(No Model.)

S. D. McKELVEY.

MAGNETO TELEPHONE.

No. 517,764. Patented Apr. 3, 1894.

Fig. 1.

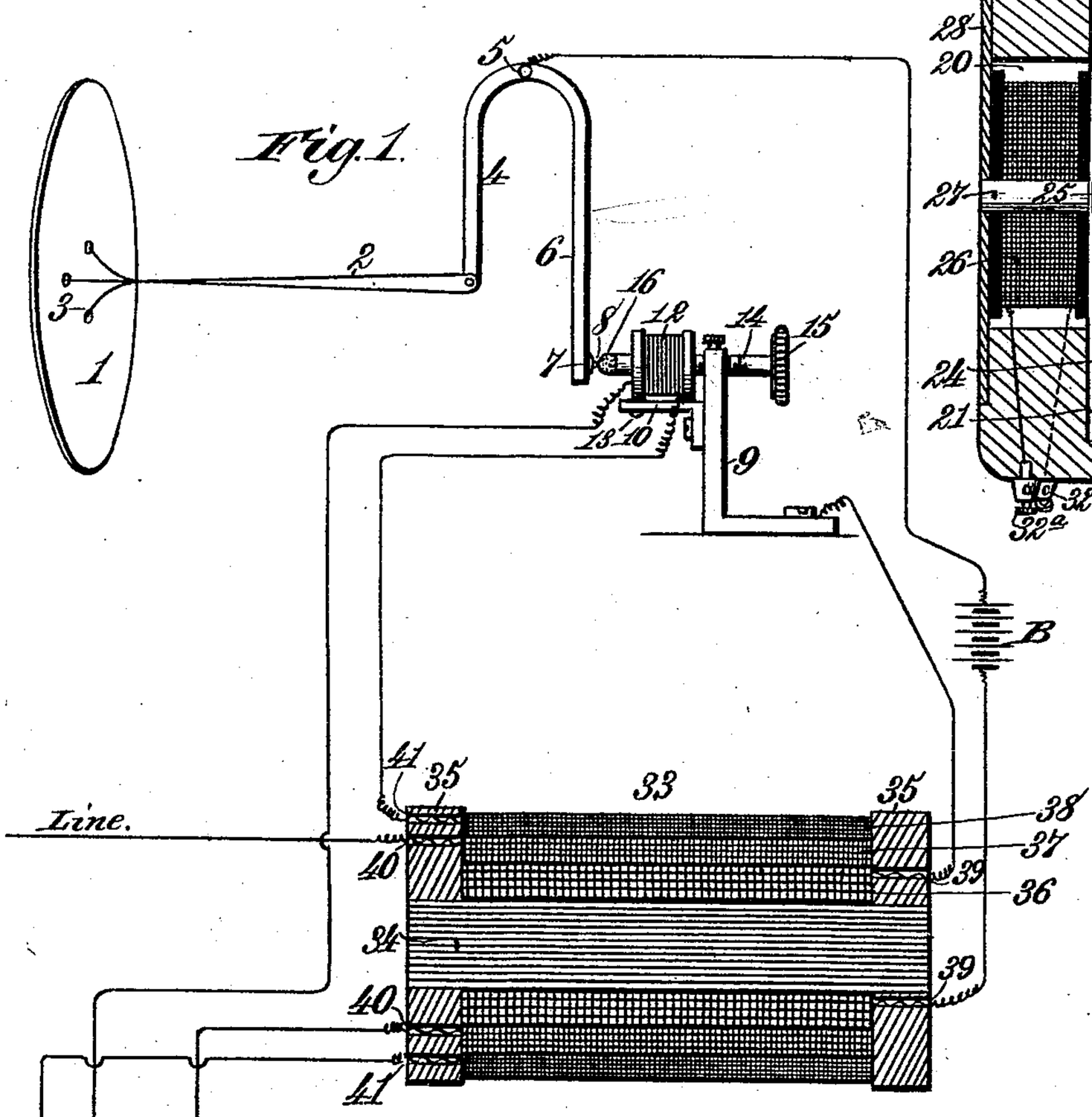


Fig. 2.

