No. 625,806. Patented May 30, 1899.

E. W. RICE, JR.

OPERATING DYNAMO ELECTRIC MACHINES.

(Application filed Mar. 1, 1897.)

(No Model.)

FIG. 1.

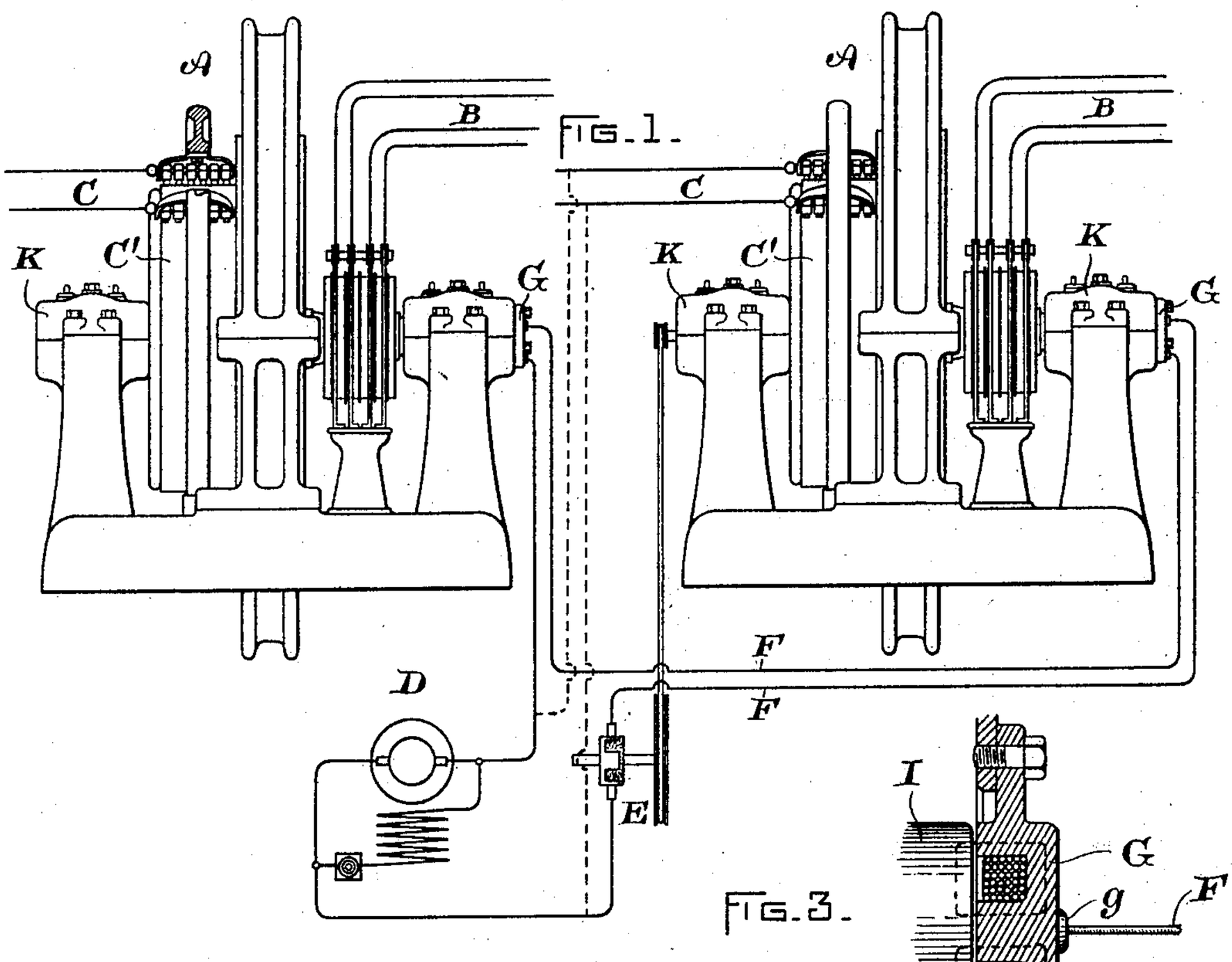
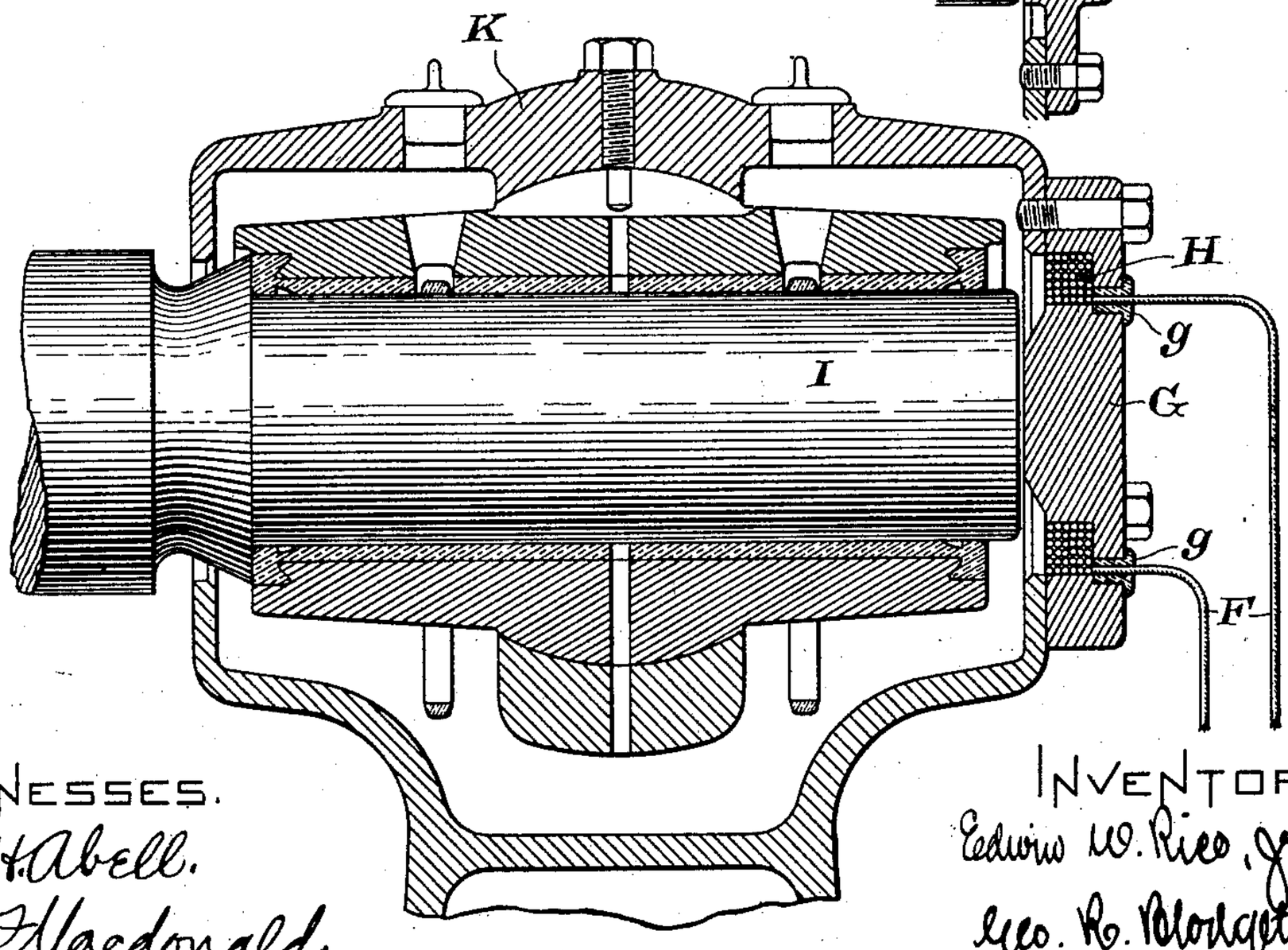


