(No Model.)

J. F. McELROY.

CURRENT DIRECTOR.

No. 486,643. Patented Nov. 22, 1892.

Fig. 1.

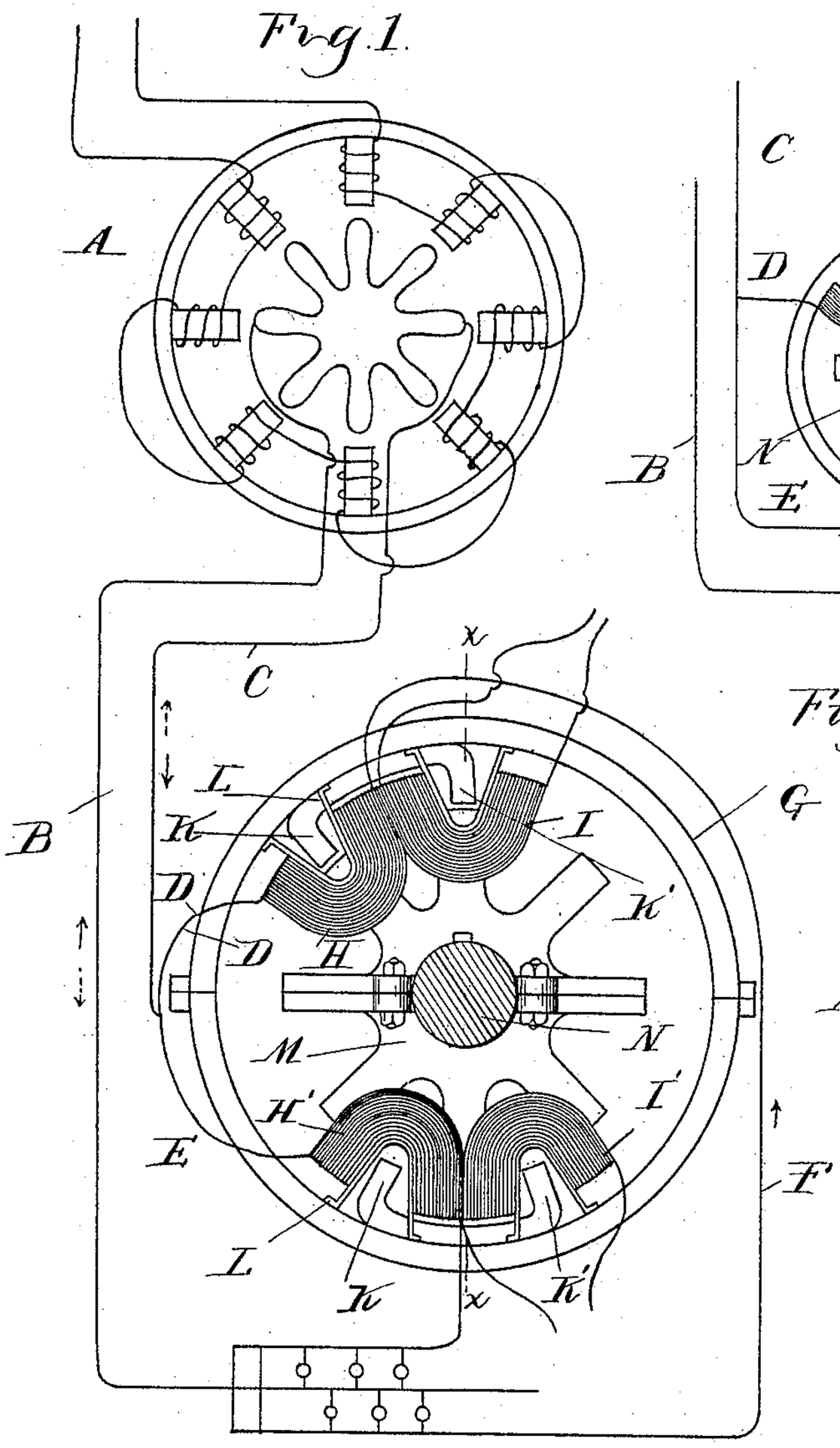


Fig. 4.

