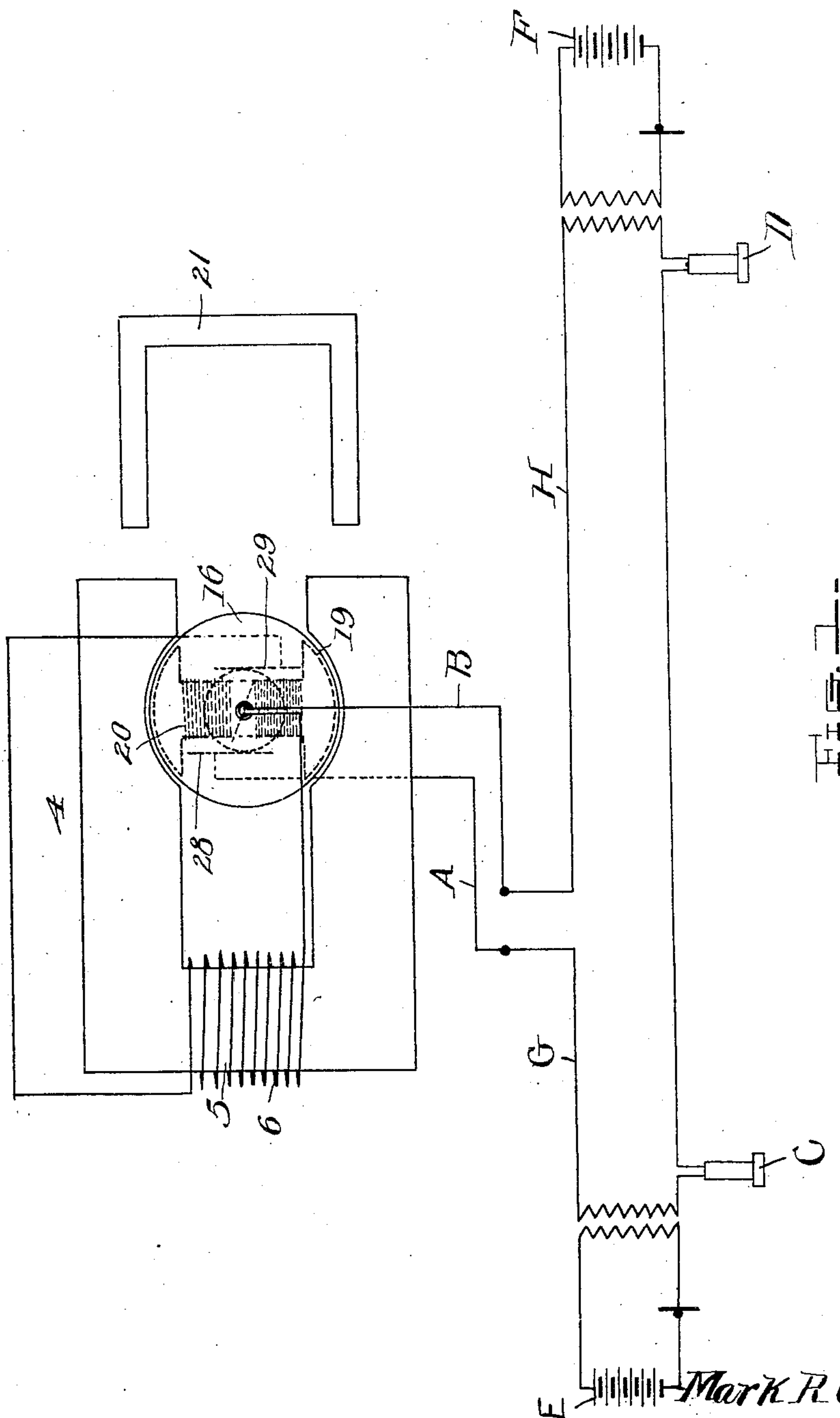


M. R. GILSON.
TELEPHONE REPEATER.
APPLICATION FILED AUG. 8, 1907.

930,854.

Patented Aug. 10, 1909.
3 SHEETS—SHEET 1.



Witnesses:

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930,854.

