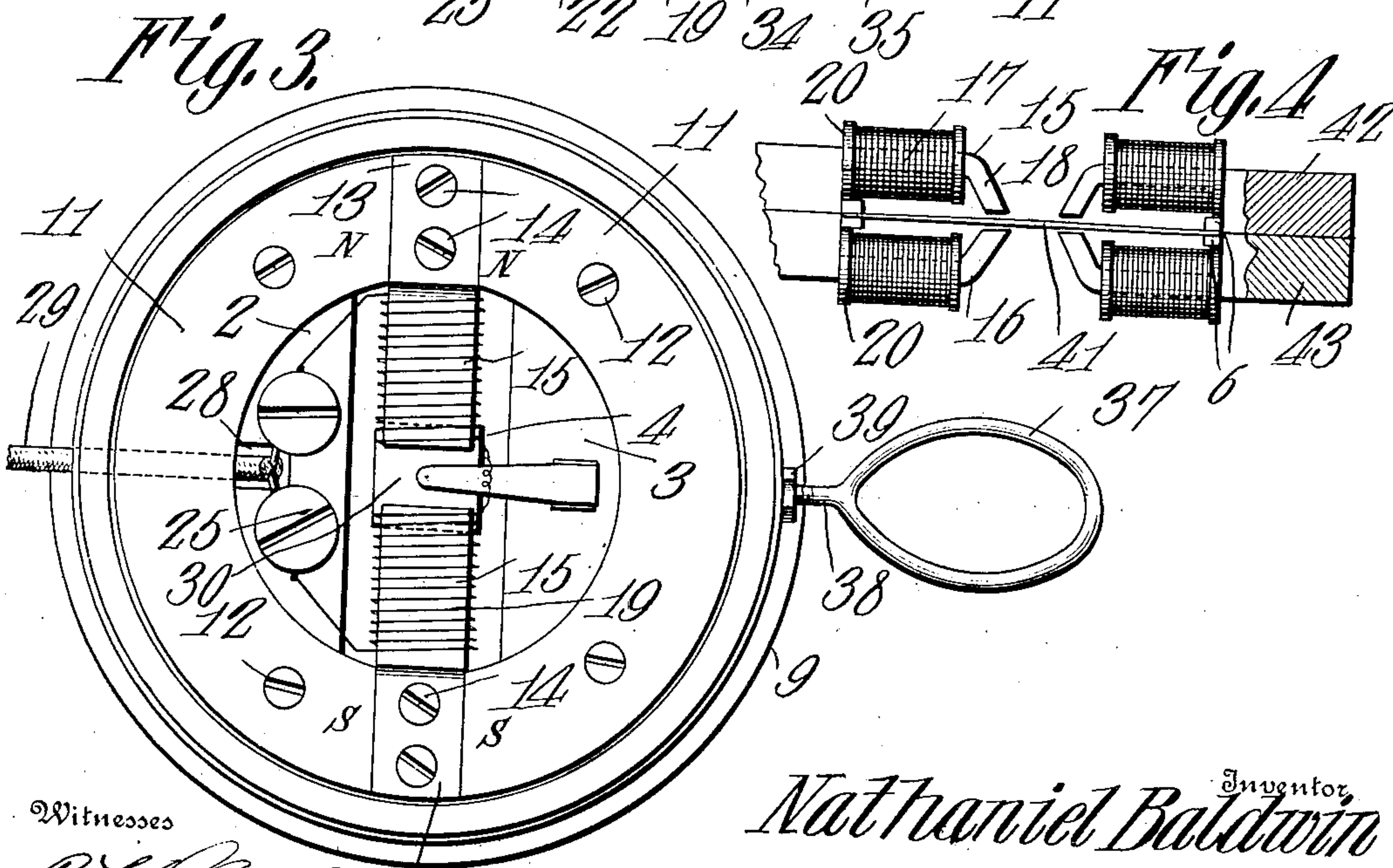
