G. C. MARX.

LUBRICATED BEARING FOR ELECTRIC FANS.

APPLICATION FILED DEC. 16, 1910.

1,167,309. Patented Jan. 4, 1916.

Fig. 1.

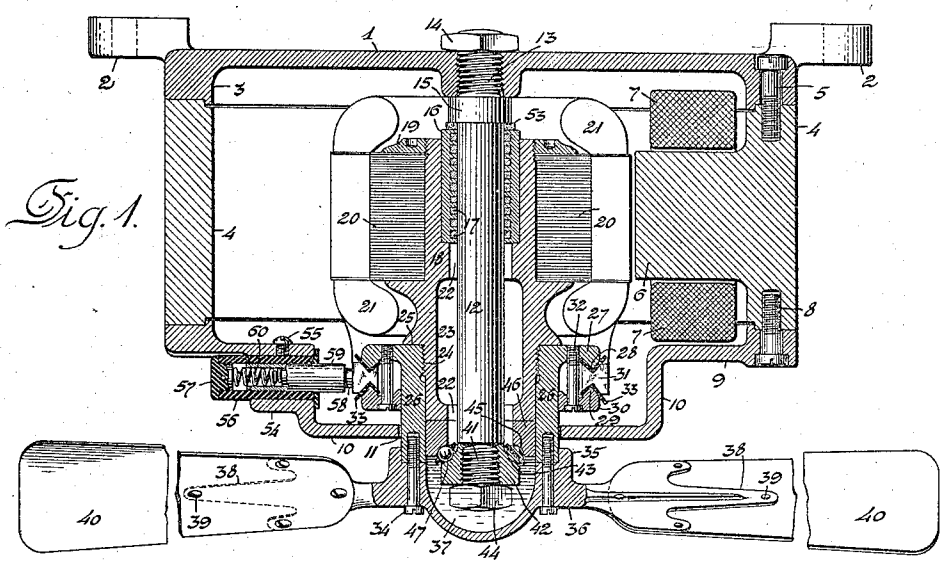
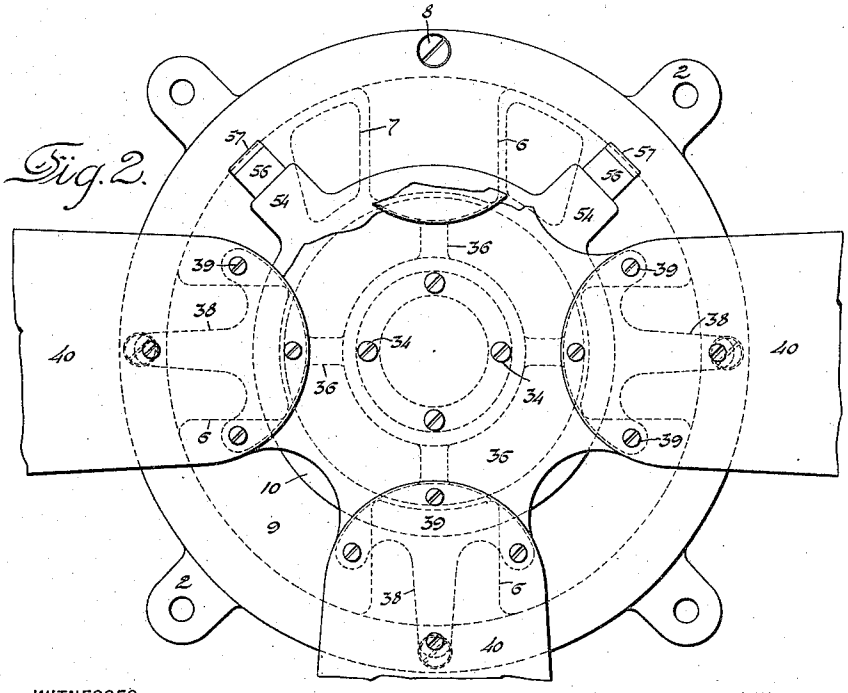


Fig. 2.



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LUBRICATED BEARING FOR ELECTRIC FANS.

1,167,309. Specification of Letters Patent. Patented Jan. 4, 1916.

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To all whom it may concern:

Be it known that I, GUSTAVE C. MARX, a citizen of the United States, residing at Elizabeth, in the county of Union and State of New Jersey, have invented certain new and useful Improvements in Lubricated Bearings for Electric Fans, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates especially to electric ceiling fans, and it has for its object to provide armature bearings which shall be well protected from the introduction of dirt between the contact surfaces, which shall have the requisite lubrication to enable it to run for a long period without attention, and which shall have an efficient bearing to sustain the weight of the armature.