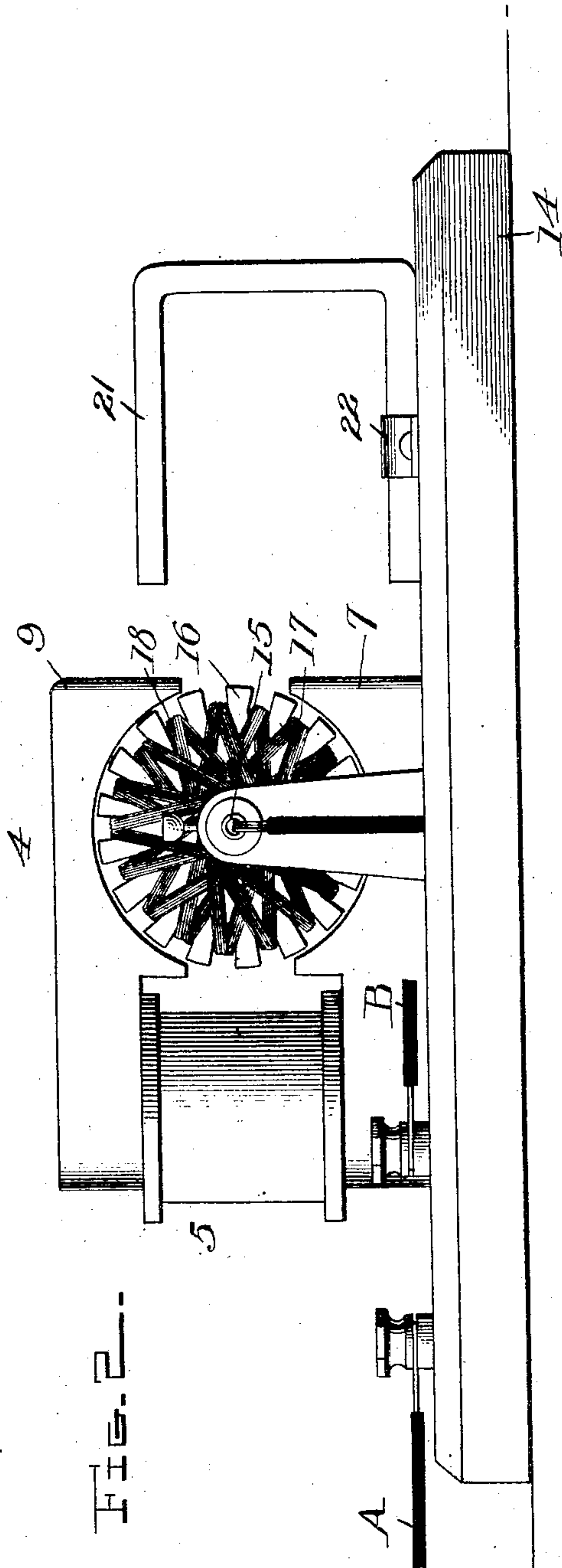


FIG. 2--

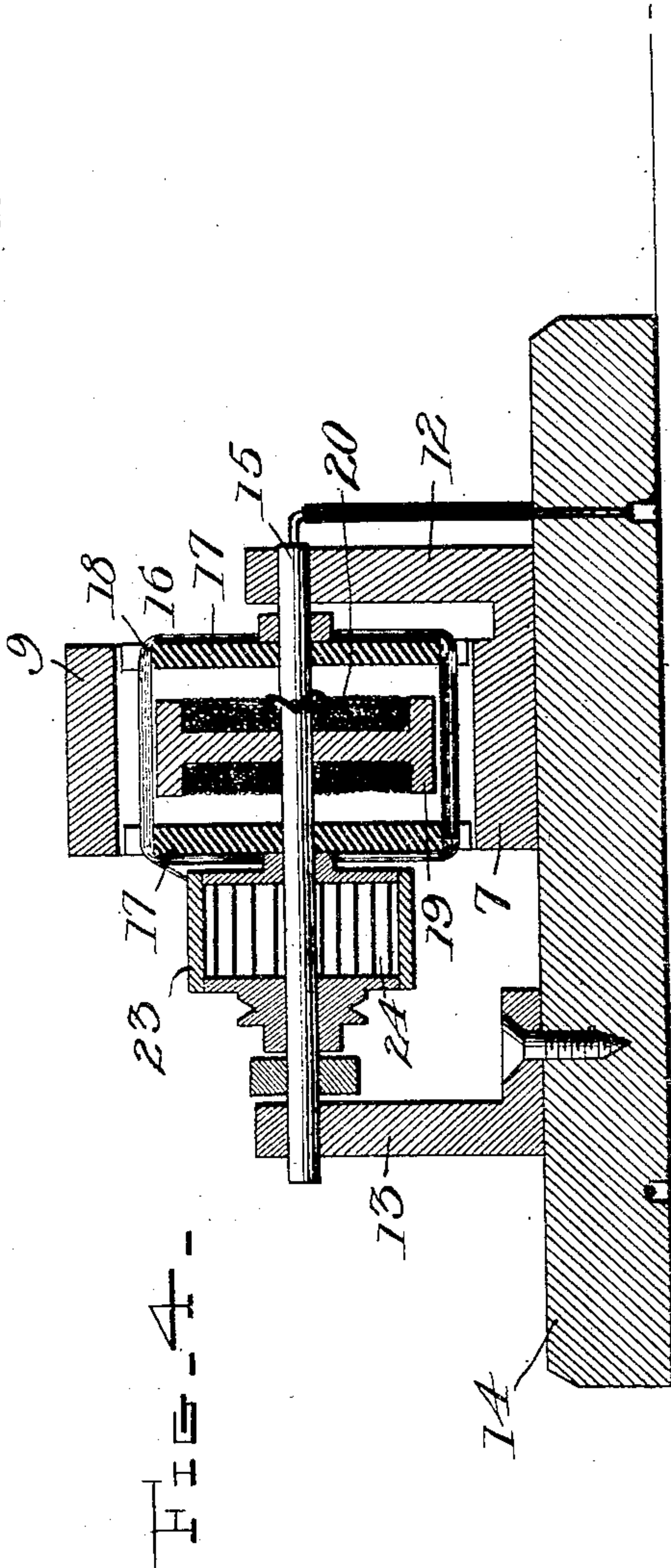


FIG. 4--

Witnesses

For a Nachf.
