March 25, 1941. E. S. McLARN 2,236,105

TELEPHONE SUBSET ARRANGEMENT

Filed Oct. 29, 1938 3 Sheets-Sheet 1

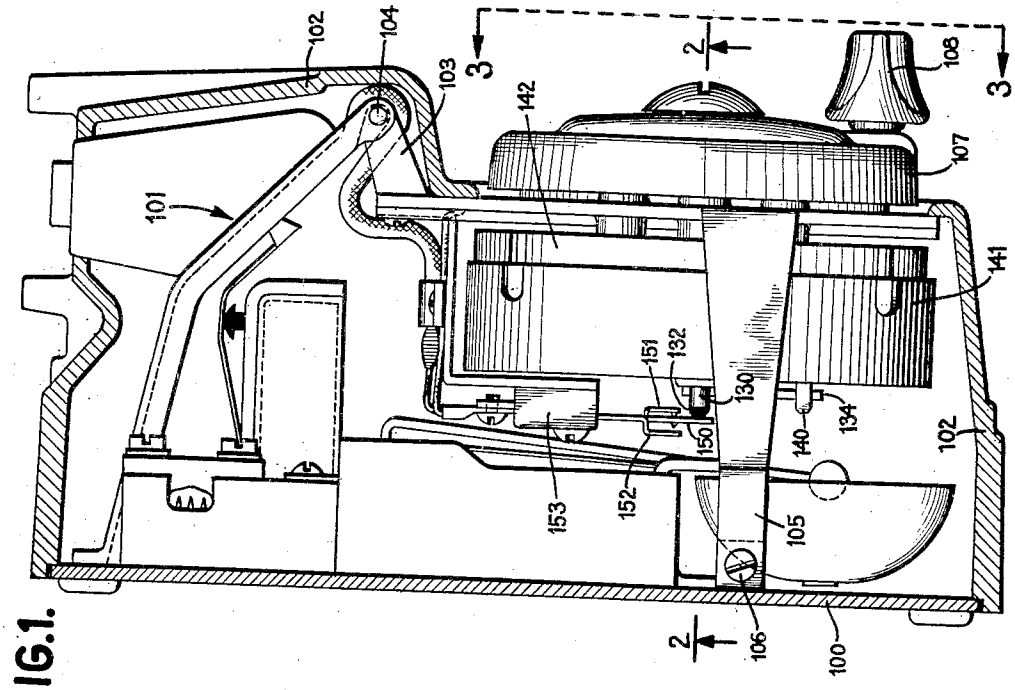


FIG.1.

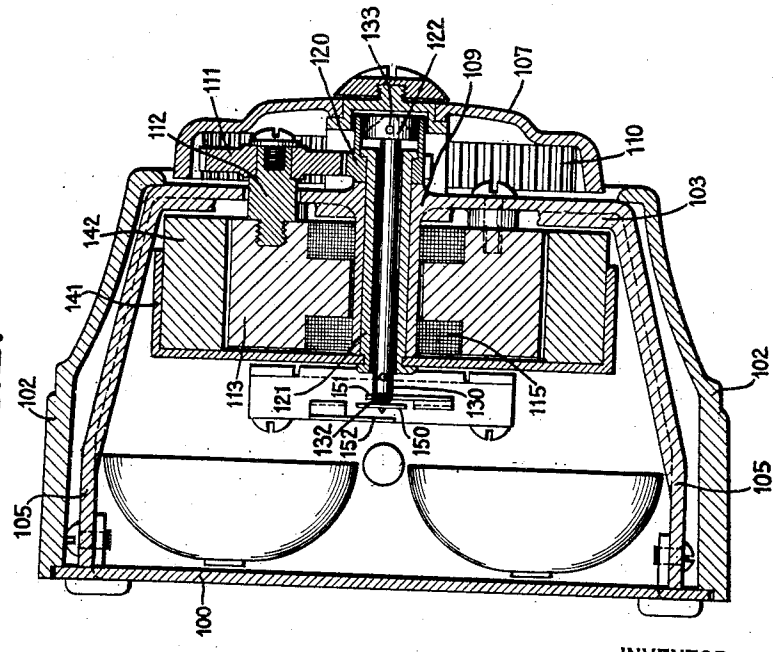


FIG.2.

