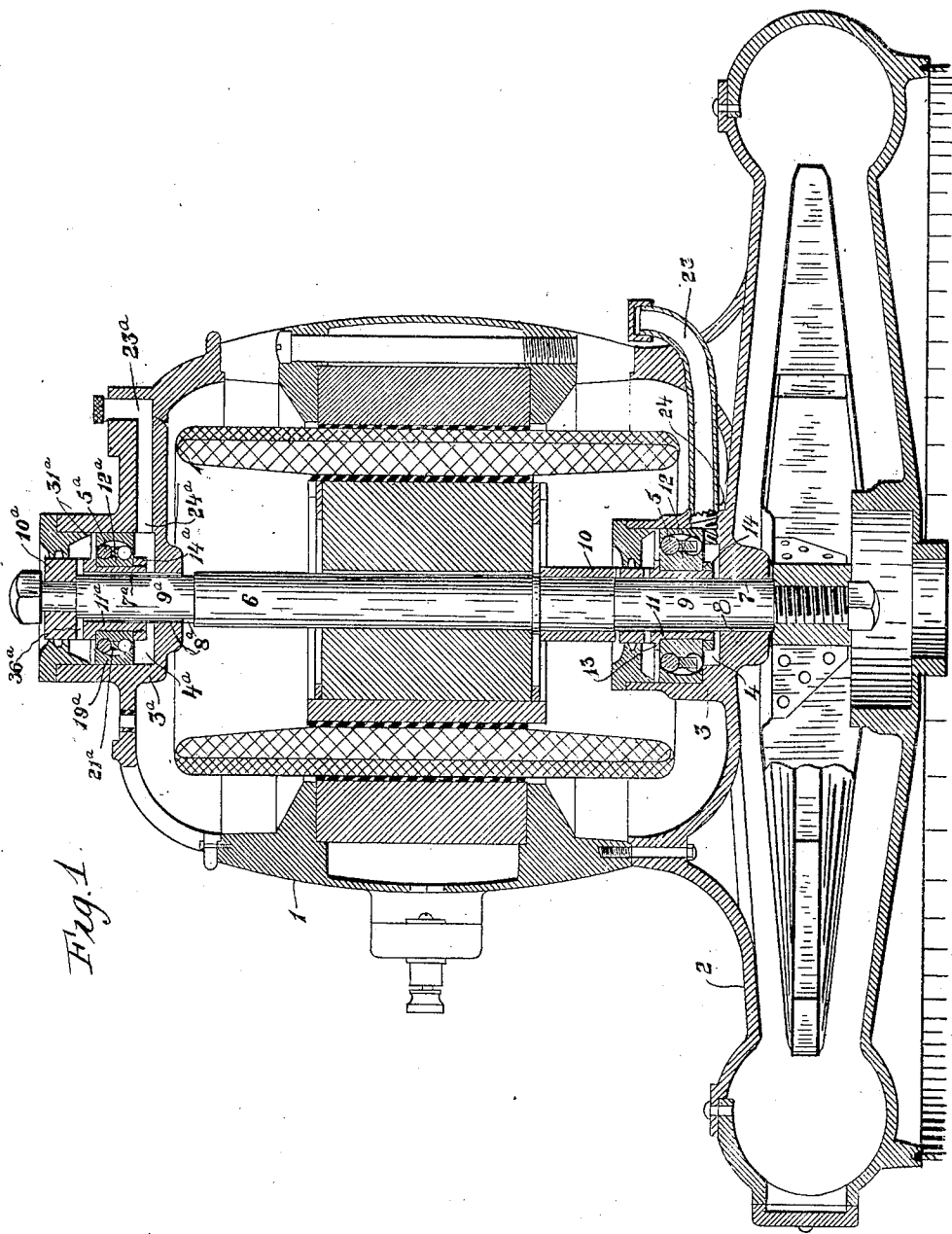


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2 SHEETS—SHEET 1.



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1,062,638.

Fig. 2.

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# UNITED STATES PATENT OFFICE.

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## VERTICAL BEARING.