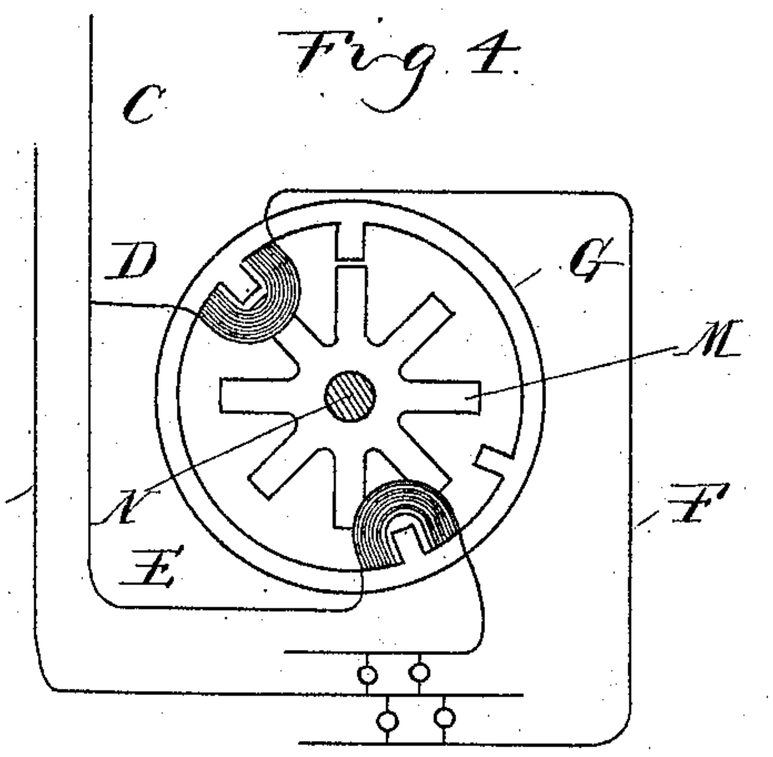


Fig. 2.

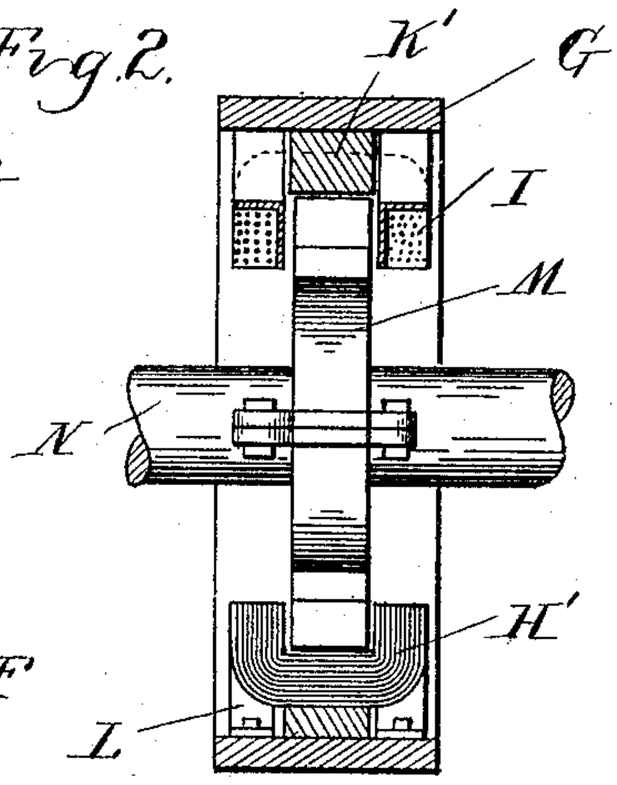
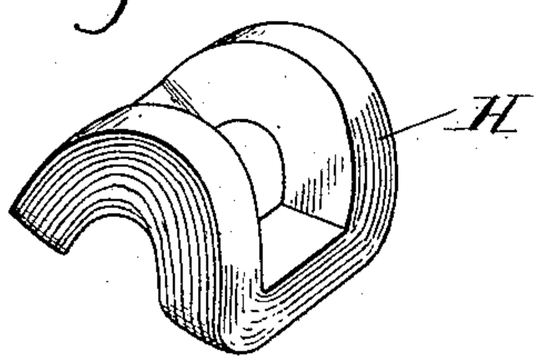


Fig. 3.



