No. 785,499.

PATENTED MAR. 21, 1905.

W. KAISLING.

ELECTRIC GENERATOR.

APPLICATION FILED JULY 20, 1903.

4 SHEETS—SHEET 1.

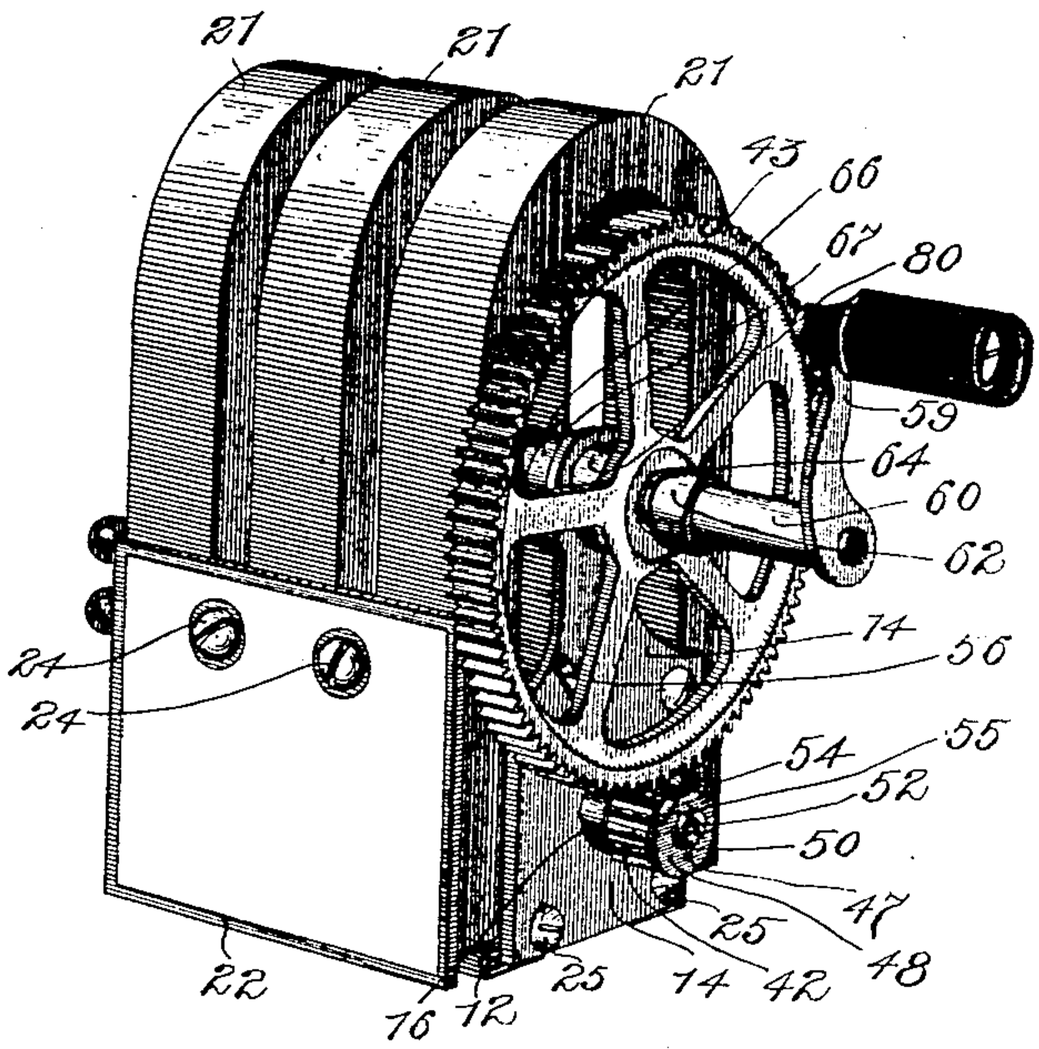

Fig. 1

Witnesses
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4 SHEETS—SHEET 2.

