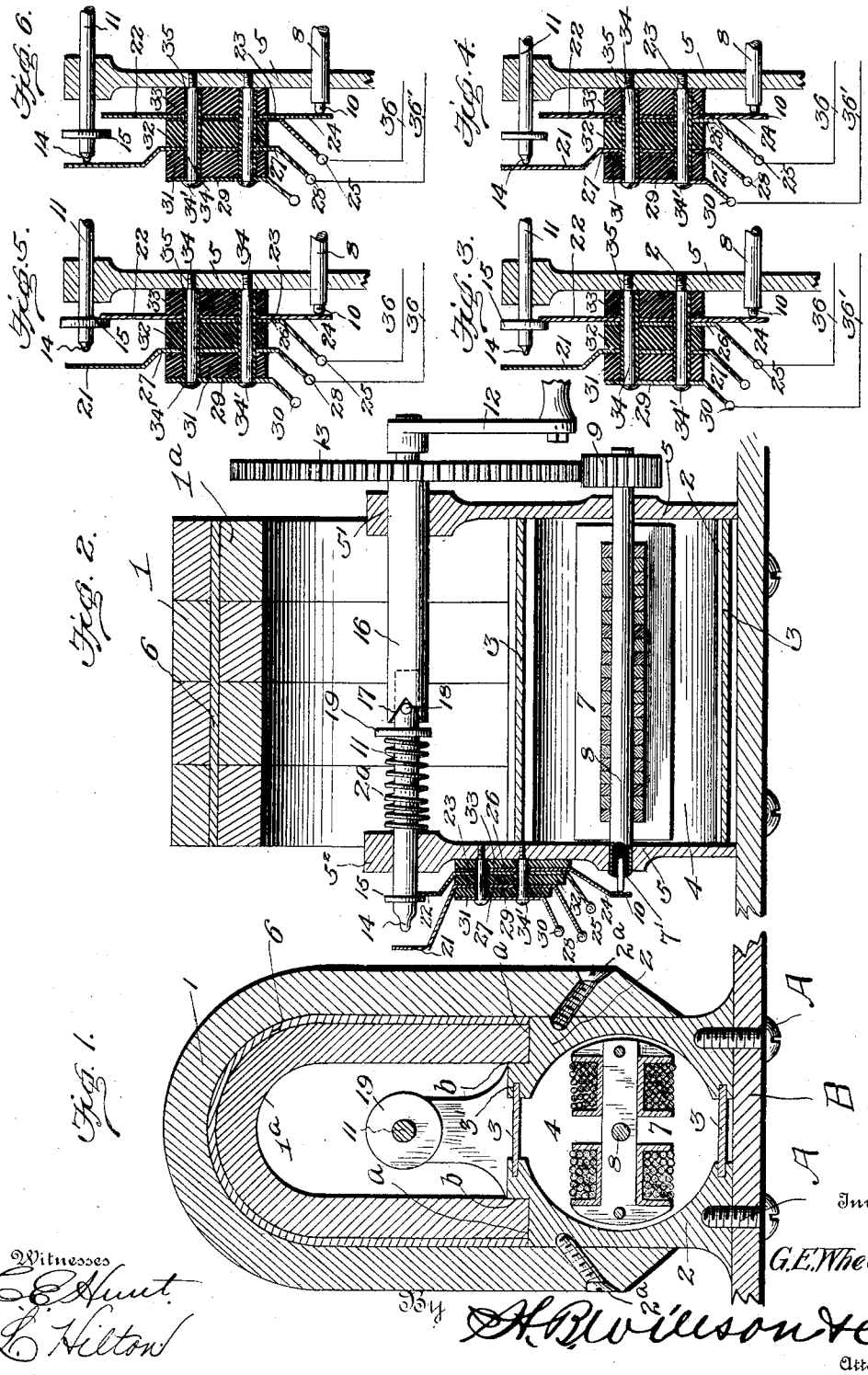
No. 746,904. PATENTED DEC. 15, 1903.

# G. E. WHEELER.

## MAGNETO GENERATOR.

APPLICATION FILED DEC. 27, 1902.

