

(No Model.)

2 Sheets—Sheet 1.

R. E. BALL.

DYNAMO ELECTRIC MACHINE.

No. 338,910.

Patented Mar. 30, 1886.

Fig. 1.

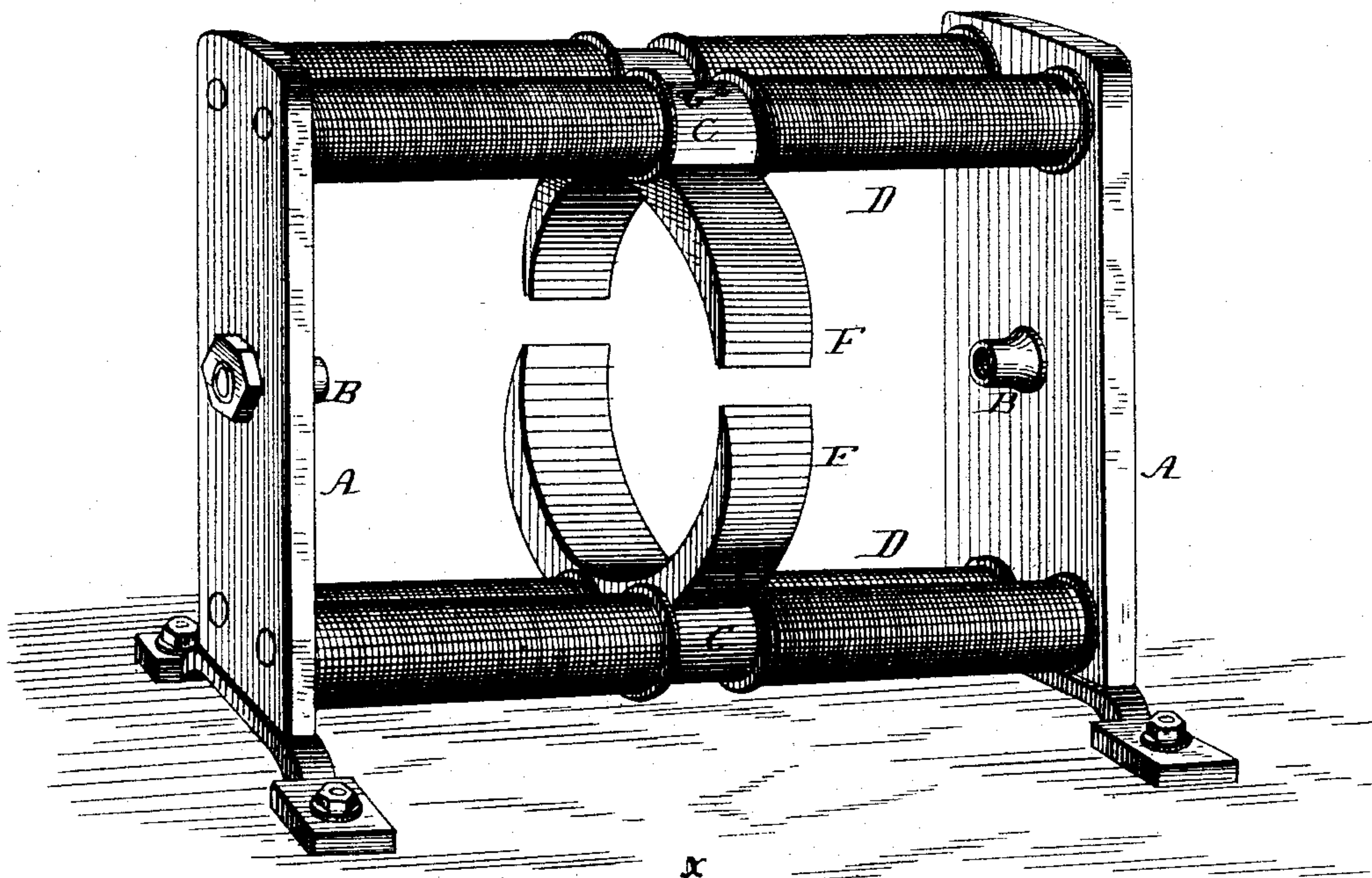
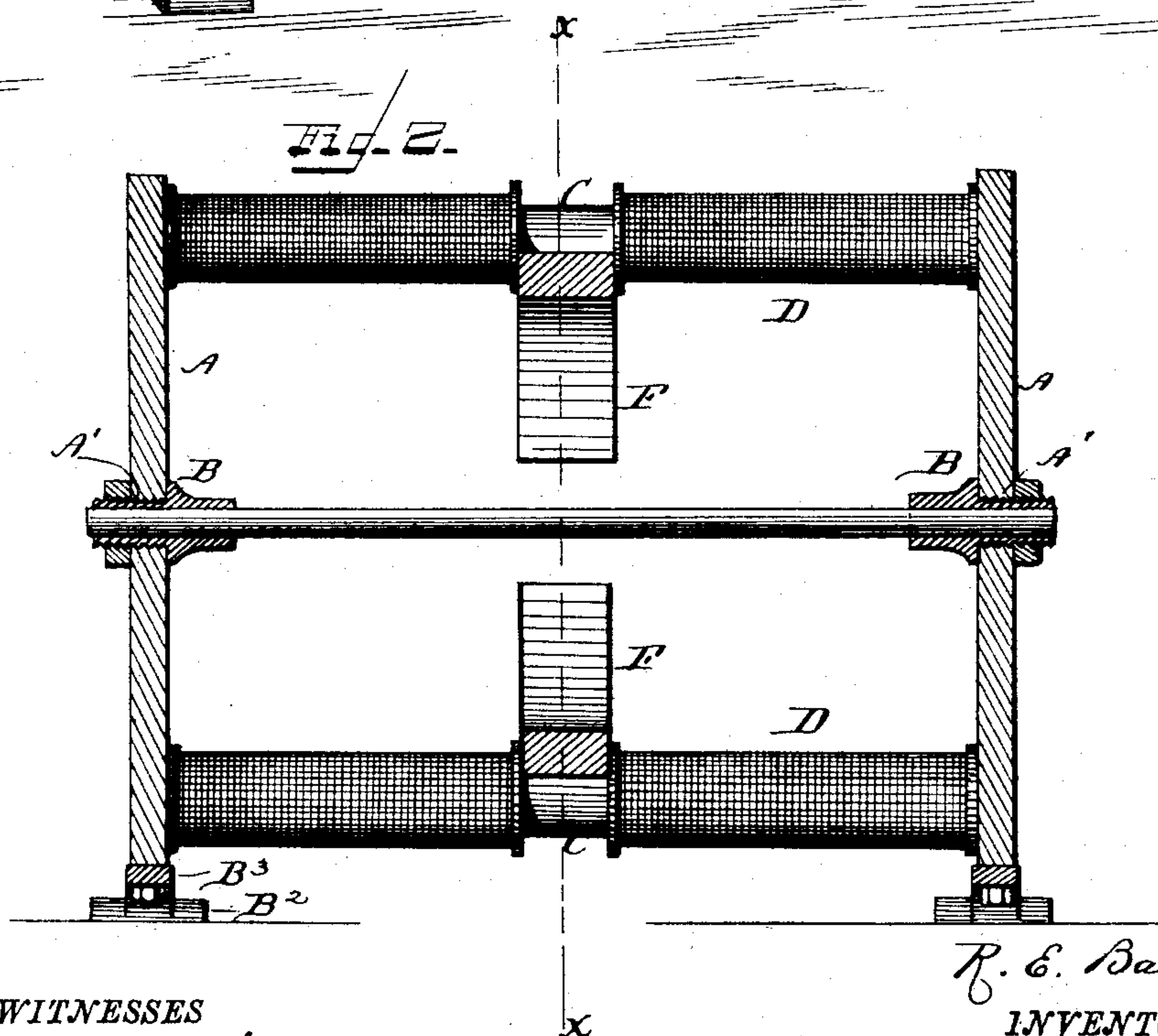


Fig. 2.



