Jan. 7, 1930. L. H. BURNHAM 1,742,985

TRANSFORMER

Filed May 20, 1929

Fig. 1.

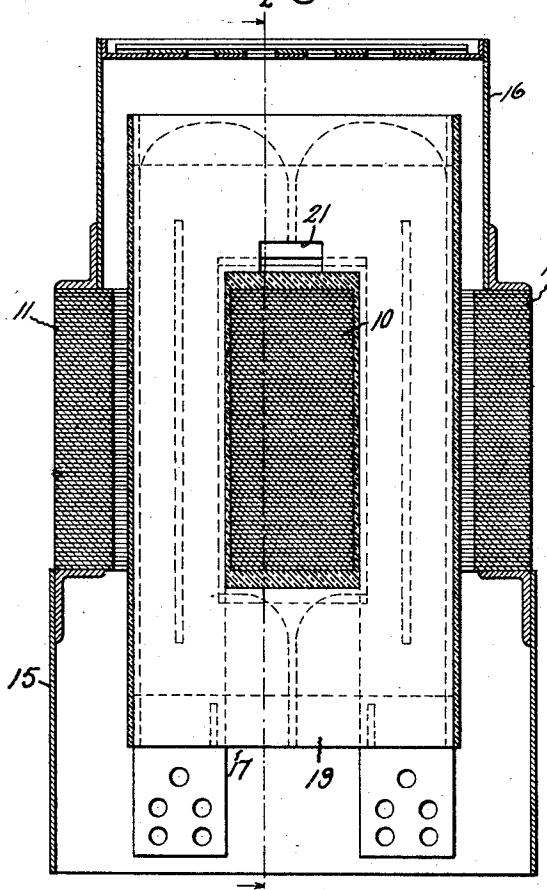


Fig. 2.

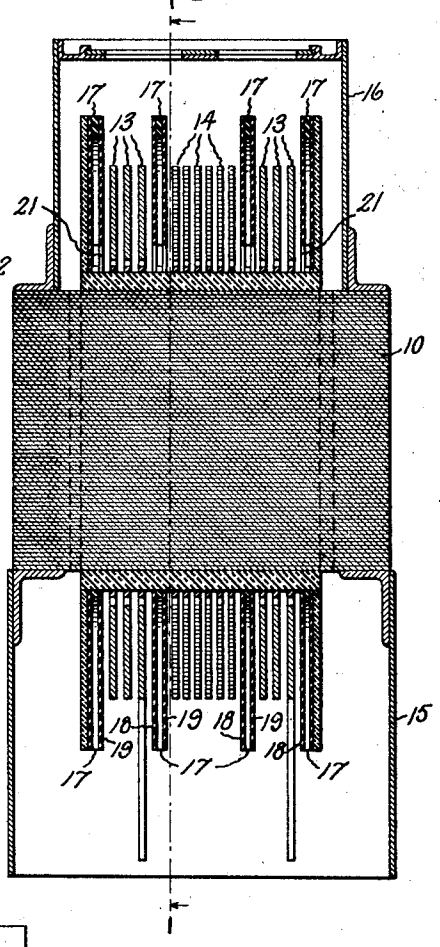
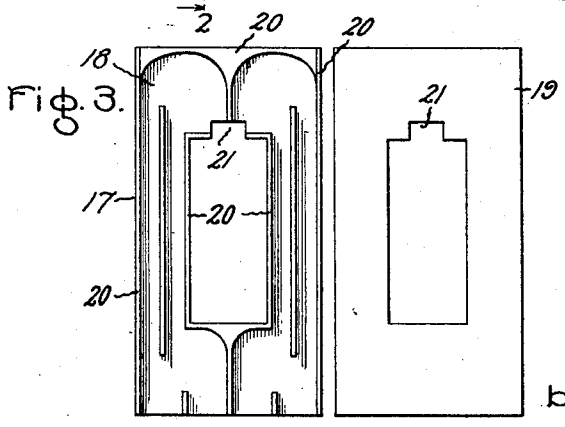


Fig. 3.



Inventor:
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UNITED STATES PATENT OFFICE

LOCKE H. BURNHAM, OF PITTSFIELD, MASSACHUSETTS, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK

TRANSFORMER

Application filed May 20, 1929. Serial No. 364,484.

