

No. 831,442.

PATENTED SEPT. 18, 1906.

C. A. KELSEY.
INDUCTOR ALTERNATOR.
APPLICATION FILED JULY 6, 1905.

2 SHEETS—SHEET 1.

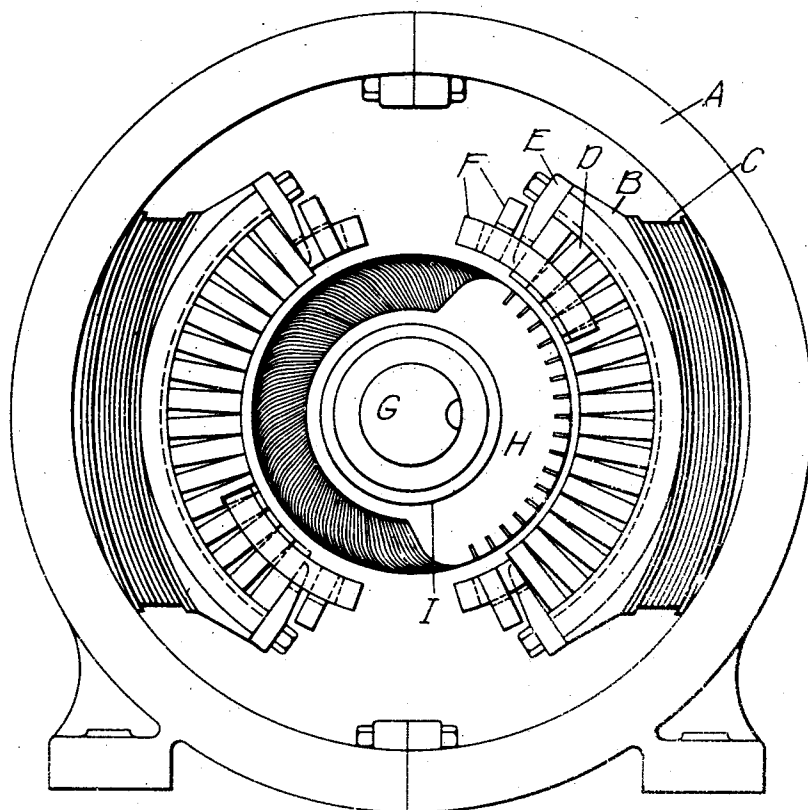


Fig. 1

Witnesses

Murray B. Badgley
Allen Oxford

Inventor

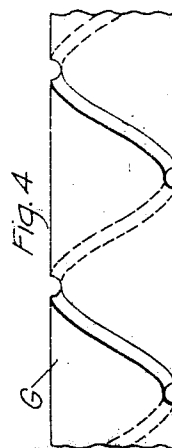
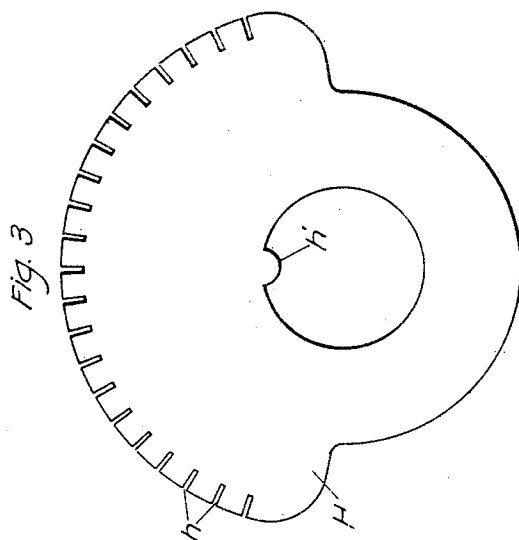
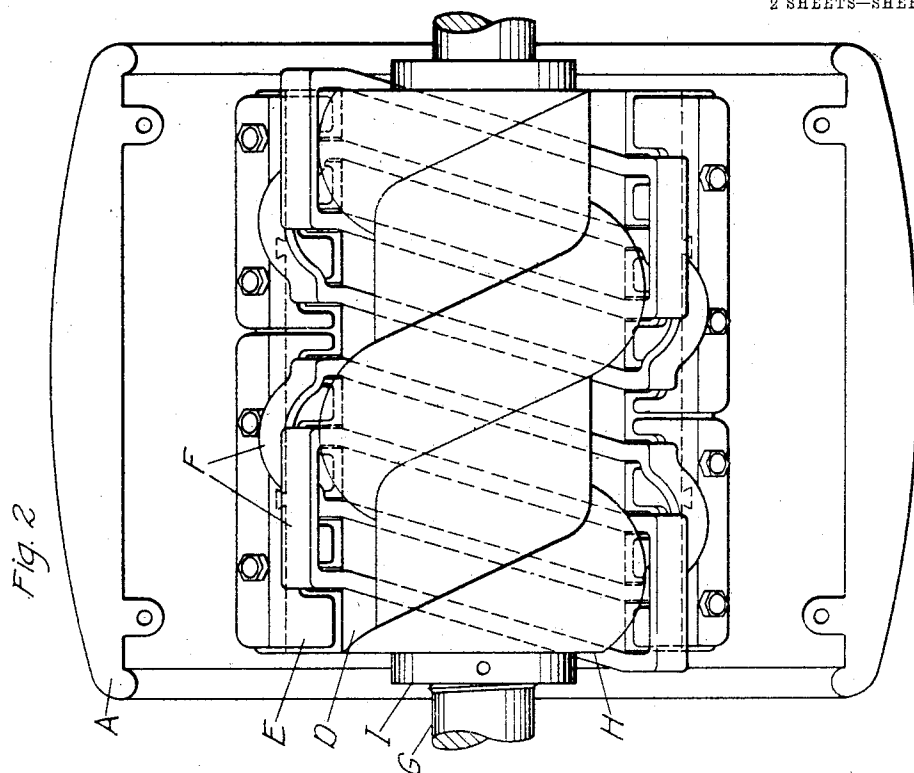
Charles A. Kelsey
By *Albert S. Davis*
Att'y

