L. J. LE PONTOIS.

ELECTRIC RELAY.

APPLICATION FILED JULY 24, 1908.

1,000,939. **Patented Aug. 15, 1911.**

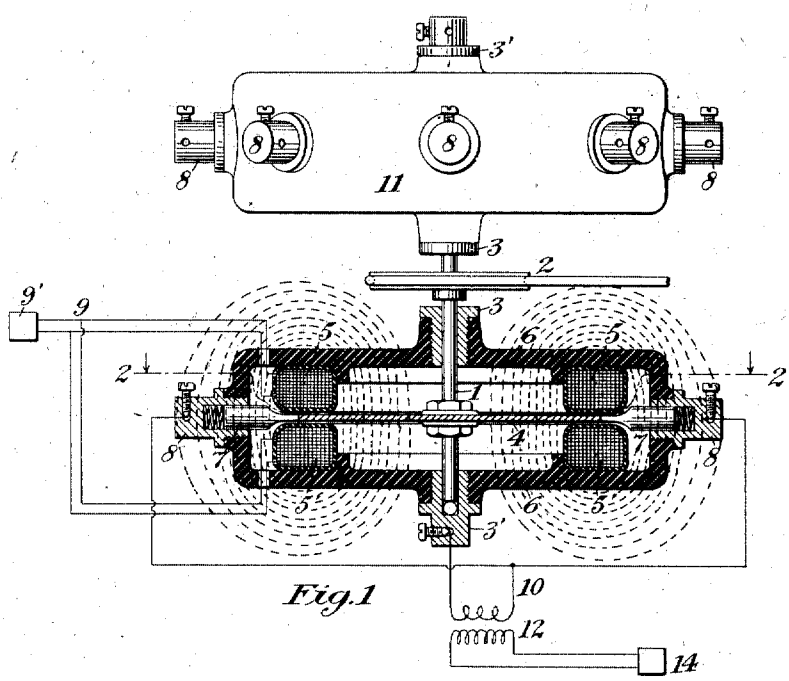

Fig. 1

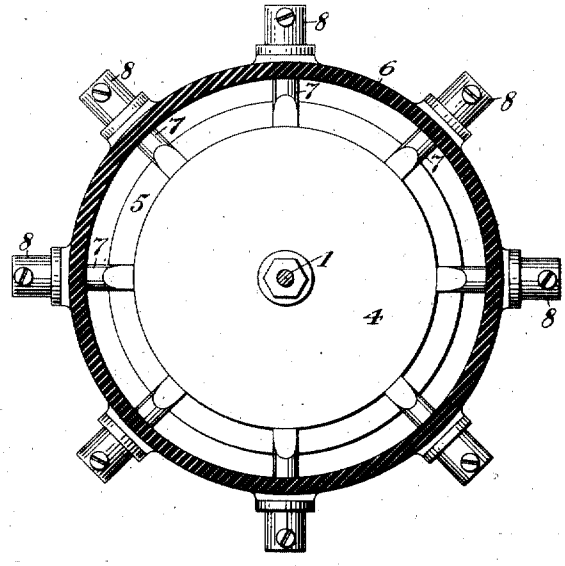

Fig. 2

Witnesses:
Edmund O. Dubocq.
Geo. A. Hoffman.

Leon J. Le Pontois Inventor
By his Attorneys
Edwards, Sager & Winter.

UNITED STATES PATENT OFFICE.

LEON J. LE PONTOIS, OF NEW ROCHELLE, NEW YORK, ASSIGNOR OF ONE-HALF TO BENJAMIN HURD, OF NUTLEY, NEW JERSEY.

ELECTRIC RELAY.

1,000,939. Specification of Letters Patent. **Patented Aug. 15, 1911.**

Application filed July 24, 1908. Serial No. 445,069.

To all whom it may concern:

Be it known that I, LEON J. LE PONTOIS, a citizen of the Republic of France, residing at New Rochelle, in the county of Westchester and State of New York, have invented certain new and useful Improvements in Electric-Relays, of which th following is a full, clear, and exact specification.

My invention relates to an electric relay device or repeater adapted to receive a comparatively small amount of energy from one or more circuits and to deliver an increased amount of energy in one or more secondary circuits.

My invention is particularly applicable to use as a telephone relay or repeater or for a similar purpose in telegraphy. It may likewise be used for various other purposes and in various different forms and relationships.

One important object of my invention is the reproduction of electric energy in the secondary circuit without materially distorting the form of the current waves or impulses. This is a feature of importance in such instances as telephony where the accurate reproduction in the secondary circuit of the form of the impressed current waves in the primary circuit without distortion is necessary.

Another object attained by my invention is the production of a device in which the ratio of electric energy delivered to that received may be readily controlled as desired.

My invention also has the advantage of being simple in structure and mode of operation, requiring little or no care or repair.

These and other objects of my invention will be understood by those skilled in the art from the following description and accompanying drawings, in which—

Figure 1 is a plan view partly in section of one form of relay device embodying my invention; and Fig. 2 is a section on the line 2—2 of Fig. 1.

