(No Model.)

E. THOMSON.

COOLING TRANSFORMER.

No. 508,654. Patented Nov. 14, 1893.

Fig. 1.

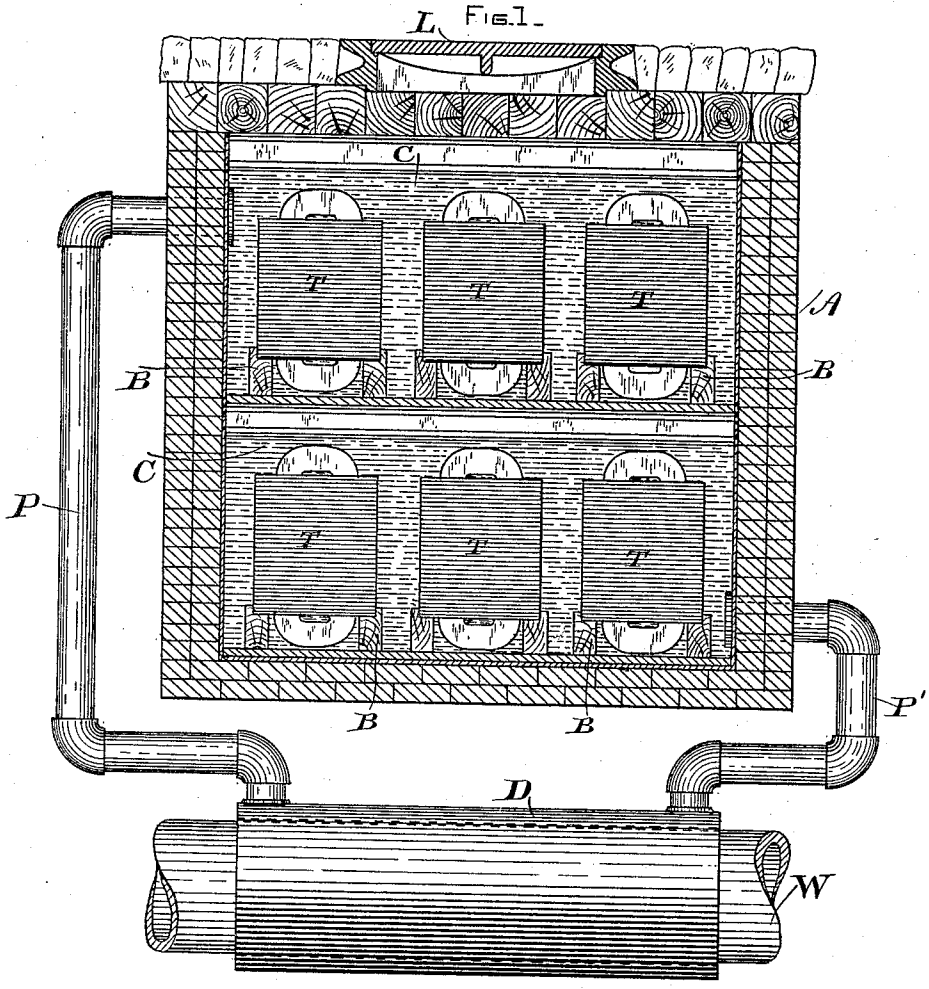
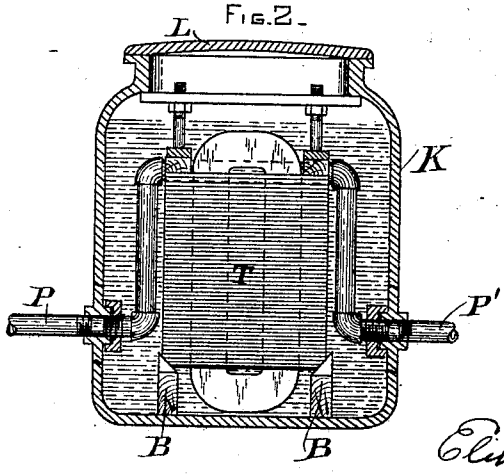


Fig. 2.



Witnesses.
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UNITED STATES PATENT OFFICE.

ELIHU THOMSON, OF SWAMPSCOTT, MASSACHUSETTS, ASSIGNOR TO THE THOMSON-HOUSTON ELECTRIC COMPANY, OF CONNECTICUT.

