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VERTICAL BEARING.

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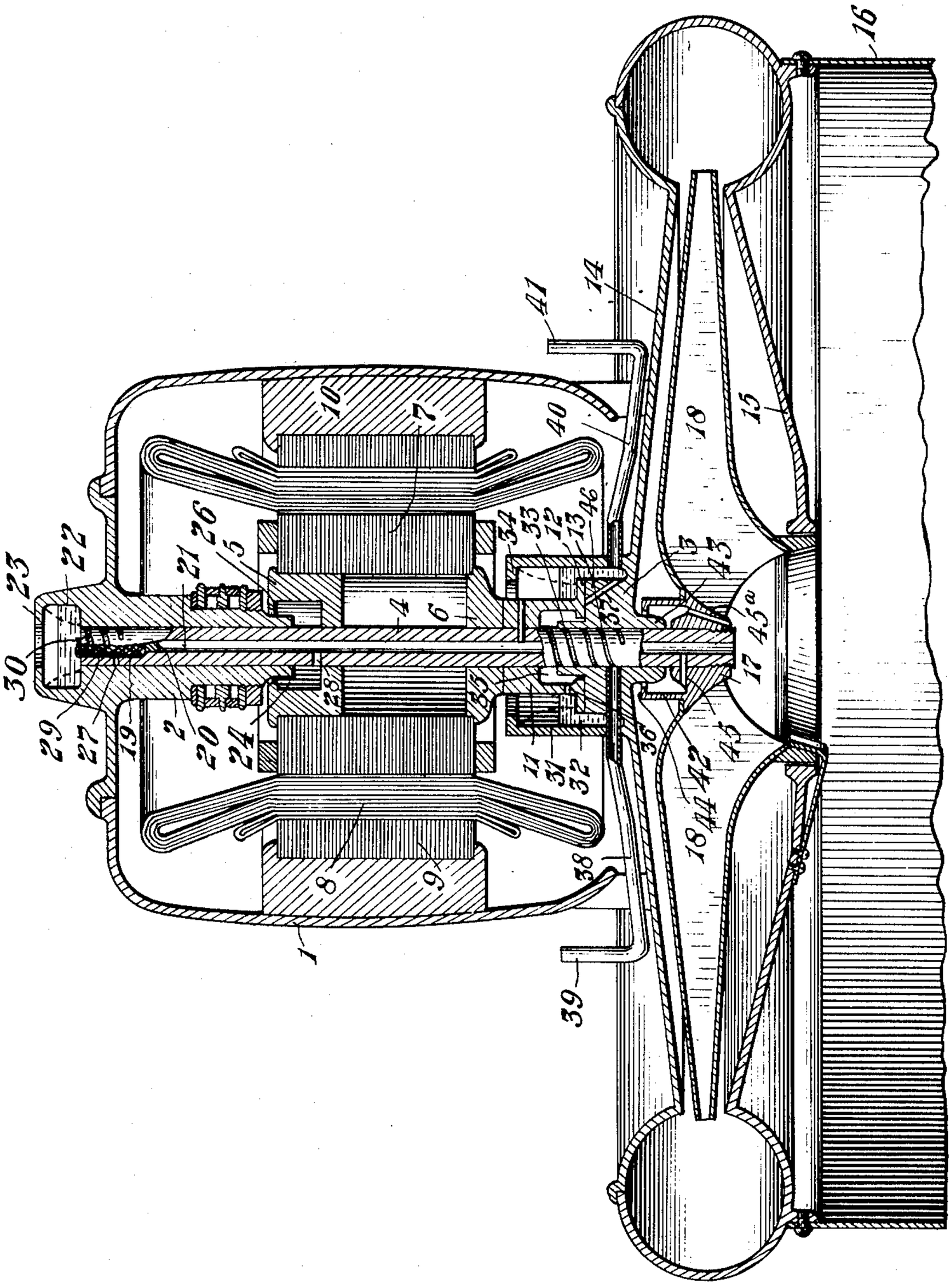
997,251.

Patented July 4, 1911.



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VERTICAL BEARING.

997,251. Specification of Letters Patent. **Patented July 4, 1911.**

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To all whom it may concern:

Be it known that I, CHARLES L. GOUGHNOUR, a citizen of the United States, residing at Canton, in the county of Stark and State of Ohio, have invented certain new and useful Improvements in Vertical Bearings, of which the following is a specification.

The invention relates to means for lubricating the bearings of a vertical shaft and in the embodiment of the same set forth herein, the improvements are adapted for use in an electric motor having a vertical shaft, on the lower end of which shaft is secured a fan located in the upper end of the dust separating chamber of a pneumatic cleaning machine.

In machines of this type, in which an oil lubricant is preferably used and a very rapid rotating speed is required of the shaft, it is necessary to efficiently and continuously lubricate all the bearings, including the lower end-thrust or supporting bearing as well as the journal bearings. It is also desirable to prevent an escape of the oil, and a lodgment of the same in the mechanism or other parts of either the motor or the blower; and it is furthermore desirable that the lubrication shall be performed automatically after the supply receptacles have been properly filled, and without any unnecessary waste of the oil.