In its preferred form, the present improvement is embodied in a ceiling fan having its frame constructed with a closed vertically-arranged cylindrical drum with inwardly extending field-magnet cores carrying the field coils, and provided with an axially sustained stationary armature-shaft upon which is mounted the armature constructed with a sleeve having at the upper end a self-lubricating side-bearing and at the lower end a ball-bearing supported by the shaft and adapted to sustain the weight and the side-thrust of the lower end of the sleeve to which the blade-carrier with its attached fan-blades is secured. In practice, the drum carrying the field-magnets is entirely closed at the top and sides and has its lower end closed by a cap-plate having a central aperture loosely embracing the armature-sleeve above the blade-carrier, which latter is formed with an oil cavity for supplying oil to a ball-bearing constructed with substantially conical ball-raceways concaved to accommodate the balls.

In the accompanying drawings Figure 1 is a sectional elevation of an electric ceiling fan embodying the present improvements, the frame and its cap-plate being represented in section upon one side through a field-magnet core and at the other side through one of the brushes; and Fig. 2 a bottom plan view of the same.

The motor-frame is shown provided with the circular plate 1 formed with the lateral lugs 2 for attachment to a ceiling and with the annular flange 3 tongued to fit the similarly grooved upper end of the cylindrical shell or drum 4 secured thereto by means of bolts 5 and having projecting from its inner wall the radial field-magnet cores 6 embraced by the field-coil 7. To the annularly grooved lower edge of the shell 4 is secured by means of the screws 8 the cap-plate 9 having a depending hub or projection 10 provided with a central aperture 11 through which passes the shouldered and threaded lower end portion of the axially disposed stationary armature-shaft 12 whose shouldered and threaded upper end 13 is secured in the concentric boss $1^{\times}$ of the plate 1 in which it is held from turning by means of the lock-nut 14.

The shaft 12 is formed in its upper end adjacent the boss $1^{\times}$ with the collar 15 beneath which it is embraced by the tubular bushing 16 having in its inner face a series of annular grooves containing rings 17 of metalline or other self-lubricating substance. The bushing 16 is fitted within an axial recess in the upper end of and forms a part of the armature-sleeve 18 upon whose reduced upper end portion are clamped by means of the screw-ring 19 the component plates or laminations 20 of the armature-core having the usual spaced peripheral notches to receive the armature-coils 21. Below the bushing 16, the bore 22 of the armature-sleeve 18 is considerably larger than the diameter of the shaft to provide clearance so as to prevent the creeping of oil upwardly from the lower armature bearing to the upper self-lubricating bearing, and an internal cavity 23 is also provided in the armature sleeve whose upper wall serves to further arrest by centrifugal action the upward movement of the oil and thus prevent injury of the upper side-bearing. It will be seen that the centrifugal force created by the rapidly revolving armature-sleeve will tend to move the oil upwardly out of the receptacle 37 until it enters the enlarged internal cavity 23, and that the atmospheric pressure from above and the centrifugal force from below will maintain the upper surface of the oil in substantially inverted cone formation, as illustrated by the dotted lines, Fig. 1.

The reduced lower portion of the sleeve 18 has an externally threaded portion 24 and an adjacent shoulder 25 to receive the internally threaded upper end of the tubular

commutator-holder 26 having at its upper end the annular flange 27 with the V-shaped member 28 between which and the correspondingly shaped member 29 of the clamp-ring 30 are secured the correspondingly shaped inner portions of the commutator bars 31 by means of the clamp-screws 32, insulating strips 33 being interposed between the commutator bars and their respective clamping members.

Secured to the lower end of the commutator-holder 26 by means of the screws 34 is the annularly recessed hub 35 of the blade-carrier 36 formed with the central oil receptacle 37 embracing the lower end of the shaft 12 and having the laterally extending arms 38 to which are secured by means of screws 39 the fan-blades 40.

The reduced and threaded lower end portion 41 of the stationary shaft 12 has secured thereon the internally threaded collar 42 formed in the upper end with a substantially conical ball-raceway 43, the collar 42 being secured in place by means of the lock-nut 44. Facing the raceway 43 and complemental thereto is the substantially conical ball-raceway 45 formed near the inner edge and at the bottom of the ring 46 fitted within the lower end of the tubular commutator-holder 26 beneath the sleeve 18. As shown in the drawings, the ball-raceways 43 and 45 are concaved to embrace a series of interposed anti-friction balls 47, and the ball-bearing thus formed serves as a combined side- and step-bearing to sustain the weight of the armature and the side-thrust of the blade-carrier as well.

