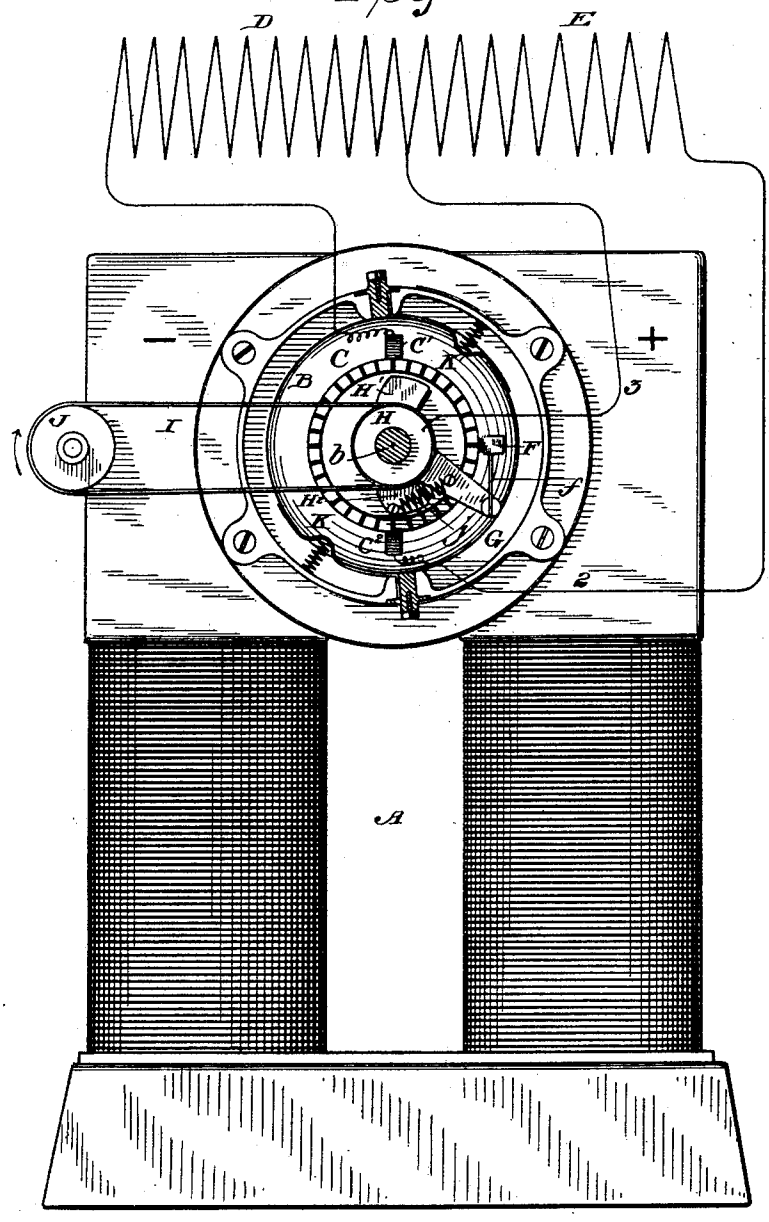
(No Model.) 3 Sheets—Sheet 1.

C. J. VAN DEPOELE.

GENERATOR FOR ELECTRIC ENGINE CIRCUITS.

No. 435,261. Patented Aug. 26, 1890.

Fig. 1.



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Stephen Jarman

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Frankland James.

(No Model.) 3 Sheets—Sheet 2.

