Aug. 30, 1932. L. H. HILL 1,873,971

AIR BLAST EQUIPMENT FOR OIL IMMERSED TRANSFORMERS

Filed Nov. 18, 1929

Fig. 1.

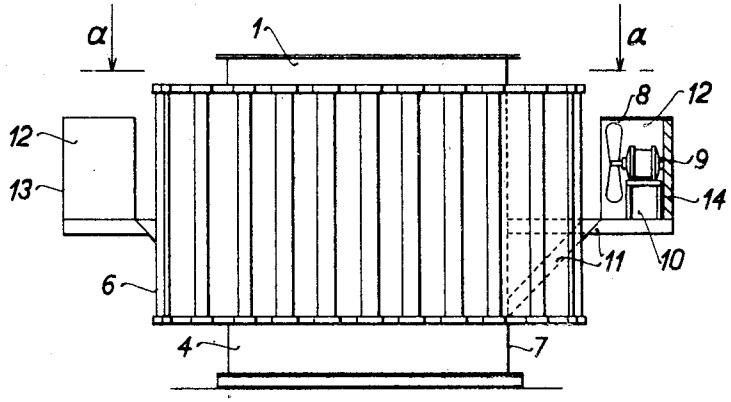
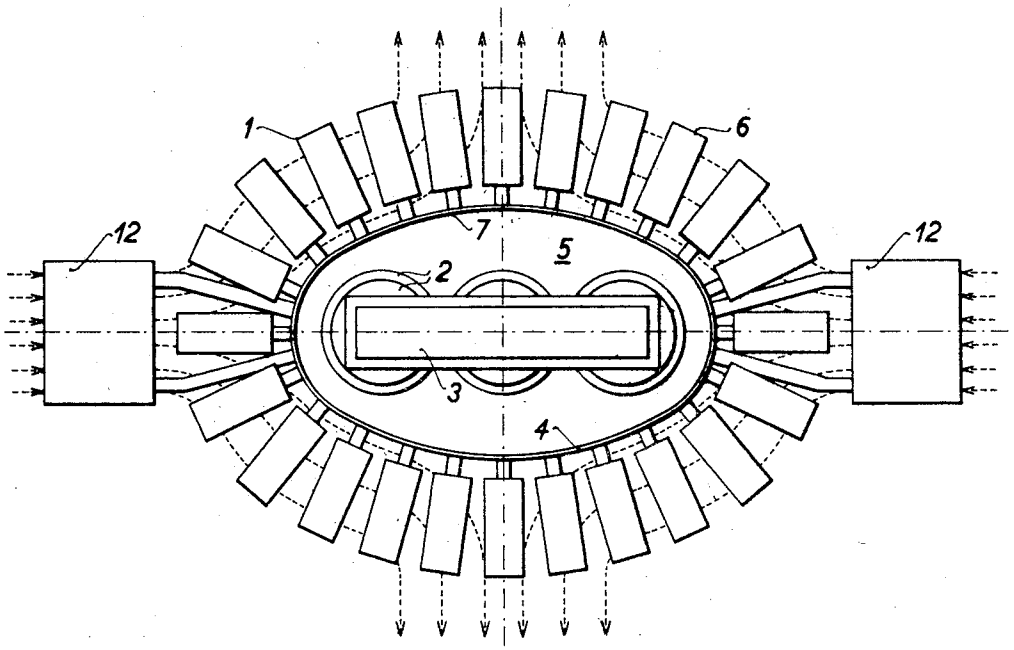


Fig. 2.



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UNITED STATES PATENT OFFICE

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AIR BLAST EQUIPMENT FOR OIL-IMMERSED TRANSFORMERS

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This invention relates to cooling means for electric transformers and has especial relation to supplemental air-cooling means for said transformers.

It is often desirable to provide oil-immersed self-cooling transformers with means for projecting blasts of air upon cooling surfaces to increase the emissivity thereof. Such supplemental cooling means may be used, for example, to secure added ventilation in localities in which high atmospheric temperatures may be occasionally encountered; or to provide for operation during periods of excessive loads; or to secure adequate cooling of large transformers wherein container space conditions preclude the mounting of otherwise sufficient radiator capacity for self-cooling.

Prior arrangements of auxiliary air-cooling equipment for self-cooled transformers are subject to the objections of high first cost, high cost of maintenance, and high power consumption. For example, in usual practice expensive metal ducts are required to direct the air blast against the radiating surfaces of the transformer. The incorporation of ducts for this purpose in the transformer structure is undesirable, not only from the point of view of first cost, but also from the maintenance point of view, in that it is particularly difficult to protect the ducts from corrosion.

