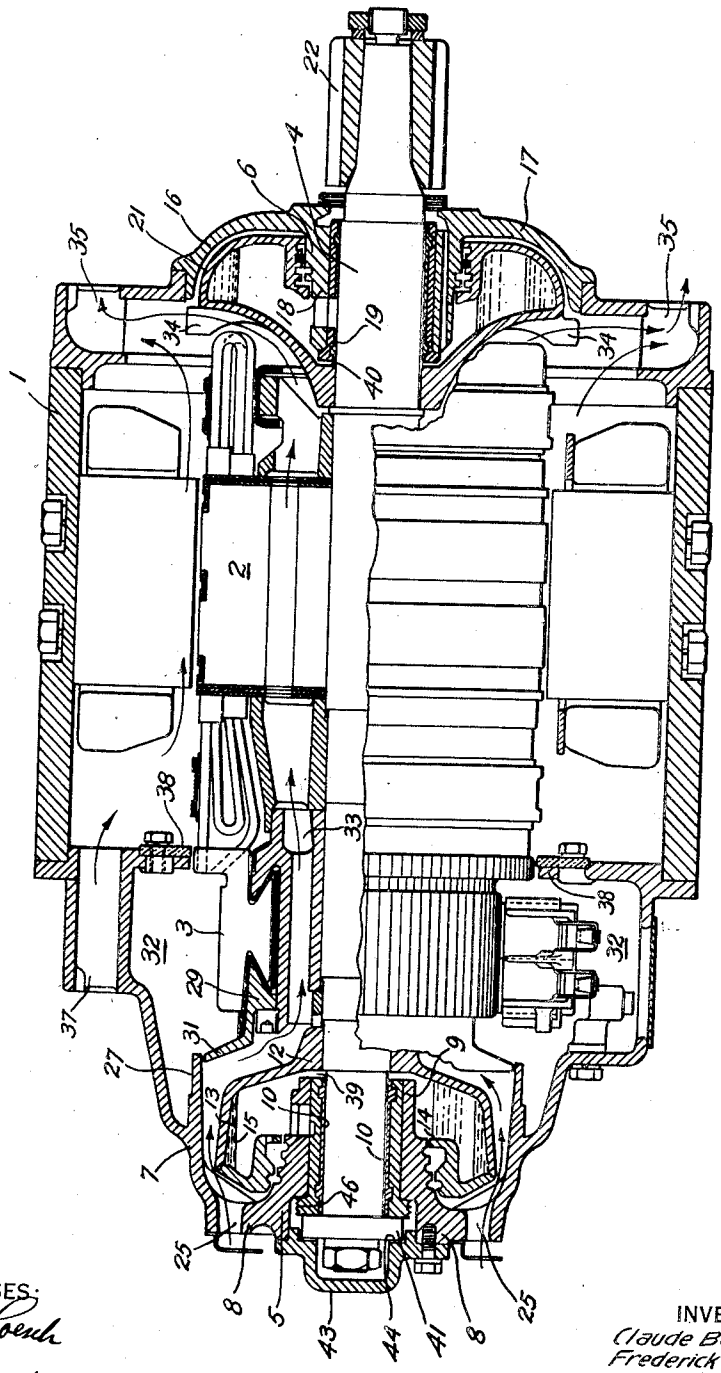
Sept. 11, 1928.

1,684,168

C. BETHEL ET AL

ROTARY OILER AND VENTILATION

Filed April 12, 1926



WITNESSES:

Carl J. Loesch

G. B. Buchanan

INVENTORS

Claude Bethel and

Frederick W. Mc. Closkey

BY

Wesley G. Carr

ATTORNEY

Patented Sept. 11, 1928. 1,684,168

UNITED STATES PATENT OFFICE.

CLAUDE BETHEL, OF WILKINSBURG, AND FREDERICK W. McCLOSKEY, OF EDGEWOOD, PENNSYLVANIA, ASSIGNORS TO WESTINGHOUSE ELECTRIC AND MANUFACTURING COMPANY, A CORPORATION OF PENNSYLVANIA.

ROTARY OILER AND VENTILATION.

Application filed April 12, 1926. Serial No. 101,355

Our invention relates to electric motors, particularly those adapted for railway applications, and it has particular relation to a novel ventilation and oiling system for such motors.

In railway motors, as in most other motors, provisions must be made to keep oil out of the interior of the machine, to prevent oil leakage, and to facilitate the quick removal and replacement of worn bearing parts. In railway motors, particularly where used in sandy districts, it is also necessary to segregate the space surrounding the commutator, so that the brushes and commutator may not be unduly worn by gritty substances carried by the ventilating air.

