No. 702,452. Patented June 17, 1902.

W. M. MINER.

ELECTRIC SYNCHRONOUS APPARATUS.

(Application filed July 25, 1901.)

(No Model.) 2 Sheets—Sheet 1.

FIG. 1.

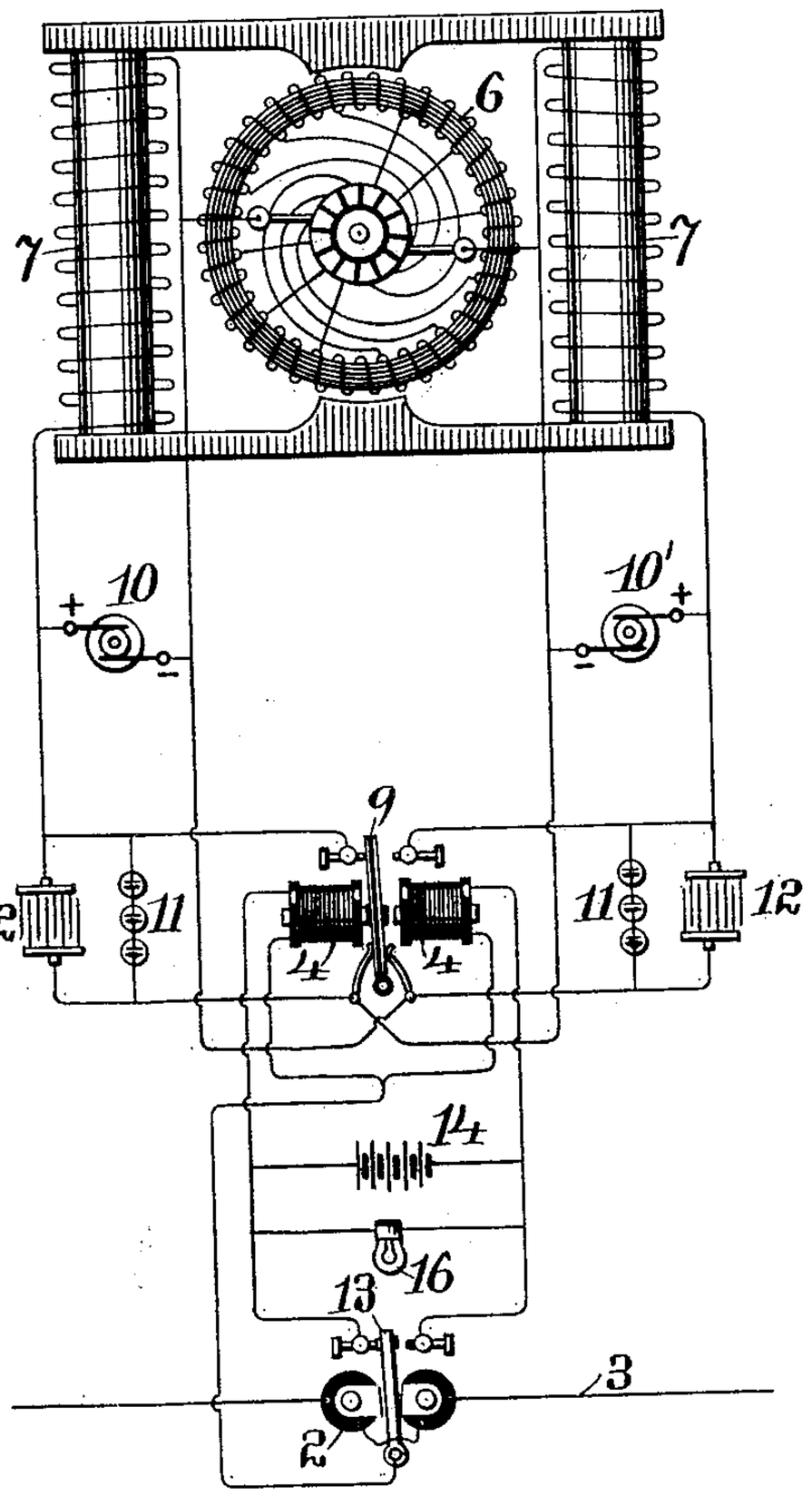

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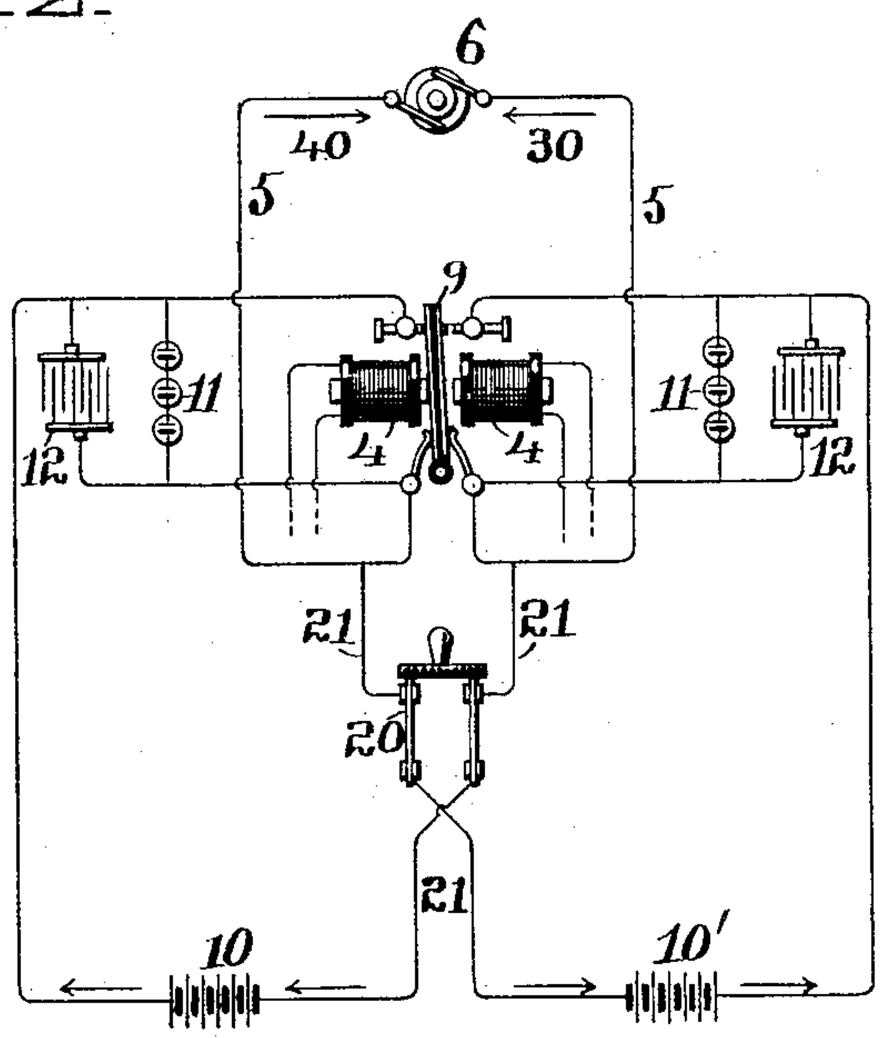
FIG. 2.



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UNITED STATES PATENT OFFICE.

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ELECTRIC SYNCHRONOUS APPARATUS.

SPECIFICATION forming part of Letters Patent No. 702,452, dated June 17, 1902.

Application filed July 25, 1901. Serial No. 69,642. (No model.)

To all whom it may concern:

Be it known that I, WILLARD M. MINER, a citizen of the United States, and a resident of Plainfield, in the county of Union and State of New Jersey, have invented certain new and useful Improvements in Electric Synchronous Apparatus, of which the following is a specification.

