H. GEISENHÖNER.

DYNAMO ELECTRIC MACHINE.

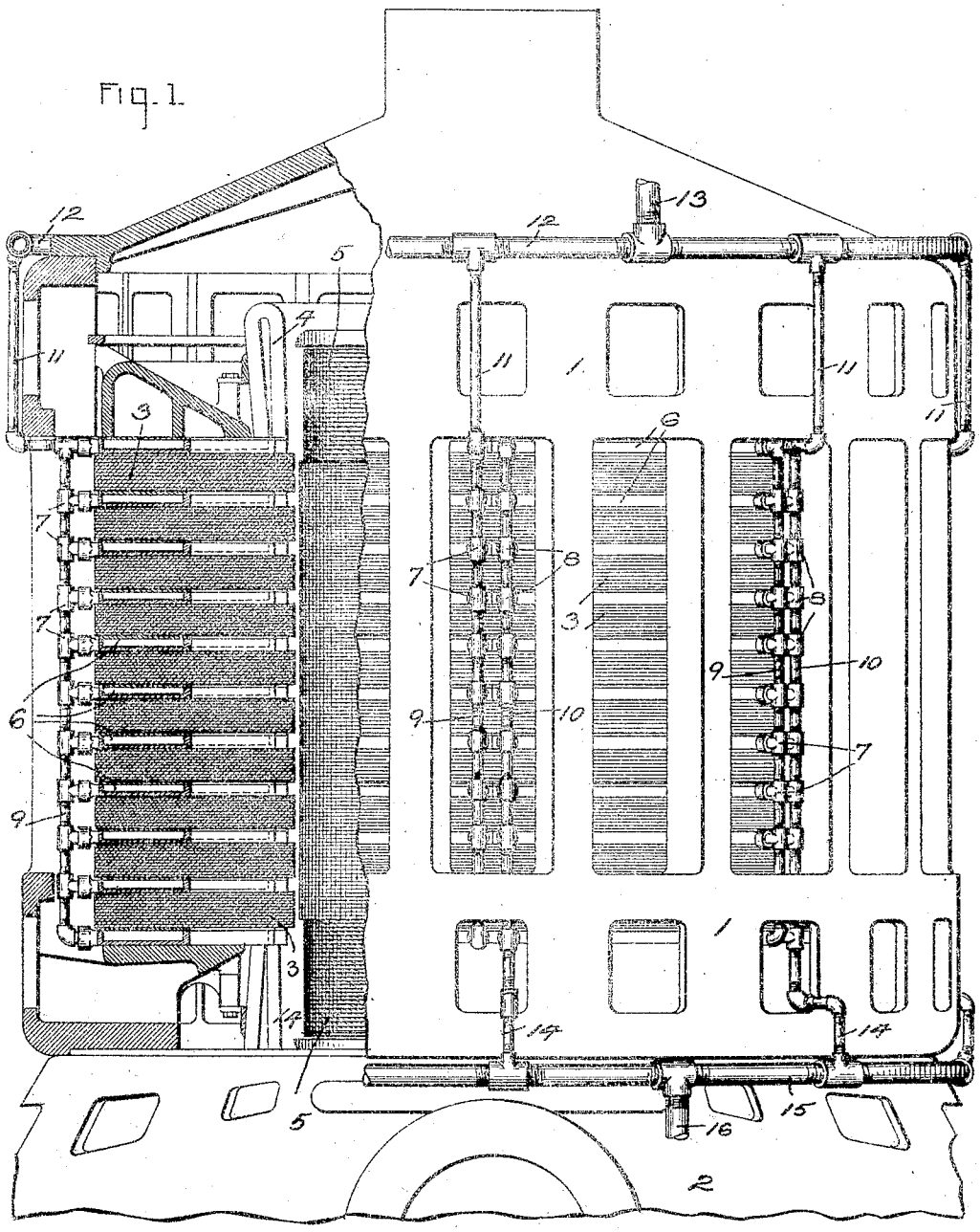
APPLICATION FILED NOV. 11, 1907.

1,016,005.

Patented Jan. 30, 1912.

2 SHEETS—SHEET 1.

Fig. 1.



WITNESSES

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2 SHEETS—SHEET 2.

