March 26, 1940. G. R. EATON 2,195,328

MAGNETO-ELECTRIC GENERATOR

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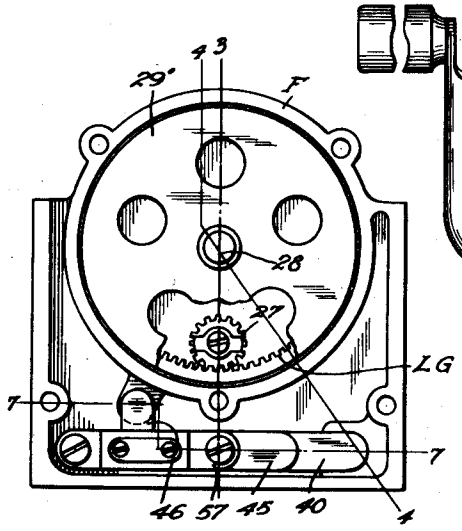

Fig. 2.

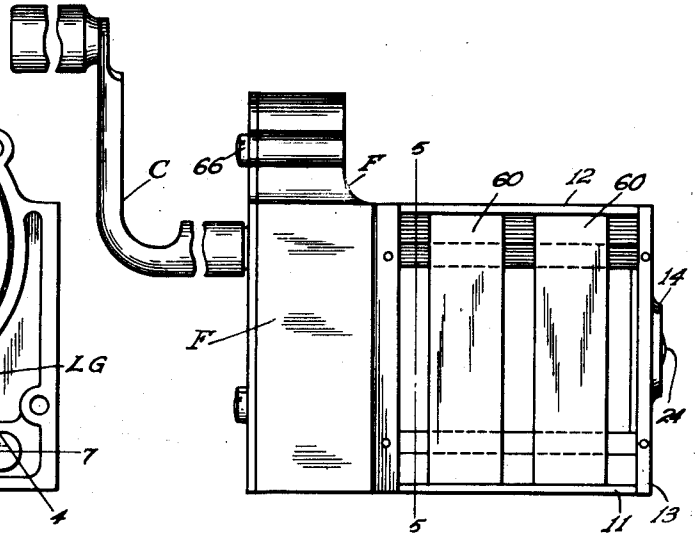

Fig. 1.

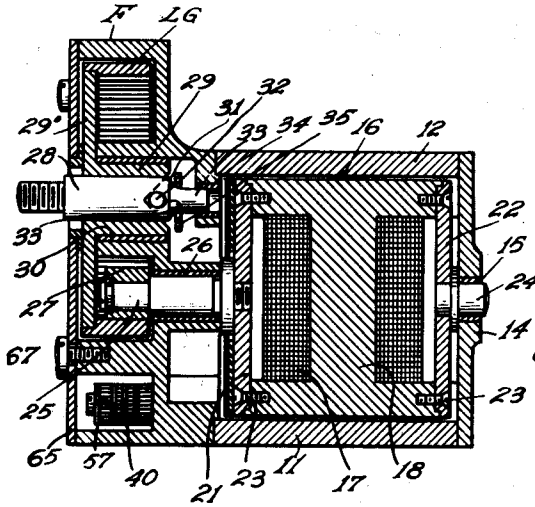

Fig. 3.

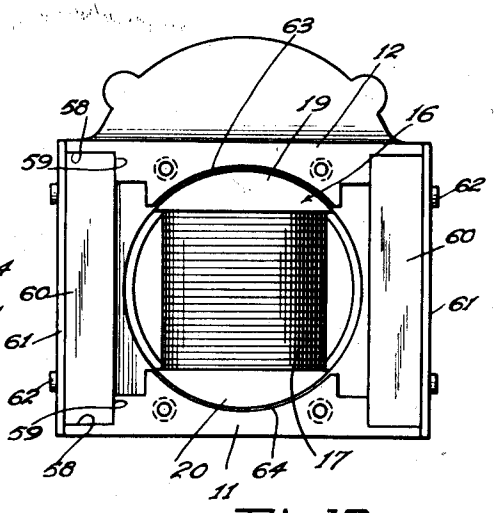

Fig. 10.

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MAGNETO-ELECTRIC GENERATOR

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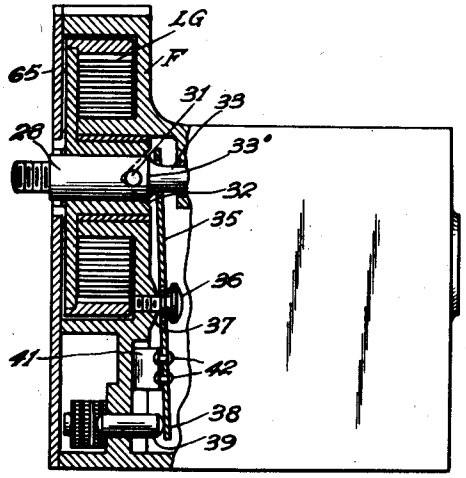

Fig. 4.