It is the principal object of our invention to meet all of the above-mentioned requirements in a novel arrangement of parts, having the combined object of cooling the lubricating oil and the machine at the same time, and utilizing the same oil for lubricating a single readily accessible and replaceable thrust bearing at the commutator end of the motor, for taking up the thrust in both directions, thereby entailing minimum delay in the replacement of worn bearing parts.

With the foregoing and other objects in view, our invention consists in the details and combinations set forth in the following specification and claims and illustrated in the accompanying drawing, the single figure of which is a longitudinal sectional view through a railway motor embodying our invention.

In the embodiment of our invention shown in the drawing, a railway motor is provided with a stator member 1 and a rotor member 2, the latter being provided with a commutator cylinder 3 and being mounted upon a shaft 4 which is supported in bearings 5 and 6. The bearing 5 at the commutator end of the machine comprises a housing 7 having a vertical supporting web 8 from which there extends an inwardly projecting bearing sleeve 9 which is supported at one end by said web. A journal bearing 10 is carried by the bearing sleeve 9 as is usual in the art.

Secured to the shaft 4 at a point adjacent to the free end of the bearing sleeve 9 is a hub 12 which rotates with the shaft and which carries a rotating oil-storing chamber 13 which extends over the bearing sleeve 9 into proximity to the web 8.

At standstill, the lubricating oil rests in the bottom of the rotating oil-storing chamber 13, out of contact with the shaft 4, as indicated at 14. When the motor starts, the oil is thrown by centrifugal force into the outer periphery of the oil storing chamber 13, as indicated at 15, and in so doing it splashes into the journal and lubricates the same. The same process is repeated also when the motor is brought to standstill.

The bearing 6 at the other end of the machine is similar, comprising a bearing housing 16, a supporting web 17, a laterally extending bearing sleeve 18, a journal bearing 19 and a rotating oil-storing chamber 21. The motor is also provided with a pinion 22 which is mounted adjacent to the bearing just described, and which is adapted to cooperate with gears (not shown) on the car axles, as is well understood by those skilled in the art.

In order to ventilate both the bearings and the rotor and stator of the motor, it is practically necessary to draw the ventilating air from the commutator end of the machine, in order to avoid the complication of the gearing which is present at the pinion end. To this end, the bearing 5 at the commutator end of the motor is provided with openings 25 in the web member 8, whereby the incoming air is drawn, in an axial direction, over the outer periphery of the rotating oil-storing chamber 13 of said bearing.

The commutator-end bearing housing 7 is also provided with a cylindrical baffle member 27 extending inwardly over the rotating oil storing chamber 13 but spaced therefrom. The supporting member 29, which supports the commutator cylinder 3, is provided with a radially extending baffle flange 31 which extends into close proximity to the baffle cylinder 27 of the bearing housing, whereby the space 32 surrounding the commutator cylinder is protected from the grit-laden ventilating air which enters through the intake passages 25.

The rotor member is provided with longitudinal passage-ways 33, which extend under the commutator cylinder 3, and which communicate with the air chamber surrounding the rotating oil storing chamber 13, over which the intake air is drawn.

At the pinion end of the motor, the rotating oil-storing chamber 21 is provided with

inwardly extending fan blades 34 whereby the air is drawn through the rotor ventilating passages 33 and is expelled through outlet vents 35 in the end bell at the pinion end of the motor, as indicated by the arrows. The rotating oil-storing chamber and the fan members are so disposed that the ventilating air is drawn over the said oil storing chamber in such manner as to cool the oil which is located in the outer periphery of the chamber while the motor is in operation.

The stator member 1 of the motor is ventilated by the same fan blades 34 previously described, the air being drawn through suitable intake ducts 37 near the commutator end of the motor, as indicated by the arrows. The space 32 surrounding the commutator member is protected from the grit-laden stator ventilating air by means of a vertical baffle member 38 which extends into proximity to the inner end of the commutator cylinder 3 and thereby by-passes the incoming stator ventilating air from the commutator space 32.

In railway motors, as heretofore constructed, it has been customary to provide the thrust bearing surfaces at the ends of the journal bearings, as at 39 and 40 in the drawing. A particular advantage of such arrangement is that the thrust bearing surfaces are oiled by the same oil supply which is used for the journal bearings, being lubricated in fact by the overflow oil which comes out of the ends of the journal bearings. A disadvantage of the utilization of thrust bearing surfaces at the inner ends of the journal bearings is that when the parts become worn, it is a very difficult job to remove the journal bearings in order to gain access to the thrust surfaces for the purpose of placing shims or the like, in place.

