

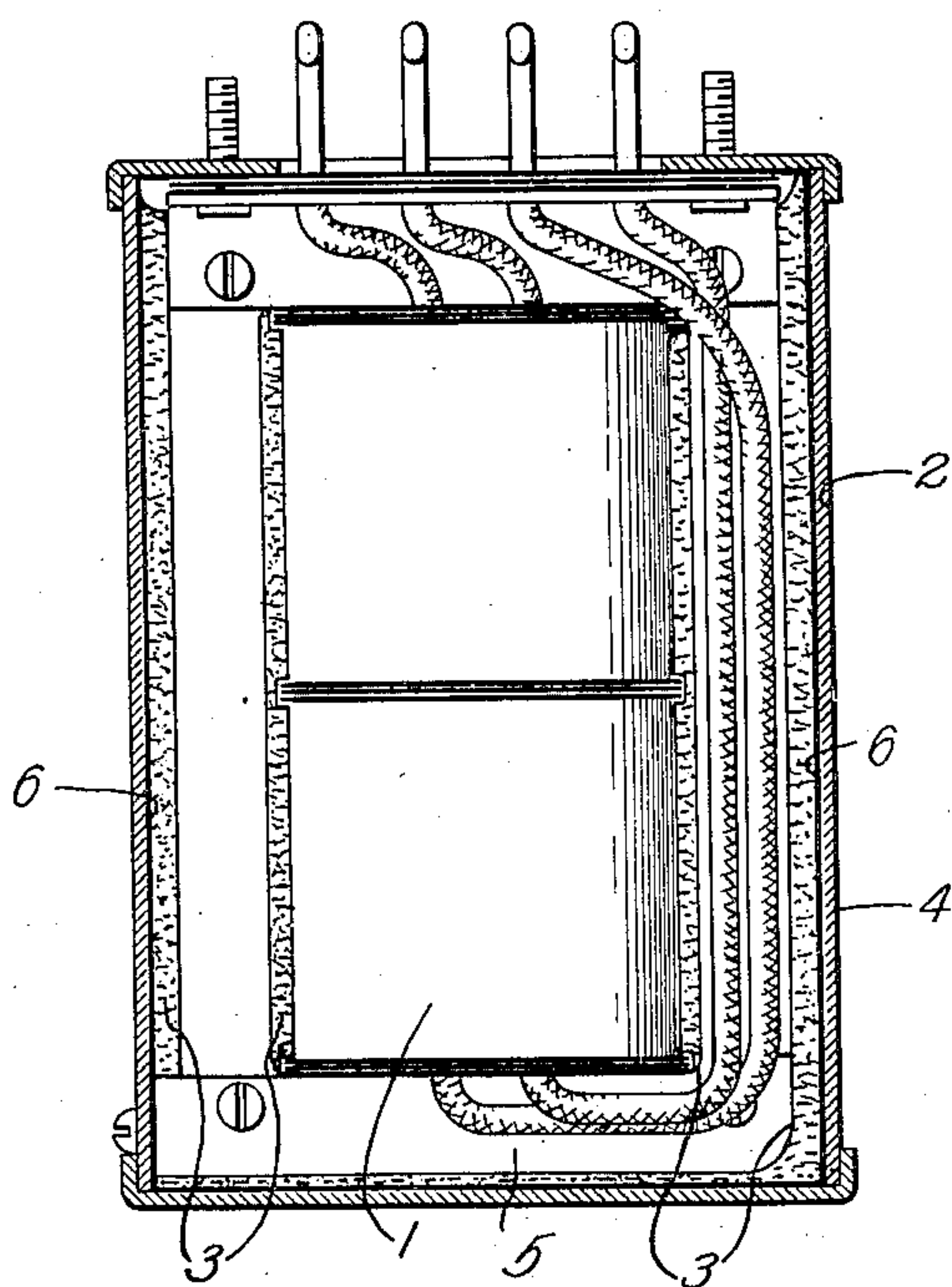
April 16, 1929.

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1,708,935

COIL AND TRANSFORMER

Filed Aug. 9, 1927



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UNITED STATES PATENT OFFICE.

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COIL AND TRANSFORMER.

Application filed August 9, 1927. Serial No. 211,661.

This invention relates to encased transformer coils and especially to means for dissipating the heat generated by the coils.

An object of the invention is to accelerate the dissipation of the heat in the windings of the transformer or other current carrying coils which are encased.

Another object of the invention is to reduce the maximum temperature which is attained by an encased coil when a specified current traverses the windings.

Still another object of the invention is to increase the load carrying capacity for a certain specified rise in the temperature of the windings.

