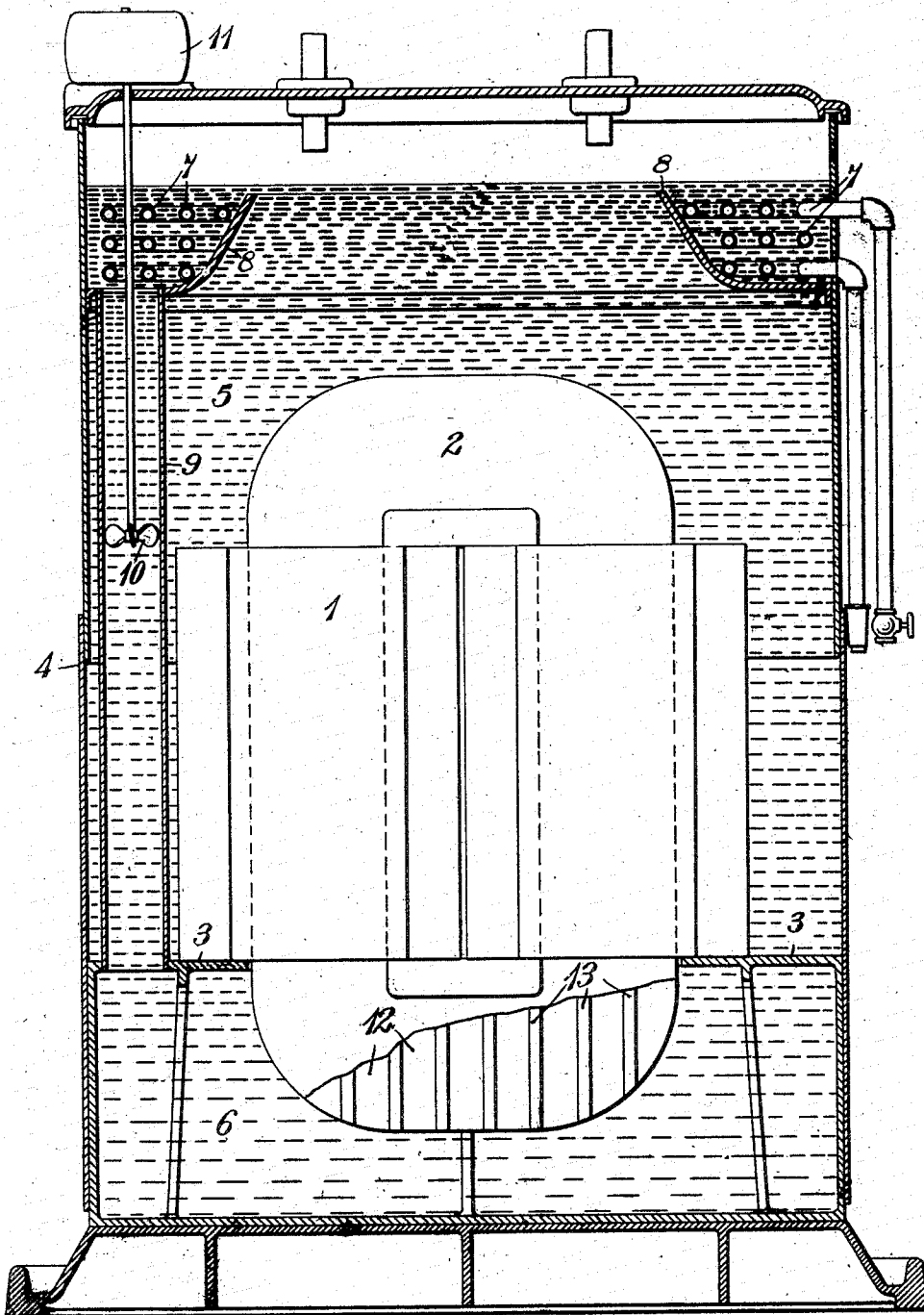


C. LE G. FORTESCUE.
 COOLING SYSTEM FOR TRANSFORMERS.
 APPLICATION FILED NOV. 6, 1908.

1,135,103.

Patented Apr. 13, 1915.



WITNESSES:

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UNITED STATES PATENT OFFICE.

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COOLING SYSTEM FOR TRANSFORMERS.

1,135,103.

Specification of Letters Patent.

Patented Apr. 13, 1915.

Application filed November 6, 1908. Serial No. 461,339.

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 Systems for Transformers, of which the following is a specification.

10 My invention relates to transformers and similar electrical devices which are immersed in oil or other insulating fluids.

The object of my invention is to provide an improved inclosing casing for devices of the class above indicated, and fluid-circulating means whereby the active parts of the apparatus which are immersed in the insulating fluid may be more effectually cooled.