We have found that the advantages of the inherently lubricated thrust surfaces may be obtained without the disadvantages just mentioned by leaving spaces at the points 39 and 40 at the inner ends of the bearings, and by taking up all thrusts, in both directions, at the more readily accessible commutator end of the motor, by providing a thrust collar 41 detachably secured to the shaft and bearing against the outer end of the journal bearing 10 at the commutator end. A cap member 43 is also provided to cover the end of the shaft and to provide a thrust bearing surface 44 for engaging the other side of the thrust collar 41.

It will be noted that the bearing surfaces on the two sides of the thrust collar 41 are lubricated by overflow oil which passes out from the outer end of the journal bearing 10 at the commutator end of the machine, and that in case the parts become worn, it is only necessary to obtain access to the commutator end of the machine, and it is not necessary to remove either one of the journal bearings 10 or 19.

In case it should become necessary to remove the journal bearing 10 at the commutator end of the machine, the thrust cap member 43 and the thrust collar 41 may be removed, after which the journal bearing 10 may be engaged, at 46, by a suitably threaded pipe (not shown), whereby the bearing may be pulled out.

While we have shown and described our invention in considerable detail for the purpose of completely illustrating the same, it is our intention that the appended claims shall be as broadly construed as is permitted by the language thereof and the prior art.

We claim as our invention:

1. A self-contained oil-reservoir and bearing comprising a stationary bearing housing having a supporting web and a laterally extending bearing sleeve supported, at one end, by said web, a journal bearing rigidly carried by said sleeve, a rotating shaft journalled in said journal bearing, a hub secured to said shaft at the free end of said sleeve, a rotating oil-storing chamber carried by said hub and overhanging said sleeve, the oil in said chamber being thrown to the outer portion thereof by centrifugal force during rotation, and means for causing a blast of cooling air flowing substantially parallel to the shaft to pass by the outer periphery of said chamber to cool the main body of oil in the outer portion thereof.

2. A self-contained oil-reservoir and bearing comprising a stationary bearing housing having a supporting web and a laterally extending bearing sleeve supported, at one end, by said web, a journal bearing rigidly carried by said sleeve, a rotating shaft journalled in said journal bearing, a hub secured to said shaft at the free end of said sleeve, a rotating oil-storing chamber carried by said hub and overhanging said sleeve, the oil in said chamber being thrown to the outer portion thereof by centrifugal force during rotation, said hub being spaced from the free end of said sleeve, a thrust collar removably secured to said shaft outside of said journal bearing, and means carried by said bearing housing for providing thrust surfaces engaging both sides of said thrust collar, the member providing the outer thrust surface being removable.

3. In a railway motor having a stator and a rotor, said rotor having a commutator member at one end and a pinion at the other end, the combination including a bearing for rotatably supporting the shaft at each end of the stator, the inner ends of said bearings being both free of thrust contacts with any portions of said rotor member, a single thrust collar removably secured to the shaft outside of the bearing at the commutator end of the motor, and means carried by the adjacent

bearing housing for providing thrust surfaces engaging both sides of said thrust collar, the member providing the outer thrust surface being removable.

4. In a railway motor having a stator and a rotor, said rotor having a commutator member at one end and a pinion at the other end, the combination including a bearing for rotatably supporting the shaft at each end of the stator, said rotor having longitudinal ventilating passage-ways extending beneath said commutator member, the bearing housing having a ventilating opening outside of the bearing at the commutator end, baffle means surrounding said last-mentioned bearing for isolating the space surrounding said commutator member from the ventilating air entering through said ventilating opening and passing through said passageways beneath said commutator member, an oil reservoir for said bearing at the commutator end, and means for causing a cooling fluid to flow past said oil reservoir into said passageways beneath said commutator member.

5. In a railway motor having a stator and a rotor, said rotor having a commutator member at one end and a pinion at the other end, the combination including a bearing for rotatably supporting the shaft at each end of the stator, said rotor having longitudinal ventilating passageways extending beneath said commutator member, the bearing housing having a ventilating opening outside of the bearing at the commutator end, baffle means surrounding said last-mentioned bearing for isolating the space surrounding said commutator member from the ventilating air entering through said ventilating opening and passing through said passageways beneath said commutator member, the stator being provided with a baffle disk cooperating with the inner end of the commutator member for completing the isolation of the space surrounding said commutator member, and means for causing streams of cooling air to pass over said bearings at the commutator end and through said rotor and through said stator, respectively, without coming in contact with said isolated commutator space.

