(No Model.) 2 Sheets—Sheet 1.

C. J. VAN DEPOELE, Dec'd.

C. A. COFFIN & A. WAHL, Executors.

ELECTRICAL TRANSMISSION OF POWER.

No. 479,966. Patented Aug. 2, 1892.

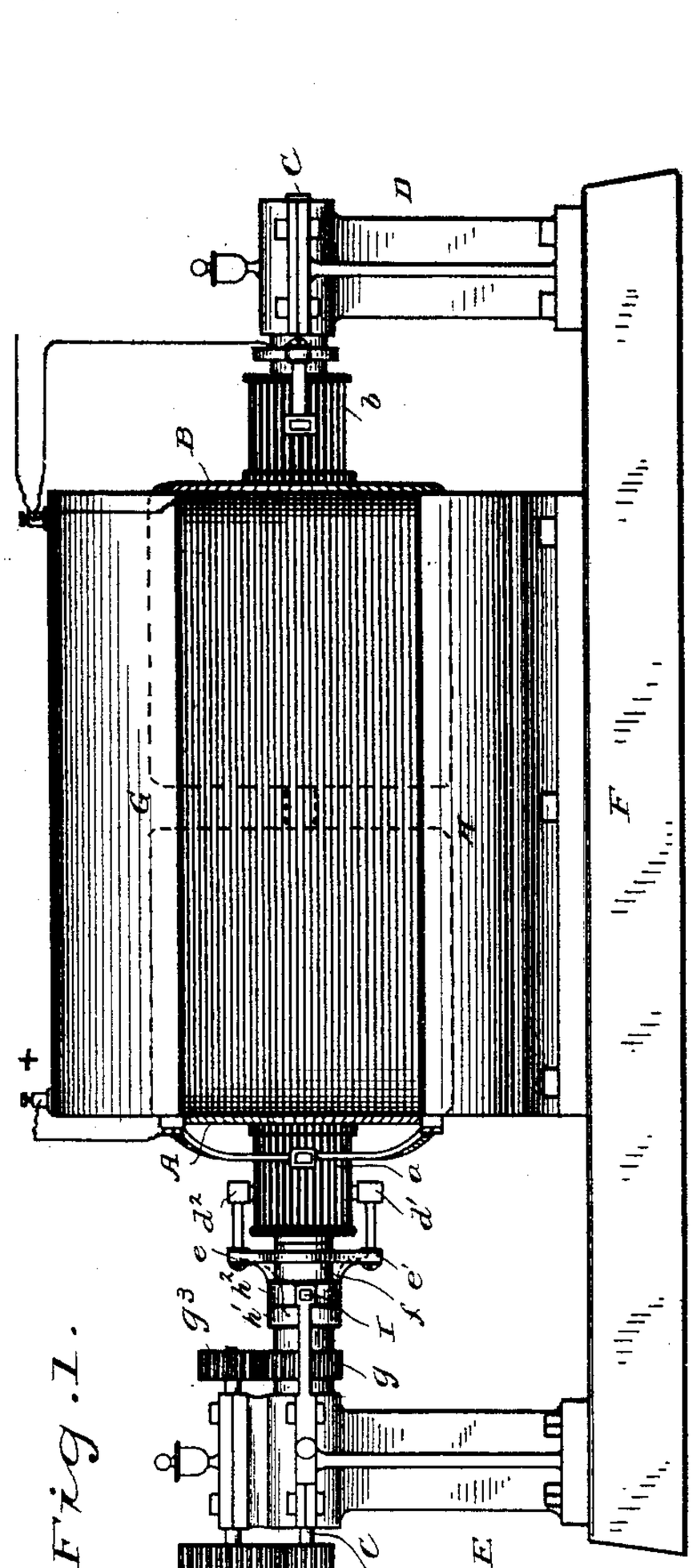


Fig. 1.

