **20** formed on the

outer circumference thereof, to provide structural support to the riser **16**. Horizontally oriented stiffening rib members **21** may also be provided on the outer circumference of each riser **16**. Vertically-oriented rib members **23** may also be formed on an inner surface **22** of each riser **16**.

[**0019**] Each riser **16** includes an outer perimeter edge **24** for engaging a groove **26** (best seen in **FIG. 2**) formed in the bottom side of each riser **16**. The perimeter edge **24** and the groove **26** provide a generally tongue and groove joint between adjacent risers **16** and/or between a riser base **12** and an adjacent riser **16** when they are stackingly engaged with one another. However, risers with yet other edge connection means for interconnecting one riser to another can be used with the riser base of the present invention. Each riser **16** includes a plurality of through apertures **28** for permitting securement members, such as threaded fasteners **30**, to extend therethrough and threadingly engage a receiving member **32** that is located on the top portion of each riser **16** and each riser base **12**. Each receiving member **32** can be formed to receive a self-tapping threaded fastener such that when a threaded fastener **30** is threadingly engaged with the receiving member **32**, the threaded fastener **30** will tap and thread into the receiving member **32**.

[**0020**] **FIG. 3** shows a partial cut-away of the riser **16** and the riser base **12** wherein a through aperture **28** of the riser **16** is positioned adjacent the receiving member **32** of the riser base **12**, such that the riser **16** and the base **12** can be mechanically secured to one another.

[**0021**] Referring now to **FIG. 2**, a cross-section of a riser **16** positioned on a riser base **12** is illustrated. The riser **16** includes a groove **26** formed in a side wall **40**. A raised edge or tongue **42** is formed on the riser base **12**. The raised edge **42** is constructed and arranged to slidingly engage with the groove **26** of the riser **16**. A sealant compound, such as butyl mastic, can be used as desired in conjunction with the tongue and groove seal **44** to ensure a fluid tight fit between the riser base **12** and the riser **16**.

[**0022**] The riser base **12** has a small height dimension h so that an excavation hole of essentially any height in the ground can be fitted with the modular lift pump station **10**. For example, in accordance with one aspect of the present disclosure, consisting of a riser base **12**, only one riser **16**, and an associated riser cover (not shown), the overall height for such a "one riser" lift station can be less than 12 inches. On the other hand, a plurality of risers **16** can be stacked as high as necessary to match the height requirements of the hole in the ground. Further, variably sized risers **16** can be utilized to ensure fit to a desired height of the lift pump station **10**. Regardless of whether a single riser **16** or a plurality of risers **16** are used, a riser cover **49** (see **FIG. 8**) may advantageously be secured to an uppermost riser **16** to close off the lift pump station **10**.

[**0023**] Referring now to **FIGS. 4-7**, the riser base **12** is shown from various perspectives. **FIG. 4** shows a partial section of the riser base **12**. The riser base **12** includes an outer band **50** that encompasses the raised perimeter edge **42**. The outer band **50** is held in fixed relationship with respect to the raised perimeter edge **42** with a plurality of spokes **52** and threaded fastener receiving members **32** that extend between the outer band **50** and the raised perimeter edge **42**. The fastener receiving members **32** can be formed with two closely spaced radially-extending spokes **52**.

[**0024**] The riser base **12** includes a top side **60** with at least a portion having a substantially flat surface for supporting a pump **72** (see **FIG. 8**). As shown in **FIGS. 6 and 7**, the riser base **12** includes a bottom side **62** having reinforced support structure **64** for strengthening the riser base **12**. The support structure **64** includes a plurality of ribs **66** that extend radially from the center of the base **12** to the outer band **50**. The support structure **64** can include at least one intermediate band **68**, such as in the form of an annular ring, positioned radially inward relative to the outer band **50**. The intermediate band **68** can be constructed and arranged to connect with the radial stiffening ribs **66**.

