No. 877,017. PATENTED JAN. 21, 1908.

L. TORDA.

DYNAMO ELECTRIC MACHINE WITH COMPENSATING WINDINGS.

APPLICATION FILED MAR. 8, 1907.

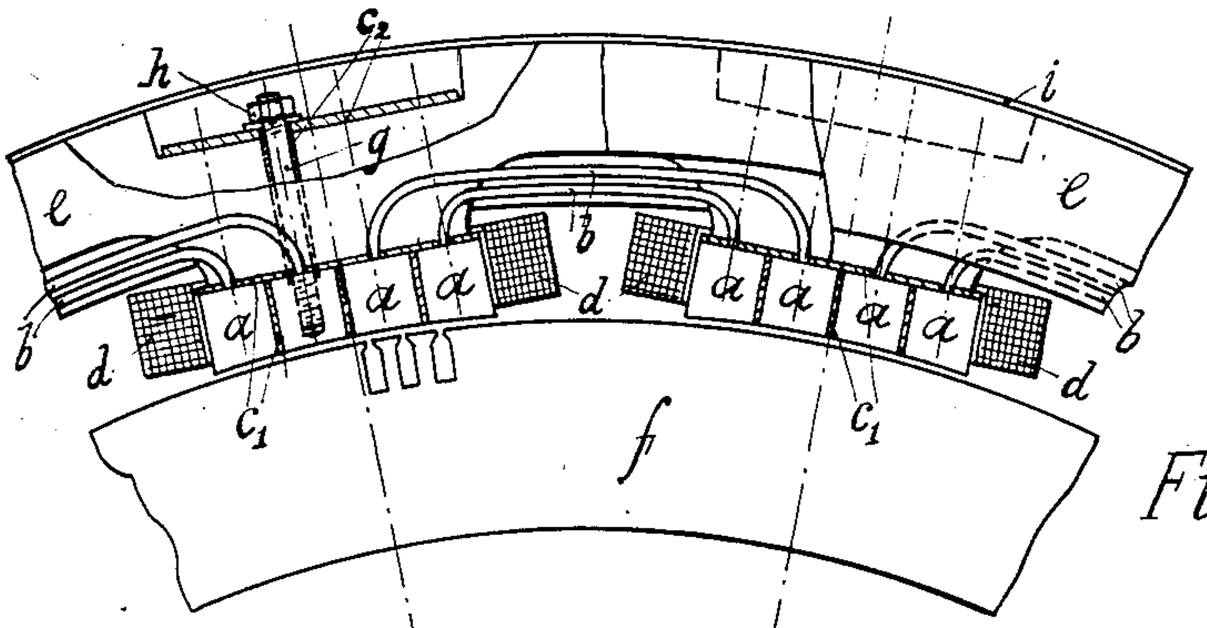

Fig. 1.

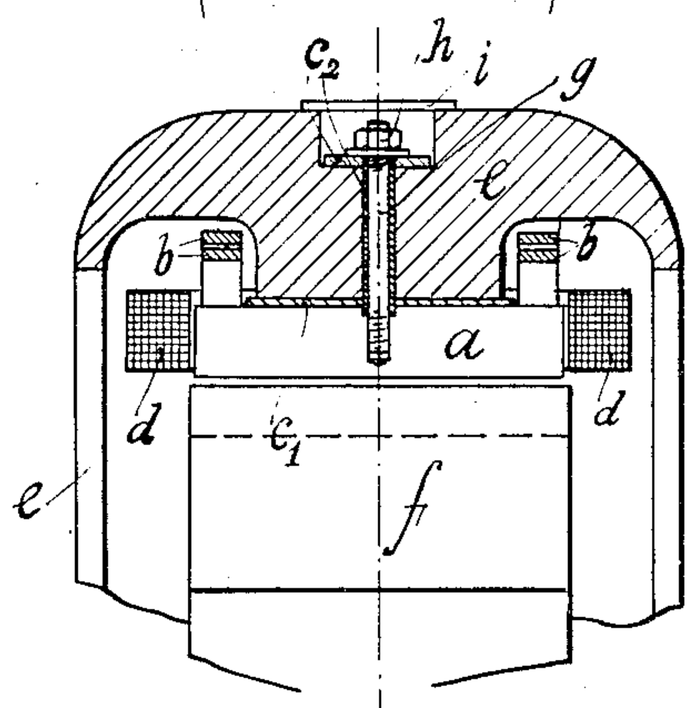

Fig. 2.