NO MODEL.




Witnesses
C. C. Hunt.
L. Hilton.

Inventor
G. E. Wheeler.
By H. B. Wilson & Co
Attorneys

No. 746,904. Patented December 15, 1903.

# UNITED STATES PATENT OFFICE.

GEORGE E. WHEELER, OF BURLINGTON, IOWA.

## MAGNETO-GENERATOR.

SPECIFICATION forming part of Letters Patent No. 746,904, dated December 15, 1903.

Application filed December 27, 1902. Serial No. 136,780. (No model.)

*To all whom it may concern:*

Be it known that I, GEORGE E. WHEELER, a citizen of the United States, residing at Burlington, in the county of Des Moines and State of Iowa, have invented certain new and useful Improvements in Magneto-Generators; and I do 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.

This invention relates to magneto-generators of that class especially designed for use in connection with telephone systems for calling up the central office or subscriber, and has for its object to provide such a generator which shall be simple of construction, comparatively inexpensive of production, and efficient in use, and one in which provision is made for protecting the armature from dust and other foreign substances, for concentrating the force of the magnets, so as to give a highly-magnetized field, and for adapting the generator for general use in equipments employing either a bridge or series shunt.

With the above and other objects in view, which will appear as the nature of the invention is better understood, the said invention consists in certain novel features of construction, combination, and arrangement of parts, as will be hereinafter more fully described, and particularly pointed out in the appended claims.

In the accompanying drawings, Figure 1 is a vertical transverse section of a magneto-generator embodying my invention. Fig. 2 is a longitudinal section of the same. Figs. 3 to 6, inclusive, are views showing the shunt-circuits.

Referring now more particularly to the drawings, the numerals 1 $1^a$ represent two field-magnets, preferably of horseshoe form, to the ends of which are connected the pole-pieces 2, which are shaped to receive the armature between them and which are connected and held properly spaced by non-magnetic plates 3, thus forming an annular chamber 4, in which the armature is inclosed, said chamber being closed at its ends by caps 5, which fit snugly against the ends of the pole-pieces and non-magnetic plates. The non-magnetic plates 3 may be of non-magnetic metal, but preferably are formed of glass or mica to enable the armature to be viewed from without. Each field-magnet 1 $1^a$ may consist of a single horseshoe-magnet or may be a compound magnet of a set of two or more horseshoe-magnets, as desired. In the present instance I have shown the magnets 1 $1^a$ as being made of relatively different sizes, the smaller magnet $1^a$ being inclosed by the larger magnet 1 or being disposed within the space bounded by said magnet 1, and each magnet 1 $1^a$ consists of a series of horseshoe-magnets disposed side by side and in contact with each other, as clearly shown in Fig. 2, thus forming two compound magnets, which are so disposed as to secure high magnetic force without increase in the size of the generator. The non-magnetic plates 3 are slidably fitted in grooves 3′ in the upper and lower edges of the pole-pieces, and thus held or clamped in position by the pole-pieces, which in turn are secured by screws A to a bracket or base-piece B. The caps 5 hold the non-magnetic plates against endwise movement, and thus prevent their withdrawal from the grooves 3′; but upon removing either cap the said plates may be withdrawn by sliding them out of said grooves, as will be readily understood. It will be observed that the ends of the large compound magnet 1 are arranged upon the outer sides of the pole-pieces 2 and are secured thereto by screws $2^a$ and that the ends of the inner compound magnet $1^a$ are fitted in recesses *a*, formed in the upper edges of the pole-pieces outside the line of the grooves 3, and that each recess has an inner shoulder *b*, against which the arms of the magnet $1^a$ are pressed. By this construction it will be seen that the magnets retain the pole-pieces 2 in fixed relation and prevent them from yielding outwardly to any extent, so that the pole-pieces cannot possibly tilt or cant so as to throw strain upon the magnetic plates 3 or produce objectionable pressure upon said plates. The two compound magnets 1 $1^a$ are separated by an interposed non-magnetic strip 6, whereby the full magnetic force is caused to be concentrated at the ends of the magnets, thus giving a highly-magnetized field for the armature and increasing

