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MOTOR-DRIVEN MECHANISM

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Fig. 1.

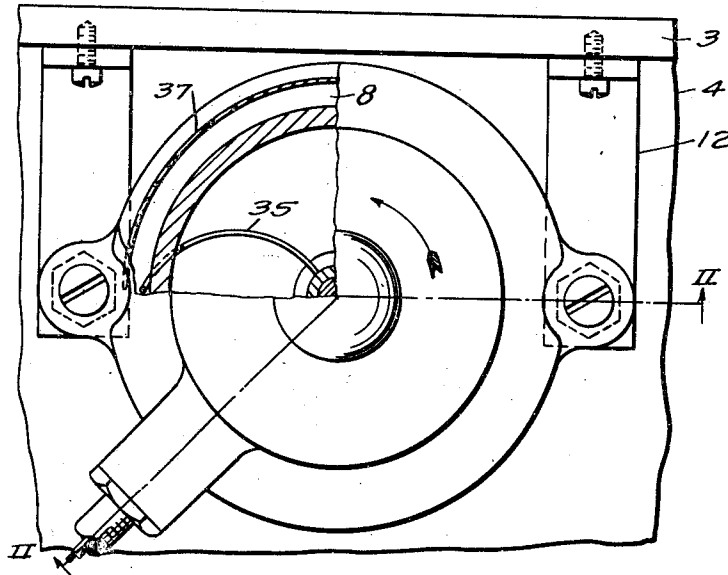
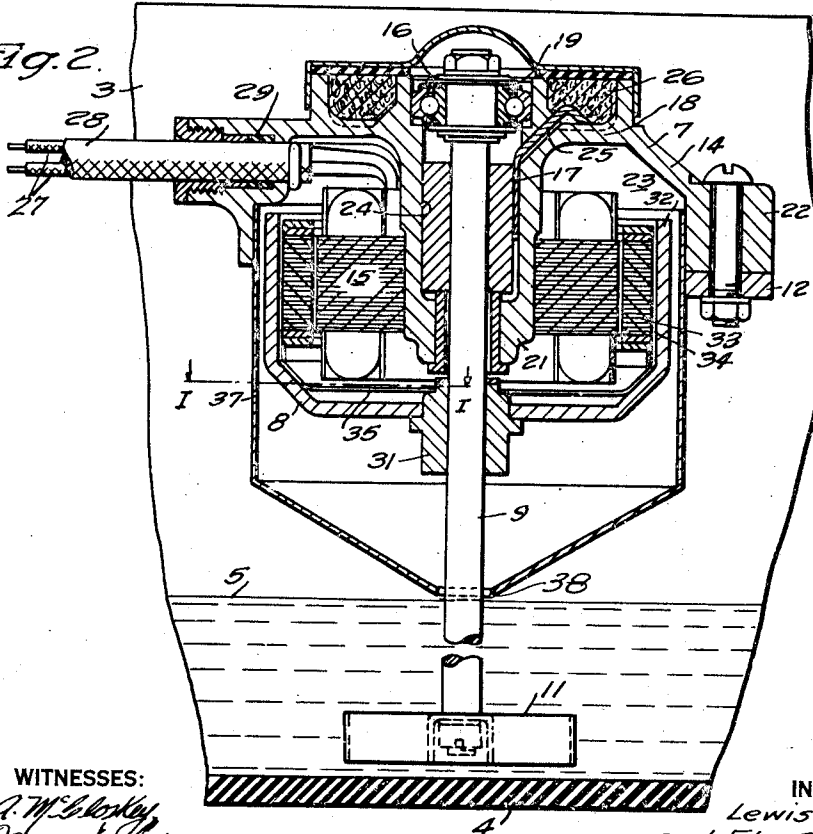


Fig. 2.



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MOTOR-DRIVEN MECHANISM

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Our invention relates to motor-driven liquid-agitator mechanisms, and it has particular relation to improvements in the mounting and arrangement of an electric motor which is adapted to be positioned above a liquid in a liquid-filled tank-type bottle-cooler, although it will be readily understood that our invention is susceptible of other applications.

An object of our invention relates to a novel disposition and shaping of the stator and rotor parts of an electric motor whereby the motor is rendered substantially splash-proof and susceptible of being at least partially immersed in a liquid, without damage to the motor-parts.

A more specific object of our invention is to provide a vertical-shaft motor in which the rotor-member is a cup-shaped member which is disposed underneath the stator-member and which extends up around the stator-core, the stator-housing being preferably so shaped and arranged as to provide a sealed annular diving bell into which the periphery of the rotor-member extends.

A more detailed object of our invention is to provide means for expelling water peripherally from the cup-shaped rotor-member of a motor constructed in accordance with our invention.