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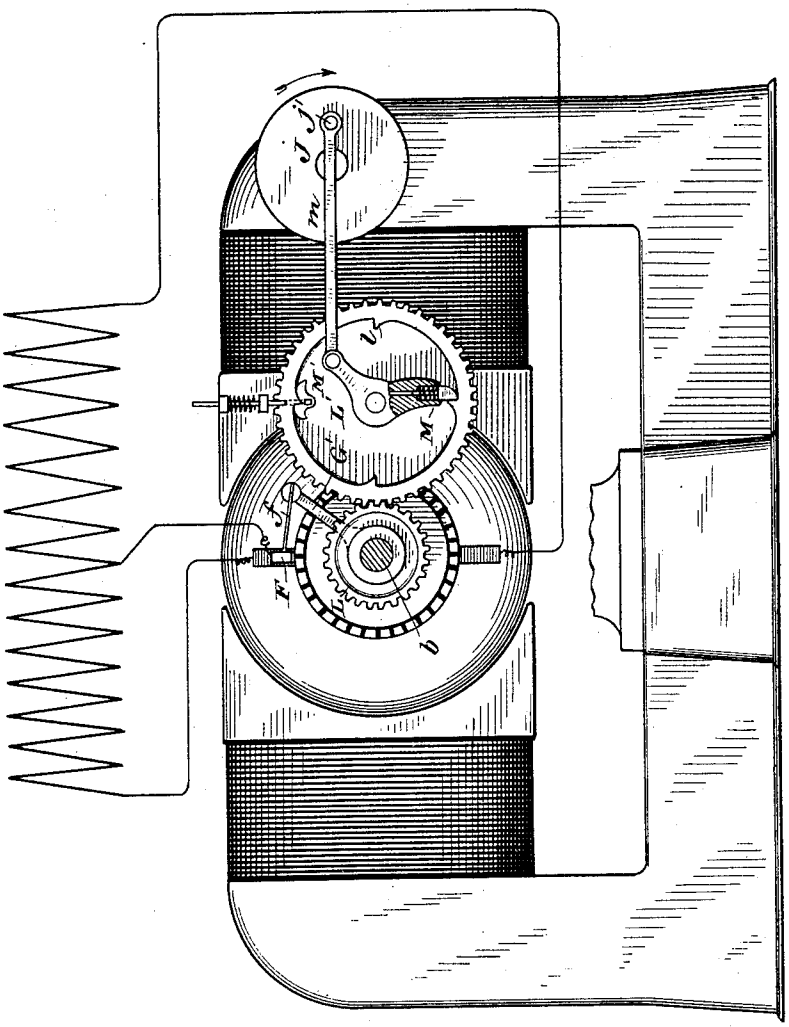

Fig. 2.

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(No Model.) 3 Sheets—Sheet 3.