Witnesses
A. L. Hobbie
H. B. Dougherty.

Inventor
James F. McElroy
By Thos. S. Sprague & Son
Atty's.

UNITED STATES PATENT OFFICE.

JAMES F. McELROY, OF ALBANY, NEW YORK, ASSIGNOR TO THE CONSOLIDATED CAR HEATING COMPANY, OF WHEELING, WEST VIRGINIA.

CURRENT-DIRECTOR.

SPECIFICATION forming part of Letters Patent No. 486,643, dated November 22, 1892.

Application filed January 2, 1892. Serial No. 416,803. (No model.)

To all whom it may concern:

Be it known that I, JAMES F. McELROY, a citizen of the United States, residing at Albany, in the county of Albany and State of New York, have invented certain new and useful Improvements in Current-Directors, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to new and useful improvements in current-directors for alternating-current dynamos.

The object of my invention is to provide improved means for obtaining direct currents from alternating currents. The present usual way of accomplishing this is by means of a commutator on the dynamo; but as such commutators are delicate pieces of machinery which require close attention their use is sometimes inadmissible. This is especially the case in lighting cars by electricity, where the usual practice is to place the generator upon one of the axles of a car or locomotive truck and where from necessity it can be given but very scant attention. For this class of dynamos and similar uses I have designed the current-director hereinafter described, and which can be used and combined with the generator into one machine.

The invention therefore consists in the peculiar construction, arrangement, and combination of parts hereinafter described, and definitely pointed out in the claims.

In the drawings, wherein like letters of reference indicate corresponding parts in the several views, Figure 1 is an elevation of one form of the current-director with the dynamo and exterior circuits in diagram. Fig. 2 is a cross-section of Fig. 1 on line *x x*. Fig. 3 is a detached perspective view of one of the magnet-coils; and Fig. 4 is an elevation of another form of the current-director, which is more simple.

Referring to the construction in Fig. 1, A represents a current-generator organized for the production of alternating currents.

B and C represent the two main conductors thereof, and D and E represent two branched conductors leading from the main conductor C through the current-director and thence to the translating devices, which latter are in multiple with the other main conductor B and one of the branch conductors E F.

The current-director consists of an outer cylindrical casing G, which may form a part or extension of the casing of the generator. To the inner wall of this are secured in pairs, preferably at nearly-opposite points, the coils H H′ and I I′. These coils are double bent, giving them the peculiar form shown, and for the purpose hereinafter explained. This form can be readily obtained by bending a coil wound in the ordinary manner in the form of a U, or it can be wound directly in this form with the help of a former consisting of two bars crossing each other, over which the wire is wound under and over. Suitable cement may be used to hold the convolutions in place after the cross is removed. The coils are secured to the casing in any suitable manner, such as by means of saddles L, which fit into the depressions of the coils, and pole-pieces K K′ extend radially into the coils a small distance, as will more fully hereinafter appear. The pole-pieces K K′ may be formed of a separate piece secured to the casing or, as shown in Fig. 4, may be formed integrally with the casing.

M is a revolving unwound armature secured upon the armature-shaft N of the generator. This armature is preferably of the form of an iron spider, the arms of which are adapted to extend into the inner depression of the coil as far as possible to form magnetic cores for the same. Of course sufficient clearance must be provided to allow the spider to revolve.

The pole-pieces extend only far enough to complete the magnetic system with a pair of spider-arms at the moment of coincidence therewith. This magnetic system is formed alternately in the two coils—that is, if one pair of spider-arms are in coincidence with the poles K K′ in one set of coils they are farthest from coincidence in the other set—and the magnetic system is thus formed alternately in the two sets of coils, and the arrangement of parts is such that the coincidence takes place alternately in the two magnetic systems synchronously with the production of the current-waves in the generator.

