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FLUID FILLED SUBMERSIBLE MOTOR

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Fig. 1.

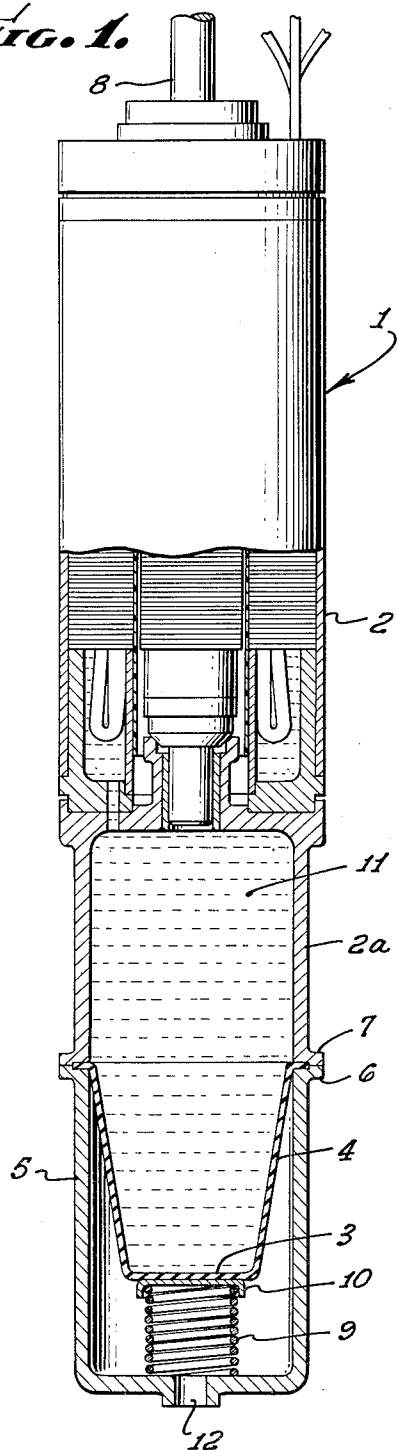


Fig. 2.

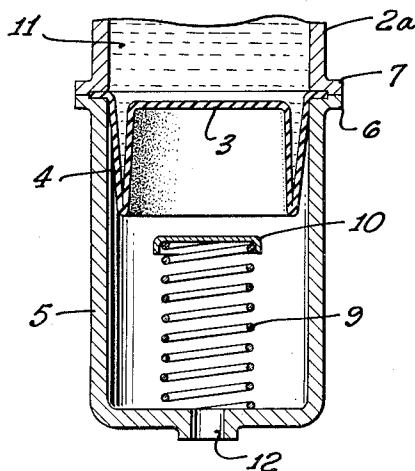
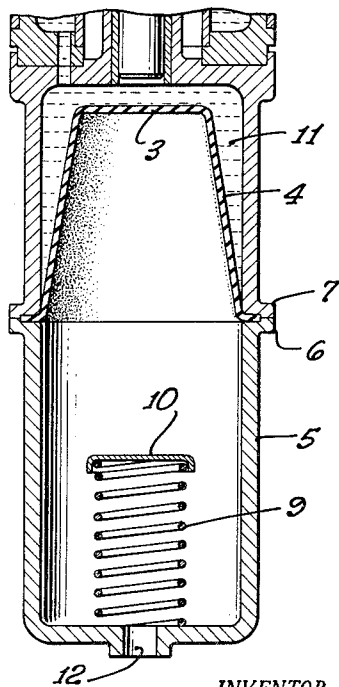


Fig. 3.



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FLUID FILLED SUBMERSIBLE MOTOR

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2 Claims. (Cl. 310-87)

This invention relates to submersible electric motors, adapted to be submerged in a well and to operate a pump or the like. In many of these motors, a fluid is used to fill the motor casing and to keep the windings from contact with the surrounding water.

The pressure of the fluid in the casing when the motor is installed is maintained at or a little greater than the liquid pressure of the water exterior of the casing, by the aid of a movable wall or diaphragm in a manner now understood.

The casing is filled with fluid prior to shipment of the motor. During shipment it is desirable to prevent the entry of air into the casing to replace fluid, such as oil, that may leak out. This is usually accomplished by providing a spring that exerts a force on the diaphragm to keep the internal pressure continuously slightly above the air pressure so that a small amount of fluid is continuously exuded during the period of shipment and storage and, to lesser extent, after the motor is installed.

It is one of the objects of this invention to improve, in general, submersible motors of this character; and particularly by making it possible to reduce the loss of fluid after the motor is in operation.

This invention possesses many other advantages, and has other objects which may be made more clearly apparent from a consideration of one embodiment of the invention. For this purpose, there is shown a form in the drawings accompanying and forming part of the present specification. This form will now be described in detail, illustrating the general principles of the invention; but it is to be understood that this detailed description is not to be taken in a limiting sense, since the scope of this invention is best defined by the appended claims.