FIG. 3.

FIG. 2.



WITNESSES.

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UNITED STATES PATENT OFFICE.

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OPERATING DYNAMO-ELECTRIC MACHINES.

SPECIFICATION forming part of Letters Patent No. 625,806, dated May 30, 1899.

Application filed March 1, 1897. Serial No. 625,467. (No model.)

To all whom it may concern:

Be it known that I, EDWIN W. RICE, JR., a citizen of the United States, residing at Schenectady, in the county of Schenectady, State of New York, have invented certain new and useful Improvements in Operating Dynamo-Electric Machines, (Case No. 536,) of which the following is a specification.

My invention relates to dynamo-electric machines, and has for its object to provide for such machines a device which will equalize the wear upon the collecting arrangements, so that the commutators or collectors may be kept true, require less turning and manipulation to make them run, and prevent their sparking or undue wear.

In the operation of dynamos it is found desirable to keep the collecting devices, particularly the rotary portions, as true as possible, so that the brushes may not jump and cause sparking and so that the turning down of the collector may be avoided. While this is the case with the ordinary collecting-rings applied to alternators, it is not so material with them, they being comparatively simple devices and there being no difference of potential to cause a spark if the brush makes imperfect contact; but it is of more importance with commutators and more especially with the large and costly commutators of modern dynamos. In such devices where many brushes are employed and the brushes "track," so that all of the brushes occupying the same relative position follow the same lines around its periphery, the commutator is apt to wear in grooves with ridges between them, though these are not very high. Still if by the end play of the armature (which is unavoidable and for some reasons desirable) these grooves and the brushes do not coincide the brush becomes heated and sparks and gives rise to the well-known difficulties caused by such incidents. To avoid these troubles, I preferably cause the armature to shift back and forth in its bearings or to have a little more than the usual amount of end play; but instead of this being a casual incident of the operation of the machine caused by the slightly-imperfect balance of the armature or other mechanical reasons I so arrange it that it shall be a regular reciprocation of the armature-shaft in its bearings, so that the brushes will rub over the entire surface of the commutator. To accomplish this, I arrange outside the end of the shaft an electro-magnet with a source of current in circuit therewith and by a suitable make-and-break device of any proper form energize the magnet from time to time, so that it exerts a pull on the shaft. This energization being intermittent, the shaft tends to reciprocate in its bearings.

The accompanying drawings show an embodiment of my invention in a particular way.

Figure 1 is a diagrammatic elevation of the invention applied to two rotary converters, while Fig. 2 is an enlarged detail, and Fig. 3 is a modification.

It is manifest that the device is equally applicable to all classes of dynamo-electric machinery, and I have simply illustrated the rotary converters because they happen to be the machines to which I have first applied it.

In Fig. 1, A A are the dynamos, B B the alternating-current mains leading from one side of the armature, and C C the continuous-current mains leading from the commutators C′ C′. I have illustrated a single set of positive and negative brushes; but it is to be understood that a suitable number, in accordance with the number of field-poles and the armature connections, will be employed. D is a separate source of current, which I have represented in diagram as a small dynamo; but any other suitable source might be used. In dotted lines I have indicated that a shunt-circuit to the main continuous-current circuit might be employed. Ordinarily this would not be desirable on account of the high voltage and the difficulty of breaking the circuit; but (particularly with small machines) it might be employed. At E is a commutating device, an ordinary make-and-break arrangement, in which insulation and conducting portions alternate in a way well understood. The commutator is shown as rotated from the shaft of the main machine, and the length of the breaks and consequent length of the periods during which current is transmitted to the shifting device is to be proportioned to the effect desired and to the size of the machine, &c., in ways well understood. F F are the

mains or leads going to the shifting devices G G.

Fig. 2 shows in enlarged form one of the bearings K of the converters having the device applied to it. In this I is the shaft, the reciprocation of which is to be attained by the device G, which consists of an iron core with a coil H surrounding it, the coil being connected to the mains F. Insulating-bushings *g* are provided. The rest of the bearing is of a form well understood. Forming no special part of my invention, it will therefore not be particularly described.

The invention is particularly applicable to the rotary converters which I have shown, because with such machines, they being driven by the current, there are no mechanical reasons why the armature would shift in its bearings, there being no belt or other intermittently-applied mechanical force, the armature therefore tending to keep in the magnetic center of the field. For the same reason my invention is particularly applicable to the combination of an alternating motor and a continuous-current generator, or vice versa.

It is of course within my invention to effect the relative transverse movement referred to by shifting the brushes instead of the armature; but this is a well-known reversal of parts in the operation of such devices as I have described.

In Fig. 3 I have shown a slight modification in the construction of the shifting device G. An energizing-coil H is provided, as before, but of less diameter, the external pole being so arranged that it is of substantially the same diameter as the end of the shaft I, and the magnetic circuit is as indicated by the dotted lines instead of being through the bearing K. This construction gives a very strong pull when energized on account of the shortness of the magnetic circuit.

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

1. The combination of a shaft and an iron-clad magnetizing-coil mounted in inductive proximity to the end of said shaft.

2. The combination of a shaft and an annular magnetizing-coil mounted in inductive relation to the end of said shaft and with its axis substantially coincident with that of the shaft.

3. The combination of a shaft carrying the rotating member of a dynamo-electric machine, and an iron-clad, annular magnetizing-coil mounted in inductive relation to the end of said shaft and with its axis substantially coincident with that of the shaft.

4. In an end-play device for rotary converters, the combination with the shaft of the rotary converter, of an iron-clad, annular magnetizing-coil mounted in inductive relation to the end of said shaft and with its axis substantially coincident with that of the shaft, and means for passing a magnetizing-current through said coil and for varying the value of said magnetizing-current.

In witness whereof I have hereunto set my hand this 25th day of February, 1897.

EDWIN W. RICE, JR.

Witnesses:
B. B. HULL,
C. L. HAYNES.