Referring to the drawings there is illustrated a shaft 1 driven from any suitable source of energy as by a belt 2. The shaft is mounted in suitable bearings 3, 3′ and carries a disk 4 preferably of low resistance material such as copper. Nearer the outer periphery of the disk are located two coils 5, 5′ located respectively on opposite sides of the disk and having their axes coinciding with that of the disk. The coils are stationary and held in position by a frame 6 of fiber or other suitable material. Engaging with the periphery of the disk are a plurality of brushes 7 yieldably supported in terminals 8 which in turn are mounted in the frame 6. The coils 5, 5′ are connected in the receiving circuit 9 from a transmitter or other source 9′, either in series or parallel, the magneto motive forces acting in the same direction to produce a magnetic field as indicated by the dotted lines. The disk 4 forms a part of the secondary circuit 10, one lead thereof being connected to all of the terminals 8 to conduct currents to or from the periphery of the disk, and the other lead being connected to the bearing 3′ to conduct currents to or from the center of the disk through the shaft 1. It will be noted that the rotating element is so disposed with reference to the exciting coils that it is cut only once by the flux set up by said coils.

In case the amplified telephonic or other currents are to be used directly in a local receiver or receivers 14, the windings of the receivers will be made to correspond to the low voltage and comparatively large amperage of the currents in the secondary circuit. If it be desired to operate receiving apparatus by means of secondary currents of high potential such as transmission over long distance, it is preferable to use a suitable transformer 12 in the secondary circuit as indicated in Fig. 1.

In operation the shaft and disk are driven at any suitable speed and radially flowing currents will be induced in the disk corresponding in strength and direction to the currents passing in the coils 5, 5′ and thereby reproducing such currents in the secondary circuit 10 although greatly amplified. The coils serve as exciting coils by reason of there being no iron in the magnetic circuit of the coils, the magnetic field induced thereby will be directly proportional in strength and direction to the current impressed upon the exciting coils. With constant speed of the driven shaft, the currents induced in the disk will therefore be directly proportional in strength and direction to the currents in the primary circuit. It will be understood that the main portion of the energy appearing in the secondary circuit is derived from the energy expended in driving the disk and that this will be subject to control as desired merely by changing the speed at which the disk is driven. Thus even though the

currents in the primary circuit are comparatively feeble, those in the secondary circuit will be greatly amplified. The greater the number of peripheral brushes bearing on the disk the less will be the distortion from a purely radial direction of current flow in the disk and the less the differences in the form of current wave in the secondary circuit from that of the primary circuit.

It will be understood that the magnetic circuit of the exciting coils may sometimes be partly iron, dependent upon the preference of the designer and the particular use or application of the device. Also the primary and secondary circuits may include various regulating and controlling devices, but as these form no part of my invention they need not be particularly referred to.

It will be understood that any desired number of my improved relay devices may be united and driven from a single source of power, various primary and secondary circuits being connected thereto, as desired, and in Fig. 1 I have indicated at 11 a second relay device also driven by the belt 2.

It will be understood that my invention is susceptible of various modifications in design and form of structure without departing from the scope thereof.

Having thus described my invention, I declare that what I claim as new and desire to secure by Letters Patent, is,—

1. In a relay device, a primary circuit containing an exciting coil, a driven disk subjected to the magnetic flux excited by said coil, a secondary circuit, and means for connecting said disk in said secondary circuit, said relay device being normally incapable of yielding a current of its own.

2. In a relay device, a primary circuit containing exciting coils, a driven disk subjected to a magnetic flux excited by said coils said disk being located between said coils, a secondary circuit, and means for connecting said disk in said secondary circuit, said relay device being normally incapable of yielding a current of its own.

3. In a relay device, a primary circuit containing an exciting coil, a driven conducting element subjected to the magnetic flux excited by said coil, said element having its axis coinciding with the axis of said coil, a secondary circuit, and means for connecting said element with said secondary circuit, said relay device being normally incapable of yielding a current of its own.

4. In a relay device, the combination of an exciting coil, a driven conducting element subjected to the magnetic flux of said coil in one path only, a supply circuit for exciting said coil, and a secondary circuit containing said driven element, said relay device being normally incapable of yielding a current of its own.

5. In a relay device, the combination of a primary circuit, a driven conducting element, means in said primary circuit for producing a magnetic flux and thereby generating electric currents in said element, the path of the magnetic flux being constituted substantially of non-magnetic material, a secondary circuit, and means for connecting said secondary circuit to the inner and outer portions of said conducting element.

6. In a relay device, a primary circuit having means for producing variable electric currents therein, means for translating said variable electric currents into a magnetic flux of corresponding variation, the path of the magnetic flux being constituted substantially of non-magnetic material, a driven conducting element subjected to said magnetic flux, a secondary circuit, and means for connecting said element in said secondary circuit.

7. In a telephone system, an amplifying device, comprising in combination a system of flat coils adapted to be connected to a transmitting circuit, an electrically conducting disk of non-magnetic material, mounted on a conducting shaft in axial alinement with said coils, said coils being related to each other and to said disk so as to produce a symmetrically distributed magnetic field, substantially the total flux of which cuts said rotating disk, and peripheral contact means for said disk, said contact means and said shaft being adapted to be connected to a receiving circuit.

8. In a telephone system, an amplifying relay device, comprising in combination a system of coils of annular shape having the same internal diameter, an electrically conducting disk of non-magnetic material mounted on a conducting shaft in axial alinement with said coils, said disk being interposed between said coils, and disposed with reference to said coils so as to substantially preclude magnetic leakage therebetween, and peripheral contact means for said disk, said coils being adapted to be connected to a transmitting circuit, and said contact means and said shaft being adapted to be connected to a receiving circuit.

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

LEON J. LE PONTOIS.

Witnesses:
L. K. SAGER,
GEO. N. KERR.