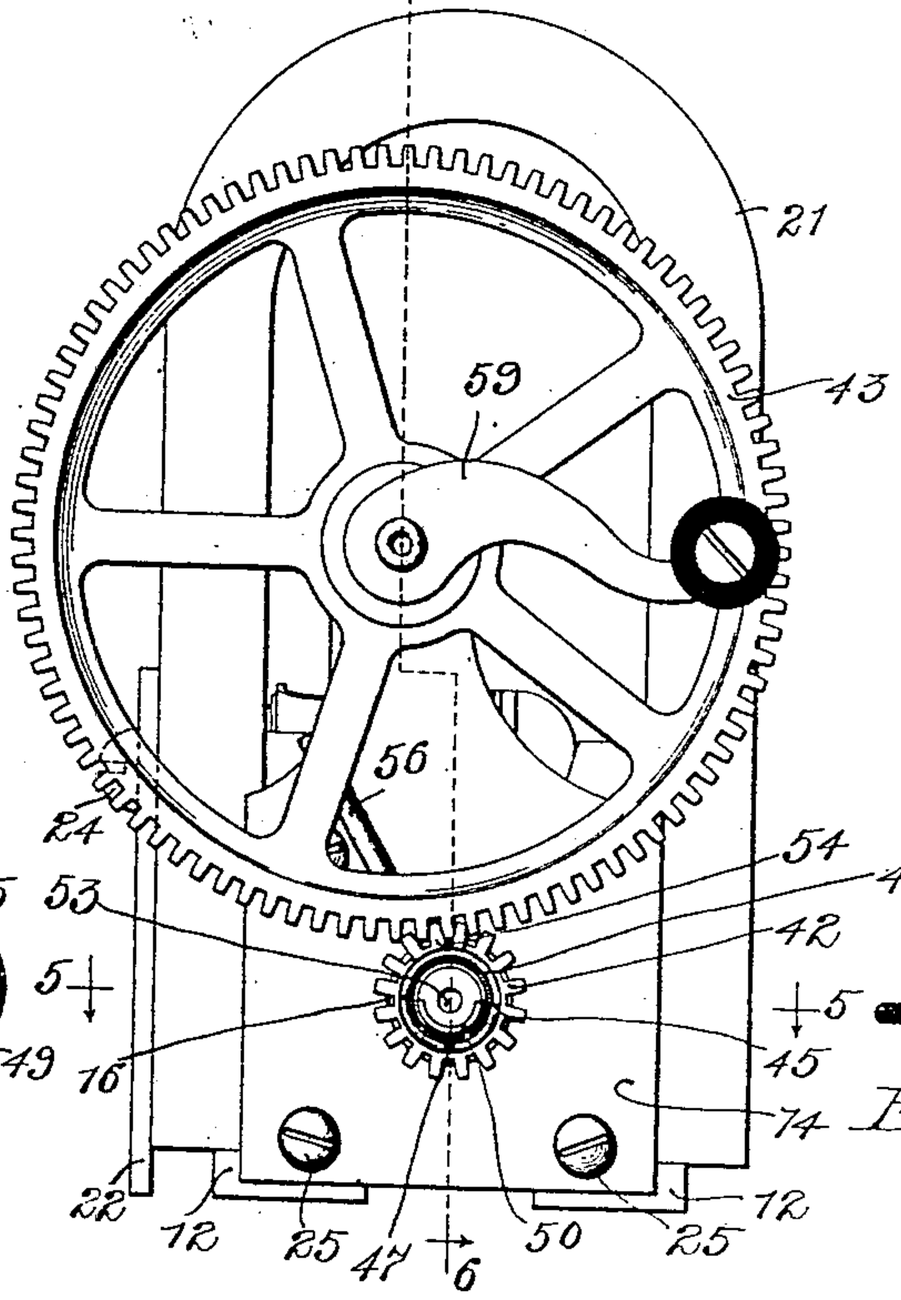

Fig. 2.

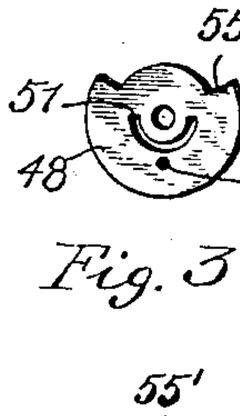

Fig. 3

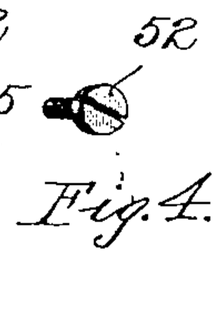

Fig. 4.

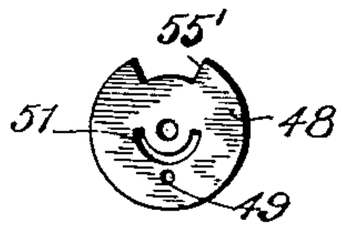

Fig. 11

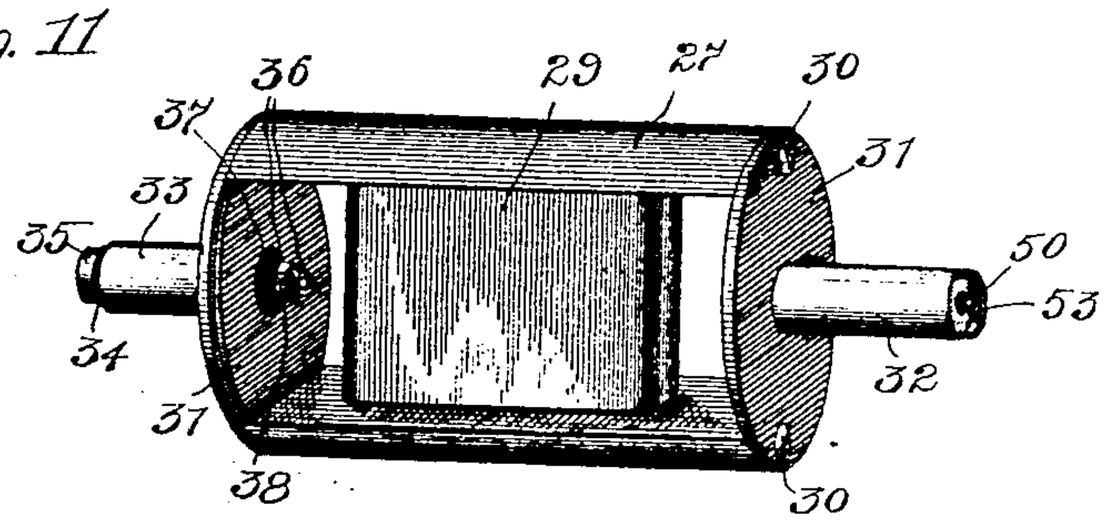

Fig. 7.