This invention relates to synchronizing apparatus for telephonic, telegraphic, and other purposes, and more particularly to that class of apparatus wherein the device to be synchronized is controlled by reversals of current produced on an electric circuit or circuits by the action of a vibrating or oscillating device which is preferably kept in oscillation or vibration by the action of a pair of operating-magnets controlled in turn by a polarized relay in a main line over which synchronizing reversals of current or pulsations are made to flow in time with the movements another apparatus.

The present invention relates principally to the means for securing the reversals of current on the local circuit by the action of the vibrator, and has in view the twofold object of reducing the voltage across the contact-points of the vibrator, while at the same time dispensing with the necessity for two local controlling-circuits which have hitherto been employed for the purpose of securing reversals of magnetic condition in the device to be controlled.

In describing my invention in connection with the accompanying drawings I shall assume that the action of the vibrator is made to produce reversals of current in the circuit for the armature of an electric motor which is to be synchronized and which may be constructed as described in the previous United States Patent No. 428,222, granted to F. J. Patten. It will, however, be understood that the invention might be applied to any local synchronizing-circuit in place of the armature-circuit of that patent.

My invention relates, further, to the manner of energizing the magnets of the motor to be synchronized, as will be hereinafter described, from the battery or generator which supplies the local synchronizing-circuit on which the reversals of current take place.

In the drawings, Figure 1 is a general diagrammatic representation of an apparatus embodying my invention. Fig. 2 is a simplified diagram of the circuits and apparatus controlled by the action of the vibrator.

Referring to the drawings, the actuating-magnets for the vibrator are indicated by the numeral 4, while 9 indicates the vibrator-lever, which is a split lever made in two parts insulated from one another, as well understood in the art, and carrying armatures upon which the magnets 4 act alternately. Said lever vibrates between stops, as shown, and its two halves form, respectively, the connection by way of the stop for the two batteries or generators 10. Said lever may be kept in vibration by any desired means—as, for instance, by the means described in my application for patent filed herewith, Serial No. 69,643, or by any of the devices described in the United States Patents Nos. 428,222, 428,221, or others of a similar character. It is preferred, however, to employ the arrangement shown in the application for patent referred to.

The polarized relay which controls the circuits of the magnets 4 is indicated at 2, while 3 is the main line over which the synchronizing pulsations flow through the relay. 13 is the armature-lever of the relay, and 14 is the local battery or generator connected in closed circuit, including the two coils of the magnets 4, as shown, while a connection from the junction of said coils is carried to the armature-lever 13. The opposite poles of the battery are also connected, respectively, to the two contacts between which the lever 13 plays, and the effect of the connection is to cause the battery to be shunted alternately from the magnets 4, so that the lever of the vibrator will be caused to follow the oscillations of the relay tongue or lever 13, as more particularly described in my pending application already referred to.

In a shunt to the contacts of the relay and across the circuit of the two magnets 4 is a non-sparking device 16, composed, preferably, of an incandescent lamp, as also described in said pending application.

The armature of the motor, which is to be kept in revolution synchronously with the dis-

tant device, is indicated at 6. The coils and the connections of this armature may be the same as those described in Patent No. 428,222, and the action of the vibrator is designed to produce reversals of current in the armature-circuit. This reversal of current flow is obtained by the action of the two generators 10 10′, which act in turn. The poles of these generators which are of the same sign are connected, respectively, to the opposite terminals of the circuit 5, as shown in Fig. 2, which contains the armature 6. Similar portions of the vibrator are also connected, respectively, to the poles of said generators which are of the same sign. Thus, as shown, the two contact-stops are connected, respectively, to poles which are of the same sign, and so, also, the two halves or portions of the vibrator. In the circuits leading to the two halves of the vibrator-lever—that is, in the connections 21—there may be interposed the double switch, (typified at 20.) In the present instance the terminals of the circuit 5 and the two halves of the vibrator-lever are connected together and to the same poles of the batteries, while the contact-stops are connected to those poles of the batteries or generators which are of the opposite sign. The vibrator operates to cause the current from one of said batteries or generators to flow through the circuit 5, connected up, as shown in Fig. 2, as a bridge or branch to the vibrator-circuits, in one direction when it is in one of its positions and then by moving to its opposite position breaks the circuit of said battery and completes the connection of the other battery, so as to cause the current from the latter to flow through the same connection 5, but in the opposite direction. This will be readily seen to be the effect by tracing the circuit of the batteries in the diagram. Thus, for instance, when the vibrator is against its left-hand contact the circuit is completed for the left-hand battery or generator 10 in the direction of the arrow, as shown, the flow being across the shunt or branch 5 in the direction of the arrow 40, while, conversely, when the vibrator is against its opposite contact the right-hand of the two batteries or generators 10′ has its circuit completed, and its current flows across the bridge or branch 5 in the opposite direction of the arrow 30.

