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[54] **SOIL PUMP SEWAGE HANDLING SYSTEM, METHOD AND TOILET APPARATUS ADAPTED THEREFOR**

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[52] **U.S. Cl.** **4/10,** 4/77, 4/90, 4/DIG. 4

[51] **Int. Cl.** **E03d 1/00,** E03d 3/00, E03d 5/00

[58] **Field of Search**.....4/8–9, 4/76, 77, 78, 79, 80, 84, 89, 90, 92, 100, 114, 115, DIG. 4; 135/37–40; 141/1, 382; 241/46, 46.02, 46.11, 46.17

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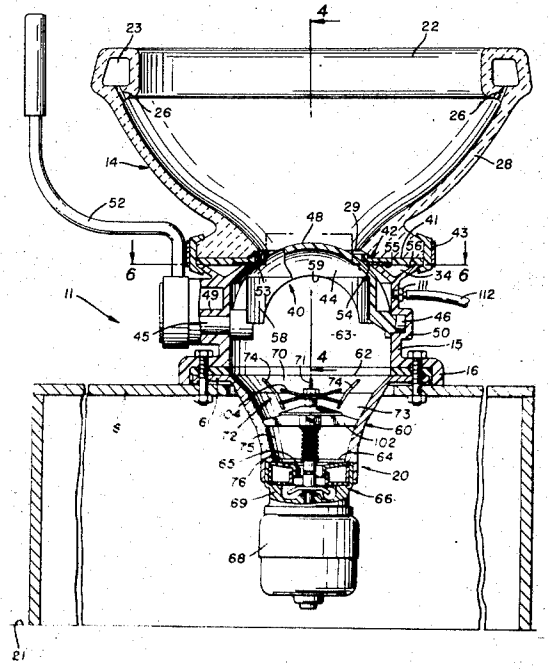
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[57] **ABSTRACT**

A sewage handling system, a toilet apparatus and a method by which waste may be pumped through a conduit of relatively small internal diameter. Heterogeneous mixtures of waste and flush fluid are emptied through a drain in the bowl portion of the toilet apparatus into a conically blending chamber therebeneath. Blade means are rotated at high speed within the blending chamber to transform the heterogeneous mixture into a homogeneous slurry that is easily transferred through the conduit into the holding tank by a pump means. A common motor drives both the blade means and the pump means, but in order to use a pump means that is low on power consumption some means must be employed to interrupt rotation of the blade means sufficiently to permit the homogeneous slurry to exit from the blending chamber and flood the intake off the pump means. In one embodiment of the invention disclosed this is accomplished by employing a clutch selectively to drive the blade means. Of particular suitability to this embodiment a baffle may be interposed between the blade means and the intake of the pump to minimize turbulence in proximity to the pump intake and thereby assure flooding of the pump intake even when rotation of the blade means is not absolutely precluded during the pumping stage of the flush cycle. In another embodiment a timing means deactivates the motor so as to interrupt rotation of the blade means for a predetermined time interval sufficient to permit the homogeneous slurry to pass from the blending chamber into the intake of the pump.

