(No Model.)

3 Sheets—Sheet 1.

J. E. GILES.

DYNAMO ELECTRIC MACHINE.

No. 281,052. Patented July 10, 1883.

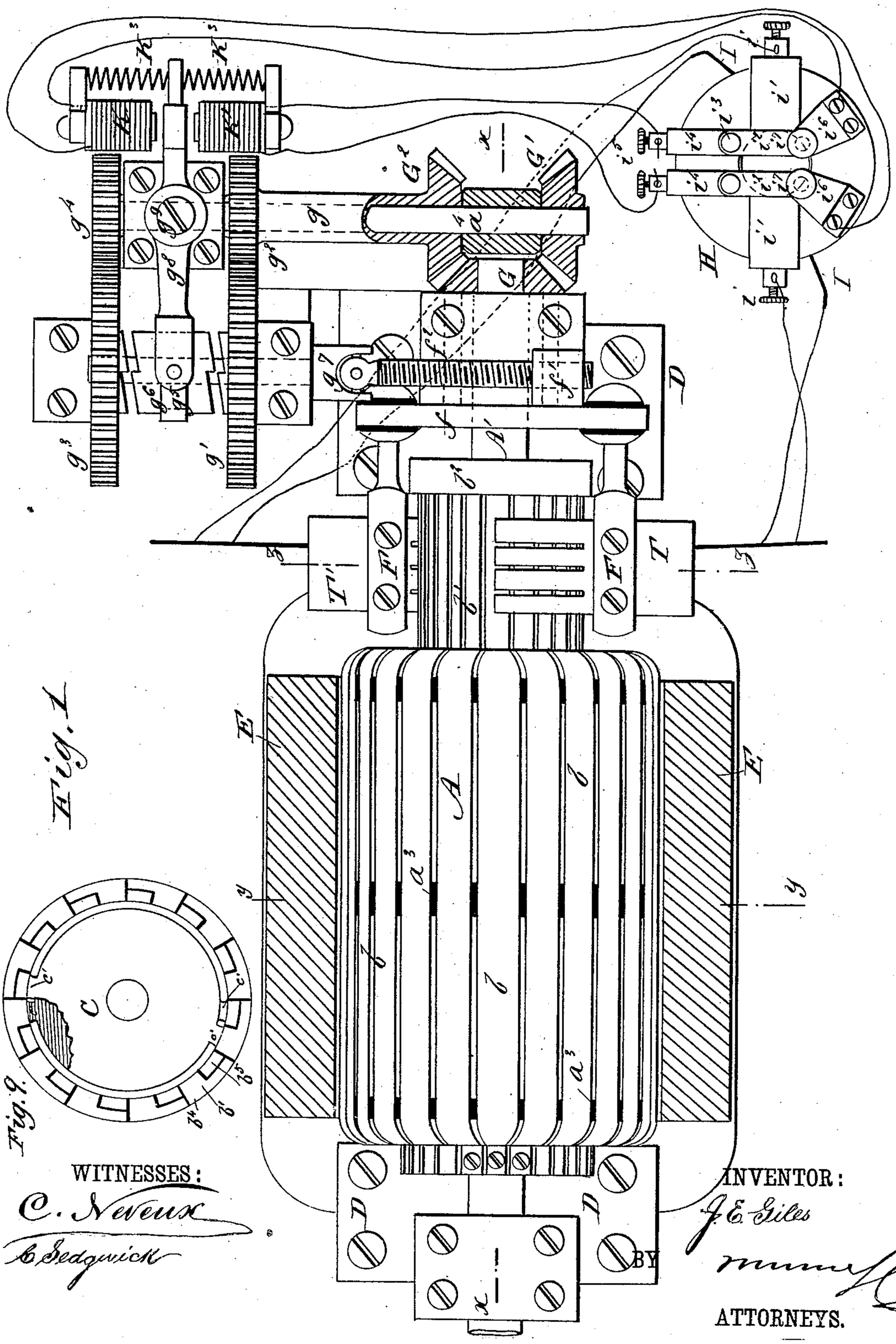

Fig. 1.