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TELEPHONE SUBSET ARRANGEMENT

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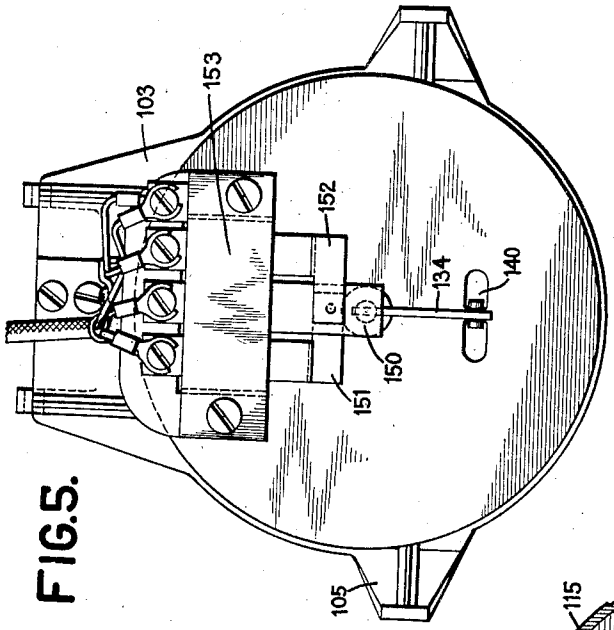


FIG.5.

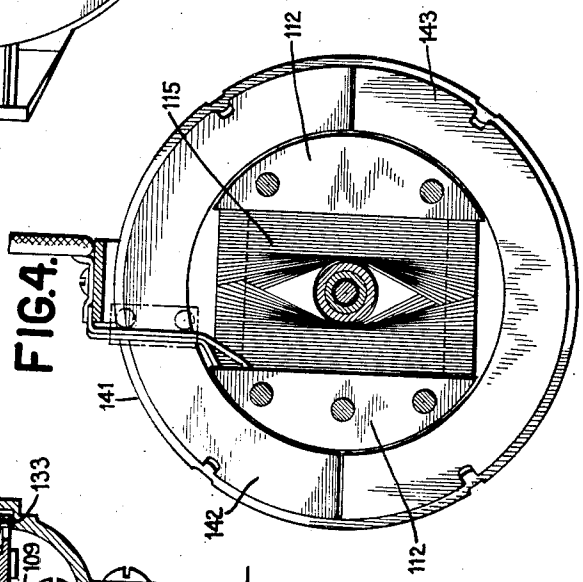


FIG.4.

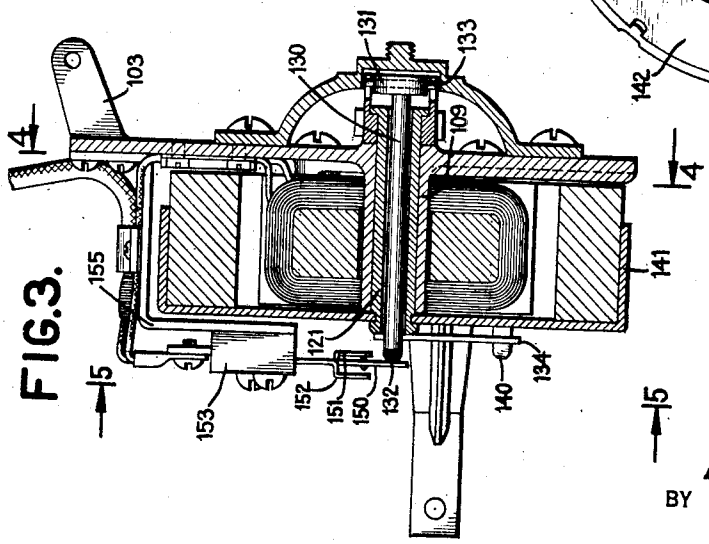


FIG.3.