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4 SHEETS—SHEET 3.

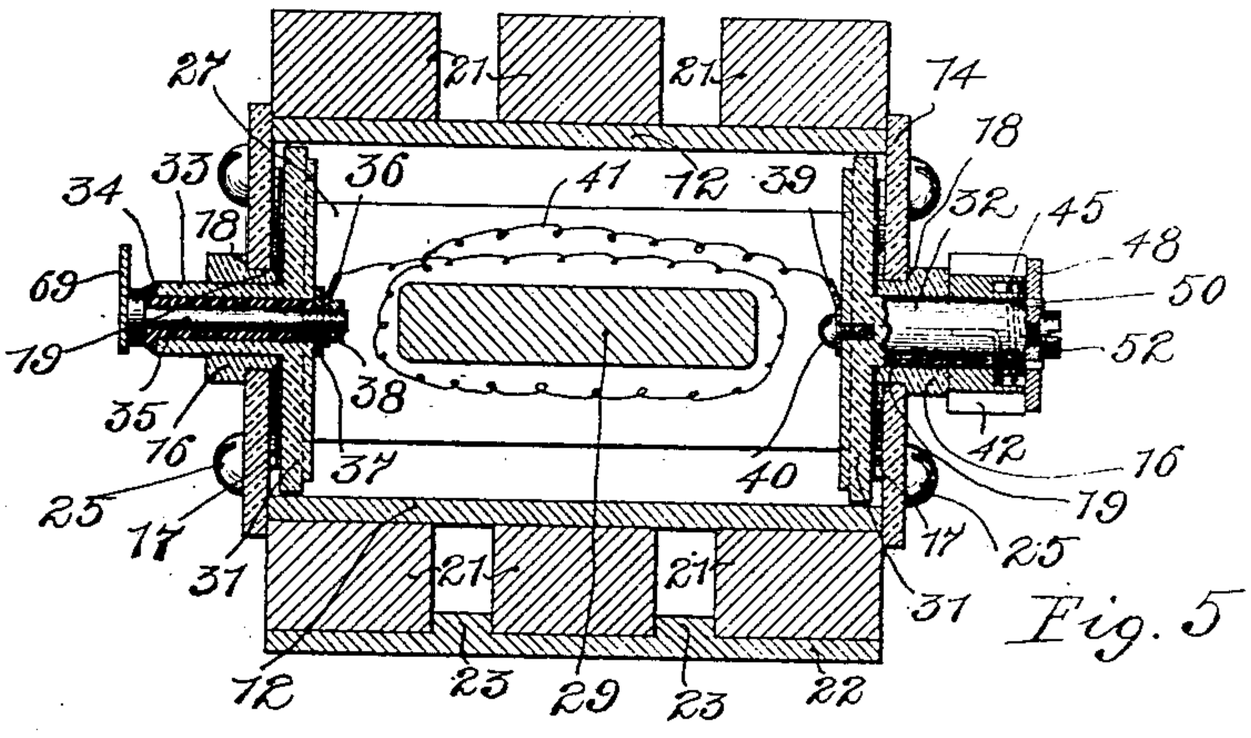

Fig. 5

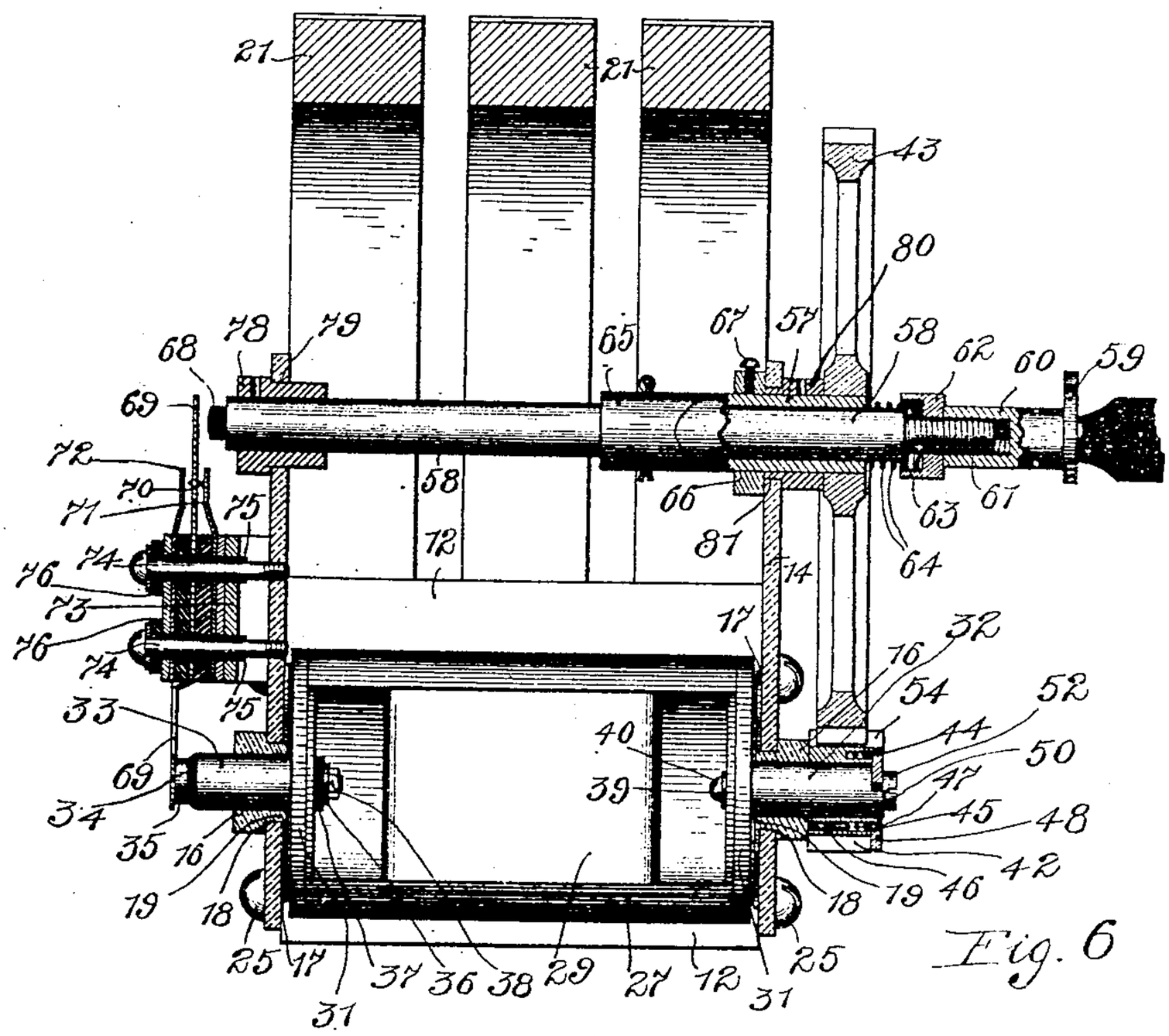

