

1,118,926.

3 SHEETS--SHEET 1.

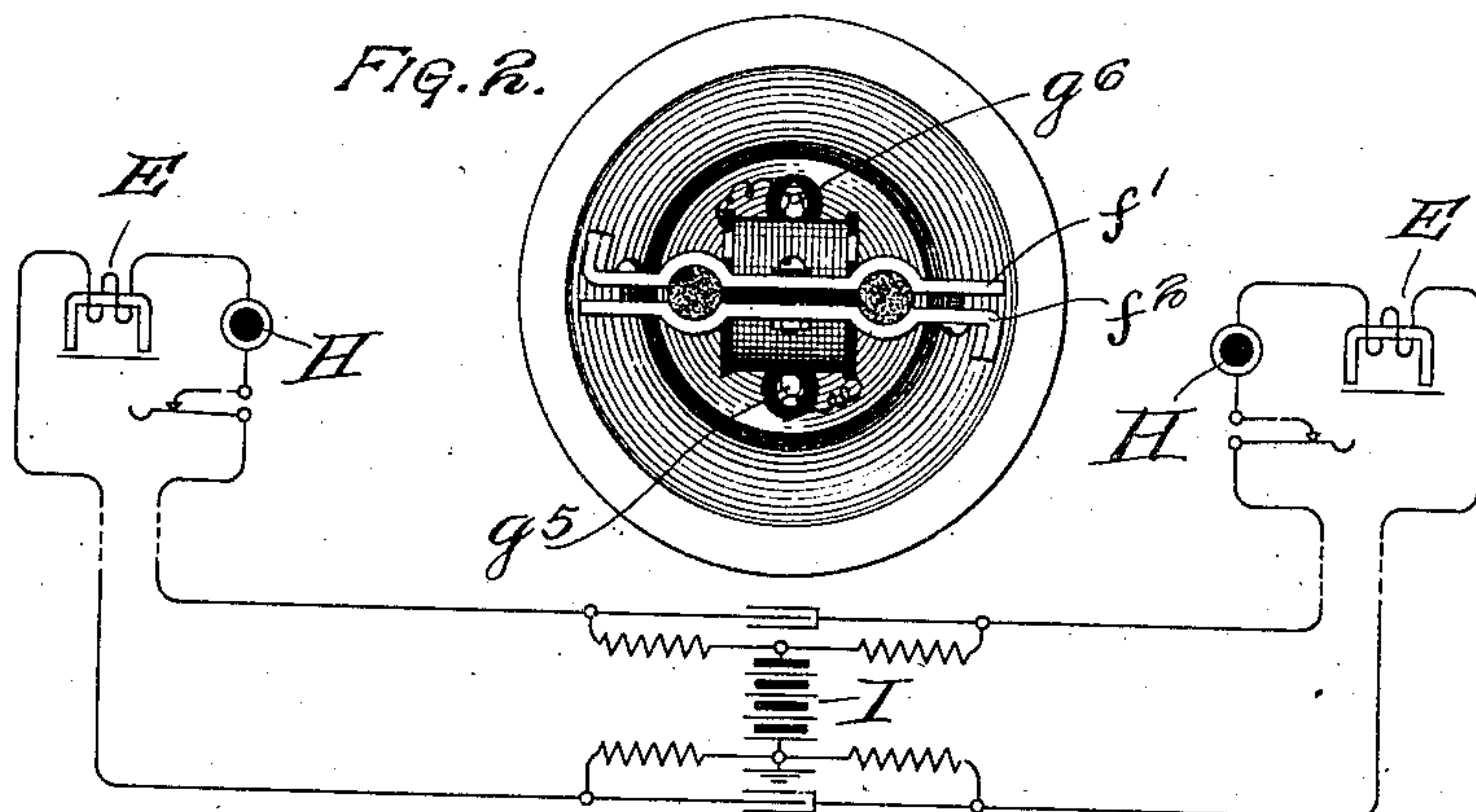