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(No Model.)

2 Sheets—Sheet 2.

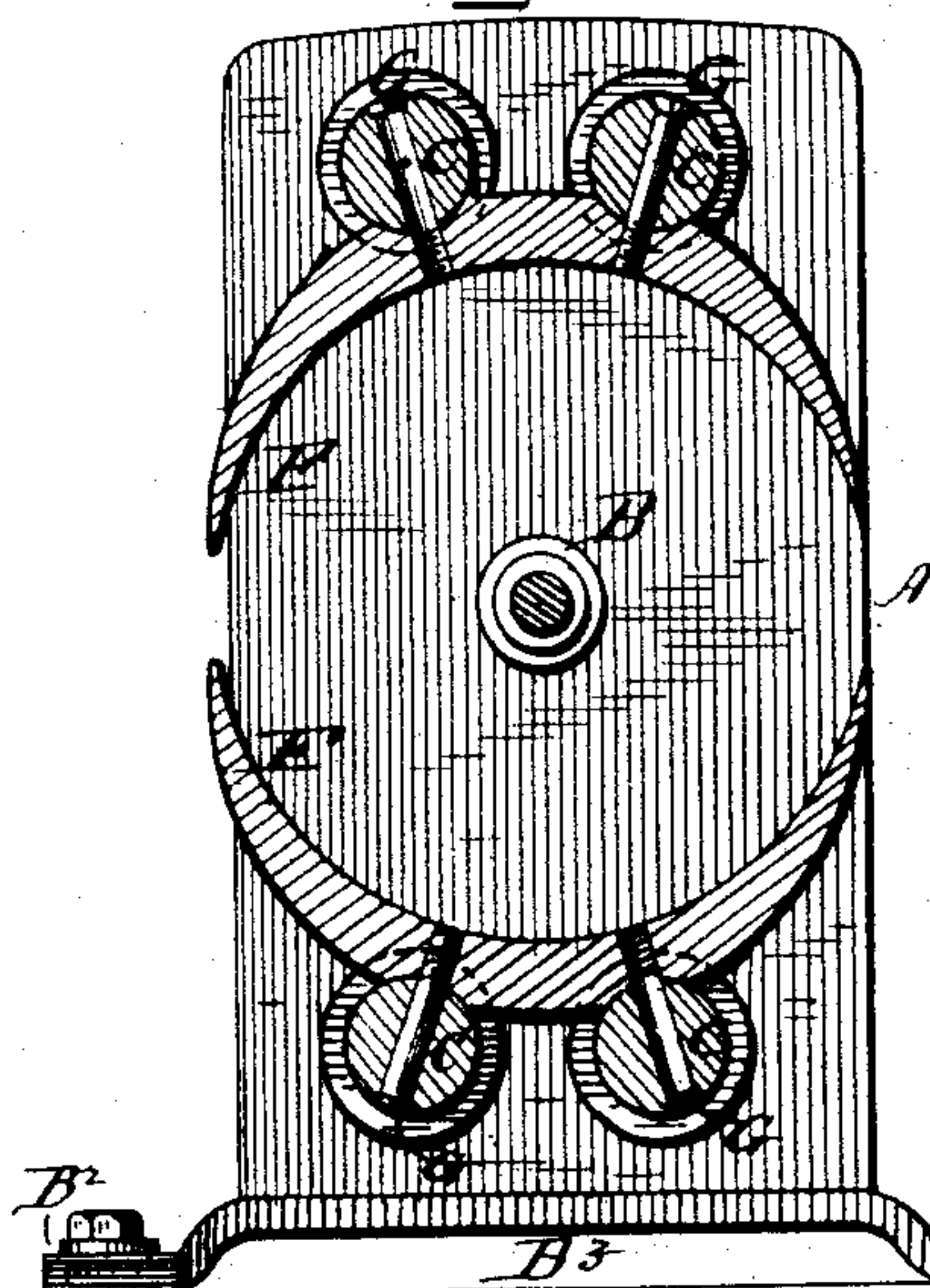