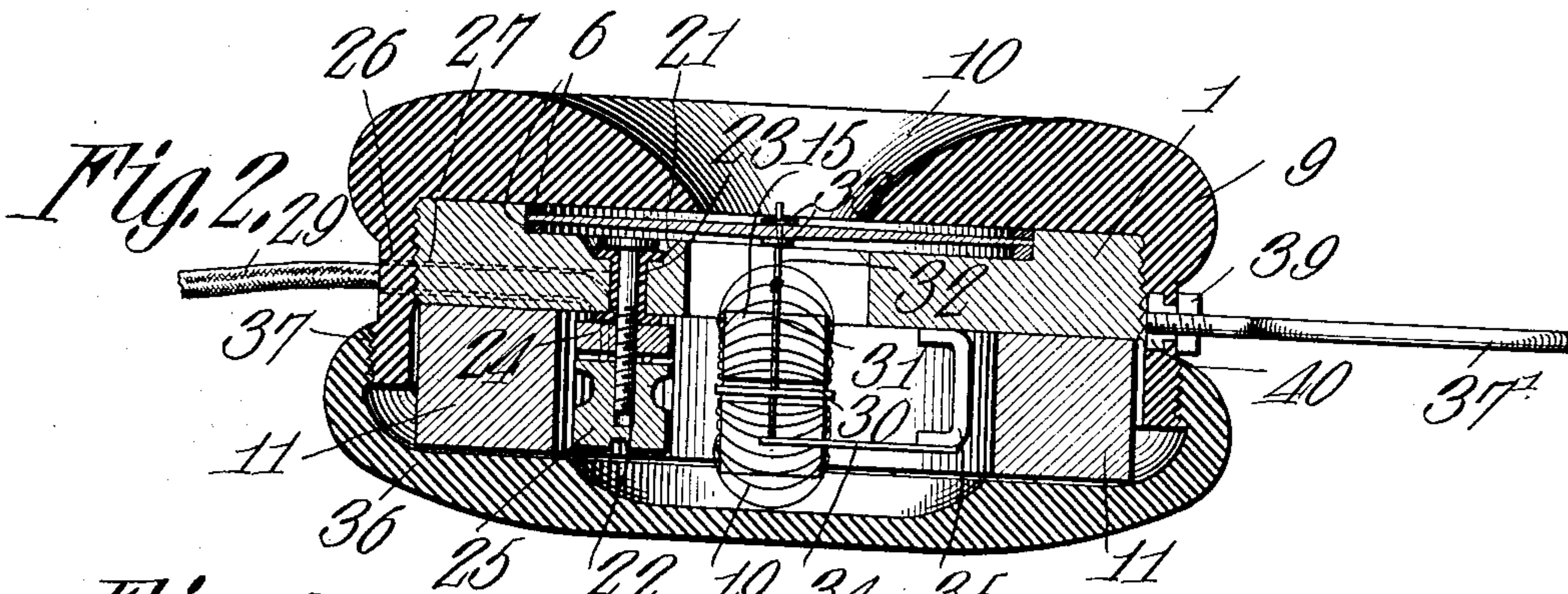