2 Claims, 7 Drawing Figures



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SHEET 1 OF 4

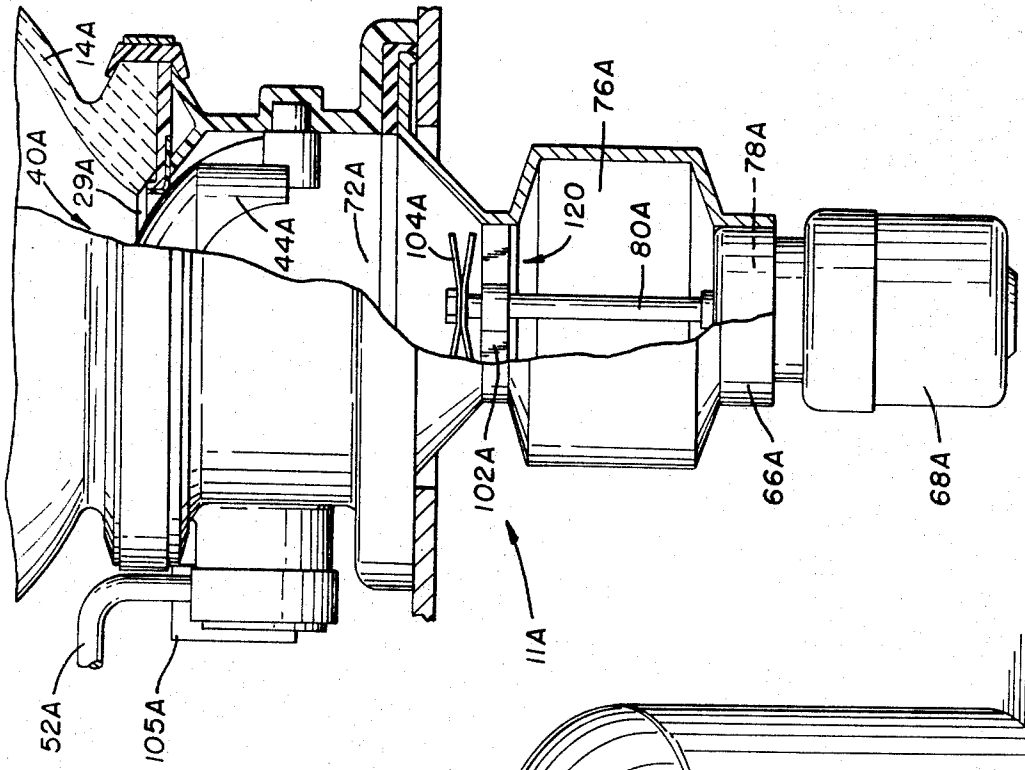


FIG. 7

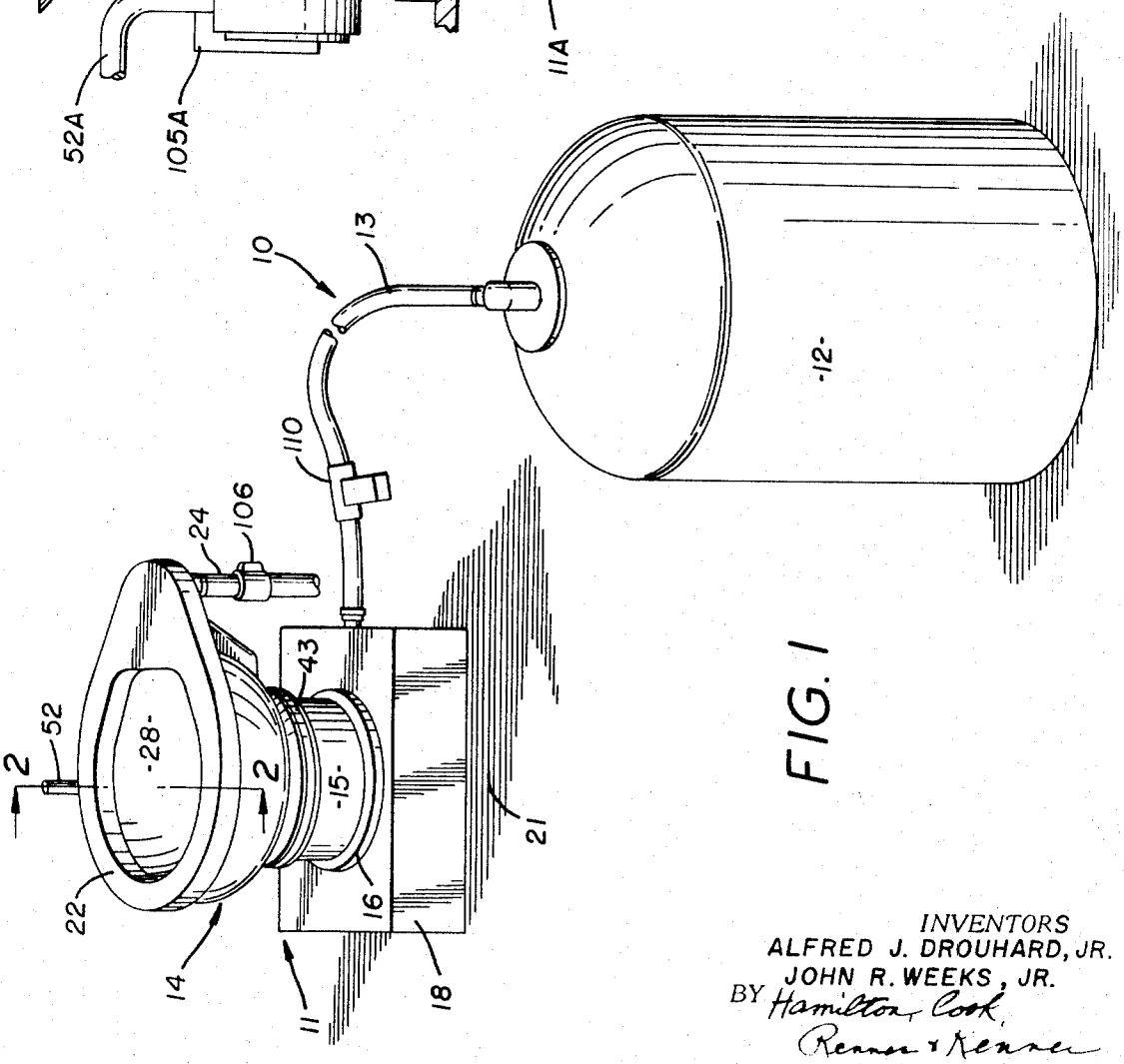


FIG. 1

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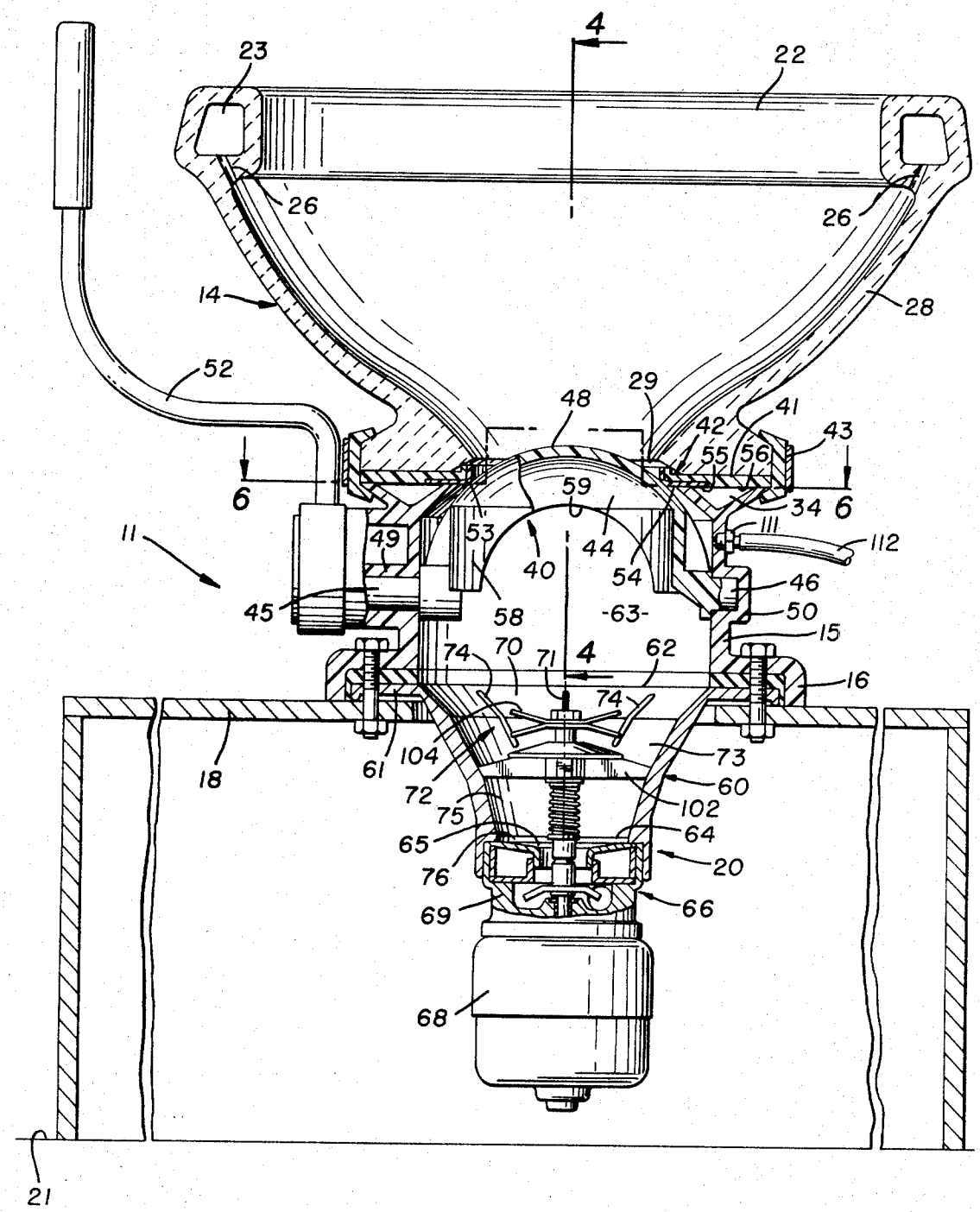


