(No Model.)

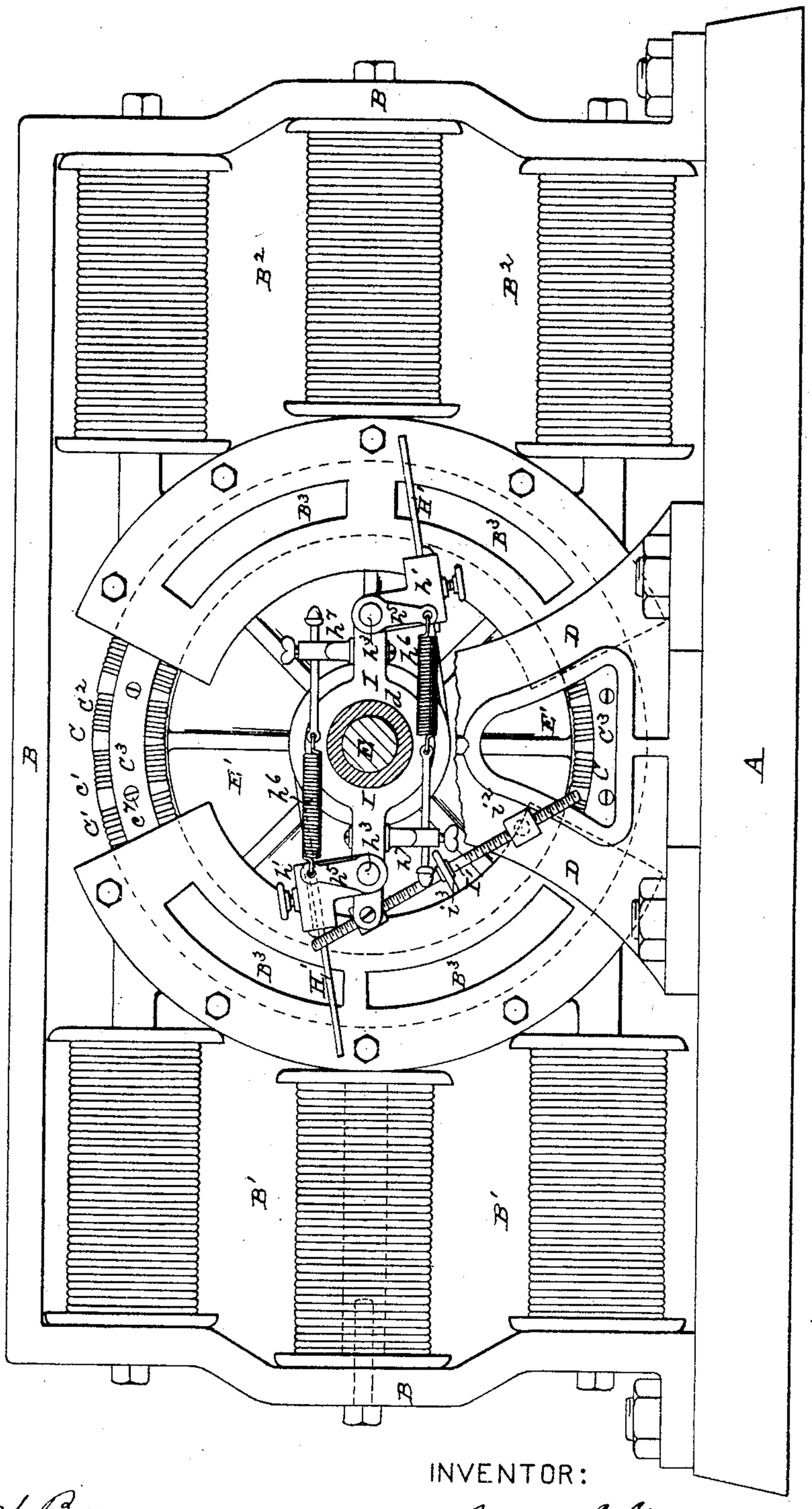
3 Sheets—Sheet 1.

C. HEISLER.

DYNAMO ELECTRIC MACHINE.

No. 260,480. Patented July 4, 1882.

FIG. 1.



ATTEST:

Robert Burns

A. Habig

INVENTOR:

Charles Heisler

(No Model.) 3 Sheets—Sheet 2.

C. HEISLER.

DYNAMO ELECTRIC MACHINE.

