No. 776,001. PATENTED NOV. 29, 1904.

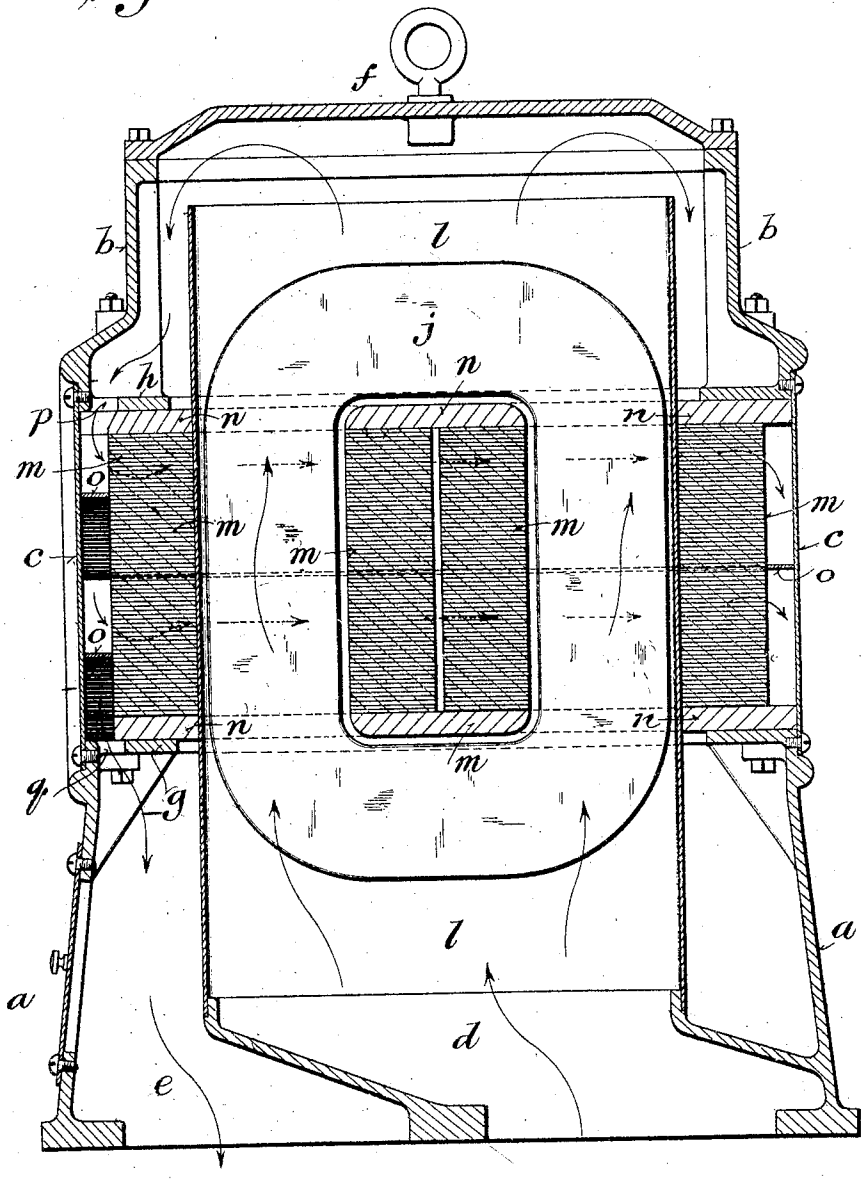
W. L. WATERS.

TRANSFORMER.

APPLICATION FILED AUG. 18, 1904.

NO MODEL. 2 SHEETS—SHEET 1.

Fig. 1.



Witnesses:

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Chas. L. Goss.

