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SUMP PUMP PLANT

3,136,259

Filed Nov. 2, 1962

2 Sheets-Sheet 1

FIG. 1

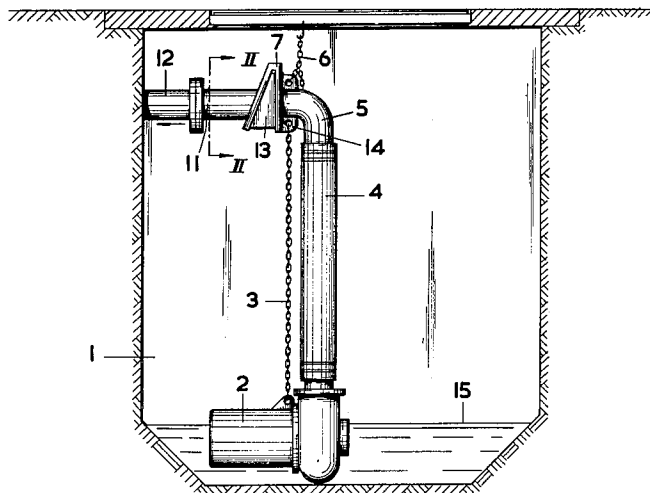
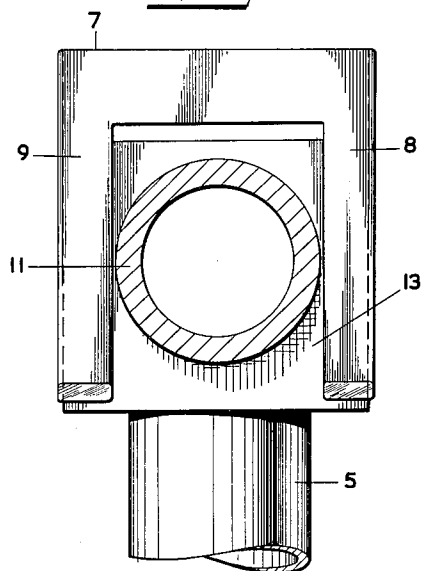


FIG. 2



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Fig. 3

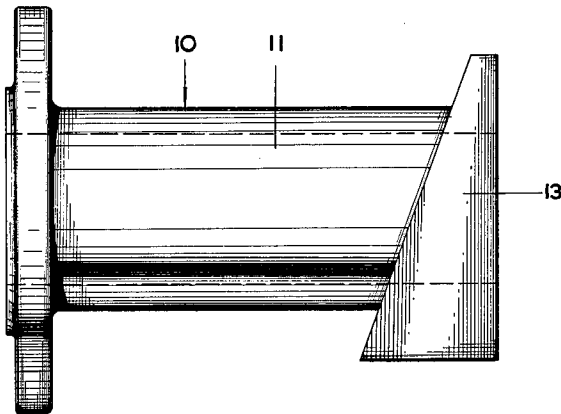
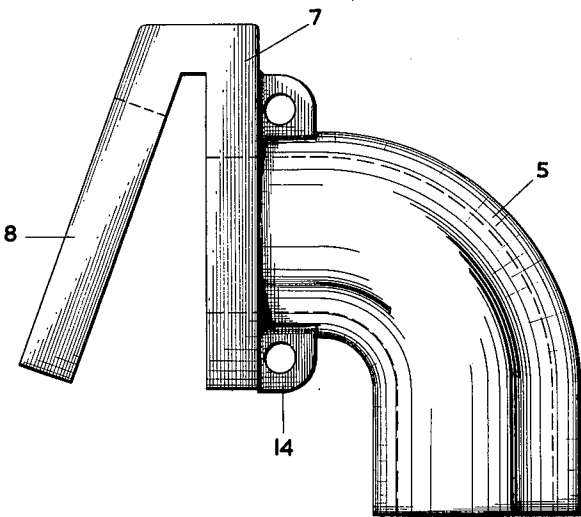


Fig. 4



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## SUMP PUMP PLANT

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3 Claims. (Cl. 103—87)

This invention is relative to a sump pump plant comprising a pump unit arranged in a sump, a rising pressure conduit which is at least partially flexible, and a flange coupling for connection of the pressure conduit with a discharge conduit.

It is known to place the pump unit (pump with motor) on the bottom of the sump and to connect the pressure conduit with the discharge conduit via a bolted flange coupling, in which case it is inconvenient to install the pump unit with pressure conduit because of the water present in the sump. It is also known to arrange guides in the sump along which the pump unit can be lowered until it bears on the inclined inlet flange of the pressure conduit which inlet is arranged on the bottom of the sump, but in this case it is difficult to install the guides and the pressure conduit, although thereafter the pump unit may be lowered without inconvenience.

The object of the invention is to provide a sump pump plant which can be quickly installed from the surface without necessity of working in the sump.

This object is obtained according to the invention in that the coupling between pressure conduit and discharge conduit comprises a flange with an inclined surface on one of the conduits and a flange with hooks on the other conduit, the hooked flange being engageable in transverse direction with the inclined flange, whereas the pump unit is suspended from the flange on the pressure conduit. With this arrangement, the pump unit and pressure conduit can be quickly installed as a whole by hanging them over the discharge conduit.

By suspending the pump unit from the flange on the pressure conduit, the flange coupling is so weighted that it is held tightly closed, which removes the inherent disadvantage of this type of coupling, namely that it tends to shift laterally and leak when there is a substantial internal pressure. Normally, this type of coupling, that is a coupling having one flange with an inclined surface and one flange with hooks which can be slid laterally over the first named flange, has to be provided with a locking bolt or a similar locking means which prevents mutual lateral displacement of the two flanges, but according to the invention no locking means for the coupling is required since because of the weight of the pump unit it is securely held in fluid-tight engagement.