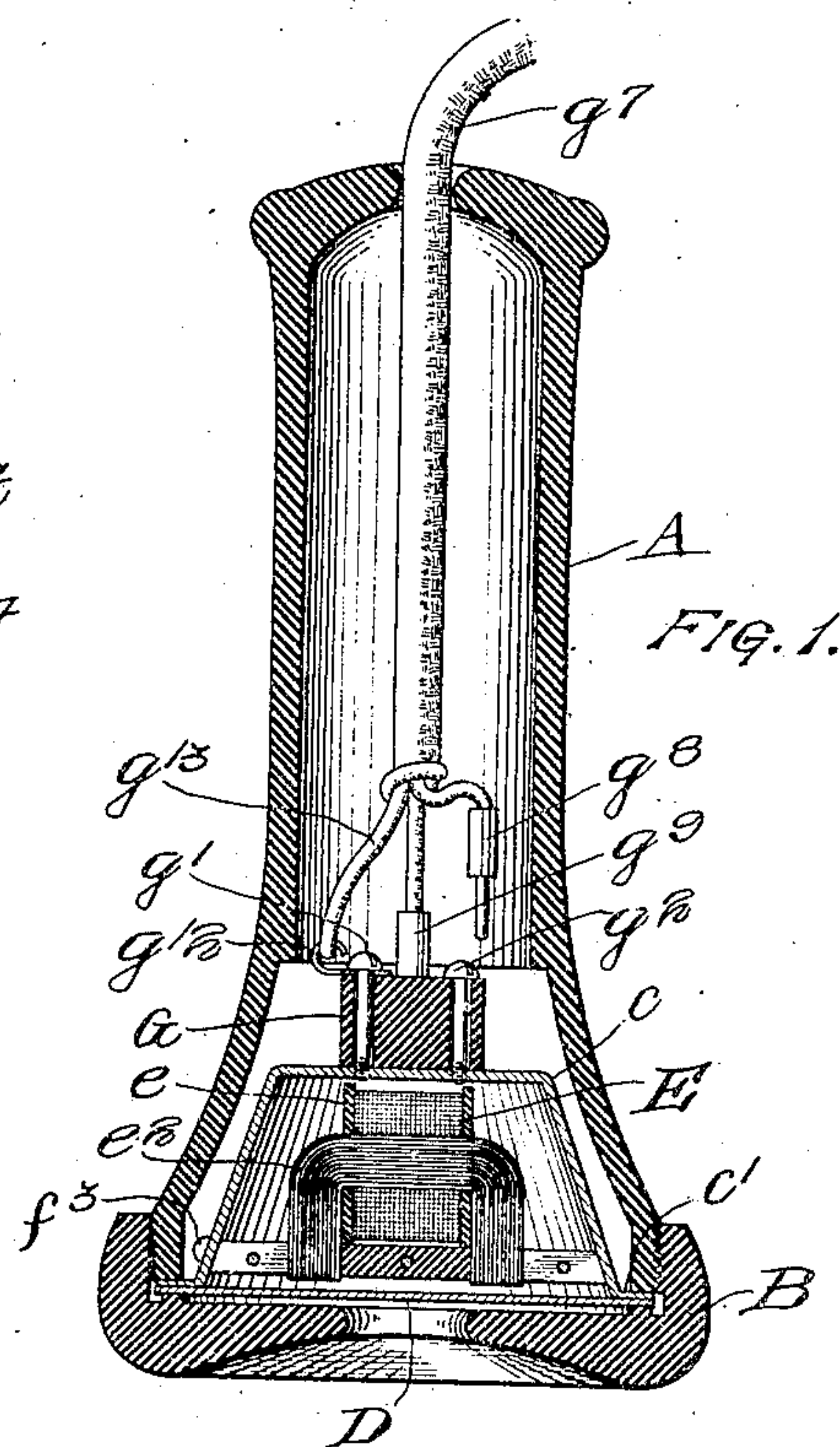