Fig. 2.

WITNESSES:

C. Neveux

C. Sedgwick

INVENTOR:

J. E. Giles

BY

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(No Model.) 3 Sheets—Sheet 2.

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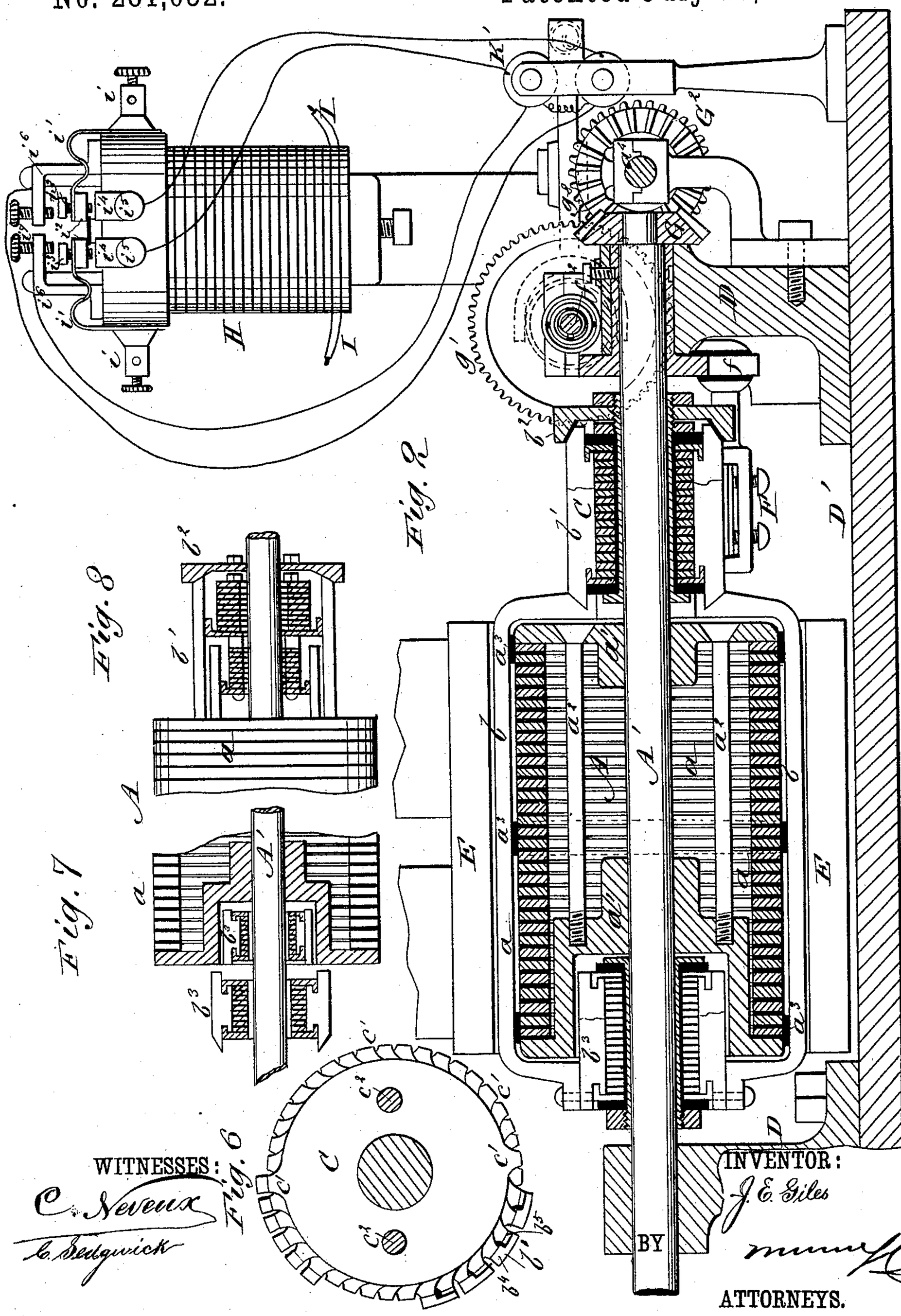

Fig. 1

Fig. 2

Fig. 8

Fig. 7

Fig. 6

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(No Model.) 3 Sheets—Sheet 3.

