

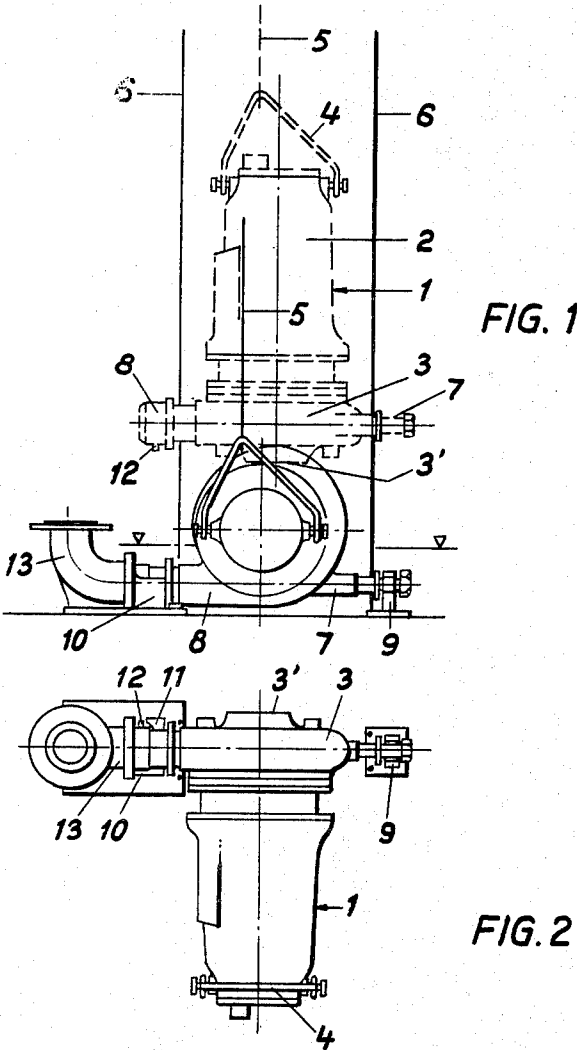
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S. ENGLESSON
PUMP DEVICE

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3 Sheets-Sheet 1



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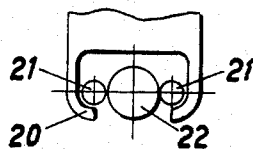
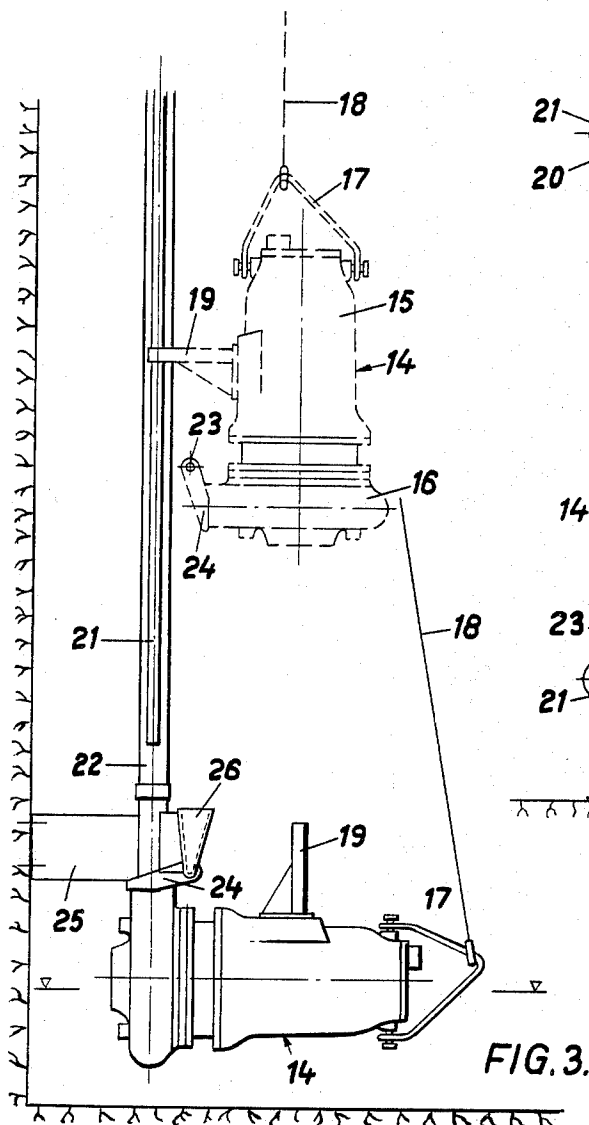


FIG. 5.