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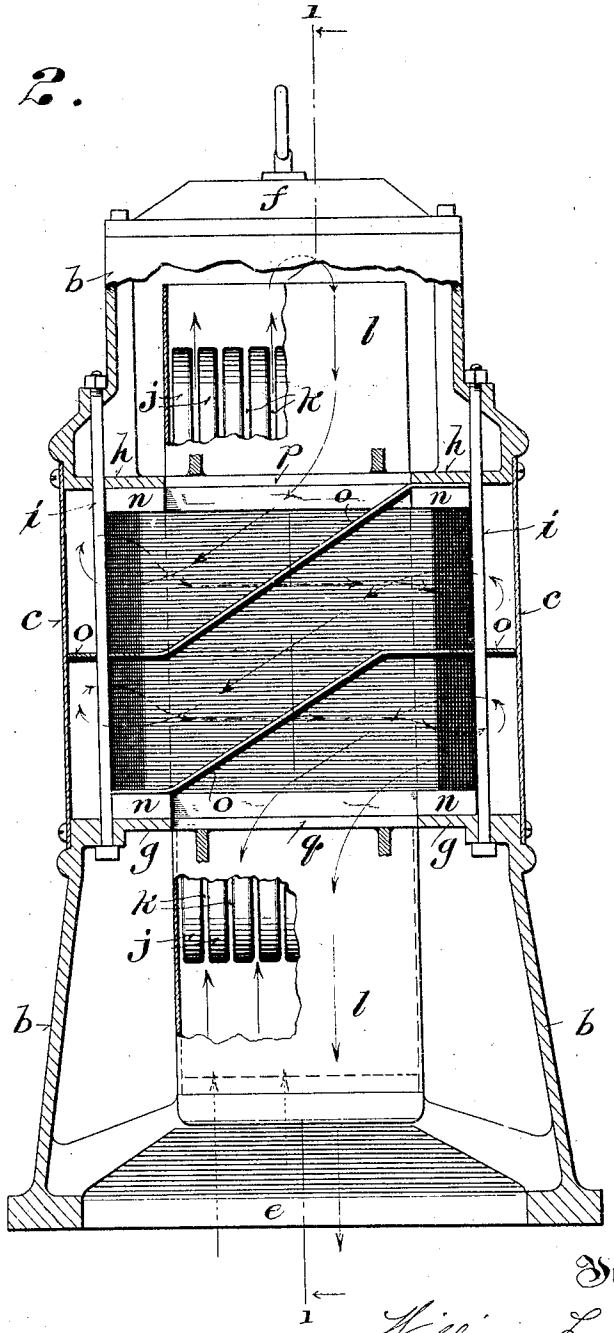
W. L. WATERS.

TRANSFORMER.

APPLICATION FILED AUG. 18, 1904.

NO MODEL. 2 SHEETS—SHEET 2.

Fig. 2.



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No. 776,001. Patented November 29, 1904.

UNITED STATES PATENT OFFICE.

WILLIAM L. WATERS, OF MILWAUKEE, WISCONSIN, ASSIGNOR TO NATIONAL ELECTRIC COMPANY, OF MILWAUKEE, WISCONSIN, A CORPORATION OF WISCONSIN.

TRANSFORMER.

SPECIFICATION forming part of Letters Patent No. 776,001, dated November 29, 1904.

Application filed August 18, 1904. Serial No. 221,167. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM L. WATERS, a subject of the King of Great Britain, residing at Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented certain new and useful Improvements in Transformers, of which the following is a specification, reference being had to the accompanying drawings, forming a part thereof.

This invention relates particularly to so-called "air-blast" transformers; and its main objects are to provide for the circulation of air between the coils and around the core, so as to carry off the heat produced by the passage of electric currents through the coils in the operation of the transformer and keep the temperature below a safe limit and generally to simplify and improve the construction and operation of transformers of this class.

It consists in certain novel features of construction and in the peculiar arrangement and combinations of parts hereinafter particularly described, and specified in the claims.

In the accompanying drawings like letters designate the same parts in both figures.

Figure 1 is a vertical longitudinal section on the line 1 1, Fig. 2, of a transformer embodying the invention; and Fig. 2 is a vertical cross-section of the same on the line 2 2, Fig. 1.

