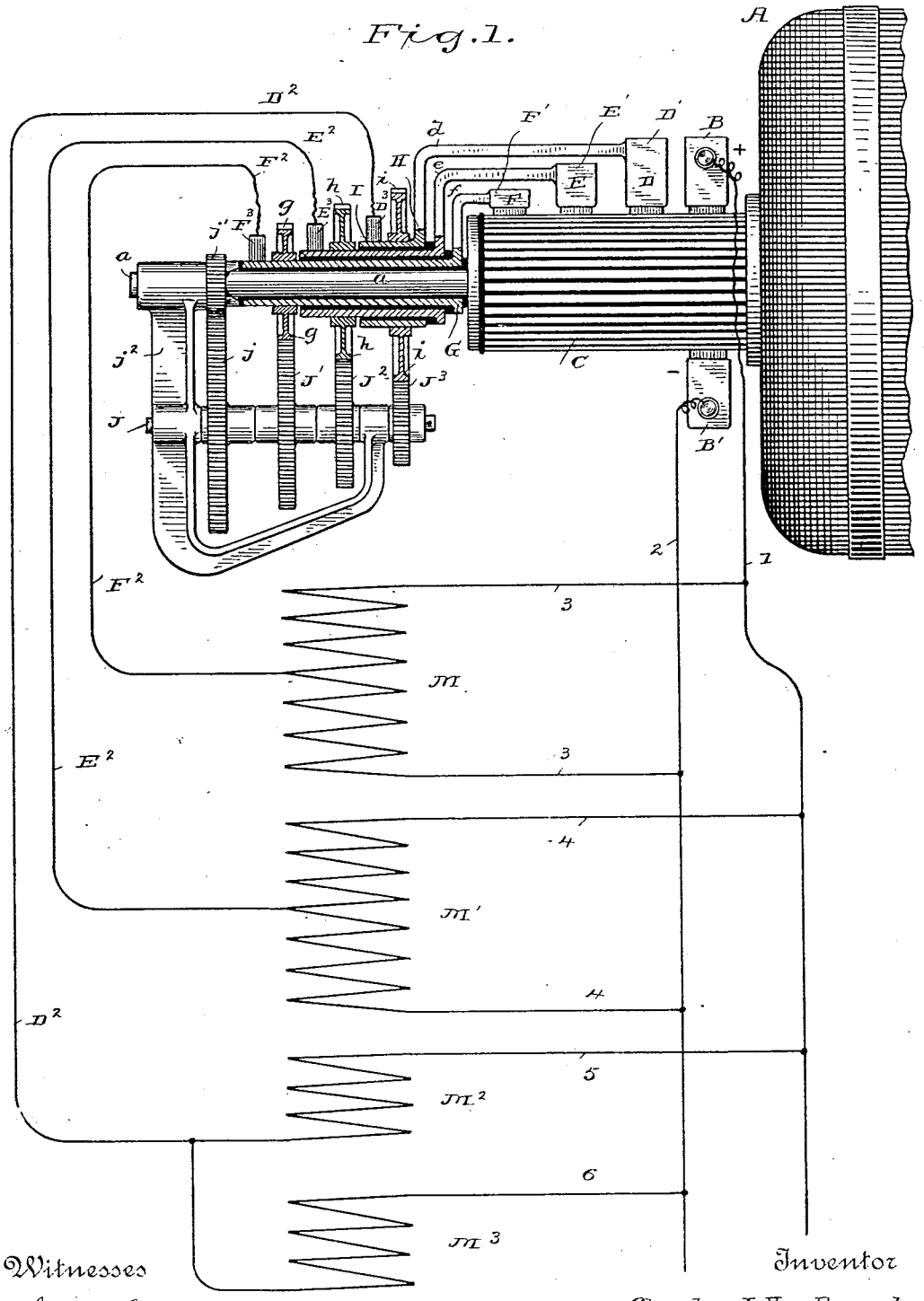
(No Model.) 2 Sheets—Sheet 1.

C. J. VAN DEPOELE.

MULTIPLE CURRENT PULSATING GENERATOR.