Fig. 4.

INVENTOR:

John Erickson
By Bulkley, Howard & King
ATTORNEYS,

1,118,926.

3 SHEETS--SHEET 2.

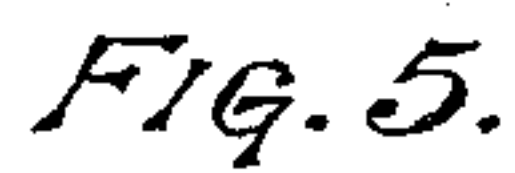


FIG. 6.

A. Andersen.

A. J. Ray

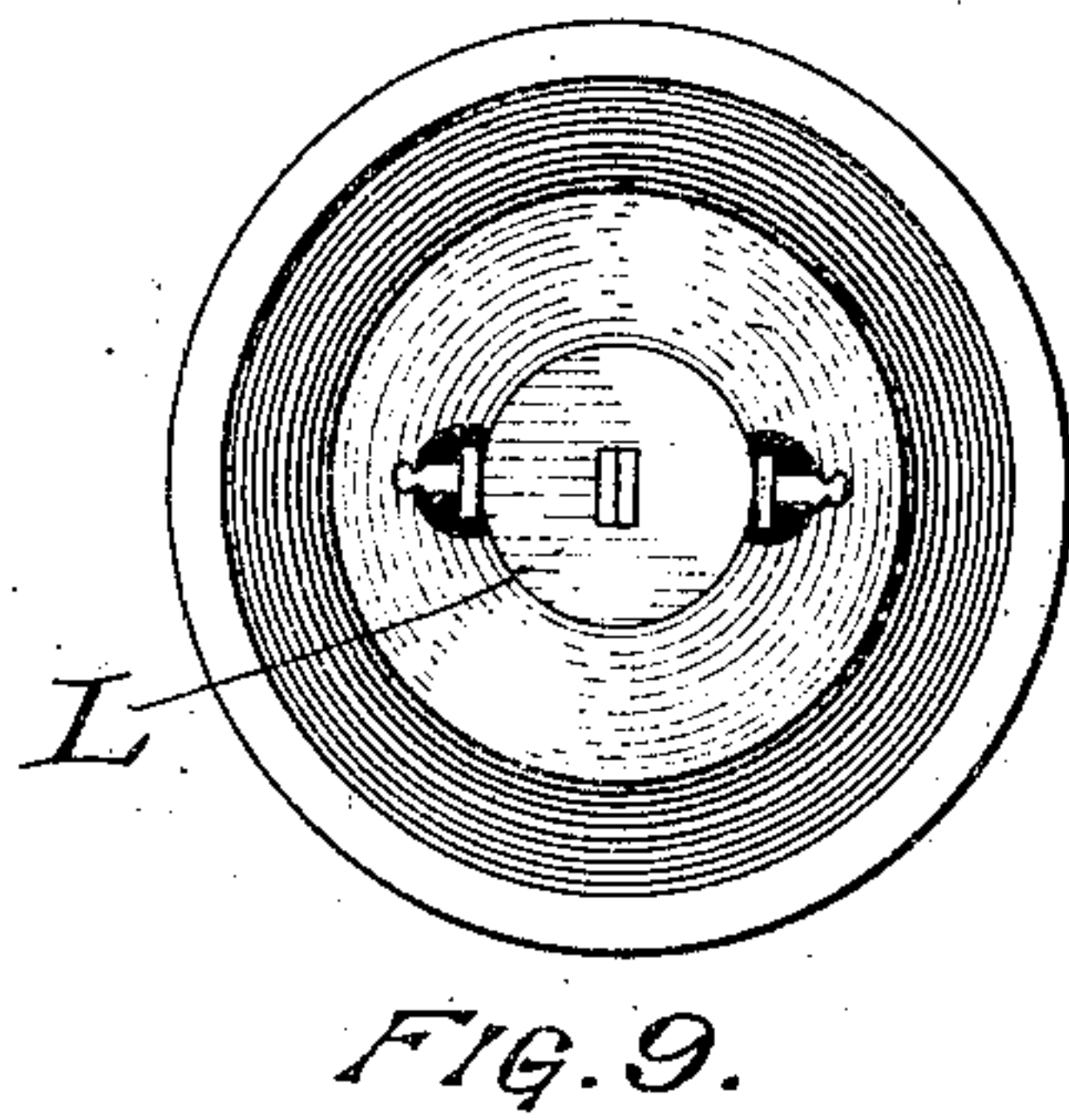
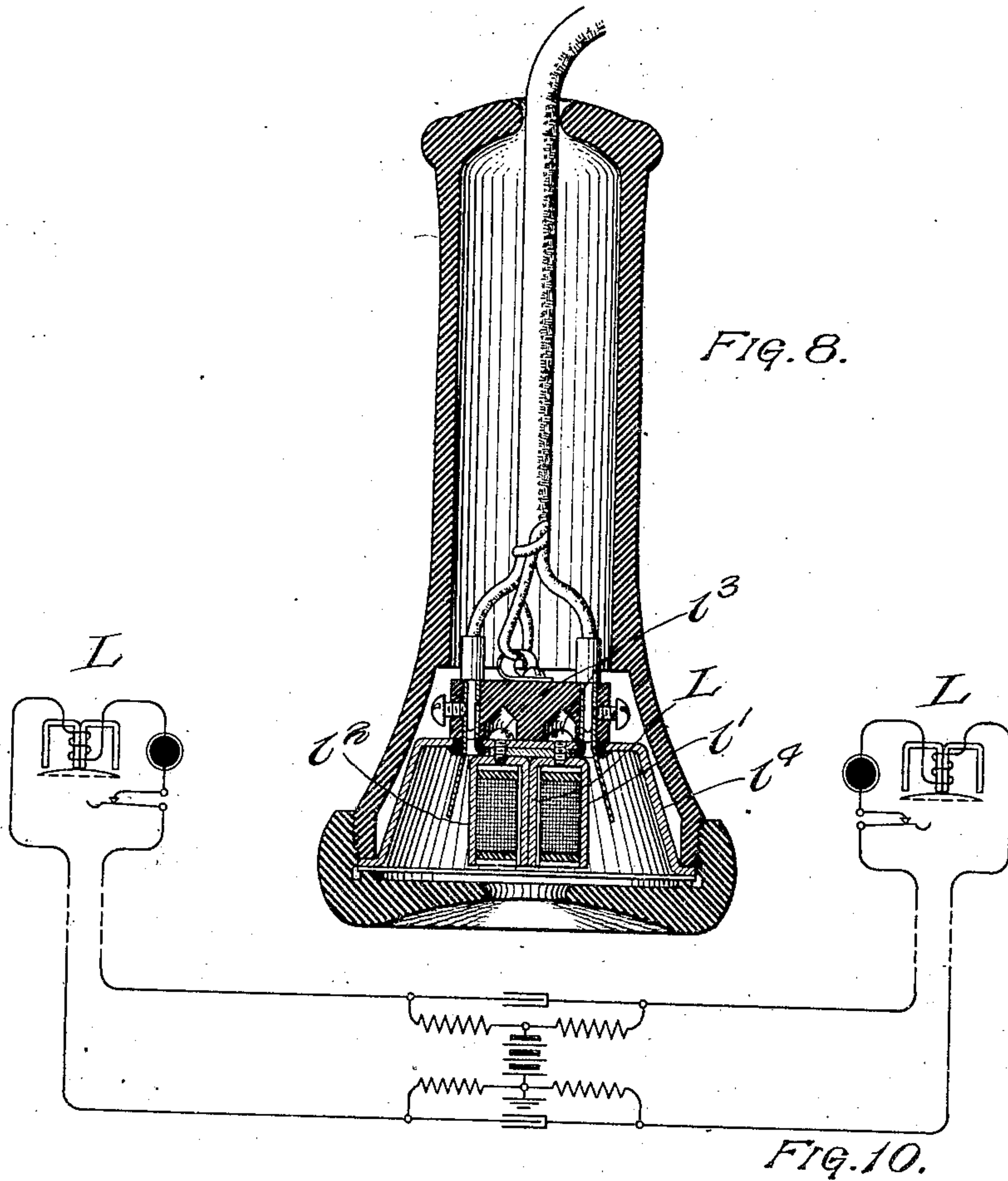
INVENTOR:

