

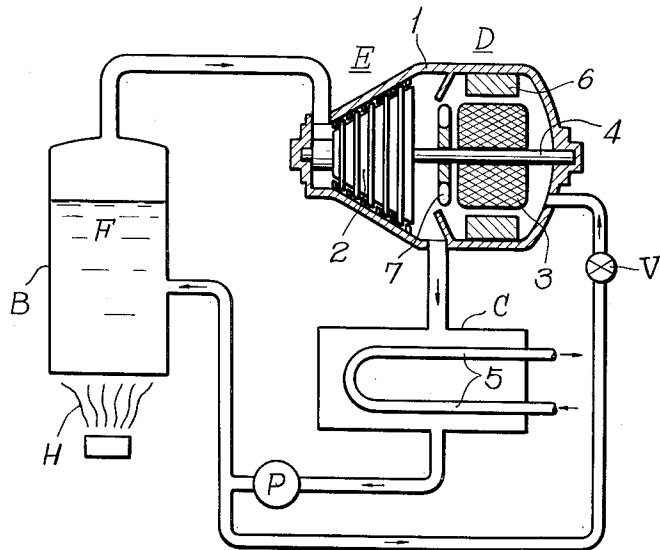
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MASANOSUKE YANAGIMACHI

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ELECTRIC GENERATOR SYSTEM

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INVENTOR.

MASANOSUKE YANAGIMACHI

BY

Mocker Blum
ATTORNEYS

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ELECTRIC GENERATOR SYSTEMMasanosuke Yanagimachi, 536 7-chome, Ebara,
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This invention relates to an electric generator system.

In the prior art, electric generators have not been enclosed within a casing also enclosing a prime mover, due to the high electrical conductivity of the working substance, such as steam, for the prime mover. As a result, it has not been possible to effect a substantial reduction in the size of the overall electric generator system, and it has further been necessary to provide means for sealing the shaft of the prime mover which extends from the inside of the prime mover casing to the electric generator.

One object of this invention is to provide an electric generator and prime mover system which may be appreciably reduced in size.

Another object of this invention is to provide an electric generator which may be cooled easily and efficiently.

According to this invention, an electric generator is enclosed inside a casing together with a prime mover. The prime mover is an expanding fluid powered mechanism, such as a turbine in which a working substance may be expanded so as to drive the electric generator. The working substance is a dielectric, such as a member of a group of fluorinated hydrocarbons, for example, trichloromonofluoromethane commonly known by the trade name Freon-11, the dielectric constant of vapor of which is 1.0019 (26° C., 0.5 atm.).

The invention will be better understood and other objects and additional advantages of this invention will become apparent upon perusal of the following description taken in connection with the drawing, and the scope of the invention will be defined in the appended claims.

In describing the invention, reference will be made to the single FIGURE of the accompanying drawing in which the single FIGURE is an axial sectional view of a unit comprising a prime mover and an electric generator embodying this invention, together with a diagrammatic layout of pipe lines belonging to the unit.

Referring to the drawing, a casing 1 encloses a vapor turbine E, as a prime mover, and an electric generator D. The rotor 2 of the turbine E and the rotor 3 of the electric generator D are secured on a common shaft 4 which is journaled rotatably inside the casing 1. An inlet for a working substance F, for example, Freon-11, is provided through the wall of the casing 1 at the end thereof which faces the high pressure side of the turbine E, the low pressure side of the turbine E facing the electric generator D. Between the turbine E and the electric generator D, an outlet is provided through the wall of the casing 1 so as to exhaust the working substance F out of the casing 1. The exhausted working substance F is then admitted into a condenser C in which the same is cooled and condensed by cooling pipes 5. The liquefied working substance F is then delivered into a boiler B through a pump P. The boiler B vaporizes the working substance F so as to feed the vapor into the inlet of turbine E.

In the past, hydrogen gas has been used to cool electric generators. According to this invention, the working substance such as Freon-11 may be substituted for the hydrogen gas to cool the electric generator D in the following easy and simplified manner. The pipe line to circulate the working substance F may have a branch extending from a point between the pump P and the boiler B and

2

directed to an opening provided through the end wall of the casing 1 remote from the turbine E. A part of the working substance F pumped may be fed into the electric generator D, being regulated by an expansion valve V provided in the branch line. The vapor of the working substance thus admitted inside the casing 1 at the end remote from the turbine E flows over the rotor 3 and the stator 6 of the electric generator D so as to cool the generator D. A fan 7 provided on the shaft 4 serves to exhaust the cooling vapor through the outlet, described hereinbefore, to the condenser C.

This invention may be adapted to a low-pressure cycle of a binary vapor cycle system for driving the electric generator. In such a case, the boiler B may be operated as a heat exchanger in which another working substance such as steam for the high-pressure cycle is condensed and the working substance such as Freon-11 for the low-pressure cycle is vaporized by the heat transferred from the condensing steam.

By virtue of the arrangement in accordance with this invention, it becomes possible to minimize the size of an electric generator system and eliminate the troublesome shaft seal problem. By virtue of the property of the specified working substance, the whole system may be kept thoroughly insulated electrically.

While particular embodiments of the invention have been illustrated and described, modifications thereof will readily occur to those skilled in the art. It should be understood therefore that the invention is not limited to the particular arrangements disclosed but that the appended claims are intended to cover all modifications which do not depart from the true spirit and scope of the invention.

What is claimed as new and desired to be secured by Letters Patent of the United States is:

1. An electric generator system comprising an electric generator; an expansible fluid powered engine drivingly connected to said generator; a single substantially sealed casing enclosing said generator and said engine and providing internal bearing support therefor; a fluid vaporizing means; an inlet in said casing adjacent said engine and connected to said vaporizing means to supply vaporized fluid to said engine to drive the latter by expansion of said fluid; an outlet in said casing in communication with said generator and said engine; condensing means connected to said outlet; and means connecting said condensing means to said vaporizing means, the expansible fluid being a dielectric fluorinated hydrocarbon.

2. Electric generator system, according to claim 1, said working substance being trichloromonofluoromethane.

3. An electric generator system as claimed in claim 1 in which said casing has a second inlet adjacent said generator; a conduit having one end connected to the means connecting said condensing means to said vaporizing means and its other end connected to said second outlet; and an expansion valve in said conduit for expanding fluid from said condensing means into said casing to flow through said generator to cool the same and to flow out of said outlet.

4. Electric generator system according to claim 3, said dielectric fluorinated hydrocarbon being trichloromonofluoromethane.

5. An electric generator system as claimed in claim 3 in which said engine and said generator have a common drive shaft; and a fan mounted on said drive shaft between said engine and said generator, and effecting flow of expanded fluid from said generator to said outlet.

6. Electric generator according to claim 5 said working substance being trichloromonofluoromethane.

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