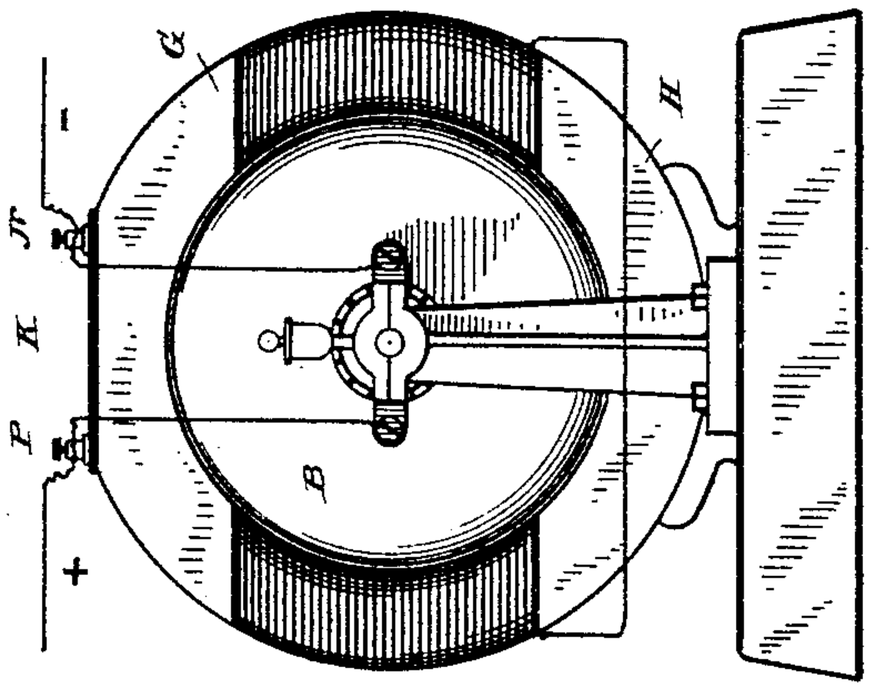


Fig. 3.

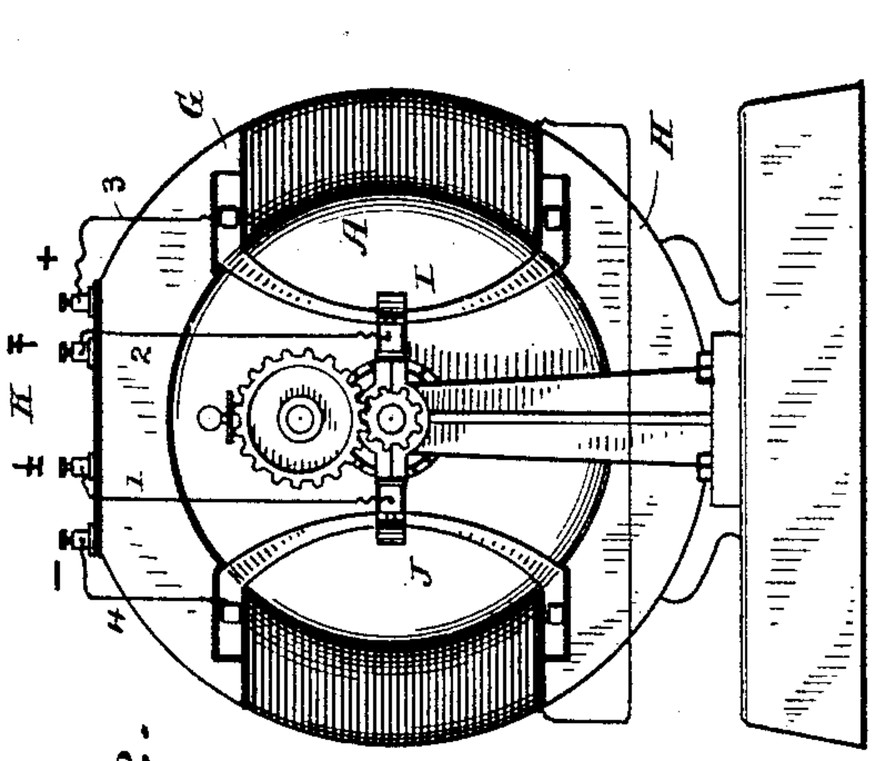


Fig. 2.