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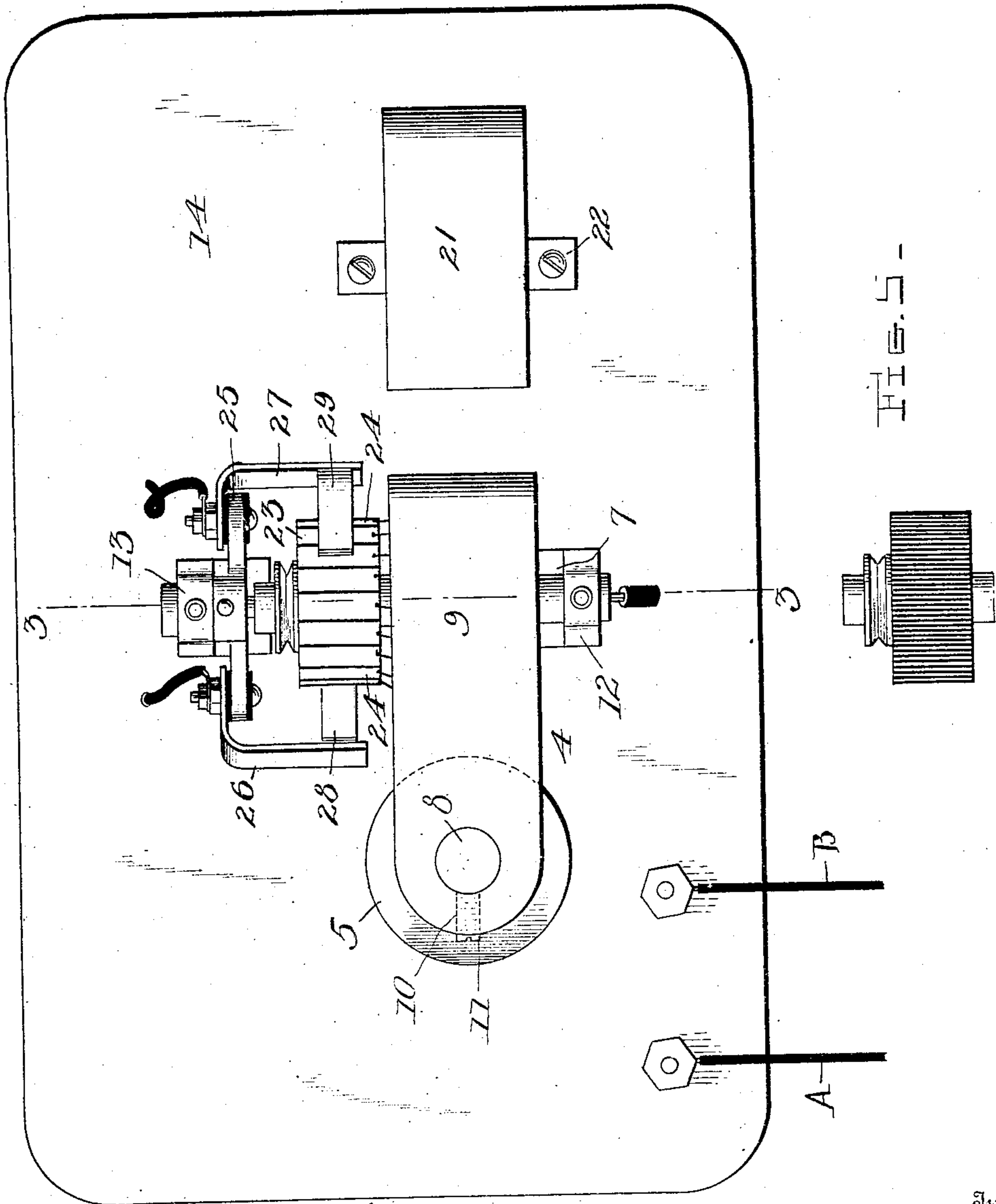
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UNITED STATES PATENT OFFICE.