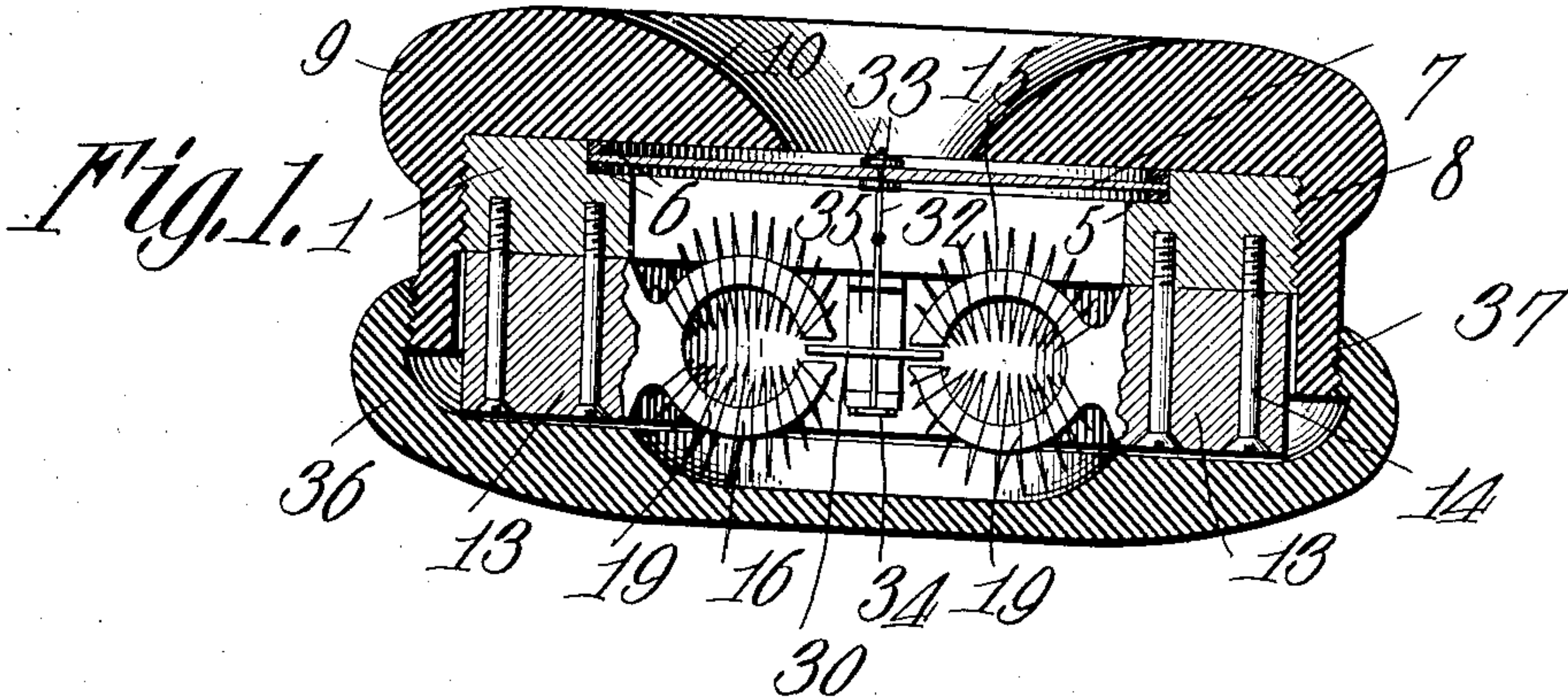


