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(54) **Title:** SUBMERSIBLE PUMP

(57) **Abstract:** A submersible pump (11) comprising an electric motor (1) provided with a power cable (5) connecting the electric motor to a power supply overground. The power cable is internally provided through the entire pump and starts from the motor and extends internally through the motor housing (7) into the strainer (2) of the pump through a liquid tight seal provided in the top end shield (9) of the motor at the periphery thereof. The cable runs through the strainer along the inner wall thereof. The power cable further extends through the impeller housing (3a) of the pump along the length thereof through a sleeve (10) provided in the impeller housing at the periphery thereof and protrudes out through the top of the impeller housing at the periphery thereof liquid tight. The cable further extends to the power supply externally along the discharge chamber (4) of the pump (Fig 1).

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TITLE OF INVENTION

Submersible pump

FIELD OF INVENTION

This invention relates to a submersible pump.

BACKGROUND OF INVENTION

Submersible pumps are generally used in oil wells or bore wells to pump out oil or water, as the case may be. A submersible pump comprises an electric motor provided with a power cable connecting the electric motor to a power supply overground. The power cable runs externally of the pump. (US Patents Nos 6022196, 6443780, 6595295, 2002/0050361 and 2002/0092667) Power cable provided externally of the pump requires extensive insulation and also a protective sleeve. This increases the cost of the pump considerably. Due to the externally provided power cable, the pump has to be installed in the oil well or bore well eccentrically in order to accommodate the cable. Due to eccentricity between the well and the pump, the motor does not get cooled uniformly due to the varying volume of water or oil surrounding the motor casing. This adversely affects the efficiency of the motor and the pump. Besides, while lowering the pump in the well for installation or after maintenance or while retrieving the pump from the well for maintenance or repairs, it has to be done with great care so as to prevent damage to the power cable and/or well due to eccentric

orientation of the pump within the well. In case the cable happens to hit the well wall the cable and /or the well wall may get damaged. In case of damage to the cable, it may have to be replaced or repaired. In case of damage to the well, the well may have to be abandoned and another well may have to be dug. Due to the constraint of eccentricity between the well and the pump, the pump diameter can not be increased with capacity of the pump. Therefore, the pump capacity has to be increased height wise. This increases the number of impeller assembly and the cost of the pump. Due to the eccentricity between the pump and the well, suction of fluid also is not uniform thereby correspondingly reducing discharge efficiency of the pump.

OBJECTS OF THE INVENTION

An object of the invention is to provide a submersible pump comprising an electric motor provided with a power cable extending internally through the pump, which does not require extensive insulation and a protective sleeve along the entire length thereof, thereby simplifying the construction of the cable and reducing the cost thereof.

Another object of invention is to provide a submersible pump comprising an electric motor provided with a power cable extending internally through the pump so as to facilitate installation of the pump concentrically with the well bore.

Another object of invention is to provide a submersible pump comprising an electric motor provided with a power cable extending internally through the pump so as to facilitate cooling of the electric motor uniformly and improve the performance of the motor and the pump.

Another object of invention is to provide a submersible pump comprising an electric motor provided with a power cable extending internally through the pump so as to facilitate size increase of the pump diametrically corresponding to the pump capacity thereby reducing the height and number of the impeller assembly and overall height of the pump and thereby the cost.

Another object of invention is to provide a submersible pump comprising an electric motor provided with a power cable extending internally through the pump which facilitates uniform suction of the fluid thereby improving discharge efficiency of the pump.

DETAILED DESCRIPTION OF THE INVENTION

According to the invention there is provided a submersible pump comprising an electric motor provided with a power cable connecting the electric motor to a power supply overground, the power cable being internally provided through the entire pump and starting from the motor and extending internally through the motor housing into the strainer of the pump through a liquid tight seal provided

in the top end shield of the motor at the periphery thereof and running through the strainer along the inner wall thereof, the power cable further extending through the impeller housing of the pump along the length thereof through a sleeve provided in the impeller housing at the periphery thereof and protruding out through the top of the impeller housing at the periphery thereof liquid tight, the power cable further extending to the power supply externally along the discharge chamber of the pump.

The following is a detailed description of the invention with reference to the accompanying drawing, in which the sole Fig1 is a cross sectional view of a submersible pump according to an embodiment of the invention. The pump (11) as illustrated in Figure 1 of the accompanying drawings comprises an electric motor (1), a strainer (2) mounted on the motor (1), an impeller unit (3) mounted on the strainer (2) and a discharge chamber (4) mounted on the impeller unit (3). The pump is installed in a well bore marked (12). (5) is a power cable connecting the electric motor (1) to a power supply (not shown) over ground. The lower end of the power cable is connected to the stator winding (6) of the motor (1) and extends internally through the motor housing (7) into the strainer (2) of the pump via a gland (8) provided in the top end shield (9) of the motor at the periphery thereof. Suction openings in the strainer are marked (2a). The gland (8) provides a liquid tight seal to the cable (5). The cable (5) runs through the strainer (2) along the inner wall thereof and extends further through the impeller housing (3a)

along the length thereof via a sleeve (10) which is fitted at the top of the impeller housing (3a) water tight at the periphery thereof. The impellers are marked (3b). The cable (5) protrudes out through the top of the impeller housing (3a) at the periphery thereof and further to the power supply along the discharge chamber (4) of the pump.