Interposed between the top of the bushing 16 and the collar 15 of the shaft 12 is a washer 53 of felt or other suitable yielding material serving to effectively exclude any dust or grit from the upper self-lubricating armature-journal, while the lower ball-bearing which receives the greater portion of the load imposed by the rotary armature is supplied with grease or other lubricant contained within the closed oil cup 37. It will thus be seen that both armature bearings are practically sealed against the admission of any foreign matter which would impair their efficiency or durability, while the construction is such that the fluid or semi-fluid lubricant of the ball-bearing cannot penetrate the dry self-lubricated upper side-bearing.

In case the side-bearing 16 17 should be otherwise located and of different type than above described, and should thus require lubrication from the oil receptacle 37 by suitable means, the clearance space 23 around the shaft 12 intermediate the step-bearing and the washer 53 would still perform its previously described function in preventing the creeping of the oil above the armature to be spread within the interior of the frame by the centrifugal action produced by the rapid rotation of the latter.

The cap-plate is shown provided with the radial bosses 54 in which are secured by means of set-screws 55 the tubular bushings 56 of insulating material, each closed in its outer end by means of a plug 57 between the inner end of which and the adjacent end of the cylindrical carbon-brush 58 fitted within the guide-tube 59 is a spring 60 by means of which the brush is maintained in yielding contact with the commutator within the cap-plate extension 10. The contact surface of the commutator is protected from dirt from the exterior of the casing by the depending hub or projection 10 of the cap-plate 9, whose central aperture 11 is fitted loosely to the exterior of the commutator-holder 26, but closely enough to prevent admission of foreign matter, especially as the intervening annular opening is at the bottom of the motor-casing where dust and dirt are least liable to reach it.

While the present improvement is susceptible of modification within the scope of the invention, the embodiment herein shown and described is deemed to be best suited for the conditions for which the improvement has been designed.

Having thus set forth the nature of the invention, what I claim herein is:—

1. The combination with a stationary vertical shaft, of a rotary sleeve embracing said shaft and having at the upper end a self-lubricating side-bearing and at the lower end a combined side- and step-bearing sustained by the shaft, said sleeve having a bore below its side-bearing substantially larger than said shaft to afford clearance therewith intermediate said bearings, and a closed oil-cup carried by said sleeve and embracing said combined side- and step-bearing.

2. The combination with a stationary vertical shaft, of a rotary sleeve surrounding and spaced from said shaft, a combined side- and step-bearing sustained by the shaft for the lower end of said sleeve, a blade-carrier carried by said sleeve and embracing said side- and step-bearing to afford a closed oil-cup therefor, and a self-lubricating side-bearing intermediate the upper portion of said sleeve and the shaft, the said side bearing and blade carrier serving to seal the sleeve against dust.

3. The combination with a stationary vertical shaft, of a rotary sleeve surrounding and spaced from said shaft, a combined side- and step-bearing sustained by said shaft for the lower end of said sleeve, a blade-carrier carried by said sleeve and embracing said side- and step-bearing to afford a closed oil-cup therefor, a self-lubricating side-bearing for the upper portion of said sleeve, and an annular chamber with overhanging walls

formed in said sleeve intermediate its bearing members.

4. The combination with a stationary vertical shaft provided with a reduced threaded end, of a rotary sleeve surrounding said shaft, a self-lubricating side-bearing intermediate the upper portion of said sleeve and the shaft, a collar fitted upon the threaded end of the shaft and affording a combined side- and step-bearing for the lower end of said sleeve, a blade-carrier secured to said sleeve and embracing said side- and step-bearing to afford a closed oil-cup therefor, and an internal cavity formed in the sleeve intermediate its bearing members and adapted to arrest the upward movement of oil from said closed oil-cup.

5. The combination with a stationary vertical shaft, of a rotary sleeve having an annular chamber merging into a shaft-receiving aperture, a step-bearing sustained by the shaft for the lower end of said sleeve, a detachable lubricant reservoir embracing the step-bearing and sealing the lower end of the sleeve, and a self-lubricating side bearing intermediate the upper portion of the sleeve and said shaft and serving to close the sleeve against dust.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

GUSTAVE C. MARX.

Witnesses:
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