

[54] SELF COUPLING SUBMERSIBLE PUMP

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 [58] Field of Search..... 417/360, 361;
 222/385, 333, 180; 285/5, 6, 33, 304, 414

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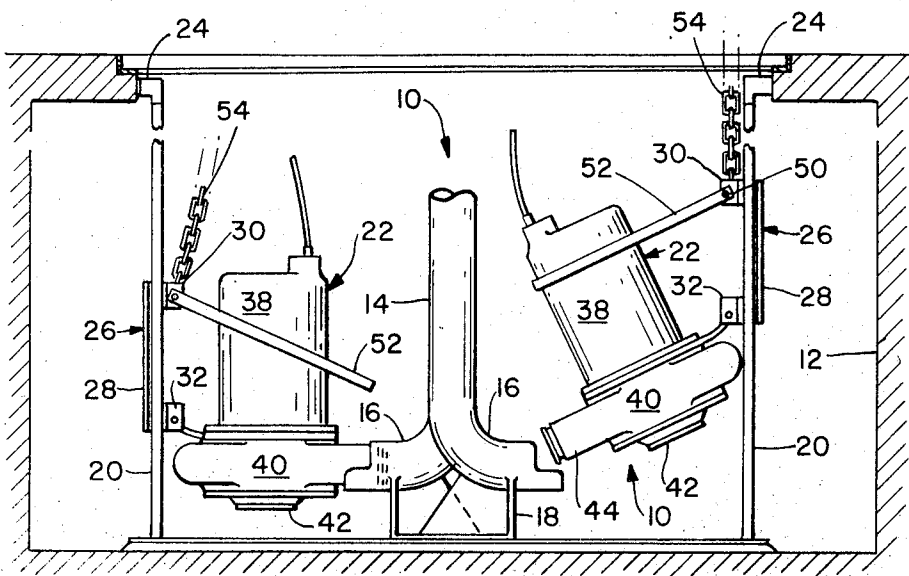
FOREIGN PATENTS OR APPLICATIONS

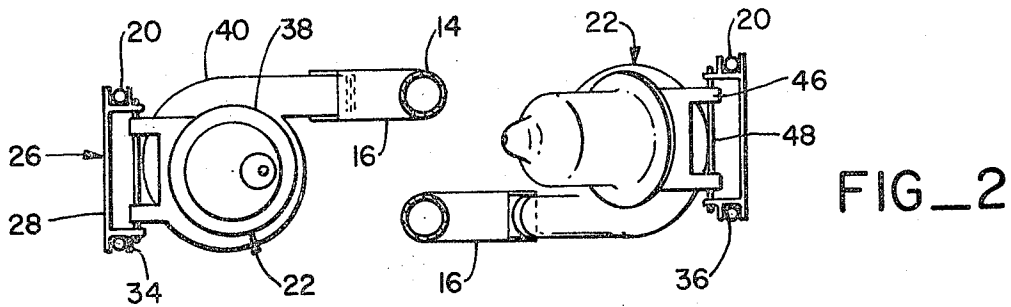
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[57] ABSTRACT

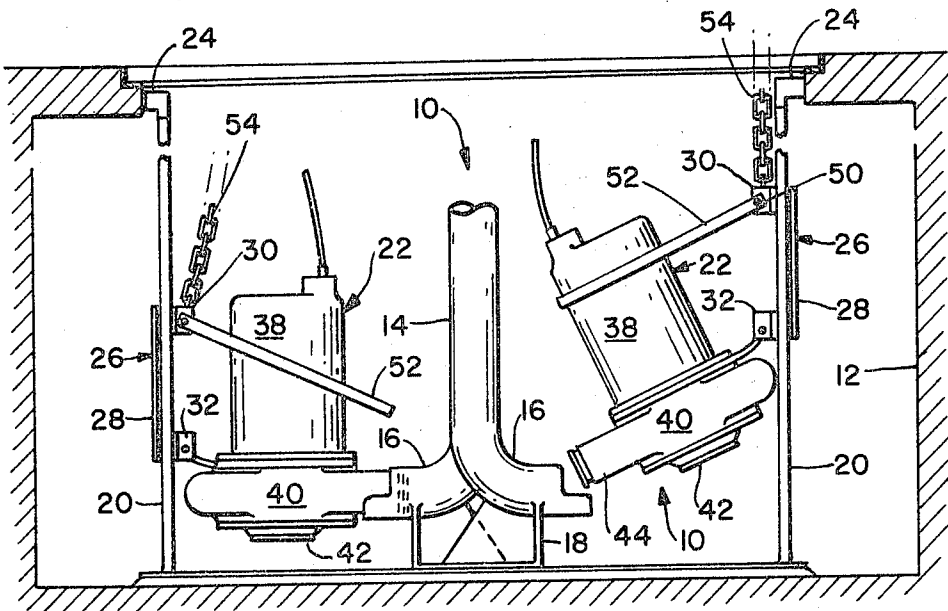
A pump apparatus for catch basins or sumps includes a pump unit supported for up and down movement on fixed guide means. The pump, having a tubular outlet, tilts at an angle when being raised or lowered, and the outlet is vertically aligned with the inlet opening of a discharge pipe. When the pump outlet engages the discharge pipe opening as the pump unit is lowered, it is automatically forced into a full coupling position by the weight of the pump unit.