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2 SHEETS—SHEET 2.



Witnesses:

Monroe D. Badgley
Hylen Oxford

Inventor:
Charles A. Kelsey
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Att'y.

UNITED STATES PATENT OFFICE.

CHARLES A. KELSEY, OF PITTSFIELD, MASSACHUSETTS, ASSIGNOR TO
STANLEY G. I. ELECTRIC MANUFACTURING COMPANY, A CORPORATION OF NEW JERSEY.

INDUCTOR-ALTERNATOR.

No. 831,442.

Specification of Letters Patent.

Patented Sept. 18, 1906.

Application filed July 6, 1905. Serial No. 268,316.

To all whom it may concern:

Be it known that I, CHARLES A. KELSEY, a citizen of the United States, residing at Pittsfield, county of Berkshire, State of Massachusetts, have invented certain new and useful Improvements in Inductor-Alternators, of which the following is a specification.

My invention relates to alternating-current generators of the inductor type, and is particularly applicable to high-speed inductor-alternators for comparatively low frequency.

Inductor-alternators are in many respects particularly adapted for use with prime movers operating at a very high speed, such as steam-turbines, since no sliding contact and no moving wire whatever is required, and consequently the structure of the rotating inductor may readily be designed for great mechanical strength adapted to resist high centrifugal strain. As inductor-alternators have been constructed heretofore it has been necessary to employ at least two poles on the inductor in order to secure a mechanical balance, and as inductor-alternators are ordinarily arranged one revolution of the inductor produces as many complete cycles as there are poles—that is, a two-pole inductor produces two complete cycles per revolution. Thus an alternator designed for twenty-five cycles would have a speed of seven hundred and fifty revolutions per minute, which, particularly with small machines, is too low for most efficient operation of a steam-turbine, while for still lower frequencies a still more inefficient speed is required.

The object of my invention is to provide a novel form of inductor-alternator adapted to give only one cycle for each complete revolution, and thereby to double the speed at which the generator may be operated for any desired frequency.

My invention broadly consists in arranging the inductor with a single helical polar projection. Since only one polar projection is employed, the machine gives only one cycle for each revolution, and since the projection is arranged in a helix the inductor may be mechanically balanced.

My invention further comprises a number of structural features, which will be best understood by reference to the accompanying drawings, in which—

Figure 1 shows an end elevation of an inductor-alternator arranged in accordance with my invention. Fig. 2 shows a side elevation with one-half of the stationary frame removed. Fig. 3 shows a detail of one of the inductor punchings or laminations, and Fig. 4 shows a detail of the inductor-shaft.

In the drawings, A represents the frame of the machine, which is provided with two projecting poles B, like an ordinary bipolar field structure. On the poles B are mounted the field-coils C, which furnish the magnetization for the machine. On the faces of the poles B are supported laminated cores D, which are held in place by suitable clamping-plates E. The laminated cores D are arranged with helical slots, as is clearly shown in Fig. 2, and in these slots are placed the armature-coils F. In this figure the armature-coils are arranged to produce a two-phase current, each phase comprising two coils and the coils of the two phases being displaced from each other ninety electrical degrees. Counting from left to right in Fig. 2, coils 1 and 3 are at the point of maximum induced voltage, since one side of these coils is directly opposite the center of the polar projection on the inductor. Coils 2 and 4 are at the point of zero-induced voltage, since the polar projection is directly opposite the centers of these coils.