The frame or housing of the transformer is preferably constructed, substantially as shown, of a cast-iron base *a* and top *b* and an intermediate sheet-metal section *c*, attached to the base and top by screws or other means. The base *a* is formed with an air-inlet duct or opening *d* and with a separate outlet duct or opening *e*, preferably through the bottom, as shown in Fig. 1. The top *b* is provided with a removable cover *f*, bolted or otherwise secured thereto. The base and top are formed with corresponding inturned flanges *g* and *h* and are connected and bound together by tie-bolts *i*.

The coils *j j*, covered with suitable insulation, are arranged with vertical air spaces or passages *k* between them, as shown in Fig. 2. They are surrounded by an insulating-casing *l*, which projects above and below them and communicates at its lower end with the inlet duct or opening *d* and at its upper end with the interior of the recessed top *b*. The core *m*, which is preferably laminated and made in two parts or sections, as shown in Fig. 1, passing through and surrounding the coils and the casing *l*, is held between the flanges *g* and *h*, being insulated therefrom by pieces *n* of wood.

The space between the sheet-metal section *c* of the housing and the core *m* is formed by a partition *o*, winding around the core into a sinuous air-passage which communicates at its upper end through an opening *p* in the flange *h* with the space between the top *b* and the casing *l* and at its lower end through an opening *q* with the space between the base *a* and said casing.

The construction and arrangement above described forms a system of air-passages which provide for the thorough ventilation of the transformer, air being forced by a fan or blower (not shown) upwardly through the opening *d* in the base and through the passages *k* between and around the coils, thence downwardly in the space between the top *b* and the casing *l*, through the opening *p*, the sinuous passage around the core, the opening *q* into the base outside of said casing and out through the opening *e*. In this way the continuous flow of air first upwardly between the coils, thence downwardly one or more times around the core, takes up and conducts off the heat developed in the coils and core and keeps their temperature below a safe limit while the transformer is in operation.

Various changes in minor details of construction and arrangement of parts may be made without affecting the principle or departing from the spirit and intended scope of the invention.

I claim—

1. In a transformer the combination of coils arranged with vertical passages between them, a core surrounding said coils, a housing inclosing said coils and core and forming a winding passage around the core, and a casing having an air-inlet at the lower end and communicat-

ing at the top with the passage around the core, substantially as described.

2. In a transformer the combination of a housing having air inlet and outlet openings in its base, a core and coils within the housing, air-passages between the coils communicating with said intake-opening, and a winding air-passage around the core communicating at the upper end with the passages between the coils and at the lower end with said outlet-opening, substantially as described.

3. In a transformer the combination of coils arranged with air-passages between them, a core surrounding said coils, a housing inclosing said coils and core and having air inlet and outlet openings in the base, the inlet-opening communicating with the passages between the coils, and a partition winding around the core and forming with it and with the housing, a sinuous air-passage which communicates at its lower end with said outlet-opening and at its upper end with the passages between the coils, substantially as described.

4. In a transformer the combination of a housing composed of a recessed top, a base having air inlet and outlet ducts opening through the bottom and an intermediate section connecting the top and base, a casing communicating at its lower end with the inlet-duct in the base and opening at its upper end into the recessed top, coils arranged in said casing with vertical air-passages between them, a core surrounding said casing within said intermediate section, and a partition winding around said core and forming with it and with said intermediate section, a sinuous passage which communicates at one end with the top of the housing and at the other end with the outlet-duct in the base, substantially as described.

5. In a transformer the combination of a housing composed of a base and top having inturned flanges with openings through them and of an intermediate connecting section, the base having air inlet and outlet ducts, a casing communicating at its lower end with said inlet-duct and opening at its upper end into the top of the housing, coils arranged in said casing with vertical passages between them, a core surrounding said coils and casing between said inturned flanges, and a partition winding around the core and forming with it and with the intermediate section of the housing a sinuous passage which communicates through the opening in the upper flange with the top of the housing and through the opening in the lower flange with the outlet-duct in the base, substantially as described.

In witness whereof I hereto affix my signature in presence of two witnesses.

WILLIAM L. WATERS.

Witnesses:

JOSEPH F. KAMINSKY,

CHAS. L. GOSS.