With the foregoing and other objects in view, our invention consists in the structures, combinations, systems and methods hereinafter described and claimed, and illustrated in the accompanying drawing, wherein:

Figure 1 is a fragmentary top plan view of a motor-driven liquid-agitator apparatus embodying our invention, a portion of the motor being shown in section on the section line I—I in Fig. 2; and

Fig. 2 is a fragmentary vertical sectional view thereof on the broken line II—II in Fig. 1.

Our invention is illustrated as being applied to a liquid-agitator apparatus of a type having a water-tank or container having side-walls 3 and a bottom 4, partially filled with water as indicated at 5. A common type of such apparatus comprises a bottle-cooler having refrigerated coils (not shown) disposed within the water for cooling the same, and space within the tank for the reception of bottles (not shown) of beverages to be cooled.

Our invention relates more particularly to a motor-attachment which is utilized in such a tank. The motor is a vertical-shaft motor having a motor-stator member 7, a motor-rotor member 8, and a depending vertical shaft 9 carrying an impeller or liquid-agitator 11 on the

lower end thereof. The motor-stator member 7 is mounted on a side-wall 3 of the tank by means of suitable brackets 12, in such position as to be preferably spaced slightly above the level of the water 5, although the motor is operative even in an immersed or partially immersed position. The agitator 11, however, is disposed near the tank-bottom 4 for the purpose of agitating the water or other liquid in the tank.

The motor-stator member 7 is provided with a stator-frame 14, an electrically wound stator-core 15, a sealed thrust-bearing 16, and a guide-bearing 17. The stator-frame 14 has a horizontally extending upper frame-portion 18 which is provided with a central perforation 19. Secured to the underside of the upper frame-portion 18, and preferably cast integrally therewith, are two downwardly depending frame-portions, namely, a centrally disposed downwardly depending frame-portion 21, and a peripherally disposed, substantially concentric, downwardly depending frame-portion 22, whereby the annular space 23 between said two downwardly depending frame-portions 21 and 22 is closed at the top by the horizontally extending upper frame-portion 18, to provide a sealed annular diving bell. The sealed thrust-bearing 16 is sealed in the central perforation 19 of the horizontally extending upper frame-portion 18, the shaft 9 being suspended from said thrust-bearing. The guide-bearing 17 is mounted within a central perforation 24 in the centrally disposed depending frame-portion 21, the shaft 9 being journaled in said guide-bearing. The guide-bearing 17 is lubricated by a wick 25 which extends down from a wick-filled lubricant-chamber 26 in the top of the motor-stator member.

The electrically wound stator-core 15 is disposed around, and supported by, the centrally disposed depending frame-portion 21. The electrical leads 27 for energizing the stator-core 15 are disposed within a cable 28 which is brought into the sealed annular diving bell 23 through an air-tight rubber gasket 29, so that the air-tight seal of the diving bell or annular space 23 is not broken.

The motor-rotor member 8 is cup-shaped, having a lower hub member 31 which is mounted on the shaft 9 in spaced relation underneath the stator-core 15, and having an upper peripheral cylindrical member 32 extending up into the annular diving-bell 23 and surrounding the stator-core 15 in spaced relation thereto. The cup-shaped rotor-member 8 is further provided with a rotor-core 33 which is carried internally by

the upper peripheral cylindrical member 32 in spaced operative relation around the outside of the stator-core 15.

In accordance with a preferred detail of construction, we preferably provide means for providing one or more upwardly extending liquid-escape openings 34 between the upper peripheral cylindrical member 32 and the rotor-core 33 which is carried thereby and we also preferably provide the bottom portion of the cup-shaped rotor-member 8 with a plurality of spiral or otherwise-shaped vanes 35 for scooping up any liquid which may collect in the bottom of the rotor-member and delivering it forcibly up into the escape-openings 34. The aforesaid escape-openings 34 may be disposed either parallel to the shaft 9, or they may be skewed or funneled outwardly, as will be obvious, to facilitate the flow of liquid upwardly and out of the cup-shaped rotor-member 8, so that the liquid will be expelled from the top of the rotating cylindrical portion 32.

In operation, the depending outer peripheral wall 22 of the motor-frame 14 cooperates with the rest of the specially shaped stator frame to provide an annular diving bell 23 within which air is trapped, thus preventing the influx of water or other liquid into the vital parts of the motor, even though the motor is partially submerged. The water-tight cup-shaped rotor-member 8 prevents water from getting up into said rotor member from underneath the same, and the sealed thrust-bearing 16 and the sealed conductor-bushing 29 serve to preserve the airtight seal which is afforded by the diving bell 23.

If desired, the amount of air which is trapped in the diving bell 23 may be increased by providing a thin diving-bell extension 37 which is connected onto the outer peripheral depending portion 22 of the stator-frame 14, so that said diving-bell extension 37, in effect, extends said frame downwardly to a point 38 well below the motor, the diving-bell extension 37 being perforated at 38 to permit the shaft 9 to pass downwardly therethrough with a good clearance.