Referring to the drawings:

FIGURE 1 is a view, mainly in longitudinal section, of a submersible motor incorporating the invention, the motor elements being shown diagrammatically;

FIG. 2 is a fragmentary view illustrating a stage in the loss of liquid in the casing after the motor is installed; and

FIG. 3 is a view, similar to FIG. 2, illustrating a further stage in the loss of liquid.

In FIG. 1 a submersible electric motor 1 is shown having an upper casing 2 in which is mounted a motor stator and rotor and a lower casing or housing 2a. The lower casing 2a is open at its bottom, but it is intended to be sealed by the aid of a flexible wall or bag-like container 3 having a conical flange 4. This flexible wall may be of rubber or rubber-like material. It is held in place against the bottom of the lower casing 2a by the aid of a cover 5. The cover 5 and the lower casing 2a have co-operating flanges 6 and 7 appropriately attached together, and between which flanges the edge of the flange 4 is clamped.

The motor 1 is provided with an upwardly extending vertical shaft 8 adapted to drive a load, such as a pump or the like.

Before the motor 1 is installed in a well, both the casing sections 2 and 2a are filled with a fluid 11. Sufficient pressure is exerted during the filling operation to ensure that the fluid pressure urges the end portion of the wall 3 downwardly against the force of a compression spring 9 arranged in the bottom or seat portion of cover 5. In order that there be no danger during shipment or stor-

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age that any air may enter the casing 2-2a and thereby cause injury, as by rust or corrosion, the compression spring 9 is utilized. It rests on the bottom of the cover 5. This compression spring is seated in a spring seat 10 attached to the upper turn of the spring 9. The spring exerts a pressure on wall 3 so that the fluid pressure within the casing 2-2a is always a little greater than the atmospheric pressure.

In normal shipment, therefore, as the spring 9 gradually expands, a small amount of fluid is exuded from the submersible motor. This continues for an appreciable period, sufficient to correspond at least to the period of storage and shipment to the place of use.

The wall 3 is so arranged that it can be reversed or turned inside out to the position shown in FIG. 3, leaving a minimum volume for the fluid 11. Thus, when the motor 1 is installed in a well, the pressure of the well water urges the wall 3 upwardly and prevents ingress of well water into the casing 2-2a.

The spring 9 is purposely so proportioned that it is effective to provide a compressive force upon the fluid filling 11 only during shipment, at which time the spring 9 remains in constant contact with wall 3. FIG. 2 illustrates the free position of spring 9 after the motor is installed, and the wall 3 and its flange 4 are being turned inside out by the loss of fluid in the well. Since the internal and external pressures are almost completely balanced, the position of wall 3 changes very gradually.

In order to permit well water to reach the outer surface of the wall 3, a port 12 is provided in the bottom of the cover 5. By the provision of short spring, greater volume is secured for the fluid 11 within the motor casing for the same overall length of the motor 1.

The inventor claims:

1. A submersible motor structure comprising a motor stator and rotor, a casing for said stator and rotor having a top section and a bottom section, a flexible extendible and collapsible bag-like container affixed to said bottom section, the interior of said flexible container being in communication with the interior of said casing, said container having an end portion, a compression spring, a seat means for said spring supported by said casing and positioned in opposed relation to said end portion of said container outside said container, said spring being interposed between said seat and said end portion, said end portion of said container having a traverse between a first position wherein said container is in fully extended condition and a second position wherein said container is in fully collapsed condition, said spring being compressed between said seat and end portion of said container when said end portion is in said first position, said spring having a length when fully relieved of compression of only a portion of the length of said traverse of said end portion of said container between said first and second positions, and a fluid filling said casing and container, whereby when the motor is in use submersed in a liquid medium with said top section located above said bottom section, the pressure of the surrounding medium continues to exert a net collapsing force on said container after said spring is fully relieved of compression.

2. A submersible motor structure comprising a motor stator and rotor, a casing for said stator and rotor having a top section and a bottom section, a flexible extendible and collapsible bag-like container affixed to said bottom section, the interior of said flexible container being in communication with the interior of said casing, said container having an end portion, a compression spring, a housing for said spring and container supported by said casing including a seat portion for said spring positioned in opposed relation to said end portion of said container, said spring being interposed between said seat and said end portion, said end portion of said container having a tra-

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verse between a first position wherein said container is in fully extended condition and a second position wherein said container is in fully collapsed condition, said spring being compressed between said seat and end portion of said container when said end portion is in said first position, said spring having a relaxation traverse from said compressed state to a maximum elongation in said housing which is only a portion of the length of said traverse of said end portion of said container between said first and second positions, and a fluid filling said casing and con-

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tainer, whereby when the motor is in use submersed in a liquid medium with said top section located above said bottom section, the pressure of the surrounding medium continues to exert a net collapsing force on said container after said spring has reached said maximum elongation.

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