The present embodiment of the invention is illustrated and described in the accompanying drawing, forming part hereof, in which the figure is a vertical axial section of the motor and fan blower showing the upper end of the dust separating chamber.

The motor includes the upright case 1 in the ends of which the upper journal-bearing 2 and the lower journal-bearing 3 are formed or secured, in which bearings the vertical shaft 4 is adapted to rotate. The upper spider 5 and the lower spider 6 are secured on the shaft between the bearings, on which spiders are secured the usual rings 7, which spiders and rings constitute the rotor of the motor and are adapted to rotate the shaft in the usual manner, the rotor being located within the windings 8 and rings 9 of the stator, which latter are secured in the retaining frame 10 formed in or attached to the case.

The collar 11 is secured on the shaft below the lower spider of the rotor, on which collar the spider is preferably supported, and the flat annular foot 12 is formed or attached on the extended lower end of the collar, which foot is adapted to rest and rotate on the opposing flat annular bearing 13 preferably formed on the body of the lower journal-bearing 3 and constitutes the lower end-thrust or supporting-bearing for the rotor and the shaft. The upper wall 14 of the blower case is preferably formed integral with the lower bearing; the lower wall 15 of the blower is connected with the upper rim of the dust-collecting chamber case 16; and the hub 17 of the blower fans 18 is secured to the lower end of the motor shaft 4 below the lower bearing 3 thereof.

The upper end portion of the shaft is bored out to form the oil chamber 19 which extends downward into the upper end of the shaft, below the closed bottom 20 of which chamber is provided the axial bore 21 which extends downward to and opens out of the lower end of the shaft. The upper supply-cup 22 is formed or attached on the upper journal-bearing with a diameter preferably somewhat larger than the diameter of the shaft, and the inturned flange 23 is preferably provided on the upper rim of the cup, which serves to retain the oil therein. The upper waste-cup 24 is formed, preferably in the upper spider 5, around the lower end portion of the upper journal-bearing, which extends part way downward into the cup, and the inturned flange 26 is preferably provided on the rim of the cup to retain the oil therein. The feed aperture 27 and the outlet aperture 28 are provided in the shaft, the former opening outward from the oil chamber 19 to the face of the journal-bearing, and the latter leading inward from the bottom of the waste-cup into the axial bore of the shaft.

For lubricating the upper journal-bearing, the oil chamber 19 is filled with absorbent material 29, preferably waste, candle-wicking or the like, and the upper supply-cup 22 is partially filled with a lubricating oil which runs down into the oil chamber and saturates the absorbent material therein when the shaft is at rest. The centrifugal force caused by the rotation of the shaft throws the oil outward around the wall of the supply-cup outside the upper end of the shaft, as shown by broken lines in the drawing, and also prevents the oil from entering

the journal bearing at the upper end of the shaft, and the same force indirectly sucks most of the free oil out of the oil chamber in the shaft, excepting such portion as is retained by adhesion in the oil chamber by the capillary attraction of the absorbent material. Of this retained oil, a sufficient amount is detached from the absorbent material and drawn from the chamber through the feed aperture 27 by centrifugal force, and is thrown outward against the face of the journal-bearing to lubricate the same.

The oil works its way upward and downward in the upper journal-bearing, assisted upward when necessary by the spiral groove 30 which may be provided in the journal upward from the feed aperture; and the excess oil finds its way either upward out of the upper end of the bearing into the upper supply-cup 22, or downward out of the lower end of the bearing into the upper waste-cup 24, in which latter cup the centrifugal force of rotation throws and holds the oil outward around the wall thereof. But when the motor is stopped, the waste oil runs by gravity from the waste-cup through the outlet aperture 28 into the axial bore of the shaft and thence downward and out of the lower end thereof whence it drops into a suitable receptacle, as the dust-separating chamber of the cleaning machine. The stopping of the motor also permits the oil in the upper supply-cup to flow downward and to again saturate the absorbent material in the oil chamber of the shaft, thus re-charging the same for a further lubrication of the upper journal-bearing. It will be understood that the use of the absorbent material in the oil chamber of the shaft is not essential. for sufficient oil will adhere around the sides and in the bottom of the chamber to lubricate the bearing, especially when the chamber is quite deep, but the absorbent material is preferred for increasing the retaining capacity of the chamber.

The lower supply-cup 31 is formed or attached on the body of the lower journal-bearing, thus forming the annular oil-chamber 32 around the body portion thereof. This supply-cup extends upward around the supporting collar 11, preferably higher than the upper end 33 of the journal-bearing, and the inturned flange 34 is preferably provided on the rim of the cup to retain the oil therein. The annular intermediate chamber 35 is provided in the collar and extends upward above the upper end of the lower journal-bearing and downward to the rotor supporting-bearing. The communicating aperture 36 is provided in the collar 11 and leads from the intermediate chamber therein outward into the lower supply-cup, which aperture is preferably located below the upper end of the lower journal-bearing; and the inclined feed port 37 extends upward from the oil chamber 32 through the body of the journal-bearing to the face of the supporting bearing, preferably at or near the inner side thereof.

