C. M. TICHENOR.

DYNAMO FRAME.

APPLICATION FILED AUG. 11, 1915.

1,317,335.

Patented Sept. 30, 1919.

2 SHEETS—SHEET 1.

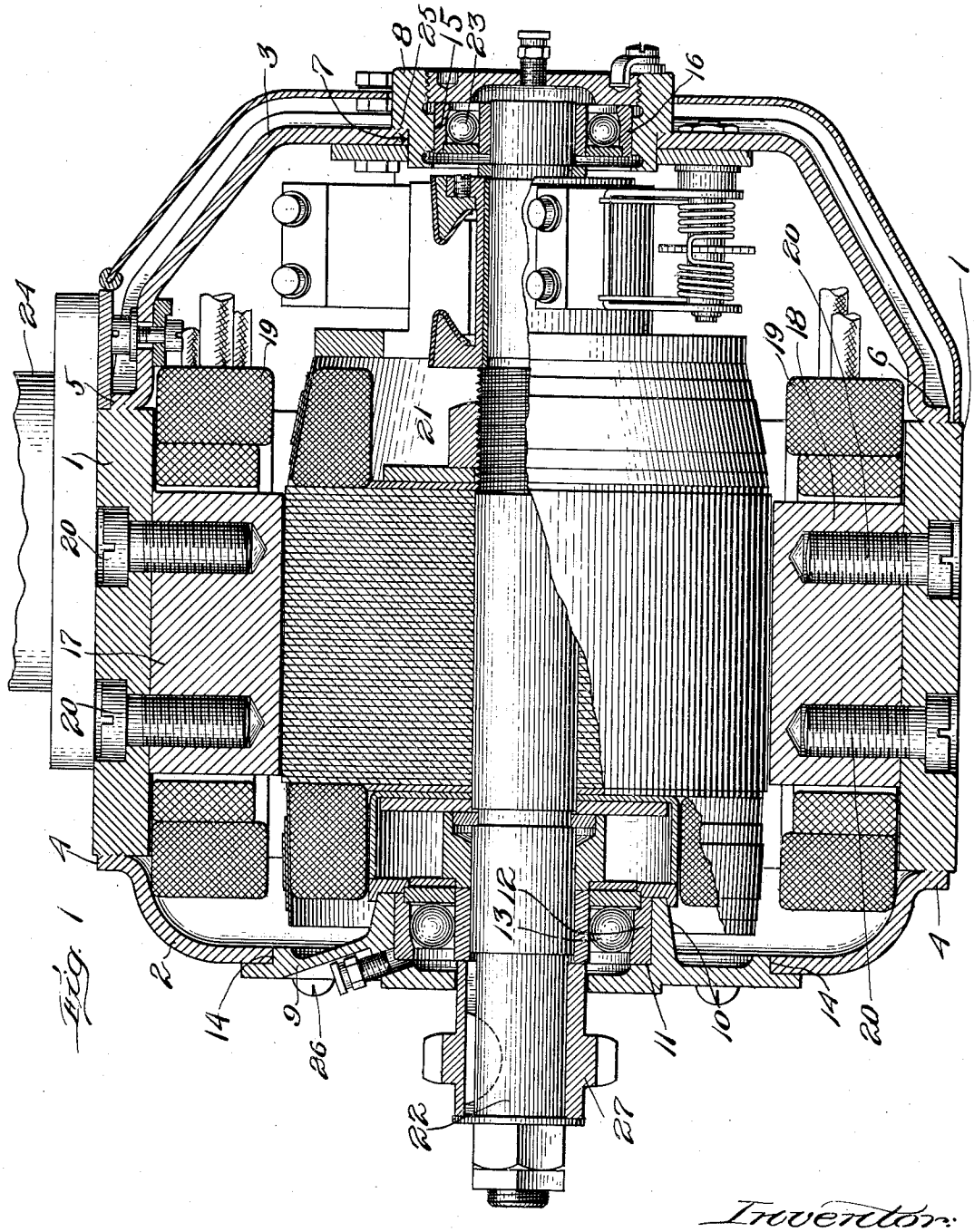


Fig. 1

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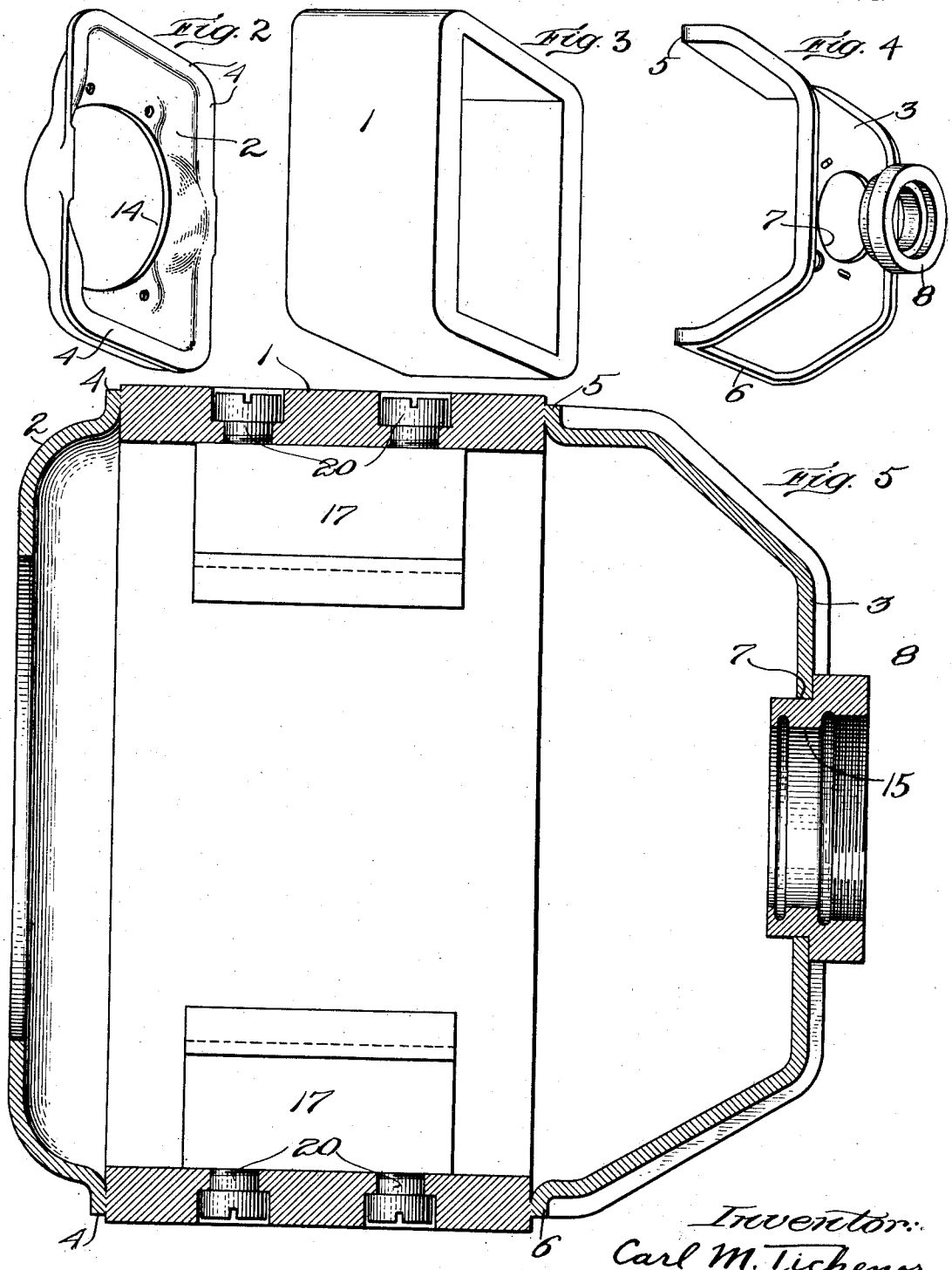
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UNITED STATES PATENT OFFICE.

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DYNAMO-FRAME.

1,317,335. Specification of Letters Patent. **Patented Sept. 30, 1919.**

Application filed August 11, 1915. Serial No. 45,006.

To all whom it may concern:

Be it known that I, CARL M. TICHENOR, a citizen of the United States, and resident of Allston, in the county of Suffolk, and State of Massachusetts, have invented certain new and useful Improvements in Dynamo-Frames, of which the following is a specification.

This invention relates to dynamo-electric machines and with regard to certain more specific features thereof to the construction of the frame or casing which supports the more active working parts of such machines.

The invention has for one of its objects to provide a strong, inexpensive and convenient housing or support for the field structure and armature of a dynamo.