No. 422,860. Patented Mar. 4, 1890.

Fig. 1.



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(No Model.) 2 Sheets—Sheet 2.

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Fig. 2.

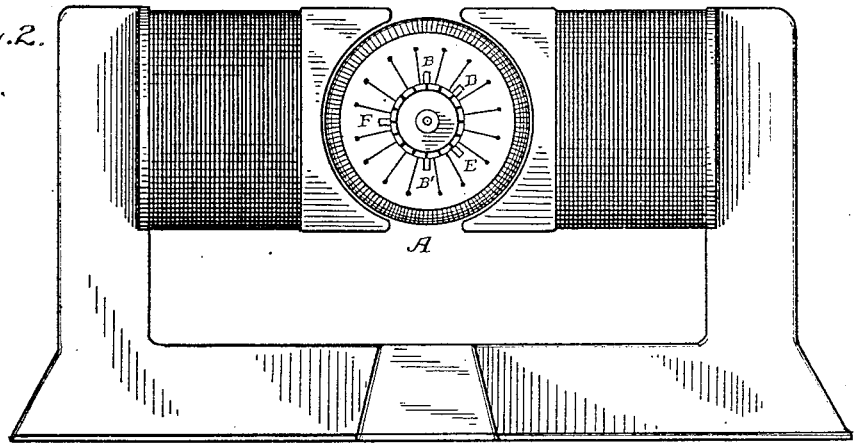


Fig. 3

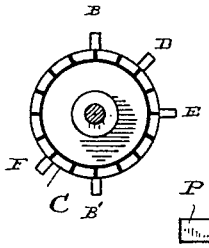


Fig. 6.

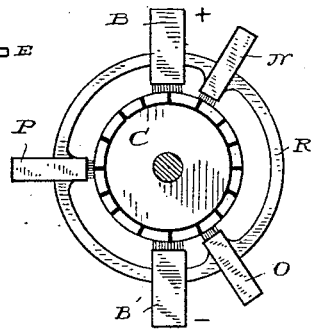


Fig. 4.

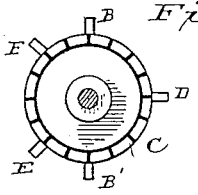
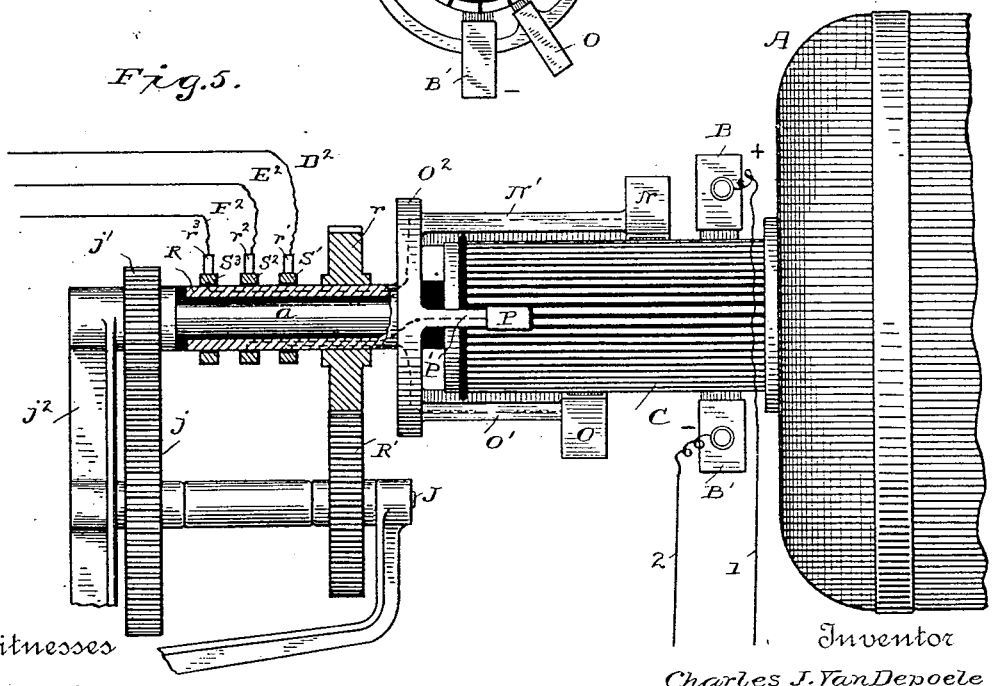


Fig. 5.