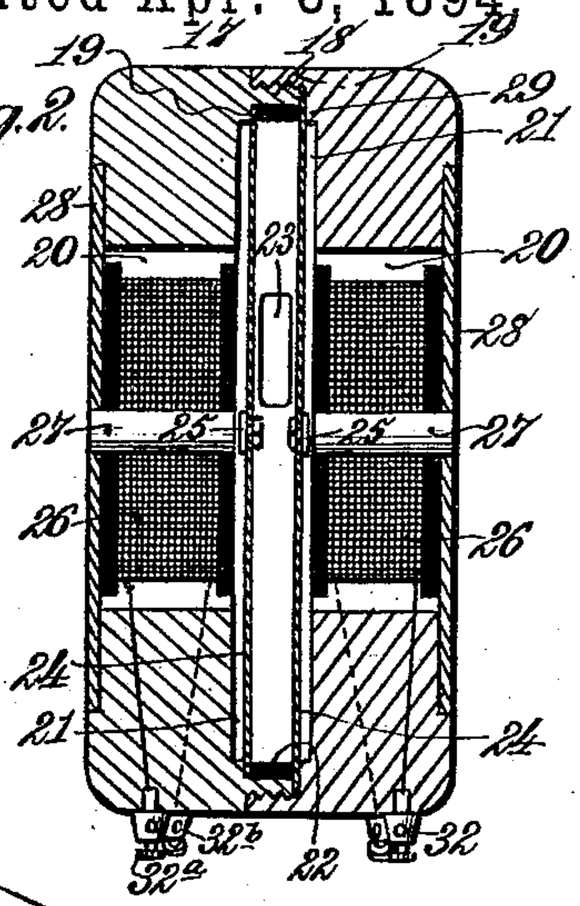


Fig. 3.

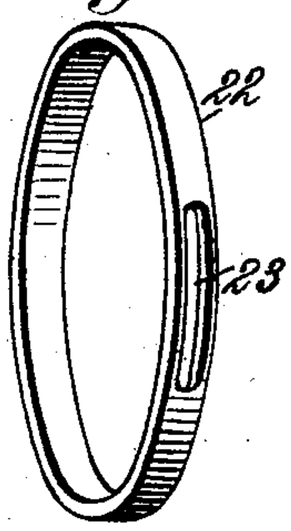


Fig. 4.

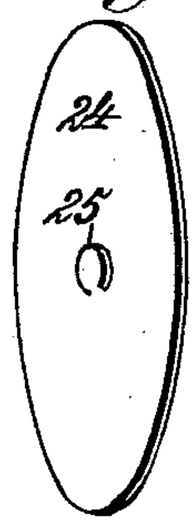
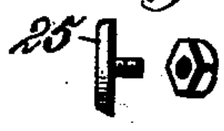


Fig. 5.



Witnesses.
Robt Everett.
Thos. A. Green

Inventor.
Stewart D. McKelvey.
By James L. Norris.
Atty.

THE NATIONAL LITHOGRAPHING COMPANY,
WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

STEWART D. McKELVEY, OF CANTON, OHIO.

MAGNETO-TELEPHONE.

SPECIFICATION forming part of Letters Patent No. 517,764, dated April 3, 1894.

Application filed December 6, 1893. Serial No. 492,949. (No model.)

To all whom it may concern:

Be it known that I, STEWART D. McKELVEY, a citizen of the United States, residing at Canton, in the county of Stark and State of Ohio, have invented new and useful Improvements in Electrical Telephones, of which the following is a specification.

It is the purpose of my invention, to provide an electrical telephone which shall have means whereby the vibratory movements of the transmitting diaphragm shall be amplified and a positive make and break contact insured, in transmitting the impulses over the line wire.

It is my further purpose to combine with a telephone a novel form of receiver, the parts of which are capable of being assembled within a materially diminished space, and to provide said receiver with a diaphragm, or diaphragms, of novel, non-conducting material, and to combine with the latter magnetic buttons, of a suitable metal, and to arrange said parts in a receiver in a novel and simple manner, whereby the diaphragms shall have free vibration in opposite directions.

It is a further purpose of my invention to provide a telephone with an induction-coil having primary, secondary, and tertiary coils, connected with the line and with the receiver in the manner described hereinafter, and to simplify and improve the construction and operation of the telephonic apparatus shown, described and claimed in an application for Letters-Patent filed by me upon the 12th day of September, 1893, Serial No. 485,430.

My invention consists, to the ends mentioned, in the several novel features of construction and new combinations and arrangements of parts hereinafter fully explained and then particularly pointed out and defined in the claims.

To enable others skilled in the art to which my said invention pertains to fully understand and to make, construct, and use the same, I will now describe said invention in detail, reference being made for this purpose to the accompanying drawings, in which—

Figure 1, is a view showing the essential parts of a telephone constructed in accordance with my invention, and comprising a diagram of the circuits. Fig. 2, is a central section of the receiver, in the axial line of its magnetic cores. Fig. 3, is a detail perspective of the annulus which incloses the acoustic chamber of the receiver. Fig. 4, is a detail perspective showing one of the diaphragms illustrated in Fig. 2, removed from the receiver. Fig. 5, is a detail view showing one manner of combining the non-metallic diaphragm and its central magnetic button.