1,062,638.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, CHARLES A. DILLON, 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 the vertical bearings for an electric motor combined with a suction fan, as in a vacuum cleaning machine. In machines of this type, ball bearings are preferably used in what might be called a lubricating chamber; and, by reason of the rapid rotation required of the rotor shaft, on which the fan is secured, and also by reason of the suction caused by the rapidly rotating fan, difficulty is experienced in properly retaining the oil in the lubricating chamber. This difficulty is overcome by the preferred embodiment of the improvement illustrated in the accompanying drawings, forming part hereof, in which—

Figure 1 is an elevation section of an electric motor combined with a fan blower; and Fig. 2, a section of the lower rotor bearing. Similar numerals refer to similar parts throughout the drawings.

The motor includes the upright case 1 formed on or connected with the upper side of the blower case 2; in each end of which motor case is formed or secured a bearing case 3 or 3<sup>a</sup> forming the lubricating chamber 4 or 4<sup>a</sup>, in which is located the lower and upper bearing balls 5 or 5<sup>a</sup> for the rotor-spindle 6. The case sleeve 7 or 7<sup>a</sup> is secured in the axial aperture 8 or 8<sup>a</sup> in the bottom or lower end of each bearing case and extends upward around and adjacent to the preferably reduced portion 9 or 9<sup>a</sup> of the rotor spindle, which case sleeve constitutes the inner wall of the annular lubricating chamber 4 or 4<sup>a</sup> which is thus formed within such bearing case. The collar 10 or 10<sup>a</sup> is secured on the spindle above each bearing case, on the lower end of which collar is formed or secured the depending tubular spindle sleeve 11 or 11<sup>a</sup>, which extends downward around and adjacent to the outer side of the upwardly extending case sleeve 7 or 7<sup>a</sup>.

The inner race collar 12 or 12<sup>a</sup> is secured on the lower end of each spindle sleeve 11 or 11<sup>a</sup>, the upper end of which collar is preferably held in position by the annular shoulder 13 or 13<sup>a</sup> formed on the sleeve, and the lower end of each collar is preferably retained in position by means of the annular

nut 14 or 14<sup>a</sup> screwed on the lower end of the sleeve; and, when the annular nut is adjusted tightly against the lower end of the race collar, it is preferably locked in this position as by means of the pin 15 entered into registering holes bored through the annular nut into the spindle sleeve, and held in place by the spring-ring 16, secured by its resiliency in the annular groove 17 formed around the annular nut, which spring is cut or severed on one side as at 18 to permit its being placed in position and removed therefrom.

The outer race-ring 19 or 19<sup>a</sup> is telescoped in the bearing case 3 or 3<sup>a</sup>, and, if desired, may be free to rotate therein, and the outer-race ring 19 is supported on the interior annular shoulder 20 provided in the bearing case, which shoulder sustains the downward thrust of the bearing. The bearing balls 5 or 5<sup>a</sup>, with the separating or spacing ring 21 or 21<sup>a</sup>, are located in the race-way 22 formed between the inner and outer race-rings, in the usual manner pertaining to this art.

Lubricating oil is supplied into each lubricating chamber 4 or 4<sup>a</sup> as by means of the inlet tube 23 or inlet duct 23<sup>a</sup> communicating with the corresponding inlet opening 24 or 24<sup>a</sup> provided in the outer wall of the bearing case, and a sufficient amount of the lubricating oil is preferably carried in each chamber to submerge the bearing balls when the parts are at rest; and it is evident that the oil will be thrown outward centrifugally by the rapid rotation of the spindle-sleeve with the inner race-ring, and will rise around the outer wall of the lubricating chamber somewhat as shown by broken lines X—X in Fig. 2.

The upper end of each lubricating chamber is preferably closed by means of the annular cover 25, the inner edge 26 of which is located adjacent to the outer side of the spindle sleeve 11 as in the lower bearing, or the spindle collar 10<sup>a</sup> as in the upper bearing, and the annular V-shaped groove 27 is preferably provided in this edge for the purpose of receiving such oil as may work upward around the spindle sleeve, which oil is thrown outward into the groove by centrifugal force and then runs down into the chamber by gravity; the lower lip of the groove being preferably made a little shorter than the upper lip to more freely permit the return of the oil.