No. 260,480. Patented July 4, 1882.

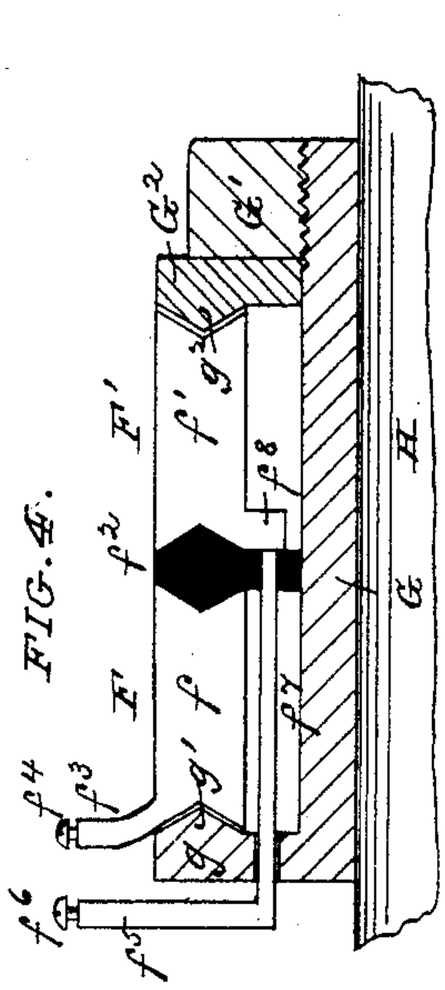


FIG. 4.