Fig. 6

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4 SHEETS—SHEET 4.

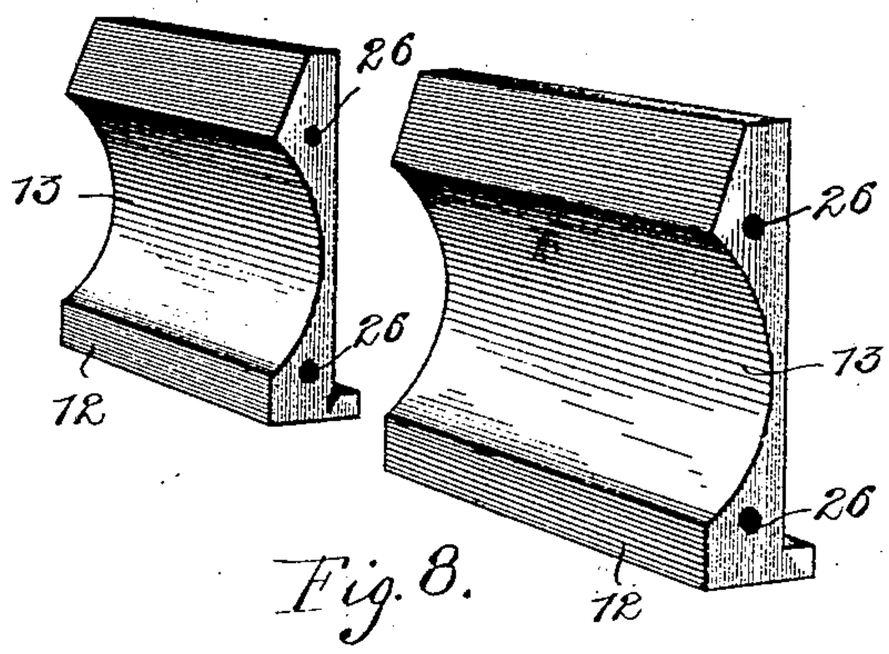

Fig. 8.