Another object comprehends the provision of a structure which may be quickly, conveniently and accurately assembled, and one in which a possibility of the heretofore frequent incorrect positioning of the armature relatively to its bearings or the pole pieces is practically obviated.

Still another object of the invention lies in the method of construction of machines of the abovesaid character, this method being characterized by the simplicity of the steps taken in assembling the parts.

Other objects will be in part obvious and in part pointed out hereinafter.

Heretofore in the manufacture of dynamos, it has been the practice quite generally followed to machine the end edges or faces of the pole piece support or body and to secure thereto the parts of the frame known as the end caps by means of screws or similar fasteners. This work was one of considerable refinement, as upon the parallel and regular machining of the end faces depended the correct axial alinement of the armature shaft bearings, and upon this and the assembly of the pole pieces depended the correct relative positions of the stator and rotor. The present invention insures the proper positioning of the parts and lessens greatly the cost of manufacture.

The invention accordingly consists of certain features of construction, combinations of elements and arrangements of parts which will be exemplified in the construction hereinafter set forth, and the scope of the application of which will be indicated in the following claims.

In the accompanying drawings wherein is shown one of various possible embodiments of the invention:

Figure 1 is a view in vertical longitudinal section of a dynamo comprising the invention.

Figs. 2, 3, and 4 are views in perspective of parts of the frame unassembled.

Fig. 5 is a view in vertical longitudinal section showing the assembled frame.

Referring now more particularly to the drawings wherein similar reference characters refer to similar parts throughout the several views there is indicated at 1 a wrapped metal pole-piece support or yoke which is of hollow rectangular form and of suitable thickness to provide a contact surface whereby the end caps 2 and 3 may be attached respectively to opposite ends of the yoke. The end cap 2 is preferably a metal stamping and is flanged as at 4 to bear against and be spot welded to the yoke 1. Likewise the end cap 3 has flanges 5 and 6 at the top and bottom thereof respectively which are spot welded to the opposite end of the yoke. The end cap 3 is preferably a metal stamping centrally apertured as at 7 for the reception of a bushing 8. This bushing is welded to the stamping 3, and for the purposes of this case may be considered as a part of the end cap. A detachable plate 9 is secured to the end cap 2 by screws or other suitable fasteners, and has an inwardly projecting flange 10, forming with the main body of the plate a shoulder 11. This flange serves to support a race 12 of a suitable anti-friction shaft bearing 13.

The inner surface of the annular flange 10 which receives the bearing race, and the surface 14 of plate 9 which fits with the aperture in the end cap 2, are machined from a common axis before the plate 9 is finally attached. The central aperture in the end cap 2 which receives the flange 10 of the plate 9, and the interior periphery 15 of the bushing 8 which receives and supports the race 16 of the opposite bearing of the armature shaft, are machined in a manner and for a purpose which will be hereinafter clearly described.

Suitable pole pieces 17 and 18 are attached to the top and bottom respectively of the yoke or frame and are equipped with a field winding or windings 19. The attach-

ment is made in the embodiment shown, by screws 20 whereby the pole pieces may be conveniently and quickly removed for purposes of examination and repair and for another purpose which will later herein appear.

The armature is shown at 21 and has its shaft 22 journaled in the bearings 13 and 23. The pole pieces 17 and 18 have their surfaces adjacent the armature shaped to conform to the periphery of the latter for obvious purposes. A regulator 24 is mounted upon the pole piece frame or yoke at the top as shown.

One of the features of this invention lies in the method of assembling parts of the frame in such manner as to insure a central position of the armature between the coöperating pole pieces, resulting in an equal distribution of the magnetic pull on both sides of the armature. This neutralizes the pull and friction upon the shaft bearings is reduced. Another feature of the invention resides in the method of assembling the parts of the frame which insures an alinement of the shaft bearings and reduces friction and wear and which insures a position of the arcuate surfaces of the pole pieces co-axial with the armature shaft and concentric with the bearings for said shaft. The parts are absolutely and accurately alined to bear a pre-determined correct relation to each other due to the method which will now be set forth.