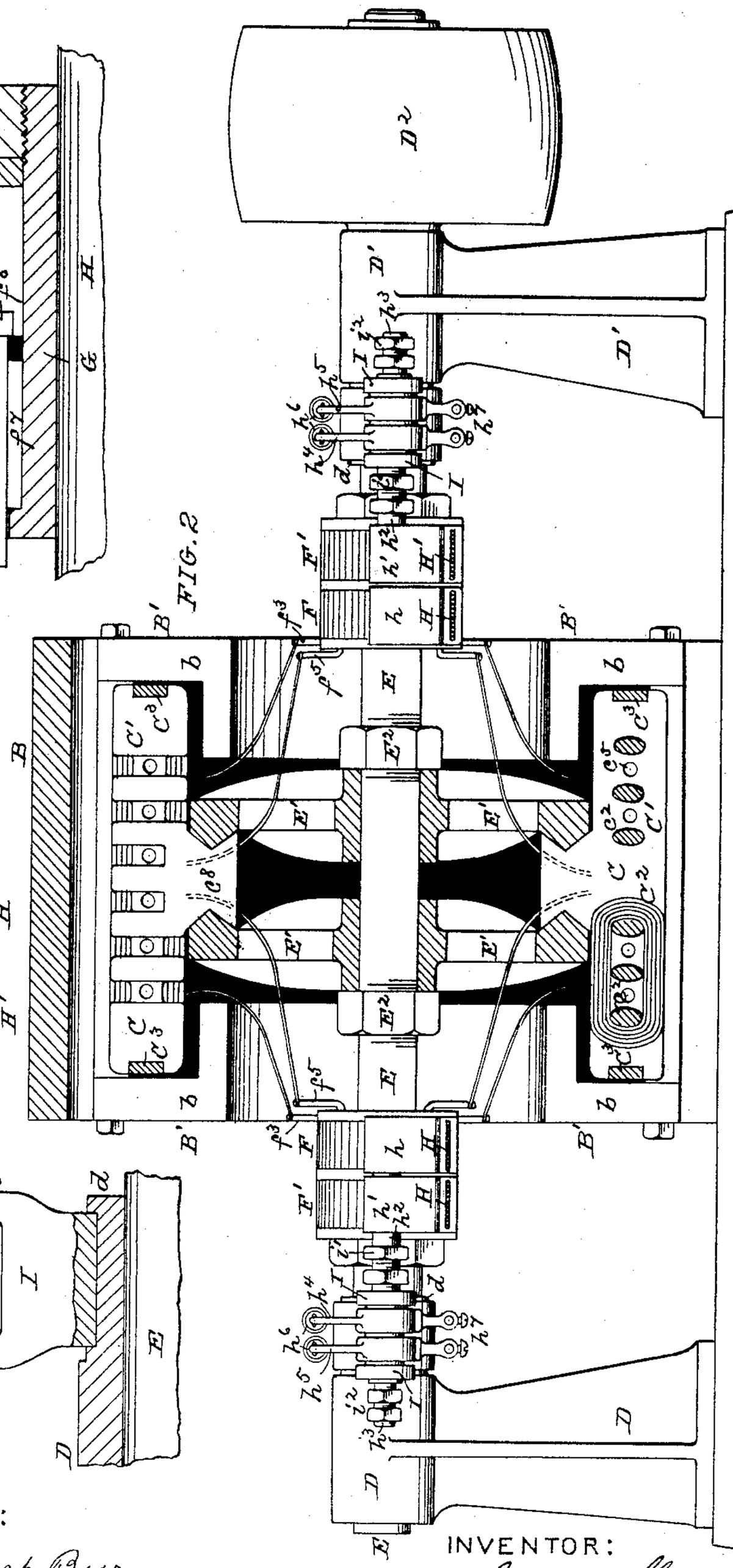


FIG. 2

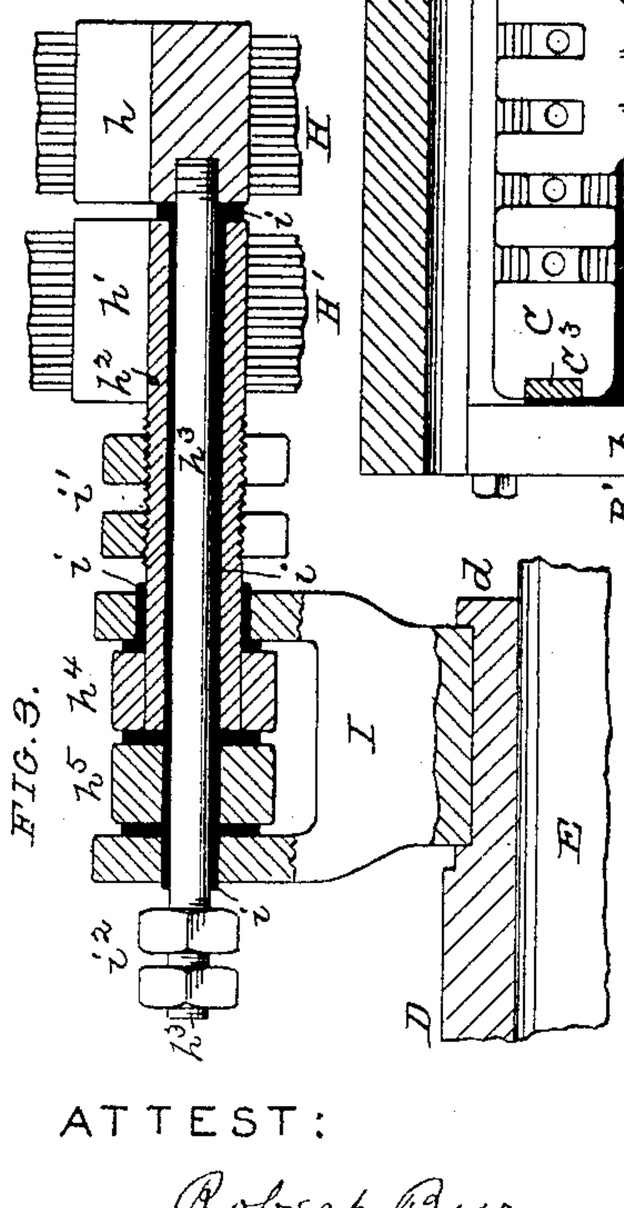


FIG. 3.

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(No Model.) 3 Sheets—Sheet 3.

C. HEISLER.

DYNAMO ELECTRIC MACHINE.

No. 260,480. Patented July 4, 1882.

FIG. 5.

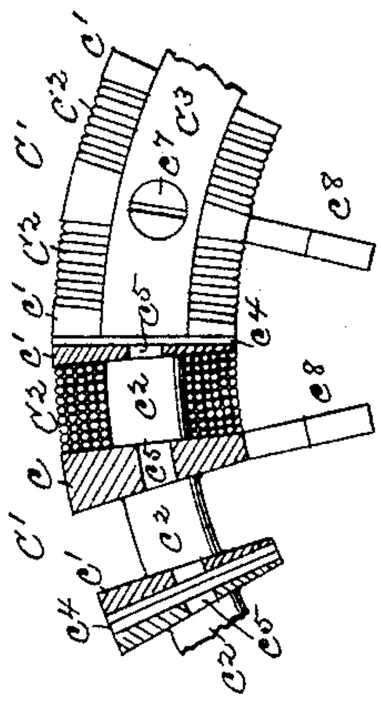

FIG. 8.

