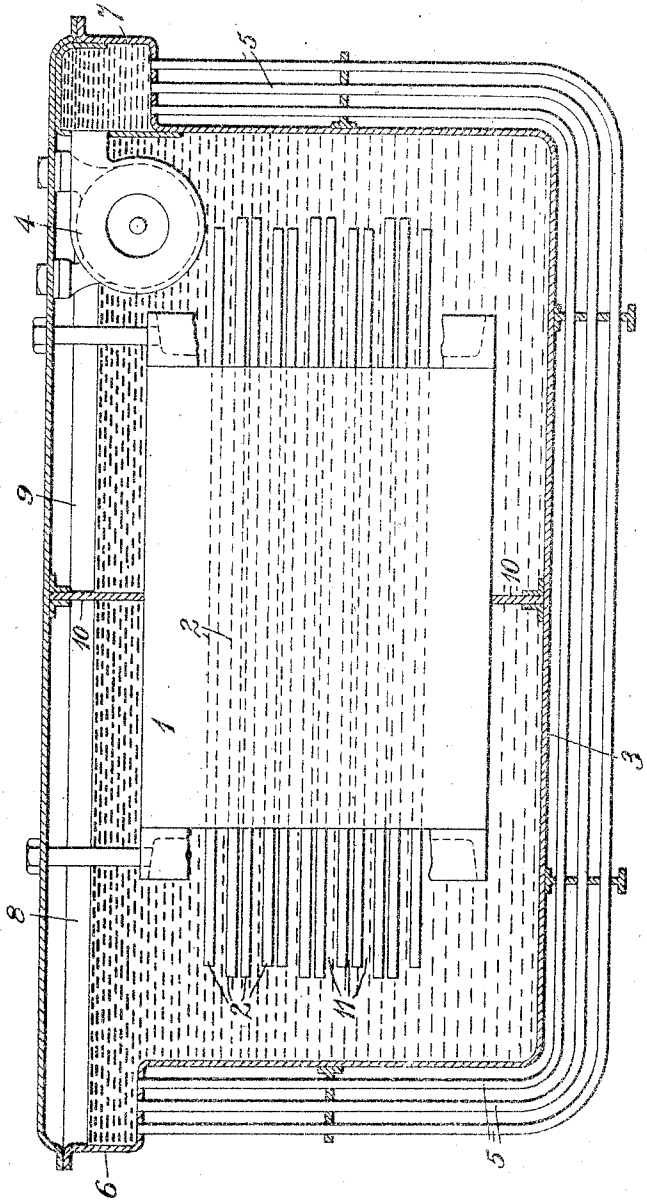
C. LE G. FORTESCUE.

COOLING DEVICE FOR ELECTRIC APPARATUS.

APPLICATION FILED NOV. 6, 1908.

1,010,134. Patented Nov. 28, 1911.



WITNESSES:

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COOLING DEVICE FOR ELECTRIC APPARATUS.

1,010,134. Specification of Letters Patent. **Patented Nov. 28, 1911.**

Application filed November 6, 1908. Serial No. 461,338.

To all whom it may concern:

Be it known that I, CHARLES LE G. FORTESCUE, a subject of the King of Great Britain, and a resident of Wilkinsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Cooling Devices for Electric Apparatus, of which the following is a specification.

My invention relates to the cooling of electrical apparatus, and it has special reference to transformers and other stationary inductive apparatus which are disposed in fluid-containing cases.

The object of my invention is to provide an improved casing for electrical apparatus of the class above indicated and means contained within the casing for efficiently circulating and cooling the oil or other insulating fluid in which the apparatus is immersed.

It is usual to provide ribbed projections or corrugations in the exposed surfaces of the tanks, in which oil-immersed transformers and similar devices are contained, in order to facilitate the radiation of the heat which is generated in the electrical apparatus and transmitted through the fluid to the tank walls. Insulating fluids, such as oil, are relatively poor conductors of heat, so that the temperature of the transformer or other electrical device within the tank may be considerably higher than that of the medium surrounding the tank.

