(No Model.) 2 Sheets—Sheet 1.

L. K. OPPENHEIMER.

SYSTEM OF ELECTRICAL DISTRIBUTION.

No. 562,647. Patented June 23, 1896.

Fig. 1.

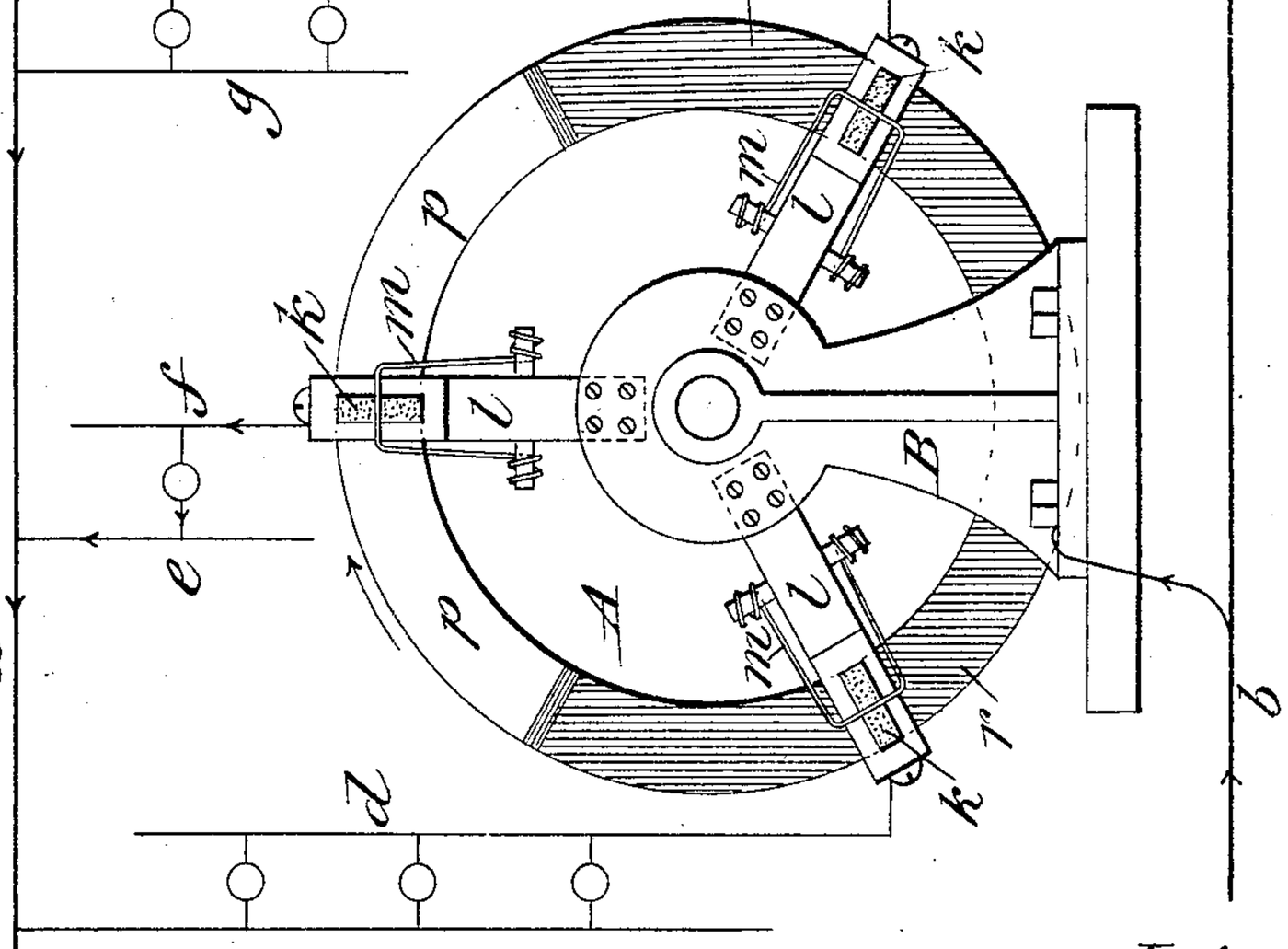

Fig. 2.