FIG. 2

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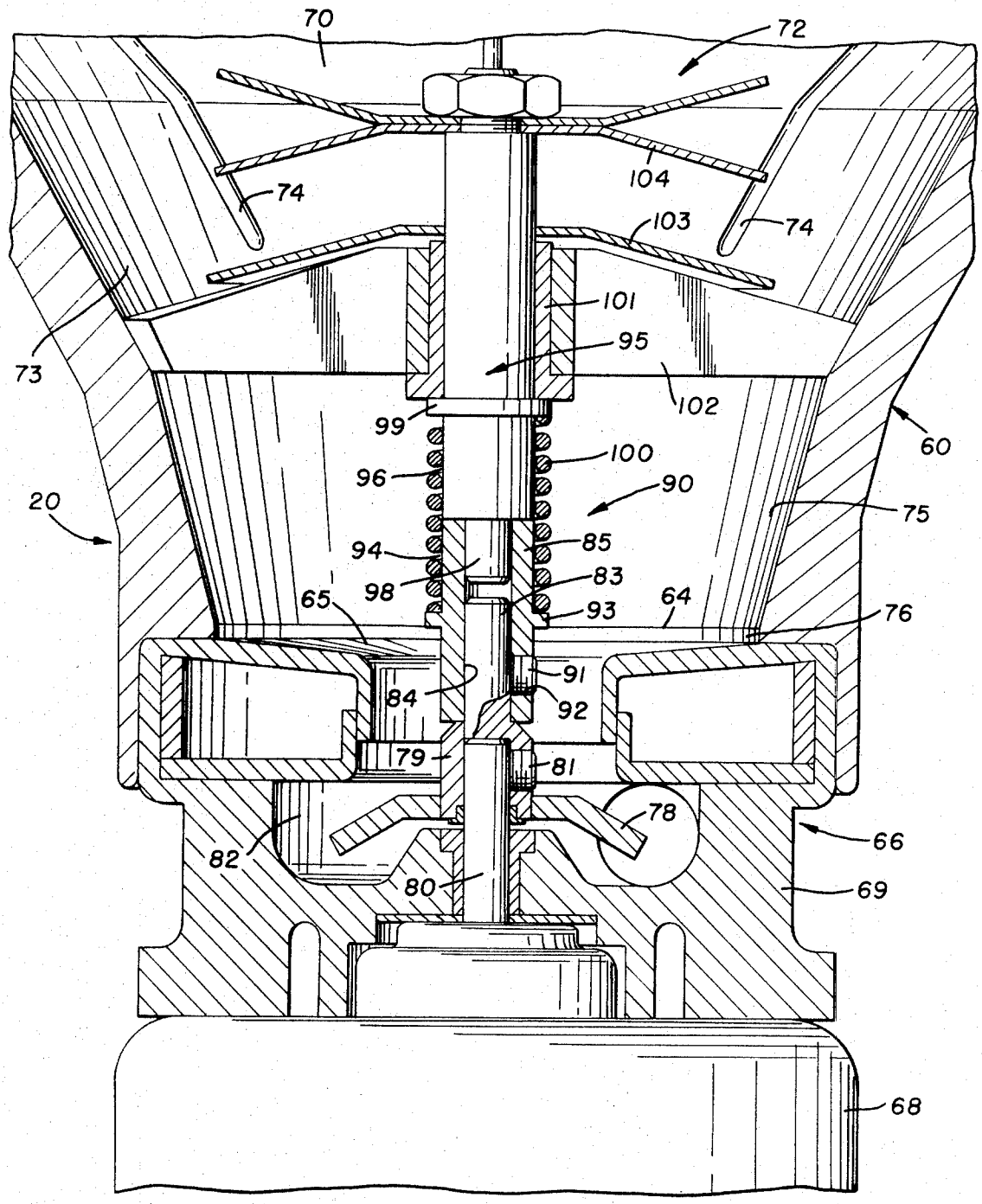


FIG. 3

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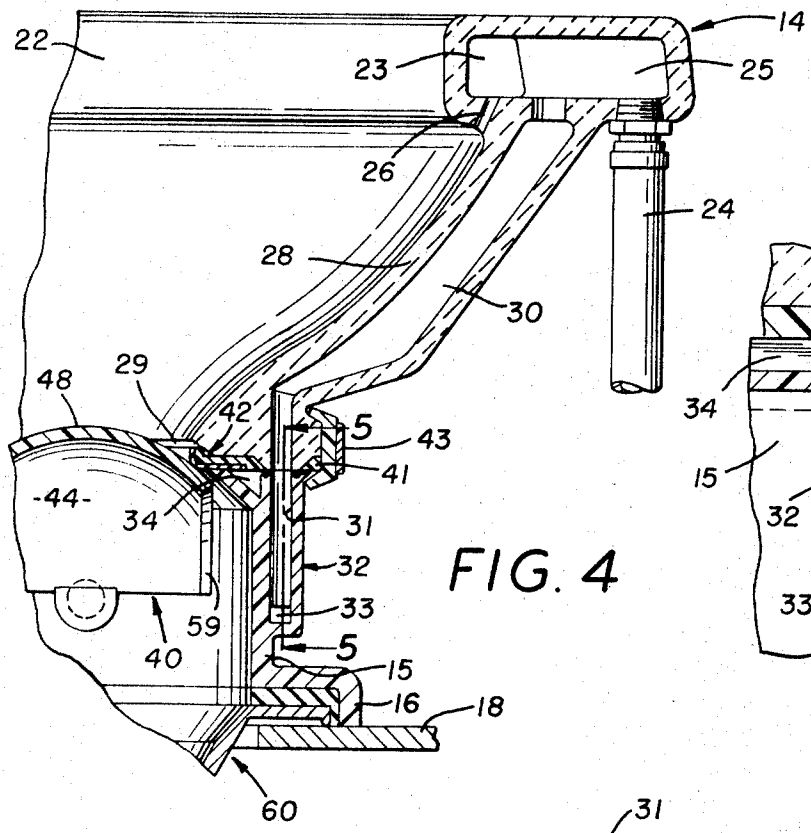


