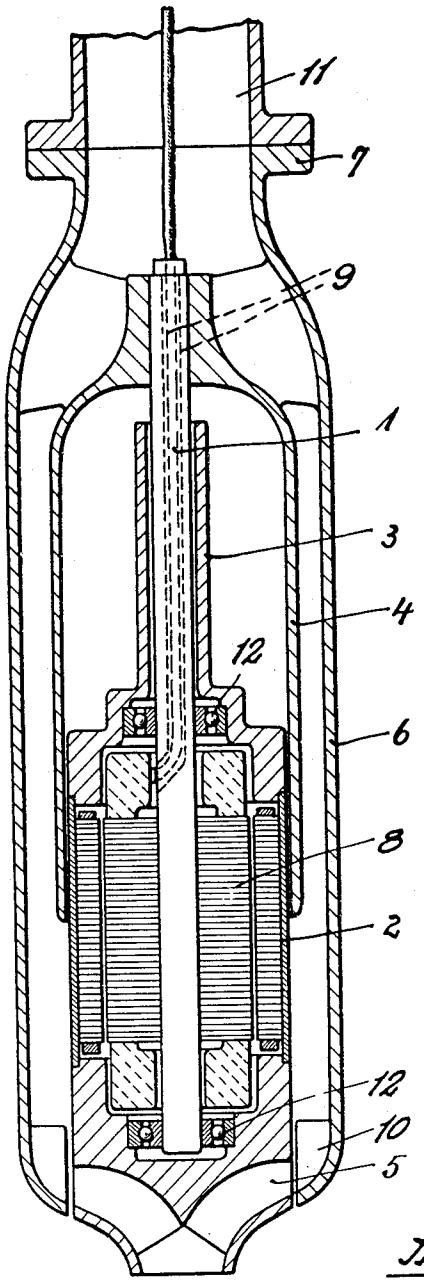
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PUMP OR IMPELLER

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PUMP OR IMPELLER

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4 Claims. (Cl. 103—87)

My invention relates to pumps or impellers and more particularly to submersible pumps adapted for use in wells.

It has already been proposed to use for this purpose centrifugal pumps coupled with an electromotor and in such a combination the motor must be protected by special means against the influence of water or other liquids existing in the well. This has been effected by maintaining a pressure above atmospheric in the space in which the motor is arranged by forcing air into it through a suitable air pipe so that liquid cannot enter. In other systems the motor has been guarded against contact with the liquid by enclosing it in a kind of diving-bell.

My invention relates to the last-mentioned kind of pumps or impellers and it is an object of my invention to improve the construction of these pumps.

It is another object of my invention to simplify this kind of pump and this is accomplished by providing a motor, the rotor of which surrounds the stator, the pump being directly connected to this rotor without the interposition of stuffing boxes, intermediate shafts or bearings. The motor as a whole is protected against the entering of water by a diving-bell. All bearings are arranged in the interior of the bell and are protected against contact with the liquid and with the dirt contained in the liquid.

In the drawing affixed to this specification and forming part thereof an embodiment of my invention is illustrated diagrammatically in axial section by way of example.

Referring to the drawing, 6 is the pump casing, in the lower part of which is arranged the stator 10 of the centrifugal pump. 1 is a hollow stationary shaft extending axially of the casing 6, on the bottom end of the shaft being mounted the stator 8 of the electromotor, which is provided with an exciting winding to which current is supplied by means of connections 9 extending through the hollow shaft 1. The rotor 2 of the electromotor carrying a short-circuited winding, for instance a cage winding, is supported in suitable ball-bearings 12 or the like. The rotor is closed at its bottom end by the rotor 5 of the centrifugal pump. In order that no liquid can enter the rotary portion 2 of the electromotor a stationary diving-bell 4 surrounds the upper portion of the rotor 2, but, if desired, the bell may be extended farther downwardly. This arrangement offers the advantage that, while the pump is in operation, only an insignificant friction exists between the rotor 2 and the liquid in the casing 6. The part 3 of the rotor extends upwardly into the diving-bell 4, encircling the shaft 1. The interior of the rotor 2 communicates with the pressure space of the pump only by way of the narrow interstice provided between the shaft 1 and the extension 3. As appears from the foregoing description, the liquid to be pumped cannot enter the interior of the rotor 2. The height of the pressure space can be easily adapted to the required output without the construction of the pump being substantially altered.

The rotor 5 of the centrifugal pump rotates about the lower bearing 12 on shaft 1. If desired, the pump rotor can be designed in such manner that it also forms the bearing cap. It may be provided with one or a plurality of sets of vanes according to the required output. The casing is connected to the pressure pipe 11 by means of a flange 7. The air within the diving-bell can be renewed in any suitable manner well known in the art.

The operation of the device is as follows: In order to drive the pump current is supplied to the stator 8 of the electromotor in such manner that a rotary field is produced which causes the rotor 2 to rotate together with the pump rotor 5. The pump discharges the liquid in the well through casing 6 and pressure pipe 11.

I wish it to be understood that I do not desire to be limited to the exact details of construction shown and described for obvious modifications will occur to a person skilled in the art.

In the claims affixed to this specification no selection of any particular modification of the invention is intended to the exclusion of other modifications thereof.

I claim:—

1. A submersible pump comprising a stationary shaft, the stator of an electromotor being fixed on said shaft, the rotor of said electromotor surrounding said stator, a centrifugal pump, the casing of which surrounds said electromotor, the pump rotor being fixed to the bottom end of said electric rotor, and a bell air-tightly fixed to the upper part of said shaft and extending downwardly along and surrounding said electric rotor.

2. A submersible pump comprising a stationary shaft, the stator of an electromotor being fixed on said shaft, the rotor of said electromotor surrounding said stator, an upwardly directed extension of said rotor surrounding said shaft, a centrifugal pump, the casing of which surrounds said electromotor, the pump rotor being fixed to the bottom end of said electric rotor, and a bell air-

tightly fixed to the upper part of said shaft and extending downwardly along and surrounding said electric rotor.

3. A submersible pump comprising a stationary shaft, the stator of an electromotor being fixed on said shaft, the rotor of said electromotor surrounding said stator, a centrifugal pump, the casing of which surrounds said electromotor, the pump rotor being fixed to the bottom end of said electric rotor and forming a closure for said electromotor, and a bell air-tightly fixed to the upper part of said shaft and extending downwardly along and surrounding said electric rotor.

4. A submersible pump comprising a stationary shaft, the stator of an electromotor being fixed on said shaft, the rotor of said electromotor surrounding said stator and being closed at its lower end, a centrifugal pump the casing of which surrounds said electromotor, a pump rotor on said electric rotor, and a bell air-tightly fixed on said shaft and surrounding said electric rotor.

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