The coils H H′ are included in the branches D and E, respectively, and the coils I I′ may

be respectively connected into the same branches or be included in independent (open or closed) circuits by themselves or with each other, or they may form choke-coils by themselves.

The operation of the device as shown in Fig. 1 will be readily understood by comparing it with the action of a transformer. When the parts are in the position shown in Fig. 1, the pole-pieces K K′ of the coils H I exactly coincide with two arms of the spider and form therewith a closed magnetic system or ring with the coils H and I in the same relation to each other as the primary and secondary coils of a transformer. Synchronous with this coincidence a current-wave flows through the conductor C and, dividing through the branches D and E, flows, also, through the coil H, and a transformer action will therefore take place between the coils H and I.

It is well known that the amount of current flowing through a primary is equal to the amount of current consumed in the secondary; but as the latter in the case under consideration consumes but little current it will therefore react upon the primary and block the flow of the current through it, and consesequently through the branch D. With the other pair of coils H′ the conditions at this moment are different. The magnetic circuit is wide open, and practically no iron is within the coils, and therefore all the resistance there is to the flow of the current is the resistance of the wire in the coil H′, which is very slight, and thus practically all the current will flow through the branch E. At the next succeeding current-impulse, which is now in opposite direction, the case is reversed. It is the coils H′ I′ which are now closed in the magnetic circuit and block the passage of the current over the branch E, while the magnetic circuit in the coils H I is wide open, and the current is therefore free to flow through the branch D. Thus instead of a to-and-fro current in the conductors D E the current will be intermittent, but always in the same direction, and with the use of the other main conductor B storage-batteries may be charged and lights maintained in the circuit and the dynamo-field supplied with current without the use of a commutator on the dynamo.

My device is compact and simple. It does not require any attention and produces no sparking.

In the modification shown in Fig. 4 the choke-coils are omitted and the coils H H′ (and consequently the flow of the current through the respective branch circuits) are blocked by the magnetic resistance formed by the closing of the magnetic circuit through either one of these coils. The current passing through a coil included in a closed magnetic circuit creates magnetism, which as soon as the point of saturation is reached opposes the flow of the current.

The essential difference in the operation of my current-director is that I do not rely upon the production of an opposing counter-electro-motive force, as in other current-directors. Nor do I rely merely upon the opening and closing of magnetic circuits through electro-magnets. I have no electro-magnets, except just at the time the magnetic circuit is closed. At other times there is hardly any iron in the coils, and therefore I have only the resistance of the wire of the coil in the open branches. I take the cores of the electro-magnets, so to speak, right out of them and place them on the revolving armature.

The object of forming the coils in the manner described will readily appear to be for the purpose of allowing the cores to be placed on the revolving armature free to move in and out of the coils by the revolution of the armature. This peculiar form of coil, however, would not be needed provided an armature would be made to move axially into and out of the coils.

What I claim as my invention is—

1. In a current-director, the combination, with a generator, of a divided circuit, a revolving armature, a fixed portion with which the armature coincides, and fixed coils in the branches of the circuit, arranged to embrace the extremities of the armature during the coinciding interval, substantially as described.

2. In a current-director, the combination, with the circuit of an alternating-current dynamo, of two magnetic circuits consisting of fixed and revolving portions alternately coinciding synchronously with the current-waves and two coils in branches of said circuit, said coils being placed on the fixed portions of the magnetic circuit with their convolution doubled or bent to embrace the extreme portions of the revolving armature at the moment of coincidence, substantially as described.

3. In a current-director, the combination, with a generator, of a revolving armature having a series of radiating arms, a divided circuit, looped coils in the branches, through which the extremities of the arms pass, and fixed cores for the coils, substantially as described.

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

JAMES F. McELROY.

Witnesses:
EDWIN A. SMITH,
GEO. A. GREGG.