In case any water should tend to collect in the cup-shaped rotor-member 8, either as a result of slopping or splashing of the water, or as a result of condensation because of alternate heatings and coolings of the motor, such water is expelled by the combined scooping or pumping action of the vanes 35 and the centrifugal effect due to the rotation of the rotor-member 8 during the operation of the motor, so that the water is forced upwardly in the escape-openings 34, so that it runs over the top edge of the peripheral cylindrical portion 32 of the rotor-member.

We claim as our invention:

1. A vertical-shaft electric motor comprising a motor-stator member having a stator-frame, an electrically wound stator-core, a sealed thrust-bearing, a guide-bearing, and a cup-shaped motor-rotor member; said stator-frame having a centrally perforated, horizontally extending upper frame-portion, a centrally disposed, centrally perforated, downwardly depending frame-portion, and a peripherally disposed, substantially concentric, downwardly depending frame-portion, whereby the annular space between said two downwardly depending frame-portions is closed at the top by the horizontally extending upper frame-portion to provide a sealed annular diving bell; the sealed thrust-bearing being sealed in the central perforation of the horizontally extending upper frame-portion;

a motor-shaft suspended from said thrust-bearing; the guide-bearing being mounted within the central perforation in said centrally disposed depending frame-portion and the shaft being journaled in said guide-bearing; the electrically wound stator-core being disposed around, and supported by, said centrally disposed depending frame-portion; an air-tight sealing-means for bringing a plurality of motor-leads into said sealed annular diving bell for exciting said electrically wound stator-core; and the cup-shaped motor-rotor member having a lower hub member mounted on the shaft in spaced relation underneath the stator-core, and an upper peripheral member extending up into said annular diving bell and surrounding the stator-core in spaced relation thereto.

2. A vertical-shaft electric motor comprising a motor-stator member having a stator-frame, an electrically wound stator-core, a sealed thrust-bearing, a guide bearing, and a cup-shaped motor-rotor member; said stator-frame having a centrally perforated, horizontally extending upper frame-portion, a centrally disposed, centrally perforated, downwardly depending frame-portion, and a peripherally disposed, substantially concentric, downwardly depending frame-portion, whereby the annular space between said two downwardly depending frame-portions is closed at the top by the horizontally extending upper frame-portion to provide a sealed annular diving bell; the sealed thrust-bearing being sealed in the central perforation of the horizontally extending upper frame-portion; a motor-shaft suspended from said thrust-bearing; the guide-bearing being mounted within the central perforation in said centrally disposed depending frame-portion and the shaft being journaled in said guide-bearing; the electrically wound stator-core being disposed around, and supported by, said centrally disposed depending frame-portion; an airtight sealing-means for bringing a plurality of motor-leads into said sealed annular diving bell for exciting said electrically wound stator-core; and the cup-shaped motor-rotor member having a lower hub member mounted on the shaft in spaced relation underneath the stator-core, and an upper peripheral member extending up into said annular diving bell and surrounding the stator-core in spaced relation thereto the cup-shaped rotor-member further having a rotor-core carried internally by the upper peripheral member in spaced operative relation around the outside of the stator-core, and means for providing one or more upwardly extending liquid-escape openings between said upper peripheral member and the rotor-core carried thereby.

3. A vertical-shaft electric motor comprising a motor-stator member having a stator-frame, an electrically wound stator-core, a thrust-bearing, a guide-bearing, and a cup-shaped motor-rotor member; said stator-frame having a centrally perforated, horizontally extending upper frame-portion, and a centrally disposed, centrally perforated, downwardly depending frame-portion; the thrust-bearing being secured in the central perforation of the horizontally extending upper frame-portion; a motor-shaft suspended from said thrust-bearing; the guide-bearing being mounted within the central perforation in said centrally disposed depending frame-portion and the shaft being journaled in said guide-bearing; the electrically wound stator-core being disposed around, and supported by, said central-

ly disposed depending frame-portion; the cup-shaped motor-rotor member having a lower hub member mounted on the shaft in spaced relation underneath the stator-core, and an upper peripheral member extending up in spaced relation around the stator-core.

4. A vertical-shaft electric motor comprising a motor-stator member having a stator-frame, an electrically wound stator-core, a thrust-bearing, a guide-bearing, and a cup-shaped motor-rotor member; said stator-frame having a centrally perforated, horizontally extending upper frame-portion, and a centrally disposed, centrally perforated, downwardly depending frame-portion; the thrust-bearing being secured in the central perforation of the horizontally extending upper frame-portion; a motor-shaft suspended

5 from said thrust-bearing; the guide-bearing being mounted within the central perforation in said centrally disposed depending frame-portion and the shaft being journalled in said guide-bearing; the electrically wound stator-core being disposed around, and supported by, said centrally disposed depending frame-portion; the cup-shaped motor-rotor member having a lower hub member mounted on the shaft in spaced relation underneath the stator-core, and an upper peripheral member extending up in spaced relation around the stator-core, and means for expelling liquid from an upper portion of the cup-shaped motor-rotor member.

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