Witnesses
H. A. Lamb
Stephen James

Inventor
Charles J. VanDepoele
By Fairbank & James
Attorney

(No Model.)

2 Sheets—Sheet 2.

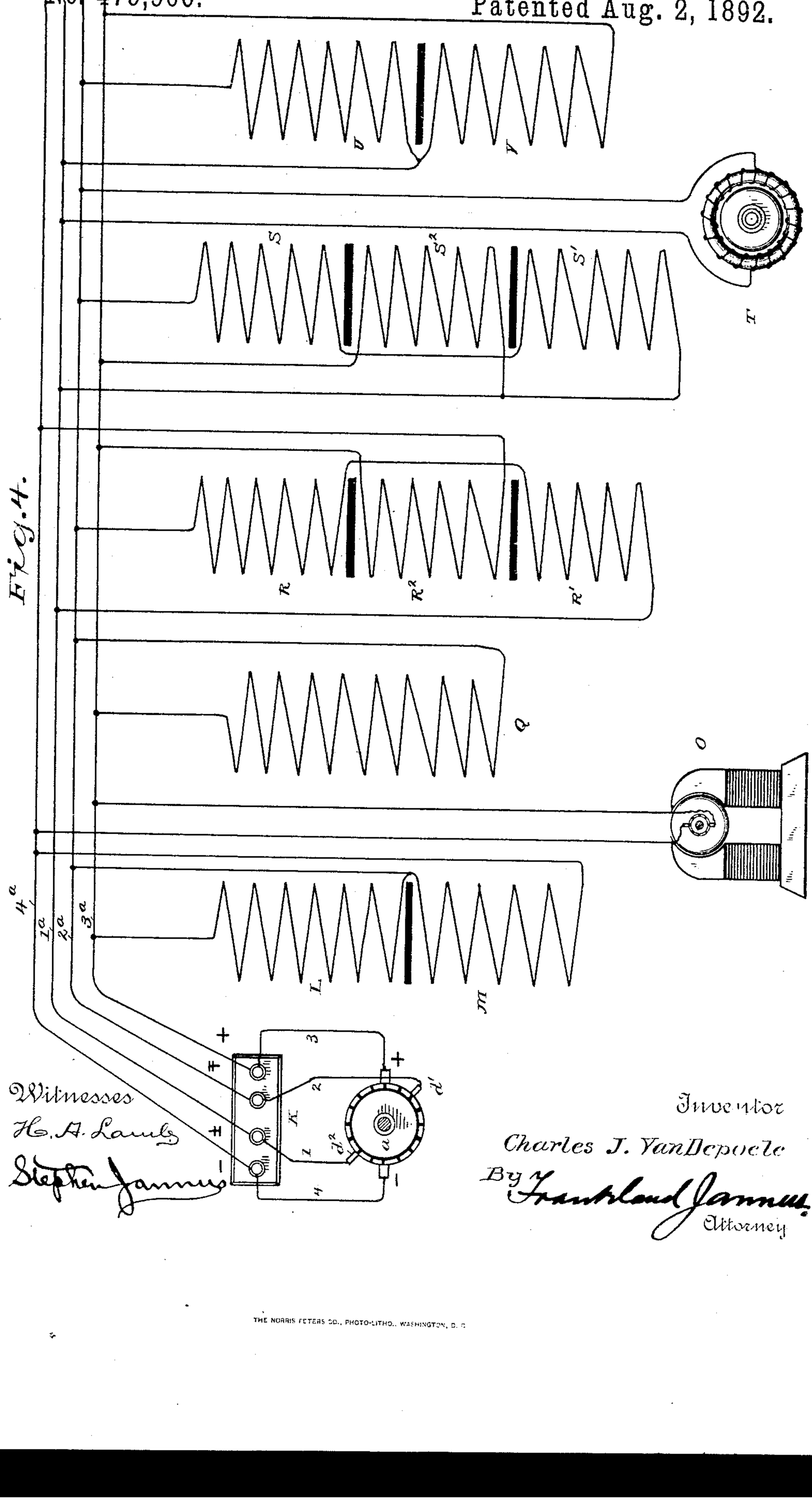
C. J. VAN DEPOELE, Dec'd.