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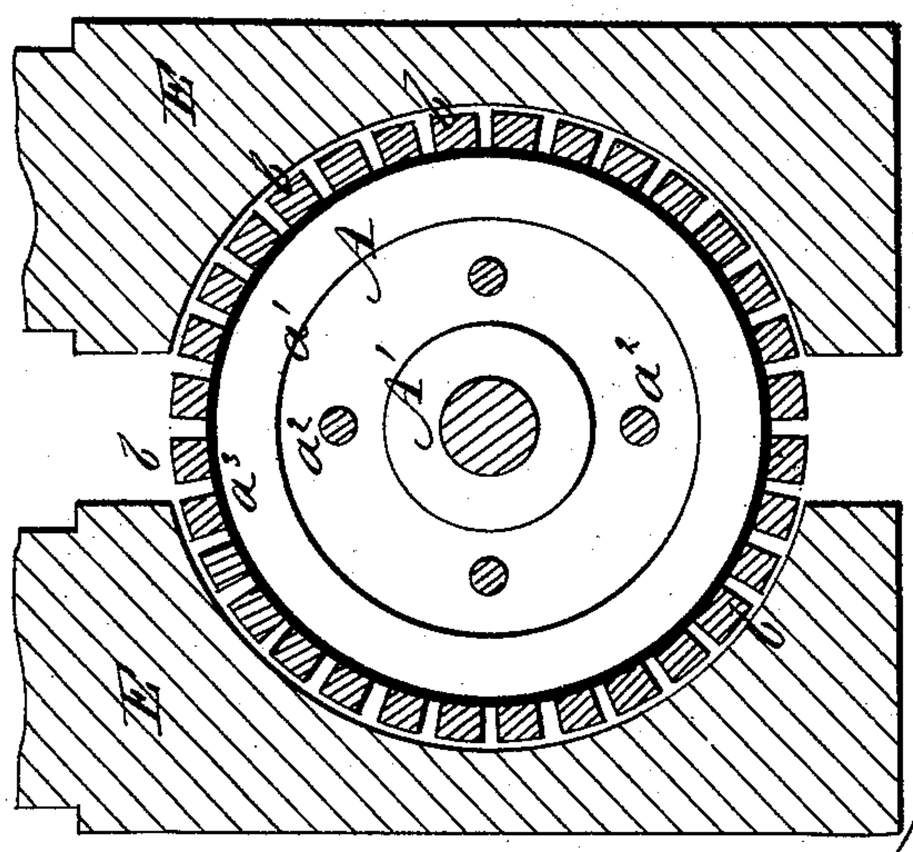