Fig. 2

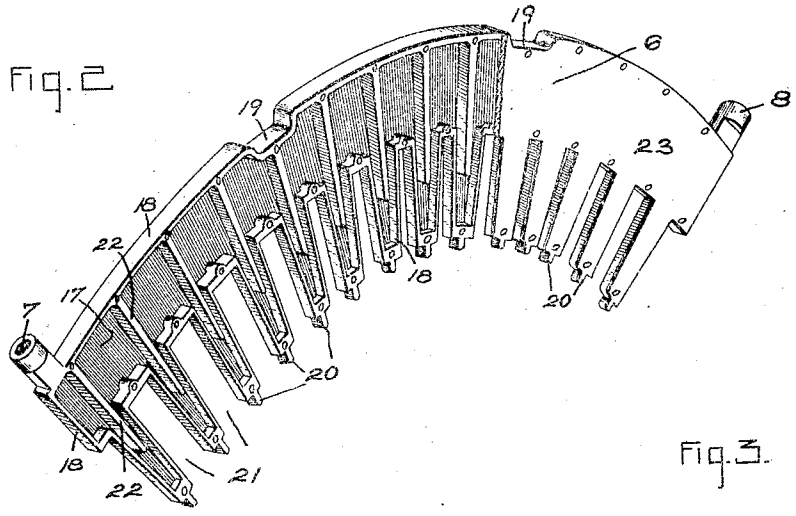
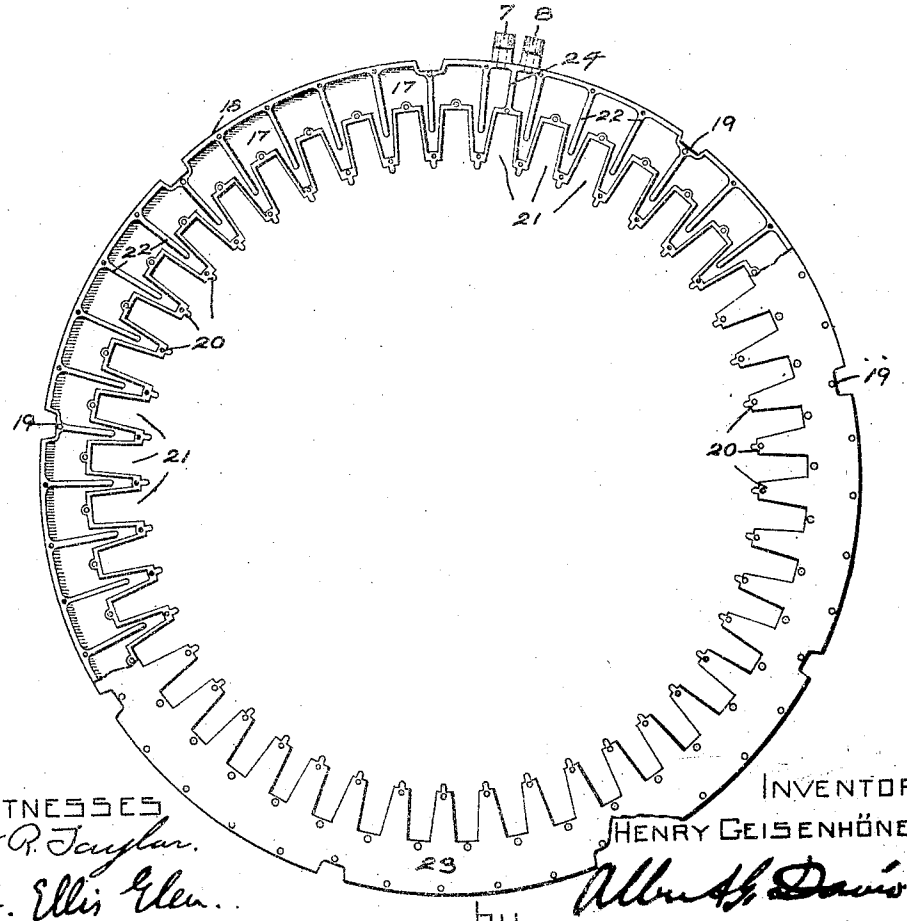


Fig. 3.



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UNITED STATES PATENT OFFICE.

HENRY GEISENHÖNER, OF SCHENECTADY, NEW YORK, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

DYNAMO-ELECTRIC MACHINE.

1,016,005. Specification of Letters Patent. Patented Jan. 30, 1912.

Application filed November 11, 1907. Serial No. 401.546.

To all whom it may concern:

Be it known that I, HENRY GEISENHÖNER, a citizen of the United States, residing at Schenectady, county of Schenectady, State of New York, have invented certain new and useful Improvements in Dynamo-Electric Machines, of which the following is a specification.

My invention relates to dynamo-electric machines and particularly to a combined space block and cooling means therefor and has for its object, the dissipation of the heat generated in the stationary members of dynamo-electric machines, due to the iron and copper losses therein.

The laminations of electrical machines are heated by eddy currents and hysteresis directly and by some of the heat generated in the windings by conduction. The usual manner of carrying away this heat is by separating the laminations into bundles and inserting space blocks. Air may be forced under pressure through the ducts formed by the space blocks or the rotating element alone may be relied upon to set up a draft for cooling the laminations. However, in large machines, it is very difficult to get an air circulation sufficient to keep the temperature of the iron within a safe upper limit to prevent rapid aging. To this end I so inclose the ducts that a cooling fluid, such as water, may be forced through them, whereby the laminations will be cooled and thus most of the heat generated in the machine will be carried off directly by conduction.

The various forms of novelty which characterize my invention are pointed out with particularity in the claims annexed to and forming a part of this specification. For a better understanding of my invention, however, reference may be had to the following description taken in connection with the accompanying drawing, in which—

Figure 1 is a view of a vertical turbo-generator provided with my invention, with parts broken away and in section showing the interior construction; Fig. 2 is a perspective view of an inclosed sectional space block with parts of the cover removed, through which a cooling fluid may be forced, and Fig. 3 is a view of an inclosed space block which, however, is made whole instead of in sections as in Fig. 2.

