

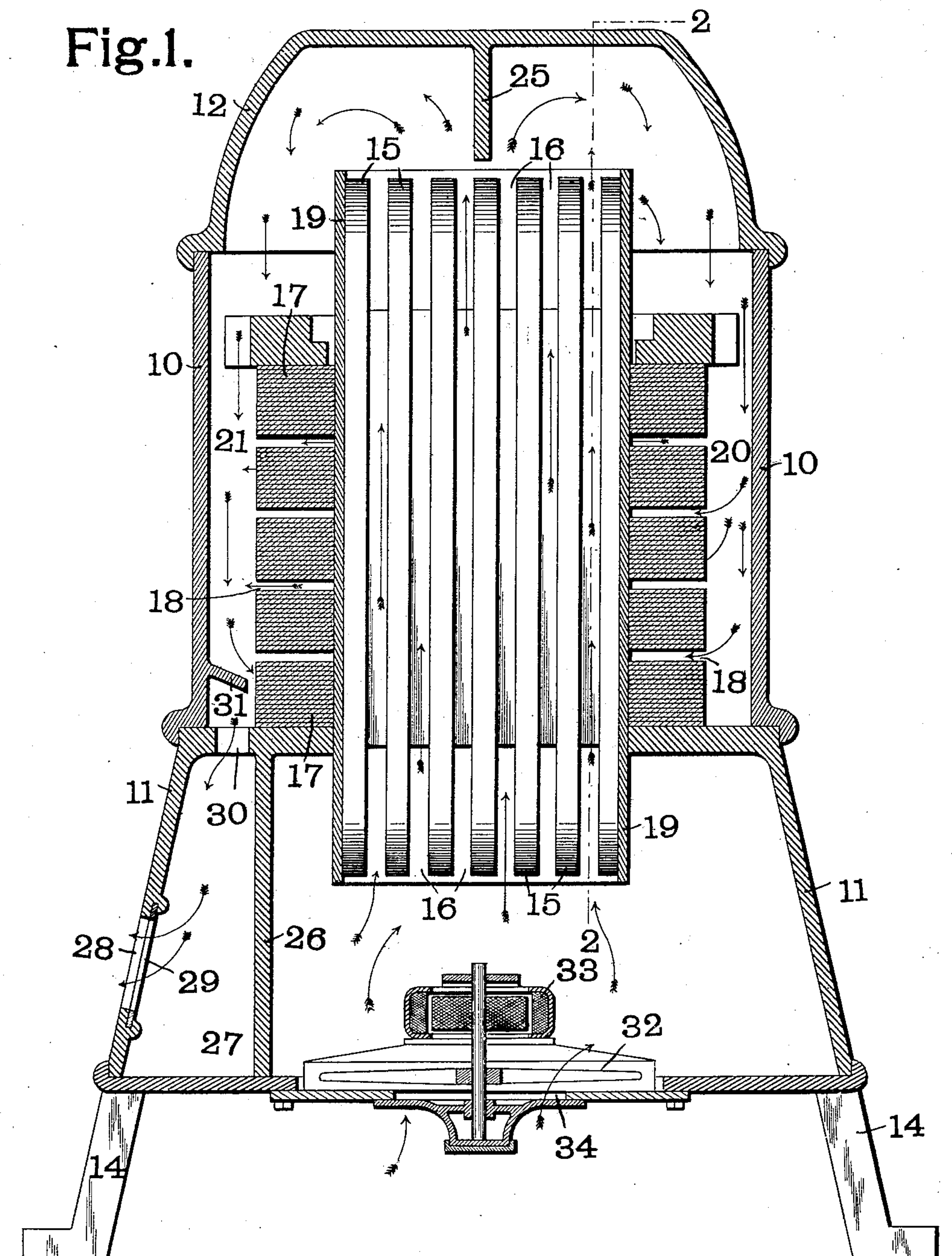
S. E. JOHANNESSEN.
TRANSFORMER.

(Application filed Oct. 30, 1902.)

(No Model.)

2 Sheets—Sheet I.

Fig. 1.