C. A. COFFIN & A. WAHL, Executors.

ELECTRICAL TRANSMISSION OF POWER.

No. 479,966. Patented Aug. 2, 1892.

Fig. 4.



Witnesses
H. A. Lamb
Stephen James

Inventor
Charles J. VanDepoele
By Frankland James
Attorney

UNITED STATES PATENT OFFICE.

CHARLES J. VAN DEPOELE, OF LYNN; C. A. COFFIN AND ALBERT WAHL, EXECUTORS OF SAID VAN DEPOELE, DECEASED, ASSIGNORS TO THE THOMSON-HOUSTON ELECTRIC COMPANY, OF BOSTON, MASSACHUSETTS.

ELECTRICAL TRANSMISSION OF POWER.

SPECIFICATION forming part of Letters Patent No. 479,966, dated August 2, 1892.

Original application filed May 6, 1891, Serial No. 391,799. Divided and this application filed September 24, 1891. Serial No. 406,741. (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 Systems of Electrical Distribution, of which the following is a description, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon.

This application is a division of a prior case filed May 6, 1891, Serial No. 391,799.

My invention relates to new and useful improvements in means and apparatus for the distribution of pulsating electric currents for the operation of reciprocating electric engines, as rock-drills and other mining machinery, or for any purpose to which the invention is applicable.

My prior patent, No. 400,231, dated April 9, 1889, sets forth and shows (in Fig. 4) a converter for imparting a rising-and-falling quality to a continuous current and also for modifying the potential thereof. In the present instance, however, this feature has been further elaborated and developed and additional methods of utilizing such currents provided for.

In a prior application, Serial No. 382,877, filed February 26, 1891, I have shown, described, and claimed a system of distributing electric currents in which a continuous current is sent from any available source and changed at or near the point of distribution into currents having a defined rise and fall and also into currents of alternating direction and of constant direction, so that from a continuous-current circuit of any kind both alternating currents and currents of continuous direction might be obtained for the operation of reciprocating electric engines requiring currents of different character for its motor-coils.

The present invention comprises a further development of that system in that I not only produce pulsating currents having a defined rise and fall, both alternating and continuous in direction, of the desired potential and at or near the point of distribution, but I also provide for the simultaneous production of continuous currents by the same machine, whereby I can take any available continuous current and transform the same into the species of currents required for my reciprocating engines, at the same time modifying the potential of the supply-current to suit the particular occasion, thus providing means for operating reciprocating electric engines under almost any conditions. For example, where power is transmitted electrically for many miles to the point of utilization it would from commercial necessity be sent over relatively small conductors and at high potential, which, although a necessity in the transmission of high powers over long distances, would be extremely dangerous to handle and would also be very difficult to insulate. It is well known that where alternating currents are to be so transmitted an inductional transformer furnishes the simplest possible means of conversion to lower the potential, and, furthermore, conversion can be carried on to any extent required to produce the desired modification in the tension of the current. It is also understood that high tension continuous currents can be reduced in potential and correspondingly increased in quantity by rotary continuous-current transformers; but according to my present invention I require currents which do not come strictly under either head, being part alternating or pulsating and part continuous, and, furthermore, these currents have a defined rise and fall, the frequency of which should be under control. Apparatus embodying the invention is shown in the accompanying drawings, and will be hereinafter described, and referred to in the appended claims.