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TELEPHONE SUBSET ARRANGEMENT

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FIG.7.

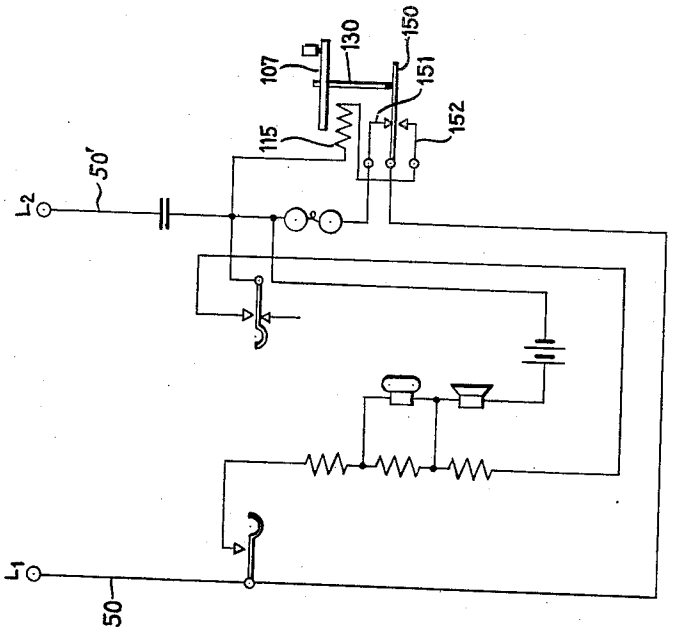


FIG.6.

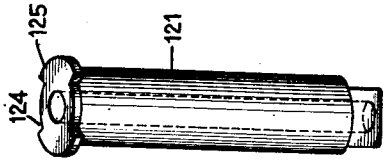
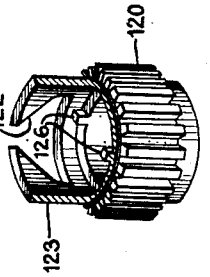


FIG.6a.



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UNITED STATES PATENT OFFICE

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TELEPHONE SUBSET ARRANGEMENT

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Application October 29, 1938, Serial No. 237,697

7 Claims. (Cl. 179—100)

My invention relates to telephone apparatus and more particularly to magneto hand generators for suitable mounting in telephone subscribers' sets.

In the magneto telephone subsets now generally in use, the telephone is usually made quite large for the accommodation of the magneto and is generally of radically different design from telephones utilizing local or common battery for ringing instead of the magnetos. Because of these limitations magneto telephone subsets have been very different in appearance from the commonly used manual and dial telephone subsets operation on batteries. Furthermore, this radical difference in structure makes necessary a removal of the telephone instrument and replacing by a different instrument if a system is to be changed from a magneto operated to a battery controlled arrangement. Moreover, the difference in structure also results in an increase in the manufacturing cost, since various types of telephone subsets which differed from each other in substantially every respect, were necessary to supply the instruments for both types of systems.

According to my invention I provide a magneto hand generator, which may be made quite compact in size and so may be incorporated in the usual type of battery telephone subset. Furthermore, the hand generator in accordance with my invention may be made of such appearance as to render the subset in which it is inserted very similar in appearance to the ordinary battery operated telephone.

Another feature of my invention resides in the construction of a hand generator composed of a small number of parts which are mounted so as to be readily acceptable for service or repair with a minimum amount of effort.

Furthermore, in accordance with a feature of my invention, the generator is so designed as to be easily started because of the position of the armature with respect to the pole pieces. Also the magneto winding and the armature are made stationary so that no sliding connection is required between the generator and the line. Because of the stationary armature and rotatable field it is possible to build the magneto generator of smaller size. The permanent magnet field pieces may be made in semi-circular shape and mounted about said armature so as to provide a flywheel effect upon rotation.