N. BALDWIN.  
TELEPHONE RECEIVER.  
APPLICATION FILED JAN. 29, 1908.

905,781.

Patented Dec. 1, 1908.



Witnesses  
E. J. Stewart  
J. J. Chapman

Inventor  
Nathaniel Baldwin  
By  
C. A. Snow & Co.  
Attorneys



# UNITED STATES PATENT OFFICE.

NATHANIEL BALDWIN, OF HEBER, UTAH, ASSIGNOR OF ONE-HALF TO WILLIAM WITT, OF HEBER, UTAH.

## TELEPHONE-RECEIVER.

No. 905,781.

Specification of Letters Patent.

Patented Dec. 1, 1908.

Application filed January 29, 1908. Serial No. 413,226.

*To all whom it may concern:*

Be it known that I, NATHANIEL BALDWIN, a citizen of the United States, residing at Heber city, in the county of Wasatch and State of Utah, have invented a new and useful Telephone-Receiver, of which the following is a specification.

This invention has reference to improvements in telephone receivers, and its object is to provide a means whereby the magnetic flux in the permanent magnets is not affected by the change of polarity in the alternating currents coming over the line. By this means, since the telephone currents simply divert the greater part of the flux first through one side of the pole pieces and then through the other, considerable loss of energy is avoided from hysteresis and eddy currents in the permanent magnets and in the armature.

In accordance with the present invention each pole of the permanent magnet of the receiver is formed with a soft iron pole piece having two opposing legs each of which carries a suitably wound coil, and the several coils are so wound and connected up that the magnetic effect is produced first on one side of the armature, whether such armature be the diaphragm itself or be connected to the diaphragm, and then upon the other side of the armature.

Since the two legs of each pole piece straddle the armature, the latter is under balanced opposing actions and therefore the diaphragm is under little or no strain. This, together with the fact that the magnets do not necessarily act directly upon the diaphragm, permits the use of a non-magnetic diaphragm such for instance as mica, and, therefore, the diaphragm may be made much lighter and more delicate and sensitive to the impulses coming over the line. Again, to produce the best results, the diaphragm may be made comparatively thick in the center and be progressively thinner toward the edges. Of course the instrument, like any other magneto telephone, may be used as a transmitter, but because of the combined effect of the several pole pieces, the constancy of the flux through the magnets and armature, the elimination to a greater or less extent of hysteresis and eddy currents, the balanced armature and delicate diaphragm, there is a markedly greater part of the energy of the sound waves converted into al-

ternating currents on the line for the purpose of telephonic transmission.

In addition to the above, the invention likewise comprises certain details of the construction which, together with the main parts of the invention, will be best understood by a consideration of the following detailed description taken in connection with the accompanying drawings forming a part of this specification, in which drawings—

Figure 1 is a central section through the telephone receiver. Fig. 2 is a similar section at right angles to that of Fig. 1. Fig. 3 is a bottom plan view of the receiver with a portion of the casing removed, and Fig. 4 is a detail partially diagrammatic view of a modified form.

Referring to the drawings, there is shown a ring 1 of any suitable material, which should be non-magnetic and may be either metal or other material, as desired. This ring may consist of brass or hard rubber or wood or whatever material may be chosen by the manufacturer, except that the material must not be magnetic. This ring 1 is formed with two opposing portions 2—3 so that the interior space of the ring instead of being circular is substantially rectangular, as indicated at 4. One edge of the ring is formed with an annular recess 5 in which is seated two gaskets 6—6 which may be of rubber or other suitable material, confining between them a diaphragm 7 which may be of the ordinary circular type. This diaphragm, however, in the form shown in Figs. 1, 2 and 3, not being under the direct control of the pole pieces of the magnet, need not be of magnetic material but may be made of mica or other non-magnetic material, and for the best results it is found that it is desirable to make the diaphragm thicker at its center than at its edges, and this diaphragm is so indicated in the drawings without, however, confining the invention to the use of such diaphragm. The outer edge of the ring 1 is formed with screw-threads, as indicated at 8 for the reception of a suitable casing 9 having one end partially inclosed by a mouth piece 10 which also serves the purpose of confining the gaskets 6 in their seat in the ring 1 and bringing such pressure to bear upon the gaskets as to firmly clamp the diaphragm in place.

Secured to the under face of the ring 1, that is the face away from the mouth piece



10, are two permanent magnets 11, 11, substantially semi-circular in shape and secured to the ring 1 by screws 12. The like poles of the magnets face each other and are spaced sufficiently to receive between them soft iron pole pieces which in turn may be secured to the ring 1 by screws 14. There should, however, be good magnetic contact between the polar faces of the magnets and the soft iron pole pieces 13. The polar designations of the magnets 11 are indicated by the letters N and S, as usual.

Each soft iron pole piece 13 is extended toward the axis of the magnets, and beyond the inner periphery of the magnets when assembled these pole pieces are formed with two opposing legs 15, 16, shown in Fig. 1 as curved in arcs of a circle with their free ends closely approaching but still sufficiently separated for a purpose which will presently appear. Instead of curving the legs 15 and 16 of the pole pieces, as shown in Fig. 1, these legs may be parallel for a distance, as indicated at 17 in Fig. 4, and then be bent at an angle to form approaching portions 18, as also indicated in Fig. 4.