4 Claims, 5 Drawing Figures

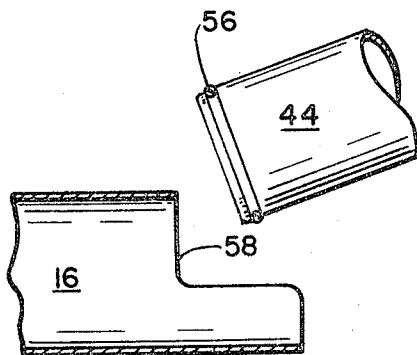




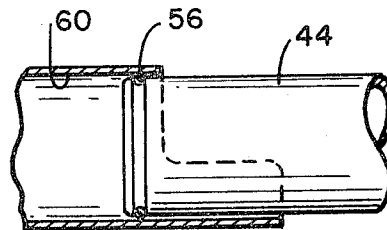
FIG_2



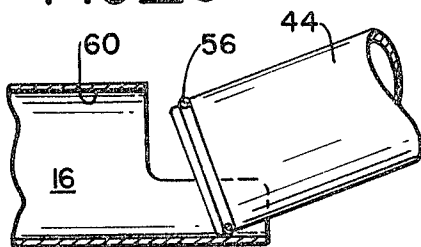
FIG_1



FIG_3



FIG_5



FIG_4

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SELF COUPLING SUBMERSIBLE PUMP

This invention relates to a pump apparatus for catch basins and the like and more particularly it relates to a pump unit that will automatically couple with the open end of a discharge pipe when lowered into the catch basin.

Such catch basins are commonly used in sewage systems where temporary storage of the effluent must be provided before it can be fed into the main sewage outlet conduit or raised to a different level before being directed to a processing plant. Submersible pumps have long been in these catch basins to remove the collected effluent when required. To facilitate inspection, repair and servicing of these pumps, it is desirable to provide a means for raising them from the bottom of the basin or sump so that workmen do not have to enter the sump itself. This requires that the pump unit when lowered be capable of automatically coupling with a discharge conduit and that when necessary to raise the pump unit it will also uncouple itself with ease.

One object of the present invention is to provide a pump apparatus of the aforesaid type for use in a catch basin or sump that enables a pump unit to couple into a fluid tight connection or uncouple with ease and efficiency when lowered and raised.

Another object of the present invention is to provide a pumping apparatus for sumps or catch basins comprising an automatic coupling pump unit that is particularly well adapted for ease and economy of manufacture, that is particularly reliable, durable and also easy to service and maintain.

Another object of the present invention is to provide a pumping apparatus for sumps or catch basins that will function with positive action by gravity force only and will not be rendered inoperative by the presence of suspended solids in the effluent or by relative high viscosity factors.

Yet another more specific object of my invention is to provide a pumping apparatus for catch basins or sump wherein a pump unit comprised of a motor and a pump is pivotally mounted and also movable upward and downward on vertical guide means fixed in the catch basin so that as the unit is raised or lowered it normally assumes a tilted position when held by a stop means. When lowered in this tilted position the pump outlet conduit engages the inlet of a fixed discharge pipe in the sump and is moved into its coupled position therein by the downward gravitational force of pump unit itself. The coupling action is quick, sure and fully automatic, requiring no manual manipulation or external power other than that required to raise the pump unit.

Other objects, advantages and features of the present invention shall become apparent from the following detailed description of one embodiment thereof presented with the accompanying drawing, in which:

FIG. 1 is a view in side elevation of a self coupling pump installation embodying the principles of the present invention;

FIG. 2 is a plan view of the pump installation shown in FIG. 1; and

FIGS. 3 - 5 are enlarged fragmentary views in elevation and in section showing the coupling action of the pump nozzle with a receiver according to the present invention.

With reference to the drawing, FIGS. 1 and 2 illustrate a typical catch basin installation utilizing a pump apparatus 10 embodying the principles of my invention. Within a basin 12 such as the type used in sewage systems to accommodate overflow extends a pair of discharge or outlet tubes 14. Each of these discharge tubes has a curved lower end inlet portion 16 that turns 90° to a horizontal orientation and is supported just above the bottom of the basin by a suitable frame assembly 18. Spaced from each discharge tube inlet is a vertical track structure 20 that supports a movable submersible pump assembly 22. As shown in FIGS. 1 and 2 this track structure comprises a pair of vertical parallel and spaced apart bars that are anchored at their lower ends in the floor of the basin. At their upper ends of the edge of the basin opening these bars are fixed to the sides of the basin opening by suitable brackets such as a pair of right angle members 24. A sliding base support member 26 for the pump 22 is retained by and movable vertically on the track members 20. Generally, this support member comprises a rigid plate with lugs or flanges 30 and 32 that extend at right angles from locations near the side edges of the plate and near its upper and lower ends respectively. Extending outwardly from each lug at a right angle thereto is another flange 34 that is spaced from and forms a channel 36 with the plate 28 and there are pairs of aligned channels on opposite sides of the plate. Thus, when installed, the vertical bars or tracks 20 fit within the channels 36 so that the support member will be guided by them as it is moved up and down.