6. In a railway motor having a stator and a rotor, said rotor having a commutator member at one end and a pinion at the other end, the combination including a bearing for rotatably supporting the shaft at each end of the stator, said rotor having longitudinal ventilating passageways extending beneath said commutator member, the bearing housing having a ventilating opening outside of the bearing at the commutator end, baffle means surrounding said last-mentioned bearing for isolating the space surrounding said commutator member from the ventilating air entering through said ventilating opening and passing through said passageways beneath said commutator member, the stator being provided with a baffle disk cooperating with the inner end of the commutator member for completing the isolation of the space surrounding said commutator member, stator intake ventilating openings by-passing said baffle disk, and means at the pinion end of said rotor for drawing two parallel streams of air through said stator and rotor members respectively.

7. In a railway motor having a stator and a rotor, said rotor having a commutator member at one end, the combination, with said commutator end, of a self-contained oil-reservoir and bearing, comprising a stationary bearing housing having a supporting web and a laterally extending bearing sleeve supported, at one end, by said web, a journal bearing rigidly carried by said sleeve, a rotating shaft journalled in said journal bearing, a hub secured to said shaft at the free end of said sleeve, a rotating oil-storing chamber carried by said hub and overhanging said sleeve, the oil in said chamber being thrown to the outer portion thereof by centrifugal force during rotation, the rotor comprising longitudiual ventilating passageways extending beneath said commutator member, said housing web having a ventilating opening, baffle means surrounding said rotating oil-storing chamber for isolating the space surrounding said commutator member from the ventilating air entering through said ventilating opening and passing through said passageways beneath said commutator member and means at the other end of the rotor for drawing air through said passageways.

8. In a railway motor having a stator and a rotor, said rotor having a commutator member at one end, the combination, with said commutator end, of a self-contained oil-reservoir and bearing, comprising a stationary bearing housing having a supporting web and a laterally extending bearing sleeve supported, at one end, by said web, a journal bearing rigidly carried by said sleeve, a rotating shaft journaled in said journal bearing, a hub secured to said shaft at the free end of said sleeve, a rotating oil-storing chamber carried by said hub and overhanging said sleeve, the oil in said chamber being thrown to the outer portion thereof by centrifugal force during rotation, the rotor comprising longitudinal ventilating passageways extending beneath said commutator member, said housing web having a ventilating opening, said bearing housing comprising a substantially cylindrical flange overhanging said rotating oil-storing chamber in spaced relation thereto, and said commutator member having a supporting ring provided with a radial flange which cooperates with said cylindrical flange for isolating the space surrounding said commutator member from the ventilating air entering through said ventilating opening and passing through said pas-

sageways beneath said commutator member, and means at the other end of the rotor for drawing air through said passageways.

9. In a railway motor having a stator and a rotor, said rotor having a commutator member at one end, the combination, with said commutator end, of a self-contained oil-reservoir and bearing, comprising a stationary bearing housing having a supporting web and a laterally extending bearing sleeve supported, at one end, by said web, a journal bearing rigidly carried by said sleeve, a rotating shaft journaled in said journal bearing, a hub secured to said shaft at the free end of said sleeve, a rotating oil-storing chamber carried by said hub and overhanging said sleeve, the oil in said chamber being thrown to the outer portion thereof by centrifugal force during rotation, the rotor comprising longitudinal ventilating passageways extending beneath said commutator member, said housing web having a ventilating opening, and means for drawing air over said rotating oil-storing chamber and into said rotor passageways.

10. In a railway motor having a stator and a rotor, said rotor naving a commutator member at one end, the combination, with said commutator end, of a self-contained oil reservoir and bearing comprising a stationary bearing housing, having a supporting web and a laterally extending bearing sleeve supported, at one end, by said web, a journal bearing rigidly carried by said sleeve, a rotating shaft journaled in said journal bearing, a hub secured to said shaft at the free end of said sleeve, a rotating oil-storing chamber carried by said hub and overhanging said sleeve, the oil in said chamber being thrown to the outer portion thereof by centrifugal force during rotation, said hub being spaced from the free end of said sleeve, a thrust collar removably secured to said shaft outside of said journal bearing, and means carried by said bearing housing for providing thrust surfaces engaging both sides of said thrust collar, the member providing the outer thrust surface being removable.

In testimony whereof, we have hereunto subscribed our names this 30th day of March, 1926.

CLAUDE BETHEL.
FREDERICK W. McCLOSKEY.