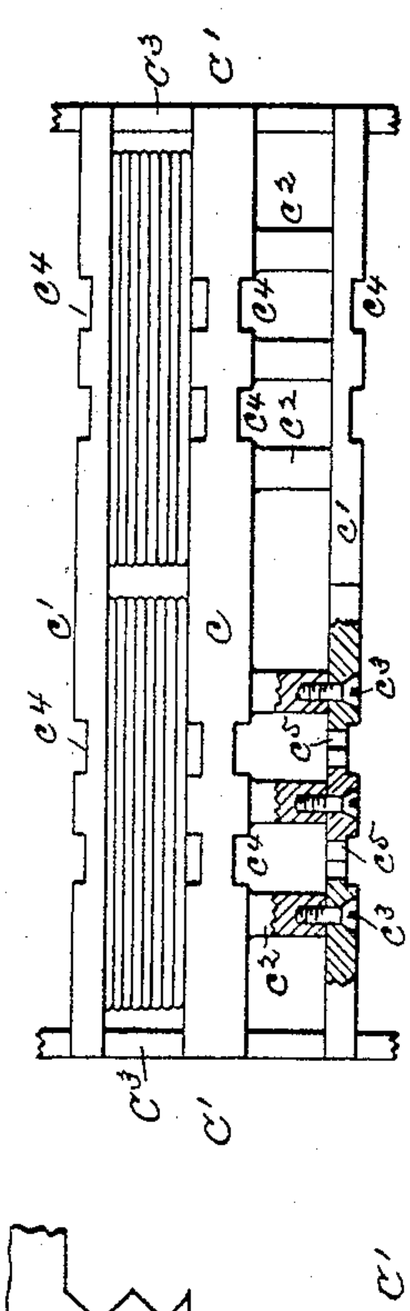

FIG. 10.

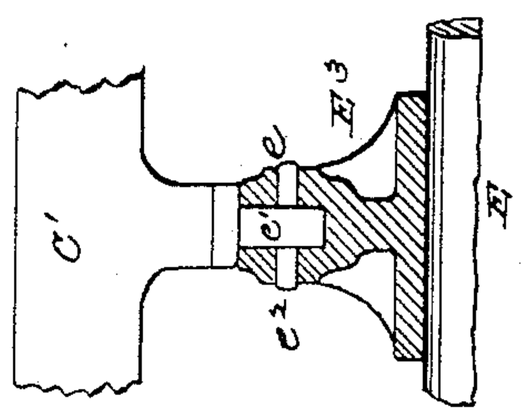

FIG. 6.

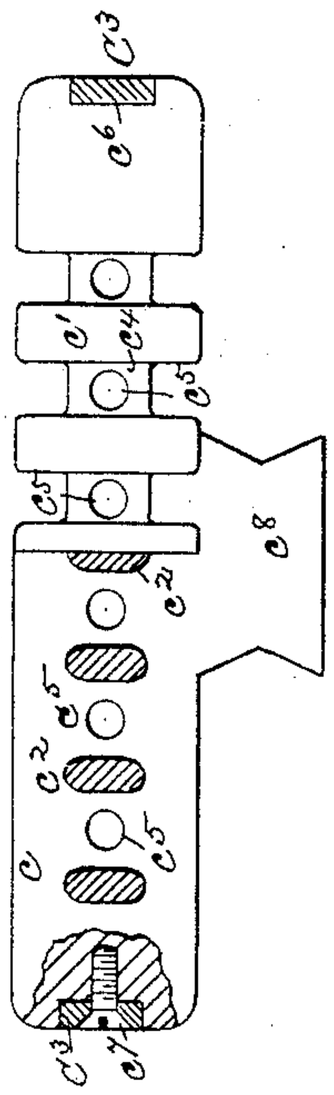

FIG. 9.