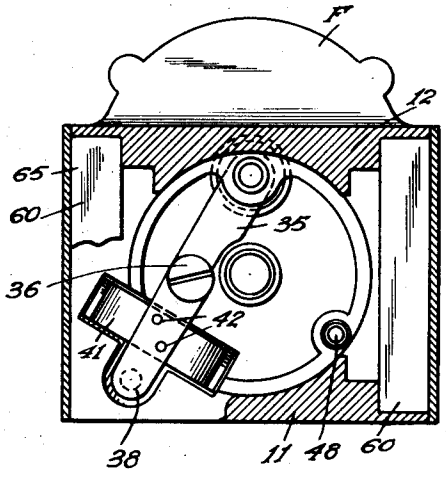

Fig. 5.

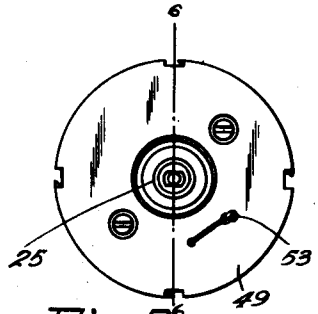

Fig. 8.

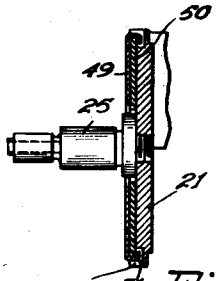

Fig. 6.

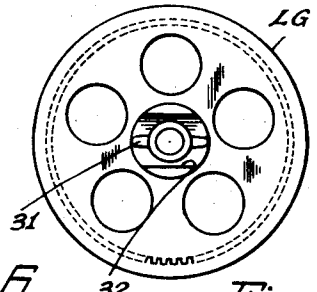

Fig. 9.

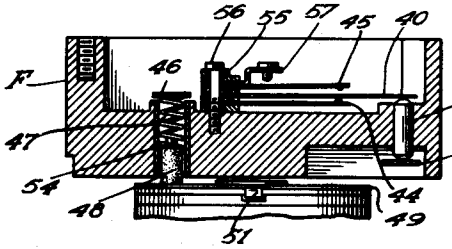

Fig. 7.

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UNITED STATES PATENT OFFICE

2,195,328

MAGNETO-ELECTRIC GENERATOR

George R. Eaton, Oak Park, Ill., assignor to Kellogg Switchboard and Supply Company, Chicago, Ill., a corporation of Illinois

Application August 5, 1937, Serial No. 157,459

4 Claims. (Cl. 171—209)

My invention relates to a magneto generator of the type used by telephone subscribers for signaling a central office particularly those subscribers associated with what are commonly known as rural lines which lines are usually of such length that the resistance is too high to permit the use of central battery equipment.

The present trend of telephone equipment is toward lighter and more compact equipment and an object of my invention is the construction of a highly efficient generator which is light in weight and small in size.

A feature of my invention is the provision of a generator in which the operating mechanism is entirely enclosed.

Another feature of my invention is a generator so constructed that the permanent magnets are held in place by the cover plates and the supporting frame which completes the magnetic circuit.

Another feature resides in the use of short bar magnets, which are preferably of special composition, on opposite sides of the rotor whereby a concentrated magnetic field is provided by a small amount of magnetic material.

Another feature of my invention is the use of an internal gear so as to reduce the overall dimensions of the generator.

Still another feature of my invention is a special lever mechanism associated with the crank shaft for operating the contact springs which control the automatic shunt common in generators of this type.

Other features not specifically enumerated above will be apparent from a perusal of the following specification and claims.

In the accompanying drawings,

Fig. 1 is a side view of my magneto generator with the side cover plate removed.

Fig. 2 is an end view with the cover removed and part of the larger gear web broken away to show the pinion gear.

Fig. 3 is a sectional view taken along the line 3—3 in Fig. 2.

Fig. 4 is a sectional view along the line 4—4 in Fig. 2.

Fig. 5 is a sectional view along the line 5—5 in Fig. 1.

Fig. 6 is a sectional view along the line 6—6 in Fig. 8.

Fig. 7 is a sectional view along the line 7—7 in Fig. 2.

Fig. 8 is an end view of the commutator disc.