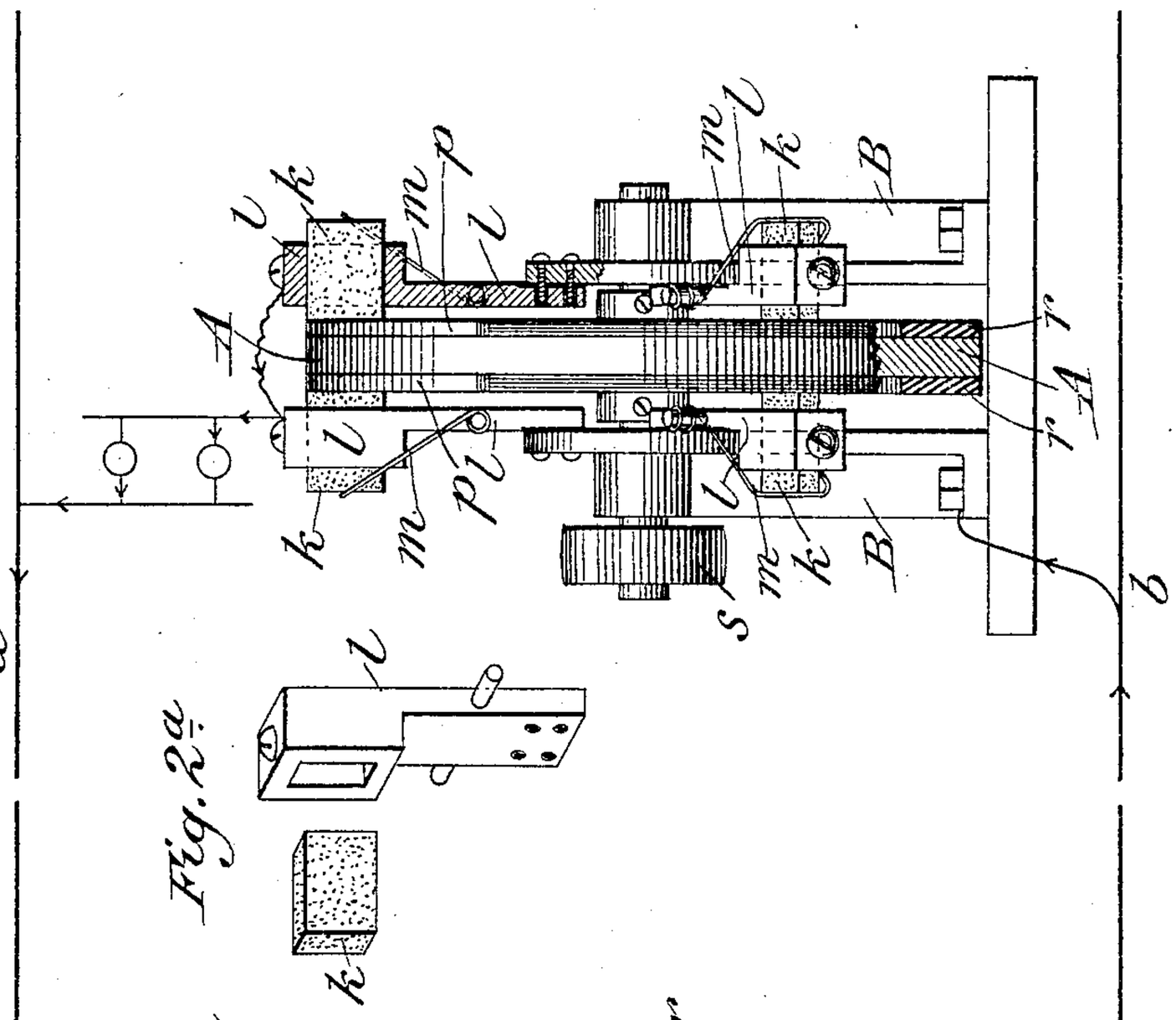

Fig. 2a.

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Fig. 3.