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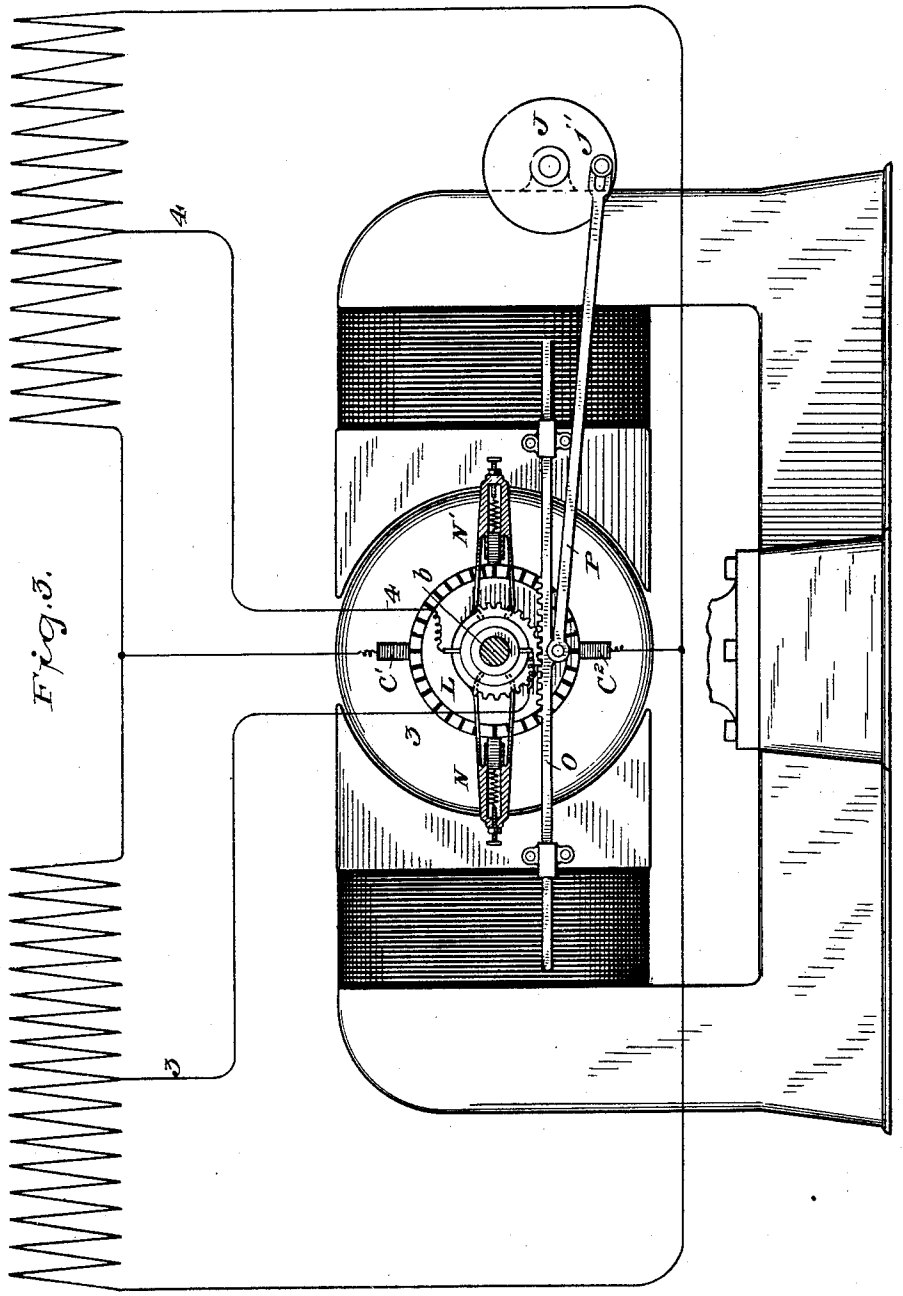

Fig. 3.

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UNITED STATES PATENT OFFICE.

CHARLES J. VAN DEPOELE, OF LYNN, MASSACHUSETTS.

GENERATOR FOR ELECTRIC-ENGINE CIRCUITS.

SPECIFICATION forming part of Letters Patent No. 435,261, dated August 26, 1890.

Application filed April 10, 1890. Serial No. 347,382. (No model.)

To all whom it may concern:

Be it known that I, CHARLES J. VAN DEPOELE, a citizen of the United States, residing at Lynn, in the county of Essex and State of Massachusetts, have invented certain new and useful Improvements in Generators for Reciprocating Electric-Engine Circuits, of which the following is a description, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon.

The present invention relates to improvements in generators for reciprocating electric-engine circuits.

The object of the invention is to transmit to the circuits of reciprocating electric engines, which may be of the type covered by my patents Nos. 400,809 and 401,231, currents having a defined rise and fall, and at the same time to determine the character of said currents, so that their rise and fall shall be very clearly marked and distinct.

In Letters Patent heretofore granted to me—for example, No. 422,855, dated March 4, 1890, and the several divisions thereof bearing even date—mechanism for producing said defined currents is shown, described, and claimed; and the object of the present invention is principally to produce a sharper definition in the said current—that is to say, to produce a more acute angle in a curve representing their rise and fall—the object being to create a more rapid increase and decrease in the magnetic field produced by coils in circuit with such a machine, and thereby when the same is applied to reciprocating electric engines, as mentioned in my said prior patent, a more rapid and powerful movement of the piston.

The invention may of course be applied to any purpose for which it is suited, but will be described and claimed in connection with the coils of a reciprocating engine.

The mechanism by which my invention is carried into effect includes a moving commutator brush or brushes, as set forth in my patent No. 422,855, the said brush or brushes being given an accelerated movement during part of their stroke, as will be hereinafter fully set forth, described, and referred to in the appended claims.