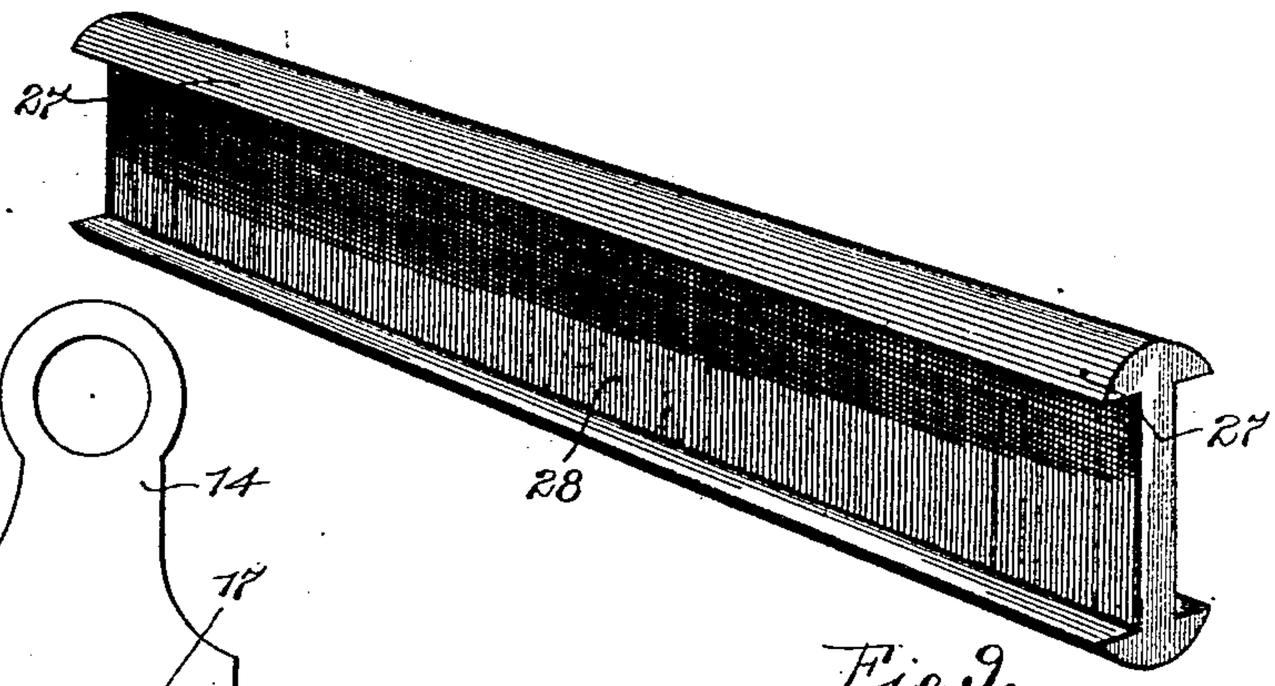

Fig. 9.

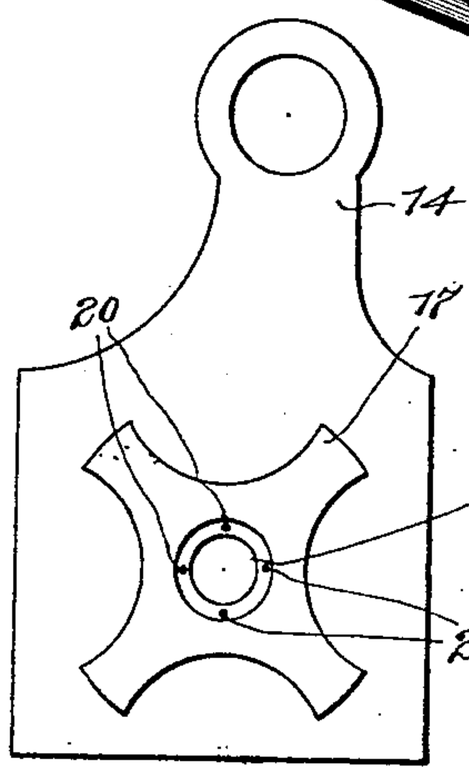

Fig. 10

Witnesses
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No. 785,499. Patented March 21, 1905.

UNITED STATES PATENT OFFICE.

WILLIAM KAISLING, OF CHICAGO, ILLINOIS, ASSIGNOR TO STROMBERG-CARLSON TELEPHONE MANUFACTURING COMPANY, OF ROCHESTER, NEW YORK, A CORPORATION OF NEW YORK.

ELECTRIC GENERATOR.

SPECIFICATION forming part of Letters Patent No. 785,499, dated March 21, 1905.

Application filed July 20, 1903. Serial No. 166,273.

To all whom it may concern:

Be it known that I, WILLIAM KAISLING, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Electric Generators, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to electric generators, and particularly to generators of the peculiar type commonly used in the telephone art for purposes of signaling.

My invention has for its principal object the provision of a generator which may be cheaply manufactured and easily assembled, but which at the same time shall be efficient, durable, and reliable in operation.

When at the present time a great number of machines of the same kind are to be manufactured, it is desirable to make the parts thoroughly interchangeable, so that in assembling the machine no time or attention is required for the purpose of fitting parts together. In the manufacture of such interchangeable parts it has been found desirable to stamp or punch the various parts rather than to mill or machine them. Milling or machining operations are of a comparatively expensive nature, and it is a further object of my invention to provide a generator in which such machining may be largely dispensed with, the generator being assembled for the greater part from suitable sheet-metal stampings. It has heretofore been the common practice to form the armatures of such telephone-generators from a cylindrical bar of soft iron or of a large number of washers or stampings placed side by side upon the armature-shaft. It has also been the common practice to form the generator pole-pieces from a bar of soft iron of standard dimensions or to form the pole-pieces of cast-iron. While the soft-iron pole-pieces are more desirable, they have heretofore been much more expensive in construction.

It is a principal object of my invention to provide means whereby the generator pole-pieces and armature may be cheaply formed of soft wrought-iron.

The improvements constituting my invention will be pointed out in detail in the following description.