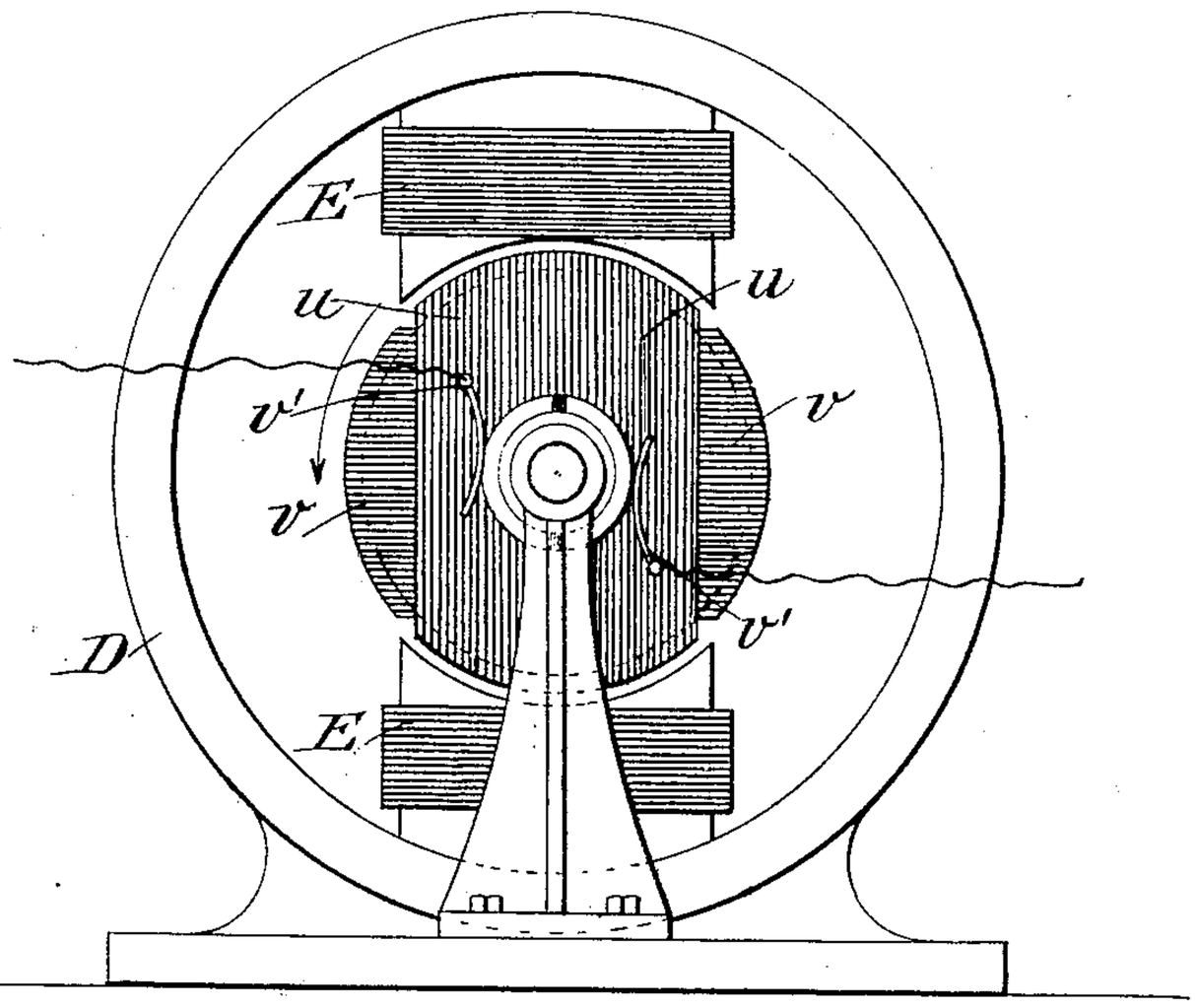
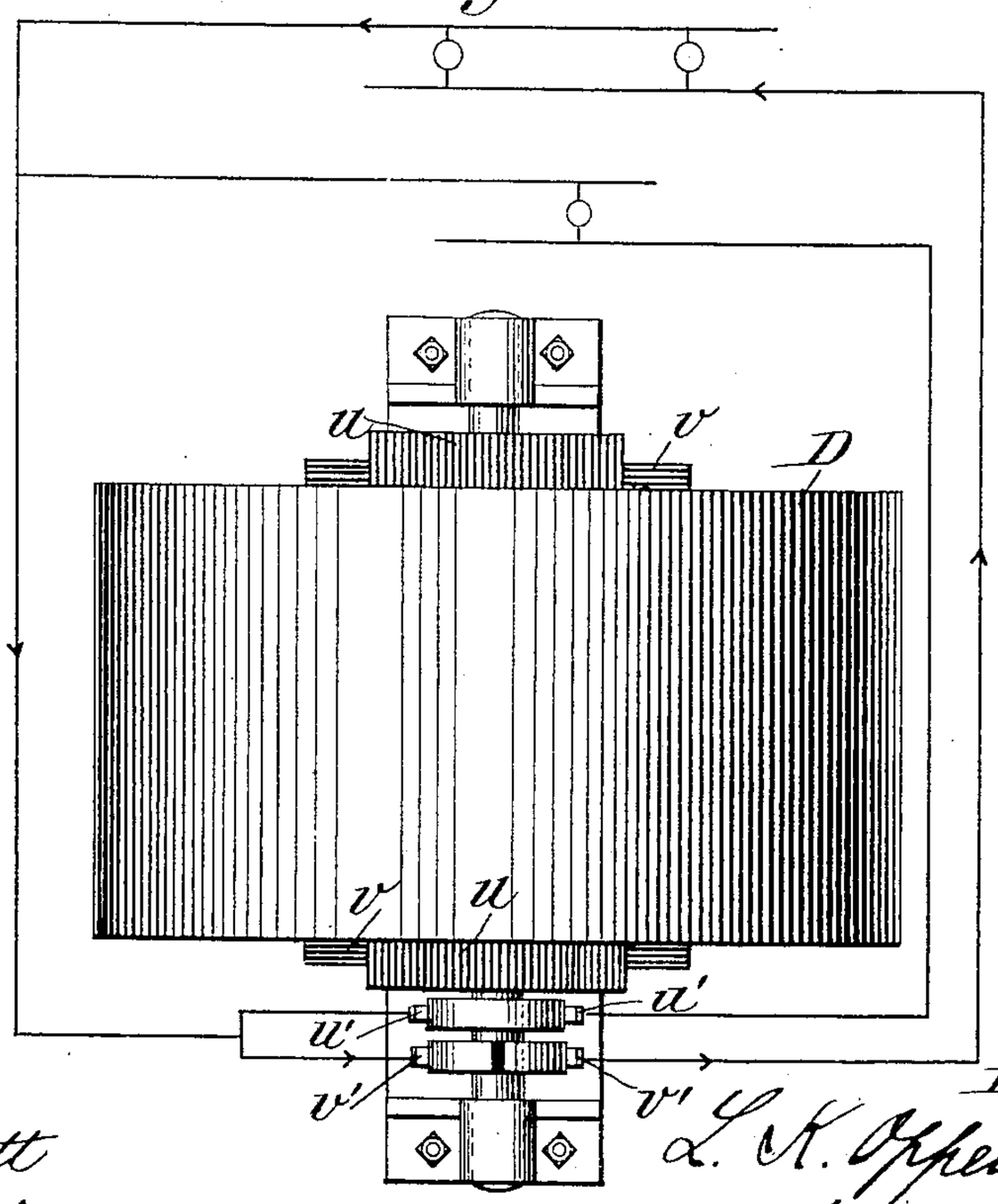


