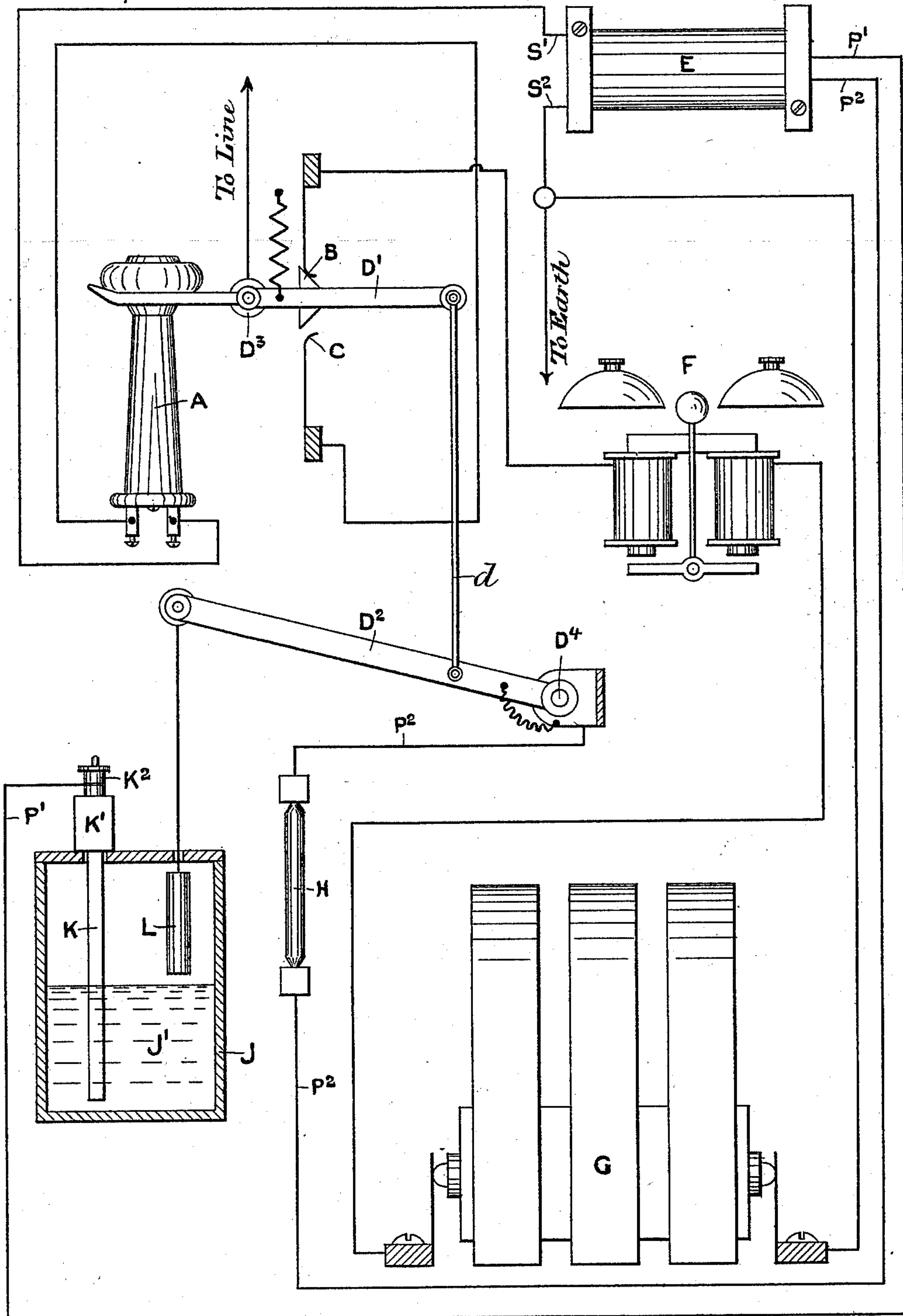


(No Model.)

W. S. HARRISON.  
TELEPHONIC APPARATUS.

No. 509,530.

Patented Nov. 28, 1893.



Witnesses:  
E. H. Stewart,  
E. A. Scott

Inventor:  
W. S. Harrison,  
by *Richardson* atty.



# UNITED STATES PATENT OFFICE.

WILLIAM STUART HARRISON, OF HONG-KONG, CHINA.

## TELEPHONIC APPARATUS.

SPECIFICATION forming part of Letters Patent No. 509,530, dated November 28, 1893.

Application filed December 13, 1892. Renewed October 5, 1893. Serial No. 487,296. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM STUART HARRISON, electrician, a subject of the Queen of Great Britain and Ireland, residing at Praya Central, Hong-Kong, China, have invented certain new and useful Improvements in Telephonic Apparatus, of which the following is a specification.