In the drawings, Figure 1 is a view in elevation showing an electric generator provided with mechanism embodying the invention, and also with a translating-circuit. Fig. 2 is also a view in elevation showing a generator embodying the invention and a translating-circuit, the specific mechanism for moving the brush being somewhat different. Fig. 3 is also a view in elevation, the same representing the invention in slightly-different form, and parts thereof being in section.

Referring to the drawings, A, Fig. 1, represents a dynamo-electric generator, which may be of any form of the continuous-current type.

B is the armature and C the commutator.

C′ C^2 are the main commutator-brushes, which are suitably sustained upon the line of commutation and connected by conductors 1 2 with opposite ends of motor-coils D E. A third moving commutator-brush F is provided which is connected by conductor 3 with the inner terminals of the coils D E.

The brush F is flexibly connected, as by a connection *f*, to an arm G, which is rotatably mounted upon the armature-shaft *b*. Upon said shaft *b* is also mounted a collar H, which is provided with lugs or projections H′ H^2 and formed to receive a belt I or other means for communicating rotary movement from a pulley J, which is to be constantly rotated by any suitable means, but preferably by an electric motor, as shown in my patent No. 422,855.

It must be understood that the means for imparting rotary motion to the moving brush-carrying devices form no essential part of the invention, since the same may be accomplished in various ways without departing therefrom, and that the form shown is merely by way of illustration.

The arm G is free to move upon the shaft *b*, but is connected to the driven part H by a spring *j*, and consequently if unobstructed the arm G and brush F would travel around the commutator in accordance with the movement of the collar H. It being desired, however, to impart great rapidity of movement to the brush F during portions of its travel, I place yielding obstructions K K′ in the path of the arm G at such points in its travel as will produce the effect sought. The pulley J being in motion will transmit its movement to the collar H and connected parts, and the arm G and commutator-brush F will move in ac-

cordance with the motion of the pulley J until the said arm encounters the obstruction K, when its motion will be arrested, while the collar H continues to rotate, driven by the pulley J and belt I, thereby distending the spring *j*, and this will continue until the lug H′ in its movement reaches the arm G, when, being arranged to engage the same, it will force said arm past the obstruction K. The arm G having been liberated from the obstruction, will now be moved rapidly forward under the influence of the spring *j*, until it has, so to speak, overtaken itself, when for a short distance it will move at normal speed—the speed of the collar H—until it reaches the obstruction K′, where it will be arrested, to be subsequently released by the lug H′ and make a rapid movement from its state of rest against the obstruction K′ toward the other obstruction K. This action will be repeated so long as the parts continue to move as described, the result being a spasmodic action of the current during portions of each revolution of the moving brush.

The mechanical effect here sought can be secured in a variety of ways—for example, as seen in Fig. 2, in which the freely-moving arm G is replaced by an arm G′, which is rotatably mounted upon the shaft *b*, the said arm being a continuation of or attached to a gear-wheel L rotatably mounted upon the said shaft *b*. A moving brush F is secured to the arm G′, as by springs *f*. The gear-wheel L is actuated by a driving-gear L′. The gear L′ is provided with a number of ratchet-teeth *l*, four being shown, and said teeth are adapted to be engaged by a spring-pawl M. A spring-stop M′ is also provided to hold the gear L′ and prevent undesired movement thereof. The pawl M is mounted upon the same axis as the gear L′ and is provided with an actuating-pitman *m*, which is connected to a crank *j′* on the pulley J. The rotation of the pulley J will, through the crank *j′* and pitman *m*, communicate movement to the pawl M. The pawl M being in engagement with one of the teeth *l* will during one part of the movement of the crank *j′* impart rotary movement to the gear L′, and through it the gear L to G′ and contact-brush F. Having partially rotated the gear L′, one of the teeth *l* will be caught by the stop M′ and held stationary until the pawl M is moved rearward to engage the next tooth *l*, when in its forward movement it will partially rotate the gears L L′ and brush-carrying arm. As shown, the driving-gear L′ is of such relative size as to move the brush-carrying arm twice around the commutator at each complete revolution. Consequently four teeth *l* are provided, so that the moving brush will travel half round the commutator at each stroke. These proportions may, however, be modified, if desired.