FIG. 4

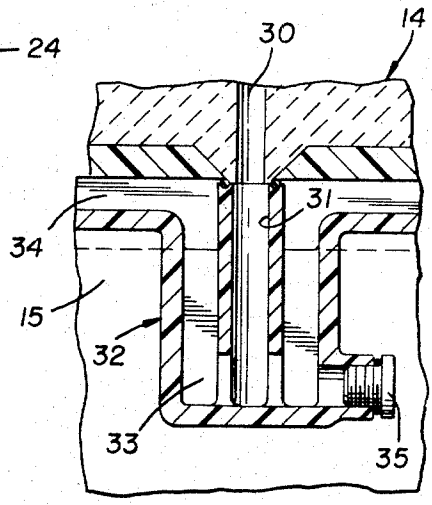


FIG. 5

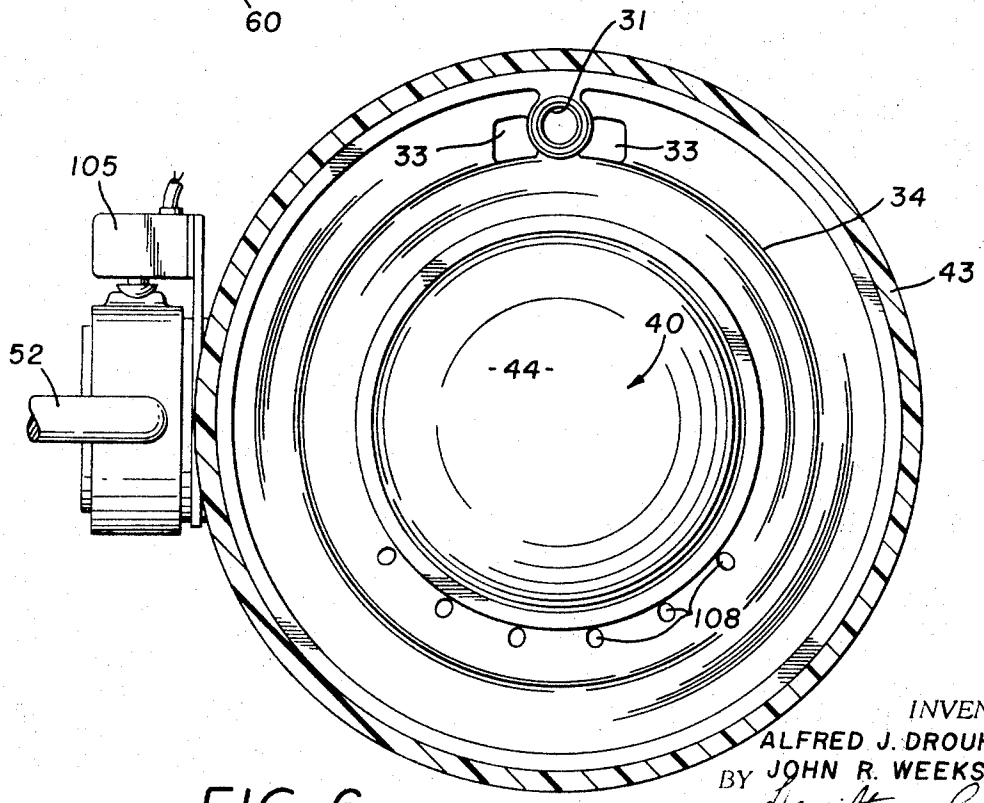


FIG. 6

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SOIL PUMP SEWAGE HANDLING SYSTEM, METHOD AND TOILET APPARATUS ADAPTED THEREFOR

BACKGROUND OF THE INVENTION

The present invention relates generally to a self-contained sewage handling system. Specifically, the present invention relates to the method and apparatus for receiving sanitary sewage in a trapless bowl and transferring it to a remote holding tank. The heterogeneous mixture of water and waste material are blended into a homogeneous slurry in order to conserve the amount of flush fluid required and in order to permit the conduit connecting the toilet to the holding tank (and through which the slurry is pumped) to be of a relatively small internal diameter.

As is becoming more and more apparent, the healthy existence of mankind requires an adequate, potable water supply and adequate facilities for the collection and disposal of sewage. Of particular importance is the collection and disposal of sanitary sewage, and the present invention relates to the removal of sanitary waste from a bowl to a temporary storage facility, or holding tank, located in spaced relation to the bowl, as is desired in an environment either remote from, or inconvenient to, a sewerage system. As such, it is particularly suitable for use in mobile homes, airplanes, buses, railway cars, boats or the like.

Self-contained sewage handling systems can be broadly classified in four categories: viz., gravity systems; recirculating systems; pneumatic systems; and, soil pump systems.

In a gravity system the relative location of the toilet bowl and the holding tank is absolutely fixed — the holding tank must be located on a level lower than the discharge drain from the toilet bowl, and, to minimize the volume of flush water required, must be in rather immediate proximity to an orientation beneath the bowl. This interdependence as to the location of the components in a gravity system seriously limits the locations wherein such an arrangement can be installed. In a recirculating system a pump, generally powered, filters and forces liquid from the holding tank back into the bowl from which it returns to the holding tank as the toilet is next flushed. Often the bowl assembly, pump, filter and holding tank are contained in a single unit, and such an arrangement is rather bulky. Although bulk is itself a definite drawback in the environment for which such a system is intended, there are other drawbacks which some users find highly offensive. As an example, because the fluid from the holding tank is recirculated to the bowl for flushing, chemicals are added to the system not only to mask the appearance of the flushing fluid but also to deodorize and disinfect the flushing fluid. To some users, however, the cure is as bad as the problem sought to be overcome. Moreover, routine maintenance to a recirculating system can also be highly unpleasant particularly inasmuch as the filter and pump are generally submerged within the holding tank.

