

Sept. 3, 1957

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2,805,350

HIGH ALTITUDE ELECTRICAL BRUSH LUBRICATION

Filed April 7, 1955

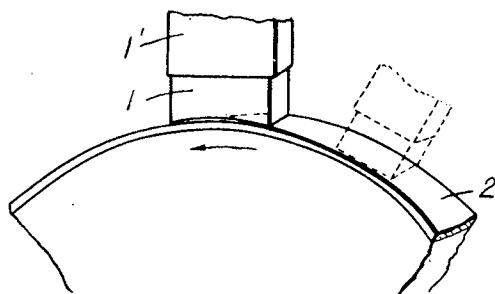


Fig. 1

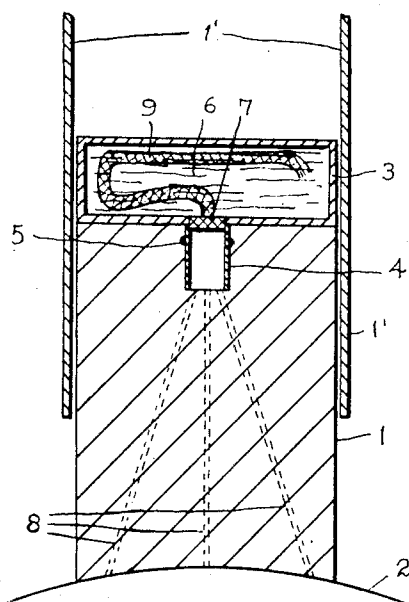


Fig. 2.

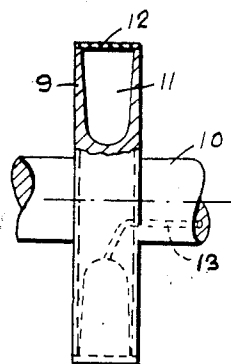


Fig. 3.

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HIGH ALTITUDE ELECTRICAL BRUSH LUBRICATION

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Application April 7, 1955, Serial No. 499,898

7 Claims. (Cl. 310—228)

This invention relates to electrical equipment intended for operation at high altitudes or in other regions of relatively low pressure and water vapour content, in particular to such equipment, for example electric motors or generators, of the kind in which electric current is transferred between relatively rotating parts of the equipment by means of a brush as of carbon or graphite on the one part making sliding contact with a co-operating contact member such as a slipring or commutator on the other part.

It is well known that due to reduction in the amount of water vapour in the atmosphere at high altitudes brush wear is often excessive, and accordingly it becomes necessary to provide some form of lubrication which will be effective at these high altitudes to reduce the brush wear without seriously impairing the transfer of current between the brush and the co-operating contact member.

The invention consists in lubricating the brush with a chlorofluorocarbon oil.

Chlorofluorocarbon oil such as that sold by Imperial Chemical Industries Limited under the trade name "Florube" possesses properties which are ideal for the purpose described above in that it resists oxidation at temperatures of the order of 200° to 300° C., and it lubricates when only an adsorbed molecular film exists. Furthermore it has no metallic ingredient and will readily vaporise at the temperature conditions existing at the contact face of the brush, particularly when the equipment is operating at low pressure. Chlorofluorocarbon oils as sold under the above trade name are described as complex mixtures of a number of closely similar compounds of carbon, fluorine and chlorine of which the following analysis is typical: Carbon 21–23%, fluorine 31–33% and chlorine 45–48%.

In describing various ways in which chlorofluorocarbon oil may be applied for effecting brush lubrication in accordance with the invention reference will be made to the accompanying drawings in which

Fig. 1 is a fragmentary perspective view diagrammatically illustrating a brush making sliding contact with a co-operating rotatable member,

Fig. 2 illustrates in section a brush having a reservoir for containing the lubricating chlorofluorocarbon oil, and

Fig. 3 illustrates in part section an arrangement in which the member which co-operates with the brush is formed with a reservoir for the lubricating oil.

Referring to Fig. 1 a brush 1 of carbon, say, is carried in a brush holder 1' and makes sliding contact with a co-operating contact member 2 shown as being a slipring but which could equally be a commutator. It will be appreciated that the brush 1 and member 2 will be electrically connected to respective relatively rotatable parts of an electric motor or other equipment (not shown) in order to permit current transfer from one such part to the other.

According to the invention chlorofluorocarbon oil is introduced to the contact area between the brush 1 and the member 2 in order to provide lubrication therebe-

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tween and thus to reduce wear of the brush 1 such as would be likely to occur, as previously pointed out, if the equipment was operating at high altitude.

In carrying out the invention where the brush 1 has a graphite or other porous body the lubricating oil is preferably stored within the brush by impregnation, being advantageously associated with a suitable carrier such as a thermo-setting resin which can control the rate of vaporisation of the oil at low atmospheric pressure; as various ways by which impregnation of the brush may be carried out are well known to those skilled in the art they need not be detailed here.

As an alternative to impregnating the brush 1 the oil may be contained in a reservoir communicating with the contact area in such manner that oil can reach the contact area at least in vapour form; two arrangements providing such reservoir are illustrated in Figs. 2 and 3 respectively of the accompanying drawings.

