Feb. 20, 1934. K. WERNERT 1,947,630

SUBMERSIBLE PUMP

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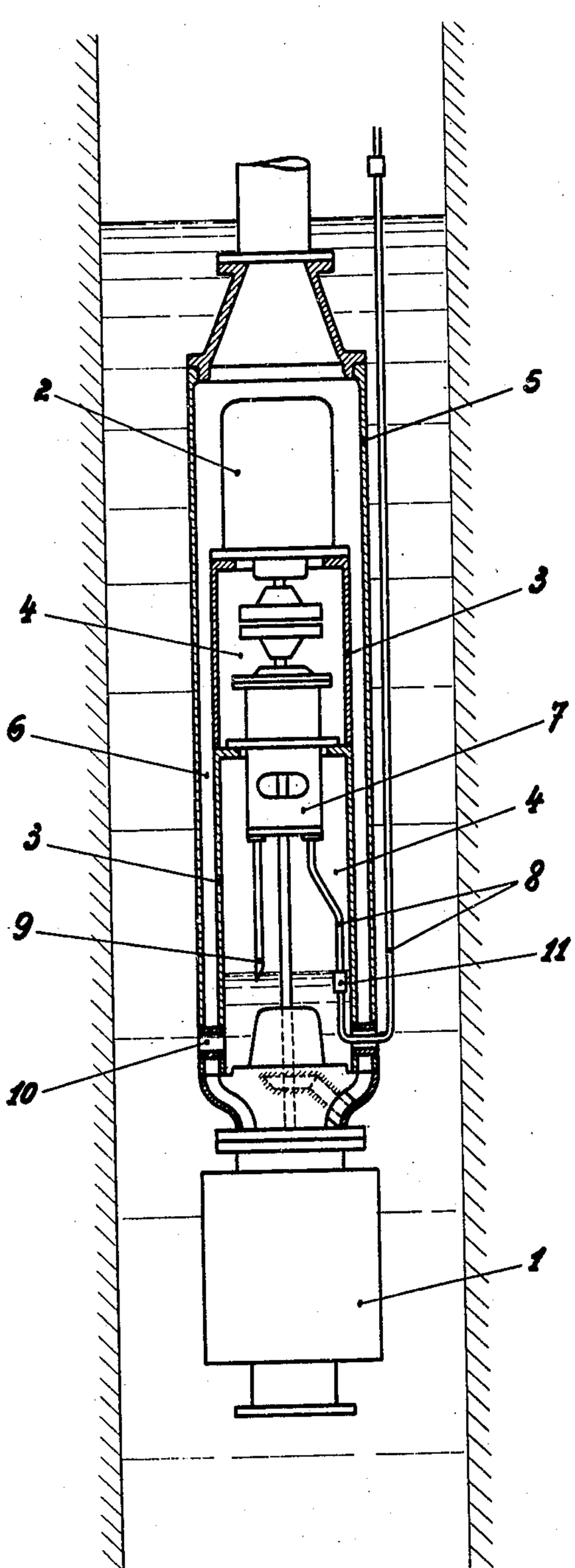

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SUBMERSIBLE PUMP

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3 Claims. (Cl. 103—87)

This invention relates to a further improvement of the submersible pump described in my application Ser. No. 499,272. This patent application relates to a pump with driving engine immersed in the water and in which, for the formation of an air gap between the pump and the driving engine, a diving bell is inserted between the pump and the driving engine, the annular space formed between the pump casing proper and the diving bell serving as conveying channel for the liquid to be raised by the pump in order, on the one hand, to obtain continuous cooling of the driving engine from all sides and, on the other hand, to prevent escape of the air from the diving bell in case of leakage of said bell, so that the driving engine is protected against any penetration of liquid.

In order to make it possible in such an arrangement to replace the air enclosed in the diving bell and to keep the liquid away from the driving engine, which might become necessary after a long time of service, a compressor of known type is, according to this invention, fitted at a suitable point of the pump aggregate, preferably between the driving engine and the pump, which compressor is controlled by the liquid rising in the diving bell as soon as the liquid level has risen to a predetermined maximum height, so that air is drawn in by the compressor and forced into the diving bell, whereupon, as soon as a sufficient quantity of air has been drawn in and the liquid level has been forced down accordingly, the compressor is again stopped as soon as the liquid level has reached the predetermined minimum height.

An embodiment of the invention is diagrammatically illustrated by way of example, partly in section, in the single figure of the accompanying drawing.

The submersible pump 1 is coupled in known manner to the driving engine 2 arranged above it. Underneath the driving engine 2 a diving bell 3 is arranged in known manner and connects the driving engine with the pump, an air space 4 being formed between these two elements. The air or the gas in this space is compressed in known manner as the liquid level rises, so that it forms a protecting layer around the driving engine. An outer wall 5 encloses the diving bell and the driving engine, and an annular space 6 is formed between this outer wall and the diving bell 3 and serves as conveying channel for the liquid to be raised.

In order to effect the refilling of the diving bell with air or gas, a compressor 7 of known type is fitted at a suitable point of the pump aggregate, preferably between the driving engine 2 and the pump 1, the suction conduit 8 of said compressor communicating with the outer air, whereas a tube 9 establishes communication between the compressor 7 and the liquid in the diving bell.

If, for instance, after the pump has run for a long time, air should escape for any reason whatsoever from the air space 4 in the diving bell and the liquid level rises up to the compressor 7, this compressor is controlled by the liquid rising at the same time in the communicating tube 9, and fresh air is sucked in through the suction conduit 8 communicating with the atmosphere, this fresh air being forced into the air space 4 of the diving bell. According to the amount of air which is forced in, the liquid is forced back through the apertures 10 into the bore-hole or the like, until the liquid level has sunk to below the end of tube 9, so that the compressor 7 becomes inoperative. In this case a check valve 11 of known type, fitted at any suitable point of the suction conduit 8, prevents the escaping of the air from the diving bell.

In the manner described it is possible, to automatically maintain in the diving bell a predetermined quantity of air compressed to a predetermined pressure, as the compressor is started up when necessary, as soon as the liquid level in the diving bell rises, so that fresh air is sucked into the bell, the compressor being stopped again automatically as soon as the quantity of air has become large enough to force down the liquid level to below the end of the tube.

What I claim is:

1. A submersible pump with a driving engine immersed in water, in which the raised liquid prevents escape of the gas serving as protective layer for the engine and being enclosed in a diving bell located between the pump and the driving engine, comprising, in combination with the pump aggregate, a compressor adapted to be driven directly by the driving engine to refill the diving bell with gas, the operation of the said compressor being started and stopped automatically and without the use of separate auxiliary means by the rise and fall of the liquid in the diving bell.

2. A submersible pump with a driving engine immersed in water, in which the raised liquid prevents escape of the air serving as protective layer for the engine and being enclosed in a diving bell located between the pump and the driving engine, comprising, in combination with the

pump aggregate, a compressor adapted to be driven directly by the driving engine and working with auxiliary liquid to refill the diving bell with air, the said compressor being automatically started by the liquid rising and entering it, and automatically stopped by the withdrawal of the liquid therefrom, without the use of separate auxiliary means.

3. A submersible pump as specified in claim 2, comprising in combination with the diving bell and the compressor, a check valve in said diving bell adapted to prevent the air escaping from the diving bell when said compressor is stopped.

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