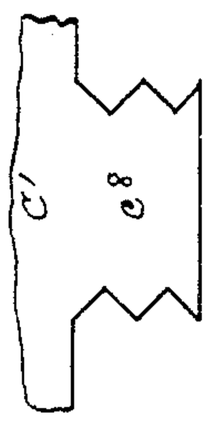

FIG. 7

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UNITED STATES PATENT OFFICE.

CHARLES HEISLER, OF ST. LOUIS, MISSOURI.

DYNAMO-ELECTRIC MACHINE.

SPECIFICATION forming part of Letters Patent No. 260,480, dated July 4, 1882.

Application filed July 12, 1880. (No model.)

To all whom it may concern:

Be it known that I, CHARLES HEISLER, of St. Louis, State of Missouri, have invented certain new and useful Improvements in Dynamo-Electric Machines; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a side elevation with parts removed. Fig. 2 is an end view with armature and field-magnet in section. Fig. 3 is an enlarged detail sectional plan of the double brush-holder. Fig. 4 is an enlarged detail section of the double commutator. Fig. 5 is a detail end view, partly in section, of a portion of the armature. Fig. 6 is a detail side view, partly in section, of one stave or section of the armature. Fig. 7 is an under perspective view of the same. Fig. 8 is a plan view, partly in section, showing the construction used when two or more bobbins are placed on each section. Figs. 9 and 10 are modified forms of the manner of securing the armature staves or sections to the axle or driving-shaft.

The object of this invention is to construct a machine by which a greater amount of magnetism is produced with a given amount of material, and within a given amount of space, than has heretofore been accomplished in dynamo-electric machines, the construction and arrangement being such that three-fourths ($\frac{3}{4}$) or over of the armature wires or bobbins are exposed to the direct influence of the field-magnet. By means of this feature—the exposure of the greater part of the armature-bobbins to the influence of the field-magnet—the use of iron in said armature-frame can be dispensed with, and any suitable diamagnetic material be used, for the reason that the armature-bobbins in the present construction are under a more direct and greater influence of the field-magnet than in any other known construction, and I am thus enabled to overcome the great difficulty met with in all dynamo and magneto electric machines—namely, the heating of the armature—as it is a well-known fact in the art that the main cause of an iron armature becoming heated is the rapid molecular movement in the iron, due to the rapid change in the polarity of the same; also, an iron armature will require a greater motive power to rotate it within the field-magnet than a diamagnetic armature, owing to the natural attraction of the field-magnet for an iron armature.

My invention consists in the provision, in a sectional armature composed of a series of longitudinal staves, of a number of radial and annular ventilating openings or passages which communicate with the center of the armature-bobbins, and by means of which the bobbins are supplied with a current of air and perfectly ventilated, with the following advantages: that it overcomes the danger of destroying the insulation of the bobbins and diminution of electro-motive force of the machine, and consequently with less motive power, and a smaller and lighter machine gives a better result, a more uniform current, and an absolutely-reliable machine.

My invention further consists in the provision in the armature of a multiple arrangement of separate bobbins on each section or stave of the armature-frame, which need not be wound directly on said sections, but which can be wound separately and secured on the tangential studs of the staves by means of screws and washers, as will hereinafter more fully appear. The object of this arrangement is to obtain a direct division of the total currents generated in said armature and avoid the necessity of the division of the current when more than one current or light are needed out of a single-current machine, which latter and ordinary construction has the following marked disadvantages: The machine will require to have a greater internal resistance, and therefore require a greater amount of motive power to obtain a given result. When the machine has more than one lamp in the circuit, and when but a single light is needed, the resistance in the line will have to be the same as if all the lights were burning, and consequently the applied motive power will have to be the same whether one or all lights are used. With the present construction but one lamp is used in a circuit of a section of the armature and field-magnet, and therefore the internal resistance of the machine is in proportion to the resistance of such circuits. Consequently by releasing—or not wanting—one or more of the lights, the motive power will be relieved precisely in proportion as said lights are dispensed with, and the speed of the machine does not require to be

changed. The intensity of any one light will not be changed by the starting or stopping of any or all the other lights, for the reason that in my system each section supplies its own light, exercising only a certain portion of the field-magnet.

My system and construction have the further advantage that they allow of the current being taken from short sections of wire, thereby overcoming in a great measure the difficulty of sparks on the commutator-brushes.

My invention further consists in the construction and arrangement of separate brushes and commutators for taking up the separate currents from the armature, as hereinafter more fully described.