Fig. 4

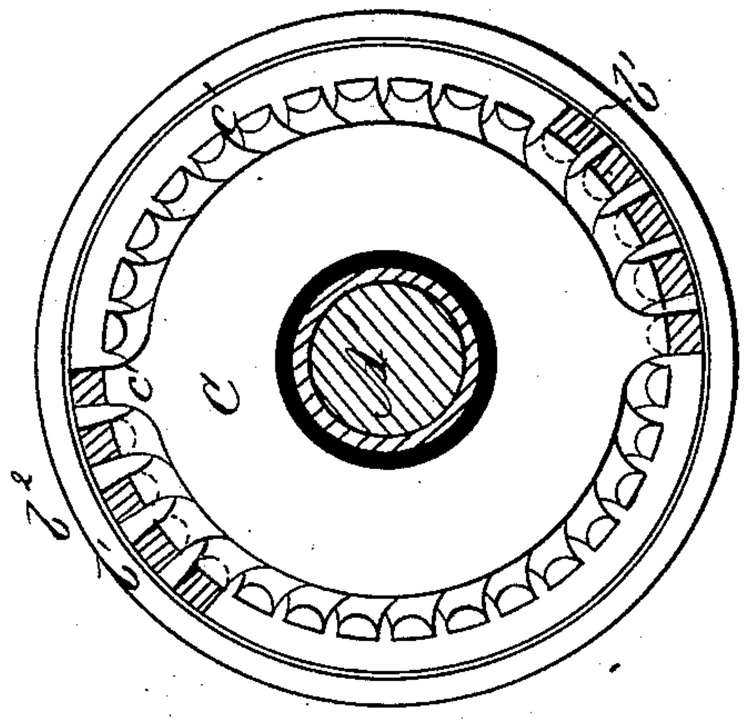

Fig. 5

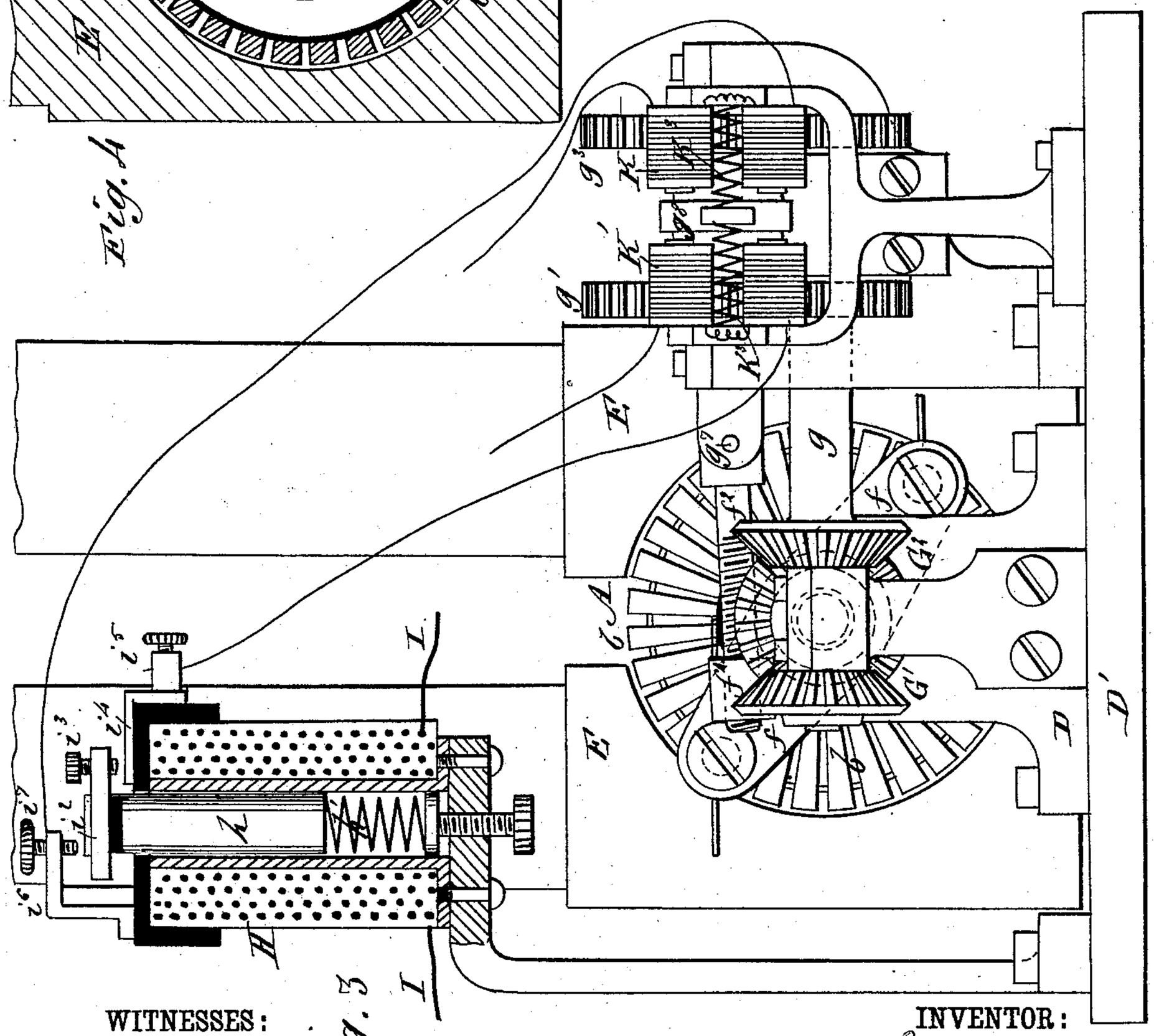

Fig. 3

WITNESSES:

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UNITED STATES PATENT OFFICE.

J. EDWIN GILES, OF HAZLETON, PENNSYLVANIA.

DYNAMO-ELECTRIC MACHINE.

SPECIFICATION forming part of Letters Patent No. 281,052, dated July 10, 1883.

Application filed December 14, 1882. (No model.)

To all whom it may concern:

Be it known that I, J. EDWIN GILES, of Hazleton, Luzerne county, and State of Pennsylvania, have invented a new and Improved Dynamo-Electric Machine and Current-Regulator, of which the following is a full, clear, and exact description.

My improvements relate to dynamo and magneto electric generators and current-regulators, the object of the invention being to overcome certain defects heretofore experienced in the manufacture of such machines. For instance, in generators the inductive wires of the armature, when in large section, cannot be carried across the end of the armature and shaft, and when a return-conductor is used through the interior of the armature the result is a large resistance to the passage of the current; and, further, that construction prevents access to the interior conductors for remedying any defects. In other cases metal disks have been employed of the full diameter of the armature; but such construction gives great addition of weight and proportional wear and tear. In the current-regulators as heretofore constructed a large increase or decrease in the strength of the current is necessary before there is any action of the regulating mechanism. In my improved generator I use an armature of the Siemens type, in which longitudinal induction-bars are employed, which are continuous between the commutator-bars on both ends of the armature, and joined to them, and these bars are insulated from each other and from the armature at intervals, so as to obtain the best possible inductive effects. The commutators are placed wholly or partly within the core, thus economizing space and permitting a core of greater length, and consequently one having greater magnetic force, being used. I also employ one or more electro-magnets for moving a clutch to adjust the current-collectors, and in connection therewith mechanism for effecting the movement of the collectors. I further employ a magnet provided with a loose core for making, breaking, or changing the direction of the electric current.

My invention further consists in certain novel features of construction, all as hereinafter described and claimed.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 is a plan view, partly sectional, of my improved dynamo-machine and current-regulator. Fig. 2 is a vertical longitudinal section on line *x x*, Fig. 1. Fig. 3 is an end view of the generator and section of the regulating-magnet. Fig. 4 is a transverse section on line *y y*, Fig. 1. Fig. 5 is a cross-section of the commutator. Figs. 6 and 9 are end views of the same slightly modified. Figs. 7 and 8 are sectional views, showing modifications in the arrangement of the commutator.