A feature of the invention comprises supplying a dull finish, as for instance, a dull black lacquer to the inside surface of the transformer or coil case to absorb the heat emitted from the windings.

While the invention is of general application it has particular application to and will be described in connection with repeating coils or other coils employed in a telephone system. These coils as commonly used are made small and compact and it is necessary to mount them in small spaces near to each other or to other telephone apparatus as, for instance, in panels or racks in a telephone exchange.

It has been known in the prior art that roughening or blackening the exterior of the casing promotes the radiation of the heat. This method, however, places a limitation on the use of coils cooled by such treatment since there are situations in which it is impracticable or undesirable to blacken or roughen the exterior of the casing. For instance, it is important in some situations as in the case of the interior or back of telephone switchboards to be able to illuminate readily all of the wiring or apparatus to facilitate working on it, locating trouble, etc. This can much more readily be done if the exterior of the apparatus including the coil casing is white or bright. It is difficult if the apparatus is finished in black.

The invention provides a coil casing which can have any desired exterior finish so that it can be made up to match other apparatus and at the same time provides for the dissipation of heat as effectively or more effectively than the prior art method.

The foregoing results are readily accom-

plished in this invention by providing the inner surface of the transformer or coil cases which are usually of tinned iron or any other polished material with a dull finish as, for instance, a dull black lacquer. This results in causing the heat to be dissipated from the coils quite as rapidly or more so than in the previous method which comprised coating only the outside of the cases black. The difference in the results obtained by the method of the prior art and that of this invention is due to somewhat different phenomena.

Ordinarily, a transformer or coil, as the case may be, develops a considerable amount of heat due to the energy consumed by the coil. In battery supply telephone transformers which were provided with cases as formerly coated, namely with black on the outside and nothing on the inside walls the heat was radiated to the inner surface of the casing. Due to the normally polished surface inherent in the tinned iron metal generally used for such cases a large amount of heat is reflected back while some is conducted to the outside surface of the transformer case where it is readily radiated by virtue of the fact that a black surface readily emits heat radiations.

With the inside surface of the cases coated black as in this invention, the heat emitted from the transformer coils is not reflected back to the windings as formerly but is almost entirely absorbed by the black surface. Thus there is little or no heating of the coils due to reflected heat. The heat absorbed by the inner walls of the casing is readily conducted to the outer surface where it is quickly dissipated by radiation and convection. Since the heat conducted from the windings is greater due to the means employed in this invention than by those formerly used, the outside of the case can be finished in any desirable manner and in the successful reduction to practice of this invention the outside of the casing was coated with aluminum paint.

A better understanding of the invention may be had from the following description with reference to the accompanying drawing in the single figure of which an encased transformer is shown with one side of the case removed to expose the dull finish on the inner walls of the casing.

In the drawing a transformer winding or other current carrying coil 1 is shown wound upon magnetic core 5 which is enclosed in a casing 2 the obverse side of which is shown removed to expose the inner walls of the case. All of the inner surfaces of the case are coated or painted black or otherwise given a dull dark finish. The coating on the inner surface of the reverse side of the case is shown mottled at 3 where the space between the windings and the core and the core and case permit this surface to be viewed. The coatings on the end surfaces are shown in section at 3. The outside of the casing 4 may be finished in any color or can be given a bright metallic finish. By means of this invention very desirable results in absorbing heat from the coil windings are obtained. The following results were obtained by a transformer similar to that described in which the outside surface consisted of a coating of aluminum paint.

The coil was first tested in a typical 24 volt battery supply telephone circuit with an initial current of .8 ampere with a casing, the outside of which was first painted black as formerly used and thereafter with an aluminum coating substituted for the black. In the first case the temperature rose to a maximum of 341° F. while in the second case the temperature rose to 354° F. With the inside painted black and the outside aluminum and with the same initial cur-

rent and with the same circuit conditions the temperature registered 331° F. showing a difference of 10° between the tests in which the outside was painted black with the inside unfinished, and the inside black with the outside aluminum, and 23° difference between the test wherein the outside was aluminum with the inside unfinished and that in which the outside was aluminum and the inside black.

What is claimed is:

1. A case for electrical coils having its inside surface blackened to increase the absorption of heat radiated from the windings.

2. A case for electrical coils having its inside surface coated with a material having good heat absorption qualities to increase the absorption of heat radiated from the windings.

3. A case for electrical coils having its outside surface coated with aluminum or other bright material and the inside surface blackened.

4. A telephone repeating coil enclosed in a metallic casing having a bright exterior finish which is readily illuminated and having an inside surface finished in a dull black for dissipating heat from the coil.

In witness whereof, I hereunto subscribe my name this 3rd day of August A. D., 1927.

ARTHUR J. CHRISTOPHER.