Thus referring to Fig. 2 the brush 1 making sliding contact with the member 2 is provided within the brush holder 1' at the end of the brush remote from the contact area with a reservoir 3 in the form of a small vessel having a cross-sectional area (in a plane perpendicular to the paper) similar to that of the brush 1. An open ended tube 4, secured round an opening in the wall of the reservoir 3 adjacent the brush 1 fits tightly into the body of the brush and is preferably sealed therein as by means of a sealing ring 5. The reservoir 3 is filled with chlorofluorocarbon oil indicated at 6, a porous restriction 7 being inserted in the tube 4 to permit the oil, in liquid or vapour form, to flow by diffusion into the bore of the tube 4 at a controlled rate determined inter alia by the porosity of the restriction 7. From the tube 4 the oil passes into the body of the brush 1 and by way of the natural pores therein and/or through specially provided ducts 8 makes its way to the contact area between the brush 1 and the member 2, the action being assisted by the relatively high temperature at the contact area. The ambient temperature and pressure will decide whether the oil from the reservoir 3, passing into the restriction 7, will leave the restriction 7 in the form of vapour and flow through the brush body in this state to the contact surface or will remain in liquid state until it reaches the contact surface.

Fig. 3 shows a slipring arrangement which could be used to provide the slipring 2 of Fig. 1 and includes a reservoir storing chlorofluorocarbon oil for effecting brush lubrication in accordance with the invention. Referring now to Fig. 3 a slipring mounting in the form of a disc or cylinder 9 is carried by a shaft 10 and has an axial dimension at least of the order of the desired slipring width. The peripheral surface of the mounting 9 is formed with a groove or trough 11 of substantial width and depth, and a band of porous metal 12 constituting the slipring passes round the mounting 9 to close the groove or trough 11 therein. In this way there is defined beneath the surface of the porous slipring 12 an annular cavity constituting a reservoir which in use is filled with chlorofluorocarbon oil, a continuous supply of such oil to the reservoir being provided, if desired, by way of a duct 13 passing along the shaft 10.

Yet another way of applying chlorofluorocarbon oil to the brush track for the purposes of the invention is to provide auxiliary lubricating brushes. Thus referring again to Fig. 1 the brush 1 may be left unimpregnated with lubricant and without a lubricant reservoir communicating therewith, while an auxiliary brush indicated in dotted lines at A makes sliding contact with the member 2 to apply the lubricating chlorofluorocarbon oil to the latter, this auxiliary brush, which will take no part in transfer of electric current to or from the member 2, being either impregnated with the lubricant oil or having a reservoir

of the oil communicating therewith in the manner previously described.

A brush impregnated or otherwise lubricated with chlorofluorocarbon oil can resist excessive wear at high altitudes, and the lubricant is such that it will not appreciably impair the commutation or current collection in an electrical machine.

What we claim is:

1. An electrical machine provided with relatively rotatable current collector parts, comprising, in combination, a brush forming one of said parts located in electrical contact with a cooperating contacting surface, chlorofluorocarbon oil positioned in the contact area between the brush and the cooperating contacting surface to serve as a lubricant for said relatively rotatable current collector parts.

2. An electrical machine as defined in claim 1 wherein said brush comprises a porous body which is impregnated with chlorofluorocarbon oil.

3. An electrical machine as defined in claim 1 wherein said brush comprises a porous body which is impregnated with chlorofluorocarbon oil and a thermo-setting resin for controlling the rate of vaporisation of said oil when said electrical machine is operating in a region of low pressure.

4. An electrical machine provided with relatively rotatable current collector parts, comprising, in combination, a brush forming one of said parts located in the electrical contact with a cooperating contacting surface, a reservoir containing chlorofluorocarbon oil, means to convey said chlorofluorocarbon oil from said reservoir to the contact area between the brush and said cooperating

contacting surface whereby said oil serves as a lubricant for said relatively rotatable current collector parts.

5. An electrical machine as defined in claim 4 wherein said oil conveying means comprises a porous material which permits the said oil to reach said contact area at least in vapour form.

6. An electrical machine provided with relatively rotatable current collector parts comprising, in combination, a brush forming one of said parts located in electrical contact with a cooperating contacting surface, a reservoir provided with passage means communicating through the body of the brush with the contact area between the brush and the cooperating contact surface, chlorofluorocarbon oil contained in said reservoir and passage means which reaches said contact area to serve as a lubricant for said relatively rotatable current collector parts.

7. An electrical machine as defined in claim 3 wherein said brush comprises a porous body and the passage means for the chlorofluorocarbon oil comprises the pores of the brush body.

References Cited in the file of this patent

UNITED STATES PATENTS

1,495,657	Wagner	May 27, 1924
2,555,997	Portail	June 5, 1951
2,703,372	Savage	Mar. 1, 1955

OTHER REFERENCES

"Handbook of Material Trade Names" by Zimmerman et al., 1953 edition Industrial Research Service, Dover, New Hampshire. Page 240, col. 2.