Witnesses

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By Attorneys

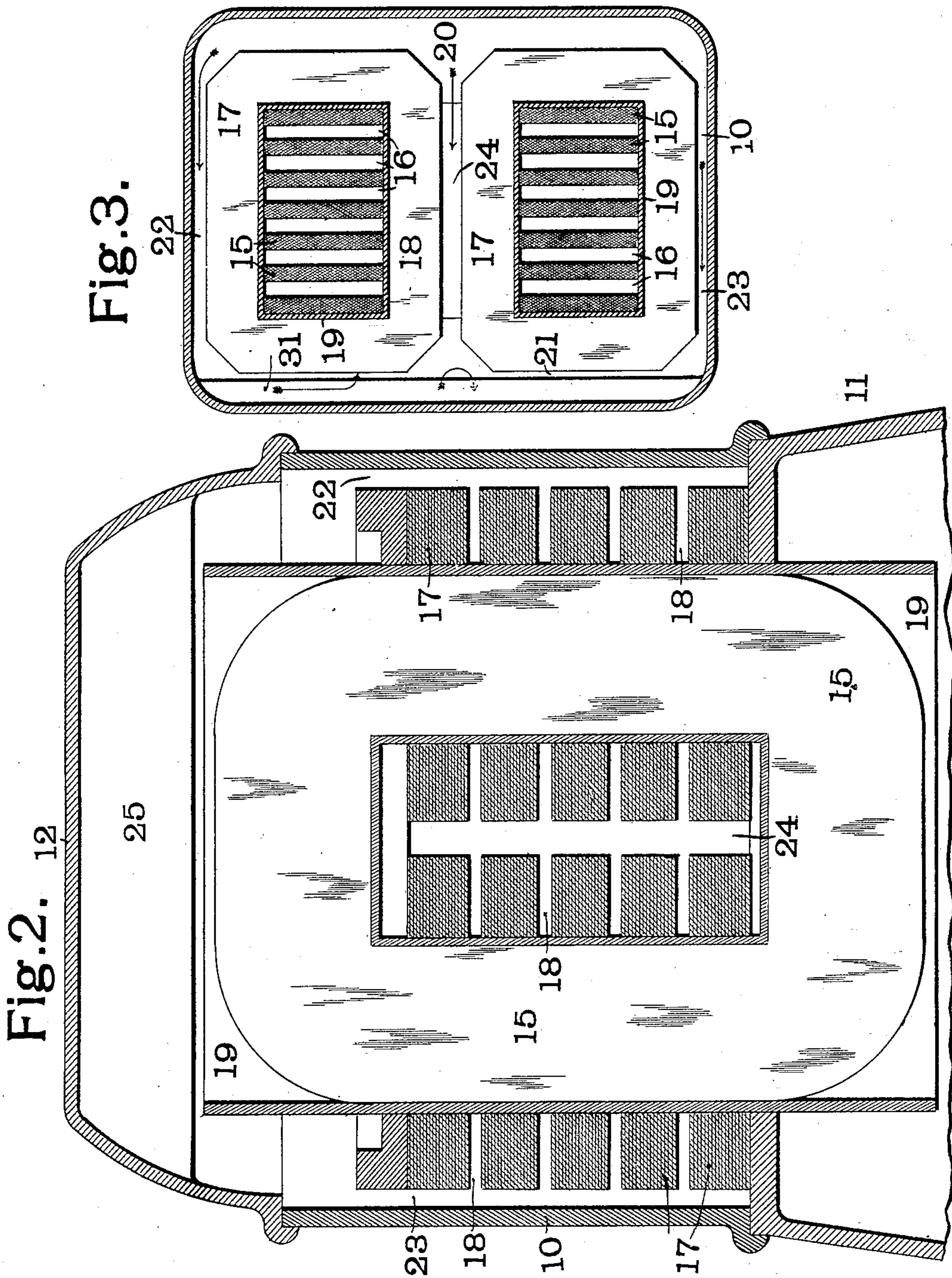
Fowler & Bryson

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2 Sheets—Sheet 2.



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UNITED STATES PATENT OFFICE.

SVEND E. JOHANNESSEN, OF EDGEWOOD PARK, PENNSYLVANIA, ASSIGNOR
TO WAGNER ELECTRIC MANUFACTURING COMPANY, OF ST. LOUIS, MISSOURI, A CORPORATION OF MISSOURI.

TRANSFORMER.

SPECIFICATION forming part of Letters Patent No. 717,006, dated December 30, 1902.

Application filed October 30, 1902. Serial No. 129,356. (No model.)

To all whom it may concern:

Be it known that I, SVEND E. JOHANNESSEN, a citizen of the United States, residing at Edgewood Park, Allegheny county, in the State of Pennsylvania, have invented a certain new and useful Transformer, of which the following is such a full, clear, and exact description as will enable any one skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, forming part of this specification.

My invention relates more particularly to an arrangement of the coils, core, and housing of a transformer to permit the ready circulation therethrough of a suitable cooling medium, such as air, under pressure for the purpose of conveying away the heat generated in the transformer by the passage of electric currents through the coils thereof.

In the accompanying drawings, in which like characters of reference refer to similar parts in the different views, Figure 1 is a vertical cross-section of a transformer embodying one form of my invention. Fig. 2 is a vertical section on the line 2 2 of Fig. 1, the lower part of the housing being broken away; and Fig. 3 is a horizontal section through the coils, core, and housing of the transformer shown in Figs. 1 and 2.