D′ is the supporting base-plate of the machine. A′ is the armature-shaft, supported upon the base D′ by pillow-blocks D D, and E E are the field-magnets. A is the armature, formed, as shown in Figs. 1, 2, and 4, of iron end pieces, a', connected to the shaft A′, between which are disks a, of iron, the whole being bound together by bolts a^2, extending from one head a' to the other.

b b are induction bars or wires extending longitudinally of the armature, and bent at both ends to correspond with the shape of the armature. These bars connect with the commutator-bars b', and in order to give rigidity to the bars when in place, and at the same time utilize the cooling effect of the surrounding air, they are insulated at intervals from each other and from the armature A by insulating-bands a^3. The induction-bars b are connected to the commutator-bars b' and to the bars b^3 of connector by any suitable means, and upon the shaft A′ is a disk, b^2, beveled to take upon the bars b' of the commutator, and insulated therefrom, so as to clamp the bars in place. The commutator and the connector are upon the shaft A′, at opposite ends of the armature, and where economy of space is required, or where a double-bar generator is constructed, a connector can be placed within one end of the armature, as shown in Fig. 2; or the commutator may be placed within the end of the armature and an external connector used, as shown in Figs. 7 and 8. The commutator, as shown most clearly in Figs. 2 and 5, is formed of metal disks C, fitted around an insulated binding-sleeve upon the shaft A′, and also insulated from each other; or, in place of the sleeve, the disks may be clamped by longitudinal bolts c^2, as shown in Fig. 6. These

disks are formed with projections c', which engage alternately with the bars b'. The brush-holders F are carried by a swiveling arm, f, which is insulated from the holders, and the arm f is adjusted by means of a nut, f', and screw f^2.

On the end of the armature-shaft A′ is a bevel-gear wheel, G, which engages with bevel-wheels G′ and G², the gear-wheel G′ being upon a transverse shaft, a^4, and G² upon a sleeve, g, that is loose upon the shaft a^4. g^2 and g^4 are pinions, one on sleeve g and the other on the shaft a^4, and g' and g^3 are gear-wheels engaged by the pinions g^2 g^4, respectively, the two wheels g' g^3 being loose upon a secondary shaft that is supported at one side of and parallel to the shaft a^4. g^6 is a clutch on the shaft of the gear-wheels g' g^3, and attached thereto by a feather, so that it may move sidewise for engagement with clutch-teeth on the sides of the wheels g' g^3. The screw f^2, before mentioned, is attached to the end of the shaft carrying the wheels g' and g^3 by means of a universal joint at g^7. g^8 is an armature-lever pivoted at g^9, and connected to a sleeve, g^5, on the clutch g^6.

K K′ are electro-magnets placed at opposite sides of the outer end of the armature-lever g^8, and provided with springs K³, that act to retain the armature in a middle position.

At H, Figs. 1, 2, and 3, is an axial magnet provided with an iron core, h, that is loose, so that it is free to move in response to changes of strength in the current. The core rests upon a spring, h', which serves to counteract the weight of the core and action of the current thereon, and this spring is adjustable by a screw, so as to regulate the resistance by its tension. i are binding-posts connected by metal strips i' to blocks i^2, the blocks being secured to the core h, one or both being insulated from the core. i^3 are adjustable contact-screws. i^5 i^5 are binding-screws connected to strips i^4 i^4. i^6 i^6 are bridges carrying adjustable contact-screws i^7 i^7, insulated from each other, and I I are the terminals of the helix, which may be connected in either a shunt or derived circuit, or in the main circuit of the generator, and the binding-posts i i are to be connected to the generator by either of the methods named; but both terminals I and binding-posts i are shown in the drawings connected in shunt-circuits. The contact mechanism of the magnet H is connected in any suitable manner with the magnets K K′ for operation of the armature-lever g^8.