My invention further consists in covering the most dangerous portions of the armature-frame and other portions of the machine with a covering of enamel, fused granite, &c., so as to obtain a perfect insulation of the same, as it is well known to the art that if any portion of the wires of the machine are in contact with the metal the machine would be rendered useless, which is a danger very liable to occur, especially at the edges where the wires are bent, owing to the expansion and contraction of the parts due to the great and frequent change of the temperature in the machine.

My invention further consists in certain details of construction, as will hereinafter more fully appear.

To the base A is firmly secured the frame B, which carries duplicate series of field-magnets B′ B², arranged as shown in the drawings, the inner face of which is semicircular in form and surrounds the rotating armature C, secured to the axle E of the machine. D D′ are the axle bearings or standards, and D² the driving-pulley.

The armature C is composed of a series of separate staves or sections, C′, consisting of a central flat bar, *c*, united to side bars, *c′*, by pins or studs c^2, upon which the armature-bobbins C² are placed.

Although each armature-section may be wound with a single coil or bobbin extending its whole length, it is preferable to place two or more short bobbins on each section, as clearly indicated in Figs. 7 and 8; and in order to allow the bobbins or coils to be wound in the most perfect and easy manner the same can be wound on a lathe and afterward placed on the studs c^2, and secured thereon by means of the plates *c′*, secured to the main portion of the section by means of screws c^3, as clearly indicated in Fig. 8.

The plates *c′* may be a single piece extending the whole length of the section, or merely separate washers for each bobbin.

In order to perfectly ventilate the armature, the parts are constructed as follows: The bars *c c′* have a series of radial air-passages, c^4, extending from the interior to the exterior of the armature, and these passages open by means of tangential openings c^5 into the interior of the bobbins, so as to form annular air-passages extending through the entire set of bobbins at a uniform distance from the axis, and permit of a circulation of air to take place through the center of the bobbins, so as to keep the same cool and prevent the heating of the same, and consequent destruction of the insulation.

The sections or staves C′ are secured together by means of circular rings C^3 at each end, which enter slots c^6 of the staves, and are secured therein by set-screws c^7, as clearly indicated in Figs. 5, 6, 7, and 8.

The sections or staves are secured to the axle in the following manner: The central bars, *c*, of the sections have inwardly-projecting lugs c^8, formed with inclined V-shaped faces, that are engaged by V-shaped ridges on the clamping-disks E′ on the axle E, which are drawn together to firmly hold the sections C′ in proper position by means of screw-nuts E² on the axle, as clearly indicated in Fig. 2.

Instead of the nuts E² for drawing the disks E′ together, a gib and key may be used to effect the same purpose. Again, instead of a single V-shaped face on the lug c^8, a number of V's may be formed on the same to effect the same result, as indicated in Fig. 9. A modified arrangement for securing the staves or sections C′ to the axle E is shown in Fig. 10. In this E³ is a hub keyed or otherwise secured to the axle, and having a number of radial sockets, *e*, for the reception of the radial stems *e′* of the sections, which are keyed in said sockets by means of pins e^2.

It will be seen that in my improved manner of fastening the armature at its center to the axle only a narrow portion of the same is taken up by such fastening, and therefore I am enabled to carry the field-magnet around the greater portion of the inner periphery of the armature, and thus obtain a very perfect exposure of a greater portion of the armature-bobbins to the influence of the field-magnet than has heretofore been obtained.

By my sectional construction of the armature and the mode of fastening to the axle I am enabled, when required, to take out any one or more sections without disturbing in any way the remaining sections.

In order to allow of the introduction and removal of the armature from the inside of the field-magnet, one or both sides *b b* may be made removable and secured in place by stud-bolts, as clearly indicated in Fig. 2.

If desirable, the field-magnet may be slotted at B³, or at any other desired place, to allow for ventilation.

The commutator F is composed of a series of segmental pieces, *f f′*, of metal, with insulating material between them, as usual. With my construction, when used to take four separate currents direct from the armature, as hereinbefore described, I have made the commutator at each end of the machine double in the following manner:

G is a sleeve surrounding the axle and having an upturned flange, *g*, the inner face of which has a circular projection, *g′*, which en-

gages in recesses in the ends of the segment-pieces *f*, and is properly insulated from the same in any usual manner.