The housing of the transformer is composed of three parts—the body part 10, the base 11, and an imperforate cap 12. The base 11 may be supported by feet 14, as shown in Fig. 1. Within the body 10 of the housing are high-tension and low-tension coils 15, arranged some distance apart, so as to leave vertical air-passages 16 between them. Surrounding the coils 15 is a laminated iron core 17, which may be provided with a number of horizontal air-passages 18 by separating the laminæ into groups suitably spaced apart. Surrounding the coils 15 and separating them from the core 17 is an open-ended casing 19, which may be of insulating material. The core 17 is arranged in the housing so as to leave air-passages 20, 21, 22, and 23 between each of the sides of the core and the corresponding side of the body portion 10 of the housing. An air-passage 24 also extends be-

tween the limbs of the core and connects the air-passages 20 and 21. The cap 12 is provided with a partition 25, which depends therefrom and divides the air-currents, as hereinafter described.

The base 11 is divided by a partition 26 to form therein a small chamber 27, having an opening 28, in which is situated a shutter 29. An opening 30 in the top of the base connects the chamber 27 with the air-passage 21.

31 is an air-deflector, which projects from the side of the body portion 10 of the housing into the air-passage 21.

A blower 32, adapted to be operated by an electric motor 33, is suitably supported in an opening 34 in the bottom of the base 11.

In the operation of this apparatus the air is supplied at a substantially constant pressure by means of the blower 32 to the lower end of the coils of the transformer. It passes upwardly through the air-passages 16 between the coils and strikes the imperforate cap 12. Here the air is divided into two downward or return currents by the partition 25. One of these currents passes downward around the core through the passage 21, past the deflector 31, through the opening 30, and thence out through the opening 28. Owing to the choking of this passage 21 by the deflector 31, a large portion of the air will be diverted to form a second return-current, which passes down through the air-passage 21 and then passes partly through the openings 18 and 24 in the core and partly around the core, through the passages 22 and 23, and finally into the chamber 27 through the opening 30, and out through the opening 28. By means of the shutter 29 the amount of air passing through the transformer may be regulated as desired.

Having fully described my invention, what I claim as new, and desire to secure by Letters Patent of the United States, is—

1. In a transformer, a housing, a core and coils within said housing, air-passages between said coils, means for dividing the air passing between said coils into a plurality of return-currents, and an air passage or passages along said core for said return-currents.

2. In a transformer, a housing, a core and

coils within said housing, air-passages between said coils, means for dividing the air passing between said coils into a plurality of return-currents, an air passage or passages
5 along said core for said return-currents, and a common outlet for said currents.

3. In a transformer, a housing, a core and coils within said housing, air-passages between said coils, means for dividing the air
10 passing between said coils into a plurality of return-currents, an air passage or passages along said core for said return-current, air-passages around said core, and a common outlet for said currents.

4. In a transformer, a housing, a core and coils within said housing, air-passages between said coils, a partition in the upper part of said housing for dividing the air passing
15 between said coils into two return-currents, an air passage or passages along said core for said return-currents, and a common outlet for said currents.

5. In a transformer, a housing, a core and coils within said housing, air-passages between said coils, a partition in the upper part of said housing dividing the air passing between said coils into two return-currents, an
25 air passage or passages along said core for said return-currents, air-passages around said core for one of said currents, and a common outlet for both of said currents.

6. In a transformer, a housing, a core and coils within said housing, air-passages between said coils, means for dividing the air
35 passing through said coils into two return-currents, an air-passage around said core for one of said return-currents, an outlet for said currents, and an air-passage along said core for conducting the other of said currents to
40 said outlet, said latter air-passage being contracted adjacent to said outlet.

7. In a transformer, a housing, a core and coils within said housing, air-passages between said coils, means for dividing the air
45 passing through said coils into two return-currents, a second air-passage along said core

for one of said return-currents, a partial obstruction in said second air-passage, and an air-passage through said core for the other of
50 said return-currents.

8. In a transformer, the combination with primary and secondary windings, of passages extending between the windings for the circulation of a cooling medium, a core, an open-ended casing surrounding said windings and
55 separating them from said core, a second set of passages extending through said core, and means for conducting said cooling medium from said passages between said coils to said passages through said core.

9. In a transformer, the combination with primary and secondary windings, of passages extending between the windings for the circulation of a cooling medium, a core, an open-ended insulating-casing surrounding said
65 windings and separating them from said core, a second set of passages extending through said core, and means for conducting said cooling medium from said passages between said coils to said passages through said core.

10. In a transformer, a housing, a core and coils within said housing, air-passages between said coils, means for dividing the air passing between said coils into a plurality of
75 return-currents, an air passage or passages along said core, air-passages through said core, and a common outlet for said currents.

11. In a transformer, a housing, a core and coils within said housing, air-passages between said coils, means for dividing the air
80 passing between said coils into a plurality of return-currents, an air passage or passages along said core, air-passages around said core, air-passages through said core, and a common outlet for said currents.

In testimony whereof I have hereunto set my hand and affixed my seal in the presence of the two subscribing witnesses.

SVEND E. JOHANNESSEN. [L. S.]

Witnesses:

J. A. STRICKLER,

JOHN L. HOFFMAN.