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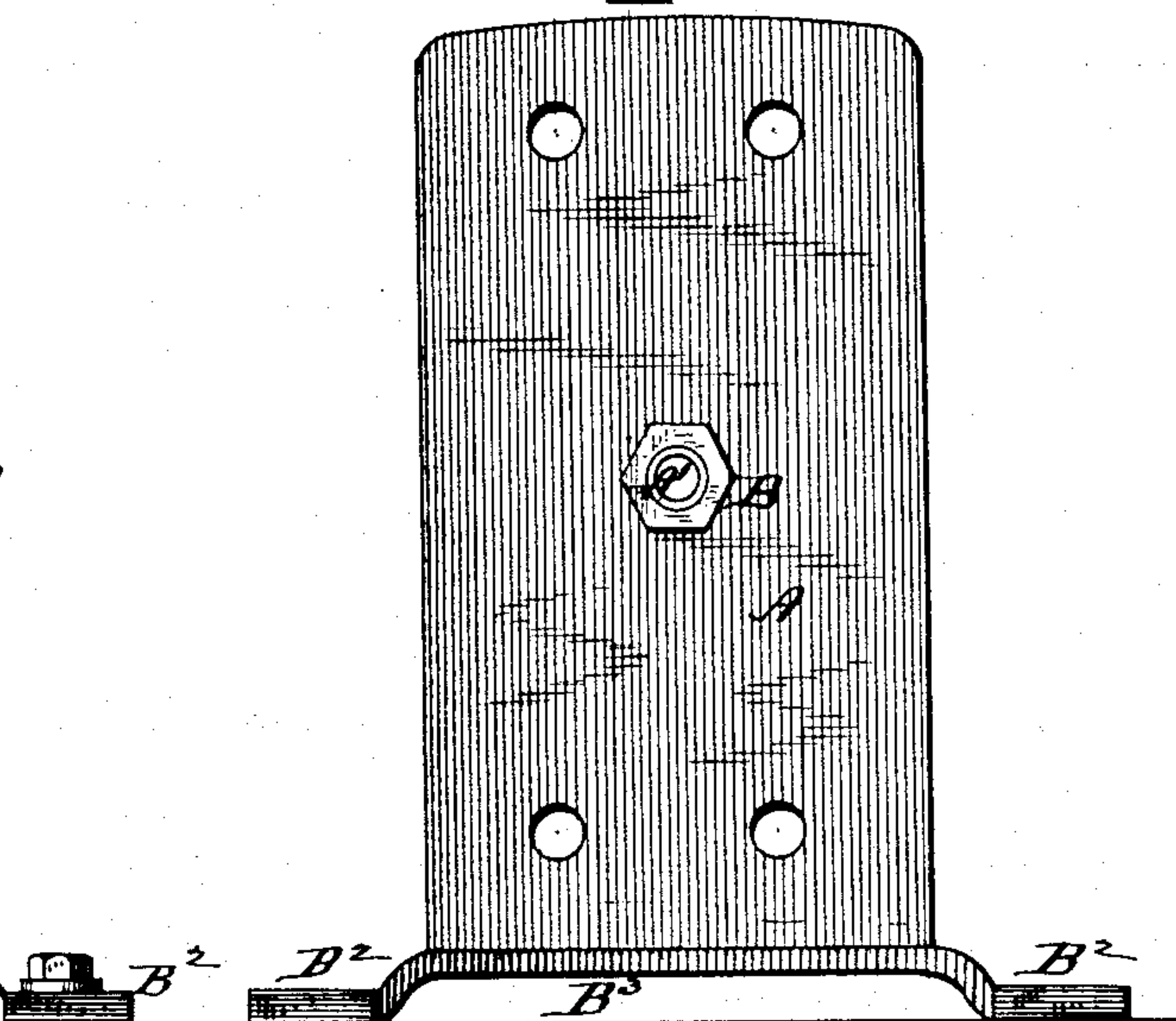