In the said drawings the reference-numeral 1 indicates the diaphragm of the transmitter, which may be made of glass, wood, slate, vulcanized fiber, or rubber, or any other suitable material. Said diaphragm is properly mounted in a transmitter-box, of any preferred construction, not shown in the drawings, as its form is well known. In rear of said diaphragm is an arm 2, preferably tapered, or reduced in diameter as it approaches the center of the diaphragm 1, at a little distance from the rearward face of which its extremity is divided to form a plurality of diverging points 3, which are attached to the diaphragm at varying distances from its center, in, or between, different nodal circles. At its rearward end the arm 2 is pivotally connected to one member 4 of an amplifying device, which is yoke-shaped, or formed to resemble an inverted U, having both its parallel members lying in the same vertical plane with the arm 2, the one to which said arm is pivotally connected being, preferably, somewhat shorter than the other. The amplifying device is supported by a pivot-pin 5, passing through the center of the curved portion which connects the parallel dependent members 4 and 6. Upon the lower end of the latter member is mounted a button, or contact 7, formed of either soft iron, or steel, in which is set a platinum contact-point 8.

The amplifying device may be formed of any suitable material, but I prefer to employ for the purpose aluminium, or a suitable alloy thereof.

In rear of the member 6 is arranged an L-shaped bracket 9, formed of conducting material and provided with a horizontal support 10, mounted upon its vertical arm. Upon this support is arranged a coil of insulated wire 12, secured to the support 10 by small screws 13, passing through said support into the non-conducting ends, or heads of the bob-

bin containing said wire. Tapped through the upper end of the vertical arm of the bracket 9 is a set-screw 14, which enters and passes through the central opening in the bobbin. This screw is made of soft iron and provided with a milled head 15, and upon its projecting extremity is mounted a carbon point 16, which is brought, by adjustment of the set-screw 14, into such position that it will have a light contact with the platinum point, or contact 8, when the transmitting diaphragm 1 is at rest.

The receiver constructed in accordance with my invention consists of a two-part, circular shell, or housing, 17, formed of any suitable material, such, for example, as hard rubber. The two parts are united by means of a threaded collar 18, on one part, which engages with a threaded flange 19, on the other part. Within each part is formed a substantially central chamber, or space 20 which opens into a central, circular chamber 21, lying between and partly in each of the two portions composing the casing, or housing. This chamber 21, which is of greater diameter than the chambers 20, and of somewhat less diameter than the casing, contains an annulus 22, formed of hard rubber, or other suitable, inelastic material. Its size is such as to enable it to fit snugly within the screw-threaded collar 18, where it forms the circular wall inclosing the acoustic chamber of the receiver, an exit being provided by forming in said annulus an aperture 23, shown most clearly in Fig. 3. Against the opposite edges of the annulus are laid diaphragms 24, formed of thin glass, gold-beaters' skin, silk, cat-gut, or other animal membrane, or any similar, suitable material, aside from iron, or steel. At, or near, the center of each diaphragm is attached a magnetic button 25, of steel, or soft iron, projecting slightly from the outer face of each diaphragm. Within the circular chambers, or spaces 20, are arranged bobbins, or spools of wire 26, which are mounted upon cores 27 carried by steel plates 28, both of which are permanently magnetized. Said plates are circular and are set in shallow, countersunk recesses in the exterior faces of the parts of the housing, said recesses being substantially concentric with the chambers 20, containing the spools of wire 26. The steel cores 27 are centrally mounted upon the plates 28 and project inward, or toward each other, their extremities being close to, but not in actual contact with, the iron, or steel buttons 25, on the diaphragms. The edges of the latter are clamped between the opposite edges of the annulus 22 and circular shoulders 29, lying at the base of the collar 18 and of the flange 19, as seen in Fig. 2. The exit aperture 23, of the annulus coincides with a suitable opening in the periphery of the casing, or housing, the latter being preferably provided with an ear-piece 30, communicating with the opening in the casing. The steel-plates, or disks 28, are secured in place by small screws 31, tapped in the parts of the casing. The terminals of the wires wound upon the steel cores 27 are connected to binding-posts 32, upon the exterior of the casing.

The reference-numeral 33 indicates an induction-coil, composed of a core 34, formed of soft iron wires, of small diameter, provided at the ends with heads 35, of non-conducting material. Upon the core 34, but insulated therefrom, is wound the primary coil 36, of wire of comparatively large diameter. Upon the primary coil, but insulated from it, is wound the secondary coil 37, of wire finer than the primary, and upon the secondary coil, in like manner, is wound a tertiary coil 38, of still finer wire, wound in a direction opposite to that of the secondary. The two terminals of the primary coil are led out through openings 39, in one of the heads 35, and one of said terminals is connected to one pole of the battery B, and the other terminal to the bracket 9. The terminals of the secondary coil are led through openings 40, in the other head 35, and connected, respectively, to the line-wire, and to one of the binding-posts 32, on the receiver. From the opposite binding-post 32, on the receiver, a wire 12^a is connected to earth, or to the metallic circuit. One terminal of the wire 12 is connected to a binding-post 32^a, on the side of the casing opposite that carrying the post to which the secondary is connected. The terminals of the tertiary coil are carried through openings 41, in the head 35 and one is connected to a binding-post 32^b, on one side of the casing of the receiver, and the other to one terminal of the wire 12.