G represents the inductor-shaft, which is mounted in suitable bearings (not shown) between the field-poles. Surrounding the shaft and supported thereby are a number of punchings or laminations H, arranged in planes perpendicular to the axis of the shaft. These laminations are shaped, as shown in Fig. 3, like rings or disks of unequal depth on opposite sides. Each lamination thus has one part projecting beyond the rest of the punching, and the several punchings are so arranged on the inductor-shaft that each is displaced circumferentially a small amount from the next one. In this manner a laminated mass is produced having a single helical polar projection. As shown in Fig. 2, this polar projection makes two complete turns around the inductor.

In order to secure the helical arrangement of the punchings, the shaft G may be provided with a spiral groove, as shown in Fig. 4, and the punchings provided with similarly

positioned tongues h' , as shown in Fig. 3, adapted to engage the helical groove in the shaft. The punchings are held in place on the shaft by suitable clamping-rings I at each end.

Since the relative movement of the helical inductor-pole and of the armature-slots is neither circumferential nor axial, but in a direction midway between these two, it may be desirable to laminate the periphery of the inductor-punchings axially. This may be done in a simple manner by slotting the periphery of the projection of each punching, as shown at h in Fig. 3.

The machine as above described evidently gives one cycle per revolution, so that by my invention it is possible to operate an inductor-alternator for twenty-five cycles at fifteen hundred revolutions per minute or for sixty cycles at thirty-six hundred revolutions.

I do not desire to limit myself to the particular construction and arrangement of parts here shown, but aim in the appended claims to cover all modifications which are within the scope of my invention.

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

1. In a dynamo-electric machine, a revolving inductor having a helical polar projection, a field-winding adapted to magnetize said inductor, and helically-arranged stationary armature-coils.

2. In a dynamo-electric machine, a stationary frame, a field-winding carried thereby, a laminated core carried by said frame and arranged with helical slots, armature-coils carried in said slots, and a revolving inductor having a helical polar projection.

3. In a dynamo-electric machine, a revolving inductor built up of parallel laminations arranged in planes perpendicular to the shaft, each lamination having a projecting portion and being displaced circumferentially a small amount from the next lamination, so as to form a laminated mass having a helical polar projection.

4. In a dynamo-electric machine, an inductor comprising a revolving shaft, and laminations surrounding and supported by the shaft, each lamination being of unequal depth on opposite sides and displaced circumferentially a small amount from the next lamination so as to form a laminated mass having a helical polar projection.

5. In a dynamo-electric machine, an inductor comprising a revolving shaft provided with a helical groove, and a plurality of simi-

lar ring-shaped laminations surrounding said shaft, each lamination being of unequal depth on opposite sides and provided with a tongue adapted to engage said groove.

6. In a dynamo-electric machine, a bipolar field structure, field-coils carried on the poles, a revolving inductor between said poles having a helical polar projection, and armature-coils carried on the faces of said poles in inductive relation to said inductor.

7. In a dynamo-electric machine, a bipolar field structure, field-coils carried on the poles, a revolving inductor between said poles having a helical polar projection, and helically-arranged armature-coils carried on the faces of said poles.

8. In a dynamo-electric machine, a bipolar field structure, field-coils carried on the poles, laminated cores carried on the pole-faces and arranged with helical slots, armature-coils carried in said slots, and a revolving inductor between said poles having a helical polar projection.

9. In a dynamo-electric machine, a bipolar field structure, field-coils carried on the poles, laminated cores carried on the pole-faces and arranged with helical slots, armature-coils carried in said slots, a revolving shaft between said poles, and laminations surrounding and supported by said shaft, each lamination being of unequal depth on opposite sides and displaced circumferentially a small amount from the next lamination so as to form a laminated mass having a helical polar projection.

10. In a dynamo-electric machine, a revolving inductor built up of parallel laminations arranged in planes perpendicular to the shaft, each lamination having a projecting portion slotted at its periphery and being displaced circumferentially a small amount from the next lamination, so as to form a laminated mass having a helical polar projection.

11. In a dynamo-electric machine, a stationary frame, a field-winding carried thereby, a laminated core carried by said frame and arranged with helical slots, armature-coils carried in said slots, and a revolving laminated inductor having a helical polar projection, each lamination of said inductor being slotted at its periphery.

In witness whereof I have hereunto set my hand this 3d day of July, 1905.

CHARLES A. KELSEY.

Witnesses:

FREDRICK MURRAY PLATT,
FORBES THOMPSON CULLEN.