The details of construction of my improved generator will be made clear by reference to the accompanying drawings, in which—

Figure 1 is a perspective view illustrating a generator constructed in accordance with my invention. Fig. 2 is an end elevation of the same, in which the parts shown in Figs. 3 and 4 are removed more clearly to illustrate details of construction. Fig. 3 shows a clamping-washer. Fig. 4 shows a screw for clamping the washer in place. Fig. 5 is a cross-sectional view in plan, taken on line 5 5 of Fig. 2. Fig. 6 is a cross-sectional view taken on line 6 6 of Fig. 2. Fig. 7 is a perspective view of the generator-armature before being wound with the necessary wire. Fig. 8 represents two generator pole-pieces as cut from a suitable bar of soft iron. Fig. 9 is a perspective view of a bar of soft iron from which individual generator-armatures are to be cut. Fig. 10 is a view in elevation of a generator end plate, and Fig. 11 shows a modified form of driving-washer.

As I have heretofore stated, it is one of the principal objects of my invention to provide means whereby pole-pieces and armatures may be cheaply formed of wrought-iron of the softest grade. This result I accomplish by so designing the armature pole-pieces that they may be cut from a long rod or bar of soft iron whose cross-section is the same as that of the generator pole-pieces.

In Fig. 8 I have illustrated a pair of pole-pieces which, as is shown, have been cut from a single bar of wrought-iron. These pole-pieces 12 12 are provided each with an inner face 13, having a cylindrical surface whose axis of generation is coincident with the axis of rotation of the generator-armature. The bar from which these pole-pieces are cut may be of so true and perfect a cross-section that no machine-work whatever is necessary upon

the pole-pieces in order to adapt them for use in a generator of the highest possible efficiency.

A generator end plate 14 is illustrated in Fig. 10, as shown in Figs. 5 and 6. This end plate is of uniform thickness throughout, and may therefore be stamped from a suitable sheet of brass or other metal. A hole cut through the end plate at 15 is adapted to receive a bearing 16 for the generator-armature. One of the end plates is provided for either end of the armature and pole-pieces of the generator. Upon the inner face of each of the end plates is secured a spacing-disk 17. This spacing-disk also may be stamped from sheet metal, as it is of uniform thickness throughout. This spacing-disk also is provided with an opening which registers with the opening 15 in the end plate. Each of the bearings 16 is desirably provided with a shoulder at 18 and an inwardly-extending portion 19 of such diameter as to fit tightly within the opening 15 of the end plate 14 and the registering opening or hole in the spacing-disk 17. In assembling these parts the bearing 16 is pressed through the tightly-fitting holes of the end plate 14 and the spacing-disk 17, when, if found desirable, the inner end of the bearing may be slightly upset in a press or by a hammer-blow or by indentations of a prick-punch near the periphery thereof, as illustrated at 20 20 in Fig. 10. In this manner a generator end plate and spacing-piece may be formed upon which no machine-work is necessary, except that the bearing 16 may be turned from a rod of stock in a turret-lathe or automatic screw-machine. This form of end plate is to be used in place of end plates of the prior art, in which the inner face of the end plate has been provided with a lug cast integrally therewith and which it has been necessary to turn to size in a lathe or other suitable machine. The diameter of the spacing-disk 17 is such as to fit snugly against the inner cylindrical surfaces of the pole-pieces, the pole-pieces when assembled being held firmly against the spacing-disk at either end by permanent horseshoe-magnets 21 21, which are slightly sprung in assembling to cause a slight inward pressure upon the pole-pieces. It has heretofore been the practice to provide for the proper spacing of the horseshoe permanent magnets by suitable ribs cast or otherwise formed upon the outer sides of the pole-pieces. In order to do away with the necessity for such ribs formed upon the soft-iron pole-pieces, I provide upon the back of a plate 22 a series of ribs 23 23, adapted to fit snugly between the horseshoe-magnets to hold the same in proper relative position. This plate is desirably secured to the front pole-piece by means of the machine-screws 24 24. In order to hold the end plates more firmly in position, the machine-screws 25 25 are provided, each passing through an end plate and into a screw-threaded hole 26 in the end of the pole-piece.

The form of armature employed is of the shuttle or H type. As in the case of the pole-pieces, the generator-armature is cut from a bar of soft iron 27, the cross-section of which is that of the finished armature. A suitable length is cut from the bar 27 and provided in any suitable manner with a shaft adapted to be mounted in the bearings 16 16 in the manner well understood. In cutting the armature from the bar 27 I have found it desirable to cut a portion of the web 28 from either end of each armature. As will be apparent from an inspection of Fig. 7, a portion of the web 28 may be stamped out, this stamped-out portion being common to two adjacent armatures. The corners of the web about which the armature-winding is wound may be slightly rounded or chamfered by means of a socket punch or file. To either end of the armature-core 29, as cut from the bar 27, is secured, by means of the screws 30 30, an armature-disk 31. To the disk at the right-hand end of the armature in Fig. 7 is secured the driving-shaft 32. The shaft 33 at the other end of the armature is made hollow or tubular. An insulating-bushing 34 within this tubular shaft 33 serves to insulate a conducting-stem 35 from the metal parts of the armature. This conducting-stem is screw-threaded at its inner end and provided with a connecting-clip 36, secured in position between an insulating-washer 37 and a clamping-nut 38. There may be provided upon the disk at the right-hand end a connecting-clip 39, secured in position by means of the screw 40. To each of these connecting-clips is soldered one end of the armature-winding, which is wound about the armature-core. This winding is diagrammatically illustrated by the line 41 in Fig. 5. Over the outer end of the armature-shaft 32 is slipped a cut pinion 42, by means of which the armature is to be driven through engagement with the driving-gear 43. In many cases it is unnecessary that there be absolutely firm and rigid mechanical connection between the driving-gear 43 and the armature-shaft, and in such cases it is desirable to provide intervening spring mechanism to insure the quiet running of the intermeshing gear-teeth. At the outer end of the pinion 42 I provide an annular groove 44, within which is coiled a spiral spring 45. One end of this spring is turned inwardly at 46 to engage a hole drilled through the pinion from the bottom of the annular groove 44. The other end of the spring is turned outward at right angles at 47. A driving-washer 48 is provided with a hole 49, within which this outwardly-extending end 47 of the spiral spring is fitted. This driving-washer is in some suitable manner firmly secured to the outer end of the shaft 32.