Pneumatic sewage systems are relatively new, and while they offer a highly desirable alternative, they are relatively expensive and tend to require special components in order to assure the subatmospheric pressure in the system necessary for the waste to be forced between the bowl and the holding tank.

In a soil pump system the contents of the toilet bowl are emptied into a holding tank by a generally hand operated piston pump — the inlet to the pump communicating with the discharge drain in the toilet bowl and the discharge from the pump communicating with the holding tank. Although this system does permit the holding tank to be located remotely of the toilet bowl, effective operation of the soil pump requires rather large amounts of liquid to effect a flush. This directly affects the size of the holding tank required for this type system. Moreover, the soil pump requires check valves on both the inlet and discharge sides thereof so that clogging of those valves is a constant threat to the satisfactory operation of the system.

In some installations the soil pumps have been electromechanically operated, but in order to provide sufficient pumping action excessive electrical power has been required with no reduction in the amount of water required to effect the transfer of the waste material from the toilet to the holding tank.

One prior known electromechanical soil pump also includes a grinder on the order of that employed in garbage disposal units to pulverize the waste material as it passes into, or through, the soil pump. These units have almost always made provision for injecting a disinfectant into the pulverized waste, because they have been designed to discharge the treated waste either immediately or after retention in one or more holding tanks for a sufficient time hopefully to allow the disinfectant to sanitize the discharge.

The prior art soil pump systems described above are not economical with regard to the amount of flushing fluid used, and the grinding mechanism heretofore used also requires an excessive amount of electrical energy to operate. Moreover, there is an increasing amount of legislation being passed to prohibit such indiscriminate waste discharge. With mandatory provisions for retention of waste until it can be drained into authorized treatment facilities, the efficiency of the flushing arrangement and the size of the holding tank required become increasingly important.

SUMMARY OF THE INVENTION

It is, therefore, a primary object of the present invention to provide an improved apparatus for a soil pump sewage handling system.

It is another object of the present invention to provide a sewage handling system, as above, wherein the holding tank can be spaced from the toilet and the course of the conduit communicating therebetween is not limited to a predetermined orientation.

It is a further object of the present invention to provide a sewage handling system, as above, which will accomplish a flush with a minimal amount of liquid so that the holding tank may be relatively small.

It is a still further object of the present invention to provide a sewage handling system, as above, in which the waste is blended with a relatively small amount of flush liquid into a homogeneous slurry that can be pumped through a conduit having a relatively small internal diameter into a holding tank.

It is an even further object of the present invention to provide a trapless toilet particularly adapted for a sewage handling system, as above, which has a bowl portion communicating with a blending and pumping

means whereby a heterogeneous mixture of waste material and flushing liquid may be drained from the bowl, blended to a homogeneous slurry and the slurry pumped through the conduit and into the holding tank of the system.

It is yet another object of the present invention to provide a method for accomplishing the transfer of waste from a toilet to a holding tank, as above.

These and other objects, together with the advantages thereof over existing and prior art forms which will become apparent from the following specification, are accomplished by means hereinafter described and claimed.

In general, a sewage handling system embodying the concept of the present invention employs a toilet apparatus that communicates with a remote holding tank by means of a conduit having a relatively small internal diameter. Means are provided to admit a relatively small amount of flush fluid into the bowl portion of the toilet, and the toilet has a drain that is selectively opened and closed by a valve means to permit heterogeneous mixtures of waste and flush fluid in the bowl to be emptied into a blending chamber positioned beneath the drain. Blade means are mounted within the blending chamber for relatively high speed rotation by a motor. The blending action of the high speed blades transforms the heterogeneous mixture of waste and flush fluid into a homogeneous slurry that may then be pumped through the small I.D. conduit and into the holding tank.

In the preferred embodiments of the present invention the pump may also be driven by the same motor that powers the blade means. In one embodiment a clutch is employed to effect selective connection between the motor and the blade means. In addition, a baffle is preferably interposed between the blending chamber and the intake of the pump in order to minimize turbulance at the intake and thereby permit the use of a centrifugal pump that has low power consumption but which requires a flooded intake.

In an alternative embodiment employing the same type pump, a timer is employed to deactivate the common motor and thereby interrupt rotation of the blade means for a predetermined period of time after the heterogeneous mixture has been blended in order to assure flooding of the pump intake with the resulting homogeneous slurry.

One preferred embodiment of a system incorporating the concept of the present invention and capable of operating according to the method thereof, together with an alternative form of the toilet apparatus usable therein, are shown by way of examples in the accompanying drawings and are described in detail without attempting to show all of the various forms and modifications in which the invention might be embodied; the invention being measured by the appended claims and not by the details of the specification.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is a schematic perspective of a system embodying the concept of the present invention depicting the toilet apparatus connected to a remote holding tank by a conduit having a relatively small internal diameter;

FIG. 2 is an enlarged vertical cross section of the toilet apparatus taken substantially on line 2—2 of FIG. 1;

FIG. 3 is an enlarged area of FIG. 2 depicting the blending and pumping mechanism of the toilet apparatus in greater detail;

FIG. 4 is a partial cross section taken substantially on line 4—4 of FIG. 2 and depicting the flush fluid passageway from a plenum chamber in the bowl portion to a trap means in the pedestal on which the bowl portion is supported;

FIG. 5 is an enlarged partial section taken substantially on line 5—5 of FIG. 4 and depicting the trap through which a portion of the flush fluid passes to wash the flush valve element during each flush cycle;

FIG. 6 is a horizontal section taken substantially on line 6—6 of FIG. 2 and depicting, in top plan, the pedestal on which the bowl portion of the toilet is supported and the valve means carried in the pedestal to open and close the drain of the bowl portion; and,

FIG. 7 is a schematic vertical section, appearing on the same sheet of drawings as FIG. 1, of an alternative form of blending and pumping mechanism adapted not only for employment in the novel toilet apparatus incorporated in a system embodying the concept of the present invention but also for practicing the method thereof.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring more particularly to the drawings, a sewage handling system embodying the concept of the present invention is designated generally by the numeral **10** and comprises a toilet apparatus **11** that communicates with a holding tank **12**, as by the transfer conduit **13** having a relatively small internal diameter.