Preferably, the pump unit is suspended from a chain which is attached to the pressure conduit adjacent its flange and has such a length that the flexible part of the pressure conduit is held straight but is not substantially tensioned. The chain then carries the weight whereas the flexible pressure conduit absorbs the reaction couple when the pump unit is started so that the pump does not turn about the chain.

The axis of the pump unit may be vertical (motor above the pump) and then the chain is attached centrally on the upper end of the motor, but preferably the axis of the pump unit is horizontal and then the lower end of the chain is attached substantially vertically above the center of gravity of the pump unit. In the latter case, one obtains an additional safe guard against overheating of the motor. When, e.g. by a defect of the control apparatus, the water level in the sump sinks so far that the lateral pump inlet remains submerged for two thirds of its height only, the pump sucks in so much air that the

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impeller practically does not raise any water into the pressure conduit so that the water level remains at substantially the same height. But the pump unit is then still submerged sufficiently for the surrounding water to safely cool the motor which is now at a low load.

The invention will now further be described with reference to the accompanying drawings.

FIG. 1 shows a lateral view of a sump pump plant according to the invention, arranged in a sump.

FIG. 2 shows a section through the discharge conduit according to the line II—II in FIG. 1.

FIG. 3 is a lateral view of one half of the coupling.

FIG. 4 is a lateral view of the other half of the coupling.

According to FIG. 1, the pump plant is arranged in a sump 1. The water-tight pump unit 2 is suspended from a chain 3 and is connected with a pressure conduit 4, the middle part of which is flexible. The upper, bent part 5 of the pressure conduit 4 carries a chain 6 via which the pump unit can be lifted from the sump and lowered into it. The bent part 5 of the pressure conduit 4 ends in a rectangular flange 7, whereas two hooks 8, 9 project obliquely from the two upper corners of the flange 7. The hooks 8, 9 are so spaced from each other that they straddle the tube like portion 10 of the coupling part 11 with sufficient play. The coupling part 11 is permanently connected with the discharge conduit 12 and need not be unfastened for removing or reinstalling the pump unit. The coupling part 11 ends in a flange 13 having an inclined rear surface which is engaged by the hooks 8, 9 of the flange 7, when the flange 7 is slid in transverse direction over the flange 13. The inclination of the hooks and of the inclined rear surface and also the over-all construction of the flanges 7 and 13 is such that when the flanges are slid into engagement with another, their front surfaces provide a fluid-tight seal, to which end a sealing ring or other sealing device may be inserted between the flanges 7, 13, if desired.

An eye 14 for connection of the chain 3 which carries the pump unit, is fastened, e.g. by sumping, against the part 5 of the pressure conduit 4 and against the flange 7. The length of the chain 3 is chosen so that the pump unit 2 is suspended just a little over the bottom of the sump and the length of the pressure conduit 4 is chosen so that the flexible part thereof is just held straight but is substantially untensioned. Thus, this part of the pressure conduit 4 prevents rotation of the pump unit 2 about the chain 3 under the influence of the reaction couple when the pump is started, whereas the coupling is loaded with substantially the full weight of the pump unit 2 via the chain 3, since the center of gravity of the pump unit 2 is substantially vertically below the coupling. Thus, the coupling will be held closed and a fluid-tight seal will be maintained. When the pump unit should be inspected, the whole sump pump plant can simply be lifted from the well by means of the chain 6, without it being necessary to descend into the sump, and afterwards the sump pump plant can be reinstalled in the same simple way into the sump by lowering the flange 7 over the flange 13, which can be done also without descending into the sump.

When the pump unit with horizontal axis is used, the suspension eye thereof can easily be given such a position that it is directly over the center of gravity of the unit so that the unit, when suspended, remains in a horizontal position. In this case, one obtains an automatic safe-guard against overheating of the motor, for when e.g. because of a defect of the control device, the water level 15 sinks so far that the lateral pump inlet remains only submerged for about 2/3 of its area, the pump will suck in so much air that its impeller does not lift any water any more into the pressure conduit. When there is an influx of water into the sump, it will again be lifted by

the pump into the pressure conduit until the above mentioned water level is again obtained, so that this level is automatically held nearly constant. There is no danger for overheating of the pumping unit under these conditions, since the motor will operate at a low load and will be sufficiently cooled by the water in which it is partially submerged.

What I claim is:

1. A sump pump plant comprising a pump-and-motor unit, a vertical pressure conduit attached to the pump outlet, at least part of said conduit being flexible, a first flange coupling element mounted on the upper end of said conduit, means for suspending said pump-and-motor unit from said first coupling element, a discharge conduit, and a second flange coupling element mounted on said discharge conduit, one of said coupling elements comprising a flange having a downwardly inclined surface and the other of said coupling elements comprising a flange having a pair of hooks so that the hooked flange is removably engaged in transverse direction with the inclined flange, said engagement being maintained by the suspension of

the pump-and-motor unit from said first coupling element.

2. A plant according to claim 1, wherein said suspending means comprises a chain which is attached to the pressure conduit adjacent said first flange coupling element and has such a length that the flexible part of the pressure conduit is held straight but is substantially untensioned.

3. Plant according to claim 2, wherein the lower end of the chain is attached substantially vertically above the center of gravity of the pump-and-motor unit, the axis of which is horizontal.

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