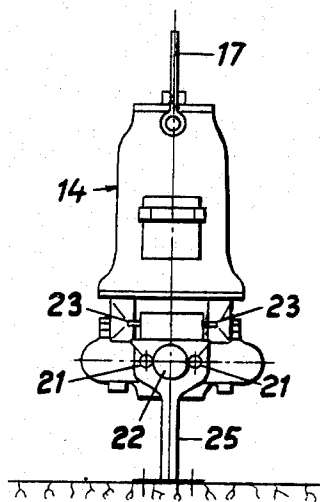


FIG. 4.

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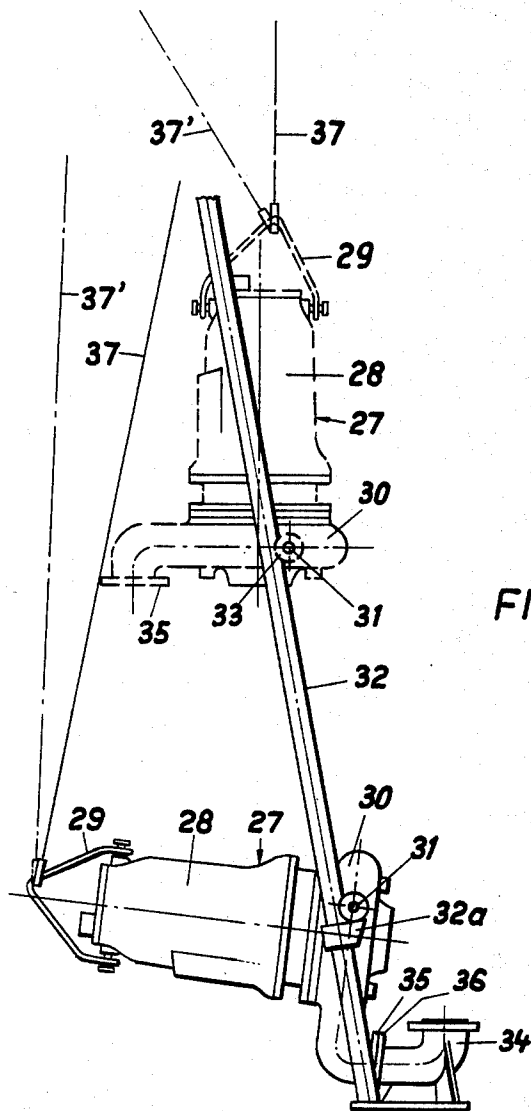
S. ENGLESSON

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3 Sheets-Sheet 3



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3,234,885

PUMP DEVICE

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5 Claims. (Cl. 103—87)

The instant invention refers to a pump device with a submersible elongated assembly comprising a composite centrifugal pump and electric motor, said assembly being intended to operate immersed in a body of fluid. Pump devices of this type are known in the prior art and are generally adapted to pump between two predetermined levels. In order to save space it is desirable that the lowest level be as low as possible. In known devices of the type in question the assembly of a pump and an electric motor consists of a substantially cylindrical unit with an inlet to the pump at one end wall of the cylinder. The assembly is lowered into the tank or similar from which pumping is to be effected, with its axis substantially vertical. Also, the assembly is often provided with some type of flange connection between the outlet of the pump and a feed-out tube fixed in the tank or the pit.

The lowest level in the tank is in this case determined by the bottom side of the pump assembly. In this manner the motor casing of the pump assembly will be surrounded by air instead of by water during a considerable portion of its operation. However, it has proved that considerably less heat is transferred from the electric motor in air than in water, and the object of the invention is therefore to provide a device such, that the pump assembly can be made to operate with a substantial portion of its motor casing permanently immersed in the water without of the volume of the tank having to be increased for this reason. Thus, the fluid inlet of the pump should have such a level in the position of operation of the assembly that with the water at the lowest level necessary for the pump to operate the motor casing will be surrounded by the fluid in the body of fluid to a considerable extent.

In accordance with the instant invention the above object is attained by the axis of the pump motor assembly being made to take a horizontal or inclined position in operation. For this purpose the pump motor assembly can be provided with means serving as pivots and adapted to engage gripping means fixedly positioned in the body of fluid so that with engagement therebetween the pump assembly will be pivoted to a position of operation predetermined by fixed stop means.