INVENTOR:
John Erickson
By Buckley, Howard & Dwyer
ATTORNEYS,

J. ERICKSON.
 TELEPHONE SYSTEM RECEIVER.
 APPLICATION FILED MAR. 1, 1910.

1,118,926.

Patented Dec. 1, 1914.
 3 SHEETS—SHEET 3.



WITNESSES
 A. Andersen.
 A. J. Ray

INVENTOR:
 John Erickson
 By Bulkeley Howard & Dring
 ATTORNEYS,

UNITED STATES PATENT OFFICE.

JOHN ERICKSON, OF CHICAGO, ILLINOIS, ASSIGNOR TO AUTOMATIC ELECTRIC COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

TELEPHONE-SYSTEM RECEIVER.

1,118,926.

Specification of Letters Patent.

Patented Dec. 1, 1914.

Application filed March 1, 1910. Serial No. 546,614.

To all whom it may concern:

Be it known that I, JOHN ERICKSON, a citizen of the United States of America, and resident of Chicago, Cook county, Illinois, have invented a certain new and useful Improvement in Telephone-System Receivers, of which the following is a specification.

My invention relates to telephone receivers of the kind in which electromagnets are employed.

Prior to my invention the cores of the electromagnets of telephone receivers had been made of solid iron, with the result that eddy currents would develop therein, causing some loss of efficiency.

My invention contemplates, therefore, a telephone receiver in which the electromagnet thereof has a laminated core, which core may consist of a plurality of flat plates laid together, or a plurality of wires held together in the form of a bundle, said plates or wires being preferably of soft iron.

These plates or wires may be suitably insulated from each other if desired, or the superficial oxidation of the iron which invariably takes place may be depended upon to furnish the resistance necessary to break up the eddy currents, as will hereinafter more fully appear.

For the broader purposes of my invention the receiver may be of any suitable, known or approved character. I find, however, that my improvement, which consists in using laminated cores for the electromagnets of telephone receivers, is especially beneficial for that form of receiver in which the coil or coils thereof are connected in series with the line, and in which battery current is supplied over the line circuit to the coil or coils of the receiver, whereby no permanent or polarizing magnet is necessary.

To the foregoing and other useful ends my invention consists in matters hereinafter set forth and claimed.

In the accompanying drawings Figure 1 is a longitudinal section of a receiver embodying the principles of my invention. Fig. 2 is an end elevation or face view of the receiver shown in Fig. 1, with the diaphragm thereof removed. Fig. 3 is a detail view of the mounting or connection-fitting by which the circuit conductors are connected with the coils of the receiver. Fig. 4 is a diagram of a telephone circuit illustrating the manner in which my improved

receiver may be connected in the line in series with the transmitter in a common battery system. Figs. 5 and 8 are longitudinal sections of receivers embodying additional features of my invention. Figs. 6 and 9 are end elevations of the receivers shown in Figs. 5 and 8, respectively, with the cap and diaphragm removed. Figs. 7 and 10 are diagrams of telephone circuits illustrating the manner in which the receivers shown in Figs. 5 and 8, respectively, may be connected in the line in series with the transmitter in a common battery system.

As illustrated in Figs. 1 and 2, my receiver comprises the usual casing A and the screw-threaded cap or centrally-apertured cover B. In the lower or enlarged end of the casing A is secured a flanged cup C preferably composed of brass or some other non-magnetic material. The flange c' of the cup C is adapted to extend over the end of the wall of the casing A, and the cup C and diaphragm D are clamped in place thereon by the cap B. Inside the cup C there is secured an electromagnet E comprising a coil of wire e' and a core e^2 . The core e^2 is U-shaped and is composed of a number of small iron wires. The ends of the core are clamped between two bars f' and f^2 which are composed of brass or other non-magnetic material. The ends of the bars f' and f^2 are secured to the walls of the cup C by means of screws f^3 to hold the electromagnet E in position with the ends of the cores a slight distance back of the diaphragm. The poles of the electromagnet E are thus secured diametrically opposite each other and equidistant from the center of the diaphragm D.

To the back of the cup C there is secured a block of insulation G which is held in place by the screws g' and g^2 . Two hollow binding posts g^3 and g^4 are inserted through openings in the block G and are provided with projecting portions g^5 and g^6 (Fig. 2) which project through openings in the back of the cup C and to which the terminals of the coil e' are connected. The binding posts g^3 and g^4 provide means by which the receiver cord g^7 may be connected with the coil of the electromagnet E. The terminal plugs g^8 and g^9 of the receiver cord are clamped in the binding posts g^3 and g^4 by the screws g^{10} and g^{11} . To the terminal block G there is also secured a hook or ring g^{12} . The receiver cord g^7 is attached to the

hook g^{12} by the cord g^{13} , whereby the weight of the receiver may be sustained by said cord g^{13} and not by the terminal plugs g^8 and g^9 .