COOLING TRANSFORMERS.

SPECIFICATION forming part of Letters Patent No. 508,654, dated November 14, 1893.

Application filed February 4, 1892. Serial No. 420,341. (No model.)

To all whom it may concern:

Be it known that I, ELIHU THOMSON, a citizen of the United States, residing at Swampscott, in the county of Essex and State of Massachusetts, have invented certain new and useful Improvements in Cooling Transformers, of which the following is a specification.

The present invention is designed particularly for transformer sub-stations of comparatively large capacity, where, if a number of transformers are massed together in a single chamber, or if the transformers be of unusually large size, caution must be taken to prevent excessive heating, especially when the station is kept in operation during the entire day as is often the case. The highest efficiency is obtained with a transformer when the conductors under load are cold. Heating impairs its efficiency and also lessens its durability, especially if permitted to become considerable. Furthermore the insulating qualities of the insulating materials used in the transformer are much less at high temperatures, and even oil itself is not so good an insulator when hot. It is therefore the design of this invention to preserve the transformer comparatively cool, thus securing the advantages indicated, and this I accomplish by exposing oil or other insulating fluid in which the transformer is immersed to some special artificial cooling medium which may be passed through the oil, or through which the oil itself may be circulated as hereinafter more particularly set forth.

Heretofore it has been customary to immerse transformers in oil contained within a metal casing, whereby heat is conducted and radiated away from the transformer. But there are many installations where such means of cooling are impracticable or insufficient, as for instance, where transformers are built into the walls of buildings or located in underground chambers, where the casing cannot be ventilated, or where, with large transformers immersed in oil, insufficient radiating surface is obtainable to prevent overheating. For such installations as these it is specially desirable to provide an artificial cooling medium as contemplated in the present invention.

In the drawings Figures 1 and 2 are sectional views, showing two ways in which the desired cooling may be effected, but it will be understood that other dispositions may be employed as may prove most convenient in any given case.

In the first of the arrangements, illustrated in Fig. 1, the upper and lower portions of the receptacle containing the transformers are connected by an external pipe or pipes, and the cooling medium being applied to a greater or less portion of said pipe causes a constant circulation of the fluid through the chamber, and around the transformers preserving them cool. For illustration the transformer station is shown located in an underground chamber A, walled in with suitable masonry, and provided with a man-hole and cover L permitting ready access thereto. Within the chamber are arranged any desired number of transformers T, supported on insulating blocks B, and immersed in an insulating fluid C, preferably oil. A pipe or system of pipes P, P′, which may be more or less extended as may prove convenient, is provided forming a passageway connecting the upper portion of the chamber with its lower portion, and this pipe is filled with oil as well as the transformer receptacle. A greater or less portion of this pipe system is exposed to a cooling medium, which of course cools the oil in its immediate neighborhood, and gives rise to a continuous circulation throughout the casing, inasmuch as the fluid in becoming heated tends to rise passing out at the upper end of the pipe, and being replaced by cooler material entering at the other end. In Fig. 1 a pipe W, which may be part of a city water system, contains the cooling medium, and the pipe P is expanded into a casing surrounding it as shown. In actual practice it would be better to arrange the cylinder D at a higher level than is illustrated, say around the pipe P, so that the oil or other fluid cooled in the cylinder may fall therefrom through the pipe P′, being replaced by heated oil coming through pipe P.

In the arrangement shown in Fig. 2 the cooling medium is introduced directly inside the transformer casing and passed through the oil therein. Here K represents the casing containing the transformer, filled with an insulating fluid as before. Through the pipes P,

P′ is passed a current of cold water or other cooling fluid. This will abstract the heat from the interior of the casing and keep the apparatus in good working condition.

What I claim as new, and desire to secure by Letters Patent, is—

1. The combination of a receptacle or chamber containing one or more transformers surrounded by oil or like insulating fluid, with a cooling medium circulating in a pipe passing through a greater or less portion of the fluid, as set forth.

2. The combination with a receptacle containing one or more transformers surrounded by an insulating fluid, of a pipe passing through said chamber and fluid, and means for causing a cooling medium to flow through said pipe, substantially as described.

In witness whereof I have hereunto set my hand this 29th day of January, 1892.

ELIHU THOMSON.

Witnesses:
JOHN W. GIBBONEY,
BENJAMIN B. HULL.