Each leg 15 and 16 is inclosed in a coil 19 which in the structure shown in Fig. 4 may be wound upon a spool 20. The several coils which in the form shown in the drawings are four in number, are connected up in series and to the line, and in order to provide for connecting the coils to line the portion or ledge 2 of the ring 1 has its upper face recessed, as indicated at 21, to receive the heads of two screws 22 extending through two perforations in the ledge 2 and below the same into the space between the inner faces of the magnets. Each screw 22 is suitably insulated by an insulating sleeve 23 from the ring 1 when the same is of metal, and is held in place by a nut 24 and also beyond the nut receives a binding nut 25 so that the screw 22, with the nut 25, constitutes in fact a binding post.

Extending through the side wall of the casing 9 there is a perforation indicated at 26, and through the ring 1 is a corresponding perforation indicated at 27 matching the perforation 26, and the perforation 27 terminates in a recess 28 formed on the underside of the ledge 2. The perforations 26 and 27 permit the introduction of a flexible cord 29 of the double conductor type, and the terminals of these conductors may be spread out and connected to the respective binding posts in the usual manner. There is thus provided a means whereby all the terminal connections are inclosed in the casing, and there are no exposed electrical connections in the structure.

Between the opposing ends of the legs 15 and 16 of the soft iron pole pieces, there is located an armature 30 which may be in the form of a small rectangular plate, and

through the center of this armature there extends a pin 31 which may be soldered or otherwise secured to the armature so that the two parts are in immovable relation one to the other. The upper end of the pin 31 is connected by a short link 32 extending through the center of the diaphragm and secured thereto by means of washers 33 and drops of solder or otherwise, as may be desired. The pin 31 and link 32 may also be connected by a drop of solder. The pin 31 extends below the armature 30 and is there connected by solder or otherwise to the free end of a leaf spring 34, the other end of which is fast on the lower end of a bracket 35 firmly secured to the under side of the ledge 3 of the ring 1.

The free ends of the legs 15 and 16 of each pole piece 13, being of the same polarity and these pole pieces straddling the armature 30, there is exerted upon the latter a substantially equal magnetic pull on each side, and the armature having been once adjusted so as to be centralized with relation to the free ends of the legs 15 and 16, exerts practically no pull upon the diaphragm and its weight being sustained in greater part by the spring 34, the diaphragm is under practically no strain.

In order that access may be had to the interior of the structure and also that the internal parts of the structure may be protected, there is provided a cap 36 internally threaded to fit over the threaded end 37 of the side wall of the casing 9. The instrument is of suitable size to be readily grasped by the hand of the user and in order that it may be suitably supported when not in use, there is provided a hanger in the form of an eye 37 having a threaded stem 38 passing through the side wall of the casing 9 and confined in place by nuts 39, 40. When the instrument is not in use it is hung pendently from any suitable support by means of the eye 37, and the conducting cord 29 is also then pendent from the casing, and this may be the condition of the cord when the instrument is in use so that the cord is never subjected to bending strains, which may ultimately injure the insulation and even cause the breaking of the cord. Suppose, now, that the instrument is in use and alternating speech currents are coming over the line. The winding is such that with one impulse the legs 15 of the two pole pieces have their magnetism strengthened while the magnetism in the legs 16 of both poles pieces is weakened. The result is that the armature is drawn toward the free ends of the legs 15 and the diaphragm participates in this movement. When the next impulse, say in the opposite direction, is received by the coils, the armature is drawn toward the legs 16 while the legs 15 are weakened, and the telephone diaphragm is moved in the opposite



direction under the pull of the armature. In either case the magnetism of the permanent magnets is not in any way affected but only the legs 15 or 16 of the soft iron pole pieces.