[**0025**] The height h of the base **12**, shown in **FIGS. 2 and 5**, is defined by the distance between the top of the raised edge **42** and the bottom side of the riser base **62**. The height h is preferably less than a diameter of an inlet pipe **70** (shown in **FIG. 8**) that delivers effluent to the lift pump station **10**. Inlet pipes **70** are typically standard 4 inch diameter PVC pipe, but may be of smaller diameter, e.g. 3 inches or larger diameter, e.g. 6 inches. The height h is preferably maintained small so that increased versatility of the modular lift pump station **10** can be achieved. That is, the small height h takes up limited space and a riser **16** or plurality of risers **16** can be stacked on the riser base **12** to raise the top of the lift pump station **10** to a desired elevation, such as approximately to grade level. The height h of the riser base **12** is thus typically less than three inches, but can vary in size, larger or smaller, depending on design requirements of a specific application.

[**0026**] Referring now to **FIG. 8**, the modular lift pump station **10** is shown therein. The lift pump station components, including the riser base **12** and the risers **16**, are preferably formed of a plastic material, such as polyethylene or polypropolene, to prevent oxidation and corrosion. The riser base **12** and risers **16** can be formed using conventional techniques such as injection molding and gas assist molding. The lift pump station **10** includes a riser base **12** and can include a plurality of risers **16** stacked on top of one another to a desired height, whereby a riser is thus converted into a lift station through use of a riser base and associated pump and drain pipes. Sewage or effluent is delivered to the lift pump station **10** via an inlet pipe **70**. The inlet pipe **70** delivers fluid to the lift pump station **10**. An electric pump **72** having a power line **73** for supplying electrical power pumps the effluent from the lift pump station **10**. An outlet pipe **74** is attached to the pump **72** for delivering, for example, the effluent to a desired predetermined height (see the lift height as generally denoted by reference letters LH in **FIG. 8**) and location. The outlet pipe **74** can include a generally vertical extension **76** and a secondary pipe extension **78** that is horizontally aligned or angled away from the lift pump station **10**. The secondary pipe extension **78** delivers the effluent to a desired location at a raised height relative to the source (not shown) that was delivered from the inlet pipe **70**.

[**0027**] In operation, the modular lift pump station **10** includes the lift pump station base **12** positioned in a desired location below ground surface level. A pump **12** is positioned on the top surface **60** of the lift station base **12**. At least one riser **16** is positioned on the riser base **12** such that the tongue and groove engagement **44** (or other interconnection) in combination with a suitable sealant, such as butyl mastic, (not shown) forms a generally fluid tight seal

between the lift pump station base **12** and the riser **16**. A cutout or knockout **18** is removed from the riser **16** so that the inlet pipe **70** can extend through the opening created thereby. The inlet pipe **70** permits fluid to enter the lift pump station **10**. The secondary pipe extension **78** of the outlet pipe **74** extends to a desired height and out through another cutout or knockout **18** (either in the same riser or different, e.g. higher, riser **16**). Effluent is then pumped from the pump station **10** through the outlet pipe **74** and to a secondary location and height, such as an associated elevated leach field.

[**0028**] Use of the riser base **12** is not limited to the application of a lift pump station. For instance, in a drainage system or irrigation system spanning two (or more) grade levels, such as on a hill, it is often desirable to store drainage or other liquids, at least on a temporary basis, at an intermediate elevation. The riser base **12** may advantageously be employed in combination with risers **16** in such circumstances as a temporary fluid collection chamber or to facilitate redirection of fluid. Fluid may flow into the chamber through an inlet pipe passing through a cutout or knockout **18** formed in a riser **16** at a first height, and may exit the chamber through an outlet pipe at a second, e.g. lower height, without the need for a mechanical pump.

[**0029**] In yet another embodiment, the riser base **12** can be used for a sump pump station. Sump pump stations are typically utilized in buildings that have a crawl space or a basement. If the ground water level becomes too high or the basement has water leaking in from the outside, a sump pump can be used to remove the water. A riser base **12** can be assembled with at least one riser to form a sump pump station. The sump pump station can hold drainage water until the water rises to a predetermined level. A float switch or the like can activate the pump housed within the sump pump station which causes the water to be mechanically pumped out of the sump pump station.