Another feature of my invention includes a hand generator in a telephone subset in which the gearing for driving the generator is mounted outside the regular telephone casing.

With these features in view it is a principal object of my invention to provide a magneto generator of compact size.

It is a further object of my invention to provide a generator of suitable shape to conserve space and to permit the design of a magneto telephone of small and pleasing contour.

It is a further object of my invention to provide a hand generator which is easy to start.

It is a still further object of my invention to provide a hand generator in which the field is made rotatable and the armature is stationary, thus eliminating pivotal frictional points for carrying out the winding terminals.

It is a still further object of my invention to provide a hand generator made of a small number of parts which can be readily and cheaply manufactured and assembled.

It is a still further object of my invention to provide a telephone subset using a signaling means such as my improved hand generator in which the parts may be made readily accessible for servicing the telephone subset.

Further objects and advantage of my invention may be gathered from a reading of the particular description of my invention, with reference to the accompanying drawings in which

Fig. 1 illustrates a cross-sectional view of a wall type telephone constructed in accordance with my invention,

Fig. 2 illustrates a cross-sectional view taken along the line **2—2** of Fig. 1,

Fig. 3 is another sectional view of the hand generator made along the line **3—3**, of Fig. 1,

Fig. 4 is a sectional view along the line **4—4** of Fig. 3,

Fig. 5 is a plan view of the generator taken along the line **5—5**, of Fig. 3,

Figs. 6 and 6A are details of parts of the generator, and

Fig. 7 is a wiring diagram of a subset illustrating the related parts of a generator and the telephone subset circuit.

Turning now more particularly to the drawings, Fig. 1 illustrates a suitable form of wall telephone in which base plate **100** is provided upon which the telephone apparatus itself is mounted. A suitable cover plate **102** is provided to cover the working parts of the telephone. By removal of this cover plate **102**, the interior of the telephone may be readily accessible for suitable repairs. Within the telephone casing is provided a hand magneto generator or other suitable signalling

device mounted on a bracket 103. This bracket is pivoted at point 104 to a supporting post 101 fastened to plate 100 so that the entire signalling unit may be tipped outwardly for making repairs on the interior surface of the generator, for example the switch assembly, or on the bell circuit without disassembling the entire telephone arrangement. The bracket 103 is further provided with projecting legs 105 which may be fastened by suitable means to the upstanding portion 106 of base plate 100. The arms 105 may be made of suitable spring material so that the generator unit will be held in place by frictional engagement. However, since there is a considerable strain on the mechanism due to the weight and rotation of the generator, it is preferable for these parts to be fastened by suitable means such as screws.

The magneto unit itself comprises a dished cover plate 107, extending outside the subset cover plate 102, upon which a suitable crank handle 108 may be provided for operating the generator. On the under side of the plate or cover 107 and fastened thereto and preferably welded integral with it, is provided a ring gear 110 (Fig. 2). This gear engages an idler gear 111 rotatably mounted on an end of a stud shaft 112 secured to the armature 113 of the magneto. This armature is secured to bracket 103 by suitable fastening means so as to be held fixed with respect to the telephone framework.

The idler gear 111 meshes with a pinion gear 120 movably secured to a rotatable hollow shaft member 121 so as to permit a small amount of relative rotation there-between. This member 121 rotates inside a sleeve portion 109 formed on bracket 103 and is secured by suitable means to a cup-shaped pole supporting plate 141. This connection may suitably be made by making the lower end of 121 of square or other non-circular shape so that plate 141 will rotate therewith. Within the hollow of shaft 121 is slidably mounted a pin 130 provided at one end with an enlarged head portion 131, Fig. 3, and at the other with an insulated contact controlling member 132. Projecting from the enlarged head portion 131 is provided a pin 133. The pinion gear, Fig. 6A, is provided with a portion 123 integral therewith upon which are provided cam surfaces 122 for cooperation with pin 133. The gear 120 is also provided with diametrically offset projections 126 (Fig. 6A) which cooperate with the diametrically disposed recesses 124 in the flange 125 of shaft 121, Fig. 6, to permit a limited relative or free rotation of gear 120 with respect to shaft 121. The construction of the shaft 121 and gear arrangement may be clearly seen in Figs. 6 and 6A.