My invention relates to transformers. A shell type transformer has a magnetic core with three legs, the center leg being surrounded by the windings. In many transformers of this type, the windings are formed of flat coils which are supported in spaced relation so that a cooling medium such as air or oil may flow through the spaces between the coils and past the winding leg from one side of the transformer to the other. The winding leg of the core forms an obstruction to the flow of the cooling medium and shields a region behind it where it has been found that portions of the winding coils and adjacent portions of the winding leg itself sometimes become overheated. The general object of the present invention is to provide an improved arrangement and construction of coil spacers which will convey or direct some of the cooling medium into the region behind the winding leg of the core and so avoid overheating of the coils and winding leg in and adjacent to this region.

The invention will be better understood from the following description taken in connection with the accompanying drawing in which Fig. 1 is a sectional view of a shell type air blast transformer with winding coil spacers constructed and arranged in accordance with the invention, the view being taken on the line 1—1 of Fig. 2; Fig. 2 is a sectional view on the line 2—2 of Fig. 1; and Fig. 3 is a view, reduced in size, of one of the winding coil spacers with one of its sides or faces removed to show the interior arrangement.

Like reference characters indicate similar parts in the different figures of the drawing.

The invention will be explained in connection with the transformer shown in the drawing, this particular transformer being of the usual air blast type and having a horizontal magnetic core with a central winding leg 10 and two outer legs 11 and 12. The winding leg 10 is surrounded by two groups of spaced low voltage winding coils 13 and an interposed group of spaced high voltage winding coils 14. The core with the winding coils is mounted horizontally on a hollow base 15 and a hollow cap 16 is mounted on the core and encloses the upper portions of the coils 13 and 14 which project above the core. Air may be forced into the base 15 in any manner desired as by a suitable fan or blower. This air flows upwardly through the spaces between the coils 13 and 14 absorbing heat from these coils and from the winding leg 10 of the core, the heated air finally passing out and escaping through openings in the top of the cap 16.

Spacers 17 constructed and arranged in accordance with the invention surround the winding leg 10 in the spaces between certain of the coils 13 and 14. As shown in Fig. 2, the spacers 17 are provided only in the spaces between the high and low voltage groups of coils and at the outer end of each of the low voltage groups. Additional spacers of any suitable construction desired may be provided between the coils of each group and, for the sake of clearness in the drawing, are not shown.

Each spacer 17 has two sides or faces 18 and 19 formed of sheet insulating material such as pressboard, each having an opening for the winding leg 10 of the core. The sides 18 and 19 are spaced apart by spacing strips 20 of insulating material interposed between them at their inner and outer edges and at such other points as may be necessary to maintain the proper spacing against the pressure of the adjacent winding coils. These spacing strips 20 seal the space between the sides 18 and 19 except at the lower outer edge at one side of the core and at the upper inner edge just above or behind the winding leg 10 at the other side of the core. The sides 18 and 19 of the spacers 17 are cut away to provide small openings 21 between the interiors of the spacers 17 and the adjacent winding coils just above the winding leg 10. The hollow spacers 17 thus provide passages or ducts which will direct cooling currents of air from the base 15 at one side of the transformer core to the upper surface of the winding leg 10 and to the adjacent parts of the winding coils 13 and 14 at the other side of the transformer core. The inner edges of the winding coils 13 and 14 may be spaced slightly from the winding leg 10 as shown in Fig. 2 so that air

from the openings 21 in the spacers 17 may reach all the coils. It will be understood, of course, that only part of the air supplied to the base 15 will flow through the hollow spacers 17 and that a considerable part of it will flow up past the winding leg 10 and through all the spaces between the coils 13 and 14.

The capacity of a transformer is limited generally, not by its average maximum temperature, but by the highest temperature in any part of it. The invention provides an arrangement which effectively prevents excessive temperatures in parts of the transformer which would otherwise be shielded from the cooling medium by the winding leg of the core and which would therefore be more highly heated than other parts of the transformer, thus securing a more uniform heating of the entire transformer.

The invention has been explained by describing and illustrating a particular embodiment thereof but it will be apparent that various changes may be made without departing from the spirit and scope of the invention as covered by the appended claims.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. A shell type transformer having a three legged magnetic core, disc winding coils surrounding the central core leg, and a hollow insulating spacer between two of said coils, said spacer having an opening at one side of the core to receive a cooling medium and a second opening adjacent the inner edge of one of said coils at the other side of the core.

2. A shell type transformer having a three legged magnetic core, spaced disc winding coils surrounding the central core leg, and hollow insulating spacers surrounding said winding leg in the spaces between said coils, said spacers having openings at one side of the core to receive a cooling medium and openings adjacent the inner edges of said coils at the other side of the core.

In witness whereof, I have hereunto set my hand this 17th day of May, 1929.

LOCKE H. BURNHAM.