The field piece frame or yoke 1 has moved against it at the top and bottom thereof respectively, the flanges 5 and 6 of the stamped metal end cap 3. These flanges are then spot welded to the yoke and the bushing 8 is fitted into the central aperture 7 and welded around the shoulder 25. Of course if desired the order of the two specified welding operations may be reversed. The flange 4 of the end cap 2 is then moved into proper position to contact with the opposite end faces of the yoke 1 and welded in position. The pole pieces 17 and 18 may be considered as secured in position by the screws 20 or they may be attached at any point in the assembly of the frame prior to the machining operation to be described later.

The frame as now assembled is rigidly supported for relative movement with a cutting tool in such manner that the central aperture in the end cap 2, the arcuate surfaces of the pole pieces 17 and 18, and the bore in the bushing 8 have a rough common axis in alinement with the axis of the cutting tool. The cutting may be of these parts simultaneously or in succession, but it is advantageous in point of time to cut all the parts simultaneously. Furthermore the simultaneous cutting eliminates any possibility of variations in the axes of the parts cut which might be due to relative displacement between the frame and the tool taking place between the cutting operations. In the preferred embodiment of the invention the entire bore through the frame for the reception of the armature and end bearings is made at one time with a single boring tool and in substantially one operation. Of course the cutting or boring may be effected in two steps as by making a rough cut initially and a subsequent finishing cut. Such a process would be within the scope of the invention and not inconsistent with a claim that the bore is made in a single operation.

After the boring operation the pole pieces are removed through the space between the yoke 1 and end cap 3, and the field windings attached. The pole pieces and windings are then returned and secured as before. The bearing supporting plate 9 is then located within the central aperture of the end cap 2 and attached by means of screws 26. The axis of the central aperture being in alinement with the axes of the pole pieces and bearings 23 it will be obvious that the inner surface of flange 10 which has been previously machined concentrically with the surface 14 of plate 9, will join in the common axis locating from the wall of the central aperture in end cap 2. The holes for the screws 26 in the cap 2, may be located after the bore has been made.

Assuming now that the frame stands assembled comprising the yoke, pole pieces, field windings, end cap 2, and end cap 3 with its bushing 8, the armature and bearings are next introduced and the left end bearing supplemented by the bearing plate 9 carrying the bearing race. The plate is then secured in position by screws 26 and a driving member 27 is keyed against rotary movement and suitably secured against longitudinal movement on the armature shaft.

It will be obvious from the foregoing that the objects of the invention as pointed out are secured and that the device is one characterized by its inexpensive construction and the ease and accuracy which obtain in assembling the parts.

As many changes could be made in the above construction and method, and many apparently widely different embodiments of this invention could be made without departing from the scope thereof, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

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

1. The method of constructing dynamo frames which consists of separately producing a plurality of frame parts, some having different inherent characteristics from others,

and welding them together into a permanently unseparable frame prior to machining, and subsequently boring through the frame to form the end bearings and polar cavity.

2. The method of constructing dynamo frames which consists of separately producing a thick pole piece yoke, a pair of thin sheet metal end members and a bushing and bringing the said parts all together into a permanently unseparable frame before machining, the end members arranged at opposite ends of the yoke and the bushing arranged in one end member, then machining the resultant unitary structure to provide co-axial bearing apertures one in one end member and the other in the bushing of said other end member.

3. The method of constructing dynamo frames which consists of separately producing a plurality of frame parts, some having different inherent characteristics from others, and bringing them together, prior to machining the rotor cavity, into a permanently unseparable frame, and subsequently boring through said frame to form the end bearings and polar cavity.

4. The method of making dynamo frames which consists in producing a yoke of material having one characteristic; separately producing a pair of sheet metal end caps and welding them with said yoke to form a permanent frame, separately producing a sleeve and undetachably securing same to one end cap, separately producing a closure plate with concentrically machined inner and outer locating surfaces, and machining the integral frame to provide concentric apertures in the opposite ends—one of said apertures being adapted to receive the armature and locate same by means of said closure plate.

5. In a dynamo, a frame comprising a yoke of one metal, a pair of end members of stamped sheet metal welded respectively to opposite ends of said yoke, a bushing forming an integral part of one end cap, pole pieces projecting inwardly from said yoke, apertures formed in one end member and the bushing of the other end member concentric with the polar cavity, a closure plate having an inner and an outer locating surface concentrically machined, and an armature having a shaft arranged within said closure plate and located by the introduction of said plate with its outer machined surface fitting the said aperture formed in one end member.

Signed at Cambridge, in the county of Middlesex and State of Massachusetts, this 2nd day of August, A. D. 1915.

CARL M. TICHENOR.