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UNITED STATES PATENT OFFICE.

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MULTIPLE-CURRENT PULSATING-GENERATOR.

SPECIFICATION forming part of Letters Patent No. 422,860, dated March 4, 1890.

Application filed October 4, 1889. Serial No. 326,025. (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 Multiple-Current Pulsating Generators, of which the following is a description, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon.

My invention relates to machines for the generation and distribution of electric currents.

The invention is more particularly adapted to the subdivision of currents and the transmission of same to a plurality of separate circuits.

The present invention is an improvement or a development of the invention shown, described, and claimed in a prior pending application filed March 23, 1889, No. 304,544, in which prior application a novel method of producing pulsating or alternating currents is set forth, which consists, broadly, in the combination, with a commutator connected to a source of continuous currents, of stationary brushes placed upon the diameter of commutation and connected to one or more of the conductors of the working-circuits, and a brush or brushes arranged to be rotated about the periphery of the said commutator and in electrical connection with the other side or sides of the circuit or circuits represented by the main stationary brushes.

By my present invention I not only subdivide the current at the commutator-cylinder, but I supply the same to separate circuits either in waves, impulses, or pulsations of equal period or phase or of unequal period or phase, as may be desired. In many workshops and factories diverse species of electrodynamic machines are employed for many purposes to the operation of which pulsating electric currents might be applied, the said machines producing their best results with current impulses of different durations. It will therefore be apparent that by the present invention means are provided for furnishing from a single source of current a number of pulsating currents of speeds varying with the requirements of the work.

In the drawings I have shown a three-circuit arrangement, the current phases differing in period in the three circuits. It will, however, be apparent that the relative times of the currents in the said circuits may be varied as desired. The invention is not, however, limited to the production of a plurality of pulsating currents of different speeds, since it will be perfectly evident that I may with equal facility employ the invention in connection with a number of separate circuits, all or a portion thereof being desirably supplied with currents of similar phase.

An important feature of the invention consists in supplying a plurality of pulsating currents from a single source, whether the said currents pulsate in synchronism or at different rates.

In the drawings, Figure 1 is a view in elevation showing a portion of a continuous-current armature, a commutator therefor, a plurality of commutator-brushes, with means for moving a portion thereof about the commutator, and circuits and connections arranged according to the invention. Fig. 2 is a view in elevation showing a dynamo-electric generator provided with a pair of stationary brushes and a plurality of moving brushes. Figs. 3 and 4 are theoretical views, each showing the commutator of a dynamo-electric machine provided with stationary and moving brushes, the said moving brushes being seen in different relative positions. Fig. 5 is a view in elevation, partly in section, differing from Fig. 1 only in the method of operating the moving brushes. Fig. 6 is a detail end view showing the commutator, the fixed and moving brushes, and the carrier for the moving brushes, as seen in Fig. 5.

As indicated in the drawings, A is a portion of a continuous-current armature, which, as pointed out in my said prior application, may be the armature of a continuous-current generator or the armature of a motor supplied with continuous currents and employed for the purpose of changing the continuous into pulsating currents.

C is a commutator of the ordinary sectional type, and B B′ are the main stationary commutator-brushes arranged in operative relation to the surface of the commutator C. Although the said brushes will be hereinafter referred to as stationary, it must be under-

stood that they are adjustable within the usual limits, in order that they may be shifted, if necessary, to keep the said brushes upon the diameter of commutation.