As best shown in FIG. 2, the toilet apparatus **11** is of the type commonly referred to as a "trapless" toilet and has a bowl portion **14** supported on a pedestal **15**. The pedestal **15** may comprise a valve housing, as shown, so that the lower flange **16** can be secured to a hollow dais **18** in which the blending and pumping mechanism **20** of the toilet apparatus **11** may be housed, or the pedestal may, if desired, extend to the floor **21** and provide a skirt (not shown) within which the blending and pumping mechanism **20** may be housed.

The upper rim **22** of the bowl portion **14** has a passageway **23** therein connected to a fresh water supply, as represented by conduit **24** that communicates with plenum **25** (FIG. 4), capable of admitting a predetermined quantity of flush fluid. One or more apertures **26** pierce the lower side of rim **22** adjacent the wall **28** of the bowl portion **14** to direct the flush fluid — e.g., water — thereacross. The wall **28** of the bowl portion **14** curves convergingly downwardly from the rim **22** in the conventional fashion to a drain **29**.

The plenum **25**, in addition to communicating with passage **23**, also communicates with a passageway **30** that extends downwardly along the wall **28** of the bowl portion **14** and communicates with the upper end of a vertical tube **31** within a trap **32** incorporated on the exterior of the pedestal **15** (FIG. 4). As is also shown in FIG. 5, The lower end of the tube **31** opens into a trap cavity **33**, and the cavity **33** communicates directly with the V-shaped, upper, seating edge **34** on the pedestal **15** at a level above the level at which the tube **31** opens into the trap cavity **33**, for a purpose more fully hereinafter explained. A removable plug **35** in

proximity to the base of the trap **32** permits selectively draining the trap cavity **33** and passageway **30** as well as assuring drainage of any flush fluid in passageway **23** or plenum **25** that did not exit through apertures **26**. A provision for complete drainage facilitates winterizing.

A valve means **40** is operative to open and close the drain **29**, and a resilient, annular anchor base **41** on valve seat **42** may be interposed as a sealing means between the bowl portion **14** and the pedestal **15** and secured therebetween by conventional clamping arrangement **43**.

The movable element **44** of the valve means **40** may be of the ball variety and is mounted for rotation through approximately 90° on a pair of opposed gudgeons **45** and **46** that extend diametrically with respect to the spherical outer surface **48** of the movable valve element **44** and are journaled in bearing bosses **49** and **50**, respectively, provided in the pedestal **15**. The one gudgeon **45** extends, shaftlike, through boss **49** and is secured to a flush lever **52** that extends conveniently to one side of the bowl portion **14** for selectively rotating the valve element **44**.

The spherical outer surface **48** of the valve element **44** slidingly engages the annular perimeter **53** presented by the valve seat **42**. If desired, the perimeter **53** may be presented by an annular facing ring **54** supported on the resilient base **41**. As shown, the facing ring **54** may be imbedded in, and bonded to, the resilient base **41** so that the lower surface **55** of the facing ring **54** will lie within the same plane as the lower surface **56** of the resilient base **41**. The facing ring **54** is preferably made from a solvent resistant material having a low coefficient of friction and inherent lubricity, such as tetrafluoroethylene resin.

The spherical surface **48** (which is of sufficient magnitude to engage and seal the full perimeter **53** of the valve seat **42** when the valve means is closed) of the valve element **44** merges with a pair of spaced side walls, such as wall **58** depicted in FIG. **2**, each of which has a semicircular opening **59** of a diameter at least equal to the diameter of the drain **29** and oriented in a plane substantially parallel to the axis of the gudgeons **45** and **46** and such that an unobstructed passageway is provided beneath the drain **29** into the blending and pumping mechanism **20** when the valve element **44** is rotated to open the valve means **40**.

In that embodiment of the invention disclosed in FIG. **2** the blending and pumping mechanism **20** is secured to the lower flange **16** on the pedestal **15**. Specifically, a funnel spacer **60** depends beneath the pedestal and is secured thereto as by a mounting flange **61** interposed between the lower flange **16** on the pedestal **15** and the dais **18**. The major opening **62** of the funnel spacer **60** is directed upwardly and registers with the cylindrical interior **63** of the pedestal **15**. The minor opening **64** of the funnel spacer **60** is directed downwardly and communicates with the intake **65** of a centrifugal pump **66** carried on the lower extremity of the funnel spacer **60** and powered by a fractional horse power electric motor **68** supported on the housing **69** of pump **66**.

The interior of the funnel spacer **60** tapers downwardly from the major opening **62** to the minor opening **64** in three conical tiers. The uppermost tier **70** forms a transitional cone that may well be inclined to approximately 45° to direct the waste material toward the central axis **71** of the funnel spacer **60** without forming a shelf that would tend to retain the waste. The transitional tier **70** also forms the upper wall of a blending chamber **72**.

The middle tier **73** is inclined at a lesser angle with respect to a vertical reference in order to provide a greater capacity to the blending chamber and yet is provided with some taper in order to induce the currents that enhance the blending action. An inclination on the order of 30° with respect to a vertical frame of reference has been found quite satisfactory.

It has been found that even though the inclinations of the upper and middle tiers **70** and **73** contribute to the formation of currents within the blending chamber **72** necessary to achieve the homogeneous slurry required, efficiency may be even further enhanced by providing a plurality of circumferentially spaced ribs **74** on at least the middle tier **73** and, if desired, on the transitional tier **70**, to interrupt any laminar flow that might exist adjacent the walls of the blending chamber which could entrain waste material and prevent it from being blended.

The third tier **75** circumscribes an input chamber **76** for the pump **66** and as such may be nearly vertical. However, a slight inclination — on the order of 15° — is disclosed in the preferred embodiment to accommodate a transition from the blending chamber **72** to the opening for the intake **65** of the pump **66**.

As best seen in FIG. **3**, a pump impeller **78** is carried on an impeller hub **79** that is secured to the shaft **80** of the motor **68**, as be a set screw **81**. Rotation of shaft **80** will, therefore, rotate the impeller **78** within the volute **82**.