The lower-journal feed-tube 38 extends from an upturned receiving end 39 located outside the motor case, inward through the body of the lower journal-bearing to the face of the lower journal of the shaft, the receiving end of this tube being preferably located as high as the upper end of the journal-bearing; and the supporting-bearing supply-tube 40 extends from an upturned outer receiving end 41, inward through the wall of the lower supply-cup into the lower portion of the annular oil chamber therein, the receiving end of this tube being preferably located higher than the supporting bearing.

The lower waste-cup 42, preferably formed or attached on the hub 17 of the blower fan, is located around the lower end portion 43 of the lower journal-bearing, which end extends downward part way into the cup, and the inturned flange 44 is preferably provided on the rim of the cup to retain the oil therein. A suitable outlet is provided for this cup, either by the port 45 extending inward to the axial bore of the shaft, or by the port 45ª extending downward through the body of the fan hub to an opening in the lower end thereof.

For lubricating the lower journal-bearing and the rotor supporting-bearing, the feed- and supply-tubes 38 and 40 are filled with oil. The oil flows through the feed-tube directly to the face of the lower journal and works its way upward and downward along the same, assisted upward, when necessary, by the spiral groove 46, which is preferably provided in the journal upward from the opening of the supply-tube, and the excess oil finds its way either upward out of the upper end of the bearing into the annular intermediate chamber 35, or downward through the lower end of the bearing into the lower waste-cup. And the oil flows through the supply-tube into the annular oil chamber in the lower supply-cup and normally fills the same to a level above the supporting-bearing when the rotor is at rest; from the bottom of which chamber, the oil is fed upward by hydrostatic pressure, through the feed-port 37 to the face of the supporting-bearing, from which the excess oil works its way either inward into the intermediate-chamber or outward into the lower supply-cup.

When the rotor is operating, the centrifugal force throwns the free oil out of the intermediate chamber and the oil in the lower supply-cup above the supporting-bearing outward against the walls thereof, as indicated by broken lines; so that the oil in the intermediate chamber and in the upper part

of the cup is not then available for lubricating either the journal or supporting-bearings; but these bearings are directly served by the feed-tube 38 and the feed-port 37. It will be understood that when the lower waste cup is rotating, the oil therein is thrown by centrifugal force outward against the sides thereof and will not drain downward through the outlet, but that when the rotation of the cup is stopped the oil will then run downward by gravity and will escape through such outlet port as may be provided.

I claim:

1. A vertical bearing having a supply-cup thereon forming an oil chamber around its body with a rim higher than the upper end of the bearing, a shaft journaled in the bearing, a feed-tube extending through the bearing to the face of the journal, a spiral groove in the journal upward from the feed-tube, and a waste-cup on the shaft with its rim around the lower end portion of the bearing and having an outlet from its bottom.

2. A vertical journal-bearing with an annular supporting-bearing on its body and having a supply-cup thereon forming an oil chamber around its body with a rim higher than the supporting-bearing, a shaft journaled in the bearing, a collar secured on the shaft above the journal-bearing and having an annular foot resting on the supporting-bearing, a feed-port in the body of the journal-bearing leading from the oil chamber to the face of the supporting-bearing, and a supply-tube opening into the oil chamber and having a receiving end located higher than the upper end of the supporting-bearing.

3. A vertical journal-bearing with an annular supporting-bearing on its body and having a supply-cup thereon forming an oil chamber around its body with a rim higher than the supporting-bearing, a shaft journaled in the bearing, a collar secured on the shaft above the journal-bearing and having an annular foot resting on the supporting-bearing, a feed-port in the body of the journal-bearing leading from the oil chamber to the face of the supporting-bearing, and a supply-tube opening into the oil chamber.

4. A vertical journal-bearing with an annular supporting-bearing on its body and having a supply-cup thereon forming an oil chamber around its body with a rim higher than its upper end, a shaft journaled in the bearing, a feed-tube extending through the body of the journal-bearing to the face of the journal, a collar secured on the shaft above the journal-bearing and having an annular foot resting on the supporting-bearing, an intermediate chamber in the collar around the upper end of the journal-bearing and extending downward to the supporting-bearing, with a communicating-aperture through the wall of the intermediate chamber into the supply-cup, a feed-port in the body of the journal-bearing leading from the oil chamber to the face of the supporting-bearing, and a supply-tube opening into the oil chamber.

5. A vertical journal-bearing with an annular supporting-bearing on its body and having a supply-cup thereon forming an oil chamber around its body with an inturned rim flange higher than the supporting-bearing, a shaft journaled in the bearing, a collar secured on the shaft above the journal-bearing and having an annular foot resting on the supporting-bearing, and a feed-port in the body of the journal-bearing leading from the oil chamber to the face of the supporting-bearing.

6. A vertical journal-bearing with an annular supporting-bearing on its body and having a supply-cup thereon forming an oil chamber around its body with a rim higher than the supporting-bearing, a shaft journaled in the bearing, a collar secured on the shaft above the journal-bearing and having an annular foot resting on the supporting-bearing, and a feed-port in the body of the journal-bearing leading from the oil chamber to the face of the supporting-bearing.

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