While in Figs. 1 and 2 I have shown only a single moving brush, it must be understood that any desired number of brushes may be moved by the same apparatus.

It is further stated that it is not essential to the present invention that the brushes should move completely around the commutator, an upward and downward movement toward and away from the points of maximum and zero electro-motive force sufficing also for the carrying out of the invention.

The last-mentioned arrangement is illustrated in Fig. 3, in which a gear-wheel L is mounted upon the armature-shaft *b*, as in Fig. 2, but is provided with two brush-carrying arms N N′, connected on opposite sides thereof. In this figure it will be noted that two translating-circuits are shown, said circuits resembling those seen in Figs. 1 and 2, and having their return-conductors 3 4 in electrical connection with the moving brushes N N′, respectively. As here shown, the brushes N N′ do not rotate around the commutator, but are caused to oscillate toward and away from the main stationary brushes C′ C^2, motion being communicated thereto by a horizontally-supported rack O, connected by a pitman P to crank-pin *j′* upon pulley J. One end of the pitman P has a slotted connection to cause delay between the movements of the brushes.

As shown in the several forms, the delay between the movements of the traveling brushes occurs when said brushes are in position to direct the flow of maximum current through one coil and minimum current through the other. In Fig. 1 this delay is obtained through the described action of the spring *j* and coacting parts.

Fig. 2 illustrates a different form, the delay occurring during the backward movement of the pawl M, while in Fig. 3 a similar effect is secured by the slotted connection between the connecting-rod P and its actuating mechanism.

The construction may be modified in many ways without departing from the invention. Therefore the invention is not limited to the details shown by way of illustration.

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

1. The combination, with a sectional commutator and a source of current, of stationary commutator-brushes on the line of commutation, a movable brush or brushes, and means for imparting to the moving brush or brushes a spasmodic movement toward and away from the stationary brushes, substantially as described.

2. The combination, with a sectional commutator and a source of electric current, of stationary brushes upon the commutator, a brush or brushes adapted to be moved toward and away from the stationary brushes, and means for intermittently actuating the moving brush or brushes and for imparting thereto a retarded motion, substantially as described.

3. The combination, with a sectional commutator and a source of electric current, of

stationary commutator-brushes on the line of commutation, and a movable brush or brushes adapted to be moved toward and away from the points of maximum and zero electro-motive force, and means for imparting a spasmodic movement to the moving brush or brushes and for imparting accelerated speed thereto during part of their travel, substantially as described.

4. The combination, with a sectional commutator and a source of electric current, of stationary brushes upon the commutator, a brush or brushes adapted to be moved toward and away from the stationary brushes, and means for spasmodically actuating the moving brush or brushes and for imparting thereto a variable speed, and suitable working-circuits supplied through the stationary and moving brushes, substantially as described.

5. The combination, with the motor-coils of a reciprocating engine, of a source of defined currents therefor comprising a sectional commutator supplied from said source, a set of stationary brushes upon said commutator and with which the outer terminals of the motor-coils are connected, a moving brush or brushes upon said commutator, and connections between the moving brush or brushes and the inner terminals of the motor-coil and by which the flow of current in said coils is controlled, and mechanism for moving the movable brushes toward and away from the stationary brushes, said mechanism acting to move the brushes more rapidly during one part of their travel than another, substantially as described.

6. The combination, with a sectional commutator and a source of current, of stationary commutator-brushes upon the line of commutation, connected motor-coils and connections between the outer terminals of said coils and the stationary brushes, a moving brush or brushes upon the commutator, and connections between the inner terminals of the motor-coils and the moving brushes, and means for imparting a spasmodic retarded motion to the moving brush or brushes, the retardation occurring when the current is maximum in one coil and minimum in the other, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

CHARLES J. VAN DEPOELE.

Witnesses:

FRANKLAND JANNUS,

STEPHEN JANNUS.