the current-producing force of the instrument. By the formation of the chamber 4 the armature 7 is inclosed and protected from dust and other foreign elements, whereby injury thereto is prevented, and as this chamber may be readily made air and liquid tight it may be made to contain an insulating-oil for high voltages. I would say that my construction of spacing the magnets by the non-magnetic strip operates on the principle that magnetism increases as the square of the distance, the non-magnetic material acting as a separator, whereby as the magnets are in contact or electrical connection only at the poles the lines of force are caused to follow the easiest path and jump the air-gap at the point of least resistance, thus concentrating all the magnetic force at the poles. I may to a certain extent obtain a like result by forming an air-space between the magnets; but the non-magnetic strip is more efficient and more perfectly concentrates the lines of force.

The armature 7 is mounted on the armature-shaft 8, which is journaled in the caps 5 and carries at one end a pinion 9 and at the other end a contact piece or point 10. This contact piece or point 10 is insulated from the armature-shaft, as shown at 7', but is electrically connected with one pole of the armature-winding, the other pole of which winding is electrically connected to the armature-shaft in the usual way. In suitable bearings $5'$ $5^2$ at the upper ends of the caps 5 is mounted the operating-shaft 11, which both rotates and slides longitudinally in said bearings and which is provided at one end with an operating crank-handle 12 and a gear-wheel 13, the latter meshing with the pinion 9 on the armature-shaft and is formed or provided at its opposite end with a contact-point 14 and contact collar or projection 15. Fixed to the bearing $5'$ is a sleeve 16, which projects toward the opposite bearing $5^2$ and surrounds the shaft 11 for a portion of its length. The inner or free end of this sleeve is formed with a cam notch or recess 17, adapted to receive a pin 18, fixed to the shaft 11, and on said shaft adjacent to said pin is a collar 19, between which and the bearing $5^2$ is a coiled spring 20, which slides the shaft endwise in its bearings in one direction—that is, toward that side of the machine on which the bearing $5'$ is located—and therefore normally presses the pin 18 toward the notched end of the sleeve, whereby upon the rotation of the crank-handle 12 the shaft 11 will not only be turned, but caused to reciprocate by the pin, notched sleeve, and spring in the usual way.

The contact-point 14 and collar 15 coöperate, respectively, with two contact-pieces 21 and 22 in such manner that when the shaft 11 is in its normal position and the pin 18 seated in the notch 17 the collar 15 will be in contact with the contact-piece 22 and the point 14 out of contact with the contact-piece 21 and so that when said shaft is rotated and reciprocated in the direction of bearing $5^2$ the collar 15 will be moved out of engagement with the contact-piece 22 and the point 14 into engagement with the contact-piece 21, thus alternately throwing the contacts 14 and 15 into and out of engagement with their respective coöperating contact-pieces 21 and 22. The contact-piece 22 is connected to or forms part of a conducting-strip 23, which is provided with a contact-piece 24 and a binding post or connector 25, the former being always in electrical contact with the contact piece or point 10 upon the end of the armature-shaft 8. The binding post or connector 25 may be integral with the strip 23, or it may be, as shown, integral with a strip 26, riveted or otherwise fastened to said strip 23 or suitably held in electrical contact therewith, or the parts may be constructed and electrically connected in any desired way to secure the same results. The contact-piece 21 is, on the other hand, connected to or formed upon a conducting-strip 27, electrically insulated from said strips 23 and 26 and provided with a binding post or connector 28. A conducting-strip 29 is electrically connected to the frame of the machine, but insulated from the strips 23, 26, and 27 and provided with a binding post or connector 30. In order to support these several strips in proper manner and position, I provide a series of three blocks 31, 32, and 33, made of any suitable insulating material. These blocks have passed through them screws 34, which enter the cap 5, carrying the bearing $5^2$, and thus secure said blocks to said cap. As shown, the strips 23 and 26 are clamped between the inner and center blocks 31 and 32, while the strip 27 is clamped between said center block and the outer block 33, and the strip 29 is clamped against the outer face of said outer block 33 by the heads $34'$ of the screws 34. The heads of the screws are in electrical connection with the strip 29, and thus electrically connect said strip with the generator-frame and that end of the armature-winding connected to the armature-shaft 8; but insulating-sleeves 35 insulate the screws from the strips 23, 26, and 27, so that the circuit through the said strips 23, 26, and 27 must be completed through the operating-shaft and coöperating contacts, as will be readily understood.