G′ is a nut screwing on the sleeve G and against a movable collar, G², having a circular projection, g^2, engaging in recesses in the ends of the segment-pieces *f′*, and properly insulated from the same. Between the series of segment-pieces *f* and *f′* is arranged an insulating-ring, f^2, as clearly indicated in Fig. 4.

f^3 are projecting studs or posts for the segment-pieces *f*, having set-screws f^4 for the attachment of their wires from the armature-bobbins. Similarly, f^5 are the projecting studs or posts for the segment-pieces *f′*, provided with set-screws f^6 for the attachment of their wires from the armature-bobbins. Each stud or post f^5 is connected to its segment-piece by an extension, f^7, passing through the flange *g′* of the sleeve G and under the segment *f*, and screwing into the inwardly-projecting lug f^8 of the segment-pieces *f′*, and properly insulated from the collar *g*, segments *f*, and axle E by means of insulating material of any kind.

Each section F F′ of the commutators has its separate set of brushes H H′ for collecting the generated current in its set of armature-bobbins, the holders of which brushes are connected and insulated from each other in the following manner:

I is an adjustable bracket-piece, turning on an extension, *d*, of the bearing-collar of the standard D, and supporting the brush-holding devices, which consist of the brush-holders proper, *h h′*, turning-shafts h^2 h^3, arms h^4 h^5, adjustable springs h^6, with their holding-posts h^7 arranged in duplicate, as shown. The shafts h^3 of the inner sets of brushes, H, pass through the hollow shafts h^2 of the outer sets of brushes, H′, and are insulated from the same by means of insulating sleeves and collars *i i*, as clearly shown in Fig. 3, and each shaft has its separate binding-nuts *i′* i^2 for making a good connection between the conducting-wires of the machine and the brushes, a very flexible wire being used, forming the movable conductor to allow for the usual movement of the brushes caused by irregularities in the commutators caused by wear and tear of the same.

In order to adjust the brushes to the neutral line of the magnetic field, I have made the carrying-frame I circularly adjustable by means of a screw-shaft, I′, screwing through the end of the frame I and through a turning nut, i^2, on the standard D′, and provided with a thumb-wheel, i^3, by which it is operated.

Instead of collecting all the separate positive and negative currents of the machine with separate brushes insulated from each other, the total, if desired, of either the positive or negative currents may be collected and transmitted by a single brush, in which case the brush would be wide enough to cover both commutators, or two brushes be used without any insulation between them.

I am aware that prior to my invention magneto and dynamo electric machines have been constructed so as to deliver more than one current direct from the armature spools or bobbins; also, that the armature-frame of such machines have been made in sections and provided with ventilating-passages for the passage of currents of air to prevent heating of the bobbins; also, that it is not new to form the ends of the commutator-strips beveling and held in place by clamping-rings.

I am also aware that prior to my invention insulators for telegraph-lines have been enameled.

I am also aware that field-magnets having recesses or slots have heretofore been made; but,

Having fully described my said invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A sectional armature-frame composed of a series of staves arranged parallel with the axis of the same, and each stave carrying two or more separate and independent bobbins arranged end to end upon each stave, as described, and for the purpose set forth.

2. The combination, in the armature of a dynamo-electric machine, of the sections or staves C′, having studs e^2, for holding the bobbins C², and screws c^3 and plates or washers *c′* for securing said bobbins in place, substantially as and for the purpose set forth.

3. The sectional armature-frame of a dynamo-electric machine, composed of a series of longitudinal staves jointed radially together and having radial air-passages c^4 and perforations c^5, which form passages that pass through the entire series of bobbins at a uniform distance from the axis, substantially as and for the purpose set forth.

4. The armature-sections C′, having inwardly-projecting lugs c^8, in combination with the clamping-disks E′, axle E, and nuts E², or their equivalents, as and for the purpose set forth.

5. In a dynamo-electric machine generating two or more distinct currents, the armature spools or bobbins C², in combination with two or more separate commutators, F F′, the outer commutators, F′, having connection with their bobbins by conducting-wires f^7, passing underneath the inner commutators, F, as described, and for the purpose set forth.

6. The combination of the turning frame I, carrying the brush-holders H H′, &c., with the adjusting-screw shaft I′, as and for the purpose set forth.

7. A magneto-electric machine having its armature or other portions covered with a coating of enamel, fused granite, &c., for the purpose set forth.

CHARLES HEISLER.

Witnesses:
ROBERT BURNS,
A. W. HOIG.