According to my present invention, I materially improve the ventilation of the electrical apparatus by providing means for mechanically circulating the oil within the tank and also external tubes which communicate with the tank at its ends, in order to provide a complete circuit for the insulating fluid, a portion of which may be readily cooled.

The single figure of the accompanying drawing is a sectional elevation of a transformer provided with the cooling device of my present invention.

My improvement is not limited in its application to any special class of electrical apparatus or form of tank, but is shown in connection with a transformer suitable for use on alternating current railway vehicles because it has special advantages in apparatus of this character.

Referring to the drawing, the apparatus illustrated comprises a transformer core member 1 and coils 2 associated therewith, a tank 3 in which the transformer is contained and a circulating pump or propeller 4 which is driven by any suitable means (not shown).

The tank 3 has a plurality of pipes or tubes 5 which connect enlargements 6 and 7 that are located at its respective ends, said tubes being bent into a "U" shape to conform to the body of the tank adjacent to which they are disposed. The enlargement 7 is entirely closed except where it connects with the tubes 5 and with the outlet of the pump or propeller 4.

The interior of the tank is divided into two substantially equal chambers 8 and 9, by a partition 10, the arrangement of parts being such that, when the pump or propeller 4 is operated, a fluid pressure is produced in the enlargement 7 and the insulating fluid is forced from thence through the tubes 5 and into the enlargement 6 of the chamber 8. From this point, the fluid is obliged to pass through a plurality of ventilating passages 11, which are established in a well known manner between the coils 2 of the transformer, into the chamber 9. The level of the liquid in the tank must, of course, be sufficiently high to submerge the inlet of the propeller 4 which may be a centrifugal pump or any other suitable fluid propeller.

It will be observed that the apparatus employed is all contained within the transformer tank, with the exception of the tubes 5 and, consequently, the improvement may be readily applied to railway transformers, which are usually located on the bottoms of railway vehicles. When the device illustrated is located in this manner, the tubes or pipes 5 are subject to a material blast or circulation of air so that the oil passing through them is reduced to the temperature of the outside atmosphere. Railway transformers are usually disposed in long, relatively shallow tanks in which the automatic circulation of oil, caused by differences of temperature, is very slight and, consequently, it is highly desirable to provide a forced circulation within these tanks.

It will be readily understood by those skilled in the art that my improvement may

be adapted to various electrical devices, and I desire that only such limitations shall be imposed as are indicated in the appended claims.

I claim as my invention:

1. The combination with a fluid-containing tank having two chambers, electrical apparatus located in said tank and provided with internal passages which open into the respective chambers, and tubes or pipes located outside the tank in proximity to the walls thereof and constituting conduits between the chambers, of propelling means for producing a circulation of fluid through the external tubes and the internal passages.

2. The combination with a fluid-containing tank, having two side-by-side chambers, electrical apparatus disposed in both chambers and provided with ducts which open into the respective chambers, and tubes or pipes located outside the tank and constituting conduits between the upper portions of the chambers, of a propelling means located within one of the chambers and serving to produce a circulation of fluid through the tubes and ducts.

3. The combination with a fluid-containing tank having two chambers, electrical apparatus disposed in both chambers and provided with internal passages, and tubes or pipes constituting outside passages between the chambers, of a fluid propeller located within one of the chambers and serving to produce a circulation of fluid through both the internal and the external passages.

4. The combination with a fluid-containing tank having two chambers, a transformer disposed in both chambers and provided with ventilating ducts or passages which open into the respective chambers, and tubes or pipes which constitute outside conduits between the chambers, of means for producing a circulation of fluid through the tubes from chamber to chamber.

5. The combination with a fluid-containing tank having two chambers, a transformer disposed in both chambers and provided with ventilating ducts or passages through which fluid flows from chamber to chamber, and tubes or pipes which constitute outside conduits between the chambers, of a fluid propeller located within one of the chambers and serving to force fluid through the tubes into the other chamber.

In testimony whereof, I have hereunto subscribed my name this 31st day of October, 1908.

CHARLES LE G. FORTESCUE.

Witnesses:
W. M. McCONAHEY,
BIRNEY HINES.