The submersible pump assembly 22 is a self contained unit which includes an upper drive motor section 38 that receives power through a cable at its top and a lower pump section 40. The latter has a central inlet opening 42 and an outlet nozzle 44 that extends tangentially from one side of the pump section in the conventional manner. Extending from the pump section is a support bracket 46 comprised of two lug members. A pin member 48 extends through aligned bearings in the two lug members and is journaled at opposite ends in the lower flanges 32. Pivotaly connected to a similar pin member 50 journaled in the upper flanges 30 is a bandlike stop member 52 which holds the pump assembly when it tilts a predetermined amount. Attached to the upper pin member 50 or to the upper flanges is a chain 54 which is connected to a suitable lifting means (not shown) situated above the catch basin.

As shown best in FIG. 3, the pump outlet nozzle 44 has a cylindrical shape and is provided with an annular sealing member 56. This sealing member may be a conventional O-ring type which is seated in an annular groove near the end of the nozzle. When the pump assembly is disengaged from the lower end of the discharge pipe 14 it is retained in a tilted position (e.g., 30°) by the stop member 52. As the pump assembly is lowered in this tilted position the pump nozzle engages an extended lower portion 58 at the end of the discharge pipe inlet, as shown in FIG. 4. Now, as the pump assembly continues to be lowered, this lower inlet portion 58 holds the pump nozzle 44 and causes the entire pump assembly to pivot about the pin 48. Simultaneously, as this pivoting occurs the nozzle 44 moves into the discharge pipe inlet with the sealing ring 56 sliding along its inner surface 60. It will be apparent from FIG. 1 that the location of the pivotal connections

for the pump casing 40 on the base plate 28 is such that a relatively small downward force on the base plate (provided by the weight of the pump assembly 22) will, by virtue of the inherent mechanical advantage of my toggle-like arrangement, produce a relatively large outwardly thrusting force at the end of the nozzle. This force provides a substantial advantage in causing a good connection between the sump nozzle 44 and the receiving inlet 16. When the pump assembly is in the full down position, as shown in FIG. 5, the nozzle 44 is located well within the discharge inlet 16 with its sealing ring 56 providing a fluid tight seal with its inner surface 60.

In a typical catch basin 12 for a sewage system as shown in FIGS. 1 and 2, two pump assemblies 22 and a pair of discharge pipes 14 are generally used to provide the desired capacity and reliability. When it becomes necessary to raise a pump assembly to accomplish periodic servicing or repairs, the pump nozzle will readily disengage from its connected position as the assembly is drawn upward along the guide rods 20. As previously described, the reconnection of the pump nozzle 44 and discharge inlet 16 is accomplished solely by the force of gravity as the pump assembly pivots into its upright position at the bottom of the basin. From the foregoing, it should be apparent that the present invention provides a simple but unique answer to the problem of automatically coupling a pump and a discharge pipe in a catch basin. Moreover, it accomplishes the desired result with a combination of structural elements that are relatively inexpensive to manufacture while being durable, reliable in operation and easy to maintain.

To those skilled in the art to which this invention relates, many changes in construction and widely differing embodiments and applications of the invention will suggest themselves without departing from the spirit and scope of the invention. The disclosures and the description herein are purely illustrative and are not intended to be in any sense limiting.

I claim:

1. In a pumping plant including in combination a sump for accumulating sewage or the like, vertical guide means fixedly mounted in said sump, a self coupling pumping apparatus comprising:

an immersible casing with a pump and motor therein, said pump having an extended outlet nozzle; a base support means slidably connected to said vertical guide means for up and down movement; means pivotally connecting said casing to said base support means so that said casing and said outlet nozzle will tilt relative to said support means and said guide means, said connecting means being located for producing a relatively large thrusting force on said outlet nozzle when said casing is caused to pivot as a result of a relatively small downward force applied to said base support means;

stop means for holding said casing in a tilted position; a discharge tube fixedly mounted in said sump and having an extended end portion with a free infeed opening, said pump nozzle being vertically aligned to engage said discharge end portion;

the distance from the end of said outlet nozzle to said connecting means being greater than the distance from said outlet discharge end portion to said connecting means when the pump is in its lowermost coupling position,

whereby when said immersible casing is lowered into said sump, said pump outlet nozzle engages said discharge end portion and slidably enters therein into a coupling position as said casing continues to lower and simultaneously pivots upwardly from its tilted position.

2. The pumping apparatus as described in claim 1 including an annular sealing means mounted near the end of the pump nozzle.

3. The pumping apparatus as described in claim 1 wherein said extended end portion on the lower end of said discharge tube has a semi-cylindrical shape with the same curvature.

4. The pumping apparatus as described in claim 1 wherein said base support means comprises a member with projections along its opposite sides forming channels to receive said vertical guide means, a first pin means near the lower end of said member attached to said pivotally connecting means extending from said casing, and a second pin means for retaining said stop means near the upper end of said member.

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