The operation of these parts is as follows: In the rotation of the armature a current is set up in one upper wire or bar, b, and this current is communicated to a corresponding upper commutator-bar, and through the disks C, by any suitable connection, to the lower commutator-bar, induction-bar, and thence to the bar of the connector at the opposite end of the armature; thence through a second inductive bar and a second commutator-bar and disk, a second lower inductive bar, through a second internal and external commutator-bar, disk, and so on, thereby forming a complete closed circuit of the inductive wires or bars, commutator-bars, and inclosed disks. The currents will pass out, say, at brush T to holder F, and back through the other brush and holder, T′. The whole or part of such current is to pass through the terminals I I of the magnet H and the posts i i, and when the current passing through the terminals I attains a strength sufficient to counteract the tension of the spring h' the core h will be drawn down and the adjusting-screws i^3 i^3 thereby brought in contact with the strips i^4 i^4, and this contact will close the circuit through the conductors i' i', blocks i^2 i^2, adjusting-screws i^3 i^3, and conductors i^4 i^4 to and through the conducting-wires, closing the circuit on the magnet K′. The magnet K′ will then move the armature-lever g^8 and cause the clutch g^6 to engage the wheel g^3, and the shaft carrying the screw f^2 being thereby rotated the swiveled arm f will be moved in the direction to carry the brush-holders and brushes away from the neutral point, and this operation will continue until the current is reduced to its normal electromotive force, when the core h, rising, will break the circuit through the magnet K′, and the armature g^8 will move to a central position.

Should the current become weakened from any cause, the core h will rise and the blocks i^2 will be carried in contact with the adjusting-screws i^7, and the circuit will be closed to the magnet K, which will move the clutch into engagement with the wheel g', causing a reverse movement of the screw f^2 and the moving of the brushes back to the neutral point. In this manner the mechanism acts automatically to retain the current at a normal strength.

In Figs. 6 and 9 the commutator-bars b' are shown made of two bars, b^4 b^5, insulated from each other, and with which the projections c' of each of the disks C engage, respectively—that is to say, one of the projections of one of the disks will engage with the inner bar, and the other projection of the said disk with the outer bar on the opposite side, one projection of the next disk engaging with the outer bar and the other with the inner opposite bar, and so on throughout the whole series of disks. By this construction only the outer bars are subjected to wear, and they only need be removed when worn, thereby obviating the necessity of removing the entire bar and a saving of material.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. In a dynamo-electric machine, the combination, with an armature consisting of a series of insulated disks secured between two heads, of induction-bars having their ends bent downward, and secured, respectively, to the bars of the commutator and connector, and the insulating-bands a^3, substantially as herein shown and described.

2. In a dynamo-electric machine, the combination, with an armature having one or both ends of its core recessed, of a commutator and

connector arranged within said recessed ends and connected together, substantially as herein shown and described.

3. In a dynamo-electric machine, the combination, with the armature A, consisting of the heads a', one of which is recessed, the insulated disks a, and bolts a^2, of the induction-bars b, the bars b', and commutator connector-bars b^3, substantially as herein shown and described.

4. In a dynamo-electric machine, the combination, with the brush-holders F, of the arm f, provided with nut f', the swiveled screw f^2, and intermediate mechanism for operating it from the armature-shaft, substantially as herein shown and described.

5. In a dynamo-electric machine, the combination, with the brush-holders F, the arm f, provided with the nut f', the screw f^2, and shaft g^7, of the electro-magnets K K', armature-lever g^8, springs K^3, clutch g^6, pinions g' g^3, and means for operating said pinions, substantially as herein shown and described.

6. In dynamo-electric machines, the combination, with the armature-shaft, of the beveled gearing G G' G^2, the shaft a^4, the sleeve g, pinions g^2 g^4, gear-wheels g' g^3, and shaft provided with a screw, f^2, substantially as shown and described.

7. In a dynamo-electric machine, the combination, with the magnet H, strips i^4, and the bridges i^6, having contact-screws i^7, of the loose core h, provided with the blocks i^2, having the contact-screws i^3, substantially as and for the purpose set forth.

8. In a dynamo-electric machine, the combination, with the magnet H, provided with strips i^4 and contact-screws i^7, of the loose core h, provided with blocks i^2 and contact-screws i^3, and the spring h', substantially as herein shown and described.

9. In a dynamo-electric machine, a commutator consisting of the bars b', and a series of insulated disks, C, clamped together, and provided with projections c', substantially as herein shown and described.

J. EDWIN GILES.

Witnesses:
W. F. MARTZ,
G. F. KISNER.