D E F represent three separate and independent commutator-brushes, each of which is carried by a suitable holder D′ E′ F′. The holders are sustained by arms *d e f*, said arms being connected to sleeves G H I. The said sleeves are rotatably mounted concentric with the armature-shaft *a*, but most thoroughly insulated therefrom, some species of insulating anti-friction material being interposed between each of said sleeves and the other sleeve and the armature-shaft. Pinions *g h i* are secured to each of the sleeves G H I, and when acted upon by suitable driving-gear serve to rotate the sleeves at relative speeds determined by the size of the pinions and the nature of the driving-gear. A simple form of mechanism for imparting motion separately to the said sleeves G H I, and for thereby rotating toe moving brushes about the commutator-cylinder, comprises a counter-shaft J, suitably mounted with respect to the armature-shaft *a* and provided with a gear-wheel *j*, meshing with a pinion *j′* upon the armature-shaft and imparting motion to the said gear-wheel *j* and shaft J. Upon the shaft J are secured, as here shown, gear-wheels J′ J^2 J^3, meshing, respectively, with the pinions *g h i* of the separate independently-rotatable brush-carrying sleeves G H I.

As indicated, the driving-gears J′ J^2 J^3 are of different sizes, and consequently the sleeves G H I, together with the commutator-brushes carried thereby, will be moved around the commutator-cylinder at different rates of speed.

The above-described arrangement is employed where it is desired to supply currents to a number of different circuits at different rates of pulsation, and the circuits in connection with such an arrangement may be substantially as follows: From the stationary brushes B B′ extend main conductors 1 2. Between these said conductors are connected motor-coils M M′ M^2 M^3, the motor-coils being connected between the conductors 1 and 2 by branch conductors 3 3 4 4 5 6.

As explained in my said prior application, motor-coils connected between the main conductors, as just described, would continuously receive continuous currents, and be of no avail for the production of reciprocatory movement. According to the present invention, however, conductors D^2 E^2 F^2 are electrically connected with the moving brushes D E F by suitable collector-brushes D^3 E^3 F^3, and extend to a point at or near the central part of the motor-coils M M′ M^2 M^3, and as the said brushes D E F are moved around the commutator by the gearing and connections they approach and recede from the main stationary brushes, and the current flowing in the respective coils is caused to rise and fall in accordance with said movement.

The respective parts of the motor-coils M M′ M^2 M^3 (seen diagrammatically in Fig. 1) will, when connected as described, alternately receive current-impulses, and when suitable magnetic devices, tools, or pistons are placed in operative relation to the said coils the working devices of different nature will be reciprocated thereby under the influence of the current-impulses flowing in the said coils—for example, in the manner shown, described, and claimed in connection with reciprocating drilling-engines shown in Letters Patent Nos. 400,809, April 2, 1889, and 401,231, April 9, 1889.

The coils M^2 M^3 are shown somewhat separate, and they may in that position be utilized to produce a unitary result—that is, to act to produce alternately forward and backward movement of a magnetic piston placed within their field of force; or the said coils may be separately applied to the operation of single-acting working devices, substantially as shown and described with reference to Fig. 3 of my aforesaid patent, No. 400,809.

Of course with the arrangements above described the moving brushes will travel at unequal speeds. This system may be employed with great advantage in positions where it is desired to employ machines or apparatus to be driven at different speeds, since by means of the present invention a single generator large enough to supply current for all the various purposes of the shop or factory may be employed, and by providing said generator with a traveling brush for each circuit of different nature the current can be subdivided, and not only subdivided, but each subdivision be caused to pulsate with any desired rate, and in that manner both fast and slow running reciprocating electric machines can be operated from a single source of current.

It will of course be apparent that more than one reciprocating engine can be placed in each circuit, all the machines in the circuit receiving current at the same rate of pulsation.

The invention is not limited to the employment of three sets of moving brushes; but on the contrary may have as many as desired, a separate single conductor extending between each working-circuit and its traveling brush.

In Figs. 2, 3, and 4 the moving brushes are indicated in several different positions; but since said brushes move at different speeds their relative changes of position will be perpetual and without limit.