In the preferred embodiment of my inven-

tion I provide upon the outer end of the shaft 32 an extension 50, which is in the form of a section of a hollow cylindrical tube. A crescent-shaped opening 51 is cut through the washer 48, as shown, and the opening 51 registers with the projection 50 to cause the armature to rotate with the washer. The washer is desirably secured in position upon the end of the shaft 32 by means of a clamping-screw 52, having screw-threaded engagement with the hole 53 in the end of the shaft.

As best illustrated in Figs. 1, 2, and 6, the gear-wheel is provided with an outwardly-extending projection at 54, this projection being shown as of the width of three gear-teeth. The projection 54 is so placed upon the pinion as to register with the notch 55 in the driving-washer. It will be seen, furthermore, that the peripheral length of the notch 55 is such that a considerable relative movement between the pinion 42 and the shaft 32 must ensue before the projection 54 engages the driving-washer 48 at one side or the other of the notch 55. The purpose of this arrangement is under normal conditions to permit the armature to be driven by power transmitted entirely through the spiral spring 45, the spring being preferably of such a degree of stiffness that the armature may be properly rotated without causing the projection 54 of the pinion to strike either side of the notch 55 of the driving-washer. If, however, the spiral spring is broken or becomes defective in operation, the projection of the pinion engages the side of the notch on the washer 48 to drive the armature by means of an unyielding connection with the driving-gear 43. Under certain conditions, as in central-station equipments, where the generator is to be used for code-signaling, a washer of the form shown in Fig. 11 may be employed, in which the width of the notch 55′ is such as to tightly and firmly engage the projection 54. In this case the spiral spring may of course be omitted, whereby a firm rigid connection is established between the driving-gear 43 and the armature to be rotated thereby.

While I have found it desirable to form the pinion 42 by milling or other suitable machine-work, the driving-washer employed is of such shape that it may be readily stamped in one operation from sheet metal.

At 56 I have illustrated a tube adapted to convey lubricating-oil to the armature-bearing 16.

The driving-gear 43 is rigidly secured to a tubular counter-shaft 57. Through this tubular counter-shaft extends a main shaft 58, to the right-hand end of which the driving-crank 59 is rigidly secured by means of a screw-threaded hub 60 engaging the screw-threaded projection 61 upon the end of the main shaft. The hub portion 60 is locked in adjustment by means of a collar 62, having an inwardly-extending peripheral flange 63. A short spiral spring 64 is coiled about the main shaft 58 and rests within the peripheral flange 63 of the collar 62. A driving-collar 65 is keyed in position upon the main shaft 58, this driving-collar having a miter-joint connection with the inner end of the tubular shaft 57. A collar 66 is fastened in position upon the tubular shaft 57 by means of a set-screw 67. Upon turning the crank 59 power is transmitted from the collar 65 to the inner end of the tubular counter-shaft 57. On account of the mitered connection between the collar 65 and the counter-shaft the resistance of the armature to rotation causes an inward movement of the main shaft 58 and the parts secured thereto against the compression of the spring 64, the spring being compressed within the cylindrical opening at the inner side of the collar 62. The main shaft 58 extends through the generator to the left-hand end, where it is provided with a button 68, of hard rubber or other suitable insulating material. There is provided upon the left-hand end plate of the generator certain switching mechanism adapted to be operated by the longitudinal movement of the shaft 58 and a push-button carried thereby. Under normal conditions the connecting-spring 69, which has electrical engagement with the insulated stem 35, connected with one of the armature-terminals, makes contact at 70 with the grounding-spring 71, this spring being in electrical connection with the frame of the generator, as is the other terminal of the armature-winding. Thus under normal conditions the armature-winding is shunted by a low-resistance path through the frame of the generator. When the crank 59 is manipulated to operate the generator-armature, the longitudinal movement of the shaft 58 causes a movement of the connecting-spring 69 to break electrical connection with the grounding-spring 71 and to make connection with the line-spring 72, which forms one of the active terminals of the generator. These contact-springs may be mounted upon a suitable supporting-plate 73 by means of the screws 74 74, all of these switching parts being suitably insulated by means of bushings 75 75, the washers 76, and the plates 77, of insulating material, inserted between the various springs. The main shaft 58 is of course rotatably mounted within the tubular counter-shaft 57 at the right-hand end, while at the left-hand end this driving-shaft is mounted within a suitable bearing 78, which bearing is desirably pressed or driven through a suitable opening 79 in the upper end of the left-hand generator and plate. The bearing 80, in which the tubular counter-shaft 57 is rotatably mounted, is in the same manner pressed or driven into an opening 81 in the right-hand end plate.