Fig. 9 is an interior view of the large gear and

Fig. 10 is a back view with the cover plate and armature end plate removed.

Referring more particularly to Fig. 1 in which F comprises a supporting frame composed of metal or any other suitable material and which consists of a front cup-shaped portion to which is secured in any desired manner a rearwardly extending bottom member 11 and a top member 12. The cup-shaped portion is formed of non-magnetic material while the extending members are composed of magnetic material. An end plate 13 is fastened to the bottom member 11 and top member 12 by means of screws and this end plate 13 has a thickened portion 14 (Fig. 3) provided with an orifice in which is secured a bearing 15.

The armature comprises an H-shaped core 16 and winding 17 which is placed upon the round bridge member 18. The round core member differs materially from the oblong core which is usually used in generators of this type and its use greatly facilitates the winding of the armature and thus reduces the cost of construction. The edges 19 and 20 of the core 16 are arcuate-shaped so that the armature is substantially cylindrical in form. Circular metallic end plates 21 and 22 are secured to the ends of the core 16 by means of screws 23. The plate 22 has a stub shaft 24 secured to its center, which shaft enters the bearing 15. Secured in any suitable manner to the plate 21 at its central point is a shaft 25 which extends through the bearing 26 and has a pinion gear 27 secured to its end. The respective shafts 24 and 25 support the armature and permit it to be rotated. The shafts are parallel to the arcuate-shaped core pieces 19 and 20 and at right angles to the bridging member 18. Rotatably supported on the shaft 28 is a hub 29 which is also rotatably secured in the bearing 30 mounted in a recess in the frame member. Rigidly secured to the outer end of the hub 29 is a web or disc 29' to the outer circumference of which is secured the internal gear LG the teeth of which mesh with the teeth of the pinion 27.

Formed in the inner end of the hub 30 is cam notch 31. Pin 32 extends through shaft 28 within the notch 31. A crank C has threaded engagement with the end of shaft 28 and when the shaft is rotated by crank C, pin 32 will slide along the cam surfaces of the notch 31 to displace the shaft 28 relative to the hub 29, but engagement of the inner screw threaded end of the crank C with the web 29' will so limit the longitudinal movement of shaft 28 that pin 32 will be unable to move beyond the top of the notch 31. Thus

upon turning crank C, the shaft 28 is first displaced longitudinally until the end of crank C engages web 29' after which the internal gear LG is rotated with the crank. Gear LG acts through pinion 27 to impart rotary movement to the core 16.

The shaft 28 has a reduced end portion 33 which extends into a bearing 34 in the frame F. Upon the initial rotation of the shaft 28, it moves longitudinally, as above explained, and the shoulder 33' of the shaft engages the lever 35 (Figs. 3 and 4) through an orifice in which the reduced end 33 of the shaft passes.

Lever 35 is provided centrally with an orifice through which the screw 36 (Fig. 4) passes. The frame F is provided with a hump 37 at the point where screw 36 enters so as to permit the lever 35 to pivot at this point. Upon initial operation of the crank, the upper end of lever 35, as seen in Fig. 4, is moved to the right and the lower end 38 is moved to the left.

The end 38 of the lever 35 engages a plunger 39 which is adapted to move longitudinally through an orifice in the supporting frame F to operate a contact spring 40 for purposes hereinafter described. A spring member 41 is secured by means of rivets 42 to the lever 35. This spring member is bowed in such a manner that its ends rest against the supporting frame F but its center portion is raised therefrom so that the end 38 of the lever 35 normally is held away from the supporting frame F and the other end of the lever 35 is maintained against the shoulder 33' of the crank shaft 28. The springs 43 and 44 are normally engaged to complete the usual automatic shunt circuit when the generator is idle. The springs 40 and 45 are normally separated but are closed when the generator is operated to complete the electrical circuit for the armature winding. When the rotation of the crank C is stopped, the spring 41 forces the crank shaft 28 to the left in Fig. 4 and the upper end of lever 35 follows the shoulder 33'. The contact spring 40 presses the plunger 39 against the lever 35 and the spring 40 disengages the spring 45 and again engages the spring 44.

An extension 46 of contact spring 40 (Figs. 2 and 7) engages a spring member 47 which rests within an insulating bushing 54 secured within an orifice provided in the supporting frame F. The other end of spring 40 engages a carbon block 53 which is thereby spring pressed into engagement with a collector disc 49. This collector disc 49 consists of a circular copper disc which is held in position upon an insulating disc 50 by tab members 51 which fit in grooves 52 in the insulating disc and are then turned over to maintain the discs in position relative to each other. The insulating disc 50 is secured to the end plate 21 of the armature and one end of the winding 17 passes through an orifice in the end plate 21, the insulating disc 50 and the collector 48. This end is electrically connected at 53 to the collector by means of solder. The other end of the winding 17 is connected to the end plate 22 of the armature which is in electrical engagement with the frame F of the generator through the stub shaft 24. The contact springs 43, 44, and 45 are insulated from each other and from the supporting frame by means of insulating bushings 55 and a screw 56 secures them in position. A terminal 57 which has electrical engagement with the contact spring 45 provides the other terminal for the generator output.