A number of embodiments of the invention will be disclosed below with reference to the accompanying drawings, in which FIGURE 1 shows a side view of a pivoting submersible pump assembly in accordance with the invention, FIGURE 2 shows a plan view of the same assembly, FIGURE 3 shows a side view of another embodiment of a pivoting submersible pump assembly, FIGURE 4 shows a plan view of the latter pump assembly, FIGURE 5 shows a cross section of guide means for the pump assembly in FIGURES 3 and 4 and FIGURE 6 shows a side view of still another embodiment of the pump assembly with said assembly shown in two different positions.

In FIGURE 1 the designation 1 refers to a pump assembly comprising a composite pump housing 3 and a motor casing 2. The pump housing 3 is provided with a central inlet 3' at one end of the assembly, and the motor casing 2 is provided with a grip 4. A cable 5 serves to hoist and lower the pump motor assembly into a tank or pit.

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In FIGURE 1 dashed lines show the pump assembly being lowered or hoisted in the tank with cables or rods 6 being provided in pairs and serving as guides in co-operation with oppositely protruding butts 7 and 8.

As is shown with solid lines at the bottom of FIGURE 1 the butts 7 and 8 are positioned along one and the same line, which approximately is a tangent to the outside of the pump housing.

The butts 7 and 8 are adapted to be guided by the cables 6 into engagement with forked supports 9 and 10 at the bottom of the container or tank. The butt 7 is solid whereas the butt 8 actually comprises a tube or pipe connected to the pump housing or the worm of the centrifugal pump and provides an outlet from the pump. The forked support means 10 also comprises a tube and in the illustrated example it is shown as a portion of a tube bend.

The tubular butt 8, which forms the discharge from the pump, and the support means 10 connected to a pipe are provided with cooperating end portions to form a fluid-sealed connection with the tubular butt 8 positioned in the support means 10. For this purpose the support means 10 are provided with a substantially helical cam, which is engaged by a radial head 12 on the tubular butt 8 in such a manner, that said tubular butt 8 will be displaced axially when the pump assembly is pivoted from the position shown with dashed lines in FIGURE 1 to the position shown with solid lines and pivoted 90° thereto. Thus a desired sealed connection will be provided between the tubular butt 8 and the pipe portion 13 of the support means 10.

In application, the pump motor assembly 1 is lowered along its guide cables 6 by means of the cable 5 into engagement with the forked support means 9 and 10. As the axes of the oppositely directed pivot butts 7 and 8 are eccentric the pump assembly will thereafter be made to pivot around said pivot axes by its own weight, thereby simultaneously effecting axial displacement in the axial direction of the butts and a sealed connection between the discharge butt of the pump and the discharge pipe 13.

FIGURES 3-5 illustrate another embodiment of the invention wherein guide means for the pump motor assembly are positioned such, that in pivoting the pump assembly to its horizontal position their connection with each other is temporarily cut off.

In the embodiment illustrated 14 designates the pump assembly with its motor casing 15 and pump housing 16. As previously a grip 17 is provided for hoisting and lowering the assembly by means of a cable 18. Also, the pump motor assembly is provided with guide means 19, which by means of claws 20, FIGURE 5, partly encloses guide rails 21, which in the illustration are tubular and are positioned beside a tube 22 adapted to serve as the discharge tube from the pump motor assembly when the latter has been brought into its operating position.

The pump motor assembly is in this case provided with oppositely directed guide pins 23, positioned on a flange 24 connected to the discharge outlet of the pump. The discharge tube 22 can by means of a suitable mounting piece 25 at its lower end be fastened to a wall of the tank or to the bottom of the same.

As can be seen from FIGURE 3 the pump motor assembly 14 is to be lowered in vertical position projecting to one side from the guide rails and the discharge tube 22. The discharge flange 24 carrying guide pins 23 faces the discharge tube. The pivot pins 23 are situated in a plane parallel to a plane through the guide rails 21 and close to the same. In order to enable pivoting of the pump assembly with its discharge flange 24 in sealing engagement with a corresponding flange on the bottom side of the discharge tube 22 fork means 26 are fixed to the discharge tube 22. The bottom of these forked means 26

is positioned thus with respect to the bottom of the discharge tube, that in engagement of the pins 23 with the same the flange 24 of the pump will be brought into sealing connection with the bottom of the discharge tube. The forked means 26 expand funnel-like upwards in order to insure guidance of the pins into the same. In order to enable the pump motor assembly to pivot when the pins 23 have been introduced into the forked means 26 the guide rails 21 end at such a distance from the forked means that the guide means 19 of the pump motor assembly disengages after the pins have reached the region of the forked guide means 26.