Through the end of pin 130 at a point adjacent the insulated end 132, is provided a laterally projecting pin arrangement 134 which is adapted to cooperate with raised projections 140 provided on the rotor-supporting cover 141. The purpose of pin 134 is to prevent the rotation of pin 130 until the camming action of pinion gear 120 has driven pin 130 downwardly and shifted the spring contacts. Pin 130 does not turn during the period of free rotation of pinion 120 because it is held by pin 134 which is held stationary by lugs 140 because of the static inertia of the rotor. The rotor does not move until projections 126 strike the projecting surfaces of flanges 125, Figs. 6 and 6A. The rotor comprises the two semi-circular field magnets 142, 143, the shape of which may be readily seen with reference to Fig. 4. The generator design is such that in the normal or rest position the intersections of the rotor pole pieces 142, 143, will always be almost exactly opposite the center of the heads of the armature 112, of the magneto as shown in Fig. 4. These rotor elements are supported in the cup-shaped rotary supporting element 141.

Cooperating with the insulated end of pin 130 is the central contact element 150. In its normal position this contact 150 is closed against its right-hand contact 151 by which the ringer of the subset is normally maintained connected with the line 50, 50' (Fig. 7). Upon rotation of the generator, however, the contact element 150 is forced to the left opening contact 151 and closing a contact at 152 which serves to disconnect the local ringer from the line to connect the generator armature thereto. These contacts are supported in a suitable insulating arrangement indicated at 153 and supported by a suitable bracket 155 on the supporting bracket 103.

The operation of the generator is as follows: Upon rotating part 107 by handle 108, ring gear 110 turns idler gear 111 which in turn drives pinion gear 120 at a rate determined by the gear ratio between the ring gear and the pinion. After turning a short distance projections 126 contact flange 125 and cause rotor 141 to turn at the same rate. During the period of independent rotation of pinion gear 120, the cam surface 122 encounters projecting pin 133 on pin 130 forcing pin 130 downward and causing the insulated end 132 of pin 130 to move contact element 150 from contact 151 to contact 152. Rotor 141 carries with it the permanent magnets 142 and 143. These rotating poles create a change in magnetic flux in the armature 112 causing flux variations actuating at a rate determined by the speed of rotation of the rotor with respect to the armature and the number of field poles. This variation in magnetic flux in armature 112 induces a current in the armature winding 115 connected to the line 50, 50' at contact 152 and thus causes the alternating current to be transmitted over the line 50 to the distant sending station.

The conventional magneto hand generator is constructed with horse shoe magnets arranged side by side with the armature revolving between soft iron pole pieces attached to the poles of the permanent magnets. In such construction, the armature will stop either with the heads bridging the air gap and the lines of force concentrated at the edges, or at a position of 90° from this position with the heads contiguous to the pole pieces and with the lines of force spread over a considerable area. In the former position starting is difficult because of the keeper effect of the bridging armature heads whereas in the latter position, the armature heads are relatively free to move. In my generator, the bridging position is entirely eliminated thus eliminating the more difficult of the two starting positions. Upon stopping the rotation, pin 130 is returned to its normal position by the spring action of switch member 150, causing pinion gear 120 to return to a central position with respect to pin projection 133. This may be readily accomplished by the proper choice of value of spring switch member 150.

It is readily apparent that the magneto generator in accordance with my invention is very compact and is of suitable shape to be readily incorporated in the position normally occupied

by the calling dial in an automatic telephone arrangement.