Referring to Fig. 4 it will be seen that the receivers are here shown diagrammatically and that the electromagnets E are connected in series with the transmitters in a common battery system. As shown, the current from the central battery I is supplied over the line circuit and passes to the transmitters and receivers at the substations, whereby as soon as the line circuit is closed the diaphragms of the receivers are placed under a stress or tension as a result of the energizing of the electromagnets of the said receiver. In this way no permanent magnets are necessary for the receivers, as both the battery and voice-currents traverse the windings by which the diaphragms of the receivers are actuated. Since the core is composed of a number of wires the injurious effects of eddy currents which are present in solid cores are greatly reduced.

The receiver shown in Figs. 5 and 6 is similar to that shown in Figs. 1 and 2 with the exception of the electromagnet J. The core of the electromagnet J is composed of a number of iron wires and is W-shaped. All of the wires extend through the center of the coil j' to form a central pole j^2 , while half of the wires are bent up on either side of the coil to form two other poles j^3 and j^4 . The electromagnet j thus has three poles, the cross-section of the central one (j^2) being equal to the sum of the cross-section of the two outer poles j^3 and j^4 . The electromagnet is held in position by the cross bars j^5 and j^6 which are attached to the walls of the cup K by means of screws. In the form of the receiver shown in Figs. 8 and 9 the core of the electromagnet L is formed of two flat strips of iron bent into U-shape. One limb of each of the U's extends through the center of the coil, while the other limbs extend up on the outside of the coil on opposite sides of the center. With this arrangement an electromagnet is obtained which has three poles, the center one of which has double the cross-section of either one of the outer poles and is split or divided into two parts. The electromagnet L is held in position by two screws l^3 which pass through the back of the cup l^4 into the cores l^1 and l^2 .

From the foregoing it will be seen that my invention, broadly considered, is a telephone receiver provided with an electromagnet having a laminated core or pole-piece. More specifically considered my invention is in the nature of a telephone receiver in which no permanent magnet is em-

ployed, and in which the core of the magnet that receives the battery current is laminated in any suitable manner, as by using either plates or wires, in the manner previously explained. As shown in the drawings, the different parts of the laminated core are not insulated from each other by any special or artificial insulation. This may be done if desired, but I find that for all practical purposes the superficial oxidation of the soft iron may be depended upon to interrupt or break up the eddy currents, and that sufficient resistance or insulation may be obtained in this manner. This is particularly true when the laminated core is composed of a bundle of wires, as in such case the surface of each wire becomes oxidized and the resistance between the wires becomes amply sufficient to destroy, or at least materially reduce, the eddy currents which result from the passage of voice-currents through the winding of the magnet.

What I claim as my invention is:—

1. A telephone receiver comprising a diaphragm, and an electromagnet core, said core comprising a pair of U-shaped members, each member composed of a bundle of soft iron wires having their central arms joined together and located adjacent to but out of contact with the middle of said diaphragm, the opposite arms of said members terminating adjacent to said diaphragm equidistant from and on opposite sides of the center, a non-magnetic cup within which said electromagnet core is mounted, and clamping members for securing the ends of said core to said cup.

2. A telephone receiver comprising a diaphragm, an electromagnet core comprising a pair of adjacent U-shaped members, each composed of a bundle of soft iron wires, the ends of said members being adjacent to but out of contact with said diaphragm, a cup inclosing said core, and a pair of non-magnetic bars clamping the ends of said core to each cup.

3. A telephone receiver comprising a diaphragm, an electromagnet core composed of U-shaped laminations, the ends of said core being adjacent to but out of contact with said diaphragm, a cup inclosing said core, and clamping members for securing the ends of said core to said cup.

Signed by me at Chicago, Cook county, Illinois, this 10th day of Feb., 1910.

JOHN ERICKSON.

Witnesses:

EDWARD D. FALES,
ARTHUR J. RAY.