[**0030**] While the invention has been described in connection with what is presently considered to be the most practical and preferred embodiments, it is to be understood that the invention is not to be limited to the disclosed embodiments, but on the contrary, is intended to cover various modifications and equivalent arrangements included within the spirit and scope of the appended claims, which scope is to be accorded the broadest interpretation so as to encompass all such modifications and equivalent structures as is permitted under law.

I claim:

1. A modular riser base comprising:

a top side having an area with a substantially flat surface;

a bottom side having reinforcing support structure for strengthening the top side of the riser base; and

a raised perimeter edge extending from the surface of the top side, the raised perimeter edge forming a connection edge for interconnecting a riser component to the riser base.

2. The riser base of claim 1, wherein the edge is a tongue for a tongue and groove connection joint.

3. The riser base of claim 1, further comprising:

an outer band encompassing the perimeter edge, the outer band held in fixed relationship to the edge with a plurality of spokes extending between the perimeter edge and the outer band.

4. The riser base of claim 1, wherein the support structure includes a plurality of ribs extending radially from the center of the riser base to the outer band.

5. The riser base of claim 4, wherein the support structure further includes at least one intermediate band positioned radially inward relative to the outer band, the at least one intermediate band constructed and arranged to connect the radial stiffening ribs together at an intermediate radial location.

6. The riser base of claim 1, wherein a height defined by the distance between the top of the raised edge and the bottom side of the riser base is less than a diameter of an inlet pipe delivering liquid to a pump station formed on the riser base.

7. The riser base of claim 1, wherein a height defined by the distance between the raised edge and the bottom side is less than approximately three inches.

8. The riser base of claim 1, wherein the riser base includes a member for permitting a threaded fastener to threadingly engage therewith.

9. The riser base of claim 8, wherein the member receives a self-tapping threaded fastener.

10. The riser base of claim 8, wherein the member includes at least two closely spaced spokes.

11. The riser base of claim 1, wherein the riser base is formed in a substantially circular shape.

12. The riser base of claim 1, wherein the riser base is formed from plastic material.

13. The riser base of claim 1, wherein the plastic material is injection molded.

14. A modular lift pump station comprising:

a riser base having a top side, a bottom side, and a height defined by a distance between the top side and the bottom side, the height being less than a diameter of a pipe delivering liquid to the lift pump station;

a pump positioned on the riser base for pumping liquid from the riser base to a lift height; and

at least one riser stacked on the riser base, the riser permitting the liquid to discharge at the lift height through an outlet pipe extending through a sidewall of the riser.

15. The modular lift pump station of claim 14 wherein the riser base further comprises:

a top side having a surface for supporting the pump,

a bottom side having reinforcing support structure for strengthening the riser base; and

a raised perimeter edge extending from the surface of the top side forming a connecting edge member for connecting to a riser.

16. The modular lift pump station of claim 15, wherein the connecting edge member is one of a tongue and a substantially U-shaped cross-section groove for a tongue and groove connection joint.

17. The modular station of claim 15, wherein the top side includes a substantially flat surface.

18. The modular station of claim 14, further comprising:

a cover to close off the modular lift pump station.

19. The modular station of claim 15, wherein the riser base includes:

an outer band encompassing the perimeter edge and a plurality of spokes extending between the perimeter edge and the outer band.

20. The modular station of claim 19, wherein the support structure includes a plurality of ribs extending radially from the center of the riser base to the outer band.

21. The modular station of claim 19, wherein the support structure further includes at least one intermediate band positioned radially inward relative to the outer band, the at least one intermediate band adapted to connect the radial stiffening ribs together at an intermediate radial location.

22. The modular station of claim 14, wherein the height of the riser base is less than approximately three inches.

23. The modular station of claim 14, wherein the riser base includes a member for permitting a threaded fastener to threadingly engage therewith.

24. The modular station of claim 23, wherein the member is engageable with a self-tapping threaded fastener.

25. The modular station of claim 14, wherein the riser base is formed in a substantially circular shape.

26. The modular station of claim 14, wherein the riser base includes a connecting edge for connecting with an adjacent riser.

27. The modular station of claim 14, wherein a first riser is configured to stack on top of the riser base, the riser having a groove formed in the bottom side thereof for receiving the raised perimeter edge of the riser base therein, wherein the edge and groove form a locking tongue and groove engagement between the riser base and the riser.