Fig. 4.



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UNITED STATES PATENT OFFICE.

LOUIS K. OPPENHEIMER, OF CINCINNATI, OHIO.

SYSTEM OF ELECTRICAL DISTRIBUTION.

SPECIFICATION forming part of Letters Patent No. 562,647, dated June 23, 1896.

Application filed December 21, 1895. Serial No. 572,875. (No model.)

To all whom it may concern:

Be it known that I, LOUIS K. OPPENHEIMER, a citizen of the United States, residing at Cincinnati, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Systems of Electrical Distribution; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to systems of electrical distribution wherein a plurality of separate circuits containing translating devices are energized from the same source of current supply, and particularly where each circuit is supplied therefrom with a succession of intermittent impulses succeeding each other so rapidly as to produce in practice the same effect as an entirely uninterrupted current.

The present invention is based upon my discovery that the electromotive force required at the generator, for supplying a plurality of circuits with current of the necessary voltage, must bear a certain definite relationship not only to the number of circuits supplied, but also to the relative duration of the individual impulses and cessations of impulse. Availing myself of this discovery I have devised the hereinafter-described method of adapting the supply of the current to the particular requirements of use, and have likewise devised apparatus for making said method practically available.

In the accompanying drawings, Figure 1 represents, diagrammatically, the main leads of a generator-circuit and a plurality of individual circuits to be supplied therefrom and shows in side elevation a device adapted thereto in accordance with my invention for intermediating said supply. Fig. 2 represents the device referred to in end elevation. Fig. 2^a represents in detail perspective the carbon brush and its holder employed in said device. Fig. 3 represents an end elevation of another apparatus for the practice of the invention, said apparatus possessing within itself the combined functions of the device shown in Figs. 1 and 2 and of the generator supplying said device. Fig. 4 represents a plan view of Fig. 3 and illustrates the disposition of the individual circuits with respect thereto.

Similar letters of reference indicate similar parts throughout the several views.

Referring to the arrangement illustrated in Figs. 1 and 2 of the drawings, $a\ b$ indicate the main leads from a dynamo-electric machine or other generating source. $c\ d$ represent an independent circuit to be supplied therefrom. $e\ f$ represent another independent circuit, and $g\ h$ still another, it being, of course, understood that said three independent circuits require for their proper supply currents of the same or substantially the same voltage.

It will be noted that one leg of each of the independent circuits is connected permanently to one of the main leads, as a, and that the other leg, as $d\ f\ h$, is connected to a device which, to guard against imperfect contact, is preferably made up of two carbon or other brushes k, each set in a suitable brush-holder, as l, and pressed inwardly by springs m toward a revoluble metallic disk A.