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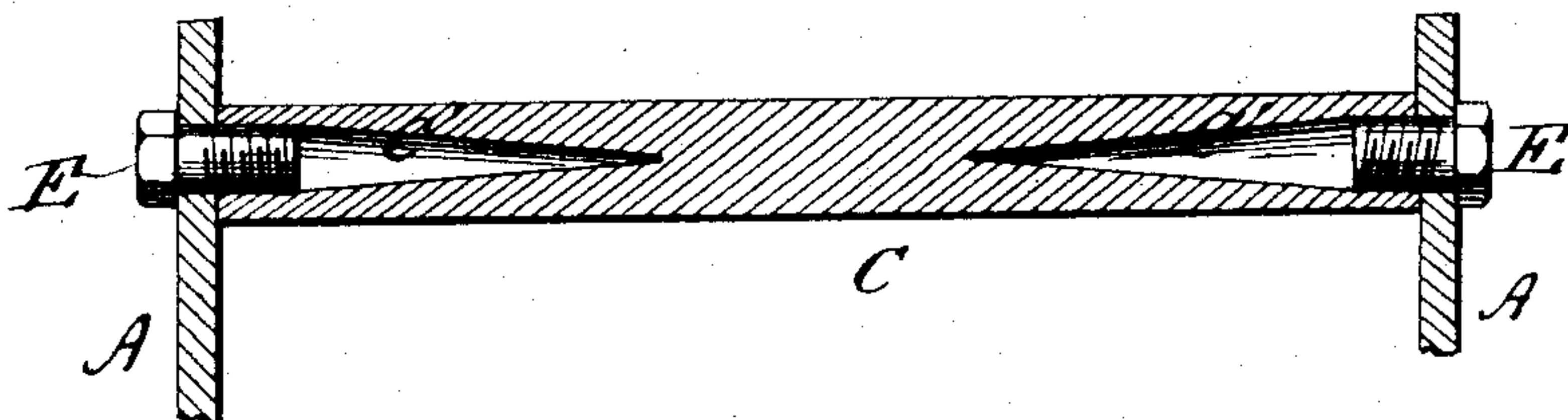
*Fig. 3.*