MARK R. GILSON, OF PHILADELPHIA, PENNSYLVANIA.

TELEPHONE-REPEATER.

No. 930,854.

Specification of Letters Patent.

Patented Aug. 10, 1909.

Application filed August 8, 1907. Serial No. 337,713.

To all whom it may concern:

Be it known that I, MARK R. GILSON, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Telephone-Repeaters, of which the following is a specification.

This invention relates to telephone repeaters, and has for its object to provide a device of this character which can be placed between telephone lines to take up the current before it reaches its destination and strengthen or magnify it, and then permit the telephone current to travel farther than it would in ordinary use of telephones in which repeaters are not employed.

Another object of this invention resides in the construction of commutator so that the tone set up would be beyond the range of the ear.

Other objects and advantages will be apparent from the following description and it will be understood that changes in the specific structure shown and described may be made within the scope of the claims without departing from the spirit of the invention.

In the drawings forming a portion of this specification, and in which like characters of reference indicate similar parts in the several views, Figure 1 is a diagrammatic view showing my repeater installed between two telephones, Fig. 2 is a side elevation of the repeater, Fig. 3 is a plan view, Fig. 4 is a section on the line 4—4 of Fig. 3, Fig. 5 is a detail view of a modified form of commutator.

Referring now more particularly to the drawings, there is shown a telephone repeater 4 comprising pole members 7 and 9 respectively which are connected by a vertically disposed iron field bar 8 which is provided with a field magnet coil 5 as shown, and which will be called hereinafter an exterior magnet. The pole member 7 at one side, is provided with a vertical standard 12, and disposed at the other side of this pole member, there is shown a standard 13. The standards 12 and 13 support a stationary armature shaft 15 which is preferably hollow as shown. The shaft 15 supports revolvably a drum wound armature 16 which consists of the spaced disks 17 and its armature winding 18 all of which being arranged to revolve between the pole members 7 and 9 re-

spectively. An arm 19 is supported upon the shaft 15 and is disposed between the disks 17 and within the winding 18. The arm 19 is provided with opposite segmental heads concentrically spaced from the poles 7 and 9, and carries a coil 20 which thus produces an interior field magnet to be hereinafter more fully referred to. The armature 16 carries a commutator 23 provided with the usual segments 24, and at one side, the commutator is provided with a suitable pulley 23^a by means of which the armature may be driven by a suitable motor, not shown. An arm 25 is supported upon the shaft 15 adjacent to the standard 13, and this arm carries brackets 26 and 27 respectively which are provided with brushes 28 and 29. Line wires A and B are connected with the brushes, as shown.

A permanent magnet 21 is secured by a strap 22 to a base block 14 which supports the described parts, the purpose of which being to neutralize and destroy residual magnetism in the field magnets by induction. It has been found that this residual magnetism if not destroyed causes a flow of direct current from the armature magnet, which would result in a tone as the brushes pass from one segment to another.