5 By this means hysteresis is almost if not quite entirely eliminated and the production of eddy currents is practically prevented.

The diaphragm forming no part of the magnetic circuit may be made of non-mag-  
10 netic material, and being under no lateral strain may also be made thin and sensitive and so offer but little resistance to the action of the magnetic effects upon the armature.

In Fig. 4, there is shown a further modifica-  
15 tion wherein a diaphragm is itself the armature of the polar extensions 15 and 16, and in this case the diaphragm, which as indicated at 41, is made either of magnetic material wholly or that portion which is within the  
20 magnetic field may be made of magnetic material. The soft iron pole pieces are in this case made of two parts 42 and 43 so that the coils may be readily wound upon the spools 20, and the magnets 11 may also be  
25 made of two parts in order to clamp the gaskets 6 firmly against the diaphragm 41.

While I have described the connections between the armature and pin 31 and between the latter and the diaphragm 7 and  
30 spring 34, as being made by drops of solder, other means may be employed for the same purpose, and the connection between the link 32 and the diaphragm may be made by reducing the size of the pin 32 and passing it  
35 through the two washers 33 and then by upsetting or riveting its free end.

While the pole pieces are shown as semi-circular with the two legs in one piece, it is to be understood that for convenience of wind-  
40 ing and construction they may each be made of two pieces as in Fig. 4, while the parts are shaped as shown in Figs. 1, 2 and 3.

What is claimed is:—

1. A magneto telephone having a perma-  
45 nent magnet, an armature in operative relation thereto, means for causing both poles of the magnet to act on each side of the armature, and means for producing opposite effects in the same pole piece.

50 2. A magneto telephone having a permanent magnet with divided polar extremities, an armature in operative relation to each member of each polar extremity, and means for varying the magnetic effect of the polar  
55 extremities on opposite sides of the armature.

3. In a magneto telephone, a permanent magnet, soft iron pole pieces each provided with opposing legs or extensions, an arma-

ture in operative relation to the legs or exten- 60  
sions, and coils applied to said legs or extensions and coupled for producing opposite effects in the same pole piece.

4. In a magneto telephone, a permanent magnet formed of two parts having like polar 65  
ends adjacent one to another, soft iron pole pieces confined between said adjacent ends of the magnets and extending one toward the other, said pole pieces each terminating in opposing legs or extensions having their ends 70  
in proximity, an armature between the proximate faces of the legs or extensions of the pole pieces, and coils upon said legs or extensions connected for producing opposite effects upon the legs of the same pole pieces. 75

5. A magneto telephone comprising a permanent magnet, soft iron pole pieces having opposing legs or extensions, coils upon said legs or extensions connected for opposing effects upon the legs of the same pole pieces, an 80  
armature in operative relation to the proximate ends of the legs of each pole piece, a diaphragm, and connections between the armature and diaphragm.

6. A magneto telephone comprising a per- 85  
manent magnet, pole pieces therefor, each having legs or extensions with their ends in proximity, coils upon said legs or extensions connected for producing opposing effects upon the legs of the same pole piece, an ar- 90  
mature in operative relation to the proximate ends of the legs or extensions of the pole pieces, a diaphragm, connections between the diaphragm and armature, a spring member, and connections between the latter and 95  
the armature.

7. A magneto telephone comprising a suitable casing, a permanent magnet formed of two members having their like poles in proximity, soft iron pole pieces extending toward 100  
the center of the magnet and each provided with opposing legs or extensions with their free ends in proximity, coils upon said legs or extensions, a diaphragm mounted in the casing and under the influence of the magnetic 105  
effects of the legs or extensions of the pole pieces, binding posts within the casing interior to the magnet, and means for the introduction of a flexible conducting cord through the walls of the casing and to the binding 110  
posts therein.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

NATHANIEL BALDWIN.

Witnesses:

JAMES WITT,

FRED SONDEREGGER.