Figure 1 is a view in elevation showing an apparatus embodying the invention. Fig. 2 is an end elevation of the front of the machine. Fig. 3 is an end elevation of the rear or other end of the machine. Fig. 4 is a diagrammatic view illustrating several arrangements of working circuits.

In Fig. 1 of the drawings is seen an electrodynamic machine mounted upon a suitable

base and comprising armatures A B, both mounted upon a shaft C, said shaft being carried in suitable bearings upon posts D E upon the base F. Field-magnets G H are also mounted upon the base F and is arranged to incase the armatures A B. The armatures may be of any continuous-current type and provided with sectional commutators. The armature A has a somewhat extended sectional commutator *a*, a sectional commutator *b* of usual construction being provided for the armature B. Main stationary brushes, plus and minus, are suitably sustained in contact with the commutator *a*, and a pair of auxiliary commutator-brushes *d' d²* is arranged to also engage the face of the commutator *a* and to be moved thereupon toward and away from the stationary brushes. The auxiliary brushes are arranged to be rotated about or oscillated upon the commutator, so as to collect and transmit pulsating currents of constant direction or alternating currents having a defined rise and fall to suitable working circuits. As indicated, the moving brushes are attached, respectively to arms *e e'*, being suitably insulated therefrom. Arms *e e'* are mounted upon a sleeve *f*, sustained upon the armature-shaft C. The sleeve *f* is provided with a gear g^2, through which it is rotated upon the armature-shaft C. Motion may be imparted to the sleeve *f* and brushes through the pinion *g'* or by separate means, as set forth in my patent, No. 422,855; but the arrangement illustrated more nearly resembles that seen in Patent No. 422,860, dated March 4, 1890, and consists of a driving-pinion *g'* upon the armature-shaft, a gear g^2, engaging and driven thereby, a gear g^3, carried upon a shaft driven by gear g^2 and engaging the pinion *g* upon the sleeve *f*. A pair of insulated contact-surfaces *h' h²* is carried upon the sleeve *f*, and the rotating brushes *d' d²* are electrically connected separately with one of the contact-surfaces. A pair of collector-brushes I J engage the contact-surfaces and transmit the current therefrom to conductors 1 and 2, extending to the working circuit or circuits. As set forth in my said prior patents, with an arrangement of this description the auxiliary brushes will be rotated about their commutator, and the currents collected by them will flow to working circuits, and said currents will have a rapid rise and fall, their frequency depending upon the speed with which their moving brushes are rotated or moved about the commutator, and it is also understood that the defined currents having a distinct rise and fall may not only be arranged to occur with any desired degree of frequency irrespective of the speed of the armature, but they may also be continuous in direction or alternating.

It will be understood that the winding of the armature B, also the field-magnet coils, must be proportioned to the character of the supply-current, having a greater or less resistance, according to the potential thereof. The winding of the generator-armature A will depend upon the desired voltage of the current to be produced thereby, so that currents of the very highest potential may be used to operate the motor-armature B and to energize the field-magnets of the generator-armature A, serving to give forth currents of the desired potential irrespective of the character of the primary supply-current.

It will be understood that where, as in the present instance, the current-modifying device comprises an armature operated as a motor to drive another armature operating as a generator both the windings may be placed upon the same armature-core and the whole apparatus be operated in the form of a single armature with double commutator, and such arrangement of the parts I consider the equivalent of that which is herein illustrated and described. So, also, it will be apparent that the pulsating currents having a defined rise and fall, which it is principally the object of this invention to produce, may be alternating in direction, as stated, or by imparting an oscillating instead of a rotating motion to the moving brushes said current may be caused to pulsate at any desired speed without any change of direction. It will therefore be apparent that the generator portion, element, or armature of the motor-generator is capable of supplying a two, three, or four wire circuit and of delivering thereto an alternating current, a current of constant direction, but pulsating in character, or a combination of either of the foregoing with current of constant potential.