The alternating current generator in connection with which I have chosen to illustrate my invention has the frame 1, which is supported by the base 2. The laminations 3 are held in position in the usual manner, and the distributed winding 4 is embedded in slots in the laminations. The revolving field 5 is shown as a smooth core rotor. These parts may take any usual or preferred forms as my invention does not depend upon these parts. The bundles of laminations are separated by the sectional space block 6, as illustrated in Fig. 2. I have preferred to show eight sections to each space block. Each of these sections has a water inlet opening 7 at one end thereof and an outlet opening 8 at the other end thereof. The inlet openings are vertically above one another as are the outlet openings. An inlet pipe 9 connects to all of the inlet openings 7 which are in a vertical line, and an outlet pipe 10 connects to the similar outlet openings 8. All of the inlet pipes are connected by other pieces of pipe 11 to an inlet header 12, which has a main inlet pipe 13 connected to it. This main inlet pipe connects with a source of cooling fluid under pressure which may be exerted by a pump or other means. Similarly, the outlet pipes 10 are connected by means of the pipes 14 to the outlet header 15, which has a main outlet pipe 16 connected to it. Referring to Figs. 2 and 3, it will be seen that these space blocks have a back 17 with a raised edge 18. The outer edge is substantially circular, following the form of the outer periphery of the laminations. The indentations 19 are made to avoid the keys upon which the laminations are assembled. The inner edge of the space blocks may have any desired shape and I have shown long projecting portions 20 which fit between the teeth of the laminæ. The indentations 21 need only be deep enough to allow the winding to be put in place and thus the space-blocks have substantially the configuration of the laminæ. Baffle plates 22 may be used to cause the cooling liquid to flow into the projecting portions 20. To effect a still slower circulation more baffle plates may be employed. A cover 23 may be riveted on or fastened in place in any other manner, so as to form a closed chamber except for the inlet and outlet openings 7 and 8.

Where the machine is of a small diameter a space-block, made as a whole, without

sections, may be used as shown in Fig. 3. In such a space block there is a partition 24 which closes the inlet passage from the outlet passage so that the cooling fluid must circulate completely about the space block. The number of sections into which the space blocks would be divided would naturally depend on the diameter of the machine on which they are to be used. However, the greater the number of sections the more directly the cold fluid will be carried to all parts of the laminations.

The operation of my cooling system is as follows: The cooling fluid is forced into the pipe 13 and thence into the inlet header 12, flowing around the header into the pipes 11 and thence into the pipes 9, whence it enters the space blocks practically at the same time through the inlet openings 7, circulating about the baffle plates 22 gradually becoming warmer due to the heat which it carries away from the iron, and finally coming out of the outlet openings into the outlet pipes 10, thence into the pipes 14 which conduct it into the outlet header 15, whence it finds its way into the main outlet pipe 16 to be disposed of in any suitable way.

For convenience in describing my construction, I have considered the flow of the cooling fluid in a certain direction, but it is evident that it may flow in either direction, or that both headers may be suitably placed, as for instance, either at the top or bottom of a turbo-generator such as I have described.

Valves may be inserted in the piping wherever necessary. Different arrangements of the piping may also be made, but my preferred arrangement has the advantage of conducting the cold fluid directly to all of the inlet openings practically simultaneously. A further modification may be made by omitting the cover plates 23 of the space blocks, the adjacent laminæ acting as cover plates. These space blocks may be either cast or made of sheet metal.

I have illustrated my invention in the best form now known to me, and I aim in the appended claims to cover all modifications falling within the spirit and scope of my invention.

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

1. Means for cooling a dynamo-electric machine, comprising a stationary core-member built up of bundles of laminations, said bundles of laminations being separated by transverse inclosed ducts, a partition dividing said ducts, said ducts having openings on both sides of said partition, and pipes for conducting a cooling liquid to certain of said openings and away from other of said openings.

2. In a dynamo-electric machine, a stationary core member having laminations, space blocks made in sections and separating said laminations into bundles, each of the sections of the space blocks comprising a back, a raised edge completely about said back having inlet and outlet openings and a cover plate fastened to said edge so as to make the section water tight, said inlet opening being at one end of and said outlet opening at the other end of the section.

3. In a dynamo-electric machine, a stationary core member having laminations, space blocks made in sections and separating said laminations into bundles, each of the sections of the space blocks comprising a back, a raised edge completely about said back and having inlet and outlet openings and a cover plate fastened to said edge so as to make the sections water tight, said inlet opening being at one end of and said outlet opening at the other end of the section, said space blocks having a configuration conforming substantially to that of the laminations.

In witness whereof, I have hereunto set my hand this seventh day of November, 1907.

HENRY GEISENHÖNER.

Witnesses:
HELEN ORFORD,
MARGARET E. WOOLLEY.