It has been found that the rapid articulation of the current caused by the commutator does not cause a perceptible tone in the current induced by the potential vibration of the telephonic current, as the current communicated to the brushes by the commutator is in direct ratio to the magnetic impulses induced in the field by the telephonic current. But the residual magnetism of the field, if not destroyed, creates an independent tone of constant pitch, perceptible separately from the telephonic vibrations. This may be explained as follows: The tone produced by a segmental commutator is not due simply to the fact that the current is interrupted but to the slight fluctuation of current caused by a change in the potential of a segment between the time of contact with the brush and its passage out of contact therewith, caused by the difference in the direction of movement of the relative coil of the armature with respect to the lines of force in the magnetic field. It will thus be seen that a large increase of segments in the commutator allows less variance in potential between the making and breaking of the con-

tact between a single segment and the brush. But even when the number of segments is comparatively small, where the exciting current is varying, it will be obvious that the tone will vary correspondingly, and consequently is not then a tone, but a constantly changing succession of vibrations tending to supplement the vibrations of the exciting current. The tone produced when the magnetic field is due to residual magnetism, is constant, being at times higher than the excited vibrations and at other times lower, and interferes with the effectiveness of the telephone current. It will thus be apparent that the elimination of the residual magnetism in the field eliminates the appreciable tone in the telephonic current when magnified by the present device.

By using the modified form of commutator shown in Fig. 5 I am enabled to omit the magnet 21. I here employ a greater number of commutator segments, and rotate the armature at a greater speed so that tone set up would be so high in pitch as to be beyond the range of the ear. It will thus be seen that by having the three windings, *i. e.*, the interior field magnet, the armature, and exterior field magnet in series, any current pulsation from an outside source sent through the field magnets will set up a magnetic field in the armature and will cause lines of force to be cut in the armature, which current generated in the armature will flow with that current pulsation from the outside source and thereby increase or boost it.

In the diagram, shown in Fig. 1, there are shown two instruments C and D, and these instruments are provided with batteries E and F respectively and the usual transmitters and induction coils. Connecting the instruments C and D are line wires G and H. It will thus be seen that when the instrument C is in use, the alternating telephone current will travel along the wire G, and the telephone current will be delivered to the wire A, whereupon the current will be taken to the armature 16, by means of the commutator, and its brush 28, and thence from the commutator, the current will be delivered to the brush 29, and from the brush 29 to the field magnet 6, and from this magnet to the field winding 20 upon the arm 19 within the armature 16. The wire B, is shown as the other pole for the field magnet 19 and completing its circuit through the line wire H, to the instrument and returning again to C. From the construction shown, it will be seen, that after the current has been received by the respec-

tive magnet windings, of the repeater, the current will be increased and permitted to enter the wires of the respective instruments.

By reason of the fact there is no moving iron in the armature 16, hysteresis or lagging is prevented, which would otherwise distort the telephone currents.

What is claimed is:

1. In a telephone repeater, the combination with interior and exterior field magnets, and a hollow armature revolving between the two, of means for destroying residual magnetism in the field magnets.

2. A telephone repeater, comprising interior and exterior field magnets, an armature revolving between said magnets, and a magnet for destroying residual magnetism in the field magnets.

3. A telephone repeater comprising interior and exterior field magnets, an armature revolving between said magnets and including a commutator and brushes, said brushes being in circuit with said exterior field magnet, the armature being in circuit with the brushes and with the inside field magnet, and a permanent magnet for destroying residual magnetism in the field magnets.

4. A telephone repeater comprising a stationary field magnet, a hollow drum wound armature, a stationary field magnet located within the hollow armature, and means for destroying residual magnetism in the field magnets.

5. A telephone repeater comprising interior and exterior field magnets, a hollow armature revolving between the field magnets, a collector carried by the armature, and magnet means for destroying residual magnetism in the field magnets.

6. A telephone repeater comprising a stationary field magnet, a hollow armature, a collector carried by the armature, a stationary field magnet located within the hollow armature, and means for neutralizing residual magnetism in the field magnets.

7. In an instrument of the class described the combination with interior and exterior field magnets, a revolving armature located between said magnets and in series therewith, and a commutator, of means for destroying by induction the tone established by the commutator brushes.

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

MARK R. GILSON.

Witnesses:

C. ELMER GOUFF,
CHARLES M. SMITH.