The field-magnets to the motor to be synchronized are indicated at 7. They may be maintained by current from any desired source; but for the purpose of simplifying the apparatus I propose to place the coils of said field-magnets in shunt to the batteries or generators 10 10′, as clearly shown in Fig. 1. In this case the generators while serving to supply the current which flows alternately in reverse direction over the connection 5 also feed the fields of the motor. Besides simplifying the apparatus this arrangement possesses the advantage that the field-magnet circuit which is in shunt, as shown, to the vibrator-contacts operates in a measure to diminish the sparking at the contacts by affording a shunt-path for any extra current produced or tending to flow at the break of the circuit. In this respect the circuit acts to reinforce or supplement the action of the liquid and plate condensers 11 and 12, placed in shunt around the contacts of the vibrator for the well-known purpose.

It will be seen that only one motor-circuit is required for securing synchronism under the control of the vibrator and that inasmuch as the batteries or generators have their same poles connected to the vibrator-stops their voltage cannot combine to establish an arc directly across the space from one vibrator contact-stop to the other contact-stop, as would be the case where the two generators are connected in series and have opposite poles connected, respectively, to said stops.

What I claim as my invention is—

1. In a synchronous apparatus for telephonic, telegraphic and other purposes, the combination of a vibrator, two generators brought into action in turn thereby, a synchronous circuit to whose opposite terminals said generators are respectively connected by poles of the same sign, and connections from the poles of said batteries of the opposite sign to the two portions of the vibrator respectively, as and for the purpose set forth.

2. The combination in a synchronous apparatus for telephonic, telegraphic and other purposes, of a vibrator, a number of actuating-magnets therefor, a main-line relay having a vibrating tongue controlling the action of said magnets so as to keep the vibrator in oscillation in time with the reversals of current through the relay, two local batteries or generators connected respectively by poles of the same sign to contacts closed in alternation by said vibrator, and a local synchronizing-circuit having its opposite terminals connected respectively to portions of said battery of the same sign, as and for the purpose described.

3. In a synchronizing apparatus for telephonic, telegraphic and other purposes, the combination substantially as described of the vibrator, two battery or generator circuits closed alternately thereby, an electric motor the terminals of whose armature-circuit are connected respectively to poles of said generators of the same sign, the remaining poles of the generator being connected respectively to the two portions of the vibrator but with the same polarity, and field-magnets for said motor retained in shunts or branches respectively from said local generators.

4. In a synchronizing apparatus for telephonic, telegraphic and other purposes, the combination substantially as described of a vibrator having two sets of contacts closed in alternation to batteries or generators whose circuits are closed by said contacts, a synchronously-operating motor, an armature therefor through which the currents from

said batteries are made to flow in alternation by the operation of the vibrator, but in opposite directions, and field-magnets for said motor maintained in shunts or branches taken from the generator-circuits at points between said generators and the vibrator-contacts.

Signed at New York, in the county of New York and State of York, this 26th day of June, A. D. 1901.

WILLARD M. MINER.

Witnesses:
DELBERT H. DECKER,
ETHEL L. LAWLER.