While I have illustrated herein a specific structure embodying the preferred form of my invention it should be distinctly understood that this is merely incorporated by way of illustration and is not to be considered as a limitation on the scope thereof. It is evident that varying forms and shapes of the magneto generator in accordance with my invention may be desired without departure from the general scope of my invention. What I consider my invention and upon which I desire to secure protection is defined in the appended claims.

I claim:

1. A telephone subset comprising, a supporting plate, a casing having an aperture, a supporting bracket carried by said plate, a magneto generator pivotally supported by said bracket within said casing but spaced from said plate, another subset circuit component supported from said plate between said plate and said generator, driving means for said generator extending through said aperture, and means for removably securing said generator to said supporting plate to prevent pivotal movement of said magneto with respect to said bracket.

2. A telephone signal generator comprising, a rotary cover having internal gear teeth, a gear train mounted inside said cover and meshing with said gear teeth, a shaft operatively associated with said gear train for rotation responsive to rotation of said cover, permanent magnet field pieces operatively associated with shaft for rotation therewith, and an armature having a winding thereon fixedly mounted in the magnetic field of said field pieces whereby operation of said gear-driving means will induce an electromotive force in said armature windings, said cover being dimensioned to extend through a conventional dial aperture of standard size so that said generator may be mounted in a telephone subset having a conventional dial aperture with said cover and gear train at least partially outside the subset.

3. A telephone magneto generator comprising a frame, an armature carrying a winding fixedly secured to said frame, magnetic field producing means comprising permanent magnets rotatably mounted on said frame for rotation about said armature, means for rotating said field producing means comprising a shaft operatively connected with said pole pieces, a pinion gear mounted on said shaft and rotatable a predetermined amount with respect thereto, rotatable gear means for driving said pinion gear, a switch normally maintaining said armature winding open circuited, and means operative in response to rotation of said pinion gear for closing and maintaining closed for the duration of such rotation a circuit for said armature winding comprising a cam portion rotatable with said pinion gear and a follower rotatably fixed to said magnetic field producing means and operated by said cam portion, said switch being operated by said follower and spring tensioned to return said follower and cam portion to a normal predetermined position.

4. A telephone signal generator comprising, a rotary cover having internal gear teeth, a gear train mounted inside said cover and meshing with said gear teeth, a shaft coaxially arranged with respect to said cover operatively associated with said gear train for rotation responsive to rotation of said cover, magnetic field pieces operatively associated with said shaft for rotation thereby, and an armature having a winding thereon fixedly mounted in the magnetic field of said field pieces whereby operation of said gear-driving means will induce an electromotive force in said armature windings, said cover being dimensioned to extend through a conventional dial aperture of standard size so that said generator may be mounted in a telephone subset having a conventional dial aperture with said cover and gear train at least partially outside the subset.

5. A telephone subset comprising a base plate, a cover plate fitted to said base plate and provided with an aperture, a telephone signalling generator mounted on one of said plates beneath said cover plate, and means for driving said generator protruding from said aperture comprising a drive gear, means for rotating said gear, a gear train connecting said drive gear and said generator, and a cover rotatable with said drive gear.

6. A telephone subset comprising an instrument supporting base plate, a cover plate fitted to said base plate and provided with a circular aperture of such dimension as to accommodate the usual telephone dial, a telephone signalling generator mounted on said base plate beneath said cover plate, and means mounted on said base plate and protruding from said aperture for driving said generator comprising a ring gear, means for rotating said gear, a gear train connecting said ring gear and said generator, and a cover rotatable with said ring gear.

7. A telephone subset comprising an instrument supporting base plate, a casing having an aperture, a first bracket fixed to said base plate, a second bracket pivoted on said first bracket and removably secured to said base plate, a telephone signal generator mounted on one side of said second bracket within said casing but spaced from said plate, another subset circuit component supported from said plate between said plate and said generator, and means mounted on the other side of said second bracket for operating said generator, said operating means extending through said aperture.

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