According to the invention, the power cable (5) runs through the pump internally upto the discharge chamber (4). The cable is provided with a protective sleeve (10) only in the impeller housing where high fluid pressures are encountered. The other sections of the pump are at atmospheric pressures. Therefore, the cable (5) does not require extensive insulation and protective sleeve along the entire length thereof as in the case of the externally extending power cable. This reduces the cost of the cable and also simplifies its construction. Since the power cable (5) is extending internally along the length of the pump concentricity between the pump and the well bore can be maintained in the installed state of the pump or while lowering the pump into the well bore or retrieving the pump from the wellbore for maintenance on repairs. Therefore, damage to the cable and/or well wall is avoided and uniform cooling of the electric motor is achieved. This increases the performance of the motor and pump. Due to concentricity between the pump and the wellbore the suction of fluid is uniform thereby improving discharge efficiency of the pump. Also the pump size can be increased diametrically corresponding to capacity thereby reducing the impeller

number and overall height of the pump. This results in further cost saving. The pump works in known manner. The other details of the pump have not been illustrated and described as such are not necessary for understanding the invention.

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CLAIM :

1. A submersible pump comprising an electric motor provided with a power cable connecting the electric motor to a power supply overground, the power cable being internally provided through the entire pump and starting from the motor and extending internally through the motor housing into the strainer of the pump through a liquid tight seal provided in the top end shield of the motor at the periphery thereof and running through the strainer along the inner wall thereof, the power cable further extending through the impeller housing of the pump along the length thereof through a sleeve provided in the impeller housing at the periphery thereof and protruding out through the top of the impeller housing at the periphery thereof liquid tight, the power cable further extending to the power supply externally along the discharge chamber of the pump.

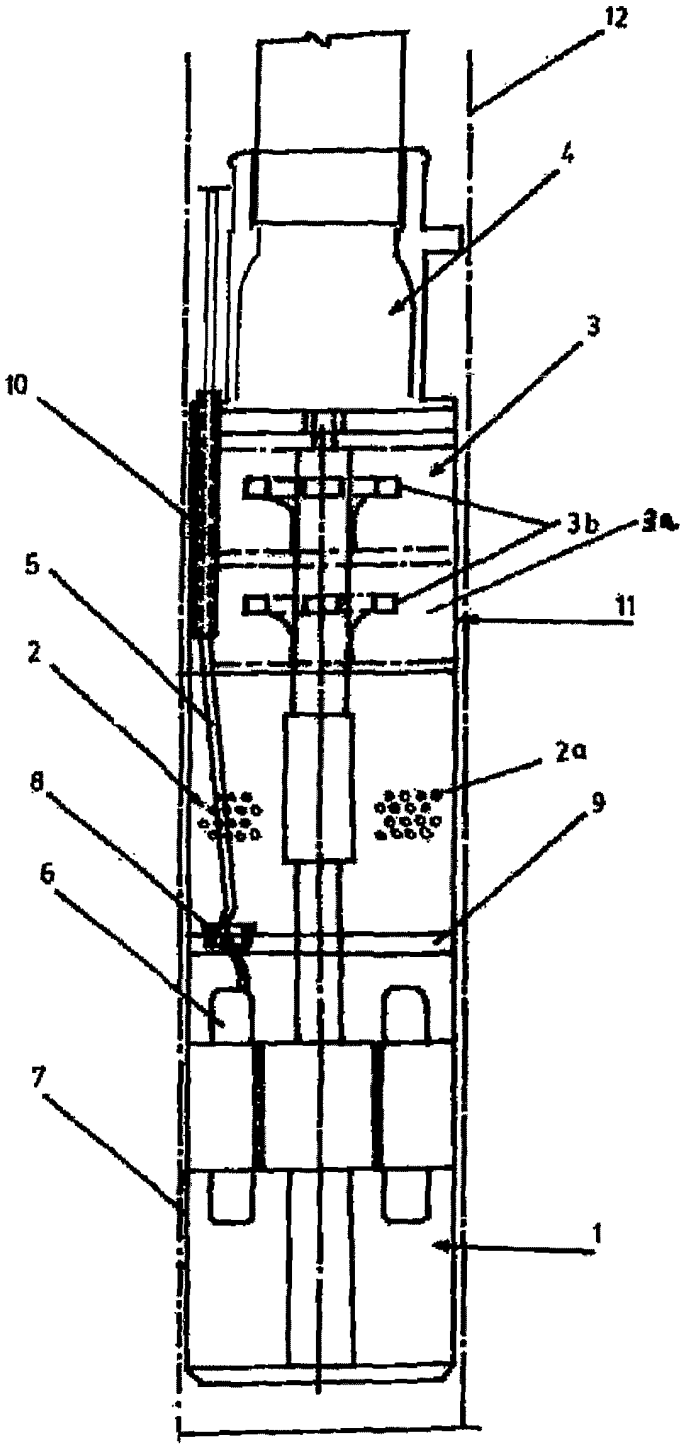

FIG 1