20 Alternating current transformers of large size have frequently been disposed in boiler iron tanks or cases and immersed in oil or other suitable insulating fluid. During the operation of oil-immersed transformers, large quantities of heat are generated in its core members and coils, and, in order to reduce the temperature of these parts, cooling coils have often been introduced into the oil near the top of the tank, water or other suitable liquid being continuously passed through the tube or pipe of which the coil is composed. These coils effectually reduce the temperature of the oil in their vicinity but, by reason of the poor heat conductivity of the fluid and its inertia the temperature of the active parts of the transformer is usually considerably higher than the average temperature of the surrounding medium.

40 According to my present invention, I provide a horizontal partition in the tank or casing, in which the transformer is disposed, which divides the interior of the tank into two chambers, parts of the transformer being located in each chamber. In addition to the partition referred to, I provide a flange or baffle plate, which extends almost to the surface of the liquid in the tank and separates the oil-immersed cooling tubes from the remainder of the tank, a large pipe or flue being provided for connecting the non-adjacent chamber of the tank with the isolated portion of the fluid which surrounds the cooling tubes. A propeller, which may be driven by any suitable motor, is located

in the pipe or flue and causes a circulation 55 of insulating fluid from the cooling tubes downwardly into the lower chamber of the tank, from whence the fluid is compelled to pass through ventilating ducts or passages, which are established, in the usual manner, 60 between the coils of the transformer, into the upper chamber of the tank.

The single figure of the accompanying drawing is a sectional elevation of a transformer disposed in a tank or casing constructed in accordance with, and provided with the attachments of, my invention.

Referring to the drawing, the matter illustrated comprises a transformer core 1 and coils 2, which are supported by a horizontal plate or flange 3, that constitutes a partition in the tank 4 and divides the interior into two chambers 5 and 6. The transformer is completely immersed in oil or other suitable insulating fluid and a cooling 75 coil 7 is immersed in the liquid near the top of the tank. The extremities of the cooling coil are located outside of the tank so that water or other cooling fluid may be circulated through the coil. 80

The cooling coil is partially isolated from the body of the liquid in the tank by means of a baffle plate 8, which is supported by the walls of the tank and extends substantially to the surface of the liquid in the tank. The annular chamber which is thus formed communicates with the lower chamber 6 of the tank by means of a pipe or flue 9, and a propeller 10, which is driven by any suitable means, such as a motor 11, serves to create 90 a circulation of insulating fluid from the vicinity of the cooling coil downwardly through the flue 9 into the chamber 6, from whence it is obliged to pass upwardly through a plurality of ventilating ducts 12, 95 which are provided in the usual manner between the coils of the transformer winding, said coils being separated by spacing strips 13.

The motor 11 may be located within the 100 tank above the liquid level without departing from the spirit of my invention, and this arrangement may be preferable in case the apparatus is exposed to the weather. The rapid circulation of the insulating fluid 105 within the tank, the simplicity of the structure and the fact that the apparatus is entirely contained within a single casing are

special advantages which render my improvement desirable and commercially important.

It is to be understood that structural modifications may be effected within the scope of my invention, and I desire that only such limitations shall be imposed as are indicated in the appended claims.

I claim as my invention:

10 1. The combination with a fluid-containing tank having a horizontal partition near one end which provides an upper and a lower chamber in said tank, a cooling coil immersed in the fluid within the upper end
15 of the upper chamber, and a conduit connecting the fluid in the vicinity of the cooling coil with the fluid in the lower chamber, of an electric transformer supported upon said partition and disposed mainly in the upper
20 chamber, and means located within said conduit for producing a circulation of the fluid through it and the upper and lower chambers.

25 2. The combination with a fluid-containing tank having a horizontal partition which divides said tank into an upper and a lower chamber and provided with a passage between the upper ends of said chambers, and an oil-cooling means disposed in the upper
30 end of the upper chamber, of an electric transformer resting upon said partition and disposed mainly in the upper chamber, and means for forcing oil from the vicinity of

the cooling means through said passage to the lower chamber.

35 3. The combination with a liquid-containing tank having a partition provided with two apertures, of a transformer projecting into one of said apertures, a pipe projecting from the other aperture, and a cooling coil
40 located adjacent to the end of the pipe which is remote from the partition, and a propeller for producing a circulation of liquid through said pipe and said transformer and through the spaces between the convolutions
45 of said cooling coil.

4. The combination with a liquid-containing tank having a horizontal partition near one end provided with two apertures, of a transformer resting upon said partition and
50 projecting into one of said apertures, a pipe projecting upwardly from the other aperture, a baffle plate near the upper end of the tank, a cooling coil between the baffle plate and the tank wall, and a propeller for forcing
55 liquid through said pipe and said transformer and through the spaces between the convolutions of the cooling coil.

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

CHARLES LE G. FORTESCUE.

Witnesses:

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BIRNEY HINES.