*Fig. 4.*



*Fig. 5.*



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# UNITED STATES PATENT OFFICE.

ROYAL E. BALL, OF NEW YORK, N. Y.

## DYNAMO-ELECTRIC MACHINE.

SPECIFICATION forming part of Letters Patent No 338,910, dated March 30, 1886.

Application filed April 25, 1885. Serial No. 163,480. (No model.)

*To all whom it may concern:*

Be it known that I, ROYAL EDWARD BALL, a citizen of the United States, and a resident of New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Dynamo-Electric Machines, of which the following is a specification.

This invention has relation to dynamo-electric machines, and has for its object the provision of means for reducing weight of the frame or end pieces and the cores of the field-magnets without in any degree lessening the efficiency of the machine.

It may be here remarked that my invention is mainly designed to be applied to that class of dynamo-electric machines wherein the cores of the field-magnets consist of parallel bars wrapped with insulated wire and attached at their ends to the end blocks or frame of the machine, and having the pole-pieces attached to such bars.

My invention consists, first, in the novel manner of attaching the pole-pieces to the bars upon which the field-coils are wrapped; secondly, in the novel construction of the end pieces to which these bars are secured; and, finally, in the novel construction, combination, and arrangement of parts, as hereinafter described and claimed.

In the accompanying drawings, Figure 1 is a perspective view of the machine complete, with the exception of the armature, its shaft, and appurtenant parts; Fig. 2, a vertical sectional view through the longitudinal axis of the armature-shaft, the armature and commutator being removed; Fig. 3, a vertical section on the line *xx* of Fig. 2; Fig. 4, a plan view of one of the end frames, and Fig. 5 a detail.

A A designate the end frames of the machine. As these end frames form a portion of the field-magnet, serving to magnetically connect the two poles of the machine, and also support the field-coils, the cores of the same, and the pole-pieces, it is necessary to make them of a quality of iron at once strong and soft. Usually these end frames are made of a good quality of comparatively soft cast-iron. I have found, however, that if these end frames are so fashioned that they can be forged they may be made much lighter than when they are

cast, and that they conduct the magnetism better. I therefore construct these end frames each of a rectangular and flat plate of forged iron, and bore holes in it at each corner for the reception of the screws which retain the field-magnet cores in position, and a hole, A', at or near the center for the passage of the armature-shaft. As the material of which these plates are composed is too soft to afford a durable bearing, and as it is impracticable to forge a journal of sufficient width upon the plate and bush the same with hard metal, I find it necessary to provide a cast or hard metal bearing for the armature-shaft. I therefore form a screw-thread within the opening A', and into said opening screw a bush, B, of hard metal. This bush projects out some distance on each side of the frame, and thus affords a very long bearing for the shaft. Feet B<sup>2</sup> B<sup>2</sup> are formed on the ends of a cross-piece, B<sup>3</sup>, which is screwed at the bottom of the frame, and serves as a base for the frame and means of attachment to the floor.

C designates the cores of the field-magnets, upon which are wrapped coils D D. These cores consist of straight cylindrical bars of forged iron, and they are bored out with a tapered hole, C', running from each end to the vicinity of the point where the pole-pieces are attached. The object of forming the tapered hole is for the purpose of having a greater mass of metal at the point where the magnetism is strongest, as I have found that if the bars be of the same weight at the ends as in the vicinity of the pole-pieces an unnecessary weight is given them as the magnetism increases from the end to the poles, and hence when that portion of the core is of sufficient size to receive all the magnetism possible without saturation the center portion of the core of the field-magnet contains an unnecessary amount. These cores are four in number—two above and two below the shaft—and they are fastened to the end frames by screws E E.

In order to secure the pole-pieces, which are lettered F F, to the circular cores C C, I form the said pole-pieces with semicircular grooves on each side, into which fit the cores, and pass screws G G through the cores and into these pole-pieces.

The machine, constructed as described, com-



bines the maximum degree of strength and efficiency with the minimum of weight.

By making the frame A A of forged metal instead of cast I produce a better effect, as the  
5 forged iron conducts the magnetism more readily than cast-iron, and the frames are at the same time lighter and stronger.

Having described my invention, I claim—

1. In a dynamo-electric machine, the com-  
10 bination, with the cores of the field-magnets, of forged iron end frames having hard-metal bearings attached thereto for the reception of the armature-shaft, substantially as described.

2. In a dynamo-electric machine, the com-  
15 bination, with the end frames and cylindrical field-magnet cores, of pole-pieces grooved to receive the said cores and secured thereto by means of screws, substantially as described.

3. In a dynamo-electric machine, the end  
frames, A A, composed of a flat plate of forged  
iron having a central opening for the passage  
20 of the armature-shaft and a cast-metal bush  
screwed into said opening, substantially as  
described.

4. In a dynamo-electric machine, the com-  
25 bination of the end frames, A A, having bear-  
ings B B, the cores C C, having a tapered hole  
at each end, and the pole-pieces F F, grooved  
to receive said cores and secured thereto, sub-  
stantially as described. 30

Signed at New York, in the county of New  
York and State of New York.

ROYAL E. BALL.

Witnesses:

GEORGE F. ESCHBACH,  
J. B. CONNOLLY.