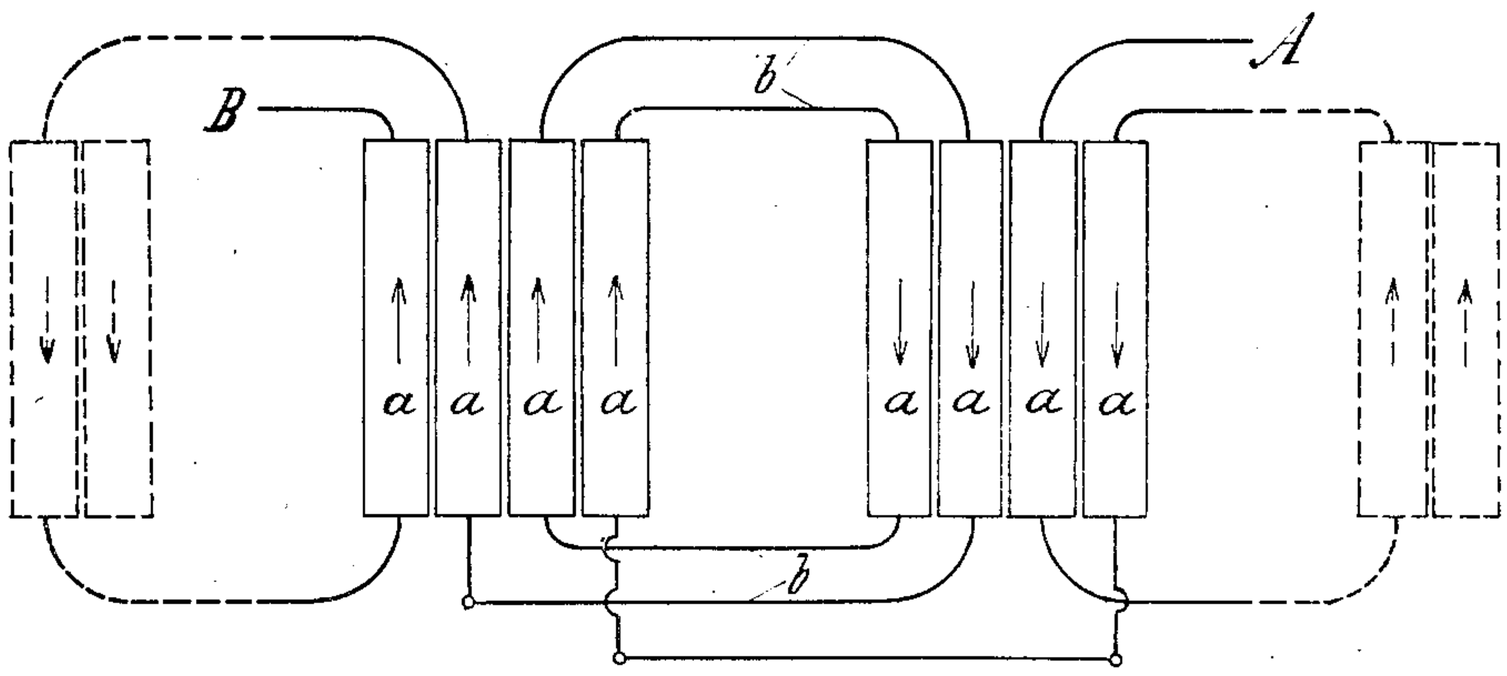

Fig. 3.

WITNESSES

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DYNAMO-ELECTRIC MACHINE WITH COMPENSATING WINDINGS.

No. 877,017. Specification of Letters Patent. Patented Jan. 21, 1908.

Application filed March 8, 1907. Serial No. 361,315.

To all whom it may concern:

Be it known that I, LUDWIG TORDA, a subject of the Emperor of Austria-Hungary, and residing at Chiswick, in the county of Middlesex, England, have invented certain new and useful Improvements in Dynamo-Electric Machines with Compensating Windings, of which the following is a specification, such as will enable those skilled in the art to which it appertains to make and use the same.

This invention relates to dynamo electric machines, and especially to continuous current machines, of the compensated type.

A continuous current compensated machine is characterized by a winding placed on the field magnet system, around and close to the armature, and is adapted to neutralize more or less the field distorting effect of the armature and at the same time assisting to obtain a good commutation. Compensated machines hitherto constructed have in their best forms a field magnet system, which is built up of laminated iron pressed together and supported by a cast iron frame. The lamination on its periphery is provided with slots in which the compensating winding is embedded in a similar way to the winding of a slotted armature. This method of construction of the compensated machines is somewhat expensive and the object of my invention is to simplify and cheapen their construction. To attain this purpose I employ iron masses or masses of other paramagnetic material as a part of the compensating winding (which in this case may more appropriately be called by the general term: "compensating device"), which part of the compensating device serves at the same time to carry the main magnetic lines, or in other words, the iron or the like is also a part of the main magnetic circuit, and I suitably connect the iron or other masses by a good conducting material to obtain the compensating effect.