Thus, in application, the pump motor assembly 14 is lowered along its guide rails 21 by means of the guide means 19. When the pump motor assembly 14 has been lowered so far that the pivot pins 23 have reached the region of the forked support means 26 said guide means 19 of the pump motor assembly will disengage from its guide rails and the pump assembly will be allowed to pivot around the pins 23 by its own weight from its vertical position to its horizontal position or to a position therebetween, sealing contact between the discharge flange 24 of the pump and the bottom side of the discharge tube 22 thereby being attained. When the pump motor assembly is raised it will be pivoted to its vertical position to begin with until the guide means 19 engages the discharge tube 22, whereafter the guide means 19 will engage the guide rails 21 in continued vertical hoisting of the pump assembly.

FIGURE 6 finally shows an embodiment in which the pump motor assembly is guided by a one-sided strain on a pair of guide rails. In this case the pump motor assembly 27 in the manner described above consists of a motor casing 28 with a hoisting grip 29 and a pump housing 30 with opposing pivot pins 31. Said assembly is suspended such with respect to vertical or inclined guide rails 32 that it will tend to lie against the guide rails 32 with its guide pins 31. With vertical guide rails this can be attained by the suspending point for the pump assembly being located on the opposite side of the guide rails from the pivot pins or the suspending point lying substantially vertically above the upper end of inclined guide rails. By means of its weight the pump motor assembly 27 will in this case tend to pivot in the direction of the guide rails, contact between the pivot pins 31 and the guide rails 32 thereby being insured. The pivot pins 31 can appropriately be provided with guide rollers 33. It should also be noted that in this case the axis of the pivot pins 31 is displaced with respect to the centre axis of the pump motor assembly.

At their lower portions the guide rails 32 are provided with stop means 32a, so that in lowering the pump motor assembly 27 with its guide rollers 33 into engagement with said stop means 32a the pump motor assembly 27 is made to pivot by its weight around the pivot pins 31 of the guide rollers 33 to a substantially horizontal position determined by the engagement between a discharge flange 35 on the pump housing and a flange 36 on a pipe piece 32 fixed to the tank.

In FIGURE 6 solid lines 37 indicate the suspension point for the pump motor assembly in connection with inclined guide rails, and the principle for suspending the pump motor assembly 27 with vertical guide rails is indicated by dot and dash lines 37'.

It should be noted that although some appropriate embodiments of the invention have been illustrated and described above, the invention can be applied in other ways, it in particular not being necessary to have a detach-

able connection between the pump discharge and a fixed discharge tube, as the invention can be applied also in cases when the discharge is connected to a hose or the like movable with the pump assembly.

As can be seen from all of the embodiments the central inlet to the pump will not allow emptying the tank lower than to substantially the level of the centre axis of the pump motor assembly with the latter in its horizontal position, thereby insuring that the motor casing of the assembly for effective cooling always will remain to a great extent below the surface of the fluid without the tank having to contain any substantial amount of remaining fluid.

I claim:

1. A pump device comprising a composite centrifugal pump and electric motor forming a submersible, elongated assembly intended to operate immersed in a body of fluid, comprising fixed gripping means in said fluid, guide means extending into said fluid body, and two oppositely directed pivots in alignment with each other at the lower portion of the pump motor assembly and at right angles to the axis of the same and positioned excentrically relative to said axis, said pivots being adapted to be guided into engagement with said fixed gripping means by said guide means.

2. A pump device, as claimed in claim 1, comprising guiding means, said guide means comprising pairs of parallel elongated means which enclose the respective pivots.

3. A pump device, as claimed in claim 1, said assembly comprising a shaft, said guide means comprising guide rails for guiding said pump motor assembly with the shaft of said assembly being substantially vertical, said guide means comprising guide means fixed to said assembly, said guide rails extending at a distance from the gripping means smaller than the distance between the pivots of the assembly and the guide means therefor.

4. A pump device, as claimed in claim 1, comprising a fixed discharge tube, a discharge butt positioned on said assembly a corresponding connecting butt of, said fixed discharge tube, said discharge butt being operable for engaging said connecting butt with said assembly in a predetermined angular position.

5. A pump device comprising a composite centrifugal pump having a first flange near the discharge opening and electric motor means forming a submersible, elongated assembly intended to operate immersed in a body of fluid comprising a fixed discharge tube including a downwardly directed connecting second flange, and gripping means, two oppositely directed pivots in alignment with each other at the lower portion of the pump motor assembly and at right angles to the axis of the same and positioned excentrically relative to said axis and disposed at the upper edge of said first flange of the pump discharge, said first flange being adapted to contact said downwardly directed connecting second flange of the fixed discharge tube in connection with said gripping means in the pivoting of the pump motor assembly.

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