It is, therefore, the general object of the present invention to obviate the disadvantages heretofore met with in supplementing the transformer self-cooling system by blower means, and to this end to provide means for the purpose specified, which will increase the operating capacities of transformers at costs less than possible with previously known arrangements.

It is a further object to provide supplementary blower means for self-cooled transformers whereby the expensive and otherwise undesirable ducts, used heretofore for the purpose of directing the air blasts against the transformer cooling surfaces, are rendered unnecessary.

A further object is to provide blower means for the purpose specified, in which high efficiency is attained and undesirable elements, such as ducts, are eliminated without necessity for employment of large numbers of blower units.

In accordance with my invention, the objects hereinbefore stated and others which will hereinafter appear are especially attained by employing transformer casings of the normal or usual shape in deflecting air from a blower, or blowers, against the cooling surfaces, or in certain cases, by shaping said transformer case for the purpose of deflecting air from said blower or blowers.

Further objects and advantages of the invention will hereinafter appear and a better understanding thereof will be had from the following description and the accompanying drawing in which, for purposes of illustration only, one embodiment of the invention is shown.

Figure 1 is a side elevation, partially in section, of a self-cooled transformer embodying supplementary cooling means in accordance with my invention;

Fig. 2 is a plan view partially in section on line *a*—*a* of the transformer shown in Fig. 1.

In the figures of the drawing, a self-cooled transformer 1 comprises windings 2, core 3, tank or case 4 containing cooling oil 5 and cooling means comprising radiators 6 connected to wall 7 of the tank. The tank in the present embodiment of the invention is of approximately elliptical shape in horizontal section, as shown in Fig. 2. The axes of windings 2, which are placed on core 3, are, as in usual practice, preferably spaced in the plane of the major axis of the elliptical tank. The radiators are each composed of a number of vertical tubes (not shown) and are spaced substantially evenly around the tank wall.

In accordance with my invention, auxiliary cooling means are provided comprising, preferably, two blowers as 8, arranged adjacent opposite ends of the major axis of tank wall 7. The blowers may be driven by motors, as motor 9, mounted on motor plates 10, supported by brackets 11 connected to the tank wall. Each blower unit 12, comprising a

blower 8 and its driving motor 9, is provided with an enclosing shield 13 and louvres 14.

In operation, heat is transferred from windings 2 and core 3 to the oil 5 in the tank. A portion of the heat is thence transferred to the tank wall 7 and radiated therefrom. The greater portion of the heat is transferred to the radiators 6 and dissipated to air which comes in contact with the outside surface of said radiators. For the purpose of providing supplemental cooling air to the wall surface and to the radiator surfaces, I place blowers 8 at such a distance from the respective ends of the tank that the air streams from the blowers reach, respectively, substantially all points of those sections of the tank wall 7 and the radiators thereto attached, lying between the blowers and the minor axis of the tank, as shown in dotted line in Fig. 2. The air streams follow closely the wall of the tank, by reason of the approximately stream line shape of said wall, and guiding means for the blower air, such as ducts, are thereby rendered unnecessary.

In the event that one of the two blowers shown should become inoperative, the remaining blower ensures that air streams therefrom will pass substantially to the opposite end of the tank from that at which such blower is located, the air tending to follow said stream line wall and, therefore, to pass around the sides of the tank.

It will be seen that, in accordance with my invention, a small number of blowers, for example, only two of said blowers disposed on the tank wall, as shown in the present embodiment, provide highly effective auxiliary cooling means by reason of the directive effect on the air streams from said blowers of the approximately stream line shaped tank wall. If desired, cover or baffle plates may be placed over the outside ends of the radiators which are adjacent the blowers, in order to direct the air stream still more accurately around the stream line transformer casing.

While I have described the transformer tank in the present embodiment of the invention as of stream line form, or of elliptical form, the invention is not limited to such special tank forms, but is directed to any tank form providing the required directive effect on the air stream or streams from a blower or blowers.

What I claim is:

1. In an electric transformer of substantially elliptical shape, a casing, cooling fluid therein, radiators external to said casing and connected therewith for circulating said fluid, and auxiliary cooling means for said transformer comprising a blower for directing an air stream along the major axis of said casing.

2. In an electric transformer, a casing of substantially elliptical shape, cooling fluid therein, radiators external to said casing and connected therewith for circulating said fluid, and auxiliary cooling means for said transformer comprising two blowers, approximately oppositely placed adjacent the ends of said elliptically-shaped casing, each of said blowers directing an air stream against an end of said casing.

In witness whereof, I hereto affix my signature this 13th day of November, A. D. 1929.

LELAND H. HILL.