In Fig. 5 the invention is shown as applied to an arrangement for feeding a number of separate circuits with pulsating currents of equal phase. This is accomplished by providing a separate moving brush for each circuit, the said moving brushes being, however, all for convenience secured to a single support and moving together around the commutator. With the arrangement seen in Fig. 5 the moving brushes N O P, or the holders within which the brushes are carried, are

sustained by arms N′ O′ P′, all connected, preferably through an annular yoke O^2, with a sleeve R, rotatably mounted upon but insulated from the armature-shaft *a*. The said arms might of course be separately connected to the sleeve R, if preferred. The armature-shaft is provided with a pinion *j′*, as in the previous instance, said pinion meshing with a driving-gear *j*, mounted upon a counter-shaft J, said counter-shaft being sustained in suitable bearings within a frame j^2. The sleeve R carries a pinion *r*, and said pinion meshes with and is driven by a gear-wheel R′ upon the counter-shaft J. The sleeve R is provided with three annular metallic contact-surfaces S′ S^2 S^3. The contact-surfaces S′ S^2 S^3 are insulated from the sleeve R, and each is in electrical connection with one of the traveling brushes N O P. Suitable collector-brushes r' r^2 r^3 bear upon and convey currents flowing through the traveling brushes and contact-rings and transmit the same through circuit-conductors D^2 E^2 F^2, which may be arranged and connected, as shown and described, with reference to Fig. 1.

The arrangement of brushes, holders, arms, and the annular connection O^2 is better seen in Fig. 6.

The invention is not limited to the details shown only by way of necessary illustration, since the forms shown may be modified and varied in many particulars without departing from either the spirit or scope of the invention.

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

1. The combination, with a source of continuous current, of main stationary brushes and circuit-connections extending therefrom, auxiliary connections extending to a plurality of separate working-circuits, and a moving brush for each circuit, said brushes traveling about the commutator and acting to vary the potential in the several circuits connected thereto.

2. The combination of a source of continuous current, a sectional commutator and main stationary brushes, a plurality of separate working-circuits extending therefrom, translating devices connected therewith, additional circuit-connections extending from the translating-circuits, and a number of moving commutator-brushes arranged to constantly travel around the commutator, one of said moving brushes being provided for and connected to the additional conductor of each translating-circuit.

3. A system of generating and distributing currents of rising and falling potential, consisting of a dynamo-electric generator or armature of the continuous-current type, having one or more sets of stationary brushes upon the commutator thereof, a plurality of auxiliary brushes constantly moving about the commutator to and from the stationary brushes and at different rates of speed, and connections between a plurality of working-circuits and the stationary and moving brushes, whereby the current is caused to rise and fall at unequal rates of speed in the different circuits.

4. A system of generating and distributing currents of rising and falling potential, comprising a sectional armature and a sectional commutator, a set of stationary brushes upon said commutator, and a plurality of brushes and means for constantly moving said brushes upon the sectional commutator toward and away from the points of maximum and zero electro-motive force, and a plurality of separate working-circuits connected to the stationary and moving brushes, and in which the potential is caused to rise and fall in accordance with the rate of movement of the traveling brushes.

5. A system of generating and distributing currents of rising and falling potential, consisting of a sectional armature and a sectional commutator, a set of stationary brushes upon said commutator, and a plurality of movable brushes, each brush being provided with separate means for moving the same about the commutator toward and away from the points of maximum and zero electro-motive force, and working-circuits connected, respectively, to the stationary and to the moving brushes, whereby the potential is caused to rise and fall in each working-circuit in accordance with the rate of movement of each traveling brush.

6. The combination, with a source of continuous current, a sectional commutator, stationary brushes therefor, and working-circuits extending from said brushes, of translating devices in said circuits, additional connections extending from the translating-circuits to additional brushes upon the commutator, and means for constantly moving the additional brushes around the commutator toward and away from the diameter of commutation, singly or together, and thereby constantly varying the potential in the translating-circuits.

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

CHARLES J. VAN DEPOELE.

Witnesses:
FRANKLAND JANNUS,
JOHN W. GIBBONEY.