A cylindrical extension **83** of the hub **79** is received within an aligning bore **84** that extends axially through the collar portion **85** of a clutch means **90**. The collar portion **85** is the power input member of the clutch means **90** and is, therefore, secured to the hub extension **83**, as by a set screw **91** that is received within a threaded bore **92** oriented radially through the wall of the clutch collar **85** on that side of the positioning flange **93** that is proximal to impeller hub **79**. That portion of the clutch collar **85** that is distal the impeller hub **79** is provided with a cylindrical clutch surface **94**.

The power receiving portion of the clutch means **90** is a blender shaft **95** that has a cylindrical clutch surface **96** of the same diameter as the clutch surface **94** on the adjacent clutch collar **85**. Alignment of the clutch surfaces **94** and **96** in adjacent proximity is achieved by a journal end **98** of reduced diameter on the blender shaft **95** that is rotatably received within the aligning bore **84** in the clutch collar **85**.

A positioning flange **99** extends radially of the clutch surface **96** and is located in axially spaced relation to the positioning flange **93** on clutch collar **85** to confine a clutch spring **100** therebetween. That portion of the blender shaft **95** extending beyond the clutch surface **96** and on the opposite side of the positioning flange **93** is journaled in a stabilizing bearing **101** carried on a spider **102** secured within the funnel spacer **60**. The spider **102** also presents an imperforate conical baffle **103** that defines the axially lowermost extent of the blending chamber **72**. The necessity for the baffle **103** in the preferred embodiment of the invention is more

fully hereinafter explained in conjunction with the description as to the operation of the subject system.

Axially beyond the spider **102** and the baffle **103**, blender blades **104** are secured to the end of the blender shaft **95** to rotate within the blending chamber **72**.

Having now provided the foregoing basic description of the major components in a preferred embodiment of the system **10**, a brief description of its operation — during which additional structural details can be included — will assure a complete understanding of the concept embodied therein.

To initiate the flush cycle one swings the flush lever **52** to rotate the movable element **44** of the valve means **40** and open the drain **29**. Contemporaneously with the rotation of the movable element **44** a timer **105** is actuated to control the flush cycle. The timer **105** opens a valve **106** in the conduit **24** to admit flush fluid into the plenum **25** from which a major portion exits through apertures **26** to mix with the waste and any residual flush fluid remaining in the bowl **14** after the previous flush cycle. It is this heterogeneous mixture of waste and liquid that is blended during the subsequent phase of the flush cycle.

Whereas a conventional water closet would require at least three gallons of water to effect a flush, only one or two cupfuls of water are necessary for flushing the toilet **11** into the system **10**.

At substantially the same time as the timer **105** opens valve **106** it also trips a switch to start motor **68** and thereby initiate the blending portion of the flush cycle. In the preferred embodiment the motor **68** is reversible and the initial direction in which the motor shaft **80** turns rotates the impeller **78** contra the direction required for pumping. As the motor shaft **80** so rotates, the clutch collar **85** — which is connected to the hub extension **83** — turns in the same direction, and in that direction rotation of the clutch collar **85** augments the frictional engagement between the clutch spring **100** and the cylindrical clutch surface **94** on clutch collar **85** by tending to tighten the helical wraps of the spring **100**. As the spring **100** thus tightens it also more firmly grips the clutch surface **96** on blender shaft **95** to rotate the blender blades **104**.

Before continuing the discussion as to the blending portion of the flush cycle it should be understood that a small portion of the water input during the flush cycle may be used to clean the spherical outer surface **48** of the valve element **44**. To effect this result a plurality of directing orifices **108** (FIG. **6**) are spaced circumferentially along that arcuate portion of the seating edge **53** beneath which the outer surface **48** of the valve element **44** swings as the valve element is rotated by the flush lever **52**. Thus, the water that feeds into the V-shaped seating edge **34** through the trap **32** is directed through the orifices **108** to wash the spherical outer surface **48** of the valve element **44**. The remainder of the water, of course, enters the bowl primarily through the aperatures **26** that pierce the rim **22**, but irrespective of the course along which the flush fluid flows, the entire volume required is considerably less than that necessary to flush a conventional toilet.

Returning now to the blending portion of the flush cycle, a typical flush might include 4 to 6½ ounces of solid waste, 6 ounces of liquid waste, a quantity of paper and approximately 2 cups (16 ounces) of flush fluid. As this heterogeneous mixture drops into the blending chamber it may be efficiently blended to a homogeneous slurry in approximately 15 seconds with high speed rotation of the blender blades **104**. Typical of the desired speed at which blending is accomplished, a 0.12 horsepower, D.C. motor **68** is powered by a 6 or 12 volt battery will turn the blender blades at 16,000 to 17,000 r.p.m. Under typical loads this would draw approximately 22 amps on a twelve volt battery which , for the short duration of the blending cycle, is not excessive. Because of the high speed at which the blender blades rotate, considerable turbulence is created, and for that reason it is desirable that the valve means **40** remain closed during the blending portion of the flush cycle; by sealing the drain **29** with the movable valve element **44** eruption of the material being blended upwardly through the drain **29** and into the bowl portion **14** is precluded.

Upon completion of the blending portion of the flush cycle the timer **105** signals the motor **68** to counterrotate shaft **80** for the pumping portion of the flush cycle. The resulting counterrotation of the clutch collar **85** applies a frictional contact to the clutch spring **100** that tends to expand its diameter and thereby loosen the grip with which the spring **100** embraces the clutch surface **96** on blender shaft **95** so that the blender shaft **95** will slip with respect to rotation of the clutch collar **85**.

Ideally rotation of the blender blades **104** would cease, but as a practical matter the slip clutch **90**, while greatly reducing rotation of the blender blades, may not always preclude all rotation of the blades, and rotation of the blender blades **104** creates an exceptionally high degree of turbulence. In fact, it has been found that this turbulence will engender cavitation beneath the blades in the area of the pump intake **65**. At the high speeds required for blending an efficient centrifugal pump would require an inordinate degree of close tolerance precision in the clearance between the impeller and the volute within which it rotates. By adopting clearances of sufficient magnitude that close tolerance precision in the manufacture of the pumps can be ignored, manufacturing costs can be minimized. Such pumps have been found to pump quite satisfactorily only so long as the intake remains flooded. For this reason, and, because it has been found effective in preventing cavitation therebeneath, employment of an imperforate baffle **103** between the blending chamber **72** and the pump intake **65** is highly desirable.