The vibrations of the diaphragm 1 communicate longitudinal movement to the arm 3, which, in turn, transmits vibratory movement to the amplifying device, thereby producing a succession of make-and-break contacts between the platinum contact point 8 and the carbon point 16. The set-screw 14, being successively magnetized thereby, by means, of the magnetic impulses flowing from the battery B, over wire 42 which leads to the pivot-pin 5, and thence through the member 6 of the amplifying device, through set-screw 14, bracket 9 and primary coil 36, a current is thereby induced in the secondary of the induction-coil, which, in turn, induces a current in the tertiary coil 38, thereby causing currents of opposite direction to traverse the wires 26, surrounding the steel cores 38, thereby exerting upon the iron, or steel buttons 25 a series of attractions varying in intensity, according to well known laws, and thus reproducing in the diaphragms 24 the vibrations of the transmitting diaphragm 1.

By the construction set forth, in which the induction-coil is provided with a primary, secondary and tertiary coil wound thereon in the initial telephone, the primary circuit sets up an induced current in the secondary coil

and the latter induces a current of slightly diminished force in the tertiary coil. The pulsations induced in the secondary coil pass over the line and through the secondary coil at the receiving station, at which point the secondary coil becomes in one sense, the primary, the tertiary coil bearing the relation thereto of a secondary coil. In other words, the current induced in the secondary coil at the initial station, are transmitted along the line to the secondary of the receiving instrument, and the latter induces a current in the tertiary coil of said station which bears the same relation as the secondary to the primary coil at the initial station.

The amplifying arm 7 can be made of iron, or steel, and when so made the button 8 may be dispensed with. I also consider it desirable, in attaching the magnetic button 25 to the diaphragm 24 to construct said button of soft iron, or steel, with a stud projecting from the center of the same. This stud is threaded and passed through an opening drilled or otherwise formed in the diaphragm 24, a small nut being then screwed upon the end of the stud.

What I claim is—

1. In an electric telephone, the combination with a transmitting diaphragm of an amplifying device, and a rigid arm pivotally connected to said amplifying device at one end and having its other end provided with divergent points which are attached to the transmitting diaphragm in or between different nodal circles, substantially as described.

2. In an electric telephone, the combination with a transmitting diaphragm of a yoke-shaped amplifying device having pivotal support in rear of said diaphragm, and a rigid arm pivotally connected at one end to one member of said device and having its other end divided into a plurality of divergent points which are attached to said diaphragm at varying distances from its center, a carbon-pointed set-screw adjustable toward and from a platinum point upon the other member of the amplifying device, a wire coil on the set-screw, an induction-coil having secondary and tertiary coils, a battery and a receiver, a primary circuit including the pivot of the amplifying device and the primary of the induction-coil, a secondary circuit including the coil on the set-screw and a wire coil in the receiver, and a tertiary circuit including a second coil in the receiver, substantially as described.

3. In a magnetic telephone, a receiver comprising two non-magnetic diaphragms clamped against an interposed ring having a sound-opening, metallic cores having their adjacent ends arranged close to magnetic buttons centrally mounted upon the outer faces of the diaphragms, metallic plates upon which the outer ends of the cores are rigidly mounted, and a chambered casing supporting said plates, substantially as described.

4. In a magnetic-telephone, a receiver comprising two non-magnetic diaphragms clamped upon an interposed ring having a sound-opening, metallic cores rigidly supported at their outer ends and having their inner ends close to magnetic buttons on the outer faces of the diaphragms, wire coils mounted on said cores and an induction coil having a primary connected through the battery to the transmitter, a secondary connected to the line and through one of the wire coils on the receiver to earth, and a tertiary which includes in its circuit the other wire coil in the receiver and a coil in the transmitter, substantially as described.

5. In an electric telephone, the combination with a transmitting diaphragm of an amplifying device, an adjustable core having contact with one arm thereof, a coil upon said core, an induction coil having a primary, secondary and tertiary coil, and a receiver, one terminal of the primary, being connected, through the battery, to the amplifying device and the other terminal to the core having contact with said device, one terminal of the secondary being connected to the line wire and the other terminal to a binding post on the receiver and thence through a coil in said receiver to earth, one terminal of the tertiary coil being connected to one end of the wire coil on the adjustable core and the other terminal to a binding post on the receiver and thence through its coil back to the other end of the wire coil, substantially as described.

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

STEWART D. McKELVEY.

Witnesses:
EDW. SHEETENHELM,
F. B. HENDERSON.