It will be seen that my invention provides a generator of excellent mechanical construc-

tion, but at the same time one which may be cheaply manufactured in large quantities and one whose many parts may be rapidly and accurately assembled.

While I have herein shown and described one preferred embodiment of my invention, it will be apparent to those skilled in the art that many modifications may be employed without departing from the spirit thereof, and I do not wish, therefore, to limit myself to the precise disclosure herein set forth; but,

Having described my invention, I claim as new and desire to secure by Letters Patent—

1. In an electric generator of the class described, the combination of a stamped sheet-metal end plate, with a stamped sheet-metal spacing-disk having the same diameter as that of the bore of the pole-pieces secured thereto.

2. In an electric generator of the class described, the combination with a sheet-metal end plate, of a sheet-metal spacing-disk secured thereto.

3. In an electric generator of the class described, the combination with a sheet-metal end plate, of a sheet-metal spacing-disk having the same diameter as that of the bore of the pole-pieces, and an armature-bearing fitting tightly through registering circular openings in said end plate and said spacing-disk.

4. In an electric generator of the class described, the combination with a sheet-metal end plate, of a sheet-metal spacing-disk, and an armature-bearing having a shoulder resting upon said end plate and fitting tightly through suitable openings in said end plate and said spacing-disk.

5. In an electric generator of the class described, the combination with an end plate, of a spacing-disk having the same diameter as that of the bore of the pole-pieces, and a cylindrical armature-bearing having a shoulder resting upon said end plate and fitting tightly through circular openings in said end plate and said spacing-disk.

6. In an electric generator of the class described, the combination with a stamped sheet-metal end plate, of a stamped sheet-metal spacing-disk having the same diameter as that of the bore of the pole-pieces, and a cylindrical armature-bearing having a shoulder resting upon said end plate and fitting tightly through registering circular openings of substantially the same size in said end plate and said spacing-disk, said bearings serving to secure said spacing-disk to said end plate.

7. In a device of the class described, the combination with an armature mounted on an armature-shaft, of a pinion loosely mounted upon said shaft, a driving-washer mounted upon said armature-shaft, yielding spring mechanism connecting said shaft and said pinion, and means whereby an engagement between said washer and said pinion is effected upon a certain degree of relative rotation between said pinion and said armature-shaft.

8. In an electric generator of the class described, the combination with an armature mounted upon an armature-shaft, of a pinion loosely mounted upon said armature-shaft, a driving-gear meshing with said pinion, a driving-washer having a suitable opening engaging a crescent-shaped projection upon the end of said armature-shaft, a spiral spring connected at one end with said pinion and at the other end with said driving-washer, said spring lying in an annular groove in said pinion, and a projection upon said pinion, there being a notch in the periphery of said washer to receive said projection.

9. In an electric generator of the class described, the combination with an armature mounted upon an armature-shaft, of a pinion loosely mounted upon said armature-shaft, a driving-gear meshing with said pinion, a driving-washer having a suitable opening engaging a crescent-shaped projection upon the end of said armature-shaft, a spiral spring connected at one end with said pinion and at the other end with said driving-washer, and a projection upon said pinion, there being a notch in the periphery of said washer to receive said projection.

10. In a device of the class described, the combination with an armature mounted upon an armature-shaft, of a pinion loosely mounted upon said armature-shaft, a driving-washer having a suitable opening engaging a crescent-shaped projection upon the end of the armature-shaft, yielding spring mechanism connecting said driving-shaft and said pinion, and a projection on said pinion lying within a suitable peripheral notch within said washer, the width of said notch being such as to permit a slight degree of relative rotation between said pinion and said armature-shaft.

11. In an electric generator of the class described, the combination of an armature mounted upon an armature-shaft, of a pinion loosely mounted upon said armature-shaft, a driving-gear meshing with said pinion, a driving-washer securely mounted upon the end of the armature-shaft, a spiral spring connected at one end with said pinion and at the other end with said driving-washer, said spring lying in an annular groove in said pinion, and a projection on said pinion resting within a notch in the periphery of said washer, the width of said notch being such as to permit a slight relative movement between said pinion and said armature-shaft.

12. In an electric generator of the class described, the combination of an armature mounted upon an armature-shaft, of a pinion loosely mounted upon said armature-shaft, a driving-gear meshing with said pinion, a driving-washer securely mounted upon the end of the armature-shaft, a spiral spring connected at one end with said pinion and at the other end with said driving-washer, and a projection on said pinion resting within a notch in

the periphery of said washer, the width of said notch being such as to permit a slight relative movement between said pinion and said armature-shaft.

13. In a device of the class described, the combination with an armature mounted on an armature-shaft, of a pinion loosely mounted at the end of said shaft, a washer secured to the end of said shaft for holding said pinion thereon, a driving-gear engaging said pinion, a spiral spring connected at one end with said pinion and at the other end with said washer, whereby a yielding driving connection is formed between said shaft and said pinion, and stops for limiting the range of said yielding spring connection and for causing unyielding connection between said shaft and pinion.

In witness whereof I hereunto subscribe my name this 14th day of July, A. D. 1903.

WILLIAM KAISLING.

Witnesses:
LYNN A. WILLIAMS,
JOHN STAHR.