The bottom member 11 and the top member 12 of the supporting frame, as shown in Fig. 10, are provided with ledges 58 and a shoulder portion 59. The permanent magnets 60 are of the bar type and rest on the ledges 58 and against the shoulder 59 in which position they are maintained by their magnetic attraction for the pole pieces, a side plate or cover 61 of nonmagnetic material is secured to the supporting frame F by means of screws 62 and also prevent the displacement of the magnets 60. The member 12 has an arcuate-shaped portion 63 which is concentric with the edge 19 of the armature core member 16 and the bottom member 11 has a similarly shaped portion 64 which is concentric with the edge 20 of the armature core member 16. The space between the pole pieces and the armature is very small so as to increase the output of the device. The magnetic circuit of the generator is completed by the members 11 and 12 which extend between the permanent magnets 60 located on opposite sides of the armature. Like poles of the magnets 60 must extend in the same direction so that the lines of force will pass through the arcuate-shaped portions of the members 11 and 12 and the core 16. The arcuate portions are substantially as deep as the thickness of the arcuate portions of the core members so that when the armature is in the position shown in Fig. 10, practically all of the magnetic lines of force will pass through the iron of the core rather than through the air and the electrical output will be very high.

A front plate 65 is secured to the frame F by means of screws 66 to cover the mechanism located in the front of the supporting frame. The plate 65 is provided with an orifice through which the reduced portion of the crank shaft 28 passes. A terminal member 67 is secured to the frame F to provide the second terminal for the electrical circuit. This circuit may be traced from terminal 57, contact springs 45 and 40, spring 47, brush 48, commutator 49, wire 53 to the winding of the armature, end plate 22, shaft 24 and frame F to terminal 67.

The bar magnets are preferably of the cast type of special aluminum alloy and the device has been found to give good results when the armature is composed of the 45—55 per cent nickel, iron mixture.

Having thus described my invention, what I claim is new and desire to secure by United States Letters Patent is:

1. In a generator of the character described, a supporting frame comprising a front portion, a cover for said portion, a large gear having a hub portion, a driving shaft resting in said hub portion and bearing in said cover and having its rearwardly extending end terminating adjacent the front portion of said frame and having limited rotation within said hub portion and longitudinal movement in said bearings, a pivoted lever located in said front portion and having one end associated with said shaft, spring means for maintaining said shaft and lever in their normal position, means for moving said shaft and lever to their alternate position at the initial rotation of said shaft, and a pair of contact springs operable upon movement of said lever.

2. In a generator of the type described, a supporting frame comprising an end portion and rearwardly extending members, an armature rotatable between said extending members, a large gear having a hub portion, a pinion gear in mesh with said large gear and connected to said armature, a driving shaft resting in said hub portion and bearing in said cover and said frame

adjacent said end portion and having its rearwardly extending end terminating thereat, and having limited rotation within said hub portion and longitudinal movement in said bearings, a pivoted lever having one end associated with said shaft, spring means for maintaining said shaft and lever in their normal position, means for moving said shaft and lever to their alternate position at the initial rotation of said shaft, and a pair of contact springs operable upon movement of said lever.

3. In a generator, a frame, an internal gear having a hub rotatably supported in said frame, a shaft rotatably and longitudinally movable in said hub, said hub having a cam recess in the inner end thereof, a projection on said shaft extending into said recess, means for limiting the longitudinal movement of said shaft relative to said hub preventing said projection passing out of said recess, an armature rotatably supported in said frame, said shaft terminating short of said armature, a lever positioned between the gear and the end of the armature arranged to be engaged and displaced by said shaft upon longitudinal movement thereof, a set of contact springs arranged to be actuated by said lever upon displacement thereof.

4. A generator of the character described including a supporting frame comprising a front portion and rearwardly extending members, a gear located in said front portion, a drive shaft for said gear having its rearward end bearing in said front portion and terminating thereat, a lever positioned between said gear and said bearing and arranged to be displaced by said shaft, a set of contacts arranged to be actuated by said lever upon displacement thereof, an armature rotatably mounted within said rearwardly extending members, and means connecting said gear to said armature.

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