As indicated in Fig. 4, many species of apparatus can be operated with the currents produced according to the present system. Conductors 1 2 3 4 extend from the four brushes upon the commutator *a* to binding-posts upon a board K, from which extend distributing-conductors 1^a 2^a 3^a 4^a, numbers 1 and 2 being supplied with alternating currents, while numbers 3 and 4 are supplied with continuous current of relatively low tension, and from these supply-conductors working circuits can be furnished with currents having varying characteristics.

As indicated in Fig. 4, a number of different forms of such apparatus are connected in said circuit. The motor-coils L M have their outer terminals connected to conductors 3^a and 4^a and their intermediate terminal to conductor 2^a. Therefore as the polarity of the intermediate conductor changes current will flow first through one motor-coil and then through the other.

O indicates an electric motor of the continuous-current type, with its commutator and brushes connected, respectively, to conductors 3^a 4^a. The field-magnet coils of the motor may be connected in shunt or series. The motor-coil Q has its terminals connected, respectively, with the positive conductor 3^a and the alternating conductor 2^a. Consequently intermittent currents of constant di-

rection will flow through said coil. Motor-coils R R′ are connected in series and receive their current from the alternating-conductors 1^a and 2^a. The center coil R^2 has its terminals connected with the continuous-current conductors 3^a 4^a. It will therefore be continuously supplied with current, while the end coils R R′ will be supplied with alternating currents. Motor-coils S S′ S^2 are arranged like the preceding, except that three wires are employed to make the connection instead of four and the current in the centrai coil, although continuous in direction, is pulsating and intermittent in character.

The device seen at T indicates an induction-motor, the same having an armature wound with closed circuits and a field-magnet through which alternating currents are sent, the current changes in the field-magnet circuit acting to induce polarizing currents in the armature. Motor-coils U V are so connected with the supply-circuit that the coil U receives alternating currents, while the coil V receives intermittent pulsating currents of constant direction. These illustrations, it is believed, will show the wide range and great utility of the system.

Any method for regulating the speed of the motor might be used; but I have here shown a motor of the shunt type, which will run at a constant speed with a constant electro-motive force independent of the load of the machine. The field here shown is of the circular type, the irou pole-pieces being placed one on the bottom and the other on the top of the machine and the winding being executed on each side of the field and between the respective pole-pieces. P and N represent the terminals of the motor to be connected to the supply-line of high tension.

The precise details of construction and arrangement may be varied according to my several patents already granted, and in addition thereto various minor changes and additions may be made in accordance with the foregoing description without departing from the invention.

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

1. A system of electrical distribution comprising a source of supply-current of relatively high potential, a motor-armature, a generator-armature wound to produce currents of the desired potential below that of the supply, a sectional commutator, main stationary brushes and auxiliary moving brushes, and connections between said main and auxiliary brushes, and suitable working circuits whereby the high-tension supply-current is converted into currents of lower potential, part having a defined rise and fall and part of constant potential.

2. A system of electrical distribution comprising a motor-armature, a generator-armature, both of the continuous-current type and each provided with a sectional commutator, a common field-magnet, a source of supply of relatively high potential connected with the motor-armature, stationary and moving brushes on the secondary commutator, and working circuits of different character connected, respectively, with the stationary and with the moving brushes and supplied with current of different character and of modified potential.

3. A system of electrical distribution comprising a motor-armature, a generator-armature, a common field-magnet, a source of supply-current of relatively high potential connected with the motor-armature, means connected with the generator-armature for imparting a pulsating or rising-and-falling character to part of the current produced thereby, consisting of auxiliary moving commutator-brushes, a working circuit or circuits connected with the said auxiliary moving brushes, and a circuit or circuits connected with the stationary brushes and supplied with continuous current, also of modified potential.

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

CHARLES J. VAN DEPOELE.

Witnesses:

JOHN W. GIBBONEY,

STEPHEN JANNUS.