Although the internal diameter of the conduit **13** that connects the toilet **11** to the holding tank **12** as well as the length of that conduit may vary, the time required to pump the homogeneous slurry from the toilet into the holding tank will generally be on the order of 15 to 20 seconds when pumping through a conduit having a ½ inch I.D. and a run of approximately 10 feet.

It has also been found that the load on the motor **68** diminishes quite markedly between the blending and pumping portions of the flush cycle, and whereas **20–22** amps may be drawn during the blending portion of the flush cycle, only 8 amps may be required during the pumping portion.

In many installations it may be more convenient to locate the holding tank at a level higher than the level

of the toilet. Particularly for these installations a valve means **110** should be incorporated in conduit **13**, and when the conduit **13** is made of a flexible material a pinch valve works quite well and may be operated, as by a solenoid, activated by the timer **105** to remain open contemporaneously with the pumping portion of the flush cycle.

Although the foregoing description has treated the blending and pumping portions of the flush cycle as being independent, sequential stages in order most efficiently to utilize a high speed, D.C. motor of relatively low horsepower, one may, if desired, overlap the blending and pumping portions of the flush cycle. This result may be accomplished by utilizing a more efficient pump, and one that would not require a flooded intake. Such a pump, however, would require a higher horsepower motor. In order to overlap the blending and pumping portions of the flush cycle with such a pump, the use of a valve means **110** would be even more important to order to permit at least an initial blending action before the pumping action begins. The timer **105** could stage the opening of the valve means **110** in order to provide the lead time necessary for the desired, preliminary blending action.

In either event it has been found that because of the excellent sealing arrangement obtained by the valve element **44** against seat **42**, a vent **111** (FIG. **2**) must be provided through the pedestal **15**. Venting beneath the valve means **40** facilitates evacuation of the waste during the pumping portion of the flush cycle. The vent **111** also contributes a second benefit by relieving any super atmospheric air pressure within the pedestal; otherwise, the pressure differential municates with the atmosphere through a conduit **112** that leads from the vent **111** to an area remote from the toilet.

In an alternative form of the toilet apparatus, identified generally by the numeral **11A** in FIG. **7**, a construction is employed that obviates the necessity of the reversible motor **68** required by the specific embodiment disclosed in conjunction with the preferred form of the invention. The use of a reversible motor **68** with the preferred embodiment is necessitated because of the particular clutch means **90** detailed in FIG. **3**. It is also quite feasible to interrupt rotation of the blender blades **104** without requiring retrorotation of the motor shaft **80** by adopting a more conventional clutch means (not shown) adapted for engagement and disengagement in responsse to an external control such as the timer **105**.

In fact, according to the embodiment depicted in FIG. **7** not only is the motor **68A** unidirectional, but the motor shaft **80A** may directly carry both the impeller **78A** and the blender blades **104A** without requiring a clutch means selectively to engage and disengage the blender blades **104A**. This result is obtained by providing an enlarged intake chamber **76A** and constricting the juncture of the blending and intake chambers **72A** and **76A**, respectively, into a throat **120** of substantially the same diameter as the blender blades **104A**. The motor shaft **80A** extends fully across the intake chamber **76A** and is journaled through a bearing spider **102A** supported to span the throat **120**.

In this embodiment, too, the flush cycle is initiated by swinging the flush lever **52A** to rotate the moveable element **44A** of the valve means **40A** and thereby open the drain **29A**. Contemporaneously with this rotation of the valve element **44A** the timer **105A** is actuated to start the motor **68A** and admit flush fluid into the bowl portion **14A** of the toilet.

As the heterogeneous mixture of waste and flush fluid drops into the blending chamber **72A**, the action of the rotating blender blades **104A** maintains a considerable portion of the mixture within the blending chamber **72A**. Of course, some fluid will pass beneath the blades **104A** and through the throat **120** into the intake chamber **76A** from which it will be discharged by the action of the pump **66A**. However, it has been found that as long as the blade means **104A** are rotated at high speed even the homogeneous slurry resulting in chamber **72A** from the blending action of rotating blade **104A** will not readily flow from the blending chamber **72A** into the intake chamber **76A** if a throat **120** is provided. Accordingly, after a sufficient time to assure proper blending — generally approximately **15** seconds — the timer **105A** interrupts the blending rotation of the blade means **104A** by stopping motor **68A**. This interruption permits the homogeneous slurry to drain from the blending chamber **72A**, through the throat **120** and into the intake chamber **76A**. Thereafter — normally only about **5** seconds are required — the timer **105A** reactivates the motor **68A** so that the pump **66A** can transfer the slurry from the intake chamber **76A** into the remote holding tank (not shown). Thereafter, the timer **105** disconnects the motor **68A** to complete the flush cycle.

From the foregoing description it should be apparent to one skilled in the art that the concept disclosed herein provides an improved toilet apparatus for employment in a unique system to transfer sanitary waste from a toilet through a relatively small I.D. conduit to a remote holding tank by a novel method.

We claim:

1. A sewage handling system comprising, a holding tank, a toilet having a bowl portion with a drain, valve means selectively to open and close said drain, means for admitting flush fluid to said bowl portion, a blending chamber communicating with said bowl portion across said drain for receiving a heterogeneous mixture of waste material, blade means rotatably mounted in said blending chamber for blending said heterogeneous mixture into a homogeneous slurry, pump means, said pump means having an intake communicating with said blending chamber and having an outlet, an imperforate baffle means interposed between said blending chamber and said intake to prevent cavitation therebeneath, a conduit connected between the outlet of said pump and said holding tank, common motor means to power both said blade means and said pump means and means selectively to interrupt blending rotation of said blade means to facilitate the operation of said pump means subsequently to the interruption of the blending rotation of said blade means.

2. A sewage handling system, as set forth in claim **1**, in which the means to interrupt blending rotation of said blade means comprises, a clutch means to effect selective connection between said blade means and said motor means while the driving connection between said pump means and said motor means is maintained.

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