The disk A is mounted to revolve freely within bearings of the metallic frame or journal-bearing supports B, to which latter the lead b is electrically connected.

Upon opposite faces of the disk A are secured the metallic segments p and the segments r, of insulating material, the arrangement, therefore, being such that when, in the revolution of the disk, the metallic segments are brought into contact with the carbons l of the brush-holders of any particular circuit current from the main leads $a\ b$ passes through that circuit, and when the insulation-segments are in contact with the same carbons the supply of current is cut off. In practice, the disk A is to be driven so rapidly by the pulley s that each independent circuit $c\ d$, $e\ f$, and $g\ h$ receives a series of intermittent impulses so quickly succeeding each other as to have practically the same effect as a continuous current.

The characteristic feature of my improvement will now be understood when I call attention to the fact that, first, the length of the metallic segments p is one-half that of the insulation-segment r, so that the period of duration of the impulse is one-half the period of cessation, and, second, that the

electromotive force of the generator supplying the leads *a b* is two hundred and twenty volts, where the voltage required for the translating devices in the independent circuits is to be one hundred and ten volts when supplied with a continuous current.

It will, of course, be understood that the particular values expressed in the preceding paragraph relate to a system, as shown in Figs. 1 and 2, wherein the problem is to supply independent circuits containing translating devices requiring one hundred and ten volts when supplied with a continuous current and three in number. Where four such independent circuits are to be supplied, four sets of equal-spaced brushes would be employed, the metallic segment *p* would be made one-third the length of the insulation-segment, and the electromotive force of the main generator would be two hundred and seventy-five volts. In fact, whatever the number of independent circuits supplied, exactly corresponding relative conditions to those specified should be established, the relative arrangement being therefore capable of expression by the following general equation, to wit: The ratio of the duration of the successive impulses of the intermittent current must be, approximately, to the duration of the intervening periods of cessation as the ratio of one-half of the electromotive force required by the translating devices employed, when constantly supplied with current, is to the electromotive force employed in excess of that required by said translating devices when constantly supplied with current. It is, of course, necessary to express this formula approximately, for the reason that lamps and all other commercial translating devices, whether constructed by the same or by different makers, present varying efficiencies and other characteristics, besides being, in some instances, affected by age and use, and for the further reason that it is often a commercial practice to supply less than a standard measure of effects, all of which would involve corresponding small changes in the proportion given, while still falling fairly within my invention.

In the form of the invention shown in Figs. 3 and 4, the generator itself is adapted to produce intermittent currents, thereby obviating the necessity of employing an auxiliary switching device of the kind shown in Figs. 1 and 2. The generator consists of a dynamo made up of a frame D, field-magnet cores E, energized by the field-coils *t*, and an armature wound with separate sections *u* and *v*, and having brushes *u'* and *v'*, which coöperate respectively with the commutators *x* and *y*. In the particular form illustrated, the dynamo is shown as supplying but two circuits, and, for this reason, each pole-piece E and armature-section end is shown as extending through an arc of ninety degrees, so as to furnish the hereinbefore-expressed ratio of duration of impulses to cessations thereof, and, at the same time, the electromotive force of the generator is established, in accordance with the same expression, at one hundred and sixty-five volts.

It is evident that any of the well-known forms of dynamos, whether constructed with drum or ring armatures and open or closed coils, may be adapted for the practice of my invention, and that while I have illustrated an armature provided with commutators there are certain conditions, depending upon the character of the translating devices employed, under which the commutators may be dispensed with and continuous collector-rings substituted.

Having thus described my invention, what I claim is—

1. The herein-described method of distributing electrical energy to a plurality of translating-device circuits, which consists in supplying successive electrical impulses to said circuits, the ratio of the duration of said impulses being, approximately, to the duration of the intervening periods of cessation, as the ratio of one-half of the electromotive force required by the translating devices, when constantly supplied with current, is to the electromotive force employed in excess of that required by said translating devices when constantly supplied with current.

2. Apparatus for distributing electrical energy to a plurality of translating-device circuits, consisting of a source of supply, to said circuits, of successive intermittent impulses, and means establishing the ratio of duration of said impulses to the duration of the intervening periods of cessation as equal to the ratio of one-half of the electromotive force required by the translating devices when constantly supplied, to the electromotive force employed in excess of that required by said translating devices when supplied with a continuous current; substantially as described.

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

LOUIS K. OPPENHEIMER.

Witnesses:
ARCH. MERRICHES,
EWD. D. SWASEY.