36 and $36'$ are line-wires, one of which (the wire 36) is at all times attached to the binding post or connector 25, while the other wire $36'$ is adapted to be connected to either binding-post 28 or 30 to short-circuit the armature-windings when the generator is not in use and connect up the generator for series or bridging work. In Figs. 3 and 4 I have shown the line-wires connected to the posts 25 and 30, forming a series shunt normally closed when the contact 15 rests against the contact 22, as shown in Fig. 3, and opened when ringing by the movement of the said contact 15 out of engagement with contact 22, as shown in Fig. 4. In Figs. 5 and 6 I have shown the wires 36 and $36'$ connected to the

posts 25 and 28, forming a bridging or open-shunt circuit, which is normally open when collar 15 engages with contact 22, as shown in Fig. 5, and is closed for ringing by the contact of point 14 with contact 21, as shown in Fig. 6. In either case the armature is short-circuited when not in operation and protected from abnormal currents, and the construction provided adapts the armature for general use.

From the foregoing description, taken in connection with the accompanying drawings, the construction and operation of the invention will be readily understood without requiring a more extended explanation.

Various changes in the form, proportion, and the minor details of construction may be resorted to without departing from the principle or sacrificing any of the advantages of this invention.

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

1. A magneto-generator embodying pole-pieces provided with grooves in their meeting faces, non-magnetic plates, spacing the pole-pieces and slidably fitting in said grooves, and caps closing the ends of the chamber formed by the plates and pole-pieces, and retaining said plates within said grooves, substantially as described.

2. In a magneto-generator, the combination of a base, pole-pieces secured thereto and provided in their meeting faces with grooves, non-magnetic plates spacing the pole-pieces and fitting in said grooves, caps closing the ends of the chamber formed by the plates and pole-pieces, and retaining said plates within said grooves, and magnets secured to the pole-pieces and adapted to prevent movement thereof, whereby strain upon the plates is prevented, substantially as described.

3. In a magneto-generator, pole-pieces, compound horseshoe-magnets, each magnet consisting of a series of magnets disposed side by side, one of the compound magnets being disposed within the space bounded by the other compound magnet, said magnets connecting at their ends with the pole-pieces, and insulating material separating the compound magnets between their points of connection with the pole-pieces, substantially as described.

4. In a magneto-generator, the combination of a frame, an armature-shaft having a contact-point, an armature thereon provided with a winding one end of which is connected to the frame and the other to said contact-point, an operating-shaft in gear with the armature-shaft and having a rotary and endwise movement, said shaft being provided with two contact members, two conductors, one normally in engagement with the contact-point of the armature-shaft and one of the contact members of the operating-shaft, and the other adapted to be engaged by the other contact member of the operating-shaft when said shaft is operated, the construction being such that the contact members of the shaft are adapted to contact alternately with said conductors as the shaft is reciprocated, the aforesaid conductors being insulated from the frame, and a third conductor insulated from said conductors but connected to the frame, the several conductors being adapted for the attachment of wires thereto, whereby a bridge or series shunt-circuit may be employed, substantially as described.

5. In a magneto-generator, the combination of a base, pole-pieces secured thereto, said pole-pieces being formed in their meeting faces with grooves and at their upper ends outside the grooves with recesses, non-magnetic plates spacing the pole-pieces and slidably fitting in said grooves, caps closing the ends of the chamber formed by the plates and pole-pieces and retaining said plates within said grooves, and a pair of magnets bounded one by the other, the inner magnet having its ends fitting in said recesses and retained in position by the outer magnet, the latter being secured at its ends to the pole-pieces and insulated from said inner magnet, substantially as described.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

GEORGE E. WHEELER.

Witnesses:
J. B. WOODSIDE,
MINNIE G. WOOD.