28. The modular station of claim 14, wherein each riser includes a raised perimeter edge formed on a top side and a mating groove formed in a bottom side for permitting a plurality of risers to stackingly engage one another with a tongue and groove arrangement.

29. The modular station of claim 14, wherein each riser further includes at least one cut-out section forming a through aperture for permitting an inlet or outlet pipe to extend therethrough.

30. The modular station of claim 14, wherein the riser base is formed in a substantially circular shape.

31. The modular station of claim 14, wherein each riser includes a plurality of stiffening ribs on at least one of an inner surface and an outer surface.

32. The modular station of claim 14, wherein the riser base forms a base for a sump pump station.

33. The modular station of claim 14, including a cover sealingly engaged with a riser.

34. A method for pumping effluent with a lift pump station comprising:

providing a riser base having a height less than a diameter of an inlet pipe;

positioning a pump on the riser base;

stacking at least one riser on the riser base to a lift height required to pump effluent to a desired elevated location;

positioning at least one outlet pipe through a side wall of a riser corresponding to the lift height required to pump effluent; and

pumping effluent from the lift pump station through the at least one outlet pipe;

35. The method of claim 34, further comprising:

sealing a connection between the riser base and the riser.

36. The method of claim 34, further comprising:

fitting a cover over an uppermost riser to close off the lift station.

37. A method for converting a riser to a lift station, comprising:

providing a riser base having a height less than a diameter of an inlet pipe;

positioning a pump on the riser base;

stacking at least one riser on the riser base to a lift height required to pump effluent to a required elevated location;

sealing a connection between the riser and the riser base; and

positioning at least one outlet pipe through a side wall of a riser corresponding to the predetermined lift height required to pump effluent.

38. The method of claim 37, further comprising:

sealing a connection between the riser base, the first riser, and each subsequent riser with a sealing member.

39. The method of claim 38, wherein the sealing member is a mastic sealant or a preformed gasket.

40. The method of claim 37, further comprising:

fitting a cover over an uppermost riser to close off the lift station.

41. A drainage holding unit, comprising:

a riser base having a top side, a bottom side, and a height defined by a distance between the top side and the bottom side, the height being less than a diameter of a pipe delivering fluid to the holding unit;

at least one riser stacked on the riser base to hold the fluid;

an inlet pipe connected to the riser for delivering fluid from a relatively higher location; and

an outlet pipe connected to the riser for discharging the fluid to a relatively lower location.

42. The holding unit of claim 37, wherein the outlet pipe is located below the inlet pipe and fluid is discharged from the holding unit without using a pump.

43. A drainage holding unit, comprising:

a riser base having a top side, a bottom side, and a height defined by a distance between the top side and the bottom side, the height being less than a diameter of a pipe delivering fluid to the holding unit;

at least one riser stacked on the riser base to hold the fluid;

an inlet pipe connected to the riser for delivering fluid from a relatively lower location; and

an outlet pipe connected to a pump for discharging the fluid to a relatively higher location.

44. A modular lift pump station comprising:

a riser base having a top surface,

a pump positioned on the top surface for pumping liquid from the riser base to a lift height; and

at least one riser stacked on the riser base, the riser permitting the liquid to discharge at the lift height through an outlet pipe extending through a sidewall of the riser, and the distance between a bottom edge of the riser and the top surface of the riser base ranges between substantially flush to approximately a diameter of an inlet pipe delivering liquid to the lift pump station.

45. The modular lift pump station of claim 44, wherein the riser base further comprises:

a top side having a substantially flat surface along at least a portion thereof for supporting the pump,

a bottom side having reinforcing support structure for strengthening the riser base; and

a raised perimeter edge extending from the surface of the top side forming a connecting edge member for connecting to a riser.

46. The modular lift pump station of claim 44, wherein the connecting edge member is one of a tongue and a substantially U-shaped cross-section groove for a tongue and groove connection joint.

47. The modular station of claim 44, further comprising:

a cover to close off the modular lift pump station.

* * * * *