The peripheral flange 28 is preferably pro-

vided on each annular cover and is adapted to rest on the upper rim 29 of the lubricating case; and the depending flange 30 is provided on each annular cover, which depending flange telescopes in and neatly fits the inside wall of the lubricator case and extends downward to the peripheral edge 31 or 31<sup>a</sup> adjacent to the upper end of the outer race collar. The inner side of this depending flange is conically inclined upward and inward from the lower edge of the flange, and the conical face 32 thus formed constitutes part of the wall of the lubricating chamber, and serves to deflect inward and downward such oil as may be centrifugally thrown outward and upward by the rotation of the spindle-sleeve and the inner race-ring, somewhat as indicated by the arrows in Fig. 2, thus continually bathing the bearing balls and preventing any considerable amount of oil from passing upward between the wall of the case and the depending flange 30 of the collar cover. Such oil, however, as may be forced upward around the outside of the depending flange of the collar cover, finds its way into the annular receiving groove 33, which is provided in the telescoped periphery of the cover, whence such oil finds its way back into the lubricating chamber through the inwardly and downwardly inclined ports 34 which are provided at intervals, from the receiving groove through the body and depending flange of the cover into the cavity of the lubricating chamber above the height to which the oil rises therein. It will be understood that the presence of the receiving groove 33 and the ports 34 prevents the oil from continuing upward and outward over the rim 29 of the bearing-case because the oil is free to flow by gravity through the receiving groove and the ports back into the lubricating chamber.

The radial air ports 35 are provided in the lower bearing sleeve 11 preferably just above the cover of the bearing, and these ports supply air at the upper end of the case-sleeve 7 and largely prevent the downward suction between the spindle and the case sleeve, caused by the rotation of the fan, from sucking oil or air out of the lubricating chamber. Such oil, however, as may work upward by suction or otherwise between the case sleeve 7 or 7<sup>a</sup> and the adjacent spindle sleeve 11 or 11<sup>a</sup>, finds its way into the internal annular receiving groove 35<sup>a</sup> provided in the spindle sleeve, and thence is thrown centrifugally outward into the lubricating chamber through the radial ports 36 or 36<sup>a</sup> which are provided in the bearing sleeve.

In the lower bearing, where there is present a suction from the adjacent fan, the case

sleeve 7 is extended upward, as shown, some distance above the radial ports 36 to shield the same, as much as may be, from the suction of the blower, but in the upper bearing the case sleeve 7<sup>a</sup> need only be extended upward to the ports 36<sup>a</sup>, for the reason that there is no suction to be contended with and such oil as may find its way upward to these ports will be thrown outward by centrifugal force, and will not be sucked inward over the upper end of the case sleeve. It is also evident that no air ports are required in the upper bearing for the same reason that there is no suction in this bearing. Otherwise, the two bearings may be and preferably are constructed substantially the same, and the description of one is a description of the other.

I claim:

1. A bearing for a vertical spindle including a case around the spindle having a lubricating chamber therein, a cover for the case having a depending flange telescoped in the case, the inner face of the flange being conically inclined upward and inward and forming part of the wall of the chamber, and there being an annular receiving groove around the telescoped periphery of the flange, and inwardly-downwardly inclined ports from the receiving groove through the body of the flange into the cavity of the lubricating chamber above the height to which the oil rises therein.

2. A bearing for a vertical spindle including a case around the spindle having a lubricating chamber therein, a cover for the case having a depending flange telescoped in the case, the inner face of the flange being conically inclined upward and inward and forming part of the wall of the chamber, and there being an annular receiving groove around the telescoped periphery of the flange, and ports leading from the receiving groove inwardly through the body of the flange into the cavity of the lubricating chamber above the height to which the oil rises therein.

3. In a vertical bearing for a combined motor and fan blower, a covered case having an axial aperture in its bottom with an upwardly extending sleeve secured therein forming an annular lubricating chamber, a rotor-fan spindle within the case-sleeve and having a depending sleeve extending downward around the case-sleeve, with a bearing between the spindle-sleeve and the case, and ports through the spindle sleeve at the upper end of the case-sleeve and above the case cover.

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