The invention is fully disclosed in the following specification, of which the accompanying drawing forms a part, in which the separate parts of my improvements are designated by suitable reference characters in each of the views, and in which:

Figure 1 is an end elevation of a portion of a multipolar dynamo, showing the essential part of the magnetic circuit, and of the compensating device. Fig. 2 is a sectional side view of the same. Fig. 3 represents diagrammatically and developed in a plan a portion of the compensating device.

In the above figures *a* represents iron bars which are connected together by strips *b* of copper or aluminium or the like in a suitable way, as shown in Fig. 3, to obtain a compensating effect. The bars *a* are insulated from each other and from the yoke *e* by sheets of insulating material c_1. These bars are fixed to the yoke by bolts *g* tapped into the bars and nuts *h*, which on their part are also insulated from the yoke by tubes and sheets of insulating material c_2. The nuts *h* are shown arranged in recesses provided in the yoke and which recesses are covered by sheets *i* of metal or other suitable material.

d designates the field coils which are to be kept in position in the usual way; *f* indicates the armature, of which no details are shown, as same is of the usual and well known construction.

The arrows in Fig. 3 indicate the direction of flow of the electric current in the bars *a*, assuming that the current is flowing from A to B.

The construction and arrangement of the compensating device and of the field magnet system shown and described is only one of many different ways in which the invention may be carried into practical effect, and various modifications may be made without departing from the spirit of the invention or sacrificing its advantages.

The main field winding is placed in any suitable way on the frame. If preferred, in addition to the compensating device so called auxiliary or commutating magnets can be used.

It will be readily understood that this invention is applicable to two pole as well as to multipolar machines.

The advantages obtained by my invention are as follows:—1. Reduction in copper of the compensating winding. 2. Discarding of a slotted field magnet system. 3. The magnet frame can be built of cheap solid iron serving as active material, in place of laminated iron, which is expensive and must be supported by a cast iron frame, which does not serve as an active material. 4. Reduction in cost of labor as the manufacture is simplified. 5. Uniform distribution of the compensating ampere conductors along the pole arc.

The so called inter-pole machines, *i. e.*

machines fitted with auxiliary or commutating magnets can also be considered as compensated machines, as in the same the auxiliary winding, though not adapted to neutralize the field distortion, is essentially a compensating winding concentrated in the neutral zone between every two adjacent main poles, in order to improve commutation. As compared with inter-pole machines, my invention offers the following advantages:— 1. Reduction in copper for the main field winding. 2. Reduction of the radial dimensions of the machines as the polar projections become much shorter. 3. Reduction in iron for the magnet frame. 4. Increase of the overall efficiency of the machines, as the constant losses, viz: the excitation and the iron losses are reduced. 5. Sparkless commutation obtainable within much wider limits.

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

1. In a dynamo electric machine of the compensated type, a compensating device, in which the compensating elements serve to carry the compensating current and also the main magnetic lines.

2. In dynamo electric machines, a compensating device for neutralizing the field distorting effect of the armature and assisting the commutation, consisting of bars of iron or other paramagnetic material forming part of the main magnetic circuit, and conductors so connecting the bars that the desired compensating effect is obtained.

3. In a dynamo-electric machine a plurality of polar projections constructed wholly or partly of magnetic material electrically insulated from each other, and from the frame, and copper or other good conductors connecting the said bars suitably to obtain a compensating effect.

4. In a dynamo-electric machine a plurality of polar projections, constructed wholly or partly of magnetic material, a plurality of bolts and nuts to fix the said bars to the frame, the said bolts and nuts being suitably insulated from the frame.

5. In a dynamo-electric machine a plurality of polar projections, constructed wholly or partly of magnetic material, a plurality of bolts and nuts for fixing the said bars to the frame, said nuts being arranged in a plurality of recesses in the yoke, and sheets of metal or other material to cover the said recesses.

6. In a dynamo-electric machine the combination with a magnet frame and armature of polar projections partly or wholly of paramagnetic bars, bolts and nuts to fix said bars to the frame, recesses for said nuts and sheets of metal or other material to cover the said recesses.

In testimony that I claim the foregoing as my invention I have signed my name in presence of the subscribing witnesses this 25th day of February, 1907.

LUDWIG TORDA.

Witnesses:
H. D. JAMESON,
F. L. RAND.