This invention has primarily for its object, the application of a single fluid cell to provide the current for the microphone circuit in telephonic apparatus, and secondarily the elimination of a switch, subsequent upon such application.

In applying the invention, a battery or cell is employed, in which the zinc, or other electro-positive element, is inserted in or withdrawn from the exciting solution, through a lever or system of levers, actuated by taking the receiver off the hook or replacing it, or by any other method whereby the electro-positive element is inserted in the exciting solution only during the period in which a current is required through the microphone. The connecting wires are so arranged that the withdrawal of the electro-positive element from the solution, takes the place of a switch in arresting the said current through the microphone.

The accompanying drawing, which forms a part of my specification, represents diagrammatically a complete telephonic apparatus, arranged in accordance with my invention.

The form of battery which is found to answer well for the purposes of the invention, consists of a jar J, of glass or other suitable material, half filled with a solution J' of bichromate of potash and sulphuric acid, in which a carbon plate K about one and three-fourths inches wide and one-half an inch thick, and preferably composed of what is known as "retort" carbon, is suspended permanently. This plate carries at its top a lead cap K', which is cast on a brass terminal K<sup>2</sup>. From this terminal a wire P' is led direct to the primary coil of an induction coil E, and from thence the wire P<sup>2</sup> leads through the microphone H to the lever D<sup>2</sup>, from the end of which is suspended the zinc element L. The latter consists of an amalgamated zinc rod, three-eighths of an inch in diameter, inserted in the solution, when the battery is put in action, to

a depth of one and one-half inches and distant from the carbon plate about one and one-half inches, the latter being permanently immersed to a depth of two inches. A battery so prepared has an internal resistance of about six ohms, and an electro-motive force of approximately two volts, and is upon the whole eminently adapted to the required purpose, a single cell being all sufficient with any of the various forms of microphones at present in use.

The microphone shown at H, is merely symbolic.

A is the receiver, hung on the forked end of the lever D', which is pivoted at D<sup>3</sup>, and connected to the lever D<sup>2</sup> pivoted at D<sup>4</sup> by the link d, so that the weight of the receiver lifts the zinc L out of the solution, and this movement throws the battery out of action and serves the purpose of a switch to break the circuit through the microphone. When the receiver is taken off the hook, the zinc drops into the solution, the battery comes into action and the circuit through the microphone is closed.

F is the magneto alarm bell, the permanent magnet not being shown, and G is the magneto generator, the driving gear being omitted.

In the position of the parts shown on the diagram with the receiver on the hook, the battery is out of action and consequently the microphone circuit inoperative, while the magneto generator G and bell F are put to line through the switch B. When the receiver is taken off the hook, contact is broken at B and the generator and bell cut out, while the receiver and secondary coil S' S<sup>2</sup> of the induction coil E, are put to line through the switch C.

It is not intended to limit the battery to the use of a bichromate of potash and sulphuric acid, or a chromic acid solution, and the carbon may either remain permanently in the solution, as described, or may be withdrawn simultaneously with the zinc, and any form of battery may be used in which either one or both of the elements can be withdrawn in any suitable manner when the current is not required.

The main advantages of the invention are as follows: It is less expensive to set up a cell of the kind above described than a Leclanché, as commonly used for telephonic purposes,



this being especially the case where its high electro-motive force and low internal resistance permit it to replace two Leclanché cells, which are frequently required with the "pencil" forms of microphone. For the production of the intermittent currents required in telephony, this cell is much more durable than the Leclanché. There is positively no local action taking place when the cell is not in use, and three times the quantity of current is obtained from a given quantity of zinc, when used in this manner, than is the case with the Leclanché cell, while the unusually low internal resistance, before mentioned, allows the microphone to act more directly upon the current strength. The process of recharging is much simpler and occupies less time than with the Leclanché, as it consists simply in replacing the spent solution by new and, when necessary, replacing the zinc rod.

The switch, which is dispensed with by means of my invention, is the one which gives the most trouble in practice, chiefly on account of the sparking which takes place, every time the circuit is opened.

The invention may readily and at trifling expense be applied to the general types of telephonic apparatus, as at present constructed and in use.

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

In telephonic apparatus, a battery or cell J, inserted in the circuit of the microphone H, the zinc or electro-positive element L suspended from a lever D<sup>2</sup>, said lever being connected with a lever D', by a link *d* so that when the receiver A is hung on the lever D', the element L is withdrawn from the solution J', the cell thrown out of action and the microphone circuit broken, and when the receiver is taken off, the element L drops into the said solution and the said circuit is closed, substantially as set forth.

In witness whereof I have hereunto set my hand in presence of two witnesses.

